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Particle Size Determination Test

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	Particle size determination	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	02.08.2022	Performed by:	John Young

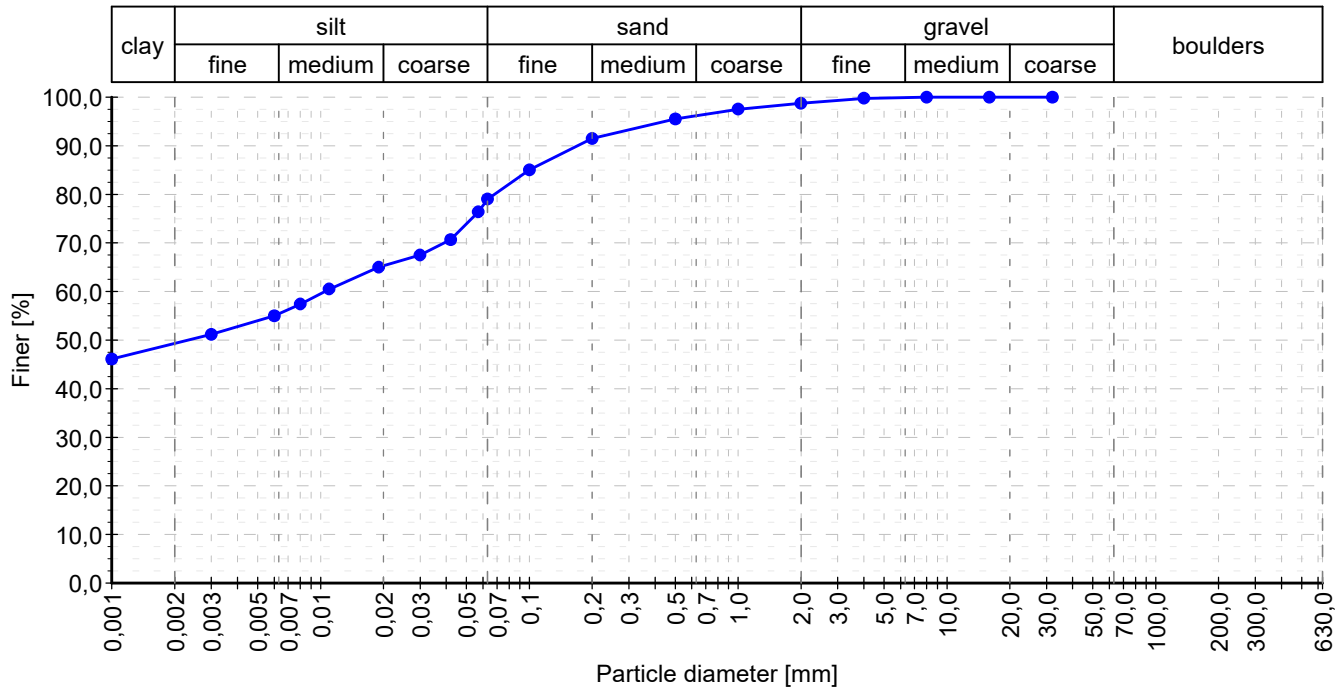
Sample

Field test:	BH5	Sample type:	undisturbed
Sample index:	VA1/1254	Geotechnical type:	GT2
Depth from:	7,00 m	Description:	
Depth to:	7,80 m	Clay with low plasticity, stiff, gray-blue color	

Specimen

Specimen ID:	VA1/1254-1	Depth:	7,40 m

Measured values and results



Fraction content:		Total weight:	50,00 g
Clay:	48,7 %	Weight check:	49,99 g
Silt:	30,4 %	Check limit:	0,3 %
Sand:	19,7 %	Verification:	0,0 %
Gravel:	1,2 %	Result:	Satisfactory
Stones:	0,0 %		

Uniformity coefficient :	Coefficient of curvature :

Soil class: CI (EN ISO 14688-2 (2018))

Notes

Specimen supplied by customer.
Combined test (sieve analysis + hydrometer test).
The sample was prepared and tested in accordance with EN ISO 17892-04.

Verified by: Peter Filmer

Date of issue: 18.08.2022

Stamp and signature

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Atterberg Limits

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID: Consistency	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	Customer: Survey ABC Ltd.
Date of measurement: 17.05.2023	Performed by: John Young

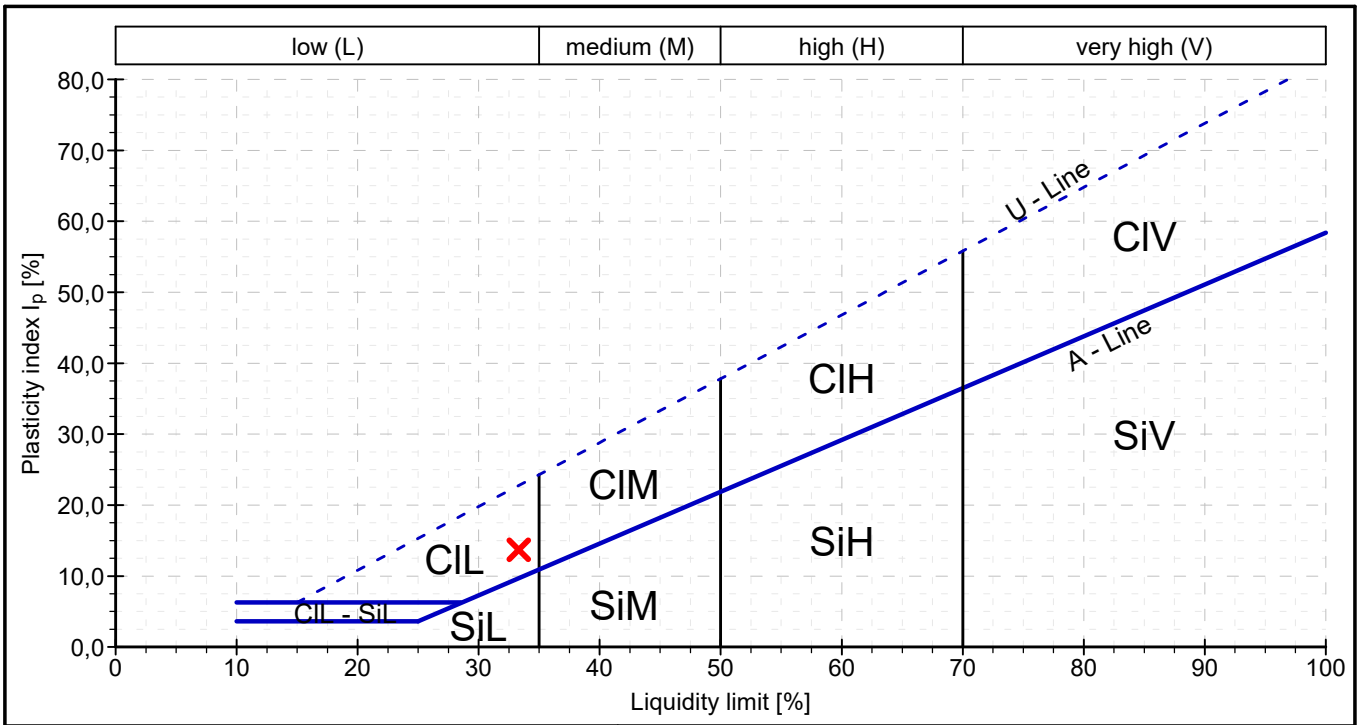
Sample

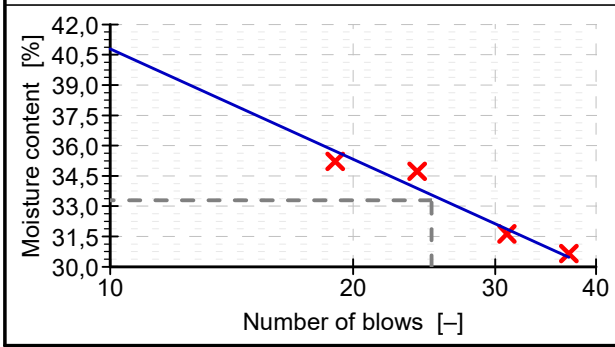
Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

Specimen

Specimen ID: V1A/1254-3	Depth: 7,20 m

Measured values and results





Average moisture content:	**24,6 %**
Liquid limit:	**33,3 %**
Plastic limit:	**19,6 %**
Plasticity index I_p:	**13,7 %**
Liquidity index I_L:	**0,36**
Consistency index I_C:	**0,64**

Consistency: **firm** (EN ISO 14688-2 (2018))

Soil type
ClL

Notes

Specimen supplied by customer.
Test method: Casagrande.
Test performed in accordance with EN ISO 17892-12.

Verified by: Peter Filmer

Date of issue: 22.05.2023

Stamp and signature

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Soil Compaction Test (Proctor modified)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	Compaction	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	12.09.2023	Performed by:	John Young

Sample

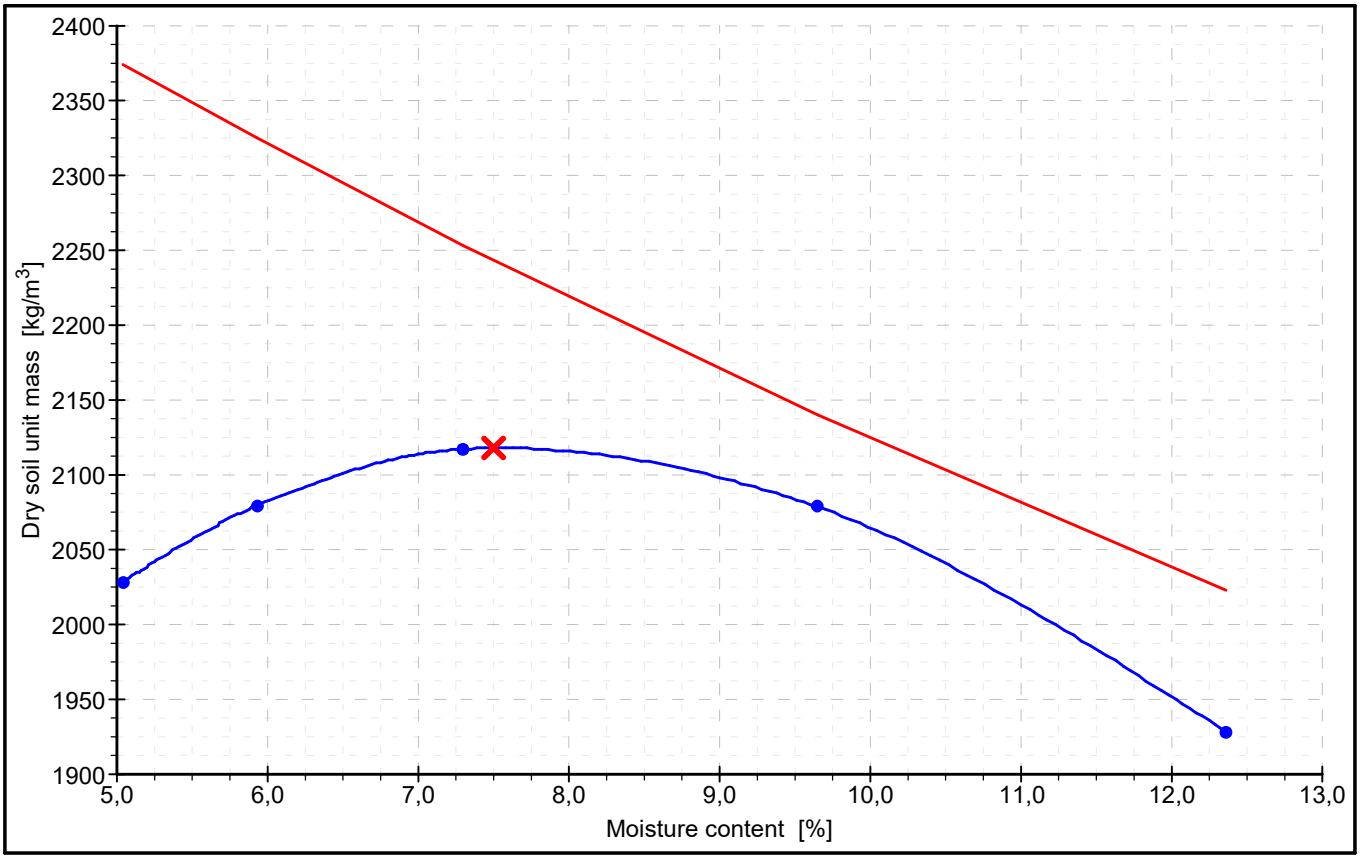
Field test:	BH7	Sample type:	disturbed
Sample index:	VA4/A2	Geotechnical type:	GT3
Depth from:	9,00 m	Description:	
Depth to:	9,90 m	Sandy clay with low plasticity. Grey-brown color.	

Specimen:

Specimen ID:	VA4/A2-4	Particle density:	2697,0 kg/m^3
Depth:	9,30 m		

Measured values and results

Type of test:	modified	Hammer type:	B
		Mold type:	B



Calculated max. dry soil unit mass:	2118 kg/m^3
Calculated optimal moisture content:	7,5 %

Notes

The test was carried out on a specimen supplied by the customer.
Specimen prepared and tested in accordance with EN 13286-2 (6.4).
Particle density determined by measurement according to EN ISO 17892-03.

Verified by: Peter Filmer

Date of issue: 15.09.2023

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California Bearing Ratio (CBR)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	CBR	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	07.09.2022	Performed by:	John Young

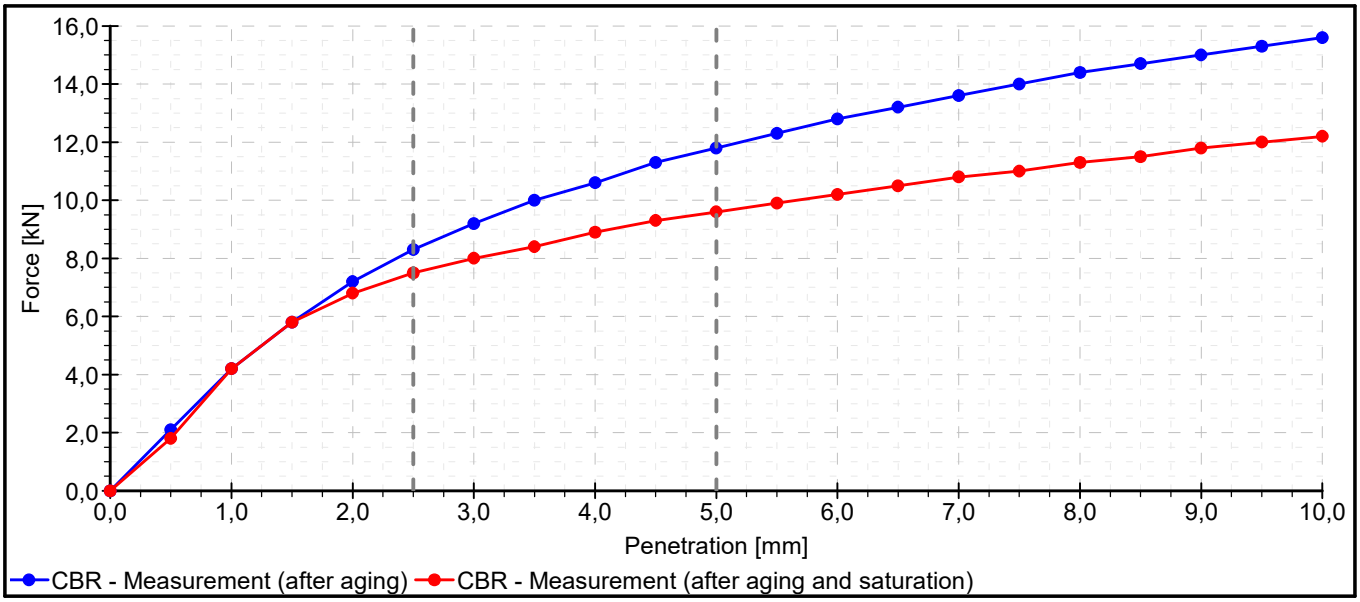
Sample

Field test:	BH4	Sample type:	disturbed
Sample index:	PV2/B4	Geotechnical type:	GT4
Depth from:	10,20 m	Description:	
Depth to:	10,80 m	Well-grained sand. Yellow-brown color. Aged.	

Specimen

Specimen ID:	PV2/B4-5	Aditive:	2% Dorosol 50
Depth:	10,60 m	Aging conditions:	stored in an impermeable package
Height:	120,12 mm	Specimen aging time:	3 day
Diameter:	150,65 mm	Saturation time:	96 hour
Initial state		**State after saturation**	
Moisture content:	12,9 %	Moisture content:	15,5 %
Wet unit weight:	2053,0 kg/m^3	Wet unit weight:	2101,0 kg/m^3
Dry unit mass:	1819,0 kg/m^3	Dry unit mass:	1819,0 kg/m^3
Saturation:	72,0 %	Saturation:	86,0 %

Measured values and results



State after aging		State after saturation	
$CBR_{2,5mm}$:	62,9 %	$CBR_{2,5mm}$:	56,8 %
CBR_{5mm}:	59,0 %	CBR_{5mm}:	48,0 %
CBR:	62,9 %	CBR:	56,8 %

Notes

Specimen preparation: specimen compacted with 100% PS energy after addition of additive. Compaction of the specimen according to EN 13286-2.
Particle density = 2700 kg/m3 (estimate).
Swelling considered relative to the original height of the specimen. Test performed in accordance with EN 13286-47.

Verified by: Peter Filmer | **Date of issue:** 16.09.2022

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Permeability Test

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	Permeability constant head	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	04.05.2023	Performed by:	John Young

Sample

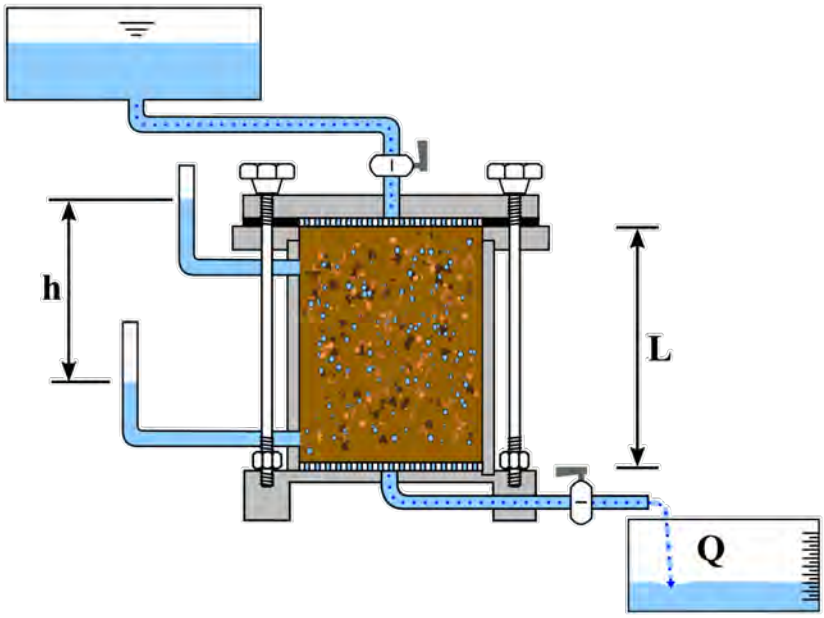
Field test:	BH7	Sample type:	disturbed
Sample index:	VA4/A2	Geotechnical type:	GT3
Depth from:	9,00 m	Description:	
Depth to:	9,90 m	Sandy clay with low plasticity. Grey-brown color.	

Specimen

Specimen ID:	VA4/A2-2	Depth:	7,15 m
Specimen length:	75,00 mm	Moisture content:	22,52 %
Specimen diameter:	75,00 mm	Unit weight:	1852,5 kg/m^3
Specimen area:	4417,86 mm^2	Dry unit mass:	1512,0 kg/m^3

Measured values

Type of test: Constant head



Measurement Nr.	Permeability [m/s]
1A	4,38E-04
2A	4,78E-04
1B	4,32E-04
2B	4,63E-04

Results

Average permeability: 4,53E-04 m/s

Notes

Specimen supplied by customer.
Test performed in accordance with EN ISO 17892-11.

Verified by: Peter Filmer

Date of issue: 17.05.2023

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Permeability Test

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	Permeability falling head	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	04.05.2023	Performed by:	John Young

Sample

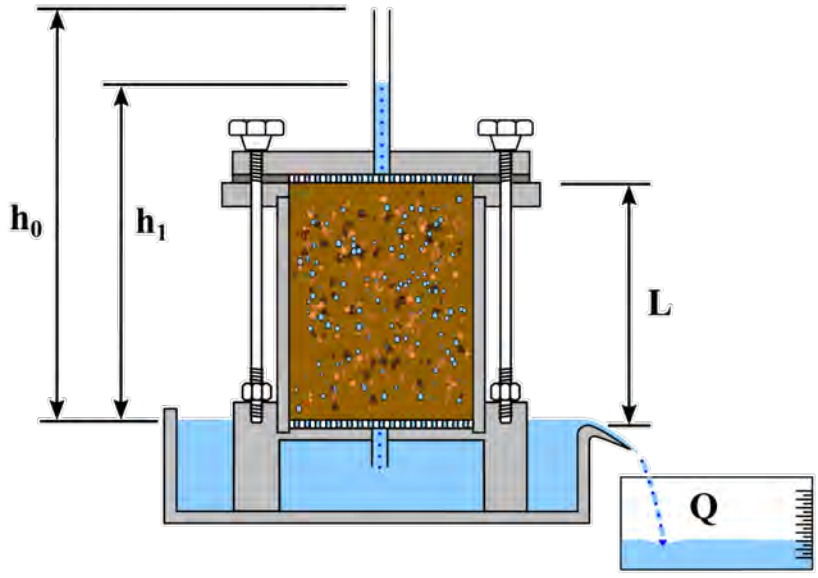
Field test:	BH5	Sample type:	undisturbed
Sample index:	VA1/1254	Geotechnical type:	GT2
Depth from:	7,00 m	Description:	
Depth to:	7,80 m	Clay with low plasticity, stiff, gray-blue color	

Specimen

Specimen ID:	VA1/1254-6	Depth:	7,60 m
Specimen length:	115,00 mm	Moisture content:	24,70 %
Specimen diameter:	100,00 mm	Unit weight:	1817,0 kg/m^3
Specimen area:	7853,98 mm^2	Dry unit mass:	1457,0 kg/m^3

Measured values

Type of test: Falling head



Measurement Nr.	Permeability [m/s]
1A	2,28E-06
1B	1,37E-06
1C	1,08E-06

Results

Average permeability: 1,58E-06 m/s

Notes

Specimen supplied by customer.
Test performed in accordance with EN ISO 17892-11.

Verified by: Peter Filmer

Date of issue: 17.05.2023

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Oedometer Test

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	Oedometer	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	04.04.2023	Performed by:	John Young

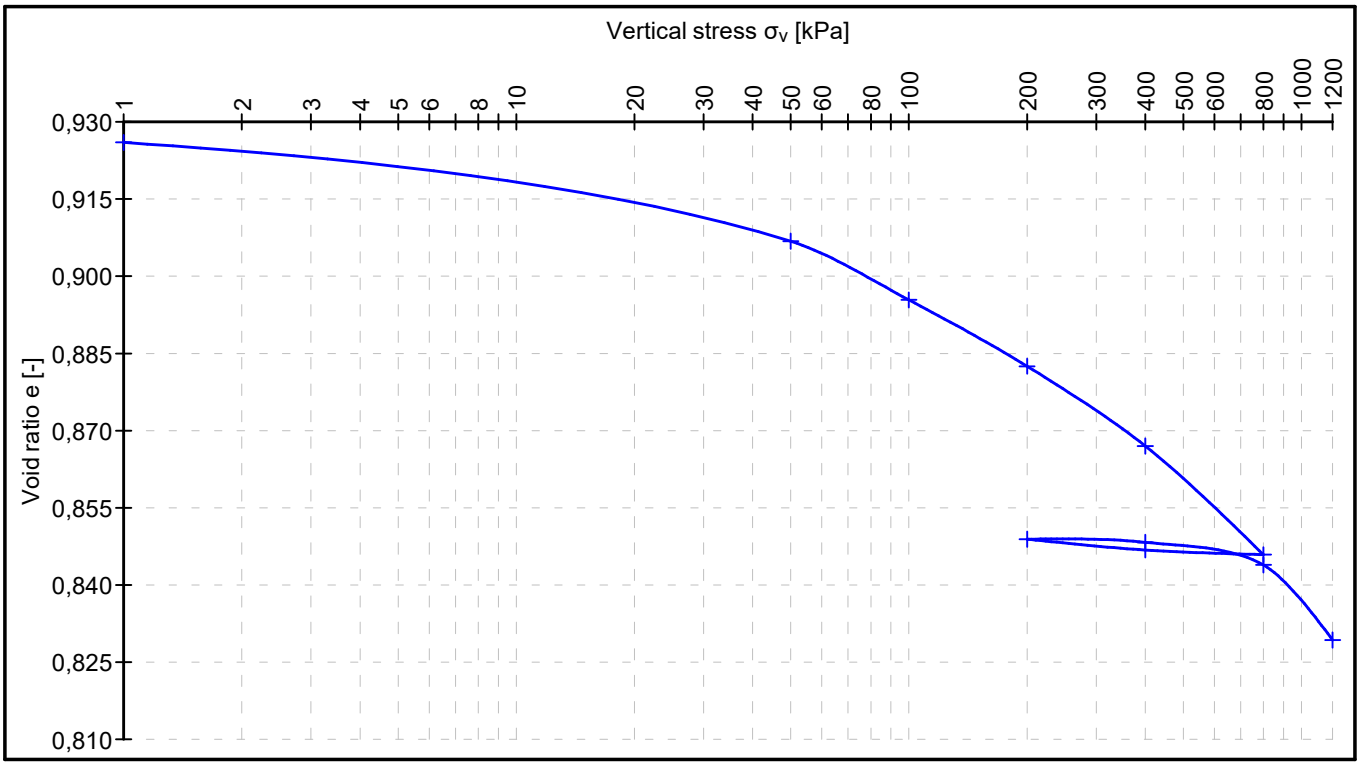
Sample

Field test:	BH4	Sample type:	disturbed
Sample index:	PV2/B4	Geotechnical type:	GT4
Depth from:	10,20 m	Description:	
Depth to:	10,80 m	Well-grained sand. Yellow-brown color. Aged.	

Specimen

Specimen ID:	PV2/B4-1A	Depth:	10,35 m	
		Before test	**After test**	
Height [mm]		30,00	28,49	
Diameter [mm]		120,00		
Particle density [kg/m^3]		2645,0		
Void ratio [-]		0,926	0,829	

Naměřené hodnoty a výsledky



Load step	Vertical stress σ_v [kPa]	Vertical Strain ε_v [%]	Void ratio e [-]	Oedometric modulus E_{oed} [MPa]	Volumetric compression coefficient m_v [1/MPa]	Compression index C_c [-]	Recompression index C_r [-]
NaN - 0	0,000	0,000	0,926				
0 - 50	50,000	0,997	0,907	5,02	0,1992	0,002	
50 - 100	100,000	1,590	0,895	8,43	0,1186	0,040	
100 - 200	200,000	2,257	0,883	14,99	0,0667	0,040	
200 - 400	400,000	3,063	0,867	24,81	0,0403	0,053	
400 - 800	800,000	4,157	0,846	36,56	0,0274	0,070	
800 - 400	400,000	4,113	0,847				0,003
400 - 200	200,000	4,003	0,849				0,007
200 - 400	400,000	4,033	0,848				0,003

Load step	Vertical stress σ_v [kPa]	Vertical Strain ε_v [%]	Void ratio e [-]	Oedometric modulus E_{oed} [MPa]	Volumetric compression coefficient m_v [1/MPa]	Compression index C_c [-]	Recompression index C_r [-]
400 - 800	800,000	4,263	0,844				0,013
800 - 1200	1200,000	5,020	0,829	52,84	0,0189	0,085	

Notes

Specimen supplied by customer.
Test performed in accordance with EN ISO 17892-05.

Verified by: Peter Filmer

Date of issue: 21.04.2023

Razítko a podpis

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Shear Box Test

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID: Shear box test	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	Customer: Survey ABC Ltd.
Date of measurement: 27.03.2023	Performed by: John Young

Sample

Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

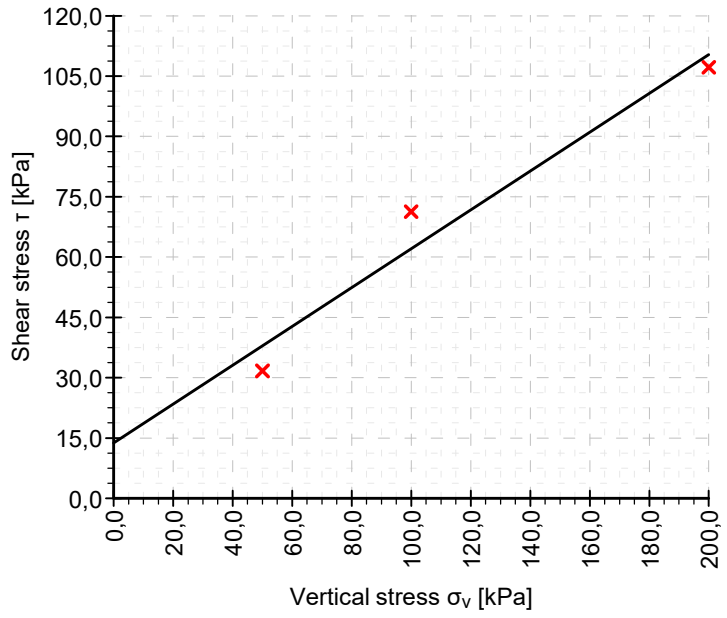
Specimen

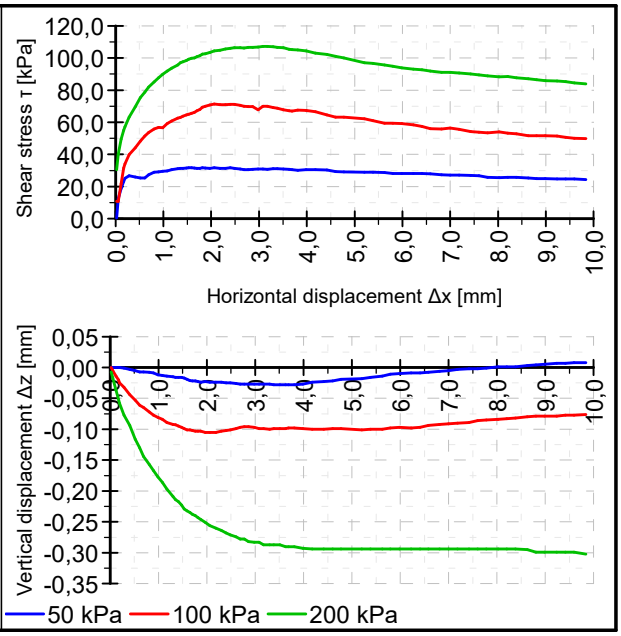
Specimen ID: VA1/1254-12 — Consolidation time: 24,0 hour

Depth: 7,35 m — Shear rate: 0,001 mm/min

	Before test	Specimen Nr. 1	Specimen Nr. 2	Specimen Nr. 3
Dimensions (width/height) [mm]	-	60,00 / 21,00	60,00 / 21,00	60,00 / 21,00
Moisture content [%]	22,45	24,40	24,30	22,10
Consolidation (before test) [mm]	-	0,210	0,550	1,170
Vertical stress [kPa]	-	50	100	200
Max. shear stress [kPa]	-	31,7	71,3	107,2
Wet unit weight [kg/m^3]	1802,0	1848,0	1921,0	1967,0
Dry unit mass [kg/m^3]	1472,2	1485,5	1545,4	1610,9
Displacement at failure [mm]	-	1,530	2,061	3,080

Measured values and results





Test results:	Angle of internal friction φ_{ef} [°]	Cohesion c_{ef} [kPa]
Peak values:	25,8	13,8

Notes

Specimens were flooded with water during the test. Moisture content indicated for the test specimens is after the end of the test (moisture content determined according to EN ISO 17892-01).
Specimen supplied by the customer, test results refer to the sample as received. Test equipment: hydraulic shear device. Test performed in accordance with EN ISO 17892-10.

Verified by: Peter Filmer — **Date of issue:** 28.03.2023

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Uniaxial Compression Test (Soil)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	1D compression (soil)	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	14.09.2022	Performed by:	John Young

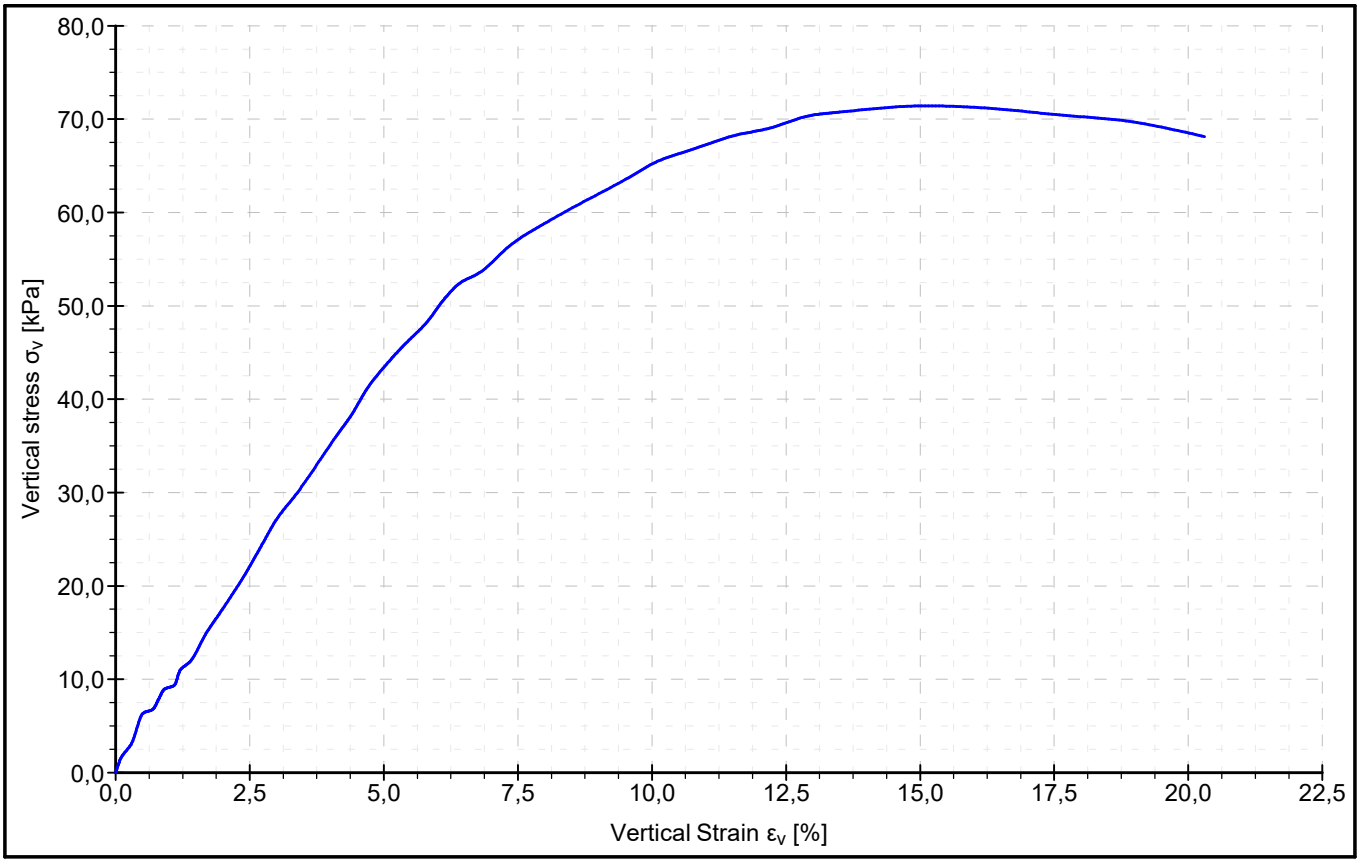
Sample

Field test:	BH5	Sample type:	undisturbed
Sample index:	VA1/1254	Geotechnical type:	GT2
Depth from:	7,00 m	Description:	
Depth to:	7,80 m	Clay with low plasticity, stiff, gray-blue color	

Specimen

Specimen ID:	VA1/1254-1	Weight:	336,54 g
Depth:	7,10 m	Moisture content:	22,40 %
Height:	98,54 mm	H/D ratio:	2,0
Diameter:	49,12 mm	Unit weight:	18,02 kN/m^3

Measured values and results



Compressive strength: 71,4 kPa	**At strain: 14,9 %**
Undrained shear strength: 35,7 kPa	Stress rate: 0,950 mm/min

Notes

Specimen supplied by customer. Stated moisture content is initial (determined according to EN ISO 17892-01). Tested specimen was undisturbed. Test performed in accordance with EN ISO 17892-07.

Verified by: Peter Filmer | **Date of issue:** 30.09.2022

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Unconsolidated Undrained Triaxial Test (UU)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID: Triax UU	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	
Customer: Survey ABC Ltd.	Performed by: John Young

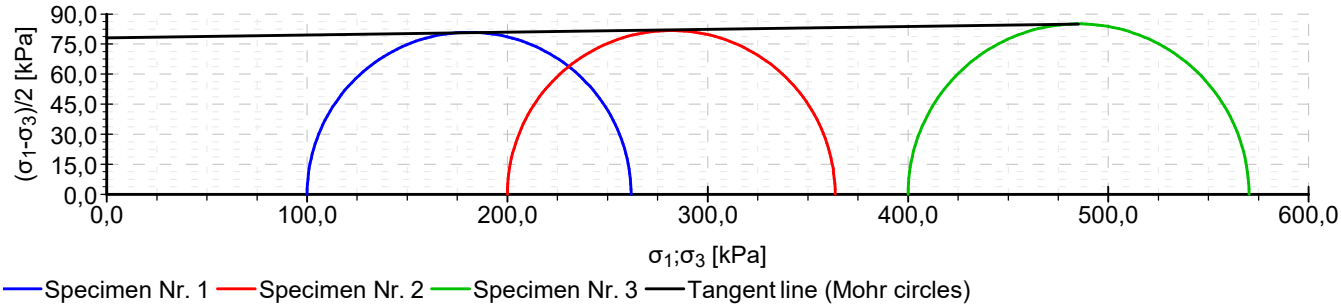
Sample

Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

Specimen

Specimen ID: VA1/1254-6A	Depth: 7,55 m		
	Specimen Nr. 1	Specimen Nr. 2	Specimen Nr. 3
Date of measurement	14.05.2023	15.05.2023	16.05.2023
Initial diameter d_0 [mm]	38,12	37,88	38,06
Initial height h_0 [mm]	75,94	76,12	76,22
Initial area A_0 [mm^2]	1141,29	1141,29	1137,70
Initial volume V_0 [cm^3]	86,67	85,78	86,72
Moisture content before test w_0 [%]	22,50	22,30	22,60
Moisture content after test w_{fin} [%]	21,70	21,60	21,20
Shear rate [mm/min]	0,750	0,750	0,750

Measured values and results



Test results:	Undrained shear strength S_u [kPa]
	78,1

Notes

The test was carried out on a specimen supplied by the customer.
Undisturbed specimen. Moisture content determined according to EN ISO 17892-01.
Test without measurement of pore pressures and volume changes.
Initial porosity, saturation and particle density - not measured/not determined.
Test performed in accordance with EN ISO 17892-08.

Verified by: Peter Filmer | **Date of issue:** 19.06.2023

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Consolidated Undrained Triaxial Test (CU)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID: Triax CU	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	
Customer: Survey ABC Ltd.	Performed by: John Young

Sample

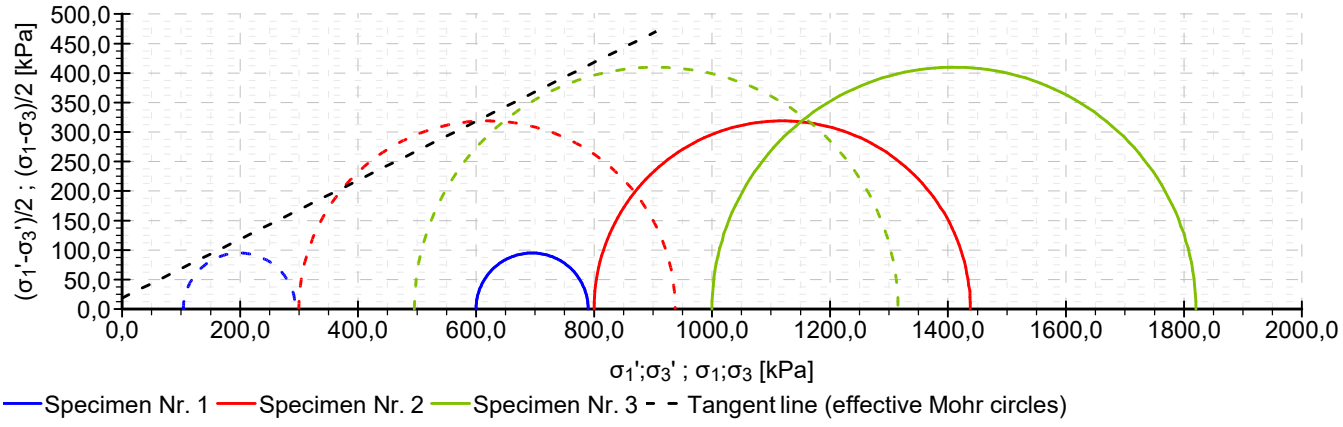
Field test: BH5	Sample type: undisturbed
Sample index: VA1/1254	Geotechnical type: GT2
Depth from: 7,00 m	Description:
Depth to: 7,80 m	Clay with low plasticity, stiff, gray-blue color

Specimen

Specimen ID: VA1/1254-8c — Depth: 7,70 m

	Specimen Nr. 1	Specimen Nr. 2	Specimen Nr. 3
Date of measurement	08.05.2023	10.05.2023	06.05.2023
Initial diameter d_0 [mm]	38,32	37,94	38,36
Initial height h_0 [mm]	76,88	76,24	76,56
Initial area A_0 [mm^2]	1153,30	1130,54	1155,71
Initial volume V_0 [cm^3]	88,67	86,19	88,48
Moisture content before test w_0 [%]	22,45	22,65	22,55
Moisture content after test w_{fin} [%]	21,32	21,24	21,08
Shear rate [mm/min]	0,032	0,032	0,032

Measured values and results



Test results:	**Undrained shear strength (specimen no.1): $S_{u,1}$ = 95,0 kPa**	
	Undrained shear strength (specimen no.2): $S_{u,2}$ = 319,0 kPa	
	Undrained shear strength (specimen no.3): $S_{u,3}$ = 410,0 kPa	
	Angle of internal friction φ_{ef} [°]	**Cohesion c_{ef} [kPa]**
	26,5	**18,5**

Notes

The test was carried out on a specimen supplied by the customer.
Undisturbed specimen. Moisture content determined according to EN ISO 17892-01.
Test without measurement of pore pressures and volume changes.
Initial porosity, saturation and particle density - not measured/not determined.
Test performed in accordance with EN ISO 17892-08.

Verified by: Peter Filmer — **Date of issue:** 28.06.2023

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Consolidated Drained Triaxial Test (CD)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID: Triax CD	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	
Customer: Survey ABC Ltd.	Performed by: John Young

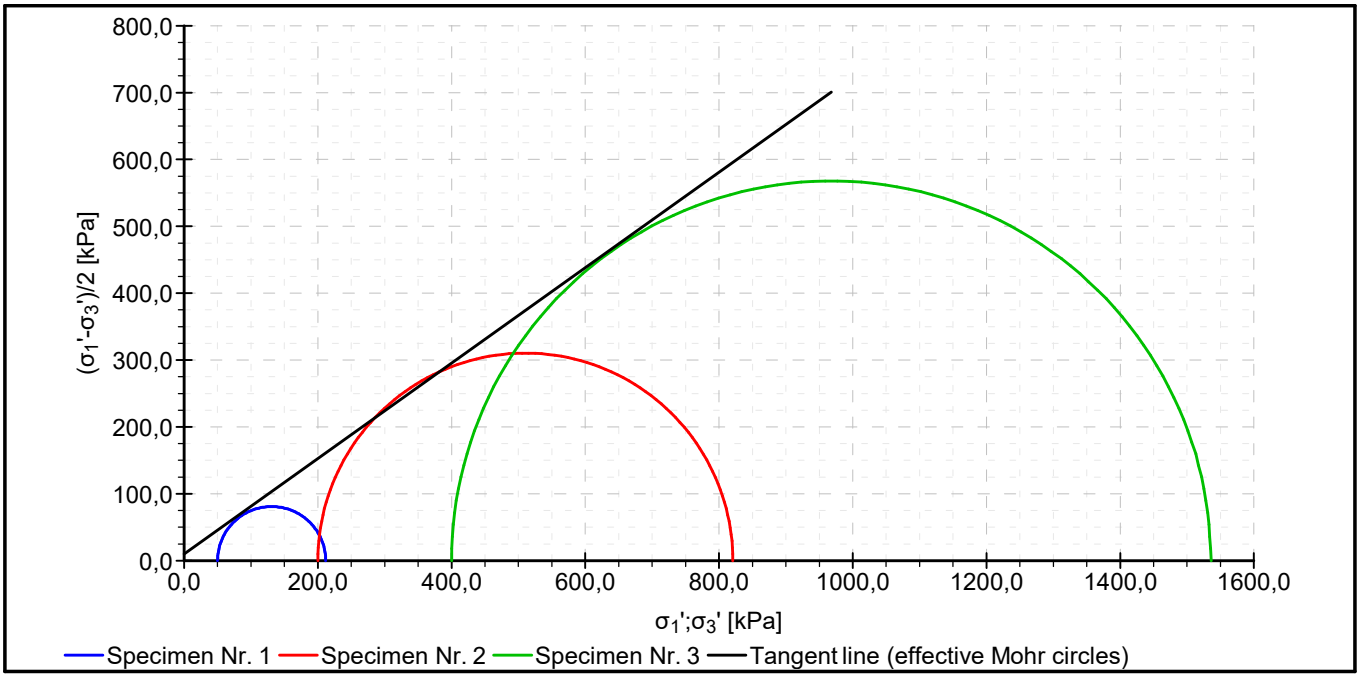
Sample

Field test: BH4	Sample type: disturbed
Sample index: PV2/B4	Geotechnical type: GT4
Depth from: 10,20 m	Description:
Depth to: 10,80 m	Well-grained sand. Yellow-brown color. Aged.

Specimen

Specimen ID: PV2/B4-3A	Depth: 10,30 m		
	Specimen Nr. 1	Specimen Nr. 2	Specimen Nr. 3
Date of measurement	10.09.2023	10.09.2023	10.09.2023
Initial diameter d_0 [mm]	37,22	37,94	38,08
Initial height h_0 [mm]	82,84	82,41	80,84
Initial area A_0 [mm^2]	1088,03	1130,54	1138,90
Initial volume V_0 [cm^3]	90,13	93,17	92,07
Moisture content before test w_0 [%]	12,90	12,70	12,20
Moisture content after test w_{fin} [%]	14,10	13,85	12,95
Shear rate [mm/min]	0,085	0,085	0,085

Measured values and results



Test results:	Angle of internal friction φ_{ef} [°]	Cohesion c_{ef} [kPa]
	35,5	**9,9**

Notes

The test was carried out on a specimen supplied by the customer.
Disturbed specimen. Moisture content determined according to EN ISO 17892-01.
Test performed in accordance with EN ISO 17892-08.

Verified by: Peter Filmer

Date of issue: 17.09.2023

Stamp and signature

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www.fine.cz

Uniaxial Compression Test (Rock)

Project: Apartment building "Moonlighting" - Survey for building permit

Test ID:	1D compression (rock)	Project ID:	2022/3548
Supplier:	GEO5 Laboratory Ltd.	Customer:	Survey ABC Ltd.
Date of measurement:	14.06.2022	Performed by:	John Young

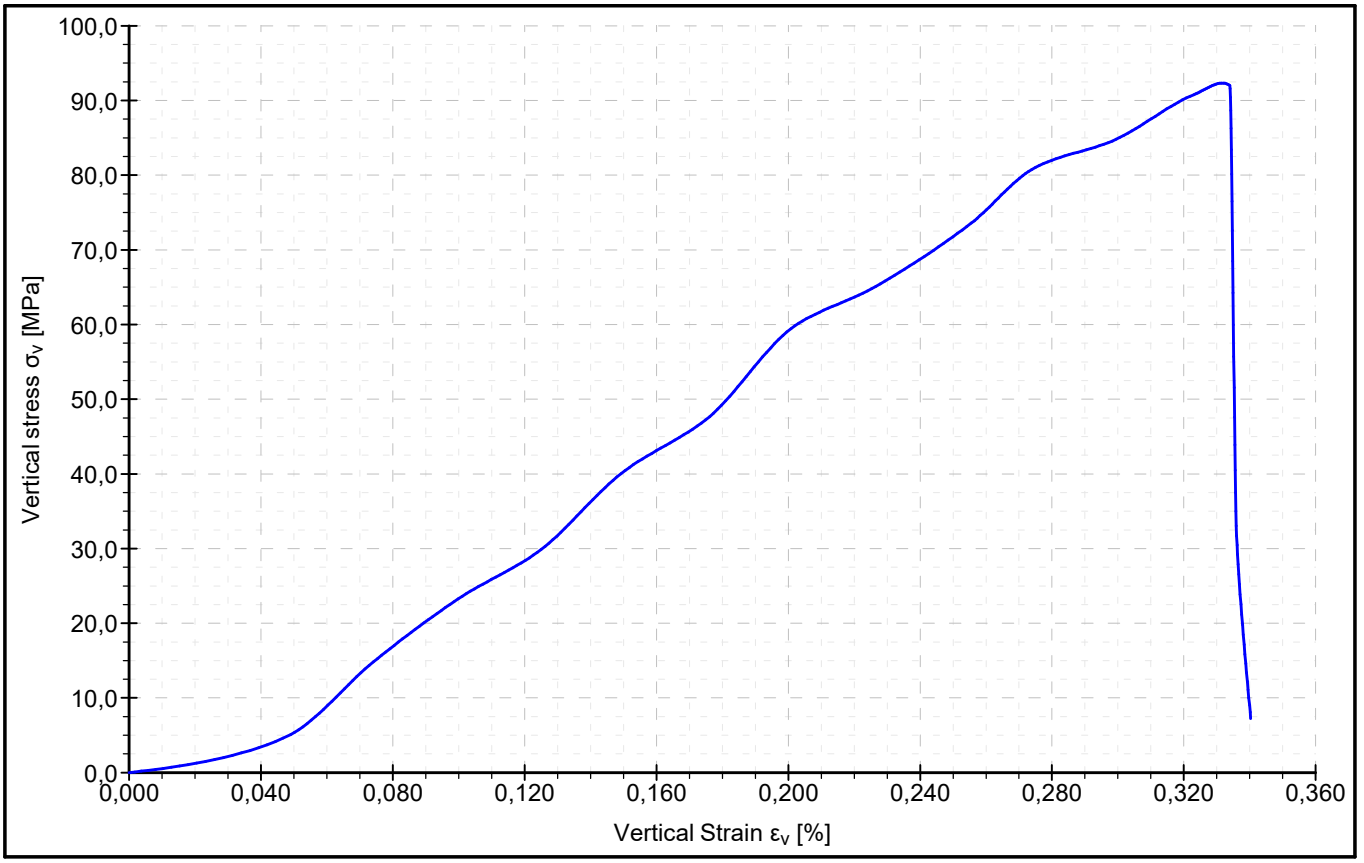
Sample

Field test:	BH6	Sample type:	rock strength
Sample index:	RC2/7	Geotechnical type:	GT1a
Depth from:	20,10 m	Description:	
Depth to:	20,90 m	Granodiorite, slightly weathered.	

Specimen

Specimen ID:	RC2/7-2	Weight:	401,25 g
Depth:	20,30 m	Moisture content:	1,70 %
Height:	93,15 mm	H/D ratio:	2,1
Diameter:	44,22 mm	Unit weight:	28,05 kN/m^3

Measured values and results



Failure type:	**Axial cleavage**	Stress rate: 0,150 mm/min
Compressive strength:	**92,0 MPa**	

Notes

Specimen delivered by the customer on 13/06/2022. Specimen was prepared and tested according to EN 1926 standard. No leveling mortar was used during testing.

Verified by: Peter Filmer

Date of issue: 18.06.2022

Stamp and signature

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Static Plate Load Test

Project: Apartment building "Moonlighting" - Survey for building permit

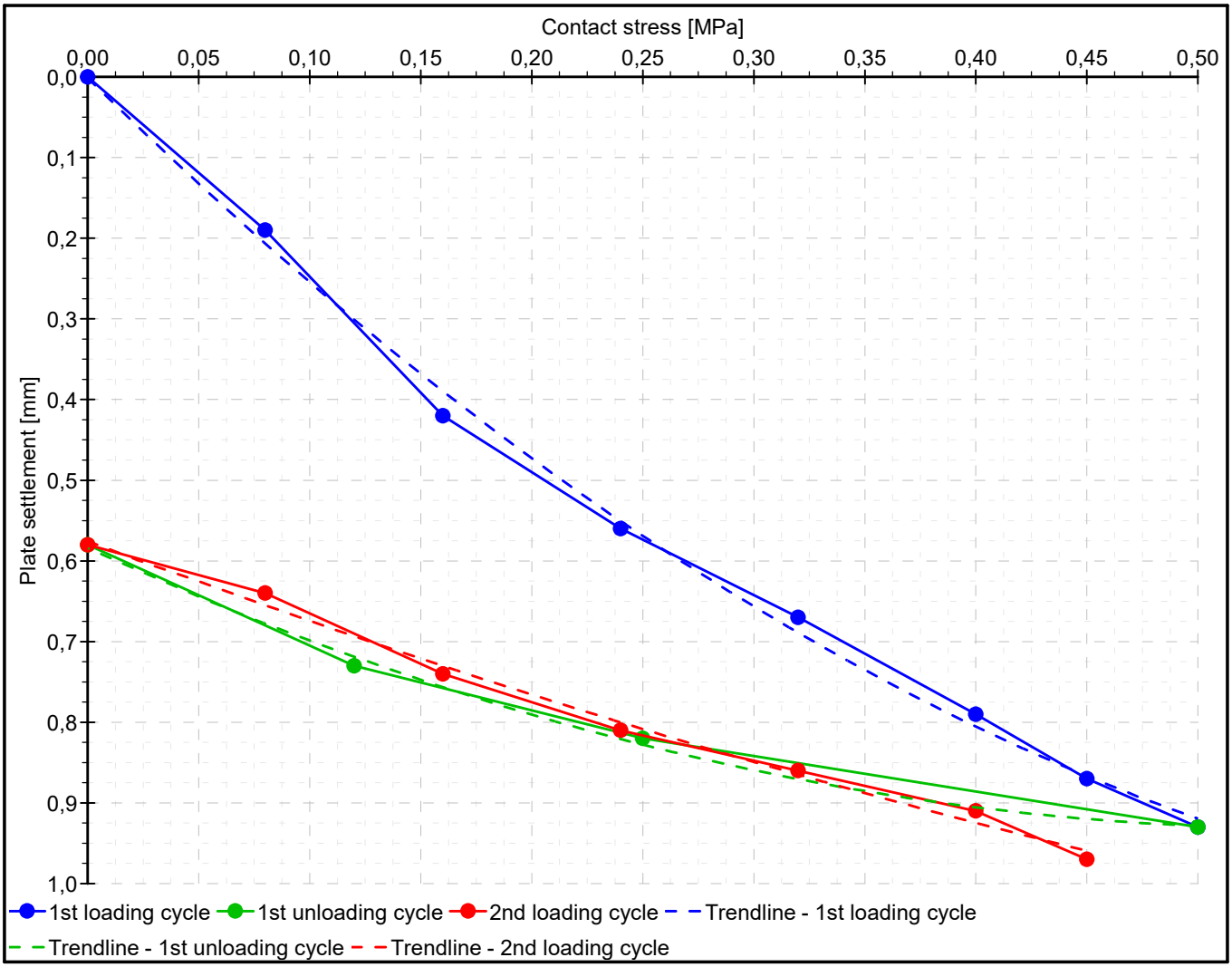
Test ID: Plate A - road	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	Customer: Survey ABC Ltd.
Date of measurement: 12.07.2022	Performed by: John Young

Tested layer description

The test was performed on a road subgrade soil.

Measured values and results

Type of test: A (road)



$E_{def,1}$:	122,6 MPa
$E_{def,2}$:	263,5 MPa
$E_{def,2}/E_{def,1}$:	2,15 -

Notes

The test was carried out as part of the reconstruction of road I/258 at km 12,850. At the time of the test - partly cloudy, no wind, approx. 25°C. Test performed in accordance with ČSN 721006.

Verified by: Peter Filmer

Date of issue: 14.07.2022

Stamp and signature

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Static Plate Load Test

Project: Apartment building "Moonlighting" - Survey for building permit

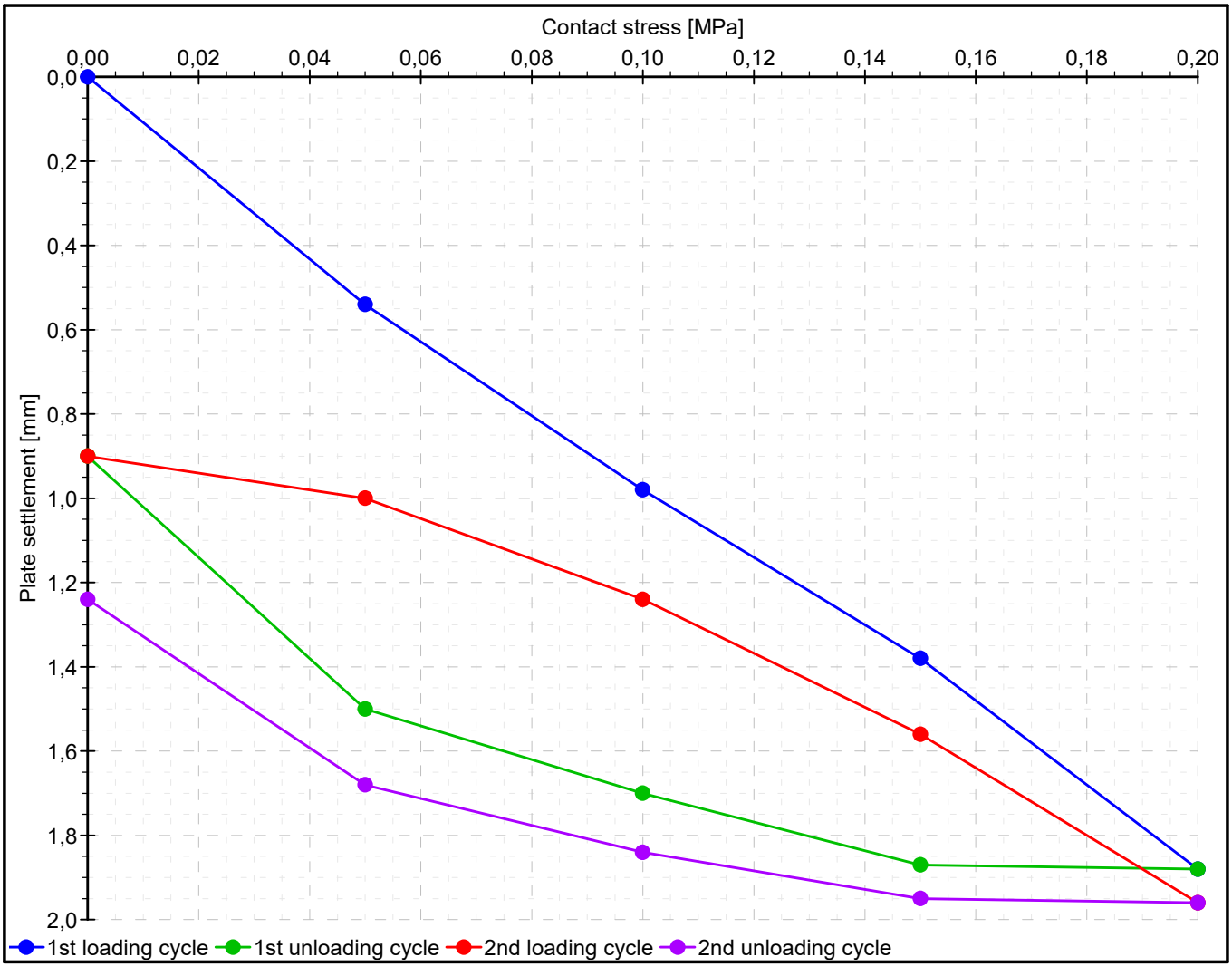
Test ID: Plate B - railroad	Project ID: 2022/3548
Supplier: GEO5 Laboratory Ltd.	Customer: Survey ABC Ltd.
Date of measurement: 12.07.2022	Performed by: John Young

Tested layer description

Railroad subgrade.

Measured values and results

Type of test: B (railroad)



$E_{def,1}$:	23,9 MPa
$E_{def,2}$:	42,5 MPa
$E_{def,2}/E_{def,1}$:	1,78 -

Notes

The test was carried out as part of the construction of line 421 (Prague - Kamenice). track number 91. The plate was placed on the left with respect to the track (in the direction of the stationing). At the time of the test - partly cloudy, no wind, approx. 25°C.
Test performed in accordance with ČSN 721006.

Verified by: Peter Filmer

Date of issue: 14.07.2022

Stamp and signature