



Report of Photographs

Site Identification: GHD-MBH-27

Project Takanini 2a/2b Conveyance	Commenced 12/11/14	Completed 13/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.45 m bgl	



0.0 m to 3.3 m



3.3 m to 6.0 m


 PO Box 6543
 Auckland 1141

BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-28**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774323.72, N 5898094.54
Surface RL (m): +25.2m
Commenced: 06-Nov-14
Completed: 06-Nov-14

Datum: NZTM
Total Depth: 6.5m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90
Comments:
Logged: RV/JFK
Processed: RV
Checked: BH

Depth (m)/ [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer	
		66			Peat (Amorphous)	OL		SILT with some clay and rootlets and minor sand, dark brown. Moist; low plasticity; sand, fine. (Topsoil)	M								
		76				Pt		@ 0.25 to 0.29 m with some ash mixed in, comprising SILT with some fine sand; dark brown to light brown.	W	S						SV 22/1	
						SM		CLAY with some silt and trace sand; drak brown. Soft; wet, low plasticity; sand fine. (Amorphous Peat)	W								
						Pt		100 mm piece of wood.	W	S							
								Fine to medium SAND with some silt; light brown. Wet; slightly dilatant. (Ash)	W							SV 16/3	
		85				Pt		CLAY with some silt, black. Soft; wet; low plasticity. (Amorphous Peat)	S	S							
								50 mm piece of wood.									
								CLAY with some silt, trace sand and 30% organic rootlets; black. Soft; saturated; low plasticity. (Amorphous Peat)	W								
								@ 1.4 m becomes wet.									
								@ 1.7 m becomes saturated with 80% wood (no rootlets).	S								
		0				Pt		Wood fragments. Push tube @ 2.0m, no recovery.							SV 7/3		
								Open banel to 3.0m, no recovery.									
								Open barrel to 3.2m, no recovery.							SV UTP (wood)		
		81															
								@ 4.0m, 500mm fragment of wood.							SV UTP (wood)		
		72															
								@ 4.5m to 5.0m, 200mm fragment of wood.									
		40															
		72															
						Pt		CLAY with minor rootlets; dark brown. Very soft, saturated; low to medium plasticity. (Amorphous Peat)	S	VS				SV 8/0			
		96															
	SPT	0						No recovery.							SV 5/0 SPT 0,0 0,0 [N=0]		
								Termination Depth = 6.45m, Target Depth									



Report of Photographs

Site Identification: GHD-MBH-28

Project	Takanini 2a/2b Conveyance	Commenced	06/11/14	Completed	06/11/14
Site	Kennys' Farm	Logged By	RV / JFK		
Job #	51-32174-04	Checked By	BH		
Client	Auckland Council	Hole Depth	0.0 m to 6.45 m bgl		



0.0 m to 4.0 m



4.0 m to 6.0 m

BOREHOLE with Piezo LOGSite Identification: **GHD-MBH-29A**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774283.72, N 5898105.46
Surface RL (m): +25.2m
Commenced: 05-Nov-14
Completed: 05-Nov-14

Datum: NZTM
Total Depth: 6.6m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90
Comments:

Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
72	Open Barrel		None		Peat (Fibrous)	SM		SILT with some rootlets and minor sand, dark brown. Moist; non-plastic; sand, fine. (Topsoil)	M							
72	Open Barrel				Peat (Fibrous)	Pt		Fine to medium SAND with some silt, light brownish yellow with black bands. Wet; non-dilatant. (Ash)	W	F					SV 34+	
72	Open Barrel				Peat (Fibrous)	SM		SILT with some clay and wood and trace sand; dark brown. Firm; moist; sand, fine. (Semi-fibrous Peat)	M	F						
72	Open Barrel				Peat (Fibrous)	Pt		Fine SAND with some silt and minor carbonaceous organics; light brown. wet; dilatant. (Ash)	W	F						
72	Open Barrel				Peat (Fibrous)	Pt		CLAY with some silt and wood fragments. Firm; wet; low plasticity. (Amorphous Peat)	S	F					SV 40/8	
72	Open Barrel				Peat (Fibrous)	Pt		SILT with some clay, wood and roots; black. Firm; saturated; low plasticity. (Semi-fibrous Peat)	S	F						
72	Open Barrel				Peat (Fibrous)	Pt		CLAY, black. Firm; saturated; medium plasticity. (Amorphous Peat)	S	F					SV 8/5	
72	Open Barrel				Peat (Fibrous)	Pt		70 mm piece of wood.	S	VS						
72	Open Barrel				Peat (Fibrous)	Pt		SILT with some wood and minor clay; dark brown. Very soft; saturated; low plasticity. (Semi-fibrous Peat)	S	VS						
72	Open Barrel				Peat (Amorphous)	Pt		CLAY with some wood; black. Firm; saturated. (Amorphous Peat)	S	F					SV 29/20 SPT	0.0, 0.0, 0.0, [N=0]
72	Open Barrel				Peat (Amorphous)	Pt		300 mm piece of wood.							SV UTP (wood)	
72	Open Barrel				Peat (Amorphous)	Pt		CLAY with some silt and 80% wood; black. Very soft; saturated. (Amorphous Peat)	S	VS						
72	Open Barrel				Peat (Amorphous)	Pt		60 mm piece of wood.	W	VS					SV 7/0 SPT	0.0, 0.0, 0.0, [N=0]
72	Open Barrel				Peat (Amorphous)	Pt		SILT with minor wood; black. Very soft; wet; medium plasticity; semi-spongy. (Semi-fibrous Peat)	W	VS						
72	Open Barrel				Peat (Amorphous)	Pt		Termination Depth = 6.55m, Target Depth								

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15

PIEZO INSTALLATION SUMMARY

BH29B



GHD Centre, Level 3
27 Napier Street, Freemans Bay
PO Box 6543
Auckland, New Zealand
Tel: +64 9 370 8000
www.ghd.com

Client: Auckland Council
Project: SHA Takanini 2a/2b
Location:
Project Reference: 51-3341103

BOREHOLE INFORMATION

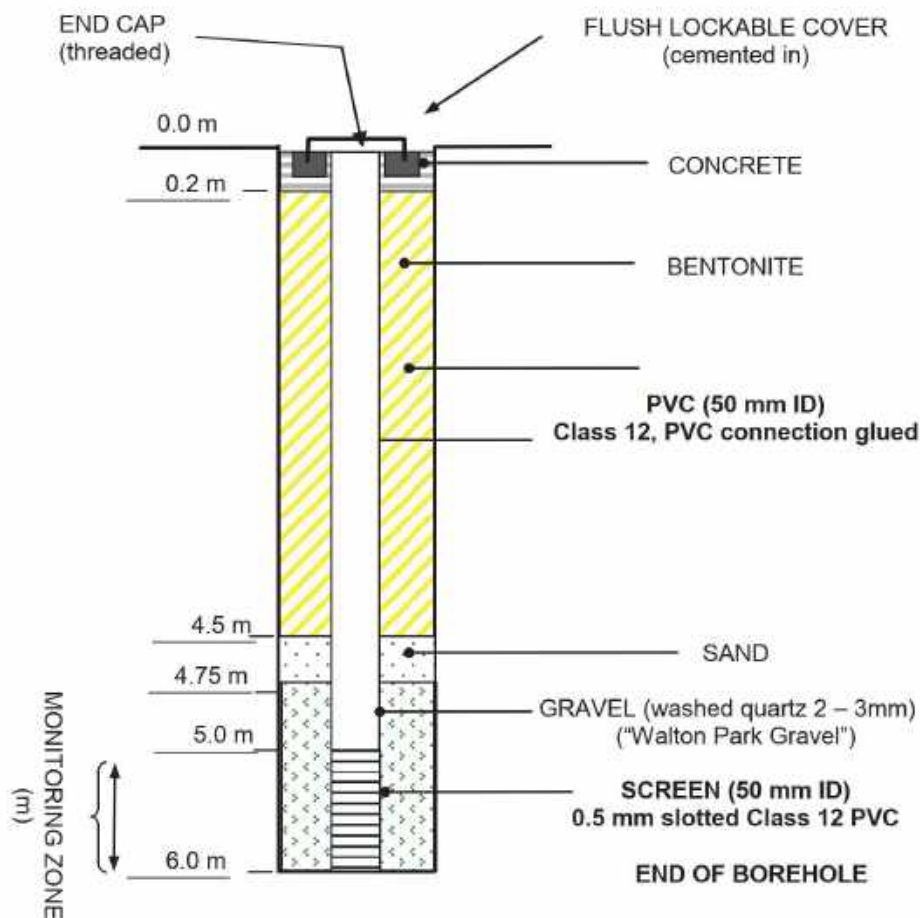
Drilling Method: Wash Bore
Diameter Core: 86mm
Contractor: Prodrill

CO-ORDINATES:

Easting: 1774277.966
Northing: 5898103.613
Ground Level: 25.263

DATE INSTALLED: 26/11/2014

VERIFIED BY: BH



NOTE: Geology summarized in borehole logs

NOT TO SCALE



Report of Photographs

Site Identification: GHD-MBH-29A

Project Takanini 2a/2b Conveyance	Commenced 05/11/14	Completed 05/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.55 m bgl	



0.0 m to 3.0 m



3.0 m to 6.55 m

BOREHOLE with Piezo LOGSite Identification: **GHD-MBH-30**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774276.78, N 5898129.89
Surface RL (m): +25.2m
Commenced: 05-Nov-14
Completed: 05-Nov-14

Datum: NZTM
Total Depth: 6.5m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60**Inclination:** -90**Logged:** JFK/RV**Shear Vane:** Geo 1060**Comments:****Processed:** RV**Bore Diameter (mm):** 96**Checked:** BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure (zoning, defects, cementing), plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
54	Open Barrel						OL	SILT with minor clay and trace sand; dark brown. Moist; non-plastic. (Topsoil)	M							
54	Open Barrel						SM	Fine to medium SAND with some silt and rootlets; greyish brown. Wet; poorly graded. (Ash)	W	S						
54	Open Barrel						Pt	CLAY with some silt and minor organics; brownish black. Soft; saturated; low plasticity. (Amorphous Peat)	S						SV 17/1	
100	Open Barrel						SM	Fine SAND with minor silt and some organics; light brown. Wet; poorly graded. (Ash)	W	S						
100	Open Barrel						Pt	CLAY with minor silt and organics; dark brownish black. Soft; wet; low plasticity. (Amorphous Peat)	W						SV 13/4	
68	Open Barrel														SV UTP (obstruction)	
100	Open Barrel						Pt	Wood pieces and fragments.							SV UTP (obstruction)	
15								No recovery.							SV UTP (obstruction)	
9	SPT						Pt	40 mm of wood fragments. No recovery.							SV UTP (obstruction) 1,1, 1,0, 0,0, [N=1]	
45							Pt	40 mm piece of wood then wood fragments.								
64	Open Barrel						Pt	320 mm piece of wood with wood fragments.								
66	Open Barrel						Pt	CLAY with trace carbonaceous rootlets; black, saturated. (Amorphous Peat)	S							
90							SM	Fine SAND with some silt; brown with white mottling, wet; dilatant. (Ash)	W	VS					SV 7/0	
90							Pt	CLAY with trace sand, black. Very soft; saturated; sand, fine. (Amorphous Peat) @ 5.5 to 5.72 m with some wood and rootlets.	S							
18	SPT						Pt	Silty CLAY with some wood; black. Very soft, saturated. (Semi-fibrous Peat)	S	VS					SPT 0,1, 0,0, 0,0, [N=0]	
								Termination Depth = 6.45m, Target Depth								

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15



Report of Photographs

Site Identification: GHD-MBH-30

Project Takanini 2a/2b Conveyance	Commenced 05/11/14	Completed 05/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.45 m bgl	



0.0 m to 4.5 m



4.5 m to 6.45 m


 PO Box 6543
 Auckland 1141

BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-31A**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774258.11, N 5898187.07
Surface RL (m): +25.3m
Commenced: 10-Nov-14
Completed: 10-Nov-14

Datum: NZTM
Total Depth: 6.5m

Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96
Inclination: -90**Comments:**
Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure (zoning, defects, cementing), plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclination, Roughness, Texture, Aperture, Coating	Piezometer
48	Open Barrel					OL		SILT with some rootlets and trace sand, dark brown. Moist; non-plastic; sand, fine. (Topsoil)	M							
100	Push Tube					SM Pt		SILT with some sand and minor rootlets, brownish orange. Firm; moist to wet; non-plastic. (Ash) CLAY with trace sand, wood and rootlets; dark brown. Firm; moist to wet; medium plasticity; sand, fine. (Amorphous Peat) @ 8.0 m with wood fragments.	M M	F F					SV 31/4	
72	Push Tube					SM Pt		Silty fine SAND, light brown with brown mottling. Moist; dilatant. (Ash) SILT with some sand, dark brown. Soft; wet; low plasticity; sand, fine to coarse. (Amorphous Peat) Push tube from 1.0 to 1.5 m.	W W	S S					SV 22/4	
72	Push Tube					Pt		Push tube from 1.5 to 2.0 m.								
52	Open Barrel					SM Pt		Silty fine SAND, light brown. Wet; dilatant. (Ash) CLAY with minor silt and wood fragments and trace sand; black. Soft; saturated; low plasticity. (Fibrous Peat) @ 2.3 m becomes wet and amorphous with high plasticity @ 2.5 m becomes saturated with low plasticity.	W S	S S					SV UTP (wood)	
100	Open Barrel					Pt		Silty CLAY with some sand and 50% wood; brown. Soft; saturated; sand, fine. (Semi-fibrous Peat)	S	S						
0	SPT							No recovery.							SV 10/4 SPT 0.0, 0.0, 0.0, [N=0]	
91	Open Barrel					Pt		CLAY with some wood; black. Very soft; saturated; medium plasticity. (Amorphous Peat) @ 3.9 to 4.25 m with 50% wood. @ 4.3 to 4.5 m with 40-90% wood.	S	VS					SV UTP (wood)	
73	SPT					Pt		CLAY with minor wood; black. Very soft; saturated; medium plasticity. (Amorphous Peat) @ 5.3 m becomes wet. @ 5.68 m becomes saturated. @ 5.9 m with large piece of wood, 40% of core.	S W S	VS					SV 0/0 SPT 0.0, 0.0, 0.0, [N=0]	
0	SPT							No recovery.							SV 0/0 SPT 0.0, 0.0, 0.0, [N=0]	
								Termination Depth = 6.45m, Target Depth								

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15



GHD Centre, Level 3
27 Napier Street, Freemans Bay
PO Box 6543
Auckland, New Zealand
Tel: +64 9 370 8000
www.ghd.com

PIEZO INSTALLATION SUMMARY

BH31B

Client: Auckland Council
Project: SHA Takanini 2a/2b
Location:
Project Reference: 51-3341103

BOREHOLE INFORMATION

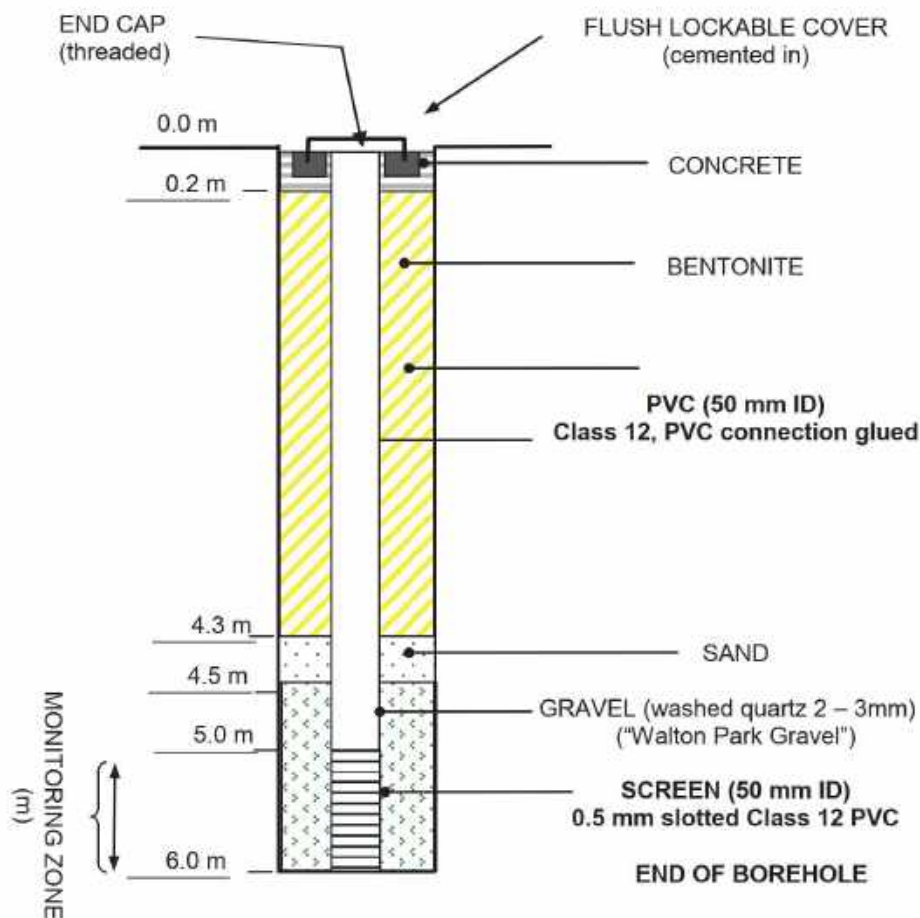
Drilling Method: Wash Bore
Diameter Core: 96mm
Contractor: Prodrill

CO-ORDINATES:

Easting: 1774251.436
Northing: 5898185.010
Ground Level: 25.284

DATE INSTALLED: 10/11/2014

VERIFIED BY: BH



NOTE: Geology summarized in borehole logs

NOT TO SCALE



Report of Photographs

Site Identification: GHD-MBH-31A

Project Takanini 2a/2b Conveyance	Commenced 10/11/14	Completed 10/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.45 m bgl	



0.0 m to 4.0 m



4.0 m to 6.45 m


 PO Box 6543
 Auckland 1141

BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-32**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774409.65, N 5897998.41
Surface RL (m): +25.1m
Commenced: 13-Nov-14
Completed: 13-Nov-14

Datum: NZTM
Total Depth: 6.5m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96
Inclination: -90**Comments:**
Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
45	Open Barrel		None		Peat (Fibrous)	OL		SILT with some rootlets and trace sand, dark brown. Moist; sand, fine. (Topsoil) @ 0.19 to 0.21 m with minor flecks of ash comprising silty fine SAND; light brown.	M							
74	Open Barrel				Peat (Fibrous)	Pt		SILT with some sand and organics; black. Stiff; saturated; sand, fine. (Semi-fibrous Peat) @ 0.8 m becomes moist. @ 0.85 m with minor rootlets, charcoal and flecks of ash comprising SILT; light brown.	S	St					SV 65/48	
56	SPT				Peat (Fibrous)	SM Pt		Fine SAND with some silt; light brown with dark brown streaks. Wet, dilatant. (Ash) CLAY with minor organics; black. Soft; saturated; low plasticity. (Semi-fibrous Peat)	W	S					SV 21/4	
91	Open Barrel				Peat (Fibrous)	Pt		Wood fragments.							SV UTP (wood) 0,0, 0,0, 0,0, [N=0]	
94	Open Barrel				Peat (Fibrous)	Pt		CLAY with minor organics; black. Soft; saturated; low plasticity. (Semi-fibrous Peat)	S	S					SV UTP (wood)	
					Peat (Fibrous)	Pt		Wood fragments.								
38	SPT				Alluvial Clay	OL		CLAY with minor rootlets; grey. Soft; saturated. (Alluvial Clay) @ 3.45 m becomes grey with black smears. @ 3.67 to 3.89 m branches of wood.	S	S					SV 25/14 SPT 0,0, 0,0, 0,0, [N=0]	
78	Open Barrel				Alluvial Clay			No recovery.							SV 0/0	
0	Open Barrel				Alluvial Clay	OL		CLAY with minor rootlets; grey. Very soft; saturated. (Alluvial Clay)	S	VS						
74	SPT				Peat (Fibrous)	Pt		CLAY with trace sand and 80% wood; black. Very soft; saturated; sand, fine; medium plasticity. (Semi-fibrous Peat) @ 4.86 m with minor wood.	S	VS					SV 7/0 SPT 0,0, 0,0, 0,0, [N=0]	
56	Open Barrel				Peat (Fibrous)			No recovery.							SV 3/0 SPT 0,0, 0,0, 0,0, [N=0]	
84	Open Barrel				Peat (Fibrous)			No recovery.								
0	SPT				Peat (Fibrous)			No recovery.								
								Termination Depth = 6.45m, Target Depth								

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15



Report of Photographs

Site Identification: GHD-MBH-32

Project Takanini 2a/2b Conveyance	Commenced 13/11/14	Completed 13/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.45 m bgl	



0.0 m to 3.45 m



3.45 m to 6.0 m

No recovery in SPT at 6.0 to 6.45 m bgl.

BOREHOLE with Piezo LOGSite Identification: **GHD-MBH-33A**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774411.72, N 5898107.47
Surface RL (m): +25.1m
Commenced: 07-Nov-14
Completed: 07-Nov-14

Datum: NZTM
Total Depth: 6.6m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90
Comments:

Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclination, Roughness, Texture, Aperture, Coating	Piezometer
0.00 [+25.10]	Open Barrel	82	None		Peat (Fibrous)	OL		SILT with trace sand and some rootlets; dark brown. Moist; non-plastic; sand, fine. (Topsoil)	M							
0.13 [+25.00]	Push Tube	80				SM		@ 0.13 to 0.38 m with some ash flecks mixed in, comprising SILT with some fine sand; light brownish grey with yellow mottling.	M							
0.38 [+24.72]	Open Barrel	54				Pt		SILT with some sand and rootlets; light brownish grey with orange flecks. Moist; sand, fine. (Ash)							SV 53/21	
1.09 [+24.01]	Open Barrel	54				Pt		CLAY with minor silt and some rootlets; black. Stiff; wet; low plasticity. (Semi-fibrous Peat)	W	St						
1.09 [+24.01]	Push Tube	0				Pt		@ 1.09 m with ash "dyke" down side of core (~30-40% of core), comprising silty SAND; light brown mottled black. 80 mm piece of wood. No recovery.							SV 6/1	
2.68 [+23.42]	Open Barrel	79			Peat (Amorphous)	Pt		CLAY with some organics and trace sand; black. Very soft; saturated; medium plasticity; sand, fine to medium; medium. (Amorphous Peat)	S	VS						
2.68 [+23.42]	Open Barrel	40				Pt		@ 2.68 to 2.73 m with minor ash "dyke" down side of core, comprising silty SAND with carbonaceous organics; light brown. Slightly dilatant. @ 2.83 m with 20-50% wood.	S	VS						
3.95 [+23.15]	Open Barrel	83				Pt		CLAY with 80% wood; dark brown. Very soft; saturated. (Amorphous Peat)	S	VS						
4.2 [+22.90]	Open Barrel	100				Pt		@ 3.95 m with 30% wood @ 4.2 m with some wood. @ 4.3 m 40 mm piece of wood.	S	VS						
4.3 [+22.89]	Open Barrel	100				Pt		CLAY with minor wood and rootlets; dark brown. Very soft; saturated; low plasticity. (Amorphous Peat)	W	VS					SV 8/0	
5.00 [+22.20]	Open Barrel	42			Peat (Fibrous)	Pt		CLAY with some wood and minor flecks of ash; black. Very soft; wet; amorphous; plastic; ash comprises silty fine to medium SAND; light brown. (Amorphous Peat)	S	VS					SV 0/0	
5.00 [+22.20]	Open Barrel	42				Pt		CLAY with minor sand and 30% wood; dark brown. Very soft; saturated; sand, fine. (Fibrous Peat)	S	VS						
5.00 [+22.20]	Open Barrel	42				Pt		CLAY; dark brown. Very soft; wet. (Amorphous Peat)	W	VS						
5.00 [+22.20]	SPT	51				Pt		CLAY with trace branches; black. Very soft; wet; high plasticity. (Semi-fibrous Peat)	W	VS					SV 0/0 SPT 0.0, 0.0, 0.0, [N=0]	
6.55 [+20.55]								Termination Depth = 6.55m, Target Depth								

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15



GHD Centre, Level 3
27 Napier Street, Freemans Bay
PO Box 6543
Auckland, New Zealand
Tel: +64 9 370 8000
www.ghd.com

PIEZO INSTALLATION SUMMARY

BH33B

Client: Auckland Council
Project: SHA – Takanini 2a/2b
Location: Takanini – Kenny's Farm
Project Reference: 51-3341103

BOREHOLE INFORMATION

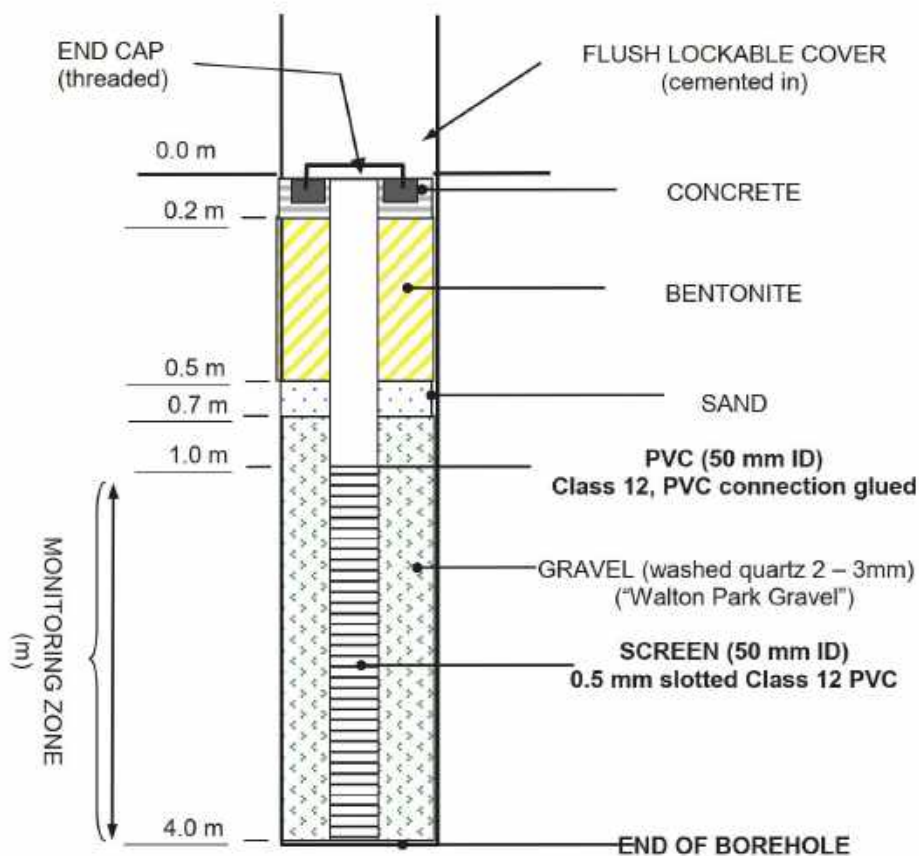
Drilling Method: Wash Bore
Diameter Core: 96mm
Contractor: Prodrill

CO-ORDINATES:

Easting: 1774411.576
Northing: 5898114.324
Ground Level: 25.059

DATE INSTALLED: 7/11/2014

VERIFIED BY: BH



NOTE: Geology summarized in borehole logs

NOT TO SCALE



Report of Photographs

Site Identification: GHD-MBH-33A

Project Takanini 2a/2b Conveyance	Commenced 07/11/14	Completed 07/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.45 m bgl	



0.0 m to 4.5 m



4.5 m to 6.45 m


 PO Box 6543
 Auckland 1141

BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-34A**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774236.71, N 5898073.82
Surface RL (m): +25.4m
Commenced: 10-Nov-14
Completed: 11-Nov-14

Datum: NZTM
Total Depth: 6.5m

Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90

Comments:

Logged: RV

Processed: RV

Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
50	Open Barrel	None			Peat (Semi-fibrous)	OL		SILT with some rootlets, black. Moist; non-plastic. (Topsoil) @ 0.18 m with trace blotches of ash, comprising SILT, light brown. Non-plastic. No recovery.	M						SV 37/24	
10						Pt		Silty CLAY with minor wood; black. Soft; moist; low plasticity. (Amorphous Peat)	M	S					SV 15/4	1
90						Pt		CLAY with some wood and minor sand; black. Soft; wet; low plasticity; sand, fine; semi-spongy. (Semi-fibrous Peat)	W	S						
						Pt		CLAY with trace sand and some wood; black. Soft; wet; low plasticity; sand, fine to coarse. (Semi-fibrous Peat)	W	S						
								@ 1.47 to 1.52 m with 50 mm piece of wood.								
100						Pt		CLAY with minor wood; dark brown. Very soft; saturated; low plasticity. (Amorphous Peat)	S	VS					SV 10/8	2
						Pt		100 mm piece of wood. No recovery.							SV 13/8	3
63																
86						Pt		CLAY with trace wood (twigs); dark brown. Soft; saturated; low plasticity. (Amorphous Peat)	S	S					SV 20/5	4
						Pt		CLAY with trace sand and 80% wood; dark brown. Soft; saturated; sand, fine. (Semi-fibrous Peat)	S	S						
						Pt		@ 3.85 m with 100 mm piece of wood.								
96						Pt		CLAY with minor wood; dark brown. Soft; saturated; low plasticity. (Amorphous Peat)								
						Pt		CLAY with trace carbonaceous rootlets; dark brown. Soft; wet; medium plasticity. (Amorphous Peat)	W	S					SPT	5
100								@ 4.75 to 4.8 m with light brown smears. (Ash)								
								@ 4.95 m becomes black.								
58								@ 5.4 m with 20 mm piece of wood, 20% of core.								
96						Pt		CLAY with minor organics; dark brown. Very soft; saturated; low plasticity. (Semi-fibrous Peat)	S	VS					SV 3/0	6
						Pt		Wood with wood fragments	S	VS					SPT	
78						Pt		CLAY with some organics; dark brown. Very soft; saturated; low plasticity. (Semi-fibrous Peat)								
								@ 6.25 m becomes black.								
								Termination Depth = 6.45m, Target Depth								

BOREHOLE LOG NZ ALT 51/32174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 15/15

PIEZO INSTALLATION SUMMARY

BH34B



GHD Centre, Level 3
27 Napier Street, Freemans Bay
PO Box 6543
Auckland, New Zealand
Tel: +64 9 370 8000
www.ghd.com

Client: Auckland Council
Project: SHA Takanini 2a/2b
Location:
Project Reference: 51-3341103

BOREHOLE INFORMATION

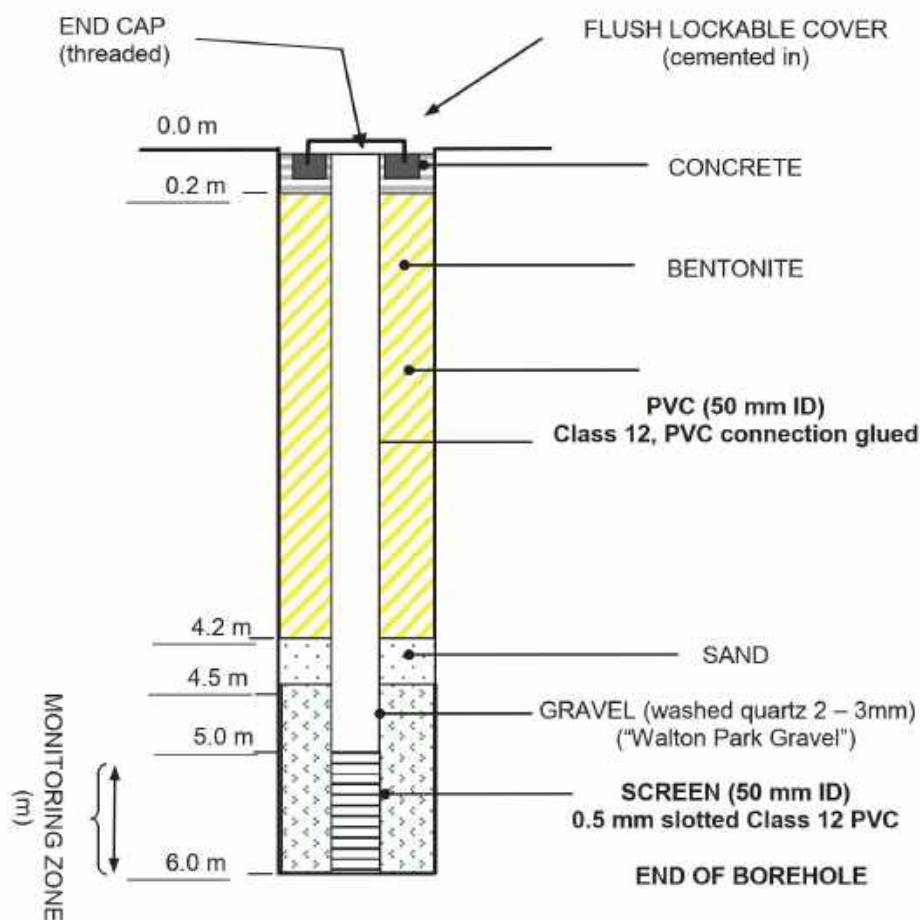
Drilling Method: Wash Bore
Diameter Core: 96mm
Contractor: Prodrill

CO-ORDINATES:

Easting: 1774238.176
Northing: 5898067.908
Ground Level: 25.369

DATE INSTALLED: 10/11/2014

VERIFIED BY: BH



NOTE: Geology summarized in borehole logs

NOT TO SCALE



Report of Photographs

Site Identification: GHD-MBH-34A

Project Takanini 2a/2b Conveyance	Commenced 10/11/14	Completed 11/11/14
Site Kennys' Farm	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 6.45 m bgl	



0.0 m to 4.5 m



4.5 m to 6.45 m


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BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-37**

Sheet 1 of 4

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm, Old Wairoa Road
Job No.: 51/32174/04

Coordinates: E 1774425.33, N 5897853.93
Surface RL (m): +25.9m
Commenced: 03-Nov-14
Completed: 05-Nov-14

Datum: NZTM
Total Depth: 21.5m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90
Comments:

Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
OB 60	OB	60			Topsoil	ML	X X X X	SILT with trace rootlets; dark brown. Moist; low plasticity. (Topsoil)	M	F						
OB 68	OB	68			Peat (Amorphous)	OL	X X X X	SILT with some clay; dark brown. Firm; moist; medium plasticity. (Amorphous Peat)	M	F					SV 30/5	
OB 78	OB	78					X X X X	@ 0.9 to 1.1 m with some wood. @ 1.0 m becomes soft. @ 1.1 to 1.4 m peat contains ash lenses comprising SILT with minor sand; light brown. Soft; wet, sand fine. @ 1.4 m becomes black. @ 1.5 m with minor sand; dark brown. Firm; saturated; sand, fine.	W	S					SV 18/5	
SPT 76	SPT	76					X X X X		S	F					SV 34+ (wood) SPT 1.0, 0.0, 0.0, [N=0]	
OB 0	OB	0					X X X X	No recovery due to piece of wood being pushed down hole by open barrel and SPT. Recovered a large amount of wood at 3.0 m, suspected from 1.95 m.								
OB 40	OB	40			Alluvial clay	CL	X X X X	CLAY with some wood; light grey. Very soft; saturated; medium plasticity. (Alluvium)	S	VS					SV 34+ (wood)	
SPT 33	SPT	33					X X X X	@ 3.67 m becomes dark grey.							SPT 0.0, 1.0, 1.0, [N=2]	
OB 91	OB	91			Peat (Amorphous)	Pt	X X X X	SILT with some wood and rootlets and minor sand; dark brown. Very soft; saturated; sand, fine. (Amorphous Peat)	S	VS					SV 2/0	
Push Tube 100	Push Tube	100					X X X X									
OB 100	OB	100				SM	X X X X	SILT with some sand; light brownish yellow. Very soft; wet; sand, fine to medium. (Ash)	W	VS						
PT 100	PT	100				OL	X X X X	CLAY; dark brown. Very soft; wet; medium plasticity. (Amorphous Peat)	W	VS						
							X X X X	Push tube from 5.5 to 6.0 m.								
SPT 100	SPT	100				ML	X X X X	SILT with trace sand; brown. Very soft; saturated; dilatant; sand, fine. (Ash)	S	VS					SPT 1.0, 0.0, 0.0, [N=0]	
						Pt	X X X X	CLAY with trace sand; dark brown. Very soft; saturated; medium plasticity; sand, fine. (Amorphous Peat)	S	VS						
OB 52	Open Barrel	52				OL Pt	X X X X	Silty CLAY with 80% wood; dark brown. Very soft; saturated. (Fibrous Peat)	S	VS						
							X X X X	CLAY; dark brown. Very soft; saturated; medium plasticity. (Amorphous Peat)								

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BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-37**

Sheet 2 of 4

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm, Old Wairoa Road
Job No.: 51/32174/04

Coordinates: E 1774425.33, N 5897853.93
Surface RL (m): +25.9m
Commenced: 03-Nov-14
Completed: 05-Nov-14

Datum: NZTM
Total Depth: 21.5m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90
Comments:

Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
52	Open Barrel	52				Pt		CLAY with minor wood; black. Very soft, saturated, medium plasticity. (Semi-fibrous Peat)	S	VS					SV 16/0	
100	SPT	100				ML		SILT with trace sand; light brownish yellow. Very soft; saturated. (Ash) @ 7.5 m becomes soft.	S	VS					SV 16/0	0.0, 0.0, 0.0, [N=0]
91	OB	91				OL		CLAY with minor silt and wood and trace sand; black. Soft, saturated; medium plasticity. (Amorphous Peat)	S	S						
100	OB	100				SM		SILT with minor sand; light brownish yellow. Soft, saturated; low plasticity; dilatant. (Ash)	S	S						
100	OB	100				OL		CLAY with some wood and carbonaceous material; black. Soft, saturated; medium plasticity. (Amorphous Peat)	S	S						
100	OB	100				SM		Silty fine SAND; light brown. Very loose; saturated. (Ash)	S	VL					SV 16/0	
100	SPT	100				Pt		CLAY with some wood; black. Soft; saturated; medium plasticity. (Amorphous Peat)	W	VL					SV UTP (wood) 0.0, 0.0, 0.0, [N=0]	
100	OB	100				SM		Silty fine SAND; yellowish brown. Very loose; wet. (Ash)	S	VS						
100	OB	100				OL		Silty CLAY with some wood; black. Soft, saturated; medium plasticity. (Semi-fibrous Peat) 20 mm piece of amber (Kauri gum) @ 9.08 m.	W	VL						
100	OB	100				OL		Silty fine SAND; light brown. Very loose; wet. (Ash)	S	VS					SV 8/0	
100	OB	100				OL		CLAY; black. Very soft; saturated; low plasticity. (Semi-fibrous Peat)	S	VS						
100	OB	100				OL		CLAY with some silt and minor wood and rootlets; dark brown. Very soft; saturated; medium plasticity. (Amorphous Peat)	S	VS					SV UTP (wood) 1.0, 0.0, 0.0, [N=0]	
100	SPT	78				OL		CLAY with minor wood; black. Very soft; saturated; medium plasticity. (Amorphous Peat)	S	VS						
100	OB	100				SM		Sandy SILT; yellow. Very soft; wet; low plasticity; dilatant; sand, fine. (Ash)	W	VS						
100	OB	100				OL		CLAY; black. Very soft; saturated; medium plasticity. (Amorphous Peat)	S	VS						
100	OB	100				SM		Sandy SILT; yellow. Very soft; wet; dilatant. (Ash)	W	VS						
100	OB	100				ML		Carbonaceous wood	W	VS						
100	OB	100				Pt		SILT with trace sand; brownish yellow. Very soft; wet; sand, fine; dilatant. (Ash)	W	VS						
100	OB	100				Pt		CLAY; black. Very soft; wet; medium plasticity; semi-fibrous, slightly spongy, plastic. (Semi-fibrous Peat)	W	VS					SV 8/0	1.1, 2.2, 3.3, [N=10]
100	SPT	100				SP		Fine SAND with some carbonaceous material; light brownish yellow. Loose; wet. (Ash)	W	L						
57	Open Barrel	57				SM		Silty SAND; light brownish yellow. Loose; saturated; dilatant. (Ash)	S	L						
78	SPT	78				Pt		CLAY with minor carbonaceous rootlets; black. Very soft; wet; medium plasticity. (Semi-fibrous Peat)	W	VS					SV 21/0	0.0, 0.0, 0.0, [N=0]
	SPT					OL		@ 13.5 m with wood fragments; dark brown. Soft, saturated; semi-spongy.	S	S						
	SPT					Pt		@ 13.6 m becomes black and amorphous.	S	S						
	SPT					ML		CLAY with minor silt and carbonaceous material; black. Soft, saturated. (Amorphous Peat)	W	S						

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 19/11/15



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Auckland 1141

BOREHOLE with Piezo LOG

Site Identification: **GHD-MBH-37**

Sheet 3 of 4

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm, Old Wairoa Road
Job No.: 51/32174/04

Coordinates: E 1774425.33, N 5897853.93
Surface RL (m): +25.9m
Commenced: 03-Nov-14
Completed: 05-Nov-14

Datum: NZTM
Total Depth: 21.5m
Contractor: Pro-Drill
Driller: Lee Sherwin

Equipment: Excavator Ex60
Shear Vane: Geo 1060
Bore Diameter (mm): 96

Inclination: -90
Comments:

Logged: RV
Processed: RV
Checked: BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES / ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
15.65	Open Barrel	32			Peat (Amorphous)	Pt		SILT, yellow. Soft, wet, low plasticity. (Ash) CLAY with some wood; black. Soft, wet; low plasticity, semi-fibrous, semi-spongy. (Amorphous Peat)	W	S						
15.65	SPT	100				SM Pt		SILT with some sand; yellowish brown. Soft, wet. (Ash) CLAY with some wood fragments; black. Soft, saturated; low plasticity, semi-fibrous, slightly spongy. (Semi-fibrous Peat) @ 15.65 to 16.7 m re-drilled and recovered disturbed core.	W	S					SV 13/0 SPT 0,0, 0,0, 0,0, [N=0]	
15.75	Open Barrel	21				SM OL		@ 15.75 m becomes dark brown. Saturated; medium plasticity SILT with some sand; yellowish, brownish orange. Soft, wet; dilatant. (Ash) CLAY with some wood; black. Soft, saturated; medium plasticity. (Amorphous Peat) @ 16.0 m becomes semi-fibrous and semi-spongy. @ 16.37 m with trace plant fragments.	W	S					Re-drilled and recovered disturbed sample from 15.65 to 16.7 m	
16.37	SPT	100				OL		@ 16.7 m becomes very soft CLAY with minor wood; black. Very soft, saturated; medium plasticity. (Amorphous Peat)	S	VS					SPT 0,0, 0,0, 0,0, [N=0]	
17.44	Open Barrel	100		None		OH		CLAY with trace organic material; dark brownish grey, spotted black. Very soft, moist, high plasticity. (Alluvium) @ 17.86 m becomes firm and light greyish brown. @ 18.0 m becomes light grey.	M	VS					SV 35/8 SPT 0,0, 0,2, 2,1, [N=5]	
19.5	Open Barrel	100			Alluvium (Puketoka)	OL		CLAY with minor silt; light greenish grey. Firm, moist; medium plasticity. (Alluvium) @ 19.5 m becomes very stiff.	M	F					SV 131/32 SPT 2,2, 2,2, 3,3, [N=10]	
20.0	SPT	100				OL		CLAY with some silt and a piece of wood; greenish grey. Very stiff; moist; low plasticity. (Alluvium)	M	VSt						
21.0	Open Barrel	100				OL		Silty CLAY; greenish grey. Very stiff, moist; low plasticity. (Alluvium)	M	VSt						

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 19/11/15



BOREHOLE with Piezo LOG

PO Box 6543
Auckland 1141

Site Identification: **GHD-MBH-37**
Sheet 4 of 4

Project:	SHA Takanini 2a/2b	Coordinates:	E 1774425.33, N 5897853.93	Datum:	NZTM
Client:	Auckland Council	Surface RL (m):	+25.9m	Total Depth:	21.5m
Site:	Kennys' Farm, Old Wairoa Road	Commenced:	03-Nov-14	Contractor:	Pro-Drill
Job No.:	51/32174/04	Completed:	05-Nov-14	Driller:	Lee Sherwin

Equipment:	Excavator Ex60	Inclination:	-90	Logged:	RV
Shear Vane:	Geo 1060	Comments:		Processed:	RV
Bore Diameter (mm):	96			Checked:	BH

Depth (m) [Elev.]	Drilling Method	Core Run / Recovery (%)	Support / Casing (m)	Water	Geological Fm	Classification	Graphic Log	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure (Geological Formation) ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/Relative Density	Weathering	Estimated Rock Strength	RQD (%)	Defect Spacing (mm)	TESTS & SAMPLES ROCK MASS DEFECTS: Depth, Type, Inclinations, Roughness, Texture, Aperture, Coating	Piezometer
21.45	SPT	100	None			OL		Silty CLAY, greenish grey. Very stiff, moist; low plasticity. (Alluvium) Piece of wood @ 21.1 m.	M	VSt					SV 187+ SPT 2.1, 3.2, 3.4, [N=12]	
21.45								Termination Depth = 21.45m, Target depth								
22																
23																
24																
25																
26																
27																
28																



Report of Photographs

Site Identification: GHD-MBH-37

Project	Takanini 2a/2b Conveyance	Commenced	03/11/14	Completed	05/11/14
Site	Kennys' Farm, Old Wairoa Road	Logged By	RV		
Job #	51-32174-04	Checked By	BH		
Client	Auckland Council	Hole Depth	0.0 m to 21.5 m bgl		



0.0 m to 4.0 m



4.0 m to 8.0 m



Report of Photographs

Site Identification: GHD-MBH-37

Project Takanini 2a/2b Conveyance	Commenced 03/11/14	Completed 05/11/14
Site Kennys' Farm, Old Wairoa Road	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 21.5 m bgl	



8.0 m to 10.28 m



10.28 m to 13.04 m



Report of Photographs

Site Identification: GHD-MBH-37

Project Takanini 2a/2b Conveyance	Commenced 03/11/14	Completed 05/11/14
Site Kennys' Farm, Old Wairoa Road	Logged By RV	
Job # 51-32174-04	Checked By BH	
Client Auckland Council	Hole Depth 0.0 m to 21.5 m bgl	



13.04 m to 16.37 m



16.37 m to 18.78 m



Report of Photographs

Site Identification: GHD-MBH-37

Project	Takanini 2a/2b Conveyance	Commenced	03/11/14	Completed	05/11/14
Site	Kennys' Farm, Old Wairoa Road	Logged By	RV		
Job #	51-32174-04	Checked By	BH		
Client	Auckland Council	Hole Depth	0.0 m to 21.5 m bgl		



18.78 m to 21.45 m



GHD Limited

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Auckland 1141

HAND AUGER LOG

Site Identification: **GHD-HA1**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Refer to Site Plan
Job No.: 51/32174/04

Coordinates: E 1773903.4, N 5897892.7
Surface RL (m): +22.3m
Commenced: 06-Jan-14
Completed: 06-Jan-14

Datum: NZTM
Total Depth: 5.0m

Contractor:**Equipment:** 50 mm hand auger**Shear Vane:** Geo946**Logged:** SKA**Processed:** BF**Checked:** SKA**Hole Diameter (mm):** 50

Depth (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation)	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.30 [+22.0]		X X X X	ML	SILT; dark brown. Non plastic [TOPSOIL]	D	St				
		0.50 [+21.8]		X X X X	OL	... from 0.2 m, becomes moist	M					
		1.00 [+21.8]		X X X X	Pt	SILT with minor clay; dark brown to black. Low plasticity. [ORGANIC SILT]	W	S	0.50	10/3		
		1.00 [+21.8]		X X X X	Pt	PEAT, fibrous to amorphous; black. ... from 0.6 m, becomes saturated	S	S				
1		1.00 [+21.8]		X X X X	SP	Silty SAND; light brown white, brown streaks. Poorly graded [PUMICEOUS SAND]	S	L				1
				X X X X	Pt	PEAT, amorphous, some fibrous inclusions; black. No recovery. ... at 1.2 m, rootlet.	S	S	1.50	10/0		
2				X X X X					2.00	11/2		2
				X X X X					2.70	13/2		
3				X X X X					3.20	82/16 (rootlets)		3
				X X X X					3.50	48/33		
4		4.00 [+18.3]		X X X X	Pt	PEAT, spongy to fibrous; black. No recovery. Saturated, amorphous organic material.	S	F	4.00	48/16		4
				X X X X		... at 4.5 m, tree remnant, rootlets.						
5		5.00 [+17.3]		X X X X		... at 4.8 m, tree remnant.						5
						Termination Depth = 5m (Target depth)						
6												6
7												7

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 18/15



GHD Centre, Level 3
27 Napier Street, Freemans Bay
PO Box 6543
Auckland, New Zealand
Tel: +64 9 370 8000
www.ghd.com

PIEZO INSTALLATION SUMMARY

HA1

Client: **Auckland Council**
Project: **SHA – Takanini 2a/2b**
Location: **Takanini**
Project Reference: **51-32174**

BOREHOLE INFORMATION

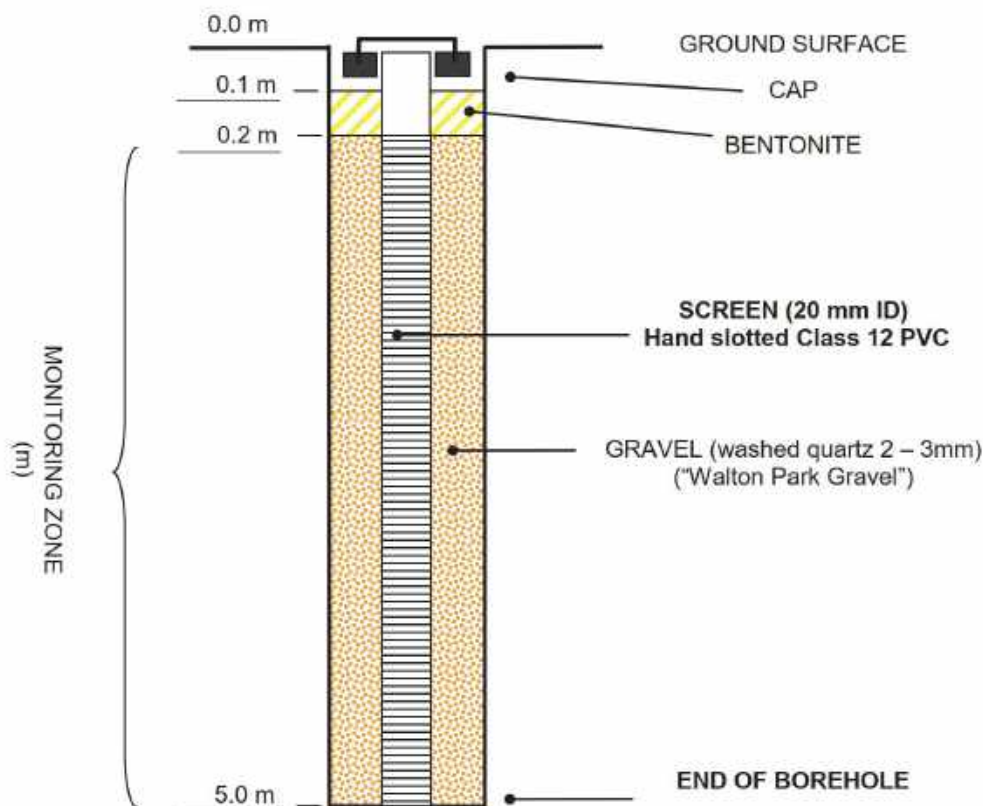
Drilling Method: Hand Auger
Diameter Core: 50
Contractor: NA

CO-ORDINATES:

Easting: 1773398
Northing: 5897698
Ground Level:

DATE INSTALLED: 06/01/14

VERIFIED BY: TS



NOTE: Geology summarized in borehole logs

NOT TO SCALE



PO Box 6543
Auckland 1141

HAND AUGER LOG

Site Identification: **GHD-HA2**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Refer to Site Plan
Job No.: 51/32174/04

Coordinates: E 1773894, N 5897919.3
Surface RL (m): +22.3m
Commenced: 10-Jan-14
Completed: 10-Jan-14

Datum: NZTM
Total Depth: 5.0m

Contractor:

Equipment: 50 mm hand auger

Shear Vane: Geo946

Hole Diameter (mm): 50

Logged: SKA
Processed: BF
Checked: SKA

Depth (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation)	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
					ML	SILT; dark brown. Non plastic. [TOPSOIL]	M	St				
		0.30 [+22.0]			OL	SILT; dark brown, spotted reddish brown. Non plastic; some amorphous organic inclusion. [ORGANIC SILT]	M	St				
		0.50 [+21.8]			Pt	PEAT, amorphous to firm; dark brown, black	W	S	0.50	13/5		
		0.90 [+20.6]			SP	Silty SAND; light brownish white, brown streaks. Poorly graded. SAND; fine. [DILATENT SAND]	S	1*				
					Pt	PEAT, amorphous, spongy; black. ... from 1.1 m, low recovery < 10 %.	S	S	1.10	20/3		
									1.50	23/5		
						... at 2.0 m, fibrous inclusions, tree rootlets.			2.00	10/5		
									2.50	26/5		
						... from 2.9 m, becomes fibrous PEAT with amorphous inclusions. ... at 3.1 m, tree rootlet.			3.10	13/7		
									3.50	20/10		
		3.80 [+18.5]			Pt	PEAT; amorphous to spongy; black. Some fibrous (rootlets) inclusions.	S	S	4.00	10/7		
									4.50	92/0 (rootlets)		
		5.00 [+17.3]				Termination Depth = 5m (Target depth)			5.00	33/20		

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 18/15



GHD Centre, Level 3
27 Napier Street, Freemans Bay
PO Box 6543
Auckland, New Zealand
Tel: +64 9 370 8000
www.ghd.com

PIEZO INSTALLATION SUMMARY

HA2

Client: **Auckland Council**
Project: **SHA – Takanini 2a/2b**
Location: **Takanini**
Project Reference: **51-32174**

BOREHOLE INFORMATION

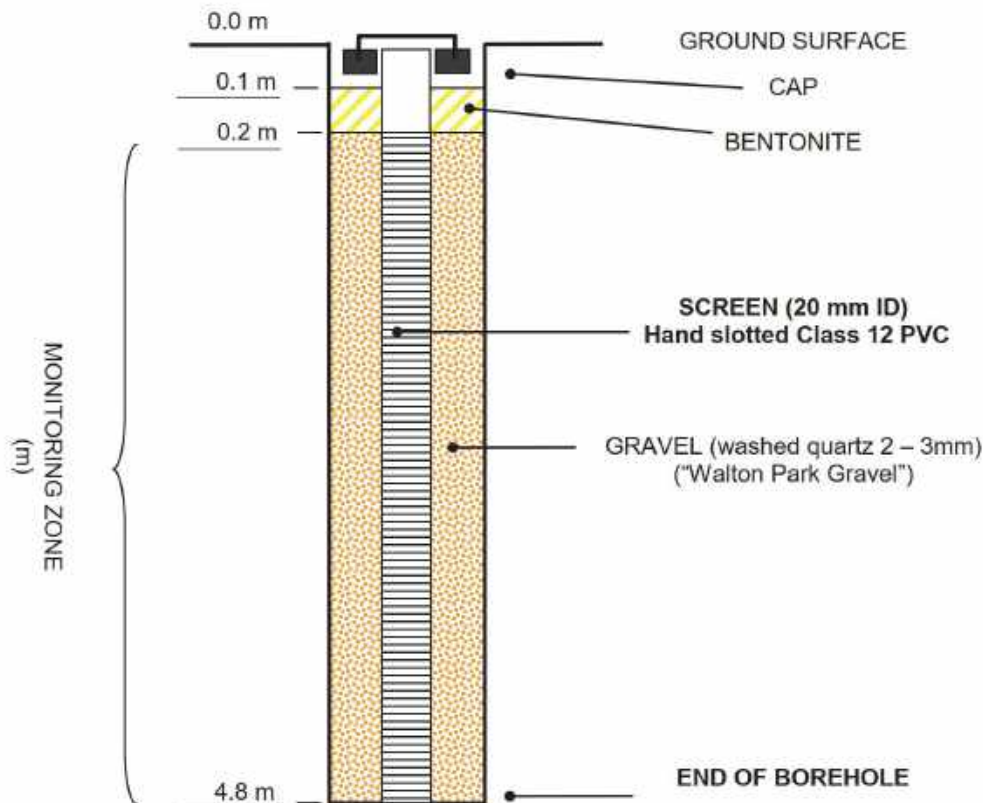
Drilling Method: Hand Auger
Diameter Core: 50
Contractor: NA

CO-ORDINATES:

Easting: 1773571
Northing: 5897753
Ground Level:

DATE INSTALLED: 06/01/14

VERIFIED BY: TS



NOTE: Geology summarized in borehole logs

NOT TO SCALE



PO Box 6543
Auckland 1141

HAND AUGER LOG

Site Identification: **GHD-HA3**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Refer to Site Plan
Job No.: 51/32174/04

Coordinates: E 1773880.4, N 5897954.6
Surface RL (m): +22.3m
Commenced: 09-Jan-14
Completed: 09-Jan-14

Datum: NZTM
Total Depth: 5.0m

Contractor:

Equipment: 50 mm hand auger

Shear Vane: Geo946

Logged: SKA
Processed: BF
Checked: SKA

Hole Diameter (mm): 50

Depth (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation)	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.40 [+21.9]		X X X X	ML	SILT; dark brown, reddish brown. Non plastic. [TOPSOIL]	M	St				
		0.70 [+21.6]		U U U U	Pt	PEAT, amorphous, minor fibrous; black.	W	S	0.50	23/3		
		1.00 [+21.3]		U U U U	OH	CLAY; dark brown, black streaks. High plasticity. Minor fibrous organic inclusion. [ORGANIC CLAY]	S	F				
1		1.20 [+21.1]		X X X X	ML	Sandy SILT; light brown white, dark brown streaks. Non plastic. [SENSITIVE SILT]	S	F	1.00	28/3		1
				U U U U	Pt	PEAT, amorphous; black.	S	S				
				U U U U		... at 1.4 m, fibrous organic inclusion, tree remnant.			1.80	3/2		
2				U U U U		... from 1.6 m, no recovery < 10 %, amorphous PEAT with trace fibrous.			2.00	10/3		2
				U U U U		... from 2.3 m, fibrous organic inclusion, becomes fibrous PEAT with amorphous inclusion.			2.50	79/25 (fibrous)		
3				U U U U		... at 3.1 m, fibrous inclusion, tree remnant. Too difficult to Auger. 3.1 m - 3.7 m, tree remnant.			3.00	62/16 (fibrous)		3
		3.70 [+18.6]		U U U U	Pt	PEAT, amorphous, some fibrous inclusion; dark brown.	S	S				
4				U U U U					4.00	56/16 (fibrous)		4
				U U U U					4.50	39/16		
5		5.00 [+17.3]		U U U U		Termination Depth = 5m (Target depth)			5.00	33/13		5
6												6
7												7

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/8/15



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PIEZO INSTALLATION SUMMARY

HA3

Client: **Auckland Council**
Project: **SHA – Takanini 2a/2b**
Location: **Takanini**
Project Reference: **51-32174**

BOREHOLE INFORMATION

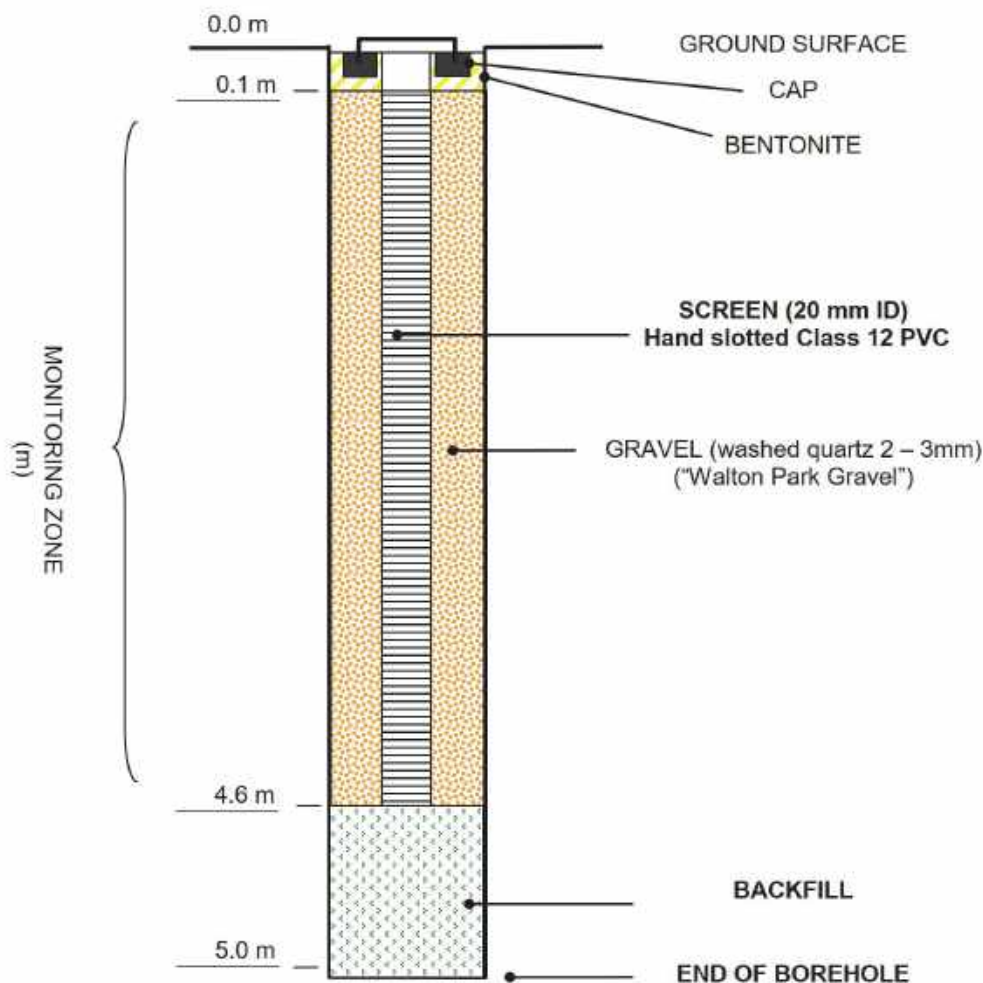
Drilling Method: Hand Auger
Diameter Core: 50
Contractor: NA

CO-ORDINATES:

Easting: 1773571
Northing: 5897753
Ground Level:

DATE INSTALLED: 06/01/14

VERIFIED BY: TS



NOTE: Geology summarized in borehole logs

NOT TO SCALE



PO Box 6543
Auckland 1141

HAND AUGER LOG

Site Identification: **GHD-HA4**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Refer to Site Plan
Job No.: 51/32174/04

Coordinates: E 1774512.5, N 5897730.9
Surface RL (m): +26.0m
Commenced: 07-Jan-14
Completed: 07-Jan-14

Datum: NZTM
Total Depth: 4.4m

Contractor:

Equipment: 50 mm hand auger

Shear Vane: Geo946

Logged: SKA

Processed: BF

Checked: SKA

Hole Diameter (mm): 50

Depth (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation)	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
0.20 [+25.8]				X X	ML	SILT; brown, spotted black. Non plastic. [TOPSOIL]; minor organic inclusion.	M	St				
0.60 [+25.4]				X X	OL	SILT, dark brown to black. Non plastic. Amorphous organic inclusion. [ORGANIC SILT]	W	F				
				X X	Pt	... from 0.4 m, fibrous to amorphous organic inclusion.	W	S	0.50	18/2		
				X X		PEAT, fibrous, spongy; black, spotted dark brown.						
				X X		... from 1.1 m, becomes amorphous.			1.10	21/3		
				X X		... at 1.3 m, sandy SILT; light yellow white. Firm, wet, non plastic. [PUMICEOUS SILT]						
				X X		... at 1.5 m, tree remnant.			1.80	13/10		
				X X		... from 1.6 m, thinly interbedded organic SILT.						
2.10 [+23.8]				X X	OL	SILT; dark grey to dark brown. Non plastic.	S	S	2.00	21/10		
				X X	Pt	Amorphous organic inclusion [ORGANIC SILT]	S	S				
				X X		PEAT, amorphous; black to dark brown.			2.50	0/0		
3.00 [+23.0]				X X	OH	... at 2.9 m, tree rootlet.	S	S	3.00	16/10		
3.30 [+22.7]				X X	CH	CLAY; light brownish white, dark brown streaks. High plasticity. [ORGANIC CLAY]	S	S	3.50	25/13		
4.00 [+22.0]				X X	OH	CLAY; light yellow grey, dark brown streaks. High plasticity. Hole swelling at 3.3 m, becomes difficult to auger.	S	S	4.00	18/10		
4.40 [+21.6]				X X		Termination Depth = 4.4m (Too Difficult to Auger (Tree Root))			4.40	229 +		

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/8/15



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PIEZO INSTALLATION SUMMARY

HA4

Client: **Auckland Council**
Project: **SHA – Takanini 2a/2b**
Location: **Takanini**
Project Reference: **51-32174**

BOREHOLE INFORMATION

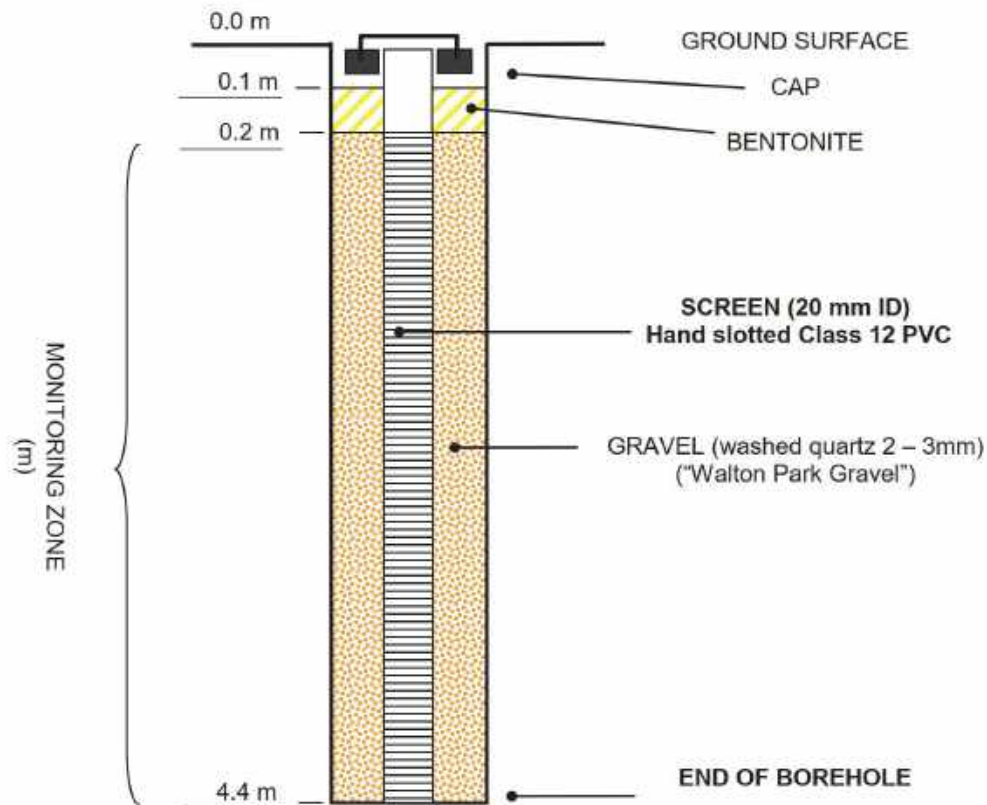
Drilling Method: Hand Auger
Diameter Core: 50
Contractor: NA

CO-ORDINATES:

Easting: 1773465
Northing: 5897535
Ground Level:

DATE INSTALLED: 06/01/14

VERIFIED BY: TS



NOTE: Geology summarized in borehole logs

NOT TO SCALE


 PO Box 6543
 Auckland 1141

HAND AUGER LOG

Site Identification: **GHD-HA5**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Refer to Site Plan
Job No.: 51/32174/04

Coordinates: E 1774773.1, N 5897829.8
Surface RL (m): +26.8m
Commenced: 07-Jan-14
Completed: 07-Jan-14

Datum: NZTM
Total Depth: 2.5m

Contractor:**Equipment:** 50 mm hand auger**Shear Vane:** Geo946**Hole Diameter (mm):** 50

Logged:	SKA
Processed:	BF
Checked:	SKA

Depth (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name [minor MAJOR], colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation)	Moisture Condition	Consistency/ Relative Density	Sample Type & Depth	Sample No.	Sample/ Test Records & Comments	Depth Scale (m)
		0.10 [+26.7]	Fill			SILT with minor fine gravel; brown. Angular roading aggregate.	D	VSt				
		0.30 [+26.6]				Gravelly SILT; brown mottled light yellow brown. Non plastic. Fine to medium gravel, angular roading aggregate.	D	VSt				
		0.50 [+26.5]			ML		M	St	0.50	120/23		
		0.80 [+26.0]			ML		M	St				
					OH	SILT with minor clay; grey, orange streaks, spotted black. Non plastic. Trace gravel.	Wt	F - St	1.00	57/10		
1		1.20 [+25.6]	Pukeloka Fm		Pt	Silty CLAY; light grey, black streaks. Stiff, medium low plasticity.	S	S	1.50	18/7		
						... from 0.6 m, spotted black, orange bands, becomes light grey brown.						
						CLAY; brownish black, black streaks. High plasticity, amorphous organic inclusion. [ORGANIC CLAY]						
						... from 1.1 m, becomes saturated.						
2		2.00 [+24.8]			OH	PEAT, amorphous; black, saturated.	W	F - St	2.00	49/13		
						... from 1.3 m, low recovery < 10 %.						
						... from 1.6 m, interbedded organic CLAY; dark brown. High plasticity.						
		2.30 [+24.6]			ML	... at 1.8 m, interlaminated sandy clayey SILT; light yellow white. Firm, wet. Low plasticity.	M	St	2.50	229 +		
		2.50 [+24.3]				Silty CLAY; light brown grey to grey black streaks. Low plasticity. [ORGANIC CLAY] Note: Hole squeezing						
3						Sandy SILT; light yellow brown. Non plastic.						
						Termination Depth = 2.5m (Too Stiff to Auger)						

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/8/15



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PIEZO INSTALLATION SUMMARY

HA5

Client: **Auckland Council**
Project: **SHA – Takanini 2a/2b**
Location: **Takanini**
Project Reference: **51-32174**

BOREHOLE INFORMATION

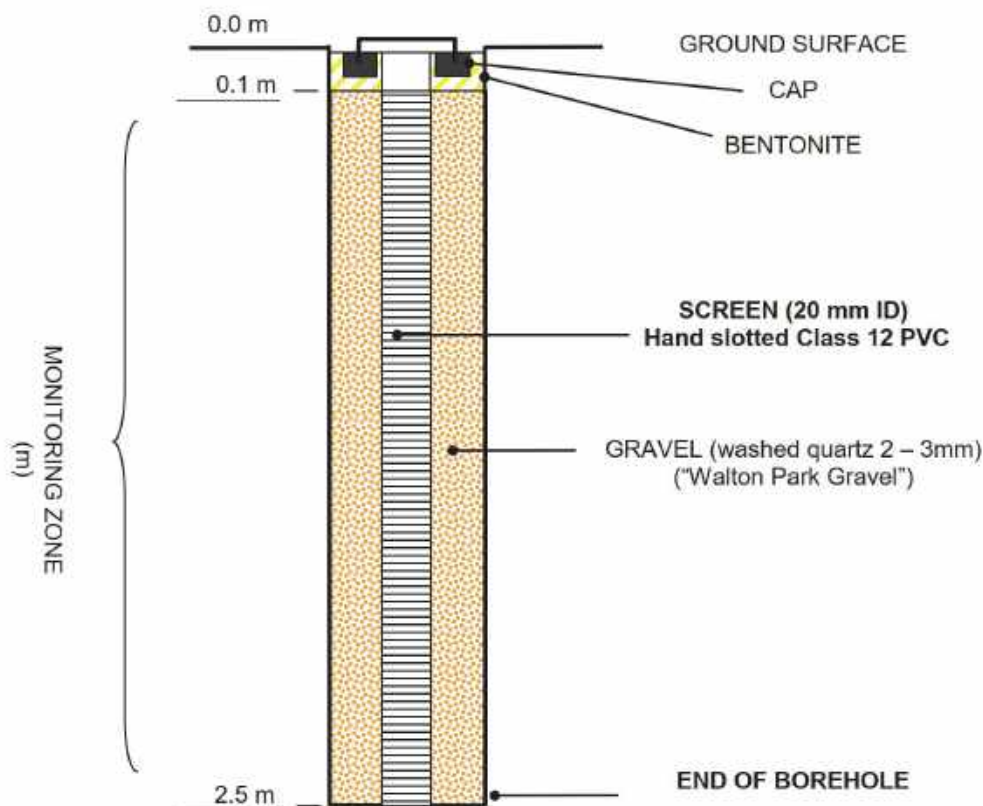
Drilling Method: Hand Auger
Diameter Core: 50
Contractor: NA

CO-ORDINATES:

Easting: 1773551
Northing: 5897644
Ground Level:

DATE INSTALLED: 06/01/14

VERIFIED BY: TS



NOTE: Geology summarized in borehole logs

NOT TO SCALE

CLIENT: Ardmore Airport Limited		LOGGED: MF CHECKED : PM		SHEET: 1 OF 4		JOB No.: 3919PA								
LOCATION: Ardmore Airport Ardmore		DIAMETER: 50 mm		DATE: 4/6/08		HAND AUGER No.: 1								
Stratigraphy	SOIL DESCRIPTION			Legend	GL(m) Depth : (m)	Water Level	Peak Strength (kPa)	Dial DR5395	Remoulded Strength (kPa)	Sensitivity	Comments	Samples	Other	Tests
Tauranga Group Materials	Topsoil													
	NATURAL: Firm, slightly plastic, dark brownish grey silty CLAY (with organic odour): moist				0.5	4/6/08	61	13	4.7					
	-becoming soft, highly plastic, brownish grey with rare dark orange streaks: wet						36	7	5.1					
	-with rare black (organic??) spots				1.0									
	Soft, slightly plastic, dark brown, silty clay PEAT with fine fibrous material: saturated						34	7	4.9					
	-poor retrieval				1.5		40	10	4.0					
							34	13	2.6					
					2.0		39	10	3.9					
					2.5		35	18	1.9					
					3.0		29	18	1.6					
	End of borehole @ 3.0 metres (Target Depth) Groundwater during drilling encountered @ 1.0 metres. Standing groundwater on completion measured @ 0.7 metres.													
					3.5									
					4.0									
					4.5									
					5.0									

GEOTEK SERVICES LIMITED

PAPAKURA BRANCH: 37 Elliott Street, PO Box 272-1217, Papakura, Manukau 2244, Auckland
Phone (64-9) 296-7241 Facsimile (64-9) 296-7243

HEAD OFFICE: Cnr Moore & Vincent Streets, PO Box 39-015, Howick, Manukau 2145, Auckland
Phone (64-9) 535-9814 Facsimile (64-9) 535-7243 E-mail enquiries@geotek.co.nz



LEGEND

- HA3 Hand auger borehole locations
- 303 Reviewed sites



GEOTEK SERVICES LIMITED

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Phone (64-9) 296-7241 Facsimile (64-9) 296-7243

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Phone (64-9) 535-9814 Facsimile (64-9) 535-7243 E-mail enquiries@geotek.co.nz

TITLE: Geotechnical Review and Borehole Location Plan
CLIENT: Ardmore Airport Limited
LOCATION : Ardmore Airport
Ardmore

SCALE	1:6000 (approx.)	@ A3
DRAWING No.	3919PA-2	
DRAWN BY	MF	
DATE	11/9/08	
SHEET	2	OF 2

C512-12-2465

Bore ID 21027

Consent No 23121

SWL-306
Post-157

1774319.8

5899485.8

Drillhole Log

Prospect	Hole No 3	Co-ordinates mE 2684714.2	mN 6461149.0
Drill Rig	Date Jan 2000	Logged by Des Oxnam	

Interval (m)		Geological Log			
From	To	Rock/Soil Type	Symbol	Colour	Description
0	4.0	Clay		Brown	clays
4.0	4.5	Clay		Green/grey	Clays
4.5	9.0				Mudstone with bands of sandstone
9.0	10.5				mudstone
10.5	67.0				Lithic sandstone with interbedded mudstone (?Kaihu)
67.0	157.0				Hard sandstone with mudstone layers (Amokura?)
157.0	175.0				Muddy sanstone with hard bands
175.0	213.0				Sandstone
213.0	220.0				Firm sandstone
220.0	230.0				Sandstone with fireclay bands
230.0	241.0				Hard fractured sandstone
241.0	249.0				Hard greywacke
249.0	258.0				Extremely hard greywacke
255.0	258.0				

2684691.7
 6461201.3
 BH2
 ID 21027
 Probed
 Bore
 1774297
 5899538

Client: Mr. Campbell

Date: 20th July 1982

Day: Tuesday

Engineers:

Rig No.: 1

Location: Airfield rd Ardmore.

Tender Truck No.: 2

Size and Purpose of Bore: 100mm water well

R12: 849617

Work Details and Bore Hole No.: Arrived on site

with all equipment. Setup rig
commenced drilling 150mm
hole. Went into a log at 3m
an hole went slightly off
learned hole to 200mm to
5m depth. Continued drilling 150mm
hole from 5m to 38.8m
with new rods, collar from
hole. Ceased work.

Carted 2 loads of water
during day.

Bore Log:

0m - 0.5m Top soil
0.5m - 3m Timber + Peat
3m - 5m Timber
5m - 10m Peat + timber
10m - 16m Pumice + sand.
16m - 24m Mudstone.
24m - 30m Coarse Sandstone
with shell
30m - 42m Line Intruded
Sandstone
42m - 95.48m Sandstone
+ Mudstone.

GROUNDWATER A.R.W.B.	
W.R. No.	3129
NAME	CHARTERED
TECHNICAL FILES	
D1121	OKS
ACTIONED	
BORE LOG	OKS
PUMP TEST	OKS
COMPUTER	OKS
WATER QUAL	

Materials Used:

Start 8.30am Finish 4.15pm

Meals and Other Breaks

Stand-by Hours

Rig Working Hours

Contract Rates

Rig Truck Km

: 4 Km

Water Tender Truck Km

: 8 Km

Tire Equipment

:

Utility or Van Service Km

: 8 Km

x 6 Winch Truck Km

:

Client's Representative:

Crew:

Driller: JG Faulkner. JG Faulkner.

Client: Mr J Campbell

Date: 21st July 1982

Day: Wednesday

Engineers:

Rig No.: 1

Location: Ardmore.

Tender Truck No.: 2

Size and Purpose of Bore: 100mm water Well

Work Details and Bore Hole No.: Arrived on site with casing prepared + bored 39m of 100mm to bottom of hole. Lowered rods + collar to bottom with 100mm drag bit attached. Commenced drilling 100mm hole for 38.8m to 95.48m. Pulled back to 62m. Went + got compressor. Blew bore at 1500gph from 3pm to 5pm. Ceased work. Carted 31 loads of water during day.

Bore Log :

Materials Used:

39m x 100mm Casing
1 x 3tooth casing shoe

Start 7.45am Finish 5.00pm :

Meals and Other Breaks :

Stand-by Hours :

Rig Working Hours :

: 3 hours.

Contract Rates :

Rig Truck Km :

Water Tender Truck Km :

Hire Equipment :

Utility or Van Service Km :

6 x 6 Winch Truck Km :

Client's Representative:

Crew:

Driller:

J. Faulkner J. Faulkner

№ 464

P.O. BOX 576, MANUREWA

Date: 22nd July 1982

Day: Thursday

Rig No.: 1

Tender Truck No.: 2

Size and Purpose of Bore: 100mm water Well

Work Details and Bore Hole No.: Continued

Bore Log

blowing bare from 9.00am to
11.00am Packed up rig + gear
left site at 12.00pm w/ all equipment

General 17 1/2 lbs. willing, @ \$2.27 per unit.

56.6% of 10'ian Drilling, @	74.60 per meter.	\$ 227.32
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[illegible]

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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2017-2018

[illegible]

Materials Used:

Compressor hire

Start 9:00am Finish 12:00pm

Meals and Other Breaks

Stand-by Hours

Rig Working Hours

Contract Rates

Rig Truck Km

2 km

Client's Representative:

Water Tender Truck Km

: 2km

Hire Equipment

• [Download the PDF](#)

Crew:

Utility or Van Service Km

$\therefore 8 \text{ Km}$

— 6 —

6 x 6 Winch Truck Km

■ [Download the full report](#)

Driller

ST Kaubine J G Fambner,

Client: I John Cambell

Date: 14th December 1982

Day: Wednesday Tuesday

Engineers:

Rig No.: 1

Location: Ardmore Airfield rd RD.2 Papakura

Tender Truck No.: 2

Size and Purpose of Bore: 100mm Water Well

Work Details and Bore Hole No.: Arrived with all gear. Set up rig over bore. Pulled pump from hole. Ran rods to 67m. Reamed hole from 67m to 95.48m. Found there to be a clay ball up in hole. Cleaned hole & right out. Pulled back to 65m. Blew bore at 2,500gph for 1½ hours. Pulled drill rods from hole. Ceased work.

Bore Log :

Materials Used:

Start 9.30am Finish 4.45pm

Meals and Other Breaks :

Stand-by Hours :

Rig Working Hours :

Contract Rates :

Rig Truck Km :

Water Tender Truck Km :

Hire Equipment :

Utility or Van Service Km :

6 x 6 Winch Truck Km :

Client's Representative:

Crew:

Driller:

S. J. E. Fuller. J. C. Faulkner.

Client: Mr John Cambell

Date: 15th December 1982

Day: Wednesday

Engineers:

Rig No.: 1

Location: Ardmore

Tender Truck No.: 2

Size and Purpose of Bore: 100mm Water Well

Work Details and Bore Hole No.: Lowered pump
back into hole. Packed up gear
+ rig left site with all gear.

Bore Log :

Maximum recommended pumping
rate 1800 gpm.

Materials Used:

Start 7.15am Finish 9.30am

Meals and Other Breaks

Stand-by Hours

Rig Working Hours

Contract Rates

Rig Truck Km

Water Tender Truck Km

Hire Equipment

Utility or Van Service Km

6 x 6 Winch Truck Km

Client's Representative:

Crew:

Driller: S.J. Kullane J.C. Kullane

CSIB-12-2465

Drillhole Log

cased 157 m

sml 5.0 m

Prospect	Hole No 2	Co-ordinates mE 2684691.7	mN 6461201.3
Drill Rig	Date Sep 1999	Logged by I. Van Houtte	

Interval (m)		Geological Log			
From	To	Rock/Soil Type	Symbol	Colour	Description
0	5.0	Clay			Clay
5.0	78.0				Waitemata sandstone/mudstone
78.0	90.8				Waitemata sandstone/mudstone
90.8	140.0				Sandstones (20% circulation loss)
140.0	149.0				Mudstone
149.0	223.7				Fractured sandstones (30% circulation loss)
223.7	224.3				Lignite coal
224.3	226.8				Fireclay
226.8	228.4				Fire clays with hard bars (Siderite)
228.4	229.85				Coal
229.85	232.0				Fireclay
232.0	243.0				Very hard sandstone
243.0	250.0				Greywacke

270

C512-12-2446

Drillhole Log

Cased 157 m Sud 3.2 m

Prospect	Hole No 1	Co-ordinates mE 2684735.3	mN 6460636.1
Drill Rig	Date Aug 1999 -	Logged by I. Van Houtte	

Interval (m)		Geological Log			
From	To	Rock/Soil Type	Symbol	Colour	Description
0	1.0	Clay			Clays
1.0	15.0	Peat			Peat/timber
15.0	43.0	Silt	Tg		Clays and Silts
43.0	50.0				Green glauconitic sandstone (Kaihu Group)
50.0	68.0				Interbedded sandstone and mudstones
68.0	80.0				Hard fractured sandstones
80.0	90.0				Mudstone
90.0	96.0				Interbedded sandstone and mudstones
96.0	107.0				Mudstone
107.0	112.0				Very hard sandstone
112.0	153.0				Interbedded sandstone and mudstones
153.0	166.0				Very hard sandstone (20% circulation loss)
166.0	208.0				Mudstone
208.0	238.5				Fractured sandstone (15% circulation loss)
238.5	246.0				Fractured greywacke (15% circulation loss)
246.0	260.6				Fractured greywacke (40% circulation loss)

265

DRILLWELL EXPLORATION N.Z. LIMITED

9 Rawson Way
Takanini
AUCKLAND

DRILLING CONTRACTORS

DAILY LOG SHEET

LOG No. 27609

P.O. BOX 360 MANUREW/

Day: Thursday

Date: 30-4-98

Client: A.R.C.

Rig No:

Consultant/Engineer:

Tender Truck No:

Location: Hamlins road.

Compressor No:

Purpose of Bore: Monitoring Bore Repair.

Bore Hole No:

Bore Size:

Map Reference No:

Permit No:

Work Details: on site 9.30

Bore Log:

Lay out Roran Sings
 Cones etc. check with
 CABLE locator. on
 position of cable's
 (locator stayed while
 Digging as cable very
 close to Bore) Dig
 with Digger To 1.2m
 Around Bent Pipe.
 Cut off - Clean and
 weld. on Turned out
 socket add 1m
 4" casing short -
 add 400 lockable
 cap. Back fill hole
 and compact.
 Pick up Sings etc.
 leave site 11.30

(512-12-1240)

For Repair details
 See G064-C01-07.

Materials Used: 1 TUNCO 4" Socket
 1m 4" casing short.
 400 lockable cap
 Digger Hire
 Welder - Generator Hire.

Start Time: 9.30 Finish Time: 11.30 Total Time:

Meals and Other Breaks:

Drill Rig Km

Rig Working Hours

Client's Representative:

Water Tender Truck Km

Stand-By Hours

6 x 6 Crane Truck Km

Compressor Hours

Drill Crew: Gary

L1 Rig Towing Truck Km

DH Hammer Hours

Utility or Van Service Km

Contract Rates

Driller: mp 166m

Other

Travel Hours

Other

DRILLWELL EXPLORATION N.Z. LIMITED

9 Rawson Way
Takanini
AUCKLAND

DRILLING CONTRACTORS
DAILY LOG SHEET

LOG No. 27257

P.O. BOX 360 MANUREWA

Day: Tuesday Date: 5.5.95Client: A.D.C.Rig No: 3

Consultant/Engineer: _____

Tender Truck No: 27Location: Hamling Rd AucklandCompressor No: HivePurpose of Bore: Cleanout & RepairBore Hole No: 1Bore Size: 100mm

Map Reference No: _____

Permit No: _____

Work Details:

Bore Log:

Arrived on site 7.30
Positioned rig over existing
bore & set up mast & drill-
pit. Ran rods to 138.55m
Flushed hole clean.
Pulled back rods to 77.1m
Set up headworks & air
lines. Began to develop
bore for 1hr. Dismantled
Airworks.
Pulled out remaining rods
& collar.
Packed up rig & site.
NB: Bore producing 164 Gph
at 77.1m.
Ceased work 1.00

Materials Used: Compressor HiveStart Time: 7.30 Finish Time: 1.00 Total Time: 5 1/2 Meals and Other Breaks: _____

Drill Rig Km

6

Rig Working Hours

5 1/2

Client's Representative: _____

Water Tender Truck Km

6

Stand-By Hours

:

5 x 6 Crane Truck Km

:

Compressor Hours

:

Drill Crew: S. O'Brien

1.1. Rig Towing Truck Km

:

OH Hammer Hours

:

Utility or Van Service Km

:

Contract Rates

:

Driller: C. Brown

Travel Hours

:

DRILLWELL EXPLORATION N.Z. LIMITED

9 Rawson Way
Takanini
AUCKLAND

DRILLING CONTRACTORS
DAILY LOG SHEET

LOG No. 27258

P.O. BOX 360 MANUREWA

Day: MondayDate: 11-5-98Client: ARC

Rig No: _____

Consultant/Engineer: _____

Tender Truck No: 9Location: Hamilins RD Ardmore

Compressor No: _____

Purpose of Bore: Repair

Bore Hole No: _____

Bore Size: _____

Map Reference No: _____

Permit No: _____

Work Details: On Site 8.30

Bore Log: _____

After Picking up Posts
& Timber. Arrs loading
Trailers with Bulbex mix
Dig Holes for 3 Posts
& Cement IN. Install
2 Rail's Around
Bore. Dig out Pav
Arrs mix concrete.
Around. Clean Gear.

Site 10.45

Materials Used: 2 BAGS cement.3 W22 Round Post.12m 150x40 H3 Rail's4 BAGS DRICON1/4 Motor Bulbex mixStart Time: 8.00 Finish Time: 11.00 Total Time: _____

Meals and Other Breaks: _____

Drill Rig Km: _____

Rig Working Hours: _____

Client's Representative: _____

Water Tender Truck Km: _____

Stand-By Hours: _____

5 x 6 Crane Truck Km: _____

Compressor Hours: _____

1.1 Rig Towing Truck Km: _____

DH Hammer Hours: _____

Utility or Van Service Km: 8km

Contract Rates: _____

Travel Hours: _____

Drill Crew: _____

Gary A.Driller: M. J. Wilson

DRILLWELL EXPLORATION N.Z. LTD.

DRILLING CONTRACTORS

DAILY LOG SHEET

19883

P.O. BOX 360 MANUREWA

Client: AUCKLAND REGIONAL COUNCIL Date: 11-5-94

Day: WEDNESDAY

Engineers:

Rig No.: 3

Location: HAMLINS ROAD
PAPAKURA

Tender Truck No.: 27

Permit No C512-12-1240

Size and Purpose of Bore: 100mm MONITOR BORE Order No

Work Details and Bore Hole No.: ①

Bore Log :

On site at 7.00am.
Set up and leveled rig. Proceeded wash
drilling 150mm hole
to a depth of 45.00
metres. Installed 100mm
casing. Ran rods and
100mm drag bit. Drilled
to 83.69 metres. Pulled
out rods and 100mm casing.
Ran rods to 45.00 metres
and reamed out to a
depth of 84.89 metres.
Pulled out rods and ran
84.89 metres of 100mm casing.
Grouted hole using 21
bags of cement. Flushed
pump, cleaned gear, ceased work.

0-1.00m BROWN CLAY
1.00-2.00m BROWN ORGANKS
2.00-20.00m ORGANKS + TIMBER
20.00-43.00m SANDY SILTS
43.00-59.00m PEAT
59.00-66.00m GREY SILTS
66.00-72.00m SANDY SILTS
72.00-84.00m MUDSTONE.

N.B. - 3½ HOURS SPENT

INSTALLING 100mm CASING

DRILLING 100mm PROBE HOLE

PULLING OUT CASING &

RUNNING RODS BACK TO
45.00 METRES.

Materials Used:

21 x 40KG BAGS OF CEMENT

84.89m x 100mm CASING

1 x 100mm CASING SHOE (PLAIN)

3 x 50 Kg BAGS OF BRAN

Start 7.00 Finish 6.30 : 11½

Meals and Other Breaks :

Stand-by Hours :

Rig Working Hours :

Contract Rates

: 3½ hours
running and pulling
casing and drilling
100mm probe hole

Rig Truck Km

7

Water Tender Truck Km

7

6 x 6 Winch Truck Km

7

Client's Representative:

Crew:

S.P.O'BRIEN

DRILLWELL EXPLORATION N.Z. LTD.

DRILLING CONTRACTORS

DAILY LOG SHEET

19884

P.O. BOX 360 MANUREWA

Client: AUCKLAND REGIONAL COUNCIL

Date: 12-5-94

Day: THURSDAY

Engineers:

Rig No.: 3

Location:

HAMLINS ROAD
PAPAKURA

Tender Truck No.: 27

Size and Purpose of Bore: 100mm MONITOR BORE

Work Details and Bore Hole No.: ①

On site at 7.30am.
 Ran rods and 100mm
 drag-bit. Drilled out
 cement in casing mouth
 and wash drilled to
 a depth of 138.55 metres.
 Pulled out rods and
 installed airline to 85.00m.
 Proceeded development
 of bore, loaded loose
 gear onto tender, cleaned
 up site and ceased work.

Bore Log :

84.00 - 138.55m MUDSTONE
+ SANDSTONE.

AIRLINE DEPTH ÷ 85.00m.

FLOW RATE ÷ 164 GPH.

STATIC WATER LEVEL ÷ 16.00m

START PRESSURE ÷ 120 P.S.I

RUNNING PRESSURE ÷ 30 P.S.I

Materials Used:

COMPRESSOR HIRE ÷ 4½ HOURS

Start 7.30 Finish 5.00 : 9½

Meals and Other Breaks :

Stand-by Hours :

Rig Working Hours :

Contract Rates :

Rig Truck Km :

Water Tender Truck Km :

6 x 6 Winch Truck Km :

Client's Representative:

Crew:

S. P. O'BRIEN

DRILLWELL EXPLORATION N.Z. LTD.

DRILLING CONTRACTORS

DAILY LOG SHEET

19885

P.O. BOX 360 MANUREWA

Client: AUCKLAND REGIONAL COUNCIL

Date: 13-5-94

Day: FRIDAY

Engineers:

Rig No.: 3

Location:

HAMLINS ROAD

Tender Truck No.: 27

PAPAKURA

Size and Purpose of Bore: 100mm MONITOR BORE

Work Details and Bore Hole No.: ① a ②

Bore Log : ②

On site at 8.15 A.M.
Continued development of
bore for $\frac{1}{2}$ hour: pulled
out airline and packed
up rig, cleaned up site,
constructed cement pad
and left site with all
gear.

BORE NO 2

Set up and leveled rig.
Dug drain to pit and
proceeded with drilling
100mm hole to a depth of
70.00 metres. pulled out rods
and ceased work.

0-1.00m BROWN CLAYS
1.00-2.00m WHITE CLAYS
2.00-3.00m BROWN CLAYS
3.00-6.00m GREY CLAYS
6.00-7.00m GRAVELS
7.00-8.00m GREY SILTS
8.00-9.40m ORGANICS
9.40-10.00m GREY SILTS
10.00-12.00m ORGANICS
12.00-52.00m GREY + GREEN
STICKY SILTS
52.00-70.00m MUDSTONE
SANDSTONE

Materials Used:

DIGGER HIRE

COMPRESSOR HOURS $\frac{1}{2}$

3 x 40KG BAGS OF CEMENT

3 x 40KG BAGS OF RHEOGEL

4 KG OF PAC R

Start 8.15am Finish 4.45 : 8.5

Meals and Other Breaks :

Stand-by Hours :

Rig Working Hours :

Contract Rates :

Rig Truck Km

8

Water Tender Truck Km

8

6 x 6 Winch Truck Km

16

Client's Representative:

Crew: S. P. O'BRIEN

DRILLWELL EXPLORATION N.Z. LTD.

DRILLING CONTRACTORS

DAILY LOG SHEET

19886

P.O. BOX 360 MANUREWA

Client: AUCKLAND REGIONAL COUNCIL Date: 16-5-94

Day: MONDAY

Engineers: PAPA KURA Rig No.: 3

Location: TAKANINI ROAD Tender Truck No.: 27

Permit No C512-12-1241

Size and Purpose of Bore: 100mm MONITOR BORE.

Work Details and Bore Hole No.: ②

Bore Log :

On site at 8.00am
 Drilled (reamed) 100mm hole
 to a depth of 84.49 metres.
 Pulled out rods and
 installed 84.89 metres
 of 100mm casing.
 Grouted hole using
 22 bags of cement.
 Flushed pump clean.
 Washed cementing gear
 and carted water.
 Ceased work.

Materials Used:

Start 8.00 Finish 3.00 : 7

84.89m OF 100mm CASING

Meals and Other Breaks :

1x 100mm CASING SHOE (PLAIN)

Stand-by Hours :

22 x 40KG BAGS OF CEMENT

Rig Working Hours :

Contract Rates :

Rig Truck Km :

Client's Representative:

Water Tender Truck Km :

6 x 6 Winch Truck Km :

Crew: S O'BRIEN

DRILLWELL EXPLORATION N.Z. LTD.

DRILLING CONTRACTORS

DAILY LOG SHEET

19887

P.O. BOX 360 MANUREWA

Client: AUCKLAND REGIONAL COUNCIL

Date: 17-5-94

Day: TUESDAY

Engineers:

Rig No.: 3

Location: PAPAURA - CHEVEDON ROAD

Tender Truck No.: 27

Size and Purpose of Bore: 100mm WATER BORE

Work Details and Bore Hole No.:

On site at 7.30am.
 Ran rods and 100mm
 drag-bit wash drilled
 from 85.00 metres to a
 depth of 149.00 metres.
 Pulled out rods and
 installed airline to
 71.00 metres. Developed
 bore for $\frac{1}{2}$ hour. Pulled
 out airline and ran
 rods to 149.00 metres.
 Continued wash drilling
 to a depth of 173.00
 metres. Pulled back rods
 and ceased work.

Bore Log :

N.B. $\div$ 3 $\frac{1}{2}$ HOURS EXTRA TIME
 FOR RUNNING RODS,
 DRILLING & PULLING
 RODS BACK.

Materials Used:

COMPRESSOR HIRE $\div$ $\frac{1}{2}$ HOUR

Start 7.30 Finish 6.45 : 114

Meals and Other Breaks :

Stand-by Hours :

Rig Working Hours :

Contract Rates :

Rig Truck Km :

Water Tender Truck Km :

6 x 6 Winch Truck Km :

Utility or Van Service Km :

Client's Representative:

Crew:

S. P. O'BRIEN

DRILLWELL EXPLORATION N.Z. LTD.

DRILLING CONTRACTORS

DAILY LOG SHEET

19888

P.O. BOX 360 MANUREWA

Client: AUCKLAND REGIONAL COUNCIL Date: 18-5-94

Day: WEDNESDAY

Engineers: Rig No.: 3

Location: PAPAURA - CLEVELAND ROAD Tender Truck No.: 27

Size and Purpose of Bore: 100mm MONITOR BORE

Work Details and Bore Hole No.: ② Bore Log :

On site at 7.15am.
 ran rods and continued
 wash drilling from
 3.00 metres to a total
 depth of 180.00 metres.
 pulled out rods and
 ran airline to 71.00 metres.
 Developed bore, grouted
 hole using 8 bags of
 cement. washed up
 gear, loaded loose
 gear onto tender pulled
 out airline and packed
 up rig. Constructed cement
 pad, tidied site and
 left with all gear.

N.B. ÷ 2½ HOURS SPENT
 RUNNING RODS, DRILLING
 & PULLING OUT.

Materials Used: Start 7.15 Finish 4.30 : 9½

10 x 40 KG BAGS OF CEMENT Meals and Other Breaks :

COMPRESSOR HIRE ÷ 5 HOURS Stand-by Hours :

1 x LOCKING BORE CAP Rig Working Hours :

1 x LOCKING PRESSURE CAP Contract Rates :

Rig Truck Km : 11 Client's Representative:

Water Tender Truck Km : 11

6 x 6 Winch Truck Km : 11 Crew: S. P. O'BRIEN

TEST EXCAVATION LOGSite Identification **GHD-TP-07**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm, 55 Cosgrave Road
Job No.: 51/32174/04

Coordinates: E 1774019.09, N 5897963.89
Surface RL (m): +25.6m
Commenced: 11-Nov-14
Completed: 11-Nov-14

Datum: NZTM
Total Depth: 4.0m
Contractor: Abernathy Projects

Equipment: Hyundai 5t
Excavation Width (m): 0.8
Logged: JFK

Bucket Size (m): 0.6
Shear Vane: Geo 308
Excavation Length (m): 2.4
Processed: RV

Bucket Type: Rock
Orientation/ Bearing: ENE-WSW
Checked: BH

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Sample Depth	Sample Type	Sample/Test Number / Records & Comments	Depth Scale (m)
1		0.4 [+25.2]			OL	SILT with some rootlets, brown. Firm; moist; non-plastic. (Topsoil)	M	F				1
		1.1 [+24.5] [+24.4]			Pt	Organic CLAY with some silt and trace sand; dark brownish black. Firm; wet; non-plastic; sand, fine. (Amorphous Peat) @ 0.75 m becomes soft.	W	F	0.40	SV	33/7	
								S	0.75	SV	20/7	
					SM	Sandy SILT with some roots; light brown. Soft; wet; non-plastic; sand, fine. (Ash)	W	S	1.00		Push Tube	
					Pt	Organic CLAY with some silt and trace sand; dark brownish black. Soft; wet; non-plastic; sand, fine. (Amorphous Peat)	W	S	1.50			
2		1.7 [+24.0]			Pt	CLAY with 60% wood and fibres; black. Soft; saturated; low plasticity. (Semi-fibrous Peat)	S	S	1.70	SV	12/4	2
		2.1 [+23.6]			Pt	Organic CLAY with some wood and fibrous inclusions; dark brown. Soft; saturated; low to medium plasticity. (Amorphous Peat)	S	S	1.90	SV	17/3	
									2.50	SV	20/4	
						@ 2.66 m becomes firm.		F	2.66	SV	26/3	
3						@ 3.05 m becomes black with low plasticity.						
						@ 3.2 m becomes soft.		S	3.20	SV	19/5	
4		4.0 [+21.7]				Termination Depth = 3.95m (Extent of reach)						4
5												5
6												6
7												7

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 19/11/15



Report of Photographs

Site Identification: TP07

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	3.95 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	Not recorded
Client	Auckland Council	Comment			
Date	11/11/2014				





Report of Photographs

Site Identification: TP07

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	3.95 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	Not recorded
Client	Auckland Council	Comment			
Date	11/11/2014				




 PO Box 6543
 Auckland 1141

TEST EXCAVATION LOG

 Site Identification **GHD-TP-08**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm
Job No.: 51/32174/04

Coordinates: E 1774247.75, N 5898044.34
Surface RL (m): +25.6m
Commenced: 10-Nov-14
Completed: 12-Nov-14

Datum: NZTM
Total Depth: 3.7m
Contractor: Abernathy Projects

Equipment: 5T Hyundai
Excavation Width (m): 1.6
Logged: JFK/MB

Bucket Size (m): 1.5
Shear Vane: Geo 308
Excavation Length (m): 2.4
Processed: RV

Bucket Type: Weed bucket, blade bucket
Orientation/ Bearing: ENE-WSW
Checked: BH

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure (zoning, defects, cementing), plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Sample Depth	Sample Type	Sample/Test Number / Records & Comments	Depth Scale (m)
1		0.3 [+25.3]			OL	Organic SILT; black. Very Stiff; dry; slightly plastic; non-fibrous, friable. (Topsoil)	M	VSt	0.10	SV	126/54	1
					Pt	Organic silty CLAY; black. Stiff; moist; medium plasticity. (Semi-fibrous Peat)	M	St	0.30	SV	90/36	
						@ 0.6 m with frequent wood fragments.			0.50	SV	78/33	
						@ 0.8 m becomes soft.			0.80	SV	Push tube	
						@ 0.9 m becomes very soft.		S	0.90	SV	25/7	
									0.90	SV	11/2	
2		1.2 [+24.4]			SM	Sandy SILT; light brown. Firm; moist; non-plastic; sand, fine; slightly dilatant. (Ash)	M	F	1.20	D		
		1.4 [+24.2]			Pt	Organic silty CLAY; black. Soft; moist; medium plasticity. (Semi-fibrous Peat)	M	S	1.30	SV	35/5	
									1.40	SV	20/2	
									1.80	SV	16/3	
									1.90	SV	13/3	
						@ 2.0 m becomes very soft.		VS	2.00	SV	8/3	
		2.1 [+23.5]			Pt	Organic CLAY with minor wood fragments and rootlets; dark brown. Very soft; saturated; low plasticity. (Amorphous Peat)	S	VS	2.40	SV	10/3	
						@ 2.4 m with large pieces of wood.						
3		2.8 [+22.8]			Pt	CLAY with minor silt and sand and 70% wood and fibrous organics; dark brownish black. Very soft; saturated; non-plasticity. (Semi-fibrous Peat)	S	VS	2.90	SV	10/8	
						@ 3.4 m becomes soft.			3.40	SV	13/8	
								S	3.50	SV	16/8	
											Organic / hydrogen sulfide odour	
4		3.7 [+21.9]				Termination Depth = 3.7m (Extent of reach)			3.80	SV	13/9	4
5												5
6												6
7												7

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15



Report of Photographs

Site Identification: TP08

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	3.70 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	Not recorded
Client	Auckland Council	Comment			
Date	12/11/2014				





Report of Photographs

Site Identification: TP08

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	3.70 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	Not recorded
Client	Auckland Council	Comment			
Date	12/11/2014				





Report of Photographs

Site Identification: TP08

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	3.70 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	Not recorded
Client	Auckland Council	Comment			
Date	12/11/2014				



TEST EXCAVATION LOGSite Identification **GHD-TP-09**

Sheet 1 of 1

Project:	SHA Takanini 2a/2b	Coordinates:	E 1774377.95, N 5898023.51	Datum:	NZTM
Client:	Auckland Council	Surface RL (m):	+25.1m	Total Depth:	3.8m
Site:	Kennys' Farm	Commenced:	10-Nov-14	Contractor:	Abernathy Projects
Job No.:	51/32174/04	Completed:	11-Nov-14		
Equipment:	5T Hyundai	Excavation Width (m):	2.0	Logged:	JFK
Bucket Size (m):	1.6	Shear Vane:	Geo 308	Excavation Length (m):	2.7
Bucket Type:	Blade	Orientation/ Bearing:	NNW-SSE	Processed:	RV
				Checked:	BH

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Sample Depth	Sample Type	Sample/Test Number / Records & Comments	Depth Scale (m)
		0.3 [+24.6]			OL	SILT with some clay and rootlets; dark brownish black. Moist; non-plastic. (Topsoil)	M	F				
		0.5 [+24.6]			Pt	Silty organic CLAY with pockets of ash and charcoal; dark brownish black. Firm; wet; non-plastic. (Amorphous Peat). Ash comprises slightly dilatant, silty fine SAND; light brown.	W	F	0.25	SV	39+	
		0.7 [+24.3]			Pt	@ 0.4 m trace wood fragments.	W	F	0.40	SV	33/7	
					SM		M	S	0.54	SV	29/7	
					Pt	Organic CLAY with minor silt and some wood and charcoal fragments; brown to dark brown. Firm; wet; low plasticity. (Peat)	W	F	0.66	SV	24/6	
1			Peat (Amorphous)		Pt	Sandy SILT; light brown. Soft; moist; non-plastic. (Ash)	S		0.80	SV	30/9	
					Pt	Organic CLAY with some fibrous organics; dark brownish black. Firm; wet; low plasticity. (Amorphous Peat)	VS		1.00	SV	Push tube	
					Pt	@ 1.1 m becomes soft.			1.00	SV	33/4	
					Pt	@ 1.55 m becomes very soft.			1.10	SV	14/3	
					Pt	@ 1.6 m with trace large pieces of wood.			1.50	SV	8/3	
2		2.1 [+23.0]			Pt	@ 1.9 m becomes dark brown.			1.55	SV	8/4	
			Peat (Fibrous)		Pt	Wood and fibrous organic material (80%) in a matrix of organic clayey SILT; dark brownish black. Matrix Soft; saturated; low plasticity. (Fibrous Peat)	S	S	2.00	SV	14/4	
3					Pt				2.50	SV		
		3.8 [+21.3]			Pt						Organic / hydrogen sulfide odour.	
4						Termination Depth = 3.8m (Extent of reach)						
5												
6												
7												

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 19/15



Report of Photographs

Site Identification: TP09

Project	SHA – Takanini 2a/2b	Depth	0.0 m	To	3.80 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	1.60 m
Client	Auckland Council	Comment			
Date	11/11/2014				





Report of Photographs

Site Identification: TP09

Project	SHA – Takanini 2a/2b	Depth	0.0 m	To	3.80 m
Job #	51-32714-04	Pit Length	Not recorded	Pit Width	1.60 m
Client	Auckland Council	Comment			
Date	11/11/2014				




 PO Box 6543
 Auckland 1141

TEST EXCAVATION LOG

 Site Identification **GHD-TP-10**

Sheet 1 of 1

Project: SHA Takanini 2a/2b
Client: Auckland Council
Site: Kennys' Farm, Old Wairoa Road
Job No.: 51/32174/04

Coordinates: E 1774463.55, N 5897861.88
Surface RL (m): +26.0m
Commenced: 12-Nov-14
Completed: 12-Nov-14

Datum: NZTM
Total Depth: 4.0m
Contractor: Abernathy Projects

Equipment: Havarda GT
Excavation Width (m): 0.8
Excavation Length (m): 2.0
Orientation/ Bearing: Not Recorded

Bucket Size (m): 0.7
Shear Vane: Geo 308
Logged: MB
Processed: RV
Checked: BH

Bucket Type: Rock

Depth Scale (m)	Water	Depth (m)/ [Elev.]	Geological Unit	Graphic Log	Classification	SOIL DESCRIPTION: (Soil Code), Soil Name (minor MAJOR), colour, structure [zoning, defects, cementing], plasticity or grain size, secondary components, structure. (Geological Formation) / ROCK DESCRIPTION: Weathering, colour, fabric, ROCK NAME (Formation Name)	Moisture Condition	Consistency/ Relative Density	Sample Depth	Sample Type	Sample/Test Number / Records & Comments	Depth Scale (m)
0.2		[+25.8]	Peat (Amorphous)		OL	Topsoil. Dry; friable.	D					0.2
0.5		[+25.5]			CL	Clayey SILT; dark orange brown with organic staining. Firm; dry to moist; slightly plastic; friable.	D	F	0.40	SV	37/7	0.5
1.2		[+24.8]			Pt	Organic clayey SILT with frequent wood inclusions; dark brown. Firm; moist; slightly plastic. (Amorphous Peat)	M	F	0.60	SV	35/6	1.2
1.4		[+24.6]			SM	Sandy SILT; light brown. Soft; moist; non-plastic; slightly dilatant; pumiceous. (Rhyolic Ash)	M	S	1.30	SV	20/6	1.4
2.4		[+23.6]			Pt	Silty CLAY with trace wood inclusions; black. Soft; wet; medium plasticity; slightly spongy. (Amorphous Peat)	W	S	1.70 1.90	SV SV	14/4 16/3	2.4
2.0			Alluvium		CL	@ 2.0 m with larger wood logs.			2.20	SV	12/3	2.0
2.4					CL	Silty CLAY; light brown. Soft; wet; medium to high plasticity. (Alluvial Clay)	W	S	2.40	SV	24/7	2.4
2.6					CL				2.60	SV	28/5	2.6
3.0					CL	@ 3.0 m becomes tan.			3.00	SV	15/4	3.0
3.30					CL				3.30 3.40	D SV	19/6	3.30
4.0		[+22.0]				Termination Depth = 4m (Extent of reach)			4.00	SV	21/4	4.0
4.0											Organic / hydrogen sulfide odour.	4.0

BOREHOLE LOG NZ ALT 5132174 - LOGS.GPJ NZ GINT DATA TEMPLATE VER 1.3.GDT 1/9/15



Report of Photographs

Site Identification: TP10

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	4.00 m
Job #	51-32714-04	Pit Length	2.00 m	Pit Width	0.80 m
Client	Auckland Council	Comment			
Date	12/11/2014				





Report of Photographs

Site Identification: TP10

Project	SHA – Takanini 2a/2b	Depth	0.00 m	To	4.00 m
Job #	51-32714-04	Pit Length	2.00 m	Pit Width	0.80 m
Client	Auckland Council	Comment			
Date	12/11/2014				



APPENDIX 4

LABORATORY TEST RESULTS

APPENDIX 4.1

LABORATORY TEST RESULTS SUMMARY

Table 4.1. Laboratory Test Results Summary

Sample ID	Material	Moisture Content (%)	Plasticity Index Test Results				Particle Size Distribution				One Dimensional Consolidation Properties				pH
			LL	PL	PI	LS	Clay (%)	Silt (%)	Sand (%)	D ₃₀	$\rho_{d,i}$	e_0	e_f	m_v	
MH01-S1 1.9-2.4m	Fibrous PEAT														7.0
MH02-S1 0.9-1.5m	Fibrous PEAT														6.0
MH03-S2 3.8-4.0m	Pumiceous silty CLAY	102	106	49	57	20	51	49	0	<1.3 μ m					
MH05-S4 26.4-27.0m	Silty SAND	52.1	Not suitable for testing				11	71	18	<14.2 μ m					
MH07-PT2 1.3-1.35m	Organic clayey SILT	71									0.88	1.888	1.487	0.34	
MH07-S1 2.3-2.8m	Organic silty CLAY	48.9	81	41	40	19	61	37	2	<1.4 μ m					
MH07-PT3 3.8-3.85m	Organic clayey SILT	51.9									1.08	1.361	0.963	0.43	
MH08-S1 4.1-4.4m	Fibrous PEAT														6.0
MH10-PT2 1.4-1.45m	Fibrous PEAT	278									0.30	5.270	3.317	2.6	
MH10-S1 1.5-2.0m	Fibrous PEAT														7.5
MH10-PT3 7.8-7.85m	Fibrous PEAT	228									0.35	4.746	3.283	1.4	
MH10-S4 20.6-21.0m	Pumiceous SILT	45.8	Not suitable for testing				8	61.5	30.5	<19.7 μ m					
MH11-S1 2.35-2.8m	Pumiceous silty CLAY	105	127	52	75	26	51	48	1	<1.4 μ m					

Sample ID	Material	Moisture Content (%)	Plasticity Index Test Results				Particle Size Distribution				One Dimensional Consolidation Properties				pH
			LL	PL	PI	LS	Clay (%)	Silt (%)	Sand (%)	D ₃₀	$\rho_{d,i}$	e_0	e_f	m_v	
MH12-S1 4.8-5.3m	Fibrous PEAT														7.5
MH13-PT1 1.3-1.35m	Fibrous PEAT	203									0.38	4.254	3.741	0.50	
MH13-S1 3.5-4.0m	Fibrous PEAT														7.0
MH13-PT2 13.7-13.75m	Fibrous PEAT	71.4									0.89	1.880	1.277	0.65	

Note: Grey cells were not selected for testing.

APPENDIX 4.2

PLASTICITY INDEX TEST RESULTS



Our Ref: 1009521.1159.0.0/Rep1A
Customer Ref: J01627
15 July 2021

Lander Geotechnical Consultants Limited
Level 3, 3 Osterley way
Manukau
Auckland 2104

Attention: Kyle Meffan

Dear Kyle

Sunfields (Winton) Ardmore Laboratory Test Report

Samples from the above mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.
This report supersedes the original report 1009521.1159.0.0/Rep1 dated 14/07/2021 due to a client request to change a sample reference from MH05-S4 to MH-05-S4.

Descriptions are enclosed for your information, but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Lander Geotechnical Consultants Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report prepared by:


.....
Tylah Wardrope
Laboratory Technician

Authorised for Geotechnics by:


.....
Corey Papu-Gread
Project Director

Digitally signed by Corey Papu-Gread
DN: cn=Corey Papu-Gread, o=NZ,
ou=Geotechnics, email=cpapu-
gread@geotechnics.co.nz
Date: 2021.07.15 11:44:39 +1200

Report checked by:


.....
Ryan Milligan
Project Manager
Approved Signatory

15-July-21

t:\geotechnicsgroup\projects\1009521\1009521.1159\workingmaterial\20200608.sunfields (winton) ardmore.docx



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4

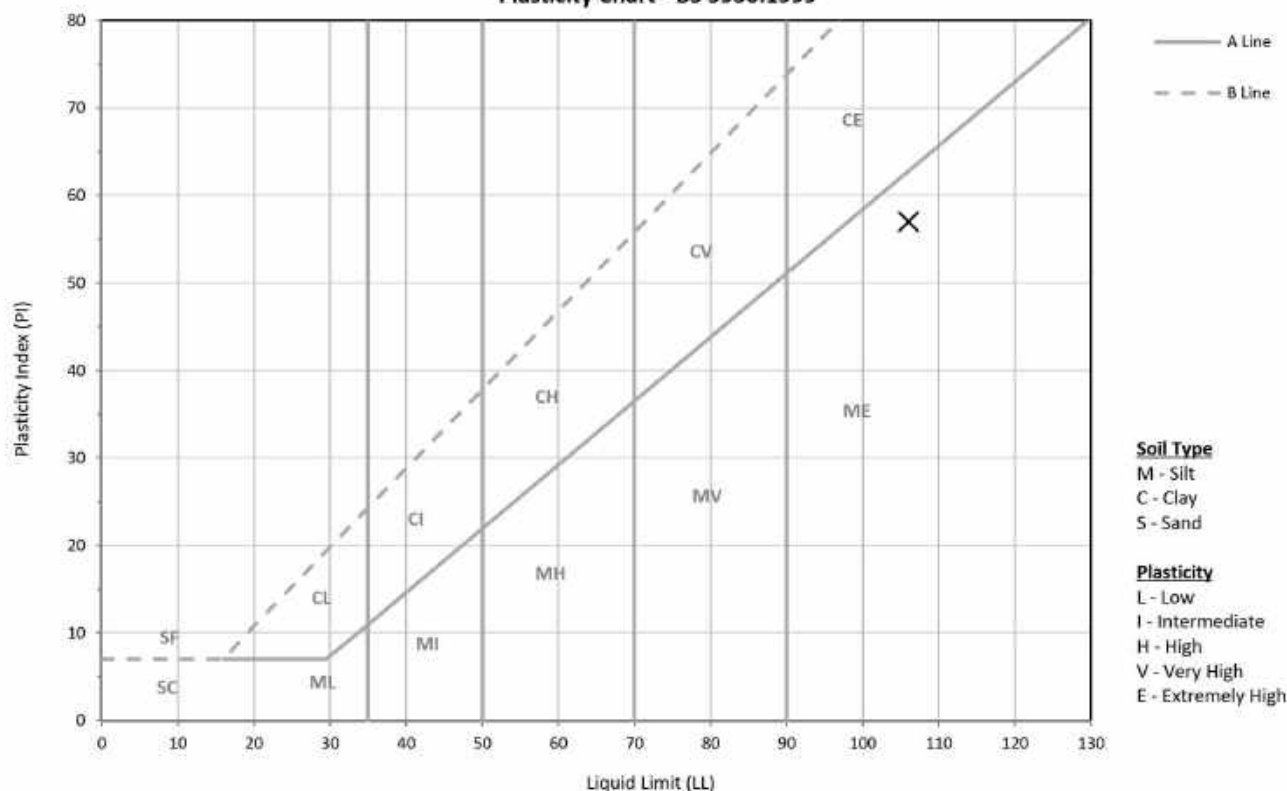
TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000123		
	Reference	HA03-S2	Top Depth	3.8m
	Sampled By	Others, Tested As Received	Bottom Depth	4.0m
	Description	Silty CLAY, brown. Wet. extremely high plasticity.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Liquid Limit 106
Plastic Limit 49
Plasticity Index 57

Plasticity Chart - BS 5930:1999



TEST REMARKS

• The material used for testing was natural, fraction passing a 425um sieve. • This test result is IANZ accredited. • Date tested 01/07/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

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Geotechnics Project Number 1009521.1159.0.0
QESTLab Work Order ID W21TG-0075
Customer Project ID J01627

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000123		
	Reference	HA03-S2	Top Depth	3.8m
	Sampled By	Others, Tested As Received	Bottom Depth	4.0m
	Description	Silty CLAY, brown. Wet. extremely high plasticity.		
SPECIMEN	Reference	Depth		
	Description			

Linear Shrinkage 20%

TEST REMARKS

• This test result is IANZ accredited. • Date tested 04/06/2021

Approved Signatory Ryan Milligan
Date 14/07/2021



Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Report No: MAT:S21TG000123

Material Test Report

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Sunfields (Winton) Ardmore
Project No.: 1009521.1159.0.0
Customer Reference No.: J01627
Report Authorised By : Ryan Milligan 14/07/2021

Please reproduce this report in full when transmitting to others or including in internal reports.

Sample Details

Location Sunfields (Winton) Ardmore
Geotechnics ID S21TG000123
Sample Reference HA03-S2
Sample Description Silty CLAY, brown. Wet,
extremely high plasticity.
Sample Depth 3.8m
Bottom Depth 4.0m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		102	
Date Tested		1/06/2021	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.



15C Amber Crescent

Judea

Tauranga 3110

New Zealand

p +64 7 571 0280

5 of 16

Geotechnics Project Number 1009521.1159.0.0

QESTLab Work Order ID W21TG-0075

Customer Project ID J01627

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4**TEST DETAILS**

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000124		
	Reference	MH-05 - 54	Top Depth	26.4m
	Sampled By	Others, Tested As Received	Bottom Depth	27m
	Description	SILT with some sand and minor clay, light grey. Moist. Dilatant.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Liquid Limit	Not Suitable
Plastic Limit	Not Suitable
Plasticity Index	Not Obtainable

TEST REMARKS

• The material was unsuitable for testing both the Liquid Limit and the Plastic Limit. • Too Sandy, Dilatant • This test result is IANZ accredited. • Date tested 03/04/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

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Geotechnics Project Number 1009521.1159.0.0
QESTLab Work Order ID W21TG-0075
Customer Project ID J01627

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000124		
	Reference	MH-05 - S4	Top	26.4m
	Sampled By	Depth Others, Tested As Received	Bottom Depth	27m
	Description	SILT with some sand and minor clay, light grey. Moist. Dilatant.		
SPECIMEN	Reference	Depth		
	Description			

Linear Shrinkage Not Suitable

TEST REMARKS

• This test result is IANZ accredited. • Date tested 03/06/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Report No: MAT:S21TG000124

Material Test Report

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Sunfields (Winton) Ardmore
Project No.: 1009521.1159.0.0
Customer Reference No.: J01627
Report Authorised By : Ryan Milligan 14/07/2021

Please reproduce this report in full when transmitting to others or including in internal reports.

Sample Details

Location Sunfields (Winton) Ardmore
Geotechnics ID S21TG000124
Sample Reference MH-05 - S4
Sample Description SILT with some sand and minor clay,
light grey. Moist. Dilatant.
Sample Depth 26.4m
Bottom Depth 27m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		52.1	
Date Tested		3/06/2021	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4

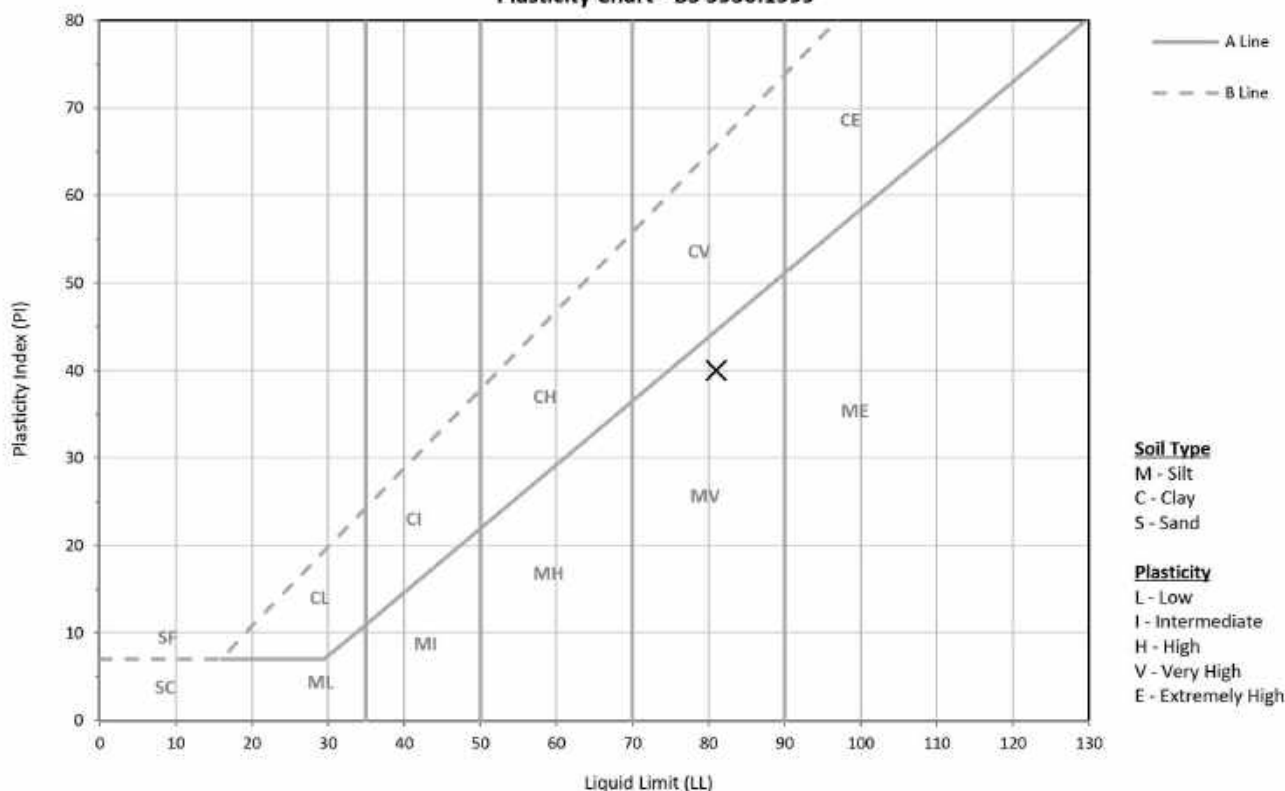
TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000125		
	Reference	MH07- S1	Top Depth	2.3m
	Sampled By	Others, Tested As Received	Bottom Depth	2.8m
	Description	Silty CLAY with trace sand, dark brown. Moist, very high plasticity.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Liquid Limit **81**
 Plastic Limit **41**
 Plasticity Index **40**

Plasticity Chart - BS 5930:1999



TEST REMARKS

• The material used for testing was natural, fraction passing a 425um sieve. • This test result is IANZ accredited. • Date tested 02/06/2021.

Approved Signatory Ryan Milligan

Date 14/07/2021



15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

9 of 16

Geotechnics Project Number 1009521.1159.0.0
QESTLab Work Order ID W21TG-0075
Customer Project ID J01627

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000125		
	Reference	MH07- 51	Top Depth	2.3m
	Sampled By	Others, Tested As Received	Bottom Depth	2.8m
	Description	Silty CLAY with trace sand, dark brown. Moist, very high plasticity.		
SPECIMEN	Reference	Depth		
	Description			

Linear Shrinkage 19%

TEST REMARKS

• This test result is IANZ accredited. • Date tested 04/06/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Report No: MAT:S21TG000125

Material Test Report

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Sunfields (Winton) Ardmore
Project No.: 1009521.1159.0.0
Customer Reference No.: J01627
Report Authorised By : Ryan Milligan 14/07/2021

Please reproduce this report in full when transmitting to others or including in internal reports.

Sample Details

Location Sunfields (Winton) Ardmore
Geotechnics ID S21TG000125
Sample Reference MH07- S1
Sample Description Silty CLAY with trace sand, dark brown.
Moist, very high plasticity.
Sample Depth 2.3m
Bottom Depth 2.8m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		48.9	
Date Tested		4/06/2021	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.



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Judea

Tauranga 3110

New Zealand

p +64 7 571 0280

11 of 16

Geotechnics Project Number 1009521.1159.0.0

QESTLab Work Order ID W21TG-0075

Customer Project ID J01627

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4**TEST DETAILS**

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000126		
	Reference	M10 - S4	Top Depth	20.6m
	Sampled By	Others, Tested As Received	Bottom Depth	21m
	Description	Sandy SILT with trace clay, light grey. Moist. Dilatant.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

TEST RESULTS

Liquid Limit	Not Suitable
Plastic Limit	Not Suitable
Plasticity Index	Not Obtainable

TEST REMARKS

• The material was unsuitable for testing both the Liquid Limit and the Plastic Limit. • Too Sandy, Dilatant • This test result is IANZ accredited. •
Date tested 01/06/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

12 of 16

Geotechnics Project Number 1009521.1159.0.0
QESTLab Work Order ID W21TG-0075
Customer Project ID J01627

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000126		
	Reference	M10 - S4	Top Depth	20.6m
	Sampled By	Others, Tested As Received	Bottom Depth	21m
	Description	Sandy SILT with trace clay, light grey. Moist. Diatant.		
SPECIMEN	Reference	Depth		
	Description			

Linear Shrinkage 4%

TEST REMARKS

• This test result is IANZ accredited. • Date tested 03/06/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Report No: MAT:S21TG000126

Material Test Report

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Sunfields (Winton) Ardmore
Project No.: 1009521.1159.0.0
Customer Reference No.: J01627
Report Authorised By : Ryan Milligan 14/07/2021

Please reproduce this report in full when transmitting to others or including in internal reports.

Sample Details

Location Sunfields (Winton) Ardmore
Geotechnics ID S21TG000126
Sample Reference M10 - S4
Sample Description Sandy SILT with trace clay,
light grey. Moist. Diatant.
Sample Depth 20.6m
Bottom Depth 21m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		45.8	
Date Tested		2/06/2021	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.

Determination of Liquid & Plastic Limit, Plasticity Index - NZS 4402: 1986 Tests 2.2 (4 Point), 2.3 & 2.4

TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000128		
	Reference	HA11-S1	Top Depth	2.3m
	Sampled By	Others, Tested As Received	Bottom Depth	2.8m
	Description	Clayey SILT with trace sand, light grey. Wet, Extremely high plasticity.		
SPECIMEN	Reference	N/A	Depth	N/A
	Description	N/A		

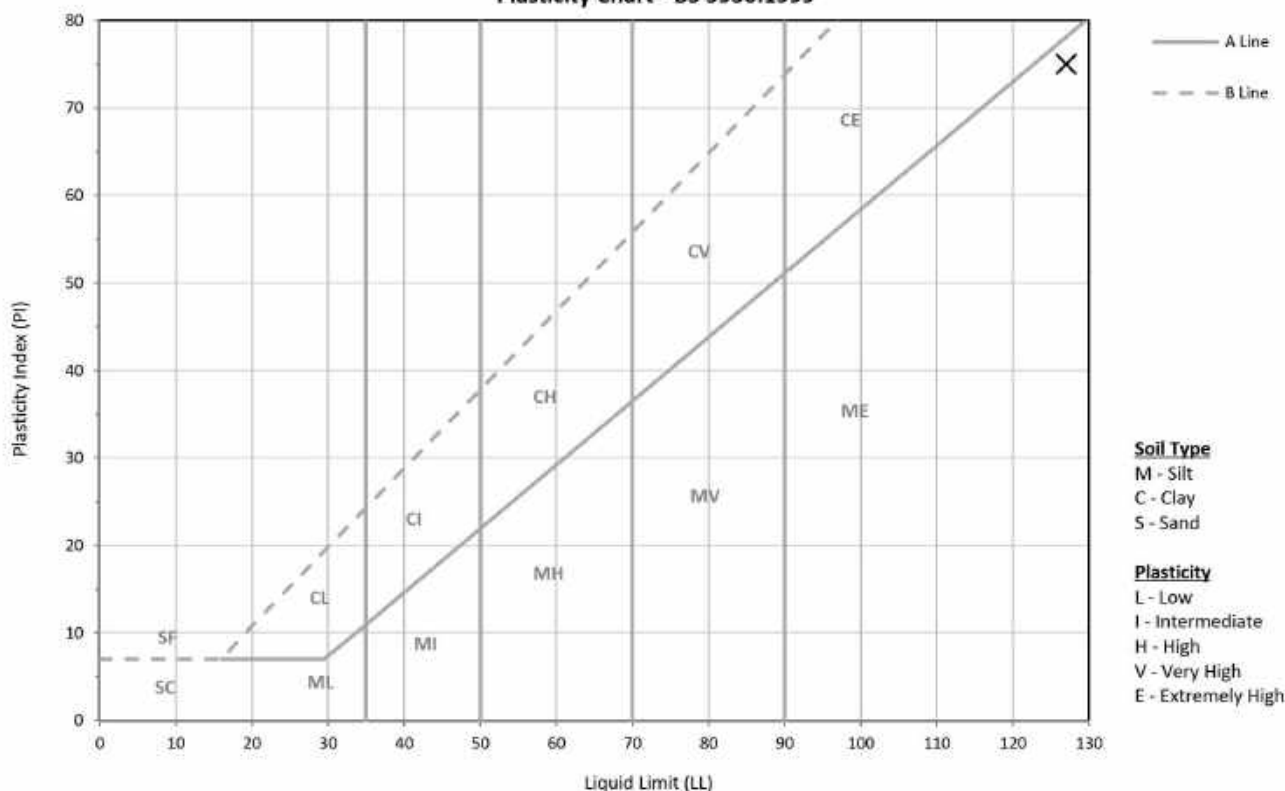
TEST RESULTS

Liquid Limit **127**

Plastic Limit **52**

Plasticity Index **75**

Plasticity Chart - BS 5930:1999



TEST REMARKS

• The material used for testing was natural, fraction passing a 425um sieve. • This test result is IANZ accredited. • Date tested 1/06/201

Approved Signatory Ryan Milligan

Date 14/07/2021



15C Amber Crescent
Judea
Tauranga 3110
New Zealand
p +64 7 571 0280

15 of 16

Geotechnics Project Number 1009521.1159.0.0
QESTLab Work Order ID W21TG-0075
Customer Project ID J01627

Determination of the Linear Shrinkage - NZS 4402:1986 Test 2.6

TEST DETAILS

LOCATION	Description	Sunfields (Winton) Ardmore		
	Data	N/A		
SAMPLE	Geotechnics ID	S21TG000128		
	Reference	HA11-S1	Top Depth	2.3m
	Sampled By	Others, Tested As Received	Bottom Depth	2.8m
	Description	Clayey SILT with trace sand, light grey. Wet, Extremely high plasticity.		
SPECIMEN	Reference	Depth		
	Description			

Linear Shrinkage 26%

TEST REMARKS

• This test result is IANZ accredited. • Date tested 04/06/2021

Approved Signatory Ryan Milligan

Date 14/07/2021



Tauranga
15C Amber Crescent
Judea
Tauranga 3110
New Zealand

p +64 7 571 0280

Report No: MAT:S21TG000128

Material Test Report

Customer: Lander Geotechnical
Address: Level 3, 3 Osterley Way
Manukau, 2104
Project: Sunfields (Winton) Ardmore
Project No.: 1009521.1159.0.0
Customer Reference No.: J01627
Report Authorised By : Ryan Milligan 14/07/2021

Please reproduce this report in full when transmitting to others or including in internal reports.

Sample Details

Location Sunfields (Winton) Ardmore
Geotechnics ID S21TG000128
Sample Reference HA11-S1
Sample Description Clayey SILT with trace sand, light grey.
Wet, Extremely high plasticity.
Sample Depth 2.3m
Bottom Depth 2.8m

Test Results

Description	Method	Result	Limits
Moisture Content [NZS 4402:1986 Test 2.1]			
Moisture Content (%)		105	
Date Tested		8/06/2021	

Comments

This test result is IANZ accredited.

If samples have been taken, and were not destroyed during testing, they will be retained for one month from the date of this report before being discarded.

APPENDIX 4.3

PARTICLE SIZE DISTRIBUTION TEST RESULTS



Our Ref: 1009479.1011.0.0/Rep1

Customer Ref: J01627

25 June 2021

Lander Geotechnical Ltd.
PO Box 97385, Manukau 2241

Attention: Kyle Meffan

Dear Kyle

Sunfield Winton Laboratory Test Report

The samples we collected from the above mentioned site have been tested according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.

Descriptions are enclosed for your information, but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Lander Geotechnical Ltd., with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report prepared by:

A handwritten signature in blue ink, appearing to read 'Jack Singh'.

.....
Jack Singh
Laboratory Technician
Approved Signatory

Authorised for Geotechnics by:

A handwritten signature in black ink, appearing to read 'Vic O'Connor'.

.....
Vic O'Connor
Project Director



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

Report checked by:

A handwritten signature in blue ink, appearing to read 'C. Papu-Gread', is written over a horizontal dotted line.

Corey Papu-Gread
Christchurch Manager

25-Jun-21

\\ttgroup.local\corporate\geotechnicsgroup\projects\1009479\1009479.1011\workingmaterial\20210625.jasi.1009479.1011.0.0.rep1.doc

x



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45a Parkhouse Road, Christchurch
New Zealand
P 64 09 356 3510
www.geotechnics.co.nz

Work order ID: W21CH-0124

Site: Sunfield Winton

BH No.: **MH3**

Sample ID: S21CH000425

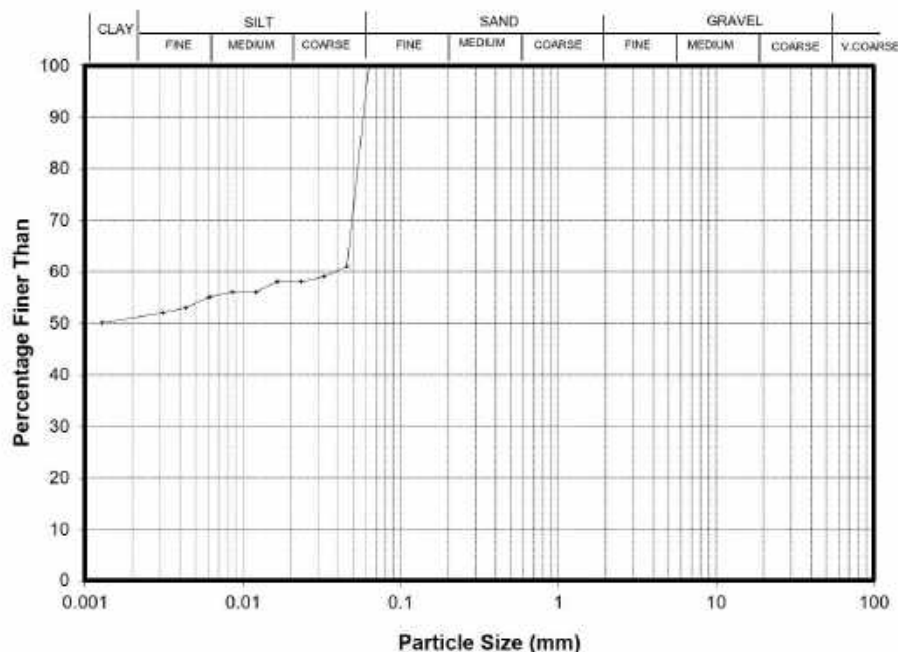
Test Method Used : NZS 4402:1986 Test 2.8.4 Hydrometer

Your Job No.: J01677

Our Job No.: 1009479.1011.0.0

Depth: **3.8m - 4.0m**

PARTICLE SIZE ANALYSIS



Sieve (mm)	Total % Passing	Sieve (mm)	Total % Passing
4.75	100		
3.35	100		
2.00	100		
0.600	100		
0.212	100		
0.063	100		

Equivalent Particle Diameter D (mm)	% of Particles Finer than D
0.0458	61
0.0327	59
0.0233	58
0.0165	58
0.0121	56
0.0086	56
0.0061	55
0.0044	53
0.0031	52
0.0013	50

Sample history : Natural, whole soil

Description: Silty CLAY, brown. Moist, extremely high plasticity.

Solid Density (Assumed) : 2.65t/m³

Remarks : A sub sample was split from the original sample for hydrometer analysis. This sample was soaked with a dispersing agent (~2 hrs), then the mechanical shaker was used, until the material was brought into suspension, before proceeding with the test.

Suspension pH 8.0. Use of assumed values in calculation is at customers discretion and risk.

The classification of sand-silt-clay components were described on the basis of particle size analysis.

Sample description is not IANZ accredited.

Entered by : JASI

Date : 16/06/2021

Checked by :

CXPG

Date :25/6/2021



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Work order ID: W21CH-0124

Site: Sunfield Winton

BH No.: **MH5**

Sample ID: S21CH000426

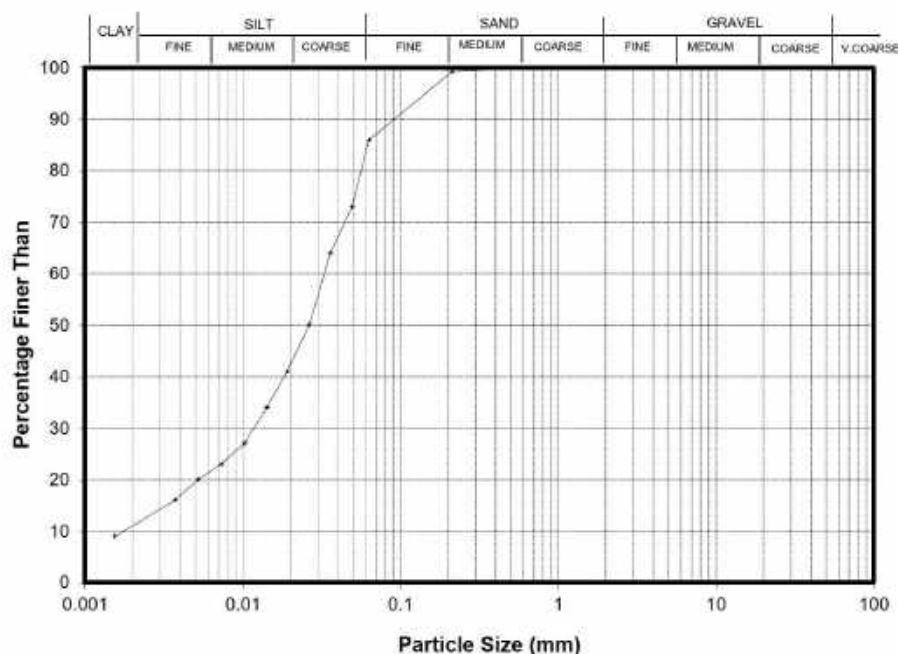
Test Method Used : NZS 4402:1986 Test 2.8.4 Hydrometer

Your Job No.: J01677

Our Job No.: 1009479.1011.0.0

Depth: **26.4m - 27.0m**

PARTICLE SIZE ANALYSIS



Sieve (mm)	Total % Passing	Sieve (mm)	Total % Passing
4.75	100		
3.35	100		
2.00	100		
0.600	100		
0.212	99		
0.063	86		

Equivalent Particle Diameter D (mm)	% of Particles Finer than D
0.0492	73
0.0358	64
0.0264	50
0.0191	41
0.0142	34
0.0102	27
0.0073	23
0.0052	20
0.0037	16
0.0015	9

Sample history : Natural, whole soil

Description: SILT with some sand and minor clay, light grey. Moist.

Solid Density (Assumed) : 2.65t/m³

Remarks : A sub sample was split from the original sample for hydrometer analysis. This sample was soaked with a dispersing agent (~2 hrs), then the mechanical shaker was used, until the material was brought into suspension, before proceeding with the test.

Suspension pH 8.0. Use of assumed values in calculation is at customers discretion and risk.

The classification of sand-silt-clay components were described on the basis of particle size analysis.

Sample description is not IANZ accredited.

Entered by : JASI

Date : 16/06/2021

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Date :25/6/2021



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Work order ID: W21CH-0124

Site: Sunfield Winton

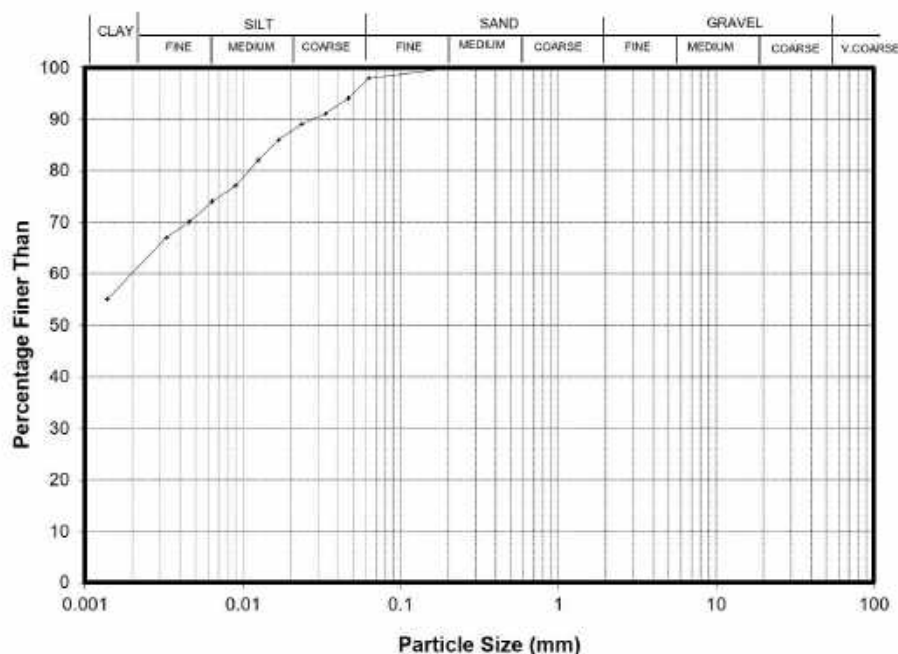
BH No.: **MH7**

Sample ID: S21CH000427

Test Method Used : NZS 4402:1986 Test 2.8.4 Hydrometer

Your Job No.: J01677

Our Job No.: 1009479.1011.0.0

Depth: **2.3m - 2.8m****PARTICLE SIZE ANALYSIS**

Sieve (mm)	Total % Passing	Sieve (mm)	Total % Passing
4.75	100		
3.35	100		
2.00	100		
0.600	100		
0.212	100		
0.063	98		

Equivalent Particle Diameter D (mm)	% of Particles Finer than D
0.0466	94
0.0332	91
0.0237	89
0.0169	86
0.0125	82
0.0090	77
0.0064	74
0.0046	70
0.0033	67
0.0014	55

Sample history : Natural, whole soil

Description: Silty CLAY with trace sand, dark brown. Moist, very high plasticity.

Solid Density (Assumed) : 2.65t/m³

Remarks : A sub sample was split from the original sample for hydrometer analysis. This sample was soaked with a dispersing agent (~2 hrs), then the mechanical shaker was used, until the material was brought into suspension, before proceeding with the test.

Suspension pH 8.0. Use of assumed values in calculation is at customers discretion and risk.

The classification of sand-silt-clay components were described on the basis of particle size analysis.

Sample description is not IANZ accredited.

Entered by :JASI

Date : 16/06/2021

Checked by :

JASI

Date : 25/06/2021



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Work order ID: W21CH-0124

Site: Sunfield Winton

BH No.: **MH10**

Sample ID: S21CH000428

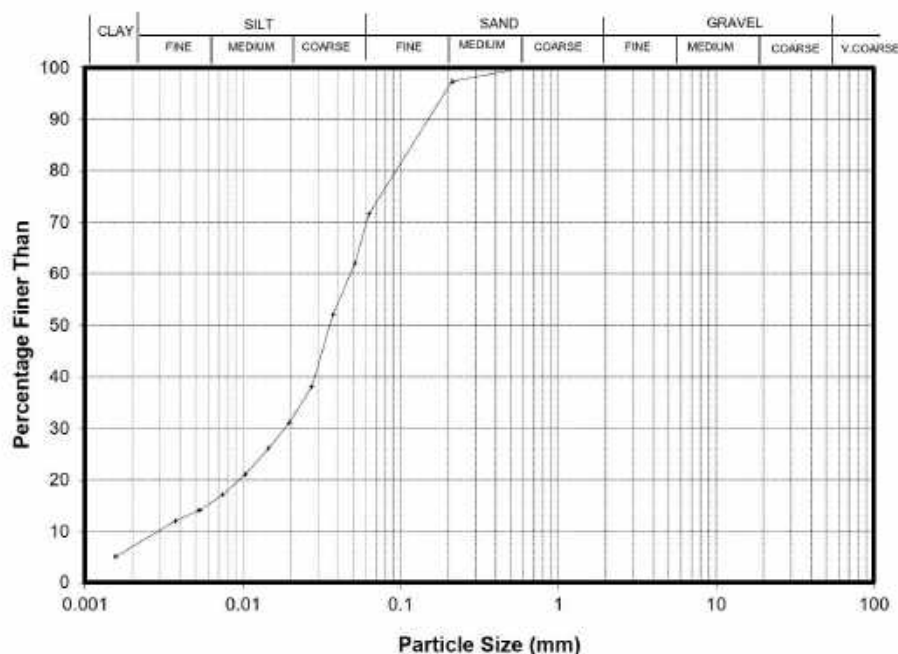
Test Method Used : NZS 4402:1986 Test 2.8.4 Hydrometer

Your Job No.: J01677

Our Job No.: 1009479.1011.0.0

Depth: **20.6m - 21.0m**

PARTICLE SIZE ANALYSIS



Sieve (mm)	Total % Passing	Sieve (mm)	Total % Passing
4.75	100		
3.35	100		
2.00	100		
0.600	100		
0.212	97		
0.063	72		

Equivalent Particle Diameter D (mm)	% of Particles Finer than D
0.0513	62
0.0373	52
0.0273	38
0.0197	31
0.0145	26
0.0104	21
0.0074	17
0.0053	14
0.0038	12
0.0016	5

Sample history : Natural, whole soil

Description: Sandy SILT with trace clay, light grey. Moist.

Solid Density (Assumed) : 2.65t/m³

Remarks : A sub sample was split from the original sample for hydrometer analysis. This sample was soaked with a dispersing agent (~2 hrs), then the mechanical shaker was used, until the material was brought into suspension, before proceeding with the test.

Suspension pH 8.0. Use of assumed values in calculation is at customers discretion and risk.

The classification of sand-silt-clay components were described on the basis of particle size analysis.

Sample description is not IANZ accredited.

Entered by : JASI

Date : 16/06/2021

Checked by :

CXPG

Date :25/6/2021



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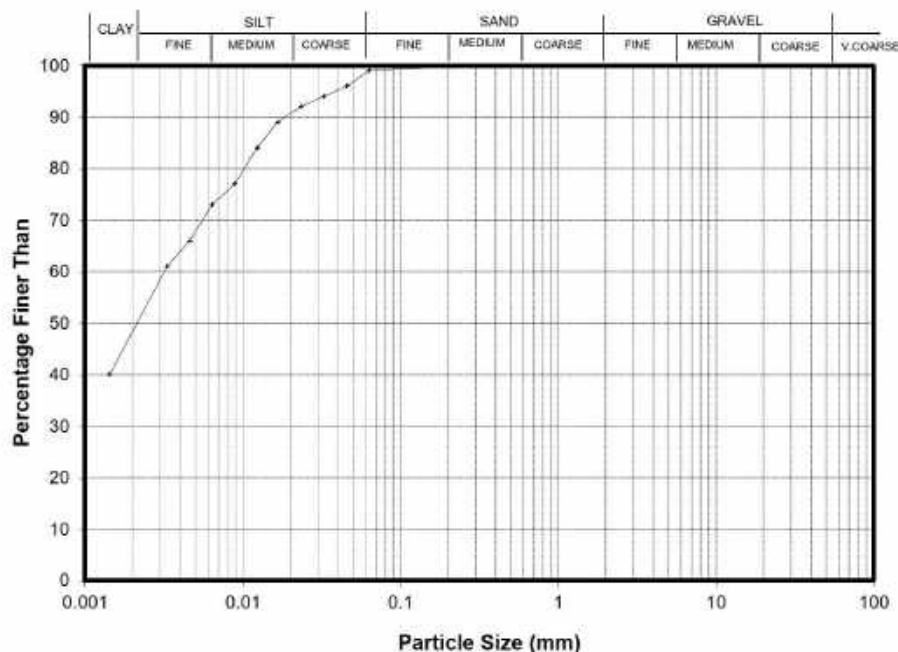
45a Parkhouse Road, Christchurch
New Zealand
P 64 09 356 3510
www.geotechnics.co.nz

Work order ID: W21CH-0124

Site: Sunfield Winton
BH No.: **MH11** Sample ID: S21CH000429
Test Method Used : NZS 4402:1986 Test 2.8.4 Hydrometer

Your Job No.: J01677
Our Job No.: 1009479.1011.0.0
Depth: **2.35m - 2.8m**

PARTICLE SIZE ANALYSIS



Sieve (mm)	Total % Passing	Sieve (mm)	Total % Passing
4.75	100		
3.35	100		
2.00	100		
0.600	100		
0.212	100		
0.063	99		

Equivalent Particle Diameter D (mm)	% of Particles Finer than D
0.0458	96
0.0327	94
0.0233	92
0.0166	89
0.0123	84
0.0089	77
0.0064	73
0.0046	66
0.0033	61
0.0014	40

Sample history : Natural, whole soil

Description: Clayey SILT with trace sand, light grey, Moist.

Solid Density (Assumed) : 2.65t/m³

Remarks : A sub sample was split from the original sample for hydrometer analysis. This sample was soaked with a dispersing agent (~2 hrs), then the mechanical shaker was used, until the material was brought into suspension, before proceeding with the test.

Suspension pH 8.0. Use of assumed values in calculation is at customers discretion and risk.

The classification of sand-silt-clay components were described on the basis of particle size analysis.

Sample description is not IANZ accredited.

Entered by : JASI

Date : 16/06/2021

Checked by :

CXPG

Date :25/6/2021

APPENDIX 4.4

1D-CONSOLIDATION TEST RESULTS



Our Ref: 1100842.0000/Rep 1
Customer Ref: J01627
10 June 2021

Lander Geotechnical Consultants Limited
Level 3
3 Osterley Way
Manukau
Auckland 2104

Attention: Kyle Meffan

Dear Kyle

Sunfields, Ardmore Laboratory Test Report

Samples from the above mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample tested.

Descriptions are enclosed for your information, but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Lander Geotechnical Consultants Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples were destroyed during testing. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report prepared by:

Sim Tirunahari
I am the author of this
document
2021.06.10 09:07:40 +12'00'

Sim Tirunahari
Soils Laboratory Manager
Approved Signatory

Authorised for Geotechnics by:

Steven Anderson
Project Director

Report checked by:

Steven Anderson
Operations and Technical Manager



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

10-Jun-21

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1 Hill Street, Onehunga, Auckland 1061

p 64 9 356 3510

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Your Job No.: J01627

Site: Sunfields, Ardmore

Our Job No.: 1100842.0000

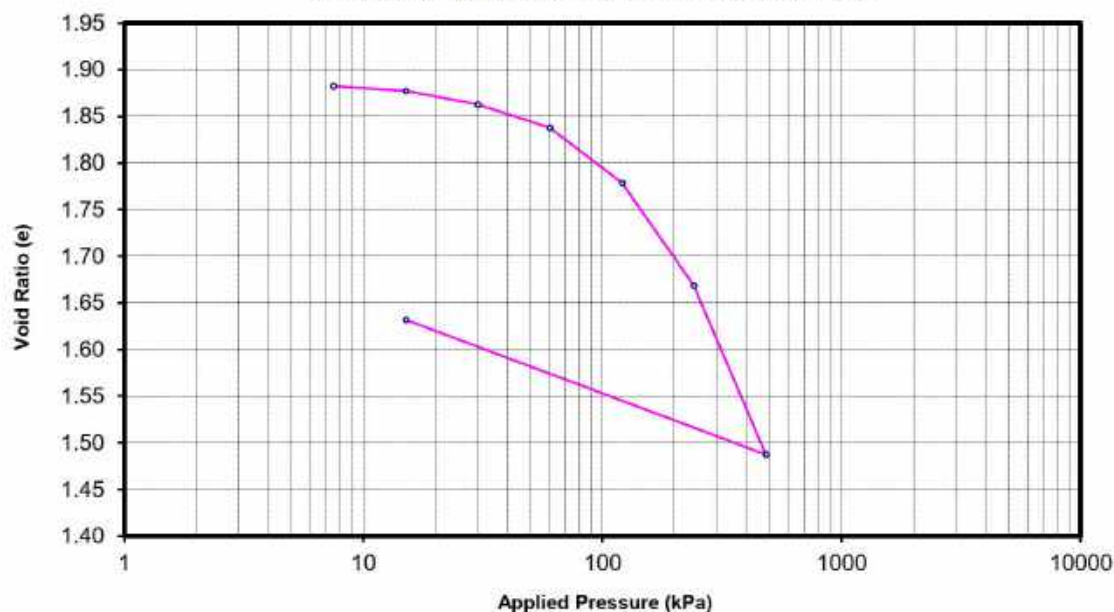
MH No.: MH 7

Sample ID.: PT2

Depth: 1.30-1.35 (m)

Test Method Used: NZS 4402:1986 Test 7.1 One-Dimensional Consolidation

ONE-DIMENSIONAL CONSOLIDATION TEST



Pressure (kPa)	Void Ratio (e)	Pressure Increment (kPa)	Coefficient of Consolidation C_v (m ² /yr)	Coefficient of Volume Compressibility M_v (m ² /MN)
As received	0			
Preload	7.5	0 to 7.5	NA	0.25
	15.1	7.5 to 15.1	2.9	0.23
	30.2	15.1 to 30.2	2.5	0.34
	60.3	30.2 to 60.3	2.4	0.29
	121	60.3 to 121	2.0	0.35
	241	121 to 241	1.4	0.33
	483	241 to 483	1.2	0.28
Unload	15.1	483 to 15.1	NA	NA

Sample History: Undisturbed core trimmed at NWC.

Description: Organic SILT with minor clay and trace sand, firm, dark brown, mottled black.

Initial Dry Density (t/m³): 0.88

Initial Water Content: 71%

Solid Density (t/m³): 2.55 (Assumed)

Initial Saturation: 96%

Temperature During Testing: Max = 20 °C Min = 19 °C

Remarks: SQR of time fitting method was used. We have assumed a value of 2.55 t/m³. The calculations of void ratio are affected by the solid density value.

The test results are IANZ accredited but the sample description is not IANZ accredited.

Approved Signatory Sim Tirunahari

Date 9/06/2021

1100842.0000/Rep 1



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Your Job No.: J01627

Site: Sunfields, Ardmore

Our Job No.: 1100842.0000

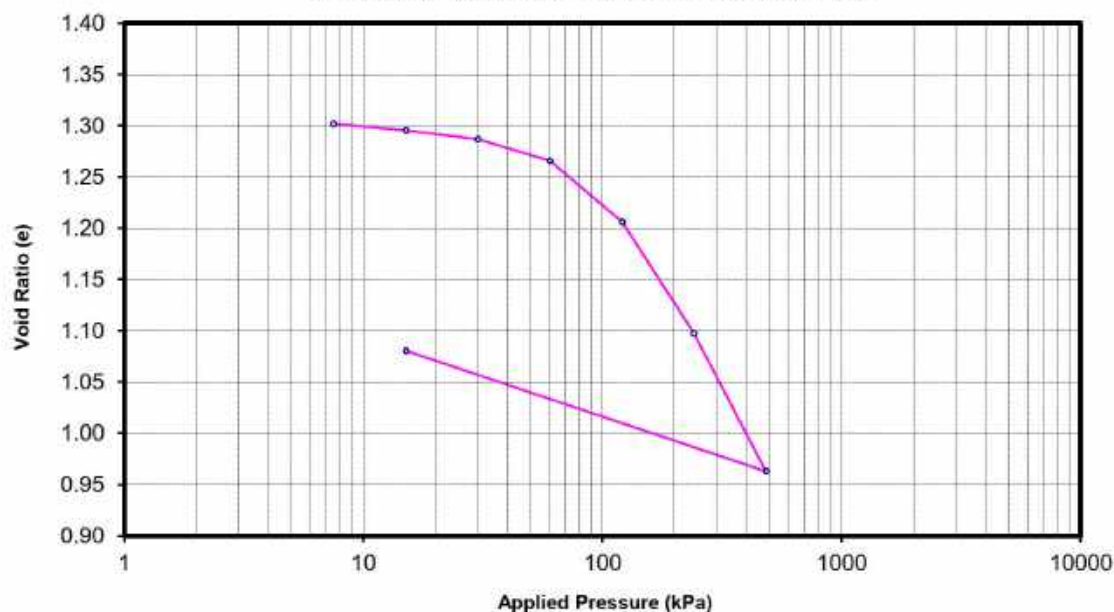
MH No.: MH 7

Sample ID.: PT3

Depth: 3.80-3.85 (m)

Test Method Used: NZS 4402:1986 Test 7.1 One-Dimensional Consolidation

ONE-DIMENSIONAL CONSOLIDATION TEST



Pressure (kPa)	Void Ratio (e)	Pressure Increment (kPa)	Coefficient of Consolidation C_v (m ² /yr)	Coefficient of Volume Compressibility M_v (m ² /MN)
As received	0			
Preload	7.5	0 to 7.5	NA	3.3
	15.1	7.5 to 15.1	4.4	0.37
	30.2	15.1 to 30.2	2.6	0.24
	60.3	30.2 to 60.3	2.4	0.31
	121	60.3 to 121	2.0	0.43
	241	121 to 241	1.2	0.41
	483	241 to 483	1.1	0.27
Unload	15.1	483 to 15.1	NA	NA

Sample History: Undisturbed core trimmed at NWC.

Description: Organic SILT with minor clay and trace sand, firm, dark brown, mottled black.

Initial Dry Density (t/m³): 1.08

Initial Water Content: 51.9%

Solid Density (t/m³): 2.55 (Assumed)

Initial Saturation: 97%

Temperature During Testing: Max = 20 °C Min = 19 °C

Remarks: SQR of time fitting method was used. We have assumed a value of 2.55 t/m³. The calculations of void ratio are affected by the solid density value.

The test results are IANZ accredited but the sample description is not IANZ accredited.

Approved Signatory Sim Tirunahari

Date 9/06/2021

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Your Job No.: J01627

Site: Sunfields, Ardmore

Our Job No.: 1100842.0000

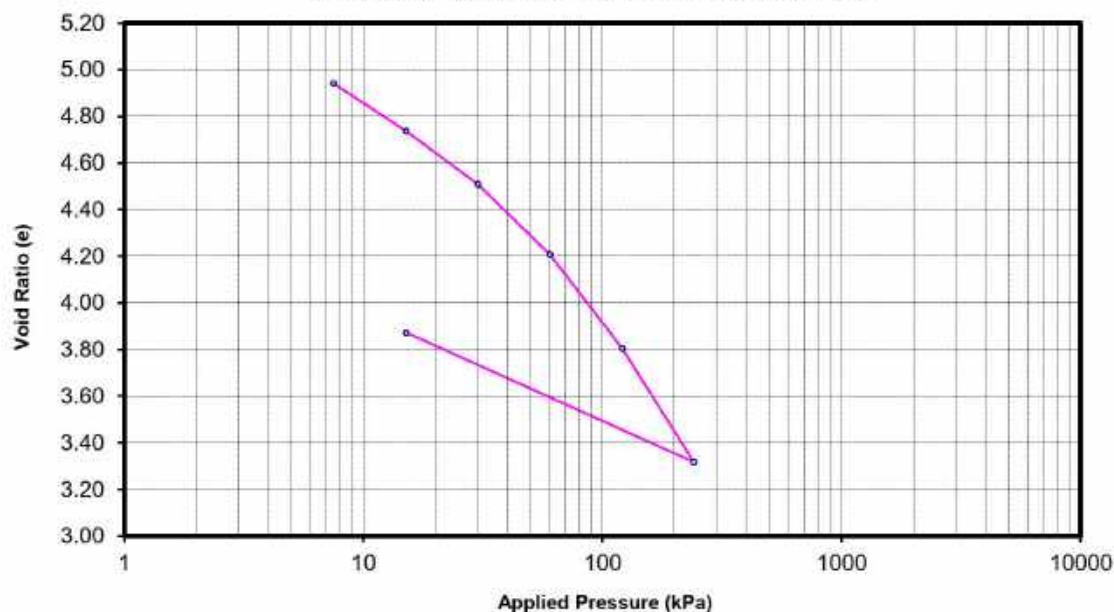
MH No.: MH 10

Sample ID.: PT2

Depth: 1.40-1.45 (m)

Test Method Used: NZS 4402:1986 Test 7.1 One-Dimensional Consolidation

ONE-DIMENSIONAL CONSOLIDATION TEST



Pressure (kPa)		Void Ratio (e)	Pressure Increment (kPa)	Coefficient of Consolidation C_v (m ² /yr)	Coefficient of Volume Compressibility M_v (m ² /MN)
As received	0	5.270			
Preload	7.5	4.942	0 to 7.5	NA	7.0
	15.1	4.738	7.5 to 15.1	0.88	4.5
	30.2	4.508	15.1 to 30.2	1.6	2.6
	60.3	4.208	30.2 to 60.3	1.8	1.8
	121	3.805	60.3 to 121	1.9	1.3
	241	3.317	121 to 241	2.0	0.85
Unload	15.1	3.873	241 to 15.1	NA	NA

Sample History: Undisturbed core trimmed at NWC.

Description: Fibrous PEAT, soft, dark brown with black.

Initial Dry Density (t/m³): 0.30

Initial Water Content: 278%

Solid Density (t/m³): 1.85 (Assumed)

Initial Saturation: 97%

Temperature During Testing: Max = 20 °C Min = 19 °C

Remarks: SQR of time fitting method was used. We have assumed a value of 1.85 t/m³. The calculations of void ratio are affected by the solid density value.

The test results are IANZ accredited but the sample description is not IANZ accredited.

Approved Signatory Sim Tirunahari

Date 9/06/2021

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Your Job No.: J01627

Site: Sunfields, Ardmore

Our Job No.: 1100842.0000

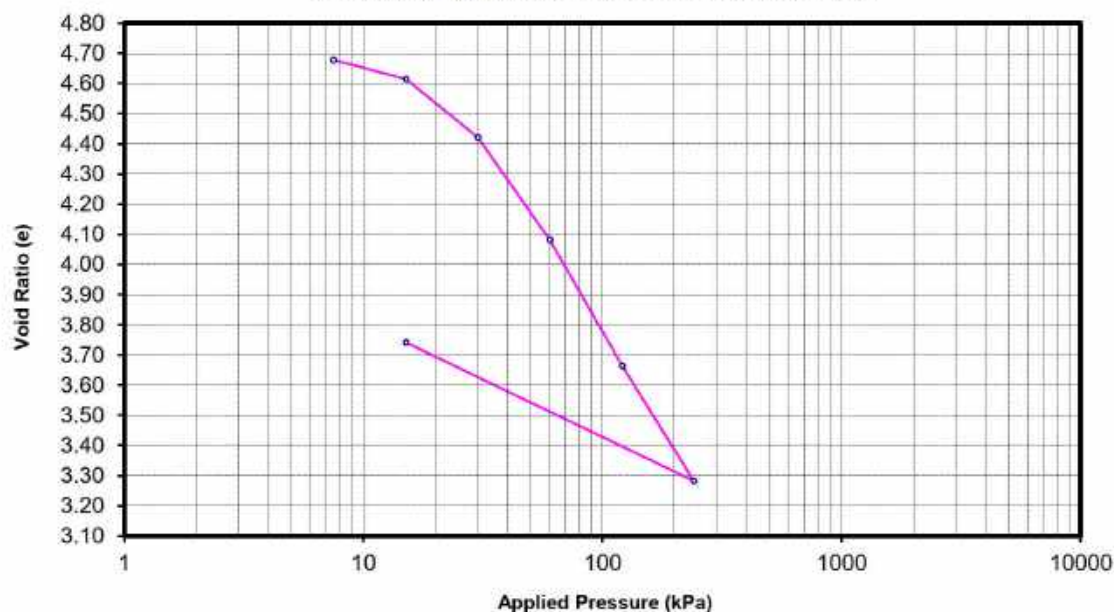
MH No.: MH 10

Sample ID.: PT3

Depth: 7.80-7.85 (m)

Test Method Used: NZS 4402:1986 Test 7.1 One-Dimensional Consolidation

ONE-DIMENSIONAL CONSOLIDATION TEST



Pressure (kPa)	Void Ratio (e)	Pressure Increment (kPa)	Coefficient of Consolidation C_v (m ² /yr)	Coefficient of Volume Compressibility M_v (m ² /MN)
As received	0			
Preload	7.5	0 to 7.5	NA	1.6
	15.1	7.5 to 15.1	3.1	1.5
	30.2	15.1 to 30.2	2.9	2.3
	60.3	30.2 to 60.3	1.9	2.1
	121	60.3 to 121	1.7	1.4
	241	121 to 241	1.5	0.68
Unload	15.1	241 to 15.1	NA	NA

Sample History: Undisturbed core trimmed at NWC.

Description: PEAT, few rootlets, soft, dark brown with black.

Initial Dry Density (t/m³): 0.35

Initial Water Content: 228%

Solid Density (t/m³): 2.00 (Assumed)

Initial Saturation: 96%

Temperature During Testing: Max = 20 °C Min = 19 °C

Remarks: SQR of time fitting method was used. We have assumed a value of 2.00 t/m³. The calculations of void ratio are affected by the solid density value.

The test results are IANZ accredited but the sample description is not IANZ accredited.

Approved Signatory Sim Tirunahari

Date 9/06/2021

1100842.0000/Rep 1



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Your Job No.: J01627

Our Job No.: 1100842.0000

Site: Sunfields, Ardmore

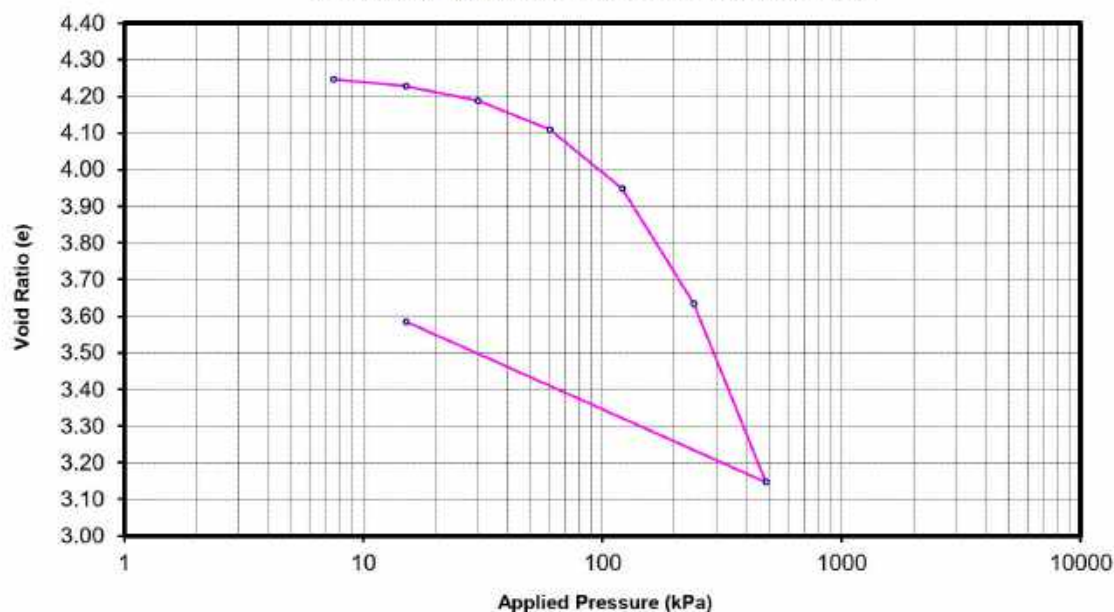
MH No.: MH 13

Sample ID.: PT1

Depth: 1.30-1.35 (m)

Test Method Used: NZS 4402:1986 Test 7.1 One-Dimensional Consolidation

ONE-DIMENSIONAL CONSOLIDATION TEST



Pressure (kPa)	Void Ratio (e)	Pressure Increment (kPa)	Coefficient of Consolidation C_v (m ² /yr)	Coefficient of Volume Compressibility M_v (m ² /MN)
As received	0			
Preload	7.5	0 to 7.5	NA	0.17
	15.1	7.5 to 15.1	11	0.48
	30.2	15.1 to 30.2	8.6	0.49
	60.3	30.2 to 60.3	7.4	0.50
	121	60.3 to 121	6.4	0.52
	241	121 to 241	5.5	0.53
	483	241 to 483	3.9	0.44
Unload	15.1	483 to 15.1	NA	NA

Sample History: Undisturbed core trimmed at NWC.

Description: PEAT, few rootlets, firm, black.

Initial Dry Density (t/m³): 0.38

Initial Water Content: 203%

Solid Density (t/m³): 2.00 (Assumed)

Initial Saturation: 95%

Temperature During Testing: Max = 20 °C Min = 19 °C

Remarks: SQR of time fitting method was used. We have assumed a value of 2.00 t/m³. The calculations of void ratio are affected by the solid density value.

The test results are IANZ accredited but the sample description is not IANZ accredited.

Approved Signatory Sim Tirunahari

Date 9/06/2021

1100842.0000/Rep 1



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Your Job No.: J01627

Our Job No.: 1100842.0000

Site: Sunfields, Ardmore

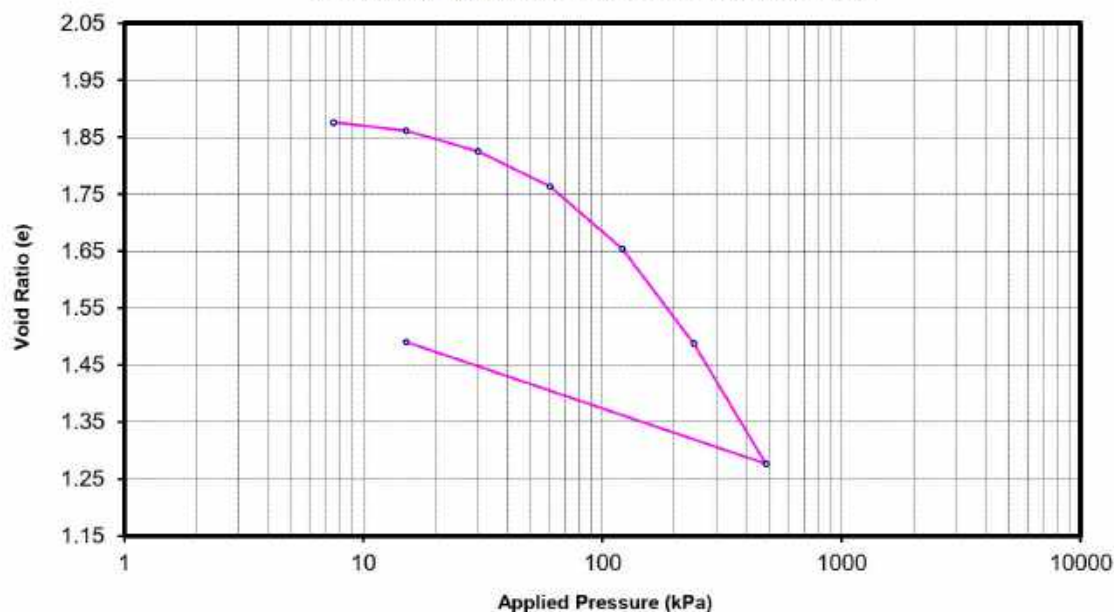
MH No.: MH 13

Sample ID.: PT2

Depth: 13.70-13.75 (m)

Test Method Used: NZS 4402:1986 Test 7.1 One-Dimensional Consolidation

ONE-DIMENSIONAL CONSOLIDATION TEST



Pressure (kPa)	Void Ratio (e)	Pressure Increment (kPa)	Coefficient of Consolidation C_v (m ² /yr)	Coefficient of Volume Compressibility M_v (m ² /MN)
As received	0			
Preload	7.5	0 to 7.5	NA	0.20
	15.1	7.5 to 15.1	0.82	0.66
	30.2	15.1 to 30.2	0.88	0.84
	60.3	30.2 to 60.3	0.93	0.72
	121	60.3 to 121	0.94	0.65
	241	121 to 241	0.95	0.52
	483	241 to 483	0.96	0.35
Unload	15.1	483 to 15.1	NA	NA

Sample History: Undisturbed core trimmed at NWC.

Description: Organic SILT with minor clay and trace sand, firm, dark brown, mottled black.

Initial Dry Density (t/m³): 0.89

Initial Water Content: 71.4%

Solid Density (t/m³): 2.55 (Assumed)

Initial Saturation: 97%

Temperature During Testing: Max = 20 °C Min = 19 °C

Remarks: SQR of time fitting method was used. We have assumed a value of 2.55 t/m³. The calculations of void ratio are affected by the solid density value.

The test results are IANZ accredited but the sample description is not IANZ accredited.

Approved Signatory Sim Tirunahari

Date 9/06/2021

1100842.0000/Rep 1

APPENDIX 4.5

PH TEST RESULTS



Our Ref: 1100861.0.0.0/REP1
Customer Ref: J01627
14 June 2021

Lander Geotechnical Consultants Limited
Level 3, 3 Osterly Way
Manukau
Auckland 2104

Attention: Kyle Meffan

Dear Kyle

Sunfields (Winton) Ardmore Laboratory Test Report

Samples from the above mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.

Descriptions are enclosed for your information, but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Lander Geotechnical Consultants Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report prepared by:

Authorised for Geotechnics by:


James Green
Construction Materials Technician
Approved Signatory


Vic O'Connor
Project Director

Report checked by:


Alan Benton
Wellington Manager



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

14-Jun-21

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Test Results

Determination of the pH Value – NZS4402 1986 Test 3.3.2 Colorimetric

Sample	Date of Test	pH Value
MH1 1.9-2.4m S1	11/06/2021	7.0
MH2 0.9-1.5m S1	11/06/2021	6.0
MH8 4.1-4.4m S1	11/06/2021	6.0
MH10 1.5-2.0m S1	11/06/2021	7.5
MH12 4.8-5.3m S1	11/06/2021	7.5
MH13 3.5-4.0m S1	11/06/2021	7.0

APPENDIX 5

SLOPE STABILITY

APPENDIX 5.1

SLOPE STABILITY SUMMARY

1 SEISMIC DESIGN PARAMETERS FOR SLOPE STABILITY

The PGA for the study area has been determined in accordance with MBIE Module 1¹ using the following formula:

$$a_{\max} = C_{0,1000} \times \frac{R}{1.3} \times f$$

Where:

Site Subsoil Class	Class C, shallow soil site (NZS 1170.5:2004, Table 3.2)
Subdivision design life	50 years, NZS 1170.0:2002, Tables 3.1 & 3.2
Return period PGA coefficient, $C_{0,1000}$	0.17, Site Subsoil Class C, Manukau (NZTA Bridge Manual Table 6.1A)
Return period factor, R	0.65 (NZS 1170.0:2002, Table 3.5)
Site subsoil class factor, f	1.33, Site Subsoil Class C (MBIE Module 1, Section 5.1)
Magnitude, M_{eff}	6.5 (NZTA Bridge Manual Table 6.1A)

Based on this formula, the following PGA for various annual exceedance probabilities (AEP) are summarised in Table 5.1 below for Importance Level 2 structures and a 50-year design life given the expected future land use. This importance levels is consistent with developments of a similar nature in the surrounding Takanini area (i.e. the Takanini Stormwater Conveyance Channel).

Table 5.1. Summary of Design Peak Ground Acceleration (PGA)

Design Case	M_{eff}	AEP	R	PGA
1-150 year seismic condition	6.5	1:150	0.65	0.11
Newmark Rigid-Block assessment (lateral spread)	6.5	N/A	N/A	0.09

2 COMPUTER SLOPE STABILITY ASSESSMENT

To assess the prevailing and long-term stability of the proposed stormwater channel, a slope stability assessment has been completed using a typical channel profile.

The slope stability assessment was carried out using Slide 2 (2018) software from Roc-Science, using the Morgenstern-Price method for circular slips, which is considered to be the governing mode of failure for our geotechnical model for this site.

In accordance with the Auckland Council Code of Practice (ACCoP), the slope stability analysis was assessed under three cases:

¹ New Zealand Geotechnical Society (NZGS) and Ministry of Business Innovation & Employment (MBIE) guidelines for Earthquake Geotechnical Practice in New Zealand. "Module 1: Overview of the guidelines" Rev. 0, Issue Date March 2016.

- Normal groundwater condition (minimum FOS >1.5 required)
- Extreme (worst credible) groundwater condition (minimum FOS >1.3 required)
- Seismic condition with 150-year event (minimum FOS >1.2 required)

Additionally, a Newmark Rigid-Block Assessment has been completed to assess the potential for lateral spread to occur, which is recommended in MBIE Module 3². For this assessment, the seismic parameters provided in Table 5.1 were adopted using the Friuli, Italy 1976 earthquake which has both a similar magnitude and PGA to that assessed for this site.

As the proposed channels are located in areas containing extensive fibrous peat deposits, this assessment has modelled only fibrous peat materials based on the geotechnical investigations completed by Lander Geotechnical as well as applicable data from nearby developments. Stiff crustal materials have been excluded from the analysis as they are variable, and it is more conservative to exclude these materials.

The material parameter properties used here are consistent with those adopted by GHD³ in their assessment of the Takanini Stormwater Conveyance Channel which were derived from triaxial test results to determine lower bound design effective stress parameters. The materials encountered by GHD are generally similar to those encountered in the current boreholes and therefore we have adopted their parameter for fibrous peat as outlined in Table 5.2 below.

A summary of the results is given in Table 5.3. Full stability outputs included in Appendix 5.2 and these results are discussed in Section 7.2 of this report.

Table 5.2. Soil Properties

Geological Unit	γ	c'	ϕ'	S_u
Fibrous Peat (Stratum S1b)	11	2	25	15

Table 5.3: Slope Stability Assessment Results

Case Number	Analysis Description	Required FoS	Resulting FoS
1	Existing Groundwater Level (Static)	1.5	1.6
2	Elevated Groundwater Level	1.3	1.3

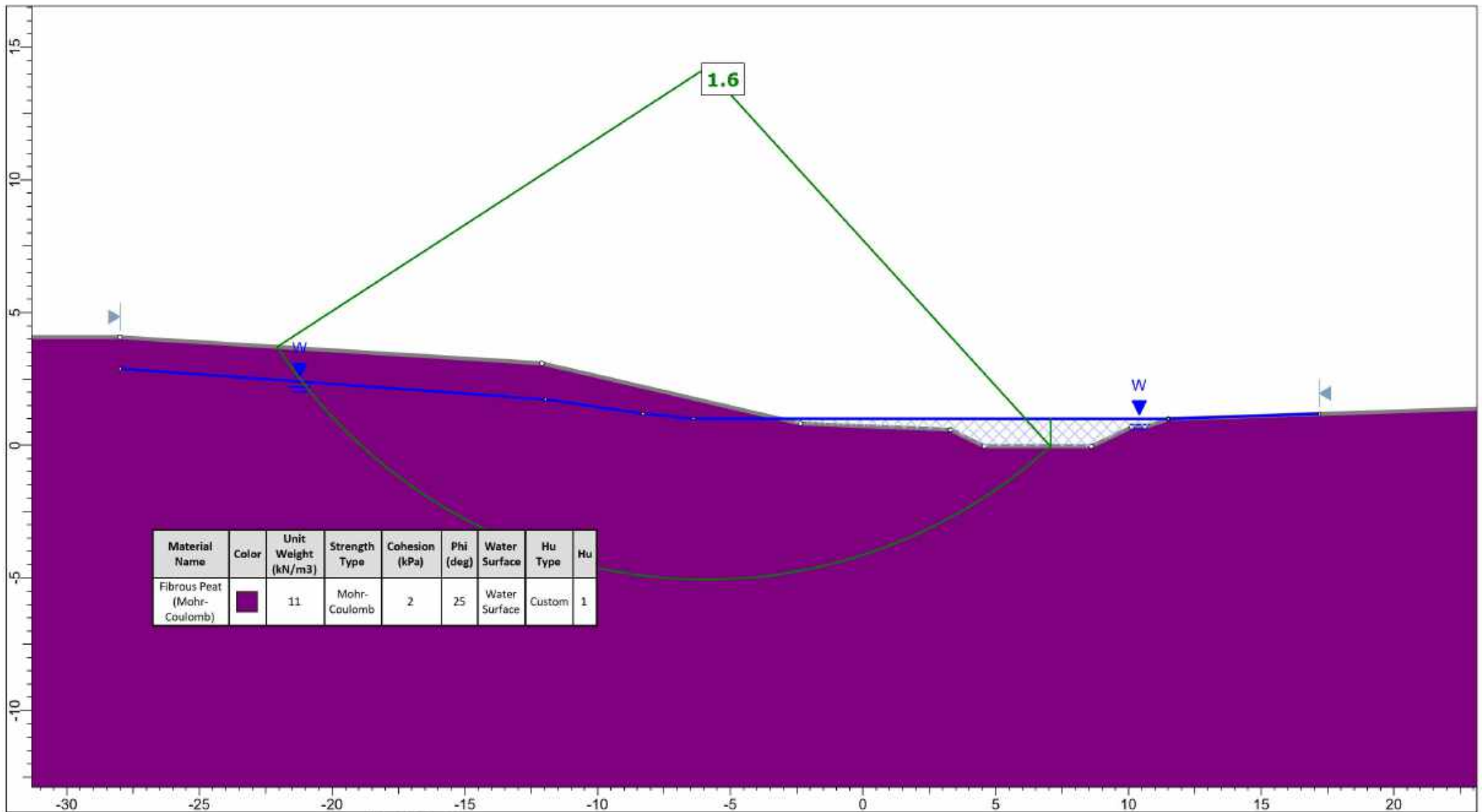
² New Zealand Geotechnical Society (NZGS) and Ministry of Business Innovation & Employment (MBIE) guidelines for Earthquake Geotechnical Practice in New Zealand. "Module 3: Identification, assessment and mitigation of liquefaction hazards" Rev. 0, Issue Date May 2016.

³ Takanini Stormwater Conveyance Channel – Geotechnical and Ground Settlements Effects Report; Technical Report E. Reference 51/32174, dated April 2016.

Case Number	Analysis Description	Required FoS	Resulting FoS
3	1/150-yr Seismic Event	1.2	1.2
4	Newmark Rigid-Block (lateral spread)	1.0	>1.0

APPENDIX 5.2

SLOPE STABILITY OUTPUTS



Analysis Description

Existing Groundwater

Cross Section Typical Channel Section

Case No. 1

Project J01627 - Sunfields Development, Ardmore

Drawn By KM

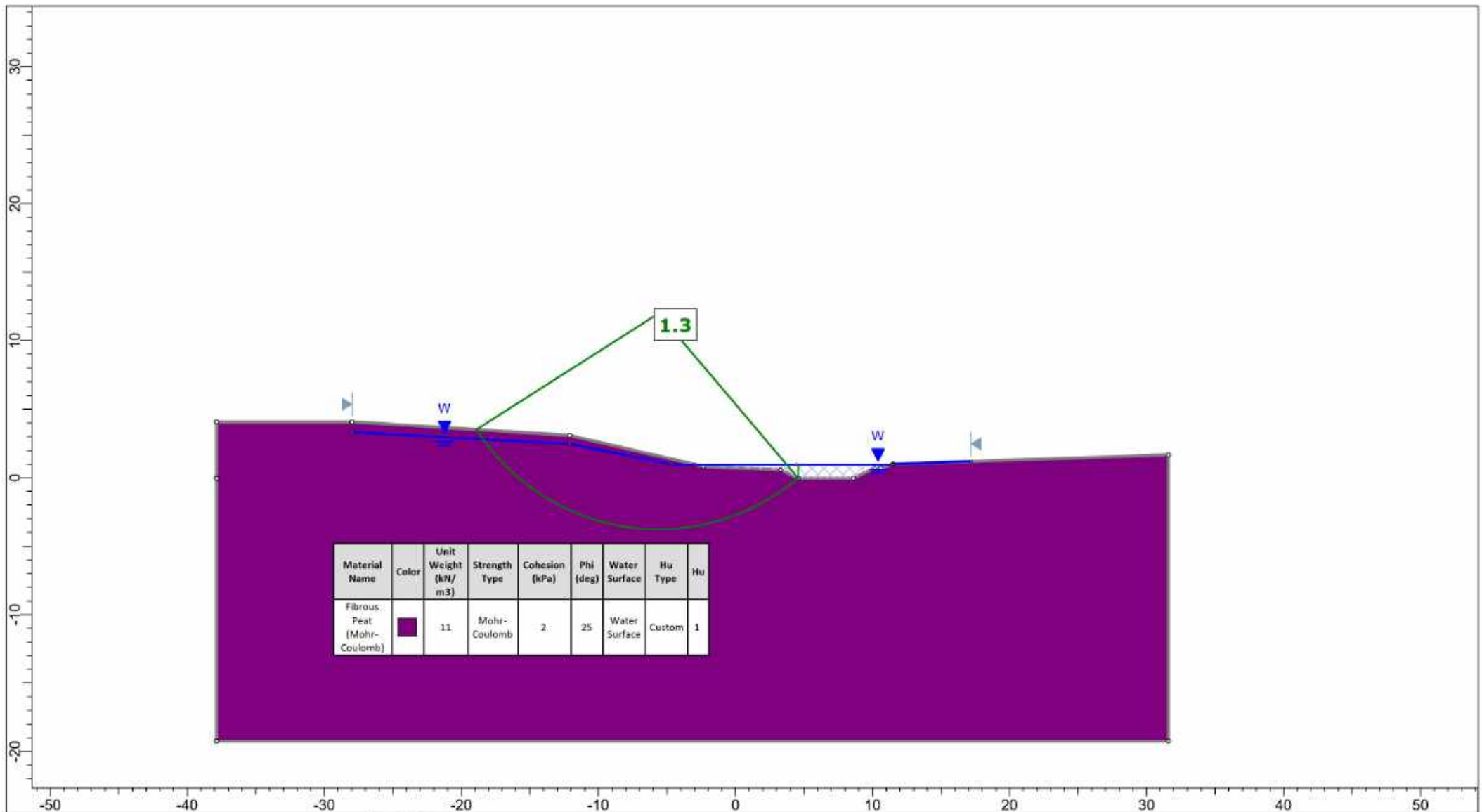
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Company Lander Geotechnical Consultants Limited

Date 10/08/2021

Scale 1:200

File Name J01627_210629_TypicalChannel.slmd



Analysis Description

High Groundwater

Cross Section Typical Channel Section

Case No. 2

Project J01627 - Sunfields Development, Ardmore

Drawn By KM

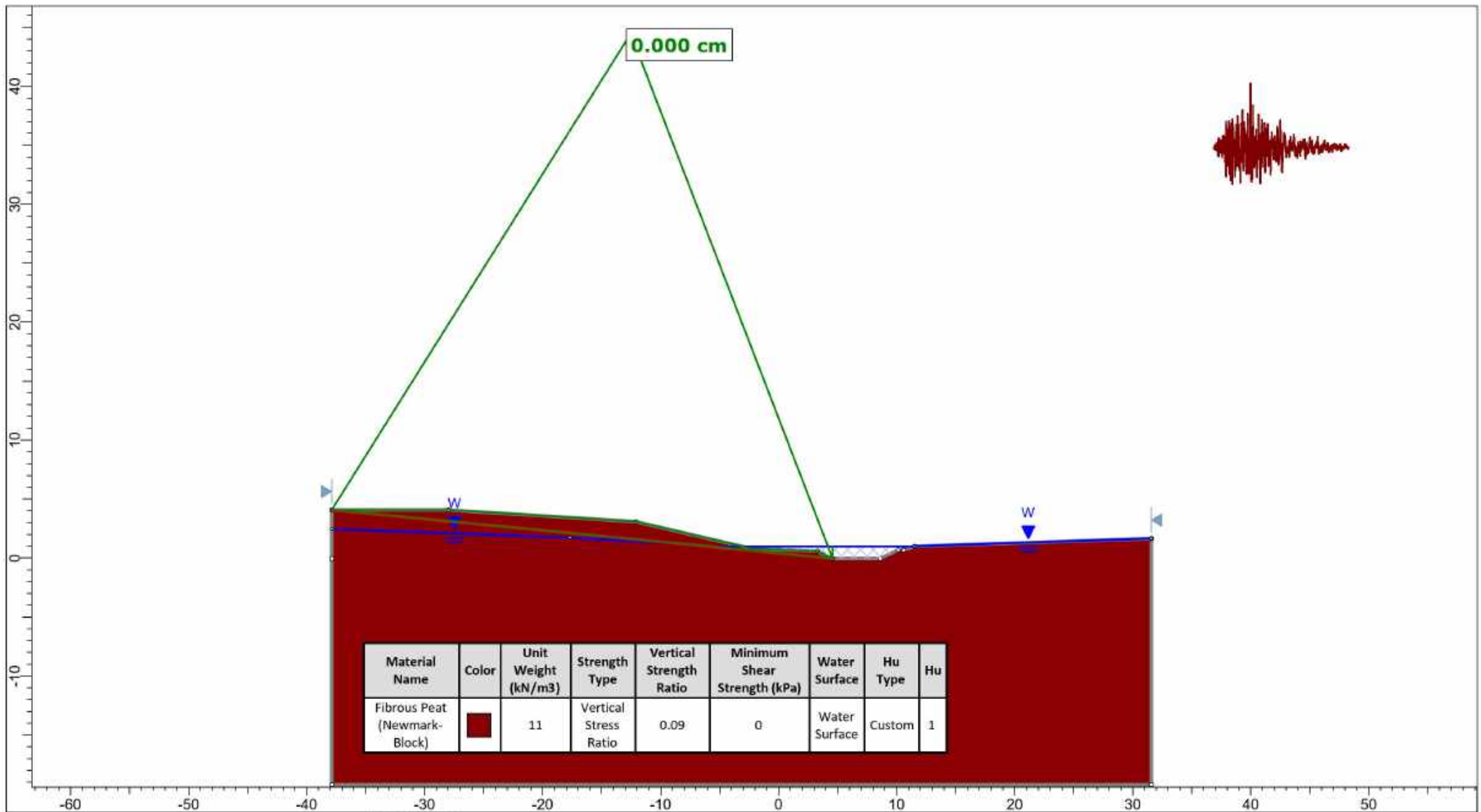
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Company Lander Geotechnical Consultants Limited

Date 10/08/2021

Scale 1:388

File Name J01627_210629_TypicalChannel.slmd



Analysis Description

Newmark-Block Assessment (Lateral Spread)

Cross Section Typical Channel Section

Case No. 4

Project J01627 - Sunfields Development, Ardmore

Drawn By KM

F.O.S Filter <1.0

Company Lander Geotechnical Consultants Limited

Date 10/08/2021

Scale 1:450

File Name J01627_210629_TypicalChannel.slmd

APPENDIX 6

CONSOLIDATION SETTLEMENT

APPENDIX 6.1

CONSOLIDATION SETTLEMENT SUMMARY AND

FOUNDATION DESIGN SOLUTION

1 COMPUTER SETTLEMENT ANALYSIS

To assess the settlement caused by the proposed earthworks fills and building loads, a settlement analysis was completed using two separate methods to provide a range of likely settlement outcomes. These methods are outlined below:

- a) Using CPeT-IT version 2 software on existing CPT data and applying the Bousinessq settlement calculation to the CPT data;
- b) Using DMT Settlements version 1 software (Marchetti).

For both settlement assessments the following assumptions were made:

- A nominal 10m x 20m rectangular building footprint was used.
- A rigid footing (i.e. stiffened pod-raft) is used.
- A conservative footing depth / embedment depth of 0.0m has been used.
- Building loads were calculated using an anticipated total uniformly distributed load (UDL, G + Q) of 5.5kPa per storey. The below typical loads for lightweight-residential dwellings in Takanini peat soils have previously been provided to us (i.e. 5.5kPa per storey is conservative):

1 Level units

- o Dead load 3.5kPa
- o Live load 1.5kPa

2 Level units

- o Dead load 5.0kPa
- o Live load 3.0kPa

For each CPT and DMT trace, the following cases were assessed:

- Case 1 – one-storey building load (5.5kPa).
- Case 2 – two-storey building load (11kPa).
- Case 3 – three-storey building load (16.5kPa).

A summary of the calculated settlements are given in Table 6.1. Full CPeT-IT records are presented in Appendices 6.2 and 6.3 and these results are discussed in Section 7.3.1 of this report.

Table 6.1. Settlement Analysis Summary table

Test ID	Case 1 (mm)	Case 2 (mm)	Case 3 (mm)
ZONE 1 – TAURANGA GROUP			
CPT02	47.6	70.4	93.3
CPT04A	211.2	316.8	422.3
CPT06	153.4	234.0	314.5
CPT11	59.6	90.2	120.9
CPT13A	121.1	192.6	264.1
CPT14	145.9	214.3	282.8
CPT15	131.8	223.9	315.9
CPT18	136.8	228.7	320.6
CPT19A	145.2	239.3	333.5
CPT21A	82.7	136.4	190.1
CPT22	14.3	26.2	38.0
CPT403	14.7	28.1	41.4
CPT407	7.1	13.2	19.2
CPT410	9.5	17.2	24.8
CPT413	44.2	76.2	108.2
CPT414	53.6	96.8	139.9
CPT415A	55.6	97.5	139.4
DMT02	96.7	155.8	214.9
DMT03	N/A	N/A	N/A
DMT05	163.7	209.9	256.1
DMT07	182.5	234.0	285.5
ZONE 2 - PUKETOCA FORMATION / EAST COAST BAYS FORMATION			
CPT01	3.4	6.4	9.4
CPT03	6.4	11.8	17.2
CPT03A	5.0	9.1	13.2
CPT05	4.4	8.2	12.0
CPT07	7.3	12.6	17.8
CPT08	2.5	4.7	6.8
CPT09	3.0	5.3	7.6
CPT09A	3.3	6.0	8.8
CPT10	3.5	6.1	8.8
CPT12	8.0	14.3	20.7
CPT16	11.4	21.3	31.2
CPT17	1.7	3.2	4.7
CPT20	4.7	9.0	13.2
CPT401	4.3	7.6	11.0
CPT402	4.0	7.6	11.2
CPT404	9.8	18.1	26.4
CPT405	2.6	4.8	6.9
CPT406	3.1	5.7	8.3
CPT408	7.8	14.8	21.8
CPT409	2.8	5.1	7.4
CPT411	6.4	11.5	16.5
CPT412	16.0	28.0	40.1
DMT01	1.9	3.0	4.0
DMT04	5.3	10.6	15.9
DMT06	9.0	17.9	26.9

Table 6.2. Ground Improvement and Foundation Solutions Summary

Typology	Preload		Preload / Localised Ground Improvement		Specific Foundation Design	
	Zone 1	Zone 2	Zone 1	Zone 2	Zone 1	Zone 2
NZS3604 Lightweight standalone 2-level , no IT walls, all timber framed / 1 st level timber floor, ground floor pod-raft (or similar on-grade slab), light weight cladding (incl. brick veneer) and roofing (Up to 11 kPa)	●	N/A	●	N/A	●	NZS3604 ⁽¹⁾
NZS3604 Lightweight terraced or duplexes were (> 1:2 aspect); 2-level , no concrete IT walls, all timber framed / 1 st level timber floor, ground floor pod-raft (or similar on-grade slab), light weight cladding (incl. brick veneer) and roofing (Up to 11 kPa)	●	N/A	●	N/A	●	NZS3604
Lightweight 3-level , no concrete IT walls, all timber framed / 1 st and 2 nd level timber floors, ground floor pod-raft (or similar on-grade slab), light weight cladding (incl. brick veneer ground level only) and roofing (> 11 kPa)	N/A	●	●	N/A	●	NZS3604 or ●
Heavy Weight Building standalone, with concrete IT walls, 1 st (plus) levels suspended concrete floors, ground floor concrete slab on grade, light weight cladding (incl. brick veneer) and roofing (> 11kPa)	N/A	N/A	N/A	N/A	●	●
Commercial and/ or industrial buildings (> 11kPa)	N/A	N/A	N/A	N/A	●	●

(1) Foundation solutions not requiring specific design per NZS3604. Definition of NZS3604 “good ground” are soils having a geotechnical ultimate bearing capacity of 300 kPa, with no ground stability issues. Provision for expansive site class will be guided by MBIE (B1 Structure, Amendment 19) and/ or AS2870:2011.

Table 6.3. Commercial / Industrial Ground Improvement and Foundation Solution Case Studies (for Zone 1 areas).

Location / Building	Building Working Load	Ground Improvement	Foundation Solution
Sikh Temple, 70 Takanini School Road	20kPa	N/A	8m deep piled foundations (to relatively shallow ECBF bedrock)
Gymnasium and Multi-Sports Centre, Bruce Pulman Park, Walters Road	Unconfirmed, typically 'lightweight'	Stage 1 (single storey) - 1400mm high preloading, average settlement of 142mm recorded Stage 2 (two-storey) - 1700mm high preloading, average settlement of 500mm recorded	foundation pads and floor slab thickenings
Mitre 10 Centre, 238 Great South Road	10kPa	500mm thick hardfill raft	Timber driven piles (for column loads) Strip footings (for external tilt slab walls)

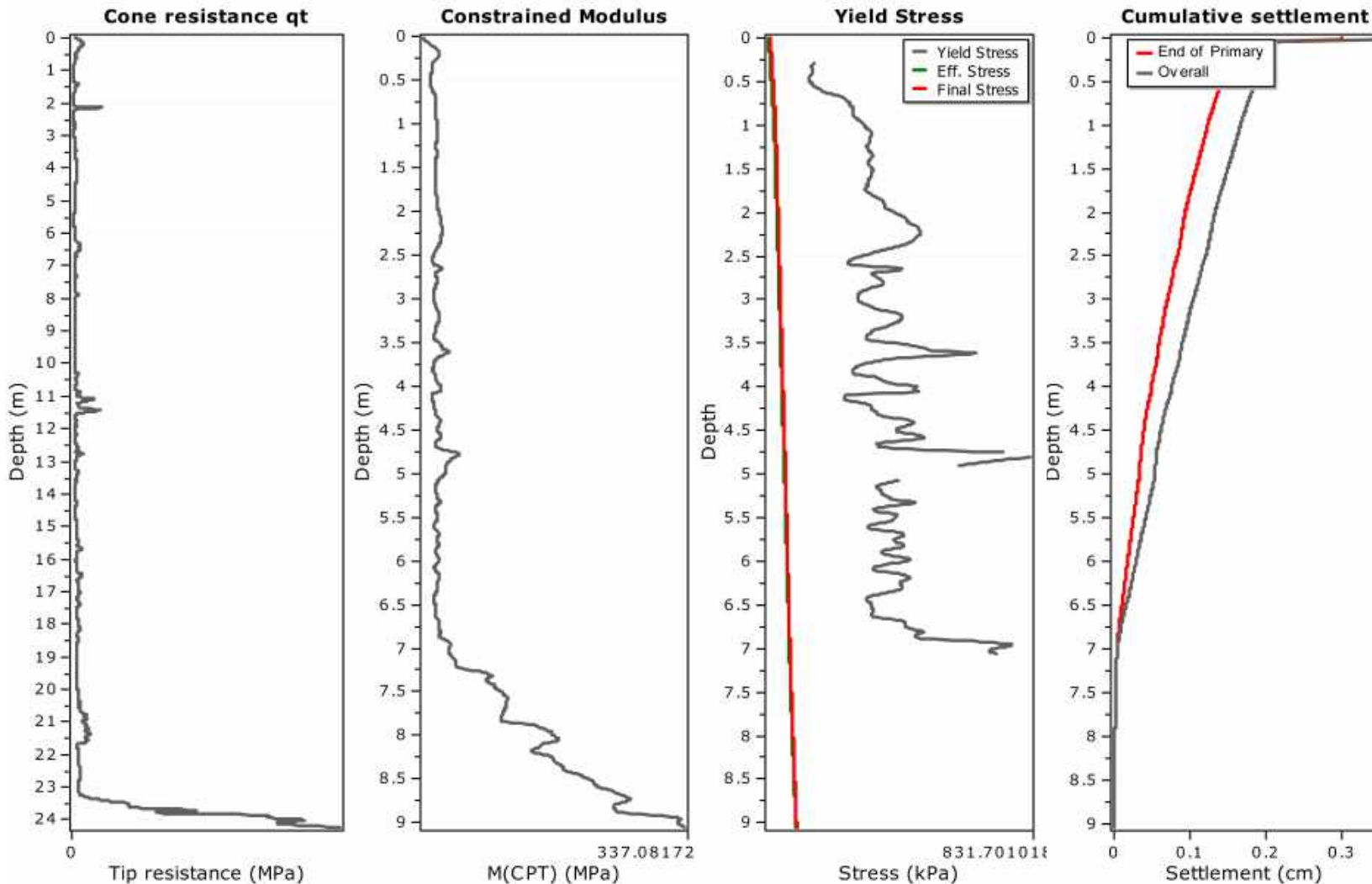
APPENDIX 6.2

CPT CONSOLIDATION SETTLEMENT ANALYSIS RESULTS

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
875	8.74	8.75	0.01	8.75	1.89	262.00	0.34	0.000	0.000	0.000
876	8.75	8.76	0.01	8.76	1.89	259.60	0.34	0.000	0.000	0.000
877	8.76	8.77	0.01	8.77	1.88	256.69	0.34	0.000	0.000	0.000
878	8.77	8.78	0.01	8.78	1.88	253.54	0.34	0.000	0.000	0.000
879	8.78	8.79	0.01	8.79	1.88	249.78	0.34	0.000	0.000	0.000
880	8.79	8.80	0.01	8.80	1.88	245.61	0.34	0.000	0.000	0.000
881	8.80	8.81	0.01	8.81	1.88	242.47	0.34	0.000	0.000	0.000
882	8.81	8.82	0.01	8.82	1.88	241.59	0.34	0.000	0.000	0.000
883	8.82	8.83	0.01	8.83	1.87	242.35	0.34	0.000	0.000	0.000
884	8.83	8.84	0.01	8.84	1.87	243.24	0.34	0.000	0.000	0.000
885	8.84	8.85	0.01	8.85	1.87	243.79	0.34	0.000	0.000	0.000
886	8.85	8.86	0.01	8.86	1.87	244.23	0.34	0.000	0.000	0.000
887	8.86	8.87	0.01	8.87	1.87	244.92	0.34	0.000	0.000	0.000
888	8.87	8.88	0.01	8.88	1.87	247.52	0.34	0.000	0.000	0.000
889	8.88	8.89	0.01	8.89	1.86	253.28	0.34	0.000	0.000	0.000
890	8.89	8.90	0.01	8.90	1.86	264.58	0.34	0.000	0.000	0.000
891	8.90	8.91	0.01	8.91	1.86	277.86	0.34	0.000	0.000	0.000
892	8.91	8.92	0.01	8.92	1.86	291.96	0.34	0.000	0.000	0.000
893	8.92	8.93	0.01	8.93	1.86	304.74	0.34	0.000	0.000	0.000
894	8.93	8.94	0.01	8.94	1.86	315.50	0.34	0.000	0.000	0.000
895	8.94	8.95	0.01	8.95	1.85	323.47	0.34	0.000	0.000	0.000
896	8.95	8.96	0.01	8.96	1.85	326.89	0.34	0.000	0.000	0.000
897	8.96	8.97	0.01	8.97	1.85	327.76	0.34	0.000	0.000	0.000
898	8.97	8.98	0.01	8.98	1.85	326.00	0.34	0.000	0.000	0.000
899	8.98	8.99	0.01	8.99	1.85	324.76	0.34	0.000	0.000	0.000
900	8.99	9.00	0.01	9.00	1.85	323.85	0.34	0.000	0.000	0.000
901	9.00	9.01	0.01	9.01	1.85	324.30	0.34	0.000	0.000	0.000
902	9.01	9.02	0.01	9.02	1.84	324.31	0.34	0.000	0.000	0.000
903	9.02	9.03	0.01	9.03	1.84	326.03	0.33	0.000	0.000	0.000
904	9.03	9.04	0.01	9.04	1.84	328.46	0.33	0.000	0.000	0.000
905	9.04	9.05	0.01	9.05	1.84	331.47	0.33	0.000	0.000	0.000

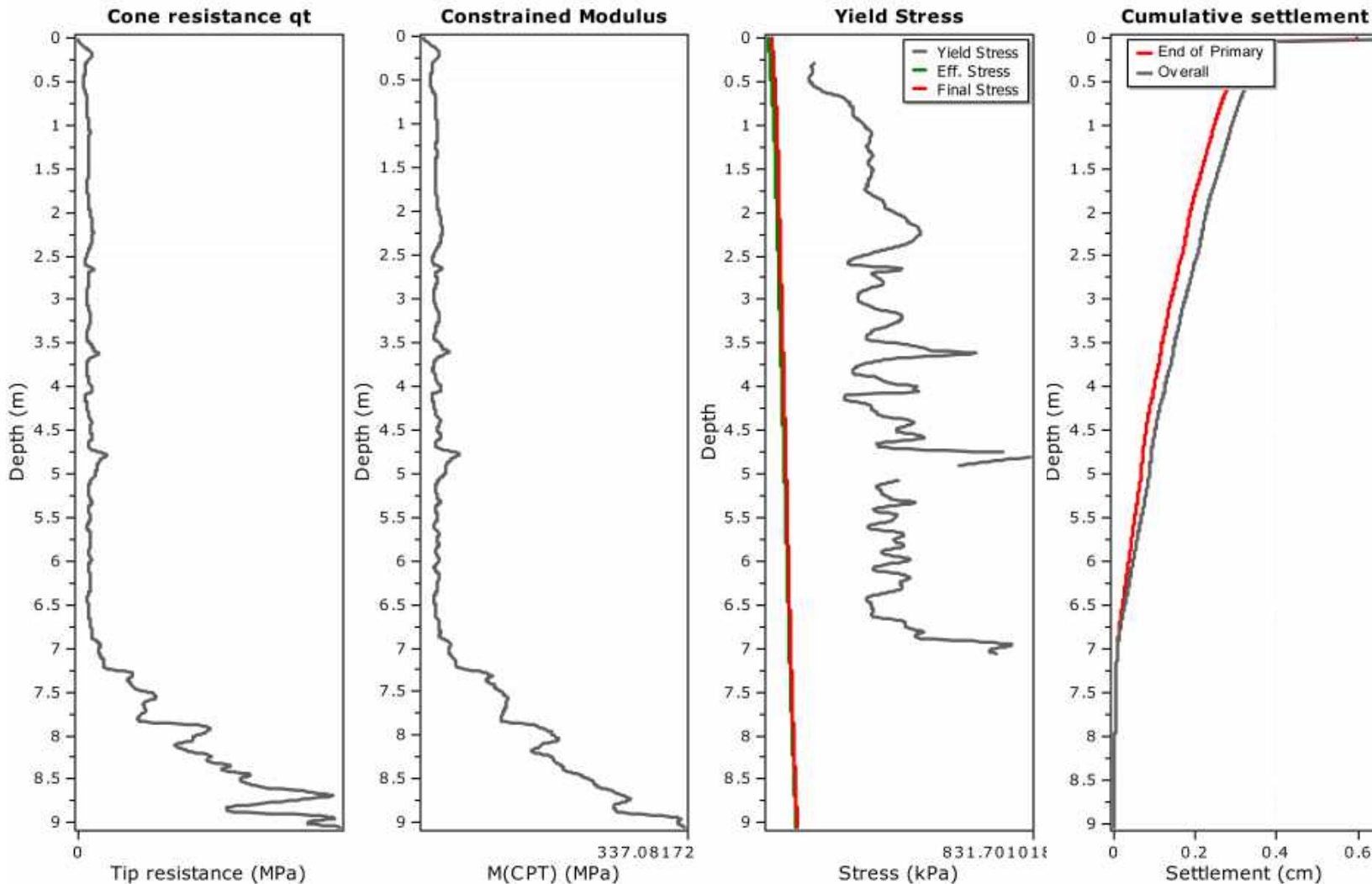
Total primary settlement: 0.30**Total secondary settlement: 0.05****Total calculated settlement: 0.34****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - \exp \left(- \frac{t}{t_p} \right) \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
875	8.74	8.75	0.01	8.75	3.78	262.00	0.34	0.000	0.000	0.000
876	8.75	8.76	0.01	8.76	3.77	259.60	0.34	0.000	0.000	0.000
877	8.76	8.77	0.01	8.77	3.77	256.69	0.34	0.000	0.000	0.000
878	8.77	8.78	0.01	8.78	3.77	253.54	0.34	0.000	0.000	0.000
879	8.78	8.79	0.01	8.79	3.76	249.78	0.34	0.000	0.000	0.000
880	8.79	8.80	0.01	8.80	3.76	245.61	0.34	0.000	0.000	0.000
881	8.80	8.81	0.01	8.81	3.76	242.47	0.34	0.000	0.000	0.000
882	8.81	8.82	0.01	8.82	3.75	241.59	0.34	0.000	0.000	0.000
883	8.82	8.83	0.01	8.83	3.75	242.35	0.34	0.000	0.000	0.000
884	8.83	8.84	0.01	8.84	3.75	243.24	0.34	0.000	0.000	0.000
885	8.84	8.85	0.01	8.85	3.74	243.79	0.34	0.000	0.000	0.000
886	8.85	8.86	0.01	8.86	3.74	244.23	0.34	0.000	0.000	0.000
887	8.86	8.87	0.01	8.87	3.74	244.92	0.34	0.000	0.000	0.000
888	8.87	8.88	0.01	8.88	3.73	247.52	0.34	0.000	0.000	0.000
889	8.88	8.89	0.01	8.89	3.73	253.28	0.34	0.000	0.000	0.000
890	8.89	8.90	0.01	8.90	3.73	264.58	0.34	0.000	0.000	0.000
891	8.90	8.91	0.01	8.91	3.72	277.86	0.34	0.000	0.000	0.000
892	8.91	8.92	0.01	8.92	3.72	291.96	0.34	0.000	0.000	0.000
893	8.92	8.93	0.01	8.93	3.72	304.74	0.34	0.000	0.000	0.000
894	8.93	8.94	0.01	8.94	3.71	315.50	0.34	0.000	0.000	0.000
895	8.94	8.95	0.01	8.95	3.71	323.47	0.34	0.000	0.000	0.000
896	8.95	8.96	0.01	8.96	3.71	326.89	0.34	0.000	0.000	0.000
897	8.96	8.97	0.01	8.97	3.70	327.76	0.34	0.000	0.000	0.000
898	8.97	8.98	0.01	8.98	3.70	326.00	0.34	0.000	0.000	0.000
899	8.98	8.99	0.01	8.99	3.70	324.76	0.34	0.000	0.000	0.000
900	8.99	9.00	0.01	9.00	3.69	323.85	0.34	0.000	0.000	0.000
901	9.00	9.01	0.01	9.01	3.69	324.30	0.34	0.000	0.000	0.000
902	9.01	9.02	0.01	9.02	3.69	324.31	0.34	0.000	0.000	0.000
903	9.02	9.03	0.01	9.03	3.68	326.03	0.33	0.000	0.000	0.000
904	9.03	9.04	0.01	9.04	3.68	328.46	0.33	0.000	0.000	0.000
905	9.04	9.05	0.01	9.05	3.68	331.47	0.33	0.000	0.000	0.000

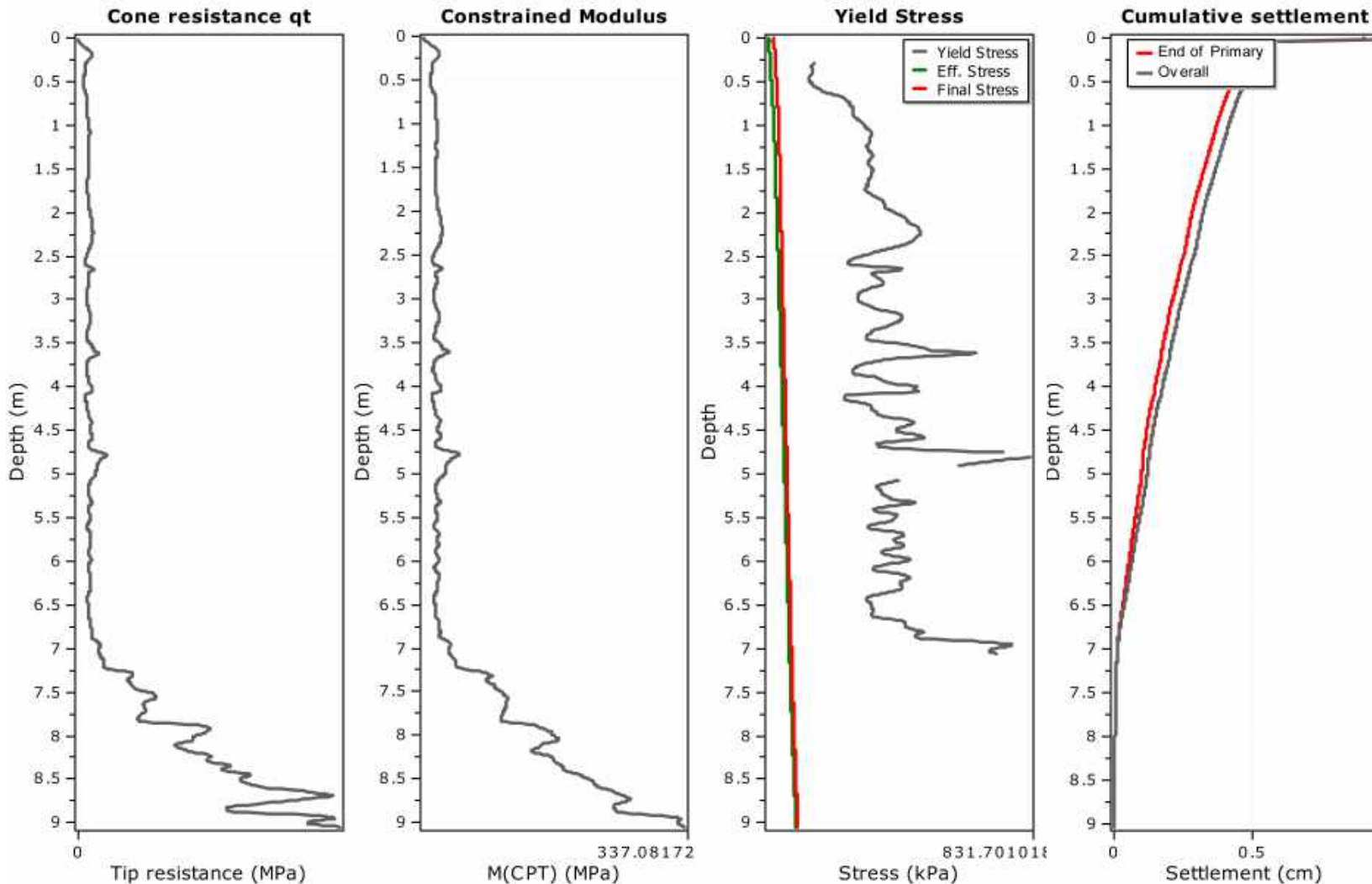
Total primary settlement: 0.60**Total secondary settlement: 0.05****Total calculated settlement: 0.64****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

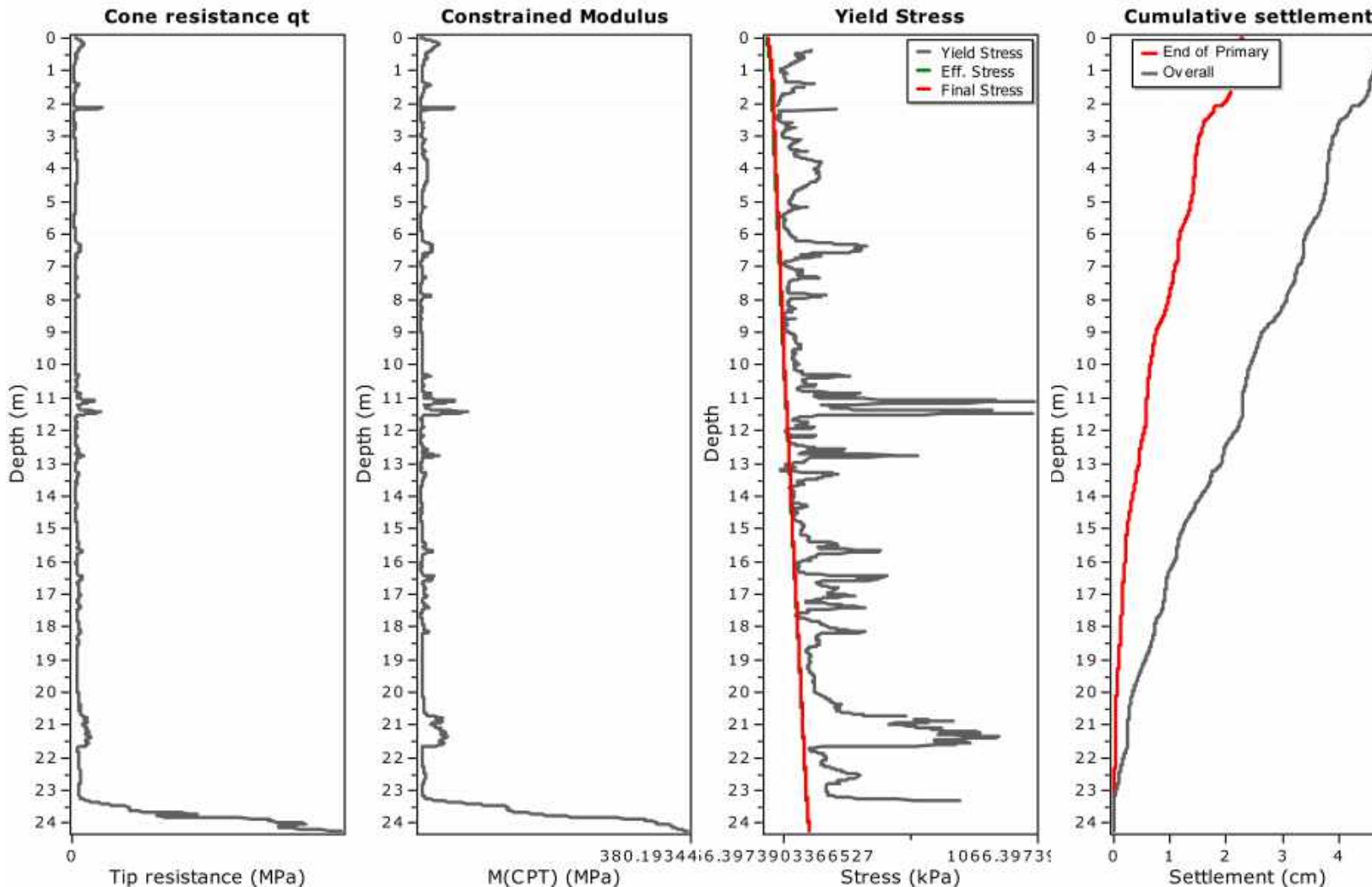
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
875	8.74	8.75	0.01	8.75	5.66	262.00	0.34	0.000	0.000	0.000
876	8.75	8.76	0.01	8.76	5.66	259.60	0.34	0.000	0.000	0.000
877	8.76	8.77	0.01	8.77	5.65	256.69	0.34	0.000	0.000	0.000
878	8.77	8.78	0.01	8.78	5.65	253.54	0.34	0.000	0.000	0.000
879	8.78	8.79	0.01	8.79	5.64	249.78	0.34	0.000	0.000	0.000
880	8.79	8.80	0.01	8.80	5.64	245.61	0.34	0.000	0.000	0.000
881	8.80	8.81	0.01	8.81	5.63	242.47	0.34	0.000	0.000	0.000
882	8.81	8.82	0.01	8.82	5.63	241.59	0.34	0.000	0.000	0.000
883	8.82	8.83	0.01	8.83	5.62	242.35	0.34	0.000	0.000	0.000
884	8.83	8.84	0.01	8.84	5.62	243.24	0.34	0.000	0.000	0.000
885	8.84	8.85	0.01	8.85	5.61	243.79	0.34	0.000	0.000	0.000
886	8.85	8.86	0.01	8.86	5.61	244.23	0.34	0.000	0.000	0.000
887	8.86	8.87	0.01	8.87	5.60	244.92	0.34	0.000	0.000	0.000
888	8.87	8.88	0.01	8.88	5.60	247.52	0.34	0.000	0.000	0.000
889	8.88	8.89	0.01	8.89	5.59	253.28	0.34	0.000	0.000	0.000
890	8.89	8.90	0.01	8.90	5.59	264.58	0.34	0.000	0.000	0.000
891	8.90	8.91	0.01	8.91	5.58	277.86	0.34	0.000	0.000	0.000
892	8.91	8.92	0.01	8.92	5.58	291.96	0.34	0.000	0.000	0.000
893	8.92	8.93	0.01	8.93	5.57	304.74	0.34	0.000	0.000	0.000
894	8.93	8.94	0.01	8.94	5.57	315.50	0.34	0.000	0.000	0.000
895	8.94	8.95	0.01	8.95	5.56	323.47	0.34	0.000	0.000	0.000
896	8.95	8.96	0.01	8.96	5.56	326.89	0.34	0.000	0.000	0.000
897	8.96	8.97	0.01	8.97	5.55	327.76	0.34	0.000	0.000	0.000
898	8.97	8.98	0.01	8.98	5.55	326.00	0.34	0.000	0.000	0.000
899	8.98	8.99	0.01	8.99	5.55	324.76	0.34	0.000	0.000	0.000
900	8.99	9.00	0.01	9.00	5.54	323.85	0.34	0.000	0.000	0.000
901	9.00	9.01	0.01	9.01	5.54	324.30	0.34	0.000	0.000	0.000
902	9.01	9.02	0.01	9.02	5.53	324.31	0.34	0.000	0.000	0.000
903	9.02	9.03	0.01	9.03	5.53	326.03	0.33	0.000	0.000	0.000
904	9.03	9.04	0.01	9.04	5.52	328.46	0.33	0.000	0.000	0.000
905	9.04	9.05	0.01	9.05	5.52	331.47	0.33	0.000	0.000	0.000

Total primary settlement: 0.90**Total secondary settlement: 0.05****Total calculated settlement: 0.94****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

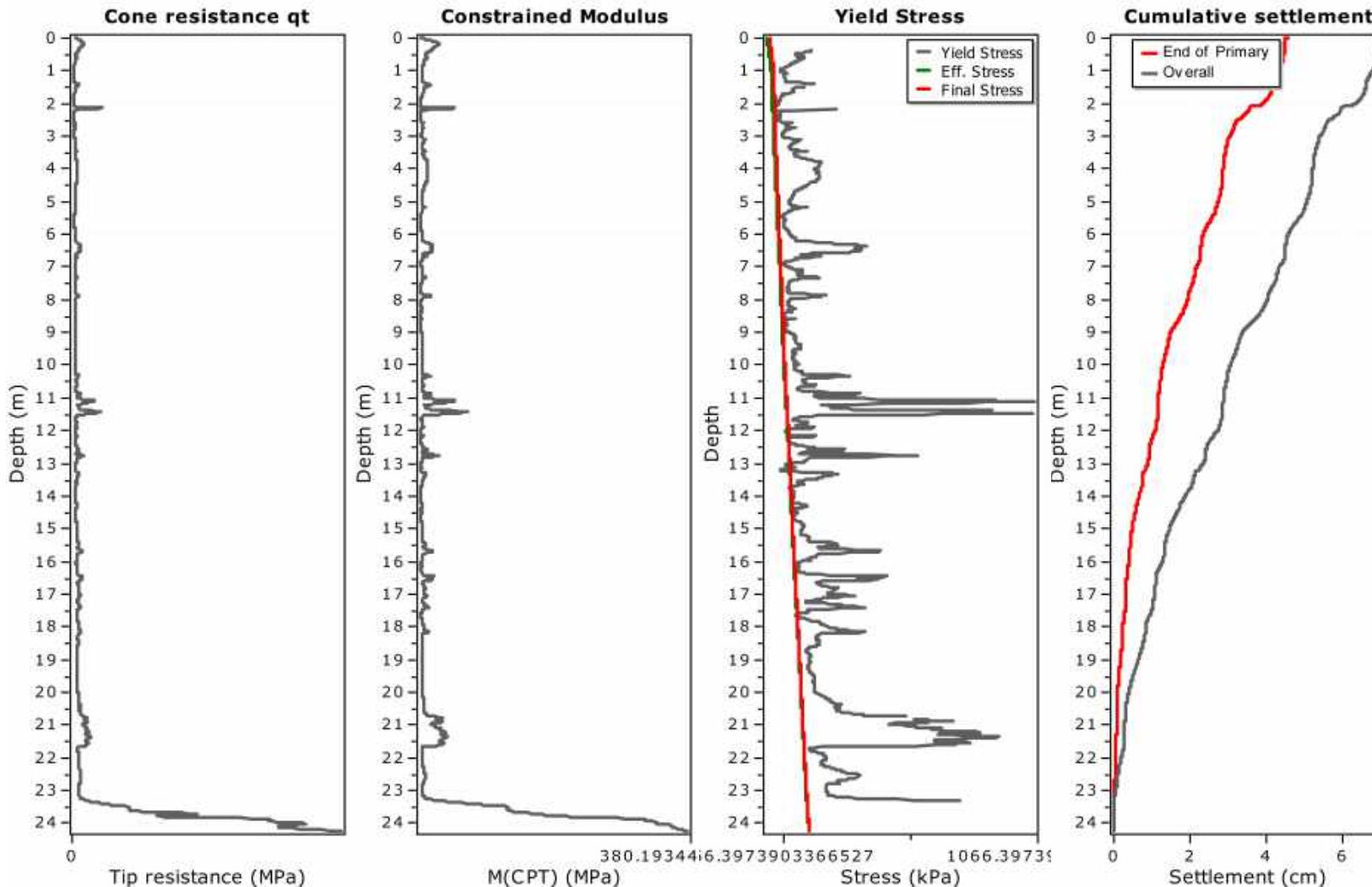
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2393	23.92	23.93	0.01	23.93	0.64	317.73	0.12	0.000	0.000	0.000
2394	23.93	23.94	0.01	23.94	0.64	319.02	0.12	0.000	0.000	0.000
2395	23.94	23.95	0.01	23.95	0.63	321.97	0.12	0.000	0.000	0.000
2396	23.95	23.96	0.01	23.96	0.63	325.86	0.12	0.000	0.000	0.000
2397	23.96	23.97	0.01	23.97	0.63	329.47	0.12	0.000	0.000	0.000
2398	23.97	23.98	0.01	23.98	0.63	331.46	0.12	0.000	0.000	0.000
2399	23.98	23.99	0.01	23.99	0.63	331.74	0.12	0.000	0.000	0.000
2400	23.99	24.00	0.01	24.00	0.63	330.88	0.12	0.000	0.000	0.000
2401	24.00	24.01	0.01	24.01	0.63	331.03	0.11	0.000	0.000	0.000
2402	24.01	24.02	0.01	24.02	0.63	331.75	0.11	0.000	0.000	0.000
2403	24.02	24.03	0.01	24.03	0.63	335.17	0.11	0.000	0.000	0.000
2404	24.03	24.04	0.01	24.04	0.63	340.35	0.11	0.000	0.000	0.000
2405	24.04	24.05	0.01	24.05	0.63	345.89	0.11	0.000	0.000	0.000
2406	24.05	24.06	0.01	24.06	0.63	349.24	0.11	0.000	0.000	0.000
2407	24.06	24.07	0.01	24.07	0.63	351.20	0.11	0.000	0.000	0.000
2408	24.07	24.08	0.01	24.08	0.63	352.86	0.11	0.000	0.000	0.000
2409	24.08	24.09	0.01	24.09	0.63	354.11	0.11	0.000	0.000	0.000
2410	24.09	24.10	0.01	24.10	0.63	354.23	0.11	0.000	0.000	0.000
2411	24.10	24.11	0.01	24.11	0.63	353.96	0.11	0.000	0.000	0.000
2412	24.11	24.12	0.01	24.12	0.63	353.59	0.11	0.000	0.000	0.000
2413	24.12	24.13	0.01	24.13	0.63	353.32	0.11	0.000	0.000	0.000
2414	24.13	24.14	0.01	24.14	0.63	353.52	0.11	0.000	0.000	0.000
2415	24.14	24.15	0.01	24.15	0.63	354.61	0.11	0.000	0.000	0.000
2416	24.15	24.16	0.01	24.16	0.63	356.44	0.11	0.000	0.000	0.000
2417	24.16	24.17	0.01	24.17	0.63	358.71	0.11	0.000	0.000	0.000
2418	24.17	24.18	0.01	24.18	0.63	361.07	0.11	0.000	0.000	0.000
2419	24.18	24.19	0.01	24.19	0.63	363.19	0.11	0.000	0.000	0.000
2420	24.19	24.20	0.01	24.20	0.63	364.68	0.11	0.000	0.000	0.000
2421	24.20	24.21	0.01	24.21	0.63	366.06	0.11	0.000	0.000	0.000
2422	24.21	24.22	0.01	24.22	0.62	367.71	0.11	0.000	0.000	0.000
2423	24.22	24.23	0.01	24.23	0.62	369.66	0.11	0.000	0.000	0.000
2424	24.23	24.24	0.01	24.24	0.62	372.93	0.11	0.000	0.000	0.000

Total primary settlement: 2.29**Total secondary settlement: 2.47****Total calculated settlement: 4.76****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

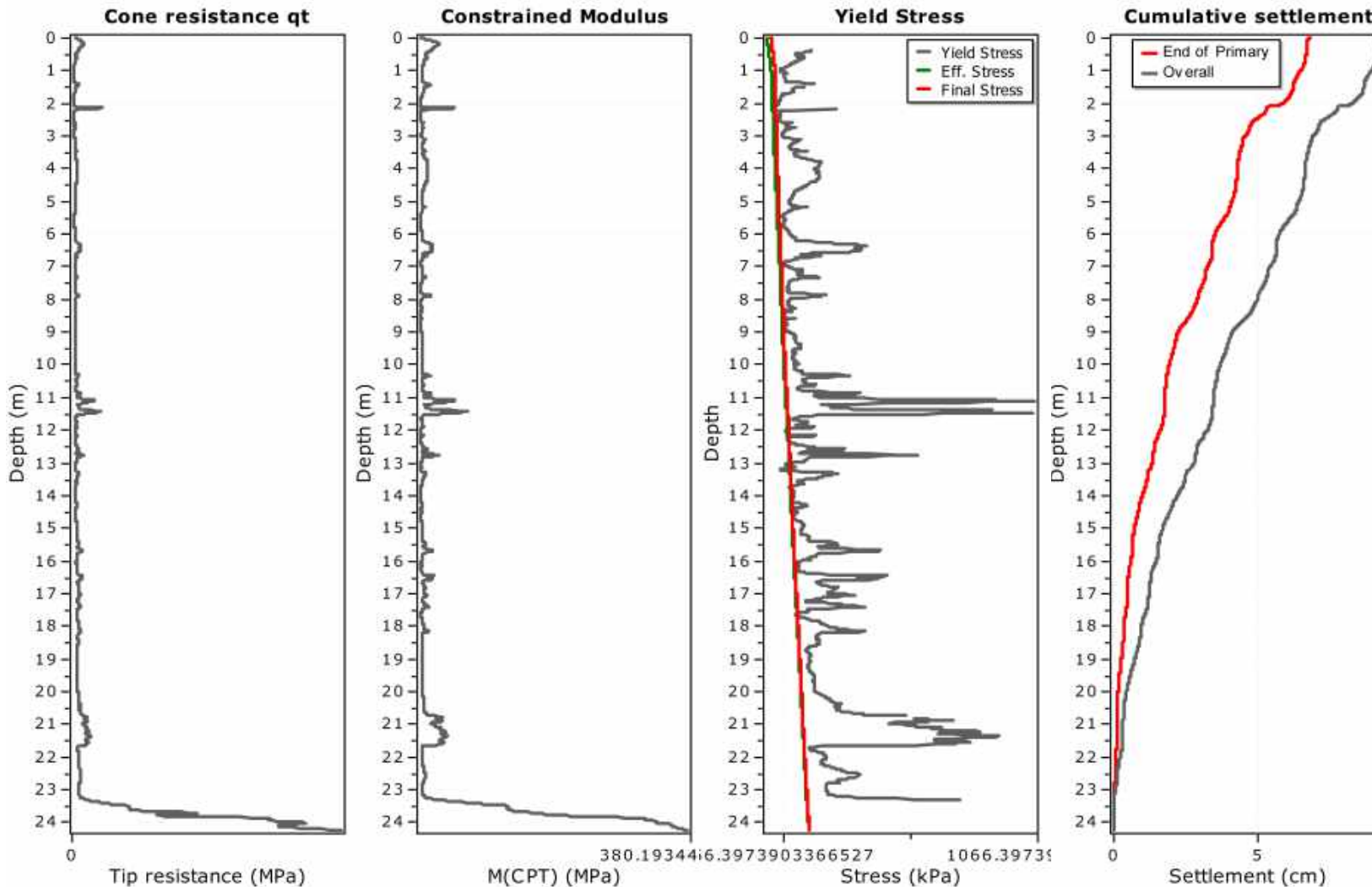
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2393	23.92	23.93	0.01	23.93	1.27	317.73	0.12	0.000	0.000	0.000
2394	23.93	23.94	0.01	23.94	1.27	319.02	0.12	0.000	0.000	0.000
2395	23.94	23.95	0.01	23.95	1.27	321.97	0.12	0.000	0.000	0.000
2396	23.95	23.96	0.01	23.96	1.27	325.86	0.12	0.000	0.000	0.000
2397	23.96	23.97	0.01	23.97	1.27	329.47	0.12	0.000	0.000	0.000
2398	23.97	23.98	0.01	23.98	1.27	331.46	0.12	0.000	0.000	0.000
2399	23.98	23.99	0.01	23.99	1.27	331.74	0.12	0.000	0.000	0.000
2400	23.99	24.00	0.01	24.00	1.27	330.88	0.12	0.000	0.000	0.000
2401	24.00	24.01	0.01	24.01	1.26	331.03	0.11	0.000	0.000	0.000
2402	24.01	24.02	0.01	24.02	1.26	331.75	0.11	0.000	0.000	0.000
2403	24.02	24.03	0.01	24.03	1.26	335.17	0.11	0.000	0.000	0.000
2404	24.03	24.04	0.01	24.04	1.26	340.35	0.11	0.000	0.000	0.000
2405	24.04	24.05	0.01	24.05	1.26	345.89	0.11	0.000	0.000	0.000
2406	24.05	24.06	0.01	24.06	1.26	349.24	0.11	0.000	0.000	0.000
2407	24.06	24.07	0.01	24.07	1.26	351.20	0.11	0.000	0.000	0.000
2408	24.07	24.08	0.01	24.08	1.26	352.86	0.11	0.000	0.000	0.000
2409	24.08	24.09	0.01	24.09	1.26	354.11	0.11	0.000	0.000	0.000
2410	24.09	24.10	0.01	24.10	1.26	354.23	0.11	0.000	0.000	0.000
2411	24.10	24.11	0.01	24.11	1.26	353.96	0.11	0.000	0.000	0.000
2412	24.11	24.12	0.01	24.12	1.26	353.59	0.11	0.000	0.000	0.000
2413	24.12	24.13	0.01	24.13	1.26	353.32	0.11	0.000	0.000	0.000
2414	24.13	24.14	0.01	24.14	1.26	353.52	0.11	0.000	0.000	0.000
2415	24.14	24.15	0.01	24.15	1.25	354.61	0.11	0.000	0.000	0.000
2416	24.15	24.16	0.01	24.16	1.25	356.44	0.11	0.000	0.000	0.000
2417	24.16	24.17	0.01	24.17	1.25	358.71	0.11	0.000	0.000	0.000
2418	24.17	24.18	0.01	24.18	1.25	361.07	0.11	0.000	0.000	0.000
2419	24.18	24.19	0.01	24.19	1.25	363.19	0.11	0.000	0.000	0.000
2420	24.19	24.20	0.01	24.20	1.25	364.68	0.11	0.000	0.000	0.000
2421	24.20	24.21	0.01	24.21	1.25	366.06	0.11	0.000	0.000	0.000
2422	24.21	24.22	0.01	24.22	1.25	367.71	0.11	0.000	0.000	0.000
2423	24.22	24.23	0.01	24.23	1.25	369.66	0.11	0.000	0.000	0.000
2424	24.23	24.24	0.01	24.24	1.25	372.93	0.11	0.000	0.000	0.000

Total primary settlement: 4.57**Total secondary settlement: 2.47****Total calculated settlement: 7.04****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

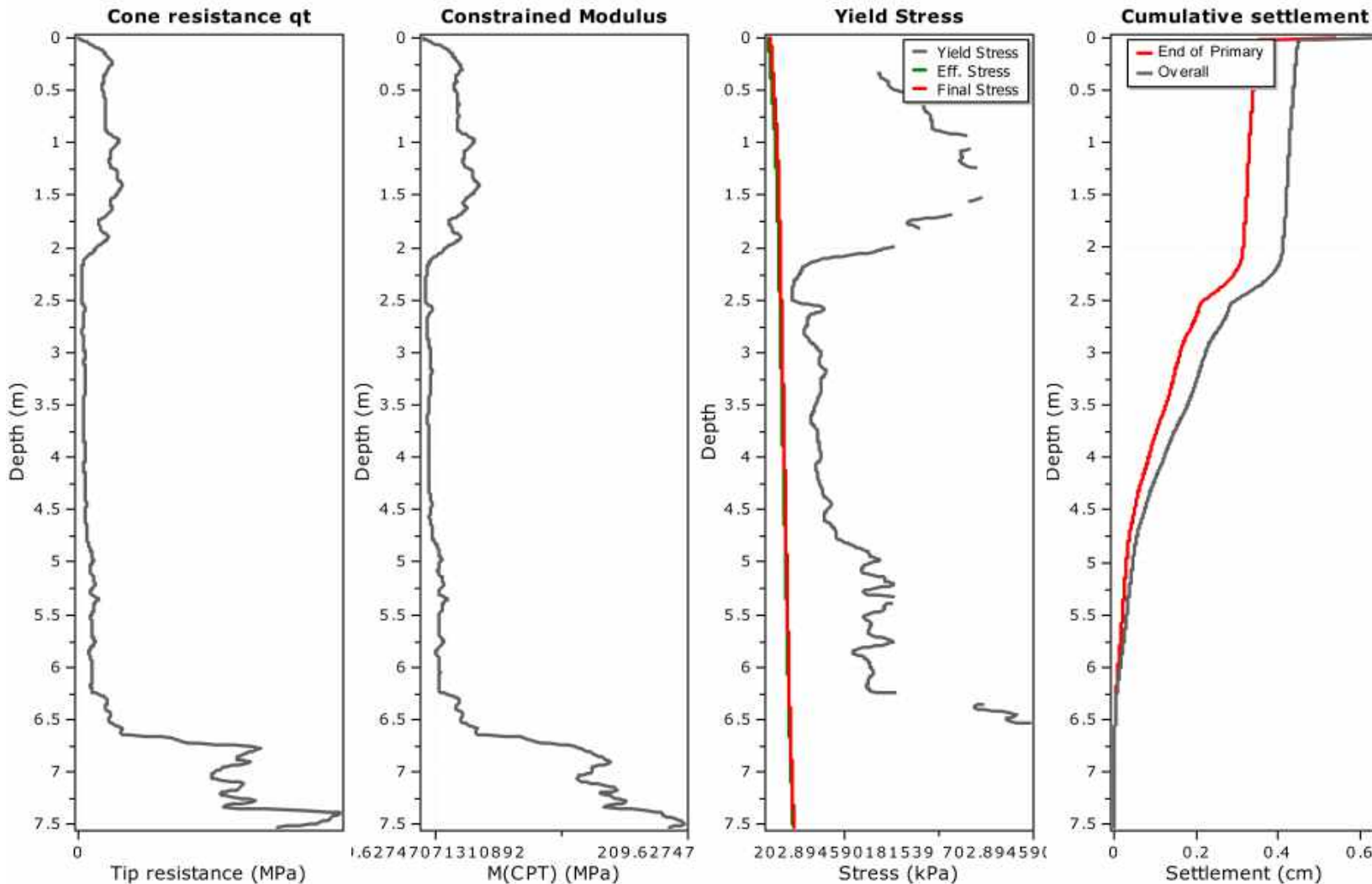
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2393	23.92	23.93	0.01	23.93	1.91	317.73	0.12	0.000	0.000	0.000
2394	23.93	23.94	0.01	23.94	1.91	319.02	0.12	0.000	0.000	0.000
2395	23.94	23.95	0.01	23.95	1.90	321.97	0.12	0.000	0.000	0.000
2396	23.95	23.96	0.01	23.96	1.90	325.86	0.12	0.000	0.000	0.000
2397	23.96	23.97	0.01	23.97	1.90	329.47	0.12	0.000	0.000	0.000
2398	23.97	23.98	0.01	23.98	1.90	331.46	0.12	0.000	0.000	0.000
2399	23.98	23.99	0.01	23.99	1.90	331.74	0.12	0.000	0.000	0.000
2400	23.99	24.00	0.01	24.00	1.90	330.88	0.12	0.000	0.000	0.000
2401	24.00	24.01	0.01	24.01	1.90	331.03	0.11	0.000	0.000	0.000
2402	24.01	24.02	0.01	24.02	1.90	331.75	0.11	0.000	0.000	0.000
2403	24.02	24.03	0.01	24.03	1.90	335.17	0.11	0.000	0.000	0.000
2404	24.03	24.04	0.01	24.04	1.89	340.35	0.11	0.000	0.000	0.000
2405	24.04	24.05	0.01	24.05	1.89	345.89	0.11	0.000	0.000	0.000
2406	24.05	24.06	0.01	24.06	1.89	349.24	0.11	0.000	0.000	0.000
2407	24.06	24.07	0.01	24.07	1.89	351.20	0.11	0.000	0.000	0.000
2408	24.07	24.08	0.01	24.08	1.89	352.86	0.11	0.000	0.000	0.000
2409	24.08	24.09	0.01	24.09	1.89	354.11	0.11	0.000	0.000	0.000
2410	24.09	24.10	0.01	24.10	1.89	354.23	0.11	0.000	0.000	0.000
2411	24.10	24.11	0.01	24.11	1.89	353.96	0.11	0.000	0.000	0.000
2412	24.11	24.12	0.01	24.12	1.89	353.59	0.11	0.000	0.000	0.000
2413	24.12	24.13	0.01	24.13	1.88	353.32	0.11	0.000	0.000	0.000
2414	24.13	24.14	0.01	24.14	1.88	353.52	0.11	0.000	0.000	0.000
2415	24.14	24.15	0.01	24.15	1.88	354.61	0.11	0.000	0.000	0.000
2416	24.15	24.16	0.01	24.16	1.88	356.44	0.11	0.000	0.000	0.000
2417	24.16	24.17	0.01	24.17	1.88	358.71	0.11	0.000	0.000	0.000
2418	24.17	24.18	0.01	24.18	1.88	361.07	0.11	0.000	0.000	0.000
2419	24.18	24.19	0.01	24.19	1.88	363.19	0.11	0.000	0.000	0.000
2420	24.19	24.20	0.01	24.20	1.88	364.68	0.11	0.000	0.000	0.000
2421	24.20	24.21	0.01	24.21	1.88	366.06	0.11	0.000	0.000	0.000
2422	24.21	24.22	0.01	24.22	1.87	367.71	0.11	0.000	0.000	0.000
2423	24.22	24.23	0.01	24.23	1.87	369.66	0.11	0.000	0.000	0.000
2424	24.23	24.24	0.01	24.24	1.87	372.93	0.11	0.000	0.000	0.000

Total primary settlement: 6.86**Total secondary settlement: 2.47****Total calculated settlement: 9.33****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

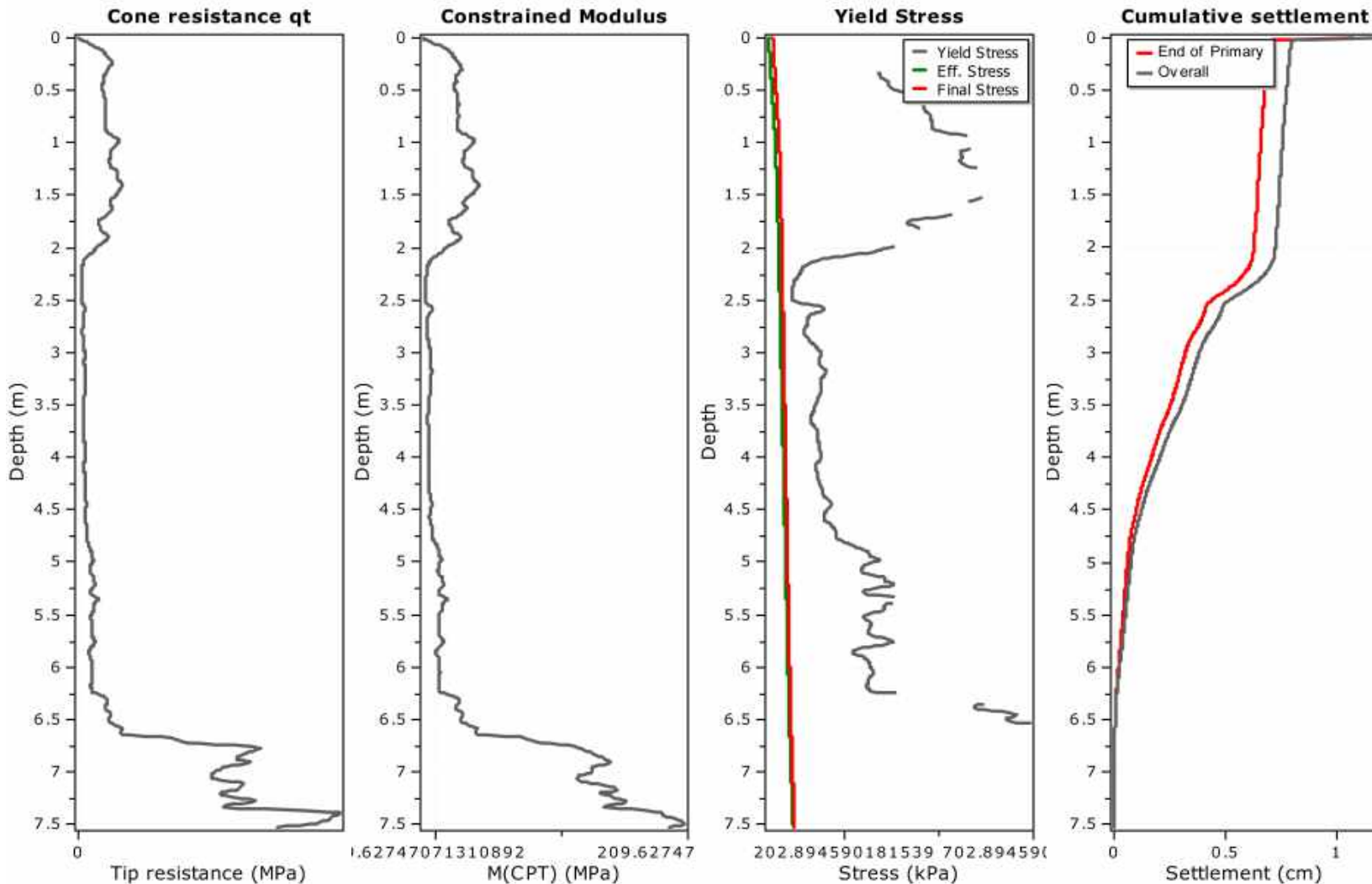
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
737	7.36	7.37	0.01	7.37	2.15	165.67	0.39	0.000	0.000	0.000
738	7.37	7.38	0.01	7.38	2.14	176.56	0.39	0.000	0.000	0.000
739	7.38	7.39	0.01	7.39	2.14	184.24	0.39	0.000	0.000	0.000
740	7.39	7.40	0.01	7.40	2.14	188.57	0.39	0.000	0.000	0.000
741	7.40	7.41	0.01	7.41	2.14	189.72	0.39	0.000	0.000	0.000
742	7.41	7.42	0.01	7.42	2.13	190.09	0.39	0.000	0.000	0.000
743	7.42	7.43	0.01	7.43	2.13	190.40	0.39	0.000	0.000	0.000
744	7.43	7.44	0.01	7.44	2.13	192.42	0.39	0.000	0.000	0.000
745	7.44	7.45	0.01	7.45	2.13	196.70	0.39	0.000	0.000	0.000
746	7.45	7.46	0.01	7.46	2.13	200.64	0.39	0.000	0.000	0.000
747	7.46	7.47	0.01	7.47	2.12	203.55	0.39	0.000	0.000	0.000
748	7.47	7.48	0.01	7.48	2.12	204.76	0.39	0.000	0.000	0.000
749	7.48	7.49	0.01	7.49	2.12	206.20	0.39	0.000	0.000	0.000
750	7.49	7.50	0.01	7.50	2.12	206.96	0.39	0.000	0.000	0.000
751	7.50	7.51	0.01	7.51	2.12	206.37	0.38	0.000	0.000	0.000
752	7.51	7.52	0.01	7.52	2.11	203.98	0.38	0.000	0.000	0.000
753	7.52	7.53	0.01	7.53	2.11	198.89	0.38	0.000	0.000	0.000

Total primary settlement: 0.54**Total secondary settlement: 0.10****Total calculated settlement: 0.64****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

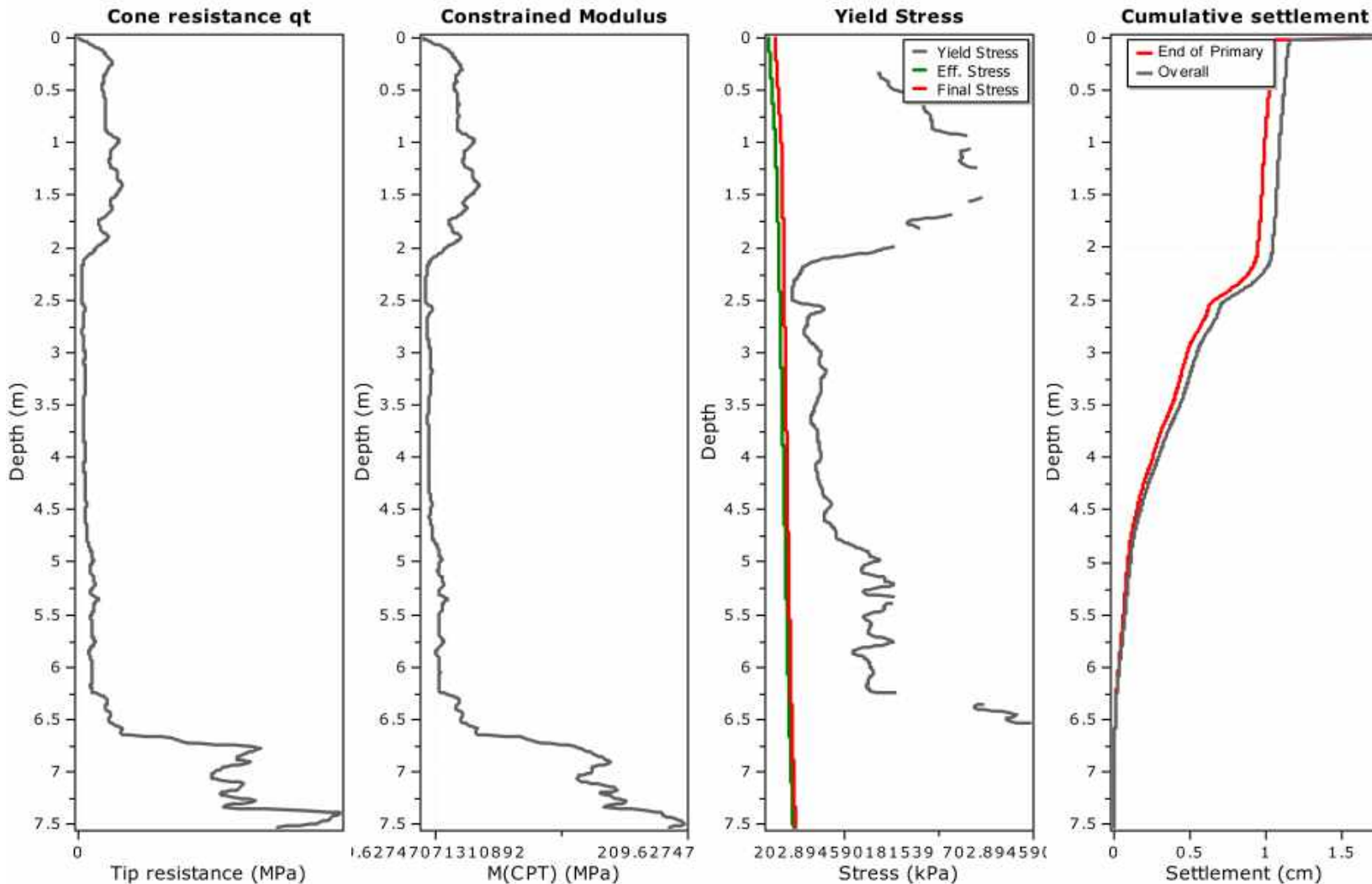
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
737	7.36	7.37	0.01	7.37	4.29	165.67	0.39	0.000	0.000	0.000
738	7.37	7.38	0.01	7.38	4.29	176.56	0.39	0.000	0.000	0.000
739	7.38	7.39	0.01	7.39	4.28	184.24	0.39	0.000	0.000	0.000
740	7.39	7.40	0.01	7.40	4.28	188.57	0.39	0.000	0.000	0.000
741	7.40	7.41	0.01	7.41	4.27	189.72	0.39	0.000	0.000	0.000
742	7.41	7.42	0.01	7.42	4.27	190.09	0.39	0.000	0.000	0.000
743	7.42	7.43	0.01	7.43	4.27	190.40	0.39	0.000	0.000	0.000
744	7.43	7.44	0.01	7.44	4.26	192.42	0.39	0.000	0.000	0.000
745	7.44	7.45	0.01	7.45	4.26	196.70	0.39	0.000	0.000	0.000
746	7.45	7.46	0.01	7.46	4.25	200.64	0.39	0.000	0.000	0.000
747	7.46	7.47	0.01	7.47	4.25	203.55	0.39	0.000	0.000	0.000
748	7.47	7.48	0.01	7.48	4.25	204.76	0.39	0.000	0.000	0.000
749	7.48	7.49	0.01	7.49	4.24	206.20	0.39	0.000	0.000	0.000
750	7.49	7.50	0.01	7.50	4.24	206.96	0.39	0.000	0.000	0.000
751	7.50	7.51	0.01	7.51	4.23	206.37	0.38	0.000	0.000	0.000
752	7.51	7.52	0.01	7.52	4.23	203.98	0.38	0.000	0.000	0.000
753	7.52	7.53	0.01	7.53	4.22	198.89	0.38	0.000	0.000	0.000

Total primary settlement: 1.08**Total secondary settlement: 0.10****Total calculated settlement: 1.18****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
737	7.36	7.37	0.01	7.37	6.44	165.67	0.39	0.000	0.000	0.000
738	7.37	7.38	0.01	7.38	6.43	176.56	0.39	0.000	0.000	0.000
739	7.38	7.39	0.01	7.39	6.42	184.24	0.39	0.000	0.000	0.000
740	7.39	7.40	0.01	7.40	6.42	188.57	0.39	0.000	0.000	0.000
741	7.40	7.41	0.01	7.41	6.41	189.72	0.39	0.000	0.000	0.000
742	7.41	7.42	0.01	7.42	6.40	190.09	0.39	0.000	0.000	0.000
743	7.42	7.43	0.01	7.43	6.40	190.40	0.39	0.000	0.000	0.000
744	7.43	7.44	0.01	7.44	6.39	192.42	0.39	0.000	0.000	0.000
745	7.44	7.45	0.01	7.45	6.39	196.70	0.39	0.000	0.000	0.000
746	7.45	7.46	0.01	7.46	6.38	200.64	0.39	0.000	0.000	0.000
747	7.46	7.47	0.01	7.47	6.37	203.55	0.39	0.000	0.000	0.000
748	7.47	7.48	0.01	7.48	6.37	204.76	0.39	0.000	0.000	0.000
749	7.48	7.49	0.01	7.49	6.36	206.20	0.39	0.000	0.000	0.000
750	7.49	7.50	0.01	7.50	6.36	206.96	0.39	0.000	0.000	0.000
751	7.50	7.51	0.01	7.51	6.35	206.37	0.38	0.000	0.000	0.000
752	7.51	7.52	0.01	7.52	6.34	203.98	0.38	0.000	0.000	0.000
753	7.52	7.53	0.01	7.53	6.34	198.89	0.38	0.000	0.000	0.000

Total primary settlement: 1.62
Total secondary settlement: 0.10

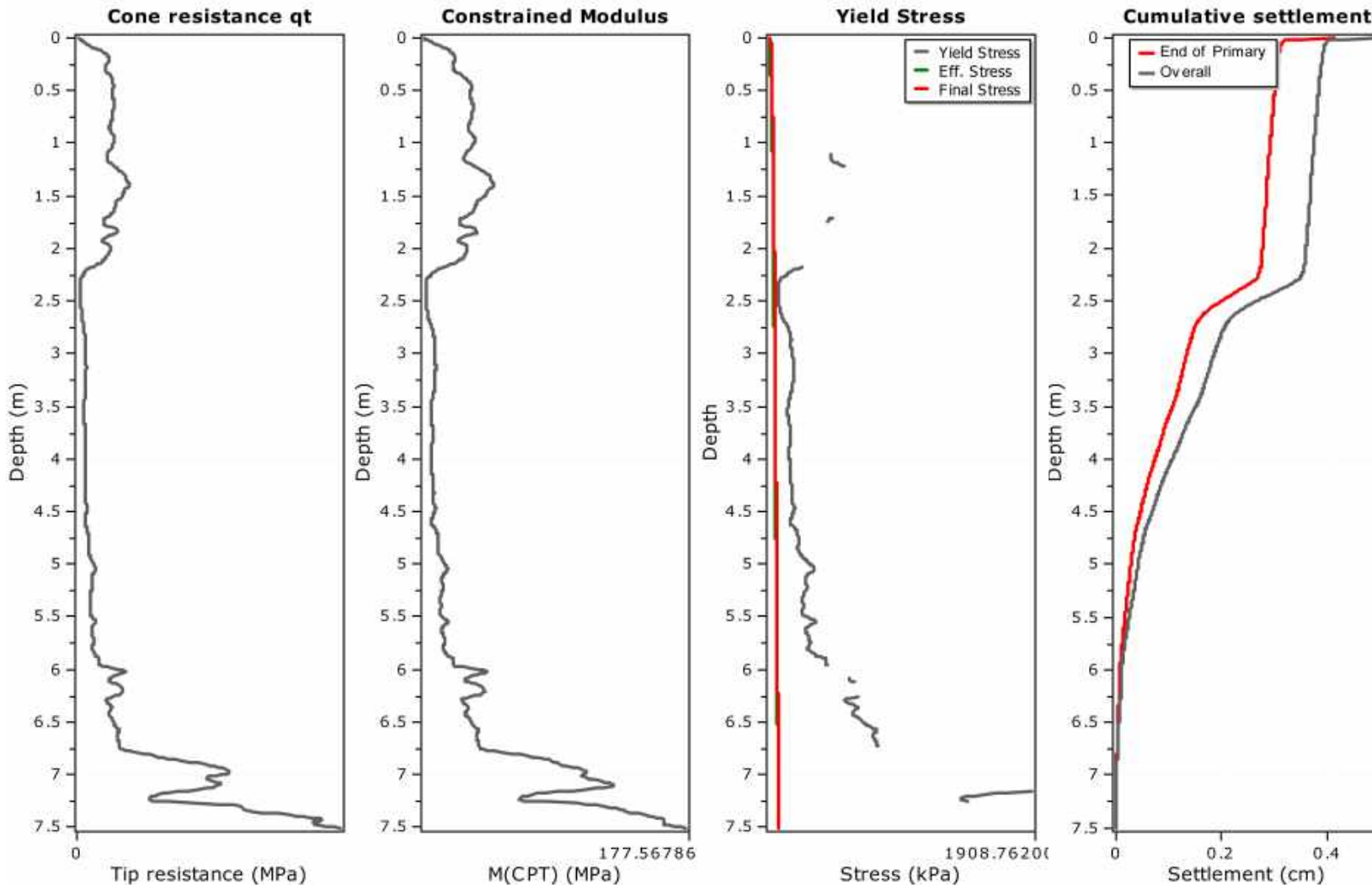
Total calculated settlement: 1.72

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{pri} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

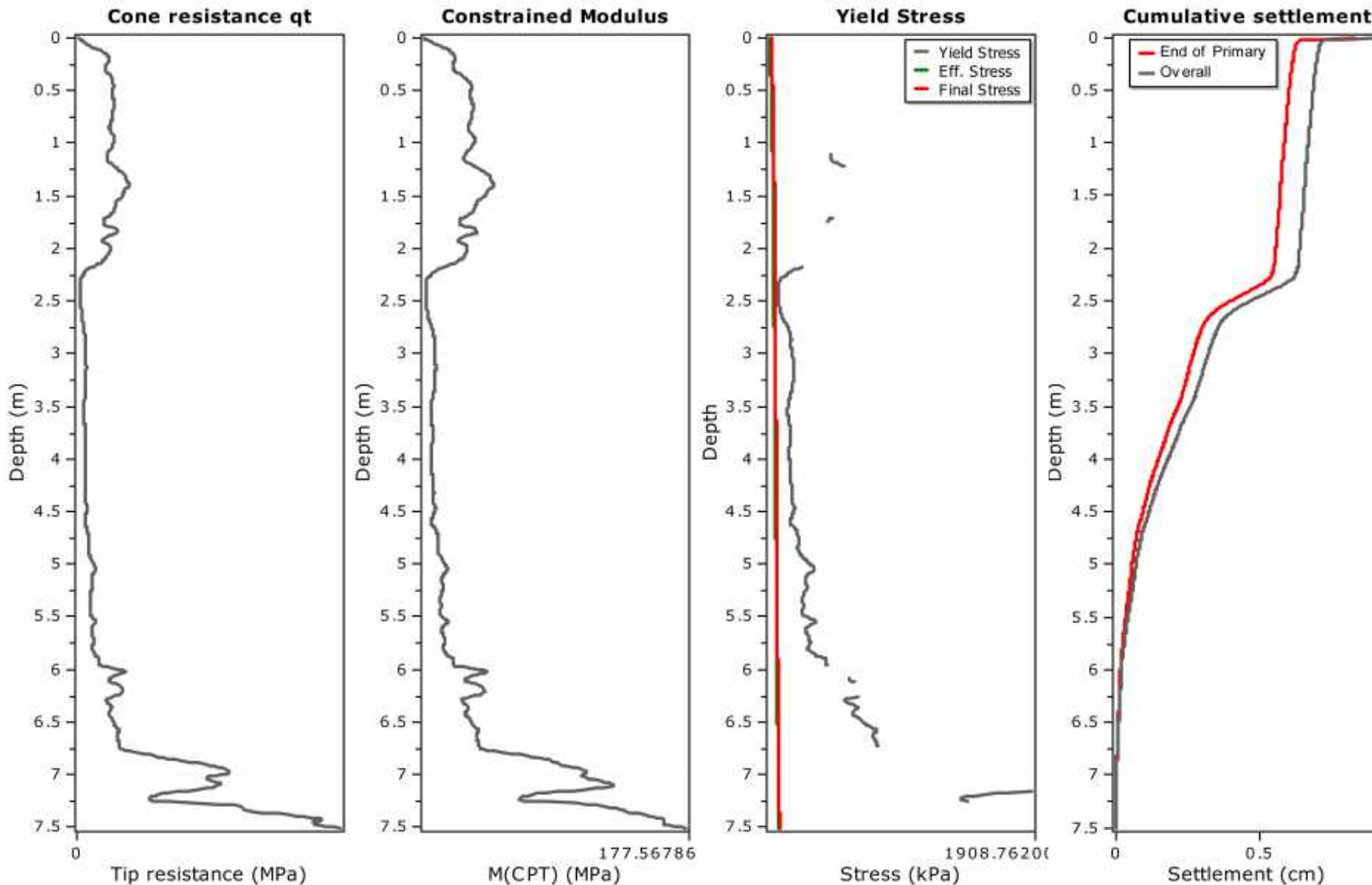
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
737	7.36	7.37	0.01	7.37	2.15	138.51	0.39	0.000	0.000	0.000
738	7.37	7.38	0.01	7.38	2.14	143.54	0.39	0.000	0.000	0.000
739	7.38	7.39	0.01	7.39	2.14	147.77	0.39	0.000	0.000	0.000
740	7.39	7.40	0.01	7.40	2.14	150.25	0.39	0.000	0.000	0.000
741	7.40	7.41	0.01	7.41	2.14	152.28	0.39	0.000	0.000	0.000
742	7.41	7.42	0.01	7.42	2.13	155.59	0.39	0.000	0.000	0.000
743	7.42	7.43	0.01	7.43	2.13	159.12	0.39	0.000	0.000	0.000
744	7.43	7.44	0.01	7.44	2.13	160.82	0.39	0.000	0.000	0.000
745	7.44	7.45	0.01	7.45	2.13	160.74	0.39	0.000	0.000	0.000
746	7.45	7.46	0.01	7.46	2.13	160.21	0.39	0.000	0.000	0.000
747	7.46	7.47	0.01	7.47	2.12	160.32	0.39	0.000	0.000	0.000
748	7.47	7.48	0.01	7.48	2.12	161.09	0.39	0.000	0.000	0.000
749	7.48	7.49	0.01	7.49	2.12	163.66	0.39	0.000	0.000	0.000
750	7.49	7.50	0.01	7.50	2.12	167.52	0.39	0.000	0.000	0.000
751	7.50	7.51	0.01	7.51	2.12	172.38	0.38	0.000	0.000	0.000

Total primary settlement: 0.41**Total secondary settlement: 0.08****Total calculated settlement: 0.50****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

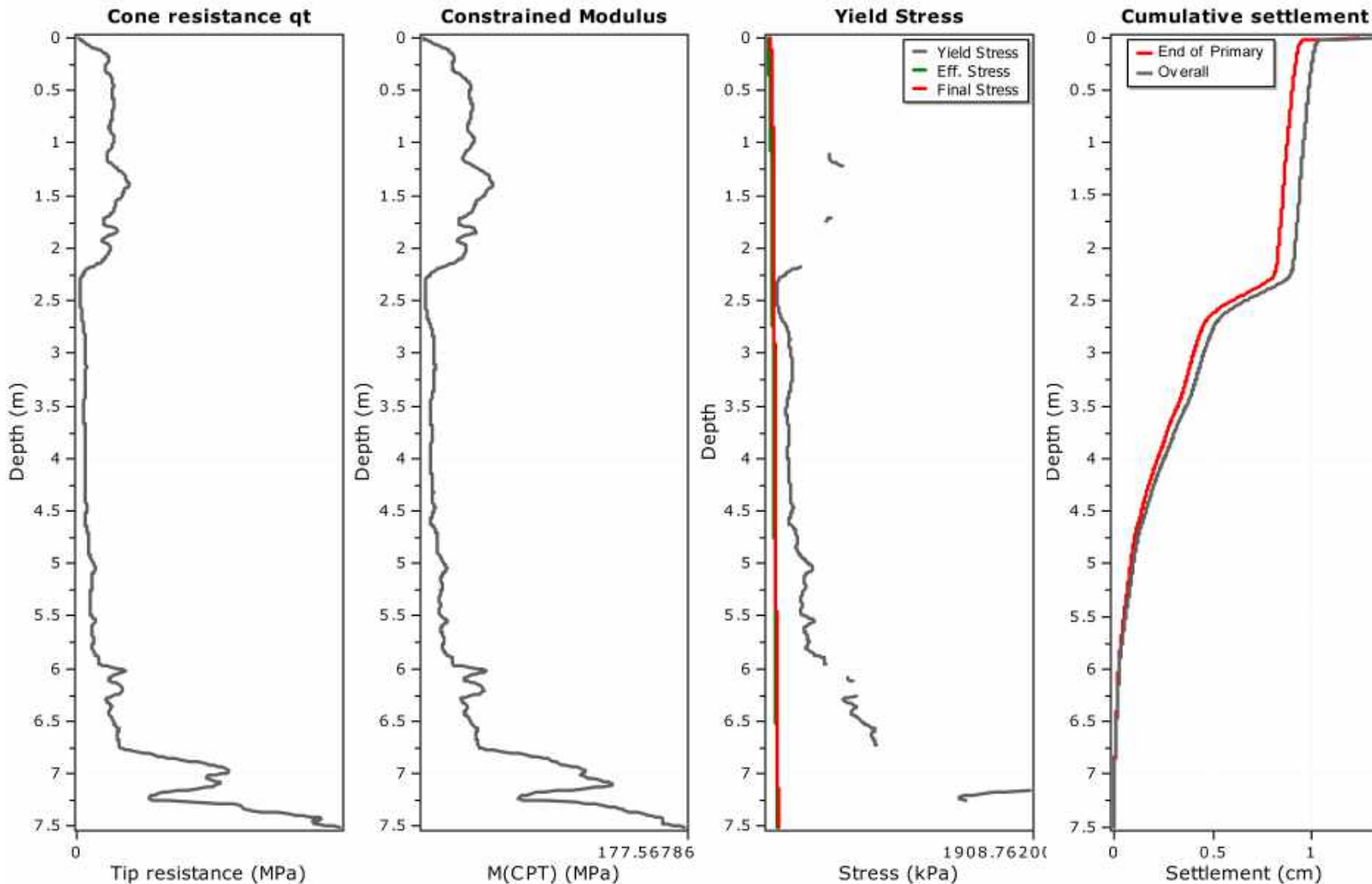
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
737	7.36	7.37	0.01	7.37	4.29	138.51	0.39	0.000	0.000	0.000
738	7.37	7.38	0.01	7.38	4.29	143.54	0.39	0.000	0.000	0.000
739	7.38	7.39	0.01	7.39	4.28	147.77	0.39	0.000	0.000	0.000
740	7.39	7.40	0.01	7.40	4.28	150.25	0.39	0.000	0.000	0.000
741	7.40	7.41	0.01	7.41	4.27	152.28	0.39	0.000	0.000	0.000
742	7.41	7.42	0.01	7.42	4.27	155.59	0.39	0.000	0.000	0.000
743	7.42	7.43	0.01	7.43	4.27	159.12	0.39	0.000	0.000	0.000
744	7.43	7.44	0.01	7.44	4.26	160.82	0.39	0.000	0.000	0.000
745	7.44	7.45	0.01	7.45	4.26	160.74	0.39	0.000	0.000	0.000
746	7.45	7.46	0.01	7.46	4.25	160.21	0.39	0.000	0.000	0.000
747	7.46	7.47	0.01	7.47	4.25	160.32	0.39	0.000	0.000	0.000
748	7.47	7.48	0.01	7.48	4.25	161.09	0.39	0.000	0.000	0.000
749	7.48	7.49	0.01	7.49	4.24	163.66	0.39	0.000	0.000	0.000
750	7.49	7.50	0.01	7.50	4.24	167.52	0.39	0.000	0.000	0.000
751	7.50	7.51	0.01	7.51	4.23	172.38	0.38	0.000	0.000	0.000

Total primary settlement: 0.83**Total secondary settlement: 0.08****Total calculated settlement: 0.91****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

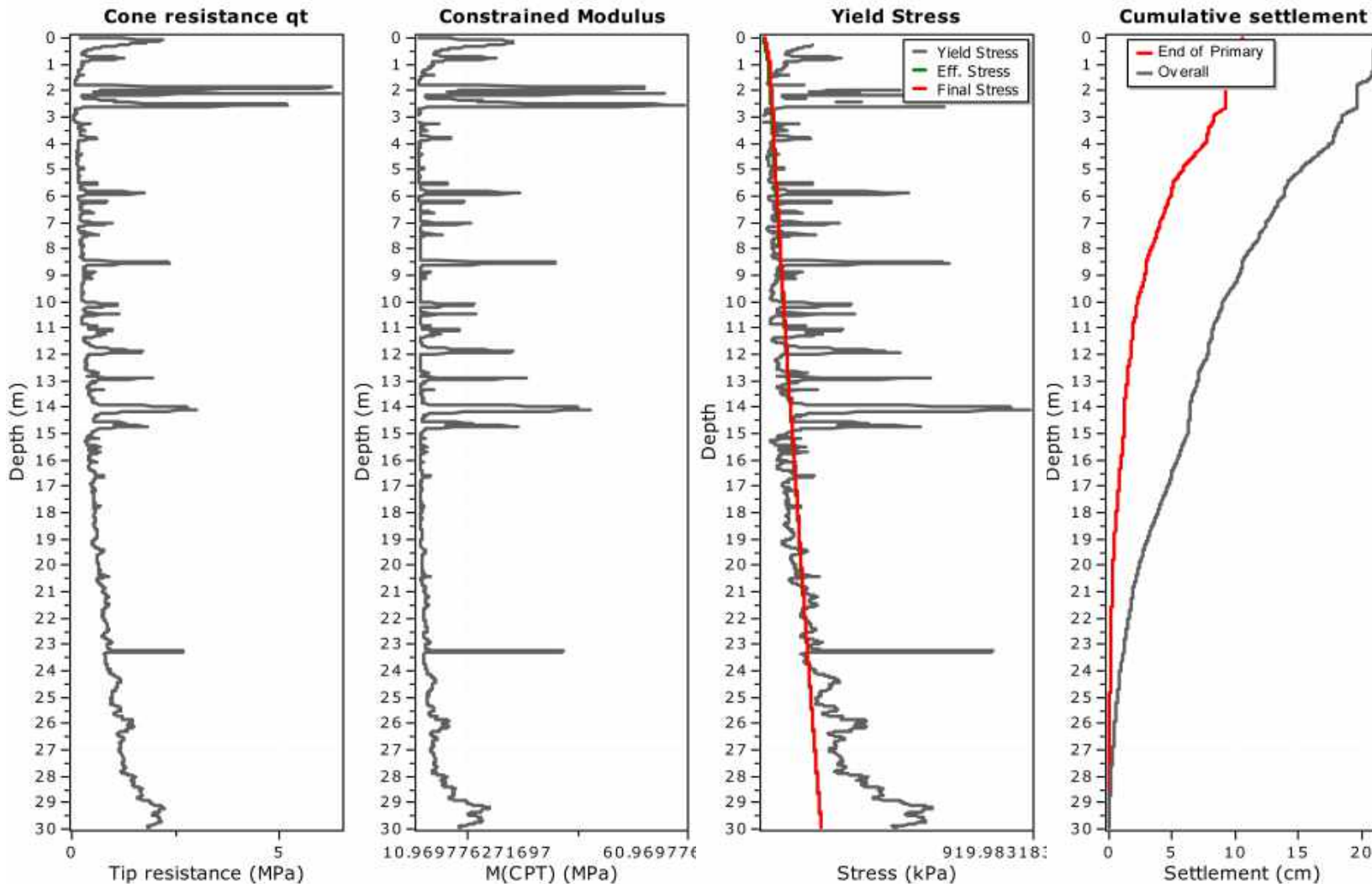
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
737	7.36	7.37	0.01	7.37	6.44	138.51	0.39	0.000	0.000	0.000
738	7.37	7.38	0.01	7.38	6.43	143.54	0.39	0.000	0.000	0.000
739	7.38	7.39	0.01	7.39	6.42	147.77	0.39	0.000	0.000	0.000
740	7.39	7.40	0.01	7.40	6.42	150.25	0.39	0.000	0.000	0.000
741	7.40	7.41	0.01	7.41	6.41	152.28	0.39	0.000	0.000	0.000
742	7.41	7.42	0.01	7.42	6.40	155.59	0.39	0.000	0.000	0.000
743	7.42	7.43	0.01	7.43	6.40	159.12	0.39	0.000	0.000	0.000
744	7.43	7.44	0.01	7.44	6.39	160.82	0.39	0.000	0.000	0.000
745	7.44	7.45	0.01	7.45	6.39	160.74	0.39	0.000	0.000	0.000
746	7.45	7.46	0.01	7.46	6.38	160.21	0.39	0.000	0.000	0.000
747	7.46	7.47	0.01	7.47	6.37	160.32	0.39	0.000	0.000	0.000
748	7.47	7.48	0.01	7.48	6.37	161.09	0.39	0.000	0.000	0.000
749	7.48	7.49	0.01	7.49	6.36	163.66	0.39	0.000	0.000	0.000
750	7.49	7.50	0.01	7.50	6.36	167.52	0.39	0.000	0.000	0.000
751	7.50	7.51	0.01	7.51	6.35	172.38	0.38	0.000	0.000	0.000

Total primary settlement: 1.24**Total secondary settlement: 0.08****Total calculated settlement: 1.32****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{\text{secondary}} = S_{\text{primary}} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

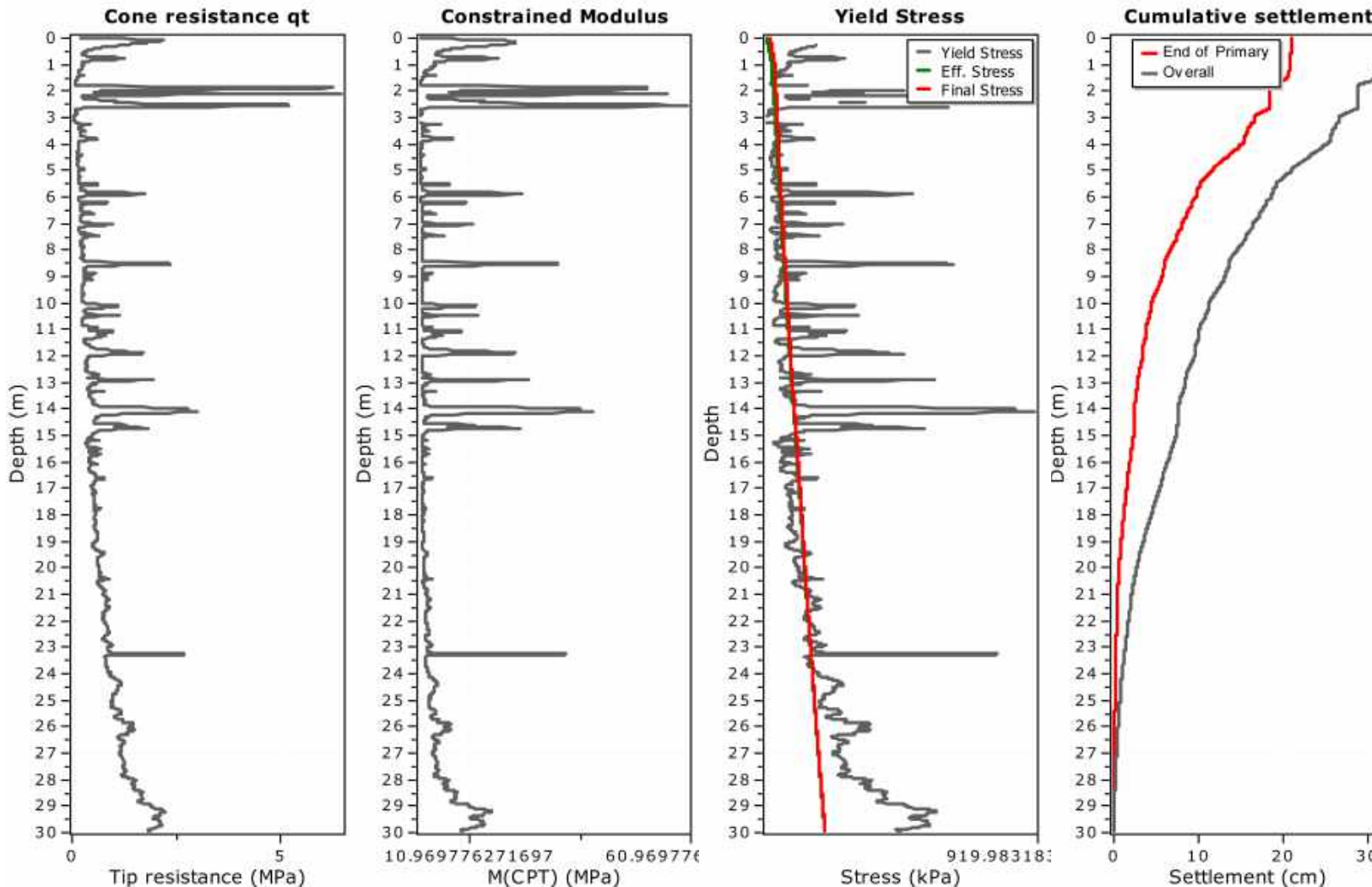
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2991	29.90	29.91	0.01	29.91	0.45	9.21	0.08	0.000	0.001	0.001
2992	29.91	29.92	0.01	29.92	0.45	9.30	0.08	0.000	0.001	0.001
2993	29.92	29.93	0.01	29.93	0.45	9.48	0.08	0.000	0.001	0.001

Total primary settlement: 10.56**Total secondary settlement: 10.56****Total calculated settlement: 21.12****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{pri} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

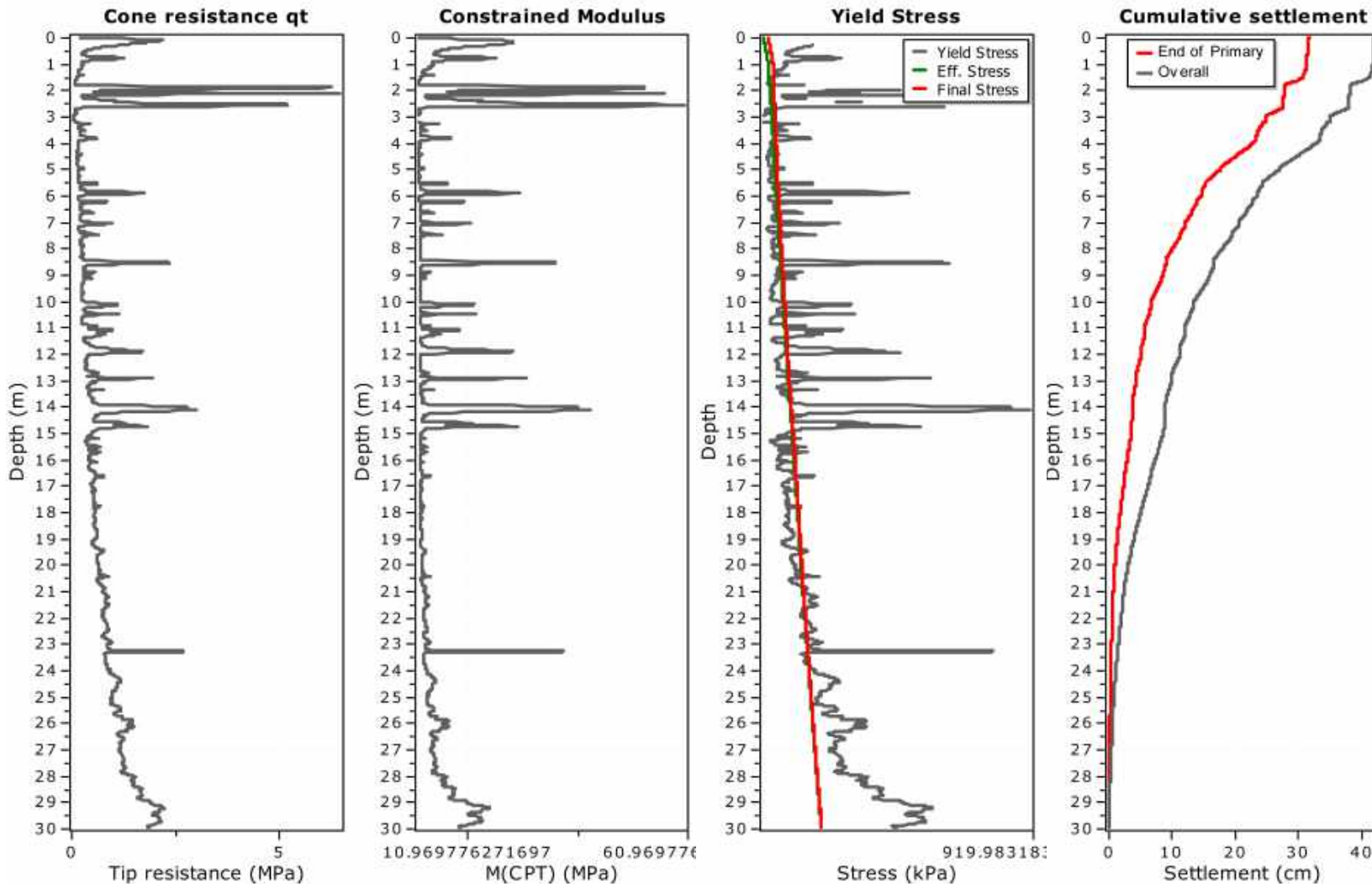
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2991	29.90	29.91	0.01	29.91	0.91	9.21	0.08	0.000	0.001	0.001
2992	29.91	29.92	0.01	29.92	0.91	9.30	0.08	0.000	0.001	0.001
2993	29.92	29.93	0.01	29.93	0.91	9.48	0.08	0.000	0.001	0.001

Total primary settlement: 21.12**Total secondary settlement: 10.56****Total calculated settlement: 31.68****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_s = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

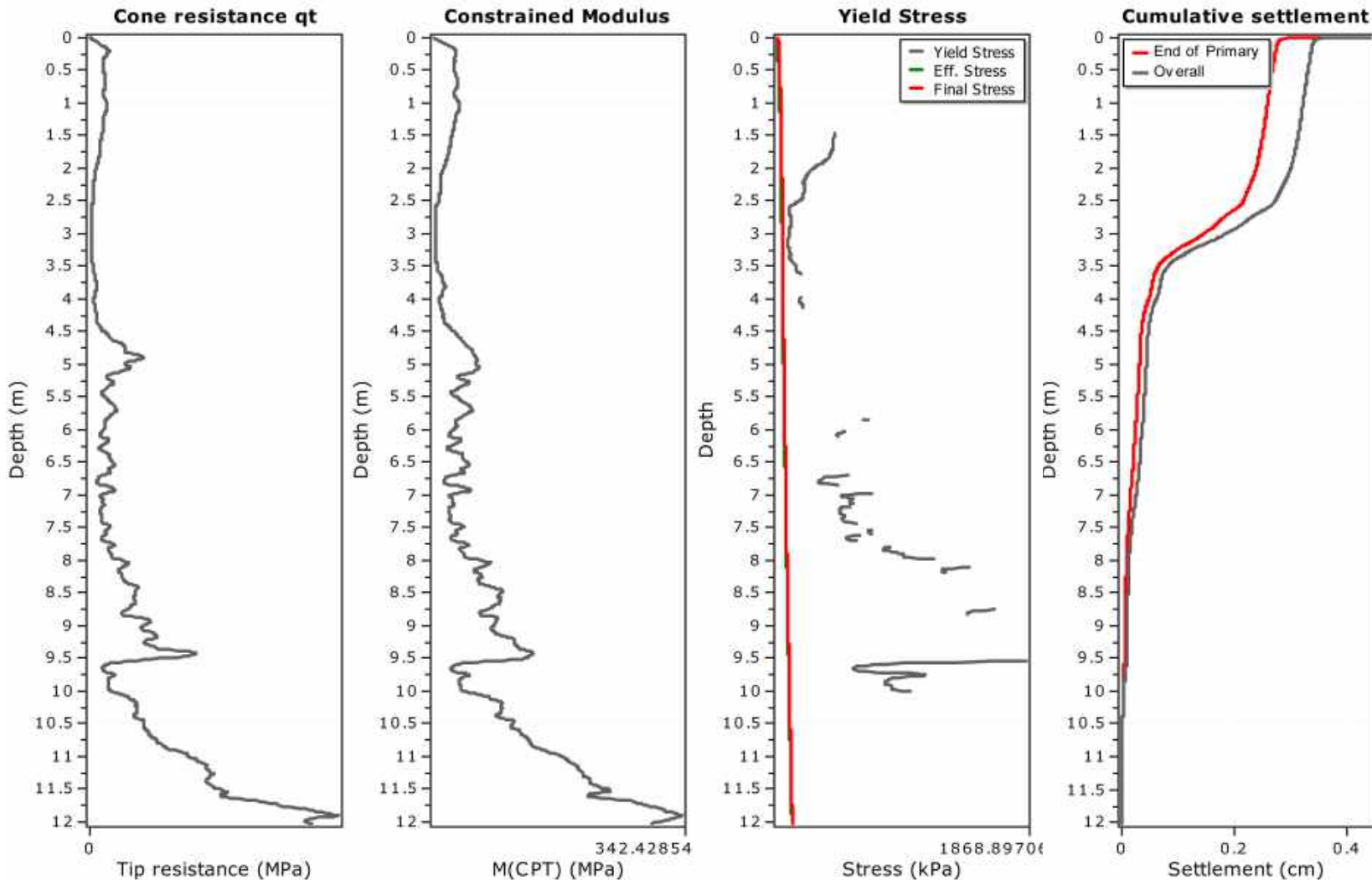
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2991	29.90	29.91	0.01	29.91	1.36	9.21	0.08	0.000	0.001	0.001
2992	29.91	29.92	0.01	29.92	1.36	9.30	0.08	0.000	0.001	0.001
2993	29.92	29.93	0.01	29.93	1.36	9.48	0.08	0.000	0.001	0.001

Total primary settlement: 31.68**Total secondary settlement: 10.56****Total calculated settlement: 42.23****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1197	11.96	11.97	0.01	11.97	1.44	322.35	0.26	0.000	0.000	0.000
1198	11.97	11.98	0.01	11.98	1.44	319.12	0.26	0.000	0.000	0.000
1199	11.98	11.99	0.01	11.99	1.44	316.94	0.26	0.000	0.000	0.000
1200	11.99	12.00	0.01	12.00	1.44	314.27	0.26	0.000	0.000	0.000
1201	12.00	12.01	0.01	12.01	1.44	309.27	0.26	0.000	0.000	0.000
1202	12.01	12.02	0.01	12.02	1.44	301.83	0.26	0.000	0.000	0.000
1203	12.02	12.03	0.01	12.03	1.44	297.76	0.26	0.000	0.000	0.000

Total primary settlement: 0.38
Total secondary settlement: 0.06

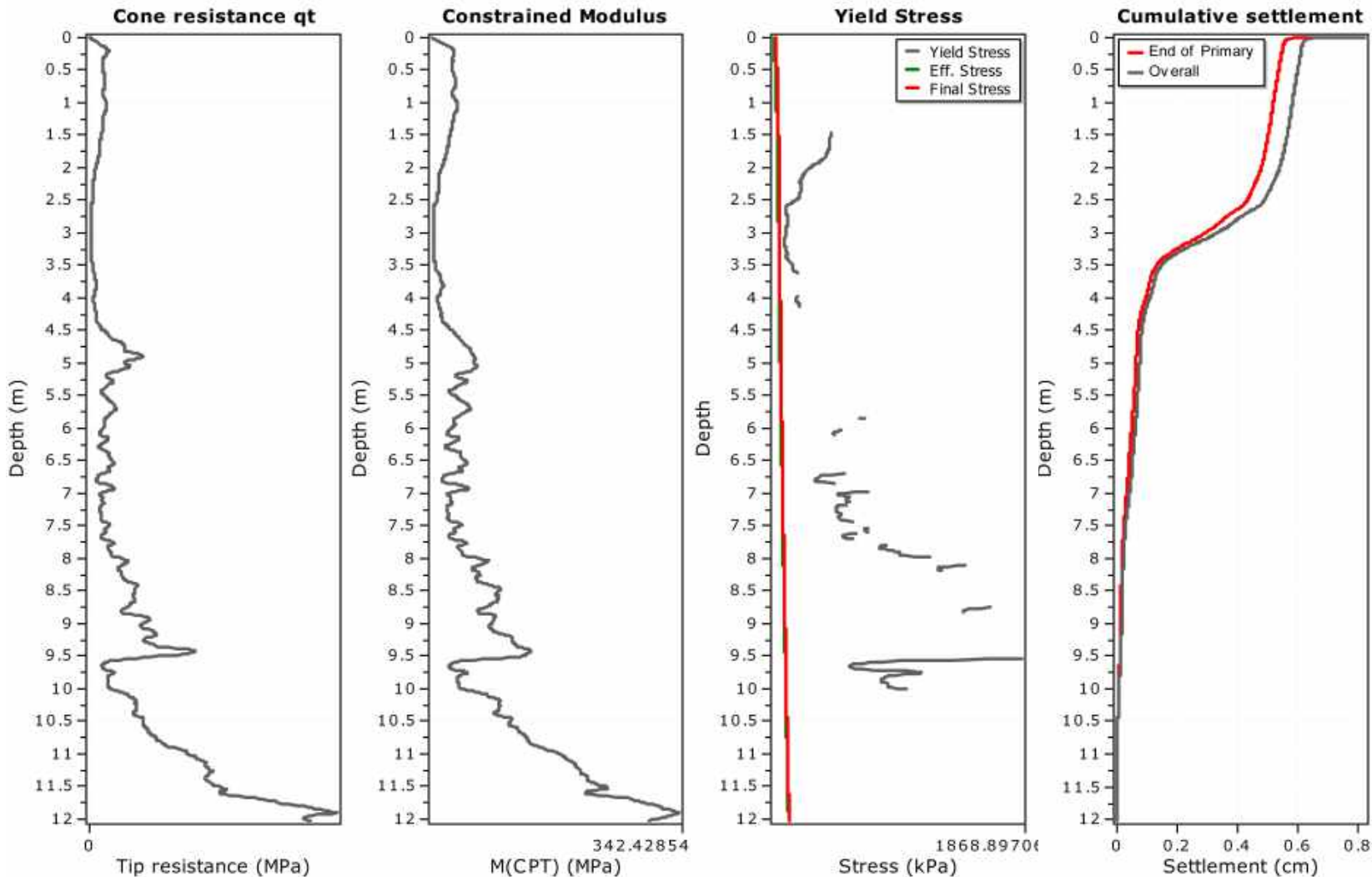
Total calculated settlement: 0.44

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-t/t_p} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1197	11.96	11.97	0.01	11.97	2.88	322.35	0.26	0.000	0.000	0.000
1198	11.97	11.98	0.01	11.98	2.88	319.12	0.26	0.000	0.000	0.000
1199	11.98	11.99	0.01	11.99	2.88	316.94	0.26	0.000	0.000	0.000
1200	11.99	12.00	0.01	12.00	2.88	314.27	0.26	0.000	0.000	0.000
1201	12.00	12.01	0.01	12.01	2.88	309.27	0.26	0.000	0.000	0.000
1202	12.01	12.02	0.01	12.02	2.87	301.83	0.26	0.000	0.000	0.000
1203	12.02	12.03	0.01	12.03	2.87	297.76	0.26	0.000	0.000	0.000

Total primary settlement: 0.76
Total secondary settlement: 0.06

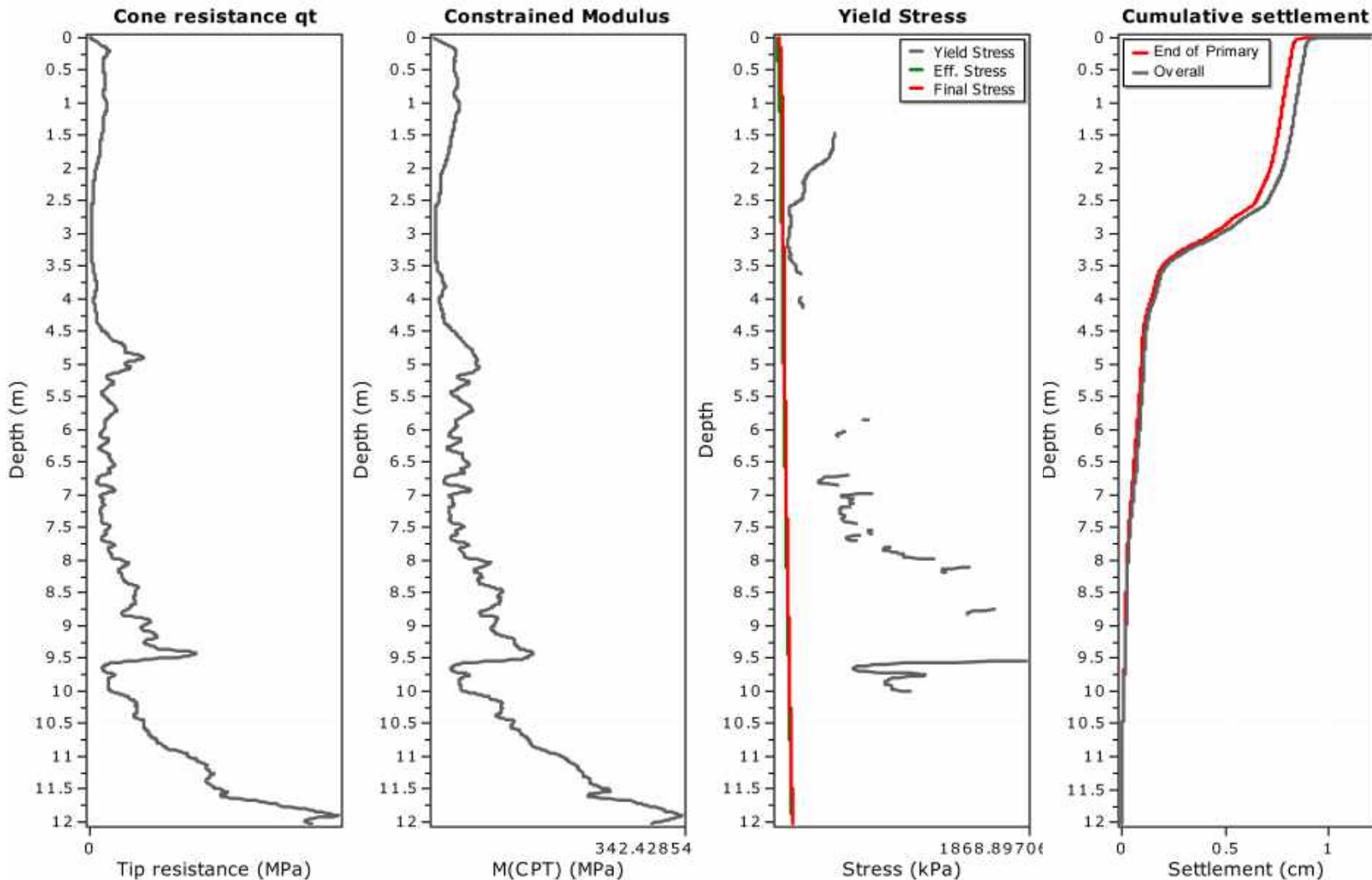
Total calculated settlement: 0.82

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1197	11.96	11.97	0.01	11.97	4.33	322.35	0.26	0.000	0.000	0.000
1198	11.97	11.98	0.01	11.98	4.32	319.12	0.26	0.000	0.000	0.000
1199	11.98	11.99	0.01	11.99	4.32	316.94	0.26	0.000	0.000	0.000
1200	11.99	12.00	0.01	12.00	4.32	314.27	0.26	0.000	0.000	0.000
1201	12.00	12.01	0.01	12.01	4.31	309.27	0.26	0.000	0.000	0.000
1202	12.01	12.02	0.01	12.02	4.31	301.83	0.26	0.000	0.000	0.000
1203	12.02	12.03	0.01	12.03	4.31	297.76	0.26	0.000	0.000	0.000

Total primary settlement: 1.14
Total secondary settlement: 0.06

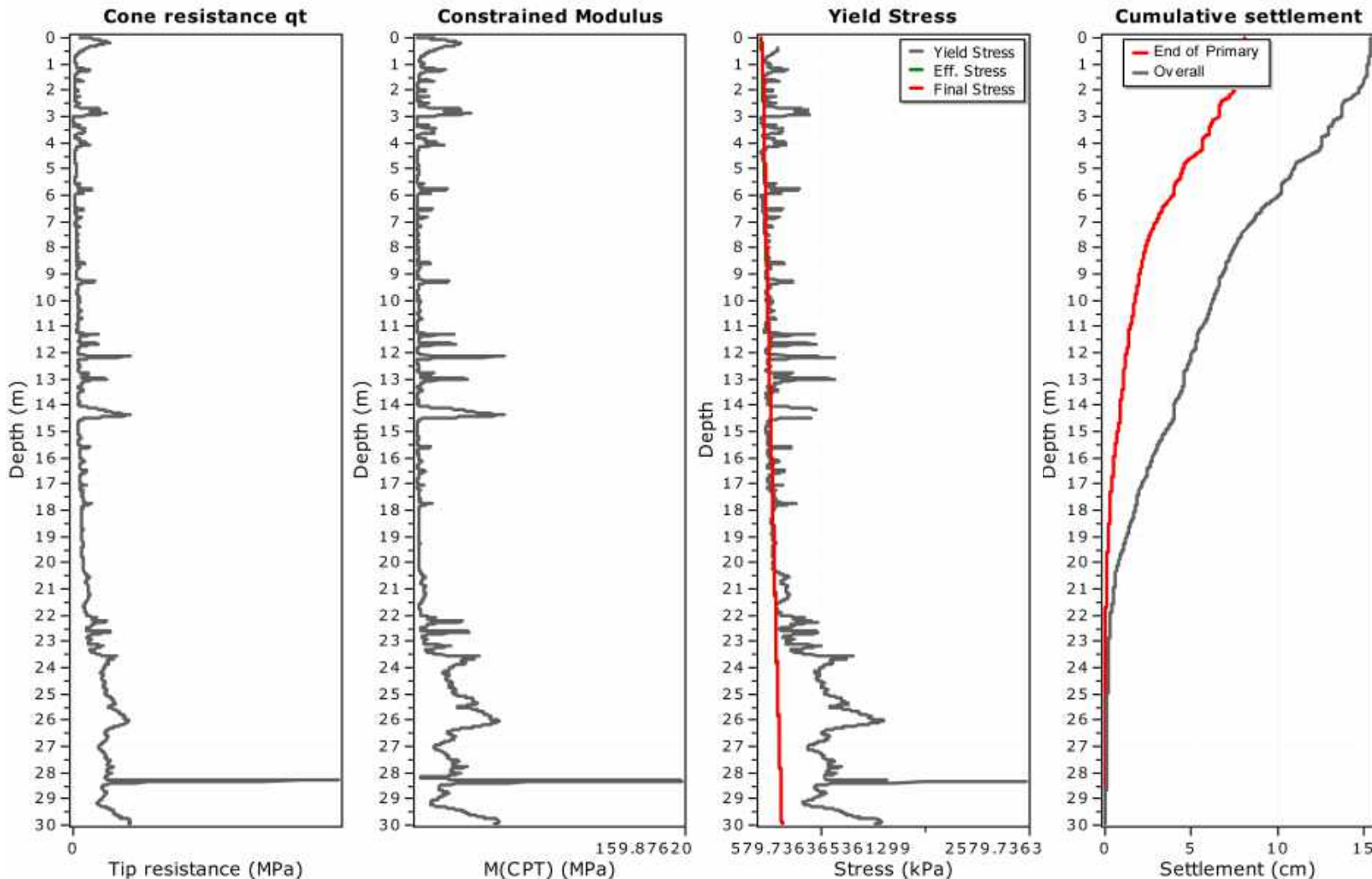
Total calculated settlement: 1.20

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

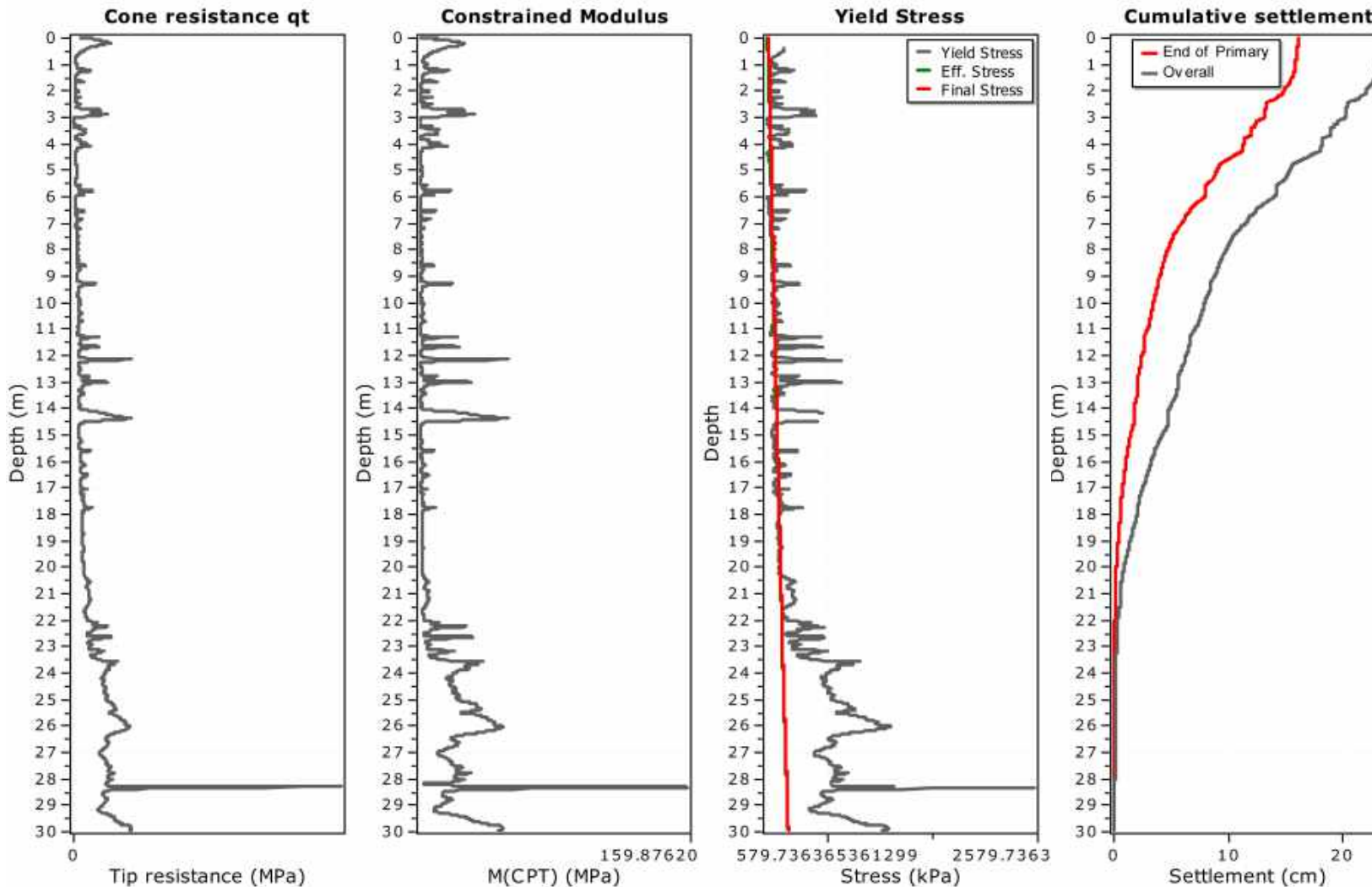
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2991	29.90	29.91	0.01	29.91	0.45	48.40	0.08	0.000	0.000	0.000
2992	29.91	29.92	0.01	29.92	0.45	47.75	0.08	0.000	0.000	0.000
2993	29.92	29.93	0.01	29.93	0.45	46.91	0.08	0.000	0.000	0.000

Total primary settlement: 8.06**Total secondary settlement: 7.29****Total calculated settlement: 15.34****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{pri} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

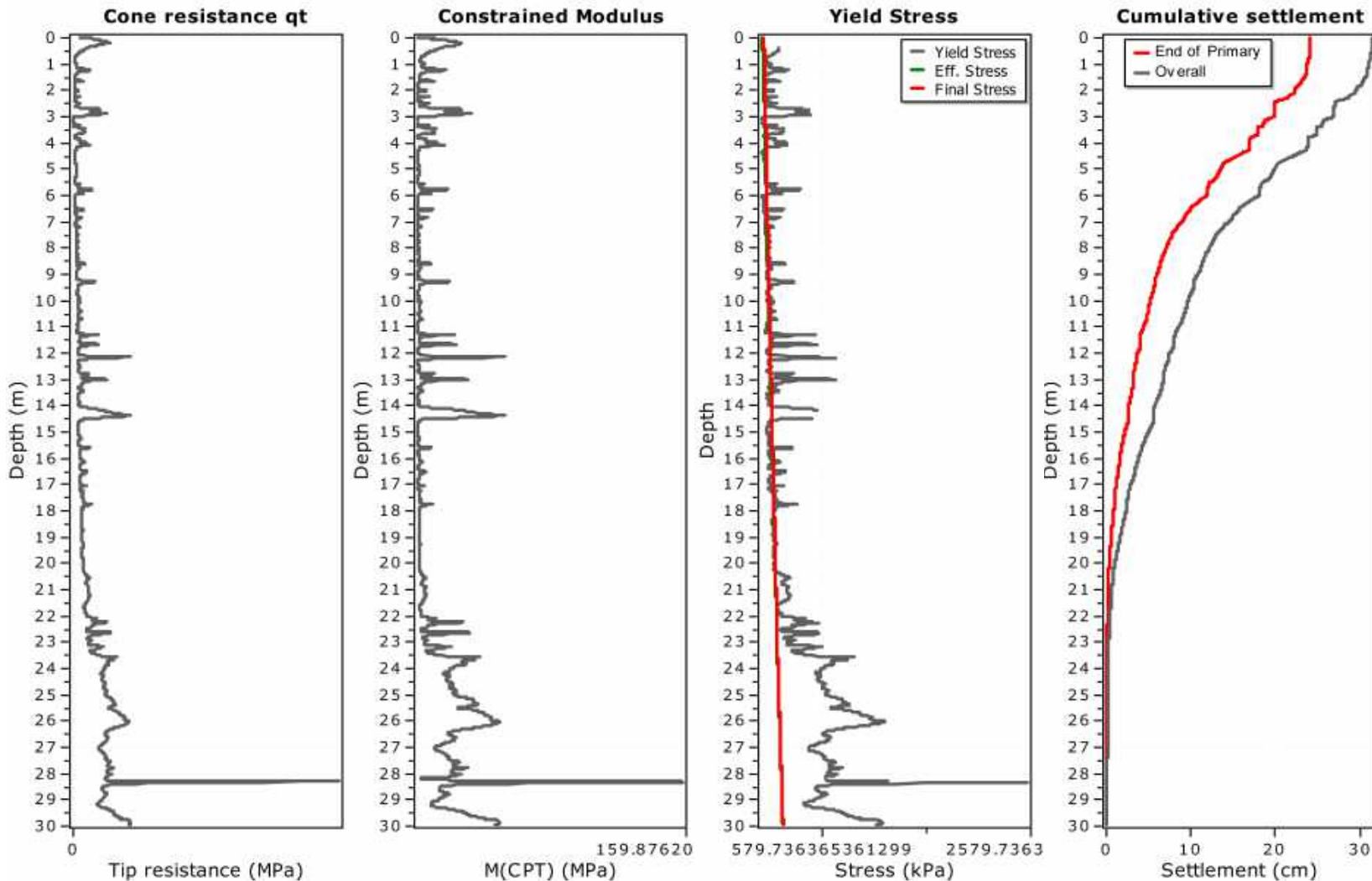
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2991	29.90	29.91	0.01	29.91	0.91	48.40	0.08	0.000	0.000	0.000
2992	29.91	29.92	0.01	29.92	0.91	47.75	0.08	0.000	0.000	0.000
2993	29.92	29.93	0.01	29.93	0.91	46.91	0.08	0.000	0.000	0.000

Total primary settlement: 16.11**Total secondary settlement: 7.29****Total calculated settlement: 23.40****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{pri} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

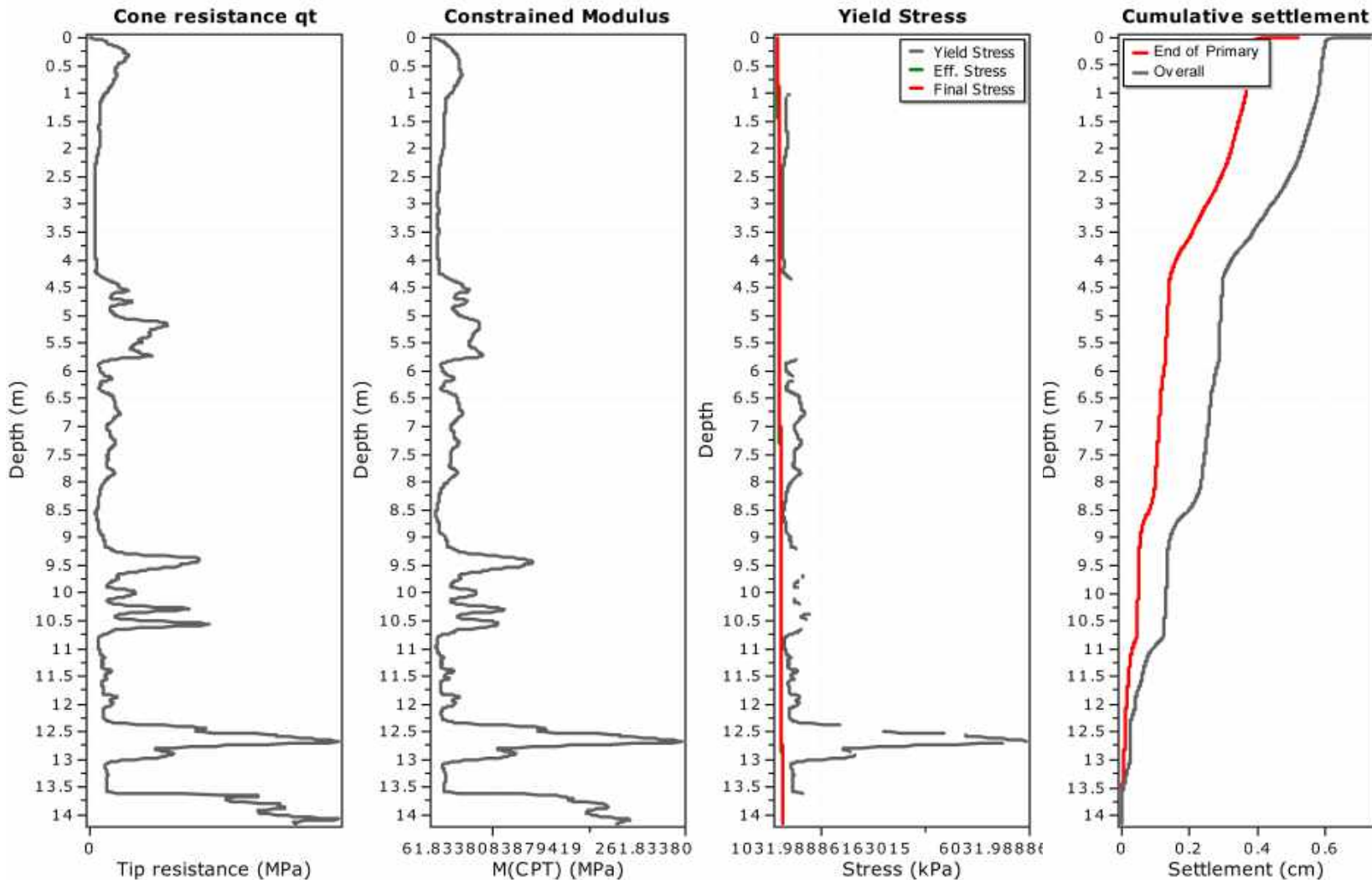
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2991	29.90	29.91	0.01	29.91	1.36	48.40	0.08	0.000	0.000	0.000
2992	29.91	29.92	0.01	29.92	1.36	47.75	0.08	0.000	0.000	0.000
2993	29.92	29.93	0.01	29.93	1.36	46.91	0.08	0.000	0.000	0.000

Total primary settlement: 24.17**Total secondary settlement: 7.29****Total calculated settlement: 31.45****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1381	13.80	13.81	0.01	13.81	1.25	176.91	0.23	0.000	0.000	0.000
1382	13.81	13.82	0.01	13.82	1.25	178.19	0.23	0.000	0.000	0.000
1383	13.82	13.83	0.01	13.83	1.25	178.97	0.23	0.000	0.000	0.000
1384	13.83	13.84	0.01	13.84	1.25	180.33	0.23	0.000	0.000	0.000
1385	13.84	13.85	0.01	13.85	1.25	180.62	0.23	0.000	0.000	0.000
1386	13.85	13.86	0.01	13.86	1.25	181.28	0.23	0.000	0.000	0.000
1387	13.86	13.87	0.01	13.87	1.25	180.77	0.23	0.000	0.000	0.000
1388	13.87	13.88	0.01	13.88	1.24	179.14	0.23	0.000	0.000	0.000
1389	13.88	13.89	0.01	13.89	1.24	174.83	0.23	0.000	0.000	0.000
1390	13.89	13.90	0.01	13.90	1.24	169.92	0.23	0.000	0.000	0.000
1391	13.90	13.91	0.01	13.91	1.24	165.00	0.23	0.000	0.000	0.000
1392	13.91	13.92	0.01	13.92	1.24	161.66	0.23	0.000	0.000	0.000
1393	13.92	13.93	0.01	13.93	1.24	159.81	0.23	0.000	0.000	0.000
1394	13.93	13.94	0.01	13.94	1.24	158.90	0.23	0.000	0.000	0.000
1395	13.94	13.95	0.01	13.95	1.24	158.69	0.23	0.000	0.000	0.000
1396	13.95	13.96	0.01	13.96	1.24	158.74	0.22	0.000	0.000	0.000
1397	13.96	13.97	0.01	13.97	1.24	158.96	0.22	0.000	0.000	0.000
1398	13.97	13.98	0.01	13.98	1.24	159.70	0.22	0.000	0.000	0.000
1399	13.98	13.99	0.01	13.99	1.23	161.51	0.22	0.000	0.000	0.000
1400	13.99	14.00	0.01	14.00	1.23	164.07	0.22	0.000	0.000	0.000
1401	14.00	14.01	0.01	14.01	1.23	166.63	0.22	0.000	0.000	0.000
1402	14.01	14.02	0.01	14.02	1.23	169.72	0.22	0.000	0.000	0.000
1403	14.02	14.03	0.01	14.03	1.23	172.93	0.22	0.000	0.000	0.000
1404	14.03	14.04	0.01	14.04	1.23	177.49	0.22	0.000	0.000	0.000
1405	14.04	14.05	0.01	14.05	1.23	182.70	0.22	0.000	0.000	0.000
1406	14.05	14.06	0.01	14.06	1.23	189.56	0.22	0.000	0.000	0.000
1407	14.06	14.07	0.01	14.07	1.23	197.72	0.22	0.000	0.000	0.000
1408	14.07	14.08	0.01	14.08	1.23	203.05	0.22	0.000	0.000	0.000
1409	14.08	14.09	0.01	14.09	1.23	204.67	0.22	0.000	0.000	0.000
1410	14.09	14.10	0.01	14.10	1.22	202.12	0.22	0.000	0.000	0.000
1411	14.10	14.11	0.01	14.11	1.22	199.63	0.22	0.000	0.000	0.000
1412	14.11	14.12	0.01	14.12	1.22	197.42	0.22	0.000	0.000	0.000
1413	14.12	14.13	0.01	14.13	1.22	195.64	0.22	0.000	0.000	0.000
1414	14.13	14.14	0.01	14.14	1.22	193.35	0.22	0.000	0.000	0.000
1415	14.14	14.15	0.01	14.15	1.22	191.43	0.22	0.000	0.000	0.000

Total primary settlement: 0.52
Total secondary settlement: 0.21

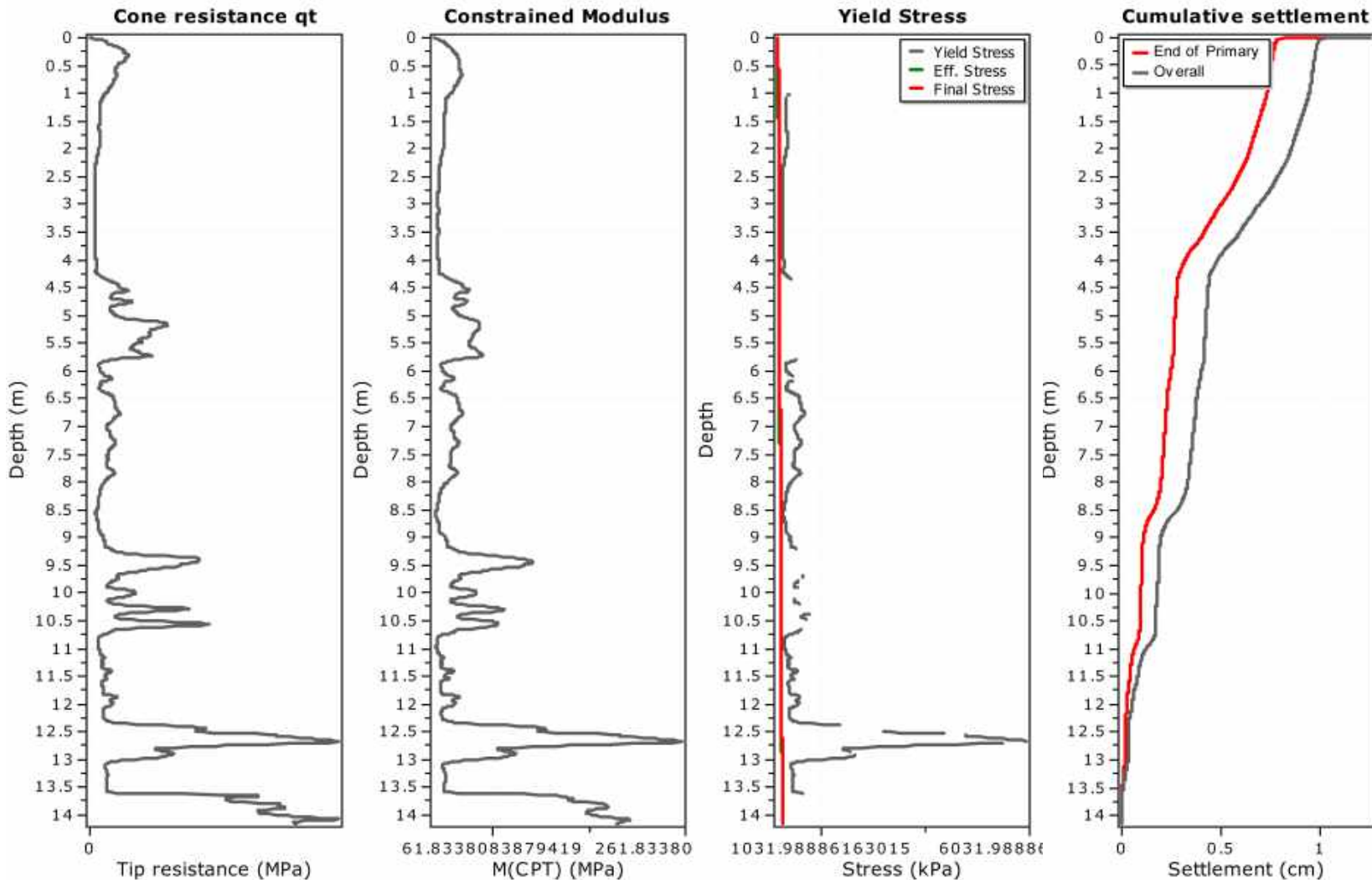
Total calculated settlement: 0.73

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1381	13.80	13.81	0.01	13.81	2.50	176.91	0.23	0.000	0.000	0.000
1382	13.81	13.82	0.01	13.82	2.50	178.19	0.23	0.000	0.000	0.000
1383	13.82	13.83	0.01	13.83	2.50	178.97	0.23	0.000	0.000	0.000
1384	13.83	13.84	0.01	13.84	2.50	180.33	0.23	0.000	0.000	0.000
1385	13.84	13.85	0.01	13.85	2.49	180.62	0.23	0.000	0.000	0.000
1386	13.85	13.86	0.01	13.86	2.49	181.28	0.23	0.000	0.000	0.000
1387	13.86	13.87	0.01	13.87	2.49	180.77	0.23	0.000	0.000	0.000
1388	13.87	13.88	0.01	13.88	2.49	179.14	0.23	0.000	0.000	0.000
1389	13.88	13.89	0.01	13.89	2.49	174.83	0.23	0.000	0.000	0.000
1390	13.89	13.90	0.01	13.90	2.49	169.92	0.23	0.000	0.000	0.000
1391	13.90	13.91	0.01	13.91	2.48	165.00	0.23	0.000	0.000	0.000
1392	13.91	13.92	0.01	13.92	2.48	161.66	0.23	0.000	0.000	0.000
1393	13.92	13.93	0.01	13.93	2.48	159.81	0.23	0.000	0.000	0.000
1394	13.93	13.94	0.01	13.94	2.48	158.90	0.23	0.000	0.000	0.000
1395	13.94	13.95	0.01	13.95	2.48	158.69	0.23	0.000	0.000	0.000
1396	13.95	13.96	0.01	13.96	2.47	158.74	0.22	0.000	0.000	0.000
1397	13.96	13.97	0.01	13.97	2.47	158.96	0.22	0.000	0.000	0.000
1398	13.97	13.98	0.01	13.98	2.47	159.70	0.22	0.000	0.000	0.000
1399	13.98	13.99	0.01	13.99	2.47	161.51	0.22	0.000	0.000	0.000
1400	13.99	14.00	0.01	14.00	2.47	164.07	0.22	0.000	0.000	0.000
1401	14.00	14.01	0.01	14.01	2.47	166.63	0.22	0.000	0.000	0.000
1402	14.01	14.02	0.01	14.02	2.46	169.72	0.22	0.000	0.000	0.000
1403	14.02	14.03	0.01	14.03	2.46	172.93	0.22	0.000	0.000	0.000
1404	14.03	14.04	0.01	14.04	2.46	177.49	0.22	0.000	0.000	0.000
1405	14.04	14.05	0.01	14.05	2.46	182.70	0.22	0.000	0.000	0.000
1406	14.05	14.06	0.01	14.06	2.46	189.56	0.22	0.000	0.000	0.000
1407	14.06	14.07	0.01	14.07	2.45	197.72	0.22	0.000	0.000	0.000
1408	14.07	14.08	0.01	14.08	2.45	203.05	0.22	0.000	0.000	0.000
1409	14.08	14.09	0.01	14.09	2.45	204.67	0.22	0.000	0.000	0.000
1410	14.09	14.10	0.01	14.10	2.45	202.12	0.22	0.000	0.000	0.000
1411	14.10	14.11	0.01	14.11	2.45	199.63	0.22	0.000	0.000	0.000
1412	14.11	14.12	0.01	14.12	2.44	197.42	0.22	0.000	0.000	0.000
1413	14.12	14.13	0.01	14.13	2.44	195.64	0.22	0.000	0.000	0.000
1414	14.13	14.14	0.01	14.14	2.44	193.35	0.22	0.000	0.000	0.000
1415	14.14	14.15	0.01	14.15	2.44	191.43	0.22	0.000	0.000	0.000

Total primary settlement: 1.04
Total secondary settlement: 0.21

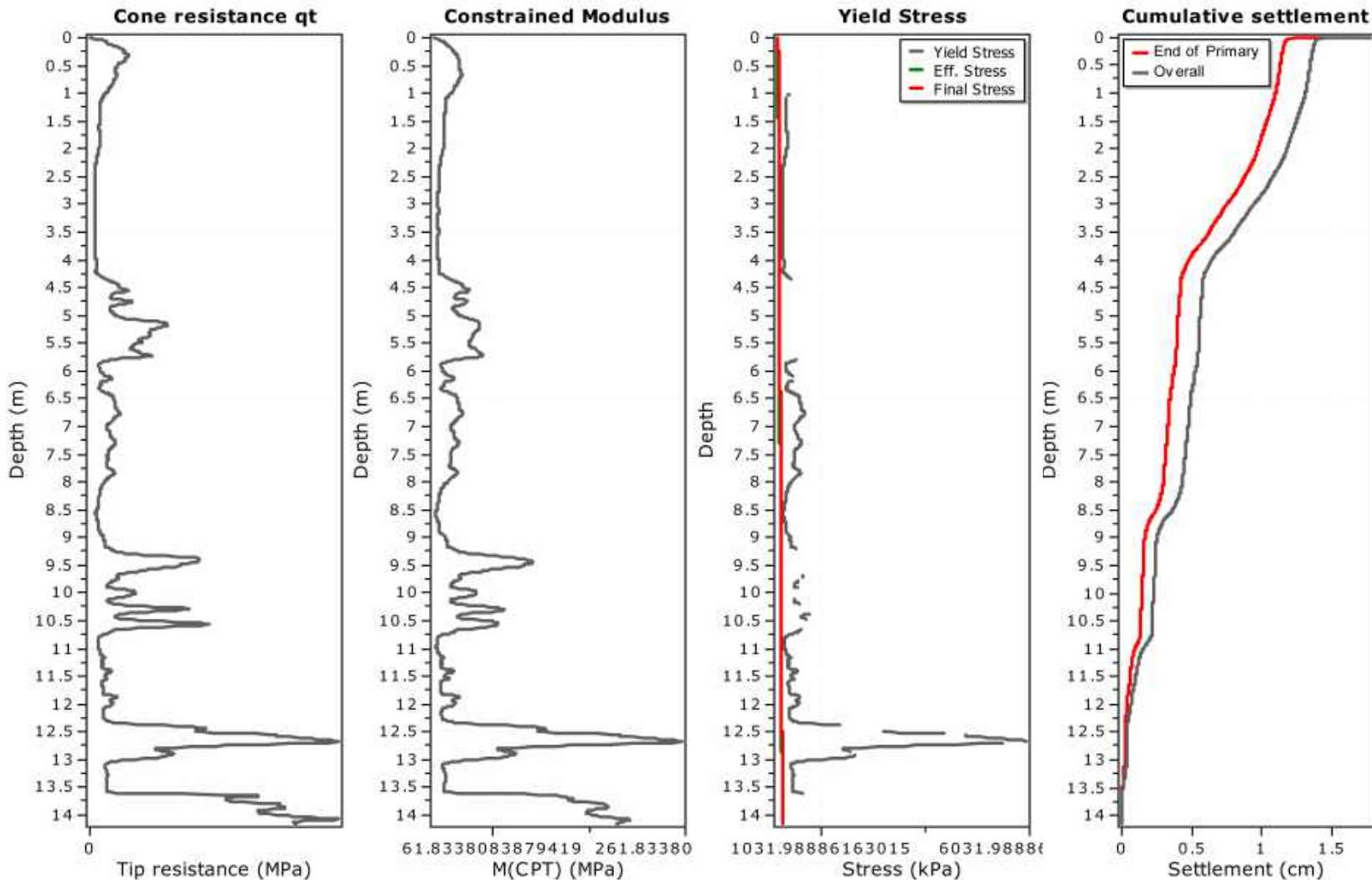
Total calculated settlement: 1.26

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{pri} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1381	13.80	13.81	0.01	13.81	3.75	176.91	0.23	0.000	0.000	0.000
1382	13.81	13.82	0.01	13.82	3.75	178.19	0.23	0.000	0.000	0.000
1383	13.82	13.83	0.01	13.83	3.75	178.97	0.23	0.000	0.000	0.000
1384	13.83	13.84	0.01	13.84	3.74	180.33	0.23	0.000	0.000	0.000
1385	13.84	13.85	0.01	13.85	3.74	180.62	0.23	0.000	0.000	0.000
1386	13.85	13.86	0.01	13.86	3.74	181.28	0.23	0.000	0.000	0.000
1387	13.86	13.87	0.01	13.87	3.74	180.77	0.23	0.000	0.000	0.000
1388	13.87	13.88	0.01	13.88	3.73	179.14	0.23	0.000	0.000	0.000
1389	13.88	13.89	0.01	13.89	3.73	174.83	0.23	0.000	0.000	0.000
1390	13.89	13.90	0.01	13.90	3.73	169.92	0.23	0.000	0.000	0.000
1391	13.90	13.91	0.01	13.91	3.73	165.00	0.23	0.000	0.000	0.000
1392	13.91	13.92	0.01	13.92	3.72	161.66	0.23	0.000	0.000	0.000
1393	13.92	13.93	0.01	13.93	3.72	159.81	0.23	0.000	0.000	0.000
1394	13.93	13.94	0.01	13.94	3.72	158.90	0.23	0.000	0.000	0.000
1395	13.94	13.95	0.01	13.95	3.71	158.69	0.23	0.000	0.000	0.000
1396	13.95	13.96	0.01	13.96	3.71	158.74	0.22	0.000	0.000	0.000
1397	13.96	13.97	0.01	13.97	3.71	158.96	0.22	0.000	0.000	0.000
1398	13.97	13.98	0.01	13.98	3.71	159.70	0.22	0.000	0.000	0.000
1399	13.98	13.99	0.01	13.99	3.70	161.51	0.22	0.000	0.000	0.000
1400	13.99	14.00	0.01	14.00	3.70	164.07	0.22	0.000	0.000	0.000
1401	14.00	14.01	0.01	14.01	3.70	166.63	0.22	0.000	0.000	0.000
1402	14.01	14.02	0.01	14.02	3.69	169.72	0.22	0.000	0.000	0.000
1403	14.02	14.03	0.01	14.03	3.69	172.93	0.22	0.000	0.000	0.000
1404	14.03	14.04	0.01	14.04	3.69	177.49	0.22	0.000	0.000	0.000
1405	14.04	14.05	0.01	14.05	3.69	182.70	0.22	0.000	0.000	0.000
1406	14.05	14.06	0.01	14.06	3.68	189.56	0.22	0.000	0.000	0.000
1407	14.06	14.07	0.01	14.07	3.68	197.72	0.22	0.000	0.000	0.000
1408	14.07	14.08	0.01	14.08	3.68	203.05	0.22	0.000	0.000	0.000
1409	14.08	14.09	0.01	14.09	3.68	204.67	0.22	0.000	0.000	0.000
1410	14.09	14.10	0.01	14.10	3.67	202.12	0.22	0.000	0.000	0.000
1411	14.10	14.11	0.01	14.11	3.67	199.63	0.22	0.000	0.000	0.000
1412	14.11	14.12	0.01	14.12	3.67	197.42	0.22	0.000	0.000	0.000
1413	14.12	14.13	0.01	14.13	3.66	195.64	0.22	0.000	0.000	0.000
1414	14.13	14.14	0.01	14.14	3.66	193.35	0.22	0.000	0.000	0.000
1415	14.14	14.15	0.01	14.15	3.66	191.43	0.22	0.000	0.000	0.000

Total primary settlement: 1.56
Total secondary settlement: 0.21

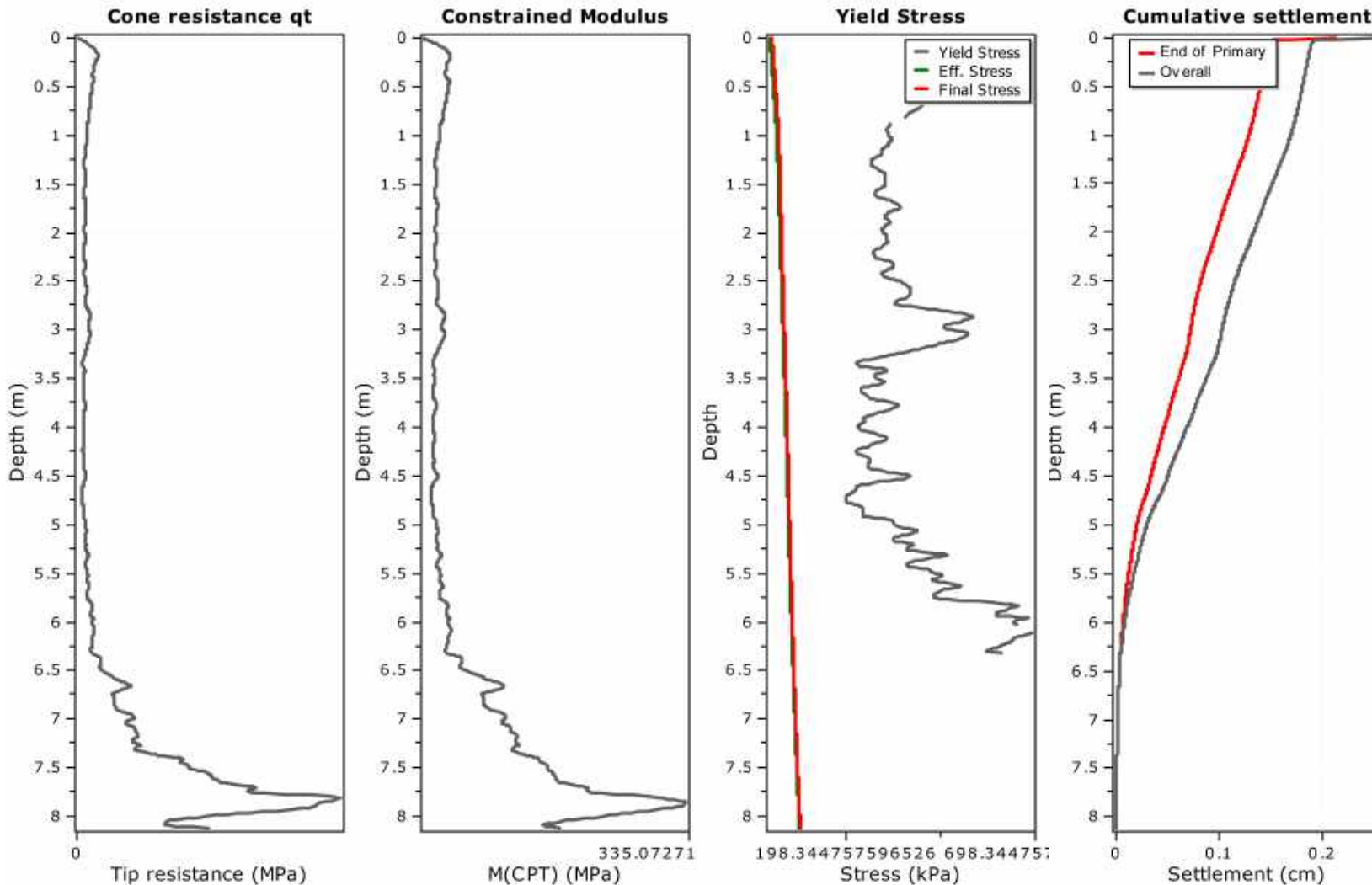
Total calculated settlement: 1.78

Abbreviations

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
783	7.82	7.83	0.01	7.83	2.05	307.35	0.37	0.000	0.000	0.000
784	7.83	7.84	0.01	7.84	2.05	315.90	0.37	0.000	0.000	0.000
785	7.84	7.85	0.01	7.85	2.05	325.04	0.37	0.000	0.000	0.000
786	7.85	7.86	0.01	7.86	2.05	330.81	0.37	0.000	0.000	0.000
787	7.86	7.87	0.01	7.87	2.05	330.04	0.37	0.000	0.000	0.000
788	7.87	7.88	0.01	7.88	2.04	329.00	0.37	0.000	0.000	0.000
789	7.88	7.89	0.01	7.89	2.04	328.68	0.37	0.000	0.000	0.000
790	7.89	7.90	0.01	7.90	2.04	326.35	0.37	0.000	0.000	0.000
791	7.90	7.91	0.01	7.91	2.04	321.13	0.37	0.000	0.000	0.000
792	7.91	7.92	0.01	7.92	2.04	313.11	0.37	0.000	0.000	0.000
793	7.92	7.93	0.01	7.93	2.03	302.81	0.37	0.000	0.000	0.000
794	7.93	7.94	0.01	7.94	2.03	292.07	0.37	0.000	0.000	0.000
795	7.94	7.95	0.01	7.95	2.03	281.66	0.37	0.000	0.000	0.000
796	7.95	7.96	0.01	7.96	2.03	271.81	0.37	0.000	0.000	0.000
797	7.96	7.97	0.01	7.97	2.03	261.94	0.37	0.000	0.000	0.000
798	7.97	7.98	0.01	7.98	2.02	250.80	0.37	0.000	0.000	0.000
799	7.98	7.99	0.01	7.99	2.02	242.31	0.37	0.000	0.000	0.000
800	7.99	8.00	0.01	8.00	2.02	234.09	0.37	0.000	0.000	0.000
801	8.00	8.01	0.01	8.01	2.02	226.18	0.37	0.000	0.000	0.000
802	8.01	8.02	0.01	8.02	2.02	215.36	0.37	0.000	0.000	0.000
803	8.02	8.03	0.01	8.03	2.02	202.60	0.37	0.000	0.000	0.000
804	8.03	8.04	0.01	8.04	2.01	190.56	0.37	0.000	0.000	0.000
805	8.04	8.05	0.01	8.05	2.01	180.40	0.37	0.000	0.000	0.000
806	8.05	8.06	0.01	8.06	2.01	173.39	0.37	0.000	0.000	0.000
807	8.06	8.07	0.01	8.07	2.01	164.06	0.37	0.000	0.000	0.000
808	8.07	8.08	0.01	8.08	2.01	155.93	0.36	0.000	0.000	0.000
809	8.08	8.09	0.01	8.09	2.00	150.11	0.36	0.000	0.000	0.000
810	8.09	8.10	0.01	8.10	2.00	150.72	0.36	0.000	0.000	0.000
811	8.10	8.11	0.01	8.11	2.00	154.31	0.36	0.000	0.000	0.000
812	8.11	8.12	0.01	8.12	2.00	162.96	0.36	0.000	0.000	0.000

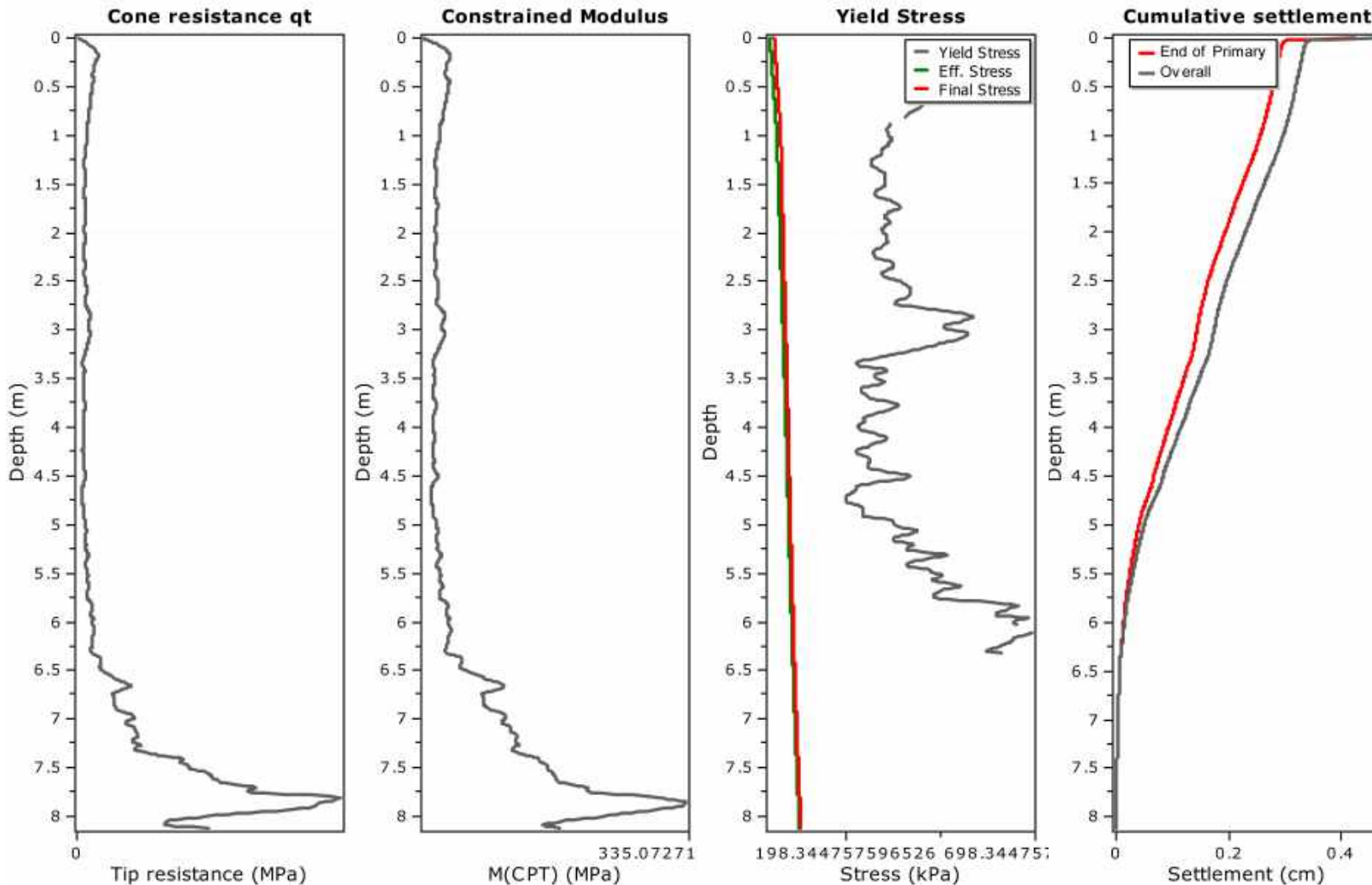
Total primary settlement: 0.21**Total secondary settlement: 0.04****Total calculated settlement: 0.25****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	M _(CPT) (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
783	7.82	7.83	0.01	7.83	4.11	307.35	0.37	0.000	0.000	0.000
784	7.83	7.84	0.01	7.84	4.10	315.90	0.37	0.000	0.000	0.000
785	7.84	7.85	0.01	7.85	4.10	325.04	0.37	0.000	0.000	0.000
786	7.85	7.86	0.01	7.86	4.10	330.81	0.37	0.000	0.000	0.000
787	7.86	7.87	0.01	7.87	4.09	330.04	0.37	0.000	0.000	0.000
788	7.87	7.88	0.01	7.88	4.09	329.00	0.37	0.000	0.000	0.000
789	7.88	7.89	0.01	7.89	4.08	328.68	0.37	0.000	0.000	0.000
790	7.89	7.90	0.01	7.90	4.08	326.35	0.37	0.000	0.000	0.000
791	7.90	7.91	0.01	7.91	4.08	321.13	0.37	0.000	0.000	0.000
792	7.91	7.92	0.01	7.92	4.07	313.11	0.37	0.000	0.000	0.000
793	7.92	7.93	0.01	7.93	4.07	302.81	0.37	0.000	0.000	0.000
794	7.93	7.94	0.01	7.94	4.06	292.07	0.37	0.000	0.000	0.000
795	7.94	7.95	0.01	7.95	4.06	281.66	0.37	0.000	0.000	0.000
796	7.95	7.96	0.01	7.96	4.06	271.81	0.37	0.000	0.000	0.000
797	7.96	7.97	0.01	7.97	4.05	261.94	0.37	0.000	0.000	0.000
798	7.97	7.98	0.01	7.98	4.05	250.80	0.37	0.000	0.000	0.000
799	7.98	7.99	0.01	7.99	4.05	242.31	0.37	0.000	0.000	0.000
800	7.99	8.00	0.01	8.00	4.04	234.09	0.37	0.000	0.000	0.000
801	8.00	8.01	0.01	8.01	4.04	226.18	0.37	0.000	0.000	0.000
802	8.01	8.02	0.01	8.02	4.03	215.36	0.37	0.000	0.000	0.000
803	8.02	8.03	0.01	8.03	4.03	202.60	0.37	0.000	0.000	0.000
804	8.03	8.04	0.01	8.04	4.03	190.56	0.37	0.000	0.000	0.000
805	8.04	8.05	0.01	8.05	4.02	180.40	0.37	0.000	0.000	0.000
806	8.05	8.06	0.01	8.06	4.02	173.39	0.37	0.000	0.000	0.000
807	8.06	8.07	0.01	8.07	4.02	164.06	0.37	0.000	0.000	0.000
808	8.07	8.08	0.01	8.08	4.01	155.93	0.36	0.000	0.000	0.000
809	8.08	8.09	0.01	8.09	4.01	150.11	0.36	0.000	0.000	0.000
810	8.09	8.10	0.01	8.10	4.01	150.72	0.36	0.000	0.000	0.000
811	8.10	8.11	0.01	8.11	4.00	154.31	0.36	0.000	0.000	0.000
812	8.11	8.12	0.01	8.12	4.00	162.96	0.36	0.000	0.000	0.000

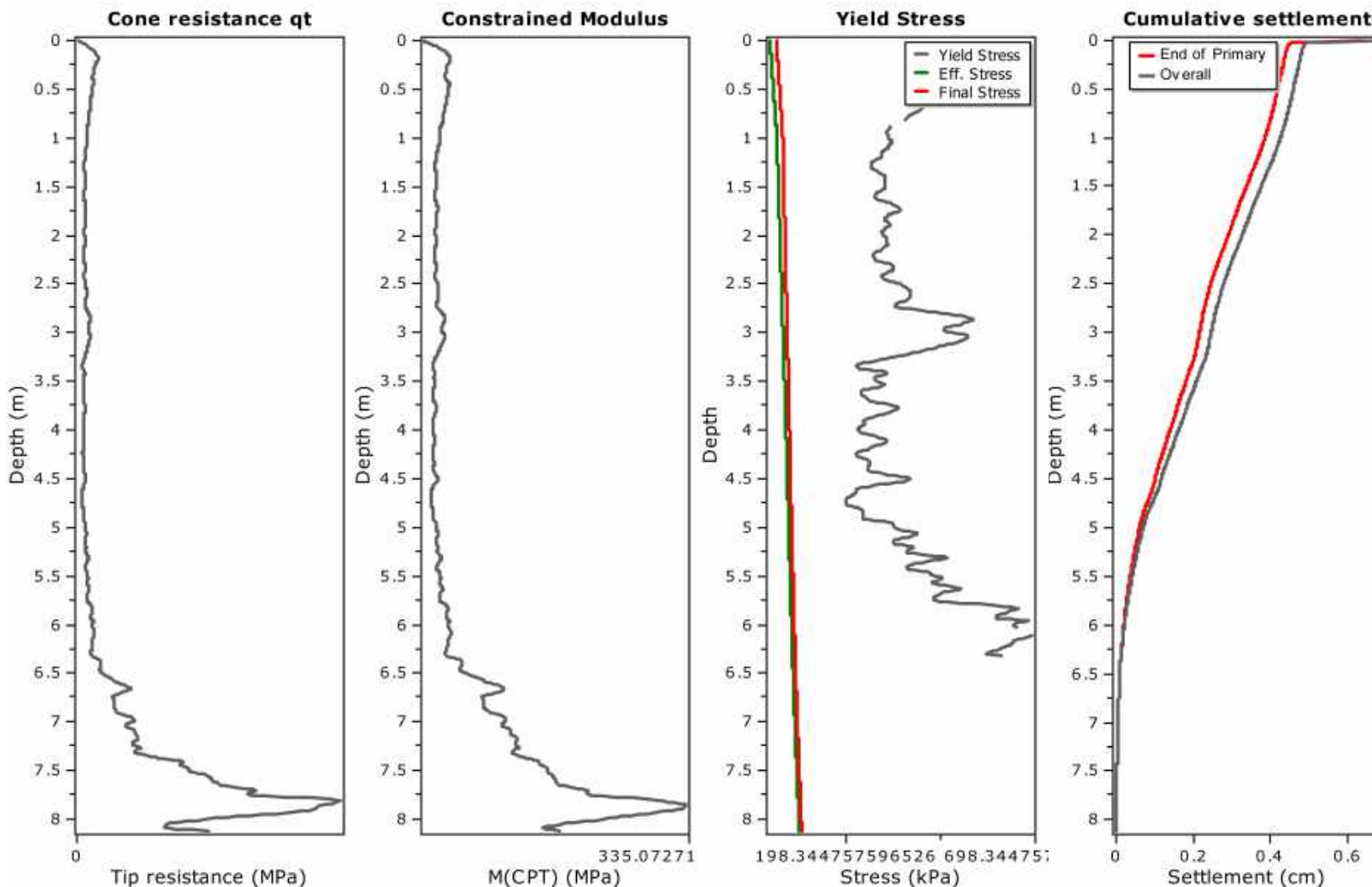
Total primary settlement: 0.42**Total secondary settlement: 0.04****Total calculated settlement: 0.47****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
M _(CPT) :	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_s = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

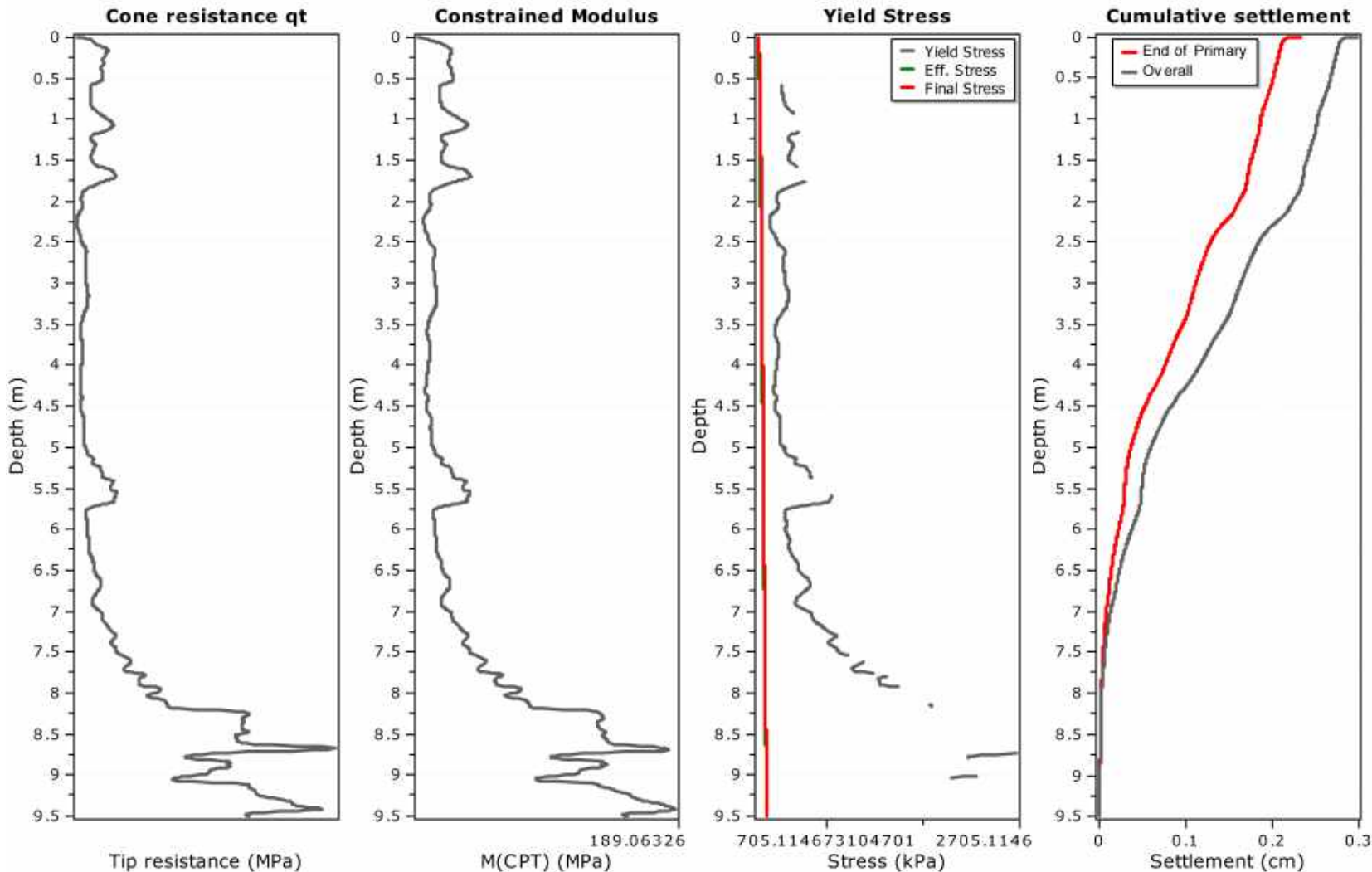
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
783	7.82	7.83	0.01	7.83	6.16	307.35	0.37	0.000	0.000	0.000
784	7.83	7.84	0.01	7.84	6.15	315.90	0.37	0.000	0.000	0.000
785	7.84	7.85	0.01	7.85	6.15	325.04	0.37	0.000	0.000	0.000
786	7.85	7.86	0.01	7.86	6.14	330.81	0.37	0.000	0.000	0.000
787	7.86	7.87	0.01	7.87	6.14	330.04	0.37	0.000	0.000	0.000
788	7.87	7.88	0.01	7.88	6.13	329.00	0.37	0.000	0.000	0.000
789	7.88	7.89	0.01	7.89	6.13	328.68	0.37	0.000	0.000	0.000
790	7.89	7.90	0.01	7.90	6.12	326.35	0.37	0.000	0.000	0.000
791	7.90	7.91	0.01	7.91	6.11	321.13	0.37	0.000	0.000	0.000
792	7.91	7.92	0.01	7.92	6.11	313.11	0.37	0.000	0.000	0.000
793	7.92	7.93	0.01	7.93	6.10	302.81	0.37	0.000	0.000	0.000
794	7.93	7.94	0.01	7.94	6.10	292.07	0.37	0.000	0.000	0.000
795	7.94	7.95	0.01	7.95	6.09	281.66	0.37	0.000	0.000	0.000
796	7.95	7.96	0.01	7.96	6.09	271.81	0.37	0.000	0.000	0.000
797	7.96	7.97	0.01	7.97	6.08	261.94	0.37	0.000	0.000	0.000
798	7.97	7.98	0.01	7.98	6.07	250.80	0.37	0.000	0.000	0.000
799	7.98	7.99	0.01	7.99	6.07	242.31	0.37	0.000	0.000	0.000
800	7.99	8.00	0.01	8.00	6.06	234.09	0.37	0.000	0.000	0.000
801	8.00	8.01	0.01	8.01	6.06	226.18	0.37	0.000	0.000	0.000
802	8.01	8.02	0.01	8.02	6.05	215.36	0.37	0.000	0.000	0.000
803	8.02	8.03	0.01	8.03	6.05	202.60	0.37	0.000	0.000	0.000
804	8.03	8.04	0.01	8.04	6.04	190.56	0.37	0.000	0.000	0.000
805	8.04	8.05	0.01	8.05	6.04	180.40	0.37	0.000	0.000	0.000
806	8.05	8.06	0.01	8.06	6.03	173.39	0.37	0.000	0.000	0.000
807	8.06	8.07	0.01	8.07	6.02	164.06	0.37	0.000	0.000	0.000
808	8.07	8.08	0.01	8.08	6.02	155.93	0.36	0.000	0.000	0.000
809	8.08	8.09	0.01	8.09	6.01	150.11	0.36	0.000	0.000	0.000
810	8.09	8.10	0.01	8.10	6.01	150.72	0.36	0.000	0.000	0.000
811	8.10	8.11	0.01	8.11	6.00	154.31	0.36	0.000	0.000	0.000
812	8.11	8.12	0.01	8.12	6.00	162.96	0.36	0.000	0.000	0.000

Total primary settlement: 0.64**Total secondary settlement: 0.04****Total calculated settlement: 0.68****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
921	9.20	9.21	0.01	9.21	1.81	144.54	0.33	0.000	0.000	0.000
922	9.21	9.22	0.01	9.22	1.81	147.96	0.33	0.000	0.000	0.000
923	9.22	9.23	0.01	9.23	1.81	150.48	0.33	0.000	0.000	0.000
924	9.23	9.24	0.01	9.24	1.81	153.31	0.33	0.000	0.000	0.000
925	9.24	9.25	0.01	9.25	1.81	153.67	0.33	0.000	0.000	0.000
926	9.25	9.26	0.01	9.26	1.81	154.20	0.33	0.000	0.000	0.000
927	9.26	9.27	0.01	9.27	1.80	154.79	0.33	0.000	0.000	0.000
928	9.27	9.28	0.01	9.28	1.80	156.14	0.33	0.000	0.000	0.000
929	9.28	9.29	0.01	9.29	1.80	157.38	0.33	0.000	0.000	0.000
930	9.29	9.30	0.01	9.30	1.80	159.27	0.33	0.000	0.000	0.000
931	9.30	9.31	0.01	9.31	1.80	161.25	0.33	0.000	0.000	0.000
932	9.31	9.32	0.01	9.32	1.80	163.17	0.33	0.000	0.000	0.000
933	9.32	9.33	0.01	9.33	1.79	166.32	0.33	0.000	0.000	0.000
934	9.33	9.34	0.01	9.34	1.79	170.25	0.33	0.000	0.000	0.000
935	9.34	9.35	0.01	9.35	1.79	174.11	0.33	0.000	0.000	0.000
936	9.35	9.36	0.01	9.36	1.79	176.35	0.33	0.000	0.000	0.000
937	9.36	9.37	0.01	9.37	1.79	177.94	0.33	0.000	0.000	0.000
938	9.37	9.38	0.01	9.38	1.79	179.85	0.32	0.000	0.000	0.000
939	9.38	9.39	0.01	9.39	1.78	181.75	0.32	0.000	0.000	0.000
940	9.39	9.40	0.01	9.40	1.78	183.88	0.32	0.000	0.000	0.000
941	9.40	9.41	0.01	9.41	1.78	185.88	0.32	0.000	0.000	0.000
942	9.41	9.42	0.01	9.42	1.78	186.66	0.32	0.000	0.000	0.000
943	9.42	9.43	0.01	9.43	1.78	184.82	0.32	0.000	0.000	0.000
944	9.43	9.44	0.01	9.44	1.78	181.26	0.32	0.000	0.000	0.000
945	9.44	9.45	0.01	9.45	1.78	175.13	0.32	0.000	0.000	0.000
946	9.45	9.46	0.01	9.46	1.77	170.58	0.32	0.000	0.000	0.000
947	9.46	9.47	0.01	9.47	1.77	153.64	0.32	0.000	0.000	0.000
948	9.47	9.48	0.01	9.48	1.77	149.11	0.32	0.000	0.000	0.000
949	9.48	9.49	0.01	9.49	1.77	148.57	0.32	0.000	0.000	0.000
950	9.49	9.50	0.01	9.50	1.77	152.34	0.32	0.000	0.000	0.000

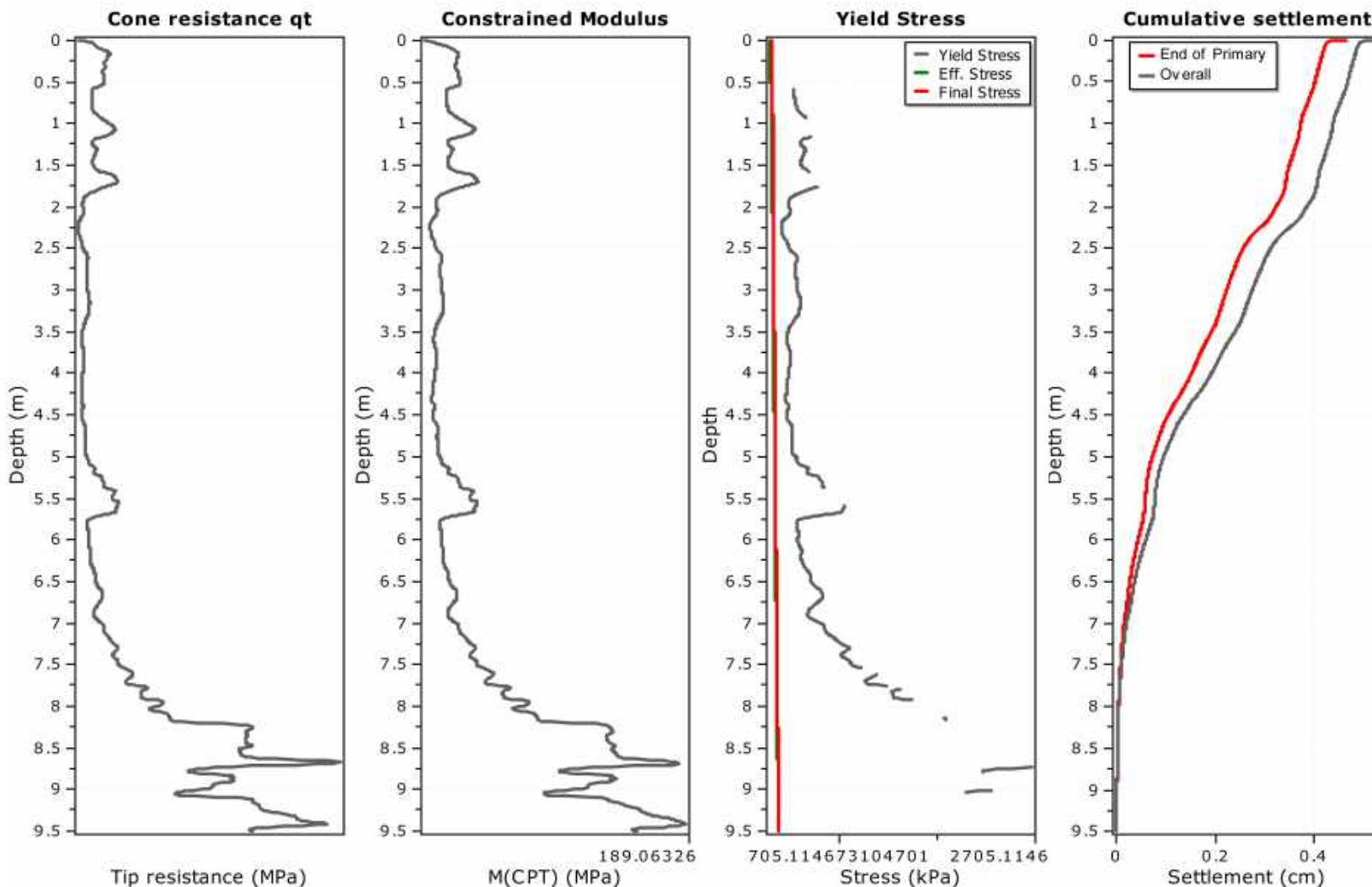
Total primary settlement: 0.23**Total secondary settlement: 0.07****Total calculated settlement: 0.30****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

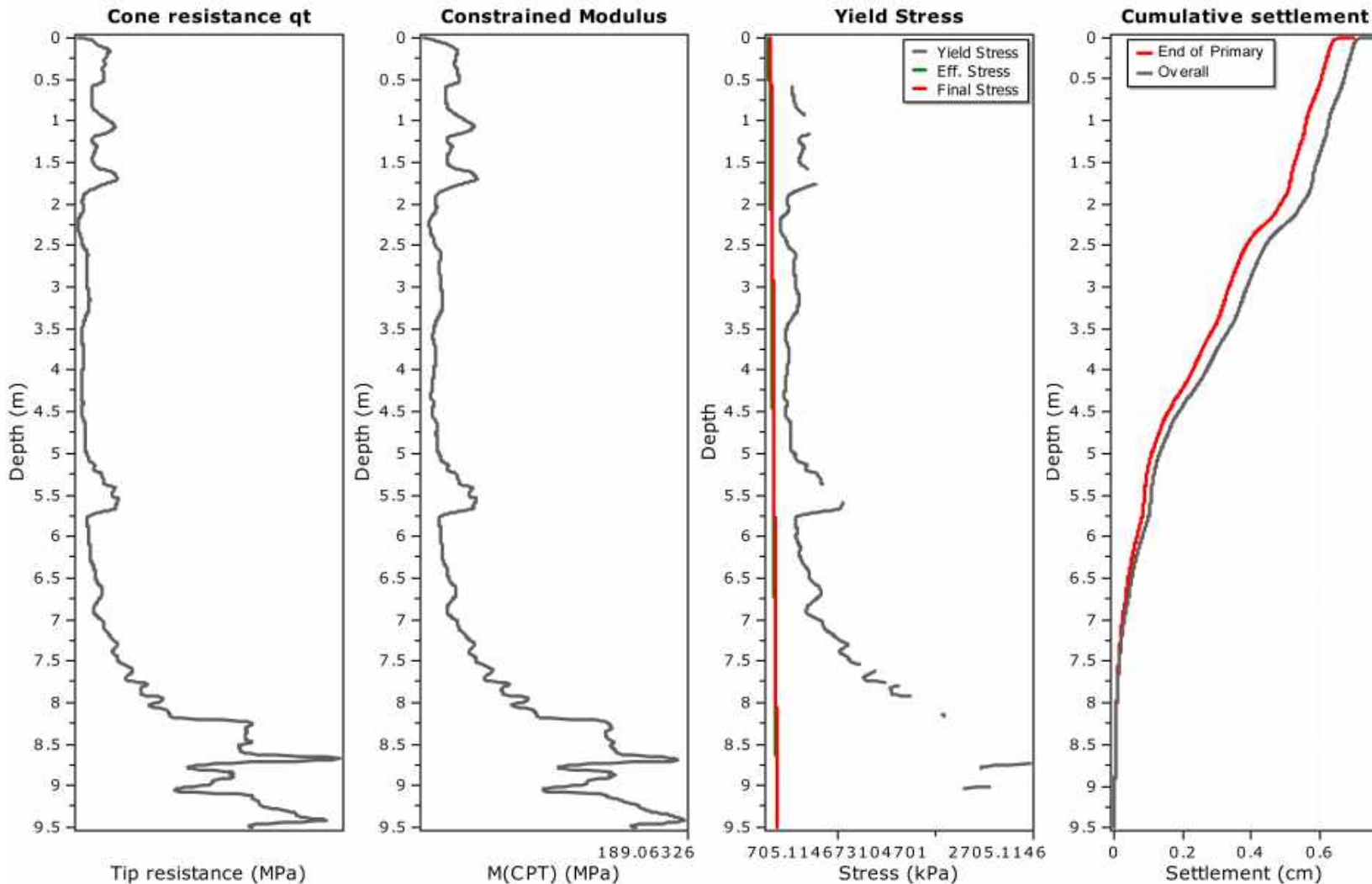
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
921	9.20	9.21	0.01	9.21	3.63	144.54	0.33	0.000	0.000	0.000
922	9.21	9.22	0.01	9.22	3.62	147.96	0.33	0.000	0.000	0.000
923	9.22	9.23	0.01	9.23	3.62	150.48	0.33	0.000	0.000	0.000
924	9.23	9.24	0.01	9.24	3.62	153.31	0.33	0.000	0.000	0.000
925	9.24	9.25	0.01	9.25	3.61	153.67	0.33	0.000	0.000	0.000
926	9.25	9.26	0.01	9.26	3.61	154.20	0.33	0.000	0.000	0.000
927	9.26	9.27	0.01	9.27	3.61	154.79	0.33	0.000	0.000	0.000
928	9.27	9.28	0.01	9.28	3.60	156.14	0.33	0.000	0.000	0.000
929	9.28	9.29	0.01	9.29	3.60	157.38	0.33	0.000	0.000	0.000
930	9.29	9.30	0.01	9.30	3.60	159.27	0.33	0.000	0.000	0.000
931	9.30	9.31	0.01	9.31	3.59	161.25	0.33	0.000	0.000	0.000
932	9.31	9.32	0.01	9.32	3.59	163.17	0.33	0.000	0.000	0.000
933	9.32	9.33	0.01	9.33	3.59	166.32	0.33	0.000	0.000	0.000
934	9.33	9.34	0.01	9.34	3.59	170.25	0.33	0.000	0.000	0.000
935	9.34	9.35	0.01	9.35	3.58	174.11	0.33	0.000	0.000	0.000
936	9.35	9.36	0.01	9.36	3.58	176.35	0.33	0.000	0.000	0.000
937	9.36	9.37	0.01	9.37	3.58	177.94	0.33	0.000	0.000	0.000
938	9.37	9.38	0.01	9.38	3.57	179.85	0.32	0.000	0.000	0.000
939	9.38	9.39	0.01	9.39	3.57	181.75	0.32	0.000	0.000	0.000
940	9.39	9.40	0.01	9.40	3.57	183.88	0.32	0.000	0.000	0.000
941	9.40	9.41	0.01	9.41	3.56	185.88	0.32	0.000	0.000	0.000
942	9.41	9.42	0.01	9.42	3.56	186.66	0.32	0.000	0.000	0.000
943	9.42	9.43	0.01	9.43	3.56	184.82	0.32	0.000	0.000	0.000
944	9.43	9.44	0.01	9.44	3.55	181.26	0.32	0.000	0.000	0.000
945	9.44	9.45	0.01	9.45	3.55	175.13	0.32	0.000	0.000	0.000
946	9.45	9.46	0.01	9.46	3.55	170.58	0.32	0.000	0.000	0.000
947	9.46	9.47	0.01	9.47	3.55	153.64	0.32	0.000	0.000	0.000
948	9.47	9.48	0.01	9.48	3.54	149.11	0.32	0.000	0.000	0.000
949	9.48	9.49	0.01	9.49	3.54	148.57	0.32	0.000	0.000	0.000
950	9.49	9.50	0.01	9.50	3.54	152.34	0.32	0.000	0.000	0.000

Total primary settlement: 0.46**Total secondary settlement: 0.07****Total calculated settlement: 0.53****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

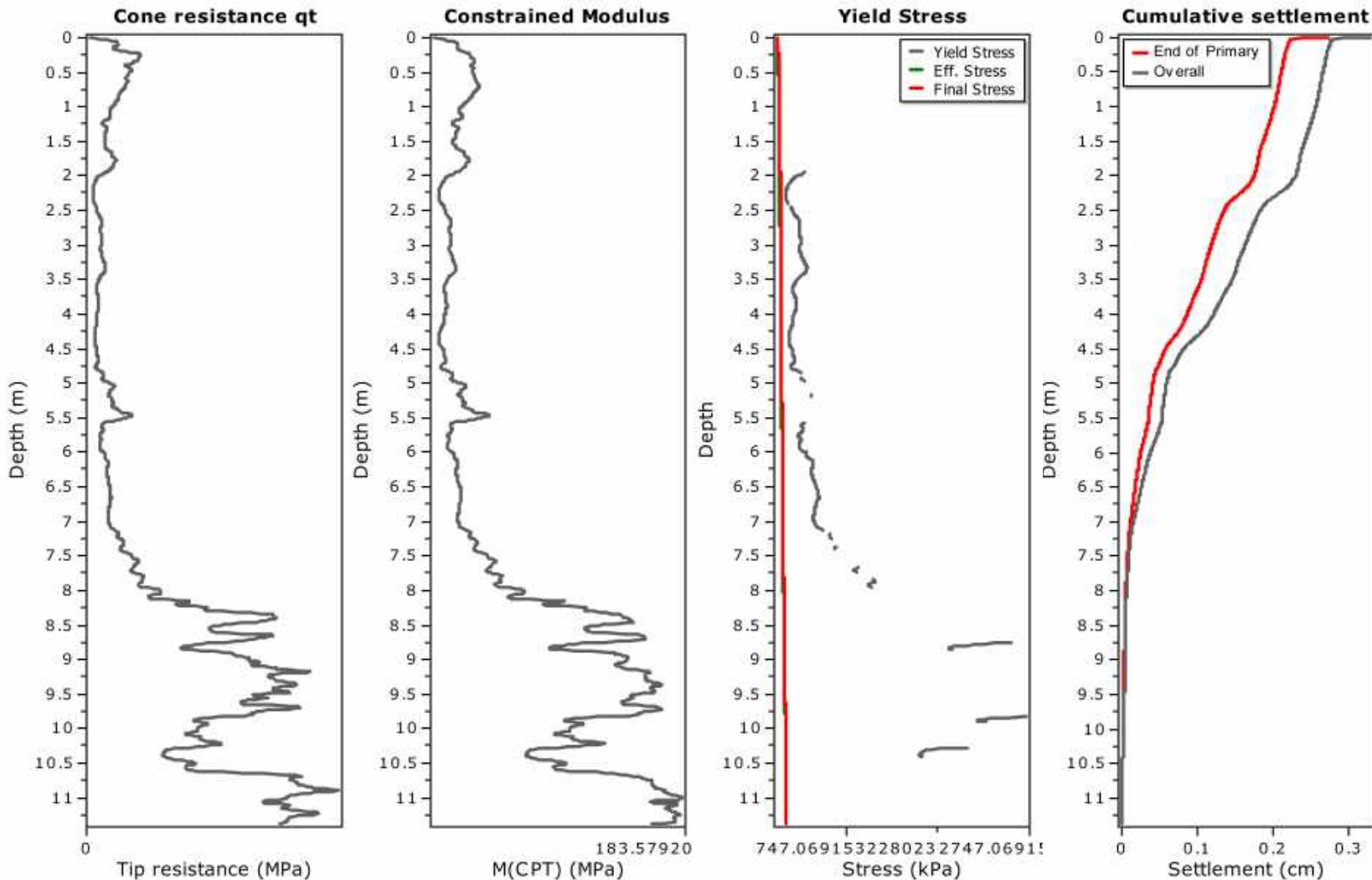
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
921	9.20	9.21	0.01	9.21	5.44	144.54	0.33	0.000	0.000	0.000
922	9.21	9.22	0.01	9.22	5.43	147.96	0.33	0.000	0.000	0.000
923	9.22	9.23	0.01	9.23	5.43	150.48	0.33	0.000	0.000	0.000
924	9.23	9.24	0.01	9.24	5.42	153.31	0.33	0.000	0.000	0.000
925	9.24	9.25	0.01	9.25	5.42	153.67	0.33	0.000	0.000	0.000
926	9.25	9.26	0.01	9.26	5.42	154.20	0.33	0.000	0.000	0.000
927	9.26	9.27	0.01	9.27	5.41	154.79	0.33	0.000	0.000	0.000
928	9.27	9.28	0.01	9.28	5.41	156.14	0.33	0.000	0.000	0.000
929	9.28	9.29	0.01	9.29	5.40	157.38	0.33	0.000	0.000	0.000
930	9.29	9.30	0.01	9.30	5.40	159.27	0.33	0.000	0.000	0.000
931	9.30	9.31	0.01	9.31	5.39	161.25	0.33	0.000	0.000	0.000
932	9.31	9.32	0.01	9.32	5.39	163.17	0.33	0.000	0.000	0.000
933	9.32	9.33	0.01	9.33	5.38	166.32	0.33	0.000	0.000	0.000
934	9.33	9.34	0.01	9.34	5.38	170.25	0.33	0.000	0.000	0.000
935	9.34	9.35	0.01	9.35	5.37	174.11	0.33	0.000	0.000	0.000
936	9.35	9.36	0.01	9.36	5.37	176.35	0.33	0.000	0.000	0.000
937	9.36	9.37	0.01	9.37	5.36	177.94	0.33	0.000	0.000	0.000
938	9.37	9.38	0.01	9.38	5.36	179.85	0.32	0.000	0.000	0.000
939	9.38	9.39	0.01	9.39	5.35	181.75	0.32	0.000	0.000	0.000
940	9.39	9.40	0.01	9.40	5.35	183.88	0.32	0.000	0.000	0.000
941	9.40	9.41	0.01	9.41	5.35	185.88	0.32	0.000	0.000	0.000
942	9.41	9.42	0.01	9.42	5.34	186.66	0.32	0.000	0.000	0.000
943	9.42	9.43	0.01	9.43	5.34	184.82	0.32	0.000	0.000	0.000
944	9.43	9.44	0.01	9.44	5.33	181.26	0.32	0.000	0.000	0.000
945	9.44	9.45	0.01	9.45	5.33	175.13	0.32	0.000	0.000	0.000
946	9.45	9.46	0.01	9.46	5.32	170.58	0.32	0.000	0.000	0.000
947	9.46	9.47	0.01	9.47	5.32	153.64	0.32	0.000	0.000	0.000
948	9.47	9.48	0.01	9.48	5.31	149.11	0.32	0.000	0.000	0.000
949	9.48	9.49	0.01	9.49	5.31	148.57	0.32	0.000	0.000	0.000
950	9.49	9.50	0.01	9.50	5.30	152.34	0.32	0.000	0.000	0.000

Total primary settlement: 0.69**Total secondary settlement: 0.07****Total calculated settlement: 0.76****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{secondary} = S_{primary} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

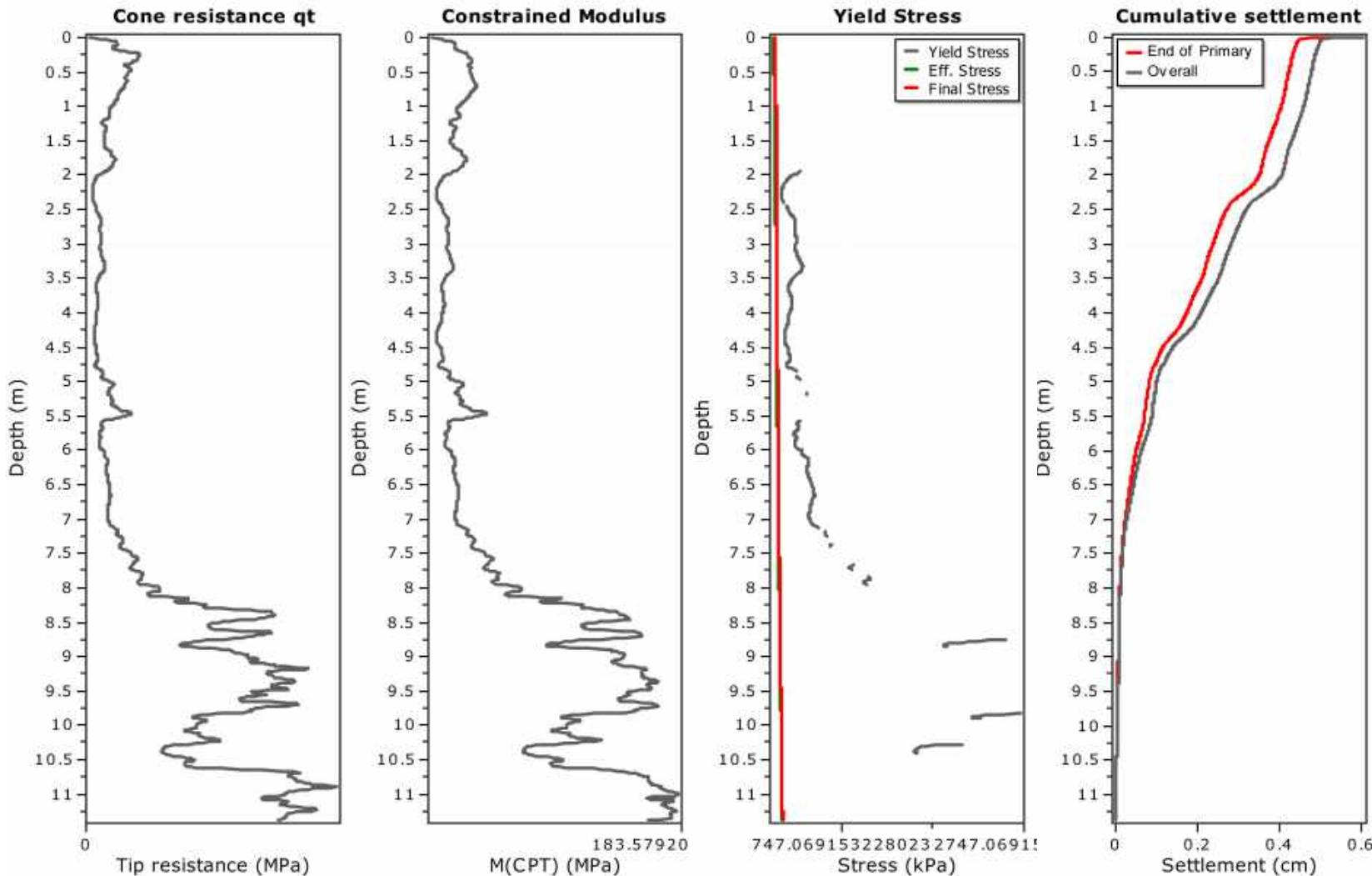
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1105	11.04	11.05	0.01	11.05	1.55	162.25	0.28	0.000	0.000	0.000
1106	11.05	11.06	0.01	11.06	1.55	158.38	0.28	0.000	0.000	0.000
1107	11.06	11.07	0.01	11.07	1.55	158.85	0.28	0.000	0.000	0.000
1108	11.07	11.08	0.01	11.08	1.55	160.43	0.28	0.000	0.000	0.000
1109	11.08	11.09	0.01	11.09	1.55	167.47	0.28	0.000	0.000	0.000
1110	11.09	11.10	0.01	11.10	1.55	177.09	0.28	0.000	0.000	0.000
1111	11.10	11.11	0.01	11.11	1.55	177.91	0.28	0.000	0.000	0.000
1112	11.11	11.12	0.01	11.12	1.54	176.34	0.28	0.000	0.000	0.000
1113	11.12	11.13	0.01	11.13	1.54	173.01	0.28	0.000	0.000	0.000
1114	11.13	11.14	0.01	11.14	1.54	170.23	0.28	0.000	0.000	0.000
1115	11.14	11.15	0.01	11.15	1.54	168.82	0.28	0.000	0.000	0.000
1116	11.15	11.16	0.01	11.16	1.54	168.94	0.28	0.000	0.000	0.000
1117	11.16	11.17	0.01	11.17	1.54	169.74	0.28	0.000	0.000	0.000
1118	11.17	11.18	0.01	11.18	1.54	170.83	0.28	0.000	0.000	0.000
1119	11.18	11.19	0.01	11.19	1.54	172.28	0.28	0.000	0.000	0.000
1120	11.19	11.20	0.01	11.20	1.53	173.98	0.28	0.000	0.000	0.000
1121	11.20	11.21	0.01	11.21	1.53	175.44	0.28	0.000	0.000	0.000
1122	11.21	11.22	0.01	11.22	1.53	176.47	0.28	0.000	0.000	0.000
1123	11.22	11.23	0.01	11.23	1.53	178.02	0.28	0.000	0.000	0.000
1124	11.23	11.24	0.01	11.24	1.53	178.98	0.28	0.000	0.000	0.000
1125	11.24	11.25	0.01	11.25	1.53	179.32	0.28	0.000	0.000	0.000
1126	11.25	11.26	0.01	11.26	1.53	178.03	0.28	0.000	0.000	0.000
1127	11.26	11.27	0.01	11.27	1.53	176.61	0.28	0.000	0.000	0.000
1128	11.27	11.28	0.01	11.28	1.52	175.75	0.28	0.000	0.000	0.000
1129	11.28	11.29	0.01	11.29	1.52	175.41	0.28	0.000	0.000	0.000
1130	11.29	11.30	0.01	11.30	1.52	175.61	0.28	0.000	0.000	0.000
1131	11.30	11.31	0.01	11.31	1.52	175.72	0.28	0.000	0.000	0.000
1132	11.31	11.32	0.01	11.32	1.52	175.69	0.28	0.000	0.000	0.000
1133	11.32	11.33	0.01	11.33	1.52	175.65	0.28	0.000	0.000	0.000
1134	11.33	11.34	0.01	11.34	1.52	175.89	0.28	0.000	0.000	0.000
1135	11.34	11.35	0.01	11.35	1.52	176.04	0.28	0.000	0.000	0.000
1136	11.35	11.36	0.01	11.36	1.51	175.90	0.28	0.000	0.000	0.000
1137	11.36	11.37	0.01	11.37	1.51	167.64	0.28	0.000	0.000	0.000

Total primary settlement: 0.27**Total secondary settlement: 0.05****Total calculated settlement: 0.33****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

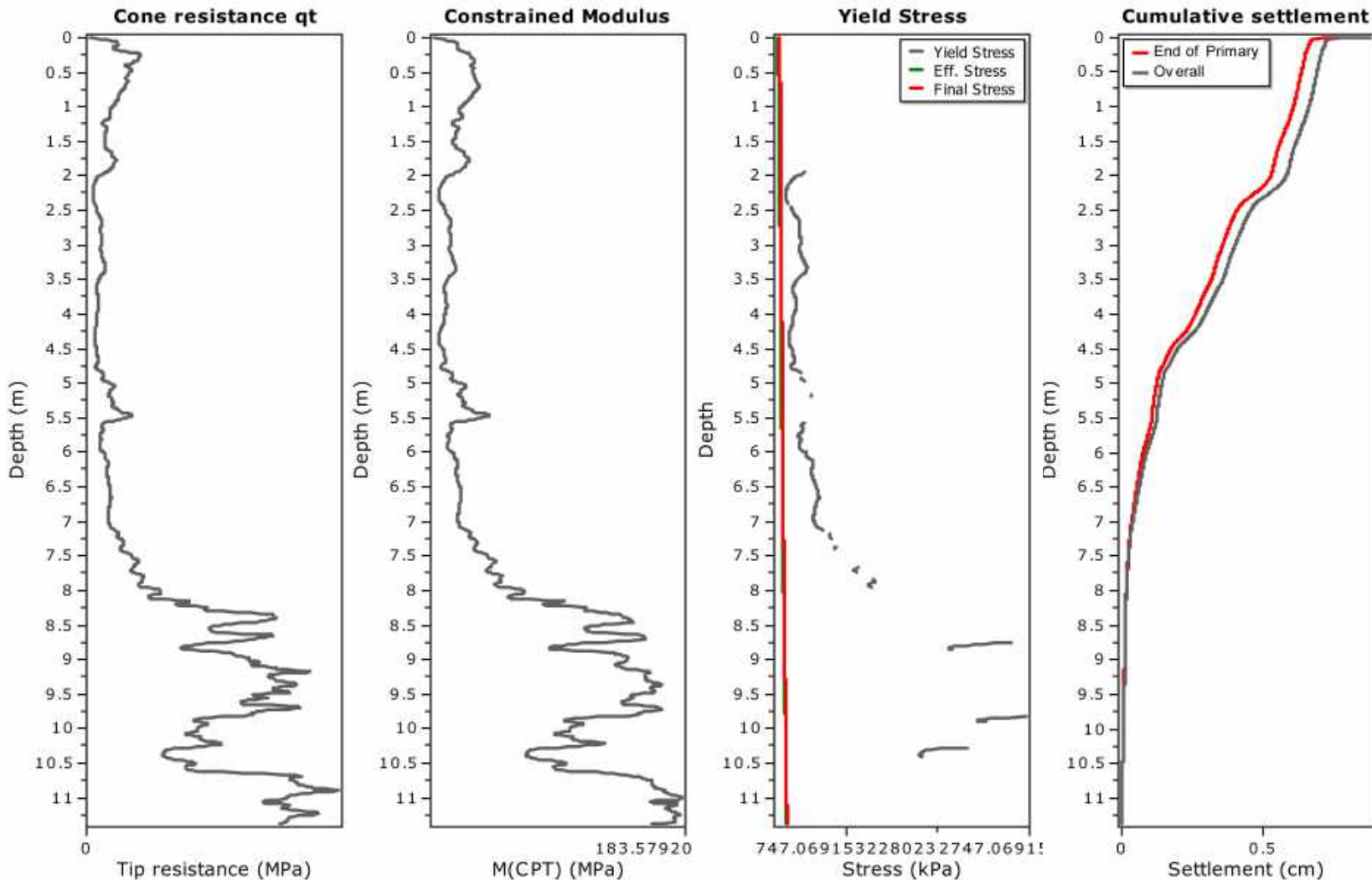
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1105	11.04	11.05	0.01	11.05	3.11	162.25	0.28	0.000	0.000	0.000
1106	11.05	11.06	0.01	11.06	3.10	158.38	0.28	0.000	0.000	0.000
1107	11.06	11.07	0.01	11.07	3.10	158.85	0.28	0.000	0.000	0.000
1108	11.07	11.08	0.01	11.08	3.10	160.43	0.28	0.000	0.000	0.000
1109	11.08	11.09	0.01	11.09	3.10	167.47	0.28	0.000	0.000	0.000
1110	11.09	11.10	0.01	11.10	3.09	177.09	0.28	0.000	0.000	0.000
1111	11.10	11.11	0.01	11.11	3.09	177.91	0.28	0.000	0.000	0.000
1112	11.11	11.12	0.01	11.12	3.09	176.34	0.28	0.000	0.000	0.000
1113	11.12	11.13	0.01	11.13	3.09	173.01	0.28	0.000	0.000	0.000
1114	11.13	11.14	0.01	11.14	3.08	170.23	0.28	0.000	0.000	0.000
1115	11.14	11.15	0.01	11.15	3.08	168.82	0.28	0.000	0.000	0.000
1116	11.15	11.16	0.01	11.16	3.08	168.94	0.28	0.000	0.000	0.000
1117	11.16	11.17	0.01	11.17	3.08	169.74	0.28	0.000	0.000	0.000
1118	11.17	11.18	0.01	11.18	3.07	170.83	0.28	0.000	0.000	0.000
1119	11.18	11.19	0.01	11.19	3.07	172.28	0.28	0.000	0.000	0.000
1120	11.19	11.20	0.01	11.20	3.07	173.98	0.28	0.000	0.000	0.000
1121	11.20	11.21	0.01	11.21	3.07	175.44	0.28	0.000	0.000	0.000
1122	11.21	11.22	0.01	11.22	3.06	176.47	0.28	0.000	0.000	0.000
1123	11.22	11.23	0.01	11.23	3.06	178.02	0.28	0.000	0.000	0.000
1124	11.23	11.24	0.01	11.24	3.06	178.98	0.28	0.000	0.000	0.000
1125	11.24	11.25	0.01	11.25	3.06	179.32	0.28	0.000	0.000	0.000
1126	11.25	11.26	0.01	11.26	3.05	178.03	0.28	0.000	0.000	0.000
1127	11.26	11.27	0.01	11.27	3.05	176.61	0.28	0.000	0.000	0.000
1128	11.27	11.28	0.01	11.28	3.05	175.75	0.28	0.000	0.000	0.000
1129	11.28	11.29	0.01	11.29	3.05	175.41	0.28	0.000	0.000	0.000
1130	11.29	11.30	0.01	11.30	3.04	175.61	0.28	0.000	0.000	0.000
1131	11.30	11.31	0.01	11.31	3.04	175.72	0.28	0.000	0.000	0.000
1132	11.31	11.32	0.01	11.32	3.04	175.69	0.28	0.000	0.000	0.000
1133	11.32	11.33	0.01	11.33	3.04	175.65	0.28	0.000	0.000	0.000
1134	11.33	11.34	0.01	11.34	3.03	175.89	0.28	0.000	0.000	0.000
1135	11.34	11.35	0.01	11.35	3.03	176.04	0.28	0.000	0.000	0.000
1136	11.35	11.36	0.01	11.36	3.03	175.90	0.28	0.000	0.000	0.000
1137	11.36	11.37	0.01	11.37	3.03	167.64	0.28	0.000	0.000	0.000

Total primary settlement: 0.55**Total secondary settlement: 0.05****Total calculated settlement: 0.60****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1105	11.04	11.05	0.01	11.05	4.66	162.25	0.28	0.000	0.000	0.000
1106	11.05	11.06	0.01	11.06	4.65	158.38	0.28	0.000	0.000	0.000
1107	11.06	11.07	0.01	11.07	4.65	158.85	0.28	0.000	0.000	0.000
1108	11.07	11.08	0.01	11.08	4.65	160.43	0.28	0.000	0.000	0.000
1109	11.08	11.09	0.01	11.09	4.64	167.47	0.28	0.000	0.000	0.000
1110	11.09	11.10	0.01	11.10	4.64	177.09	0.28	0.000	0.000	0.000
1111	11.10	11.11	0.01	11.11	4.64	177.91	0.28	0.000	0.000	0.000
1112	11.11	11.12	0.01	11.12	4.63	176.34	0.28	0.000	0.000	0.000
1113	11.12	11.13	0.01	11.13	4.63	173.01	0.28	0.000	0.000	0.000
1114	11.13	11.14	0.01	11.14	4.62	170.23	0.28	0.000	0.000	0.000
1115	11.14	11.15	0.01	11.15	4.62	168.82	0.28	0.000	0.000	0.000
1116	11.15	11.16	0.01	11.16	4.62	168.94	0.28	0.000	0.000	0.000
1117	11.16	11.17	0.01	11.17	4.61	169.74	0.28	0.000	0.000	0.000
1118	11.17	11.18	0.01	11.18	4.61	170.83	0.28	0.000	0.000	0.000
1119	11.18	11.19	0.01	11.19	4.61	172.28	0.28	0.000	0.000	0.000
1120	11.19	11.20	0.01	11.20	4.60	173.98	0.28	0.000	0.000	0.000
1121	11.20	11.21	0.01	11.21	4.60	175.44	0.28	0.000	0.000	0.000
1122	11.21	11.22	0.01	11.22	4.59	176.47	0.28	0.000	0.000	0.000
1123	11.22	11.23	0.01	11.23	4.59	178.02	0.28	0.000	0.000	0.000
1124	11.23	11.24	0.01	11.24	4.59	178.98	0.28	0.000	0.000	0.000
1125	11.24	11.25	0.01	11.25	4.58	179.32	0.28	0.000	0.000	0.000
1126	11.25	11.26	0.01	11.26	4.58	178.03	0.28	0.000	0.000	0.000
1127	11.26	11.27	0.01	11.27	4.58	176.61	0.28	0.000	0.000	0.000
1128	11.27	11.28	0.01	11.28	4.57	175.75	0.28	0.000	0.000	0.000
1129	11.28	11.29	0.01	11.29	4.57	175.41	0.28	0.000	0.000	0.000
1130	11.29	11.30	0.01	11.30	4.56	175.61	0.28	0.000	0.000	0.000
1131	11.30	11.31	0.01	11.31	4.56	175.72	0.28	0.000	0.000	0.000
1132	11.31	11.32	0.01	11.32	4.56	175.69	0.28	0.000	0.000	0.000
1133	11.32	11.33	0.01	11.33	4.55	175.65	0.28	0.000	0.000	0.000
1134	11.33	11.34	0.01	11.34	4.55	175.89	0.28	0.000	0.000	0.000
1135	11.34	11.35	0.01	11.35	4.55	176.04	0.28	0.000	0.000	0.000
1136	11.35	11.36	0.01	11.36	4.54	175.90	0.28	0.000	0.000	0.000
1137	11.36	11.37	0.01	11.37	4.54	167.64	0.28	0.000	0.000	0.000

Total primary settlement: 0.82**Total secondary settlement: 0.05****Total calculated settlement: 0.88****Abbreviations**

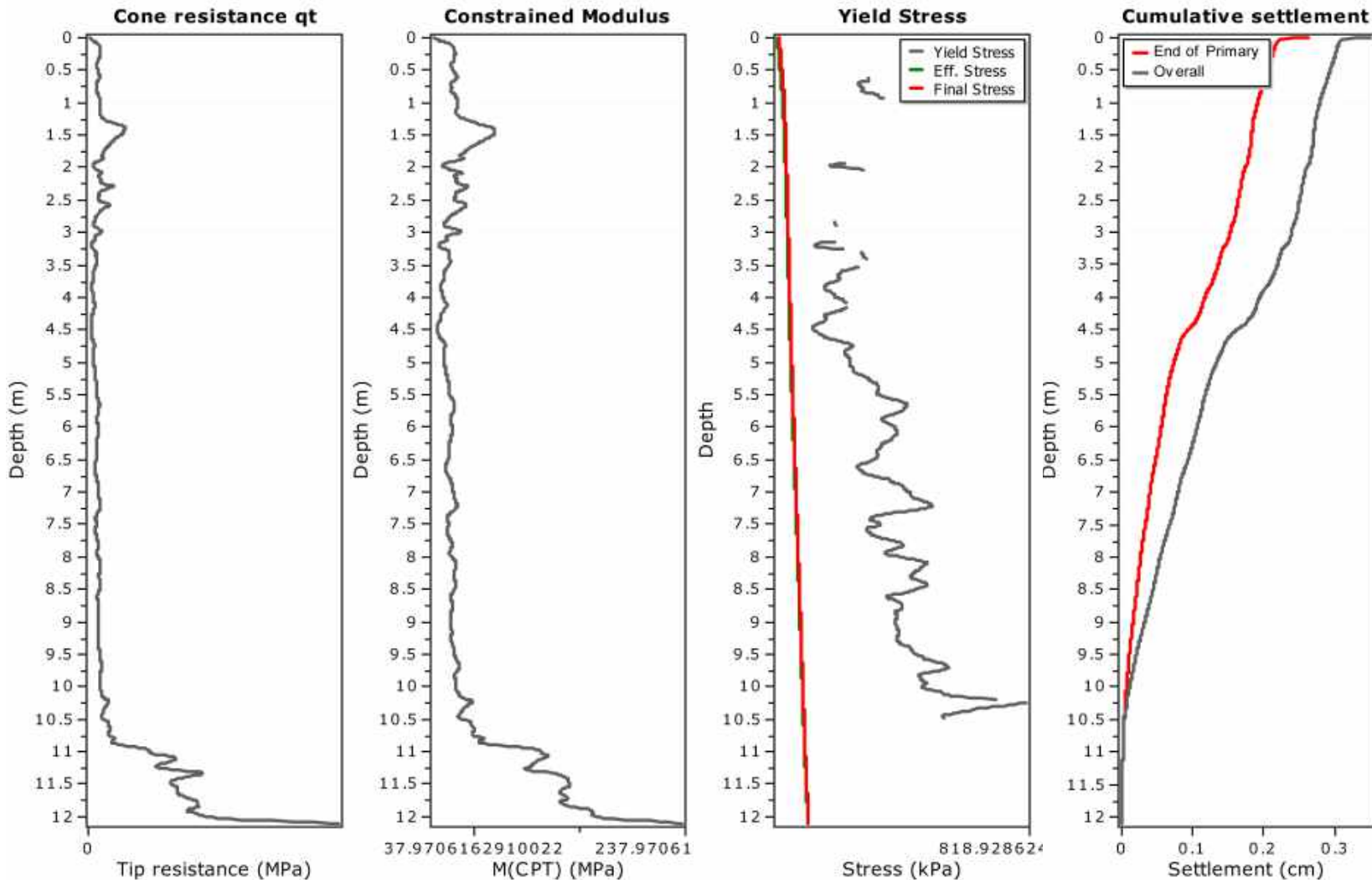
Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

CPT: CPT10

Total depth: 12.11 m, Date: 16/02/2023
Surface Elevation: 0.00 m
Coords: X:0.00, Y:0.00
Cone Type:
Cone Operator:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

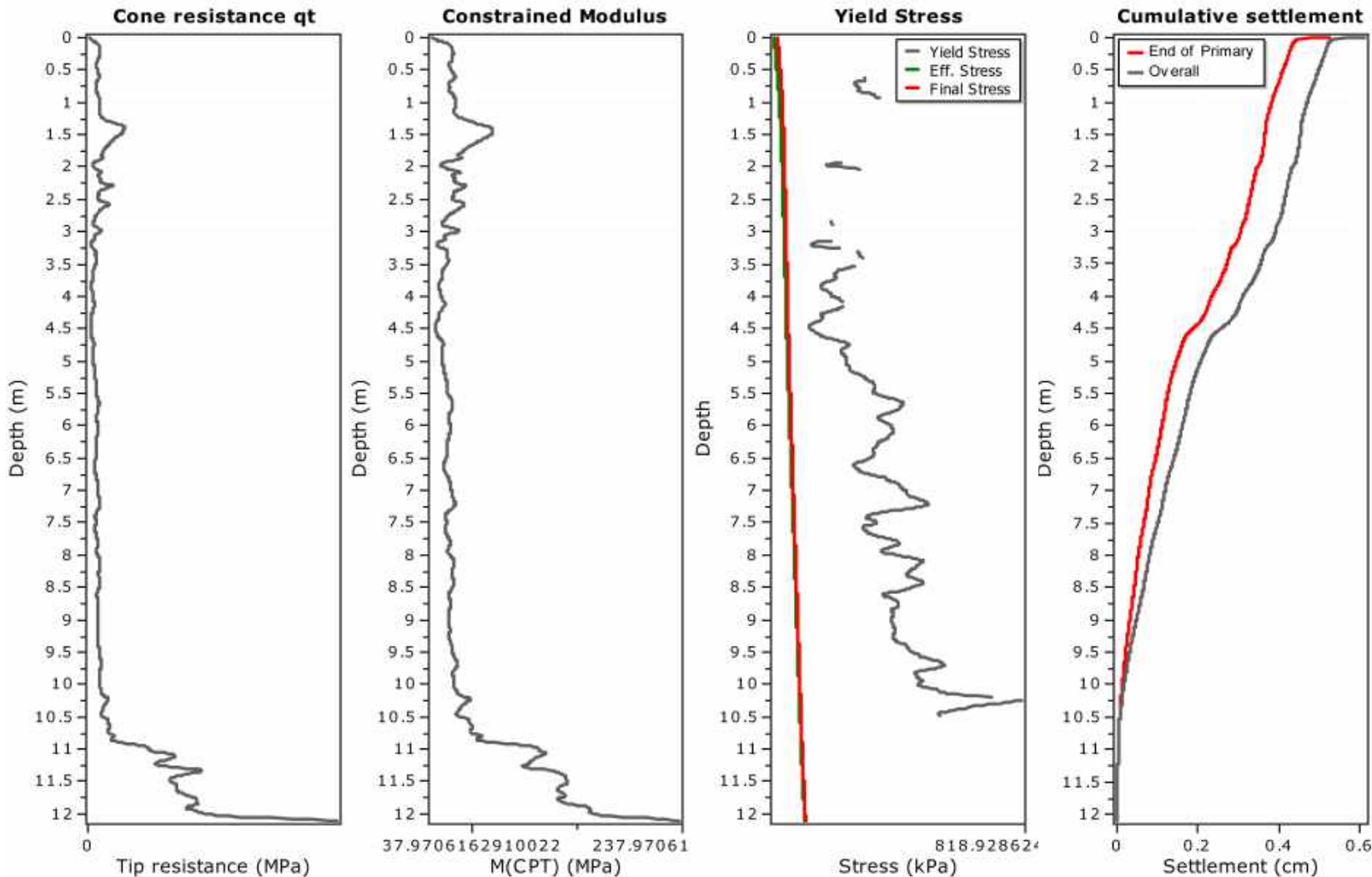
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1197	11.96	11.97	0.01	11.97	1.44	150.67	0.26	0.000	0.000	0.000
1198	11.97	11.98	0.01	11.98	1.44	149.48	0.26	0.000	0.000	0.000
1199	11.98	11.99	0.01	11.99	1.44	149.57	0.26	0.000	0.000	0.000
1200	11.99	12.00	0.01	12.00	1.44	150.87	0.26	0.000	0.000	0.000
1201	12.00	12.01	0.01	12.01	1.44	153.30	0.26	0.000	0.000	0.000
1202	12.01	12.02	0.01	12.02	1.44	157.44	0.26	0.000	0.000	0.000
1203	12.02	12.03	0.01	12.03	1.44	160.60	0.26	0.000	0.000	0.000
1204	12.03	12.04	0.01	12.04	1.43	164.04	0.26	0.000	0.000	0.000
1205	12.04	12.05	0.01	12.05	1.43	170.34	0.26	0.000	0.000	0.000
1206	12.05	12.06	0.01	12.06	1.43	180.63	0.26	0.000	0.000	0.000
1207	12.06	12.07	0.01	12.07	1.43	193.70	0.26	0.000	0.000	0.000
1208	12.07	12.08	0.01	12.08	1.43	204.73	0.26	0.000	0.000	0.000
1209	12.08	12.09	0.01	12.09	1.43	214.17	0.26	0.000	0.000	0.000
1210	12.09	12.10	0.01	12.10	1.43	222.33	0.26	0.000	0.000	0.000
1211	12.10	12.11	0.01	12.11	1.43	229.61	0.26	0.000	0.000	0.000

Total primary settlement: 0.26**Total secondary settlement: 0.09****Total calculated settlement: 0.35****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

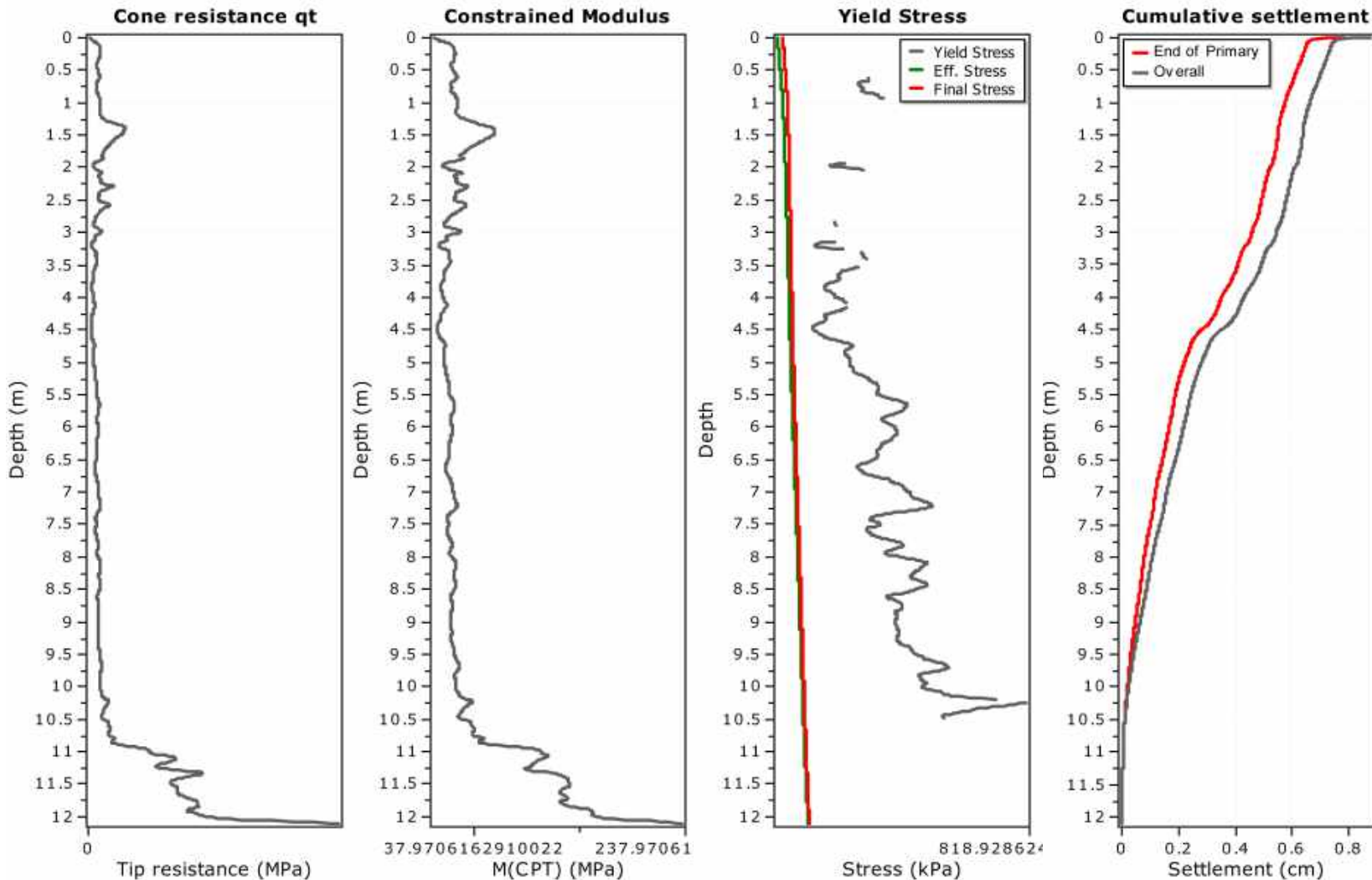
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1197	11.96	11.97	0.01	11.97	2.88	150.67	0.26	0.000	0.000	0.000
1198	11.97	11.98	0.01	11.98	2.88	149.48	0.26	0.000	0.000	0.000
1199	11.98	11.99	0.01	11.99	2.88	149.57	0.26	0.000	0.000	0.000
1200	11.99	12.00	0.01	12.00	2.88	150.87	0.26	0.000	0.000	0.000
1201	12.00	12.01	0.01	12.01	2.88	153.30	0.26	0.000	0.000	0.000
1202	12.01	12.02	0.01	12.02	2.87	157.44	0.26	0.000	0.000	0.000
1203	12.02	12.03	0.01	12.03	2.87	160.60	0.26	0.000	0.000	0.000
1204	12.03	12.04	0.01	12.04	2.87	164.04	0.26	0.000	0.000	0.000
1205	12.04	12.05	0.01	12.05	2.87	170.34	0.26	0.000	0.000	0.000
1206	12.05	12.06	0.01	12.06	2.86	180.63	0.26	0.000	0.000	0.000
1207	12.06	12.07	0.01	12.07	2.86	193.70	0.26	0.000	0.000	0.000
1208	12.07	12.08	0.01	12.08	2.86	204.73	0.26	0.000	0.000	0.000
1209	12.08	12.09	0.01	12.09	2.86	214.17	0.26	0.000	0.000	0.000
1210	12.09	12.10	0.01	12.10	2.85	222.33	0.26	0.000	0.000	0.000
1211	12.10	12.11	0.01	12.11	2.85	229.61	0.26	0.000	0.000	0.000

Total primary settlement: 0.53**Total secondary settlement: 0.09****Total calculated settlement: 0.61****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

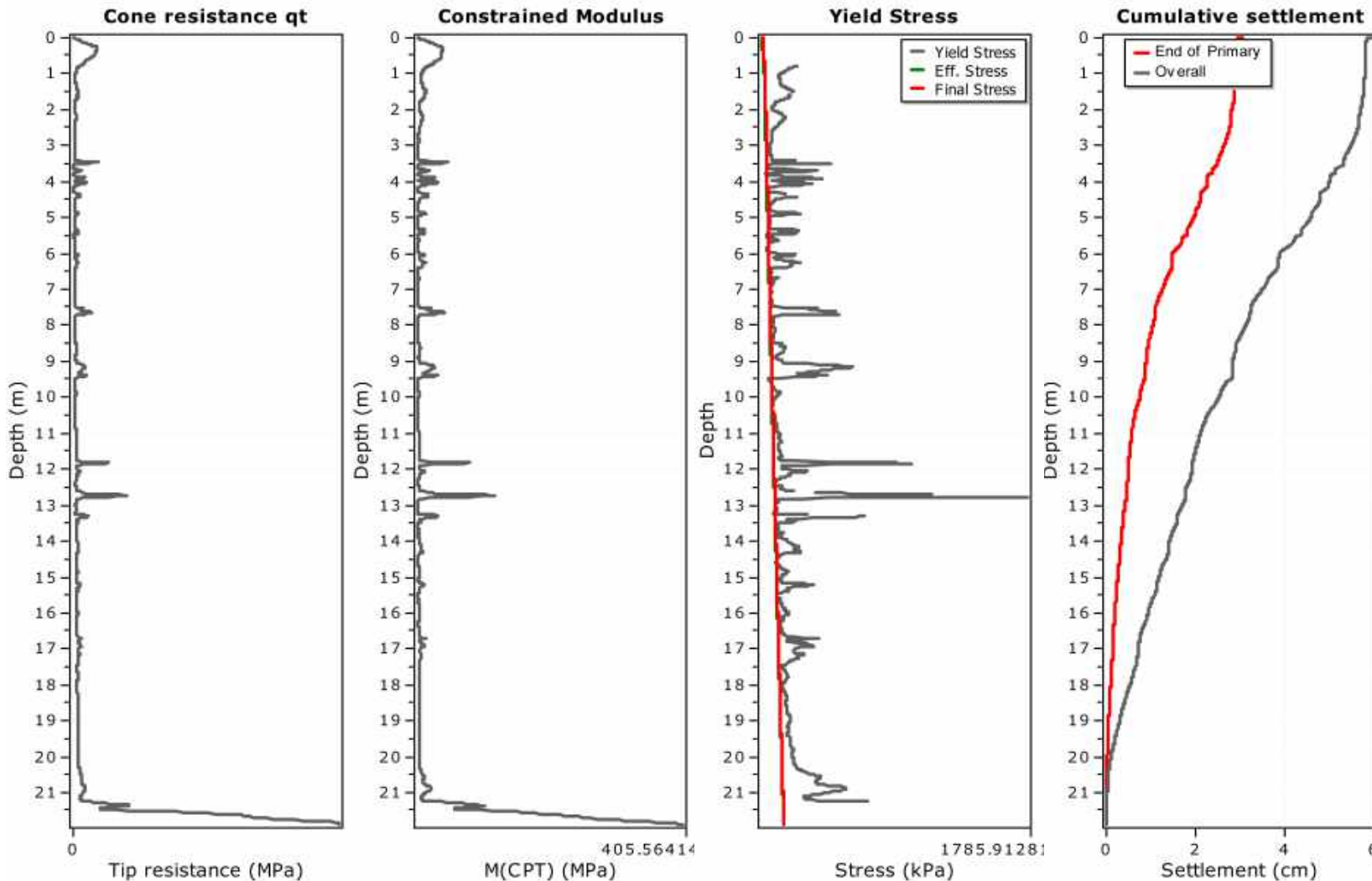
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
1197	11.96	11.97	0.01	11.97	4.33	150.67	0.26	0.000	0.000	0.000
1198	11.97	11.98	0.01	11.98	4.32	149.48	0.26	0.000	0.000	0.000
1199	11.98	11.99	0.01	11.99	4.32	149.57	0.26	0.000	0.000	0.000
1200	11.99	12.00	0.01	12.00	4.32	150.87	0.26	0.000	0.000	0.000
1201	12.00	12.01	0.01	12.01	4.31	153.30	0.26	0.000	0.000	0.000
1202	12.01	12.02	0.01	12.02	4.31	157.44	0.26	0.000	0.000	0.000
1203	12.02	12.03	0.01	12.03	4.31	160.60	0.26	0.000	0.000	0.000
1204	12.03	12.04	0.01	12.04	4.30	164.04	0.26	0.000	0.000	0.000
1205	12.04	12.05	0.01	12.05	4.30	170.34	0.26	0.000	0.000	0.000
1206	12.05	12.06	0.01	12.06	4.30	180.63	0.26	0.000	0.000	0.000
1207	12.06	12.07	0.01	12.07	4.29	193.70	0.26	0.000	0.000	0.000
1208	12.07	12.08	0.01	12.08	4.29	204.73	0.26	0.000	0.000	0.000
1209	12.08	12.09	0.01	12.09	4.29	214.17	0.26	0.000	0.000	0.000
1210	12.09	12.10	0.01	12.10	4.28	222.33	0.26	0.000	0.000	0.000
1211	12.10	12.11	0.01	12.11	4.28	229.61	0.26	0.000	0.000	0.000

Total primary settlement: 0.79**Total secondary settlement: 0.09****Total calculated settlement: 0.88****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 5.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2163	21.62	21.63	0.01	21.63	0.73	215.25	0.13	0.000	0.000	0.000
2164	21.63	21.64	0.01	21.64	0.73	221.48	0.13	0.000	0.000	0.000
2165	21.64	21.65	0.01	21.65	0.73	227.15	0.13	0.000	0.000	0.000
2166	21.65	21.66	0.01	21.66	0.73	232.57	0.13	0.000	0.000	0.000
2167	21.66	21.67	0.01	21.67	0.73	237.72	0.13	0.000	0.000	0.000
2168	21.67	21.68	0.01	21.68	0.73	244.21	0.13	0.000	0.000	0.000
2169	21.68	21.69	0.01	21.69	0.73	248.47	0.13	0.000	0.000	0.000
2170	21.69	21.70	0.01	21.70	0.73	251.97	0.13	0.000	0.000	0.000
2171	21.70	21.71	0.01	21.71	0.73	256.04	0.13	0.000	0.000	0.000
2172	21.71	21.72	0.01	21.72	0.73	262.29	0.13	0.000	0.000	0.000
2173	21.72	21.73	0.01	21.73	0.73	270.03	0.13	0.000	0.000	0.000
2174	21.73	21.74	0.01	21.74	0.73	277.85	0.13	0.000	0.000	0.000
2175	21.74	21.75	0.01	21.75	0.73	286.55	0.13	0.000	0.000	0.000
2176	21.75	21.76	0.01	21.76	0.73	295.75	0.13	0.000	0.000	0.000
2177	21.76	21.77	0.01	21.77	0.73	304.24	0.13	0.000	0.000	0.000
2178	21.77	21.78	0.01	21.78	0.72	312.72	0.13	0.000	0.000	0.000
2179	21.78	21.79	0.01	21.79	0.72	321.12	0.13	0.000	0.000	0.000
2180	21.79	21.80	0.01	21.80	0.72	329.89	0.13	0.000	0.000	0.000
2181	21.80	21.81	0.01	21.81	0.72	339.27	0.13	0.000	0.000	0.000
2182	21.81	21.82	0.01	21.82	0.72	349.90	0.13	0.000	0.000	0.000
2183	21.82	21.83	0.01	21.83	0.72	359.83	0.13	0.000	0.000	0.000
2184	21.83	21.84	0.01	21.84	0.72	374.44	0.13	0.000	0.000	0.000
2185	21.84	21.85	0.01	21.85	0.72	383.26	0.13	0.000	0.000	0.000
2186	21.85	21.86	0.01	21.86	0.72	390.91	0.13	0.000	0.000	0.000
2187	21.86	21.87	0.01	21.87	0.72	394.16	0.13	0.000	0.000	0.000
2188	21.87	21.88	0.01	21.88	0.72	397.86	0.13	0.000	0.000	0.000

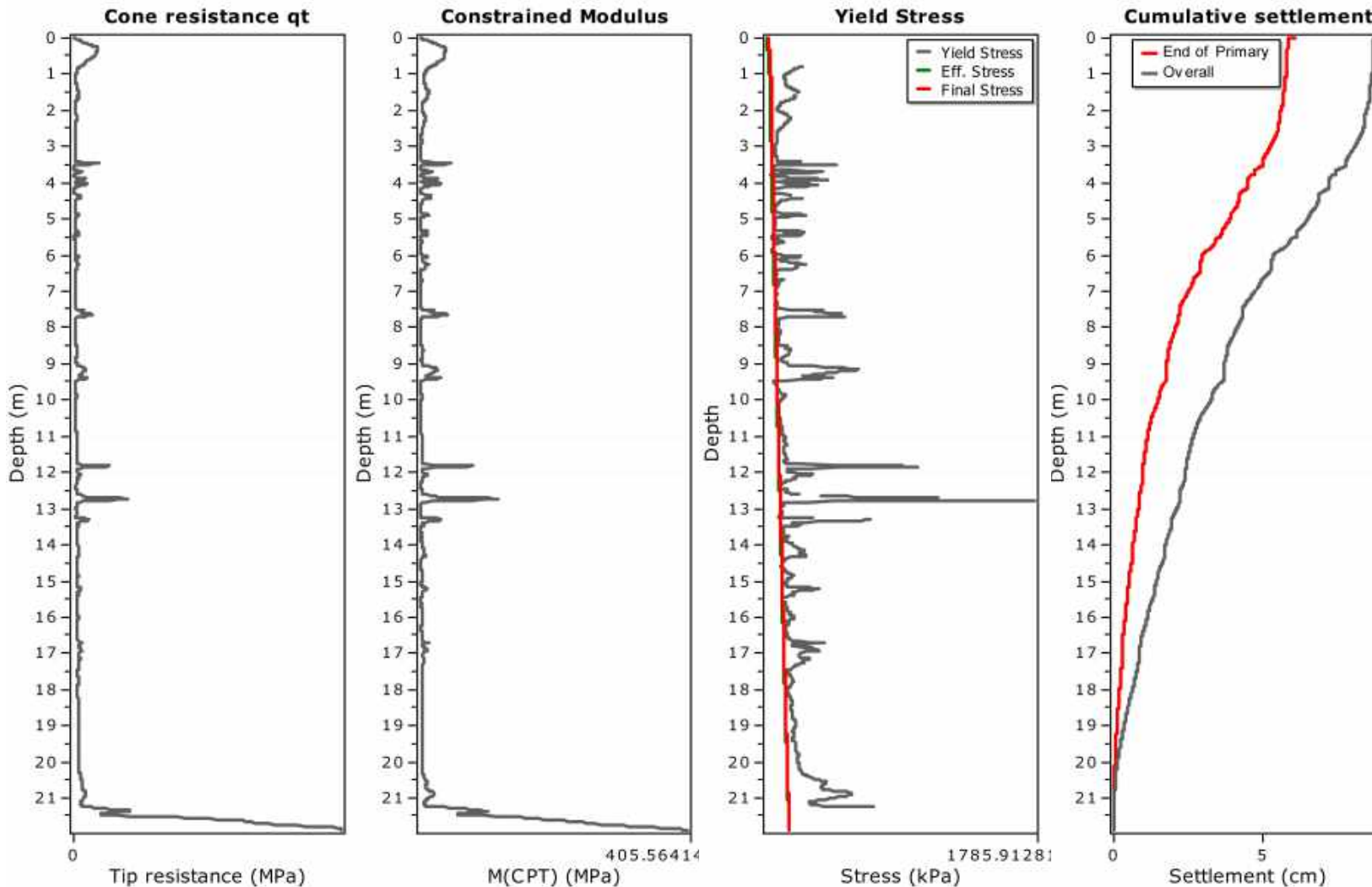
Total primary settlement: 3.06**Total secondary settlement: 2.90****Total calculated settlement: 5.96****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:

Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 11.00 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left(\frac{t}{t_p} \right)^n$$

where t_p is the duration of primary consolidation

:: Tabular results ::

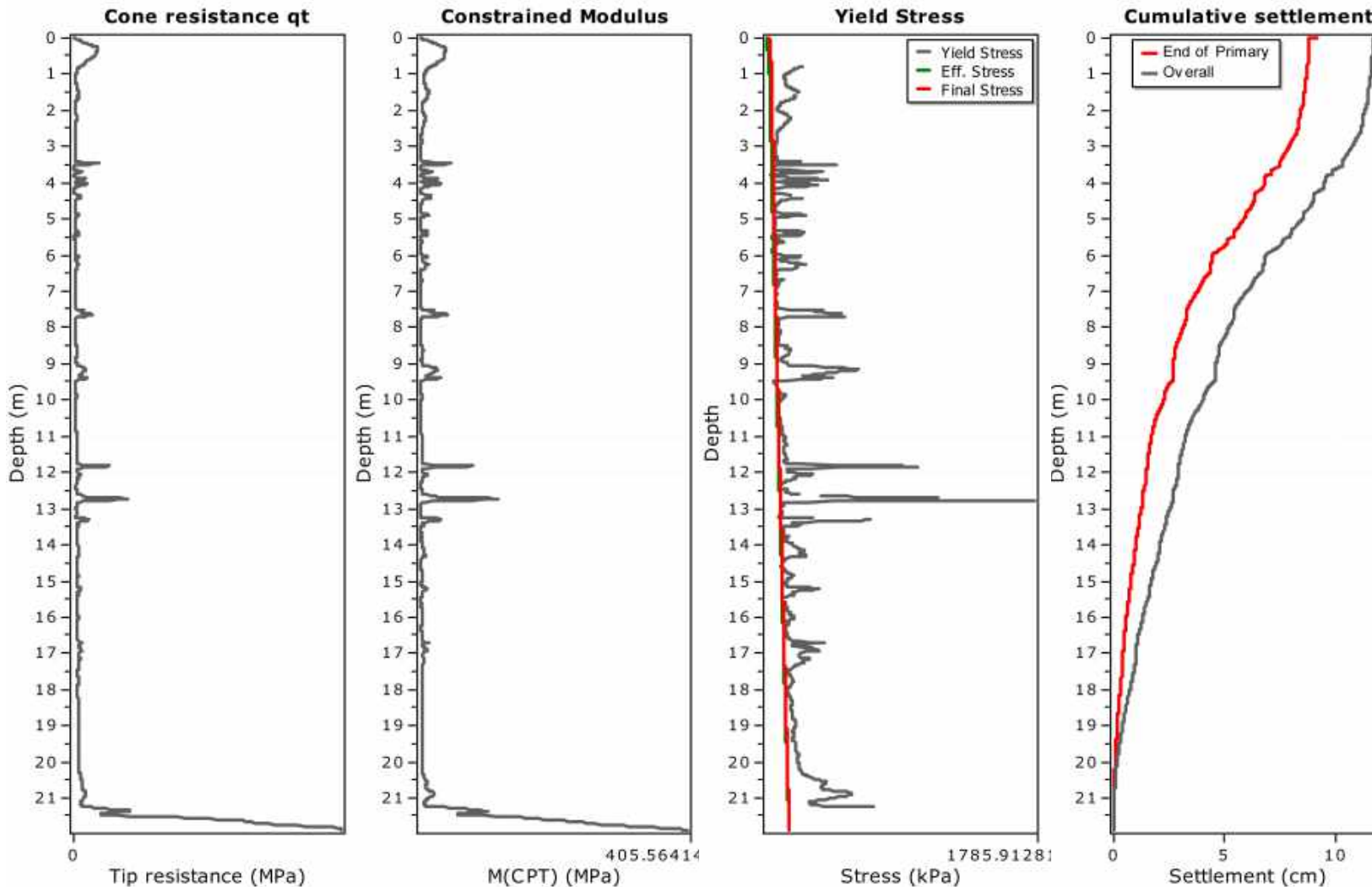
Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2163	21.62	21.63	0.01	21.63	1.46	215.25	0.13	0.000	0.000	0.000
2164	21.63	21.64	0.01	21.64	1.46	221.48	0.13	0.000	0.000	0.000
2165	21.64	21.65	0.01	21.65	1.46	227.15	0.13	0.000	0.000	0.000
2166	21.65	21.66	0.01	21.66	1.46	232.57	0.13	0.000	0.000	0.000
2167	21.66	21.67	0.01	21.67	1.46	237.72	0.13	0.000	0.000	0.000
2168	21.67	21.68	0.01	21.68	1.46	244.21	0.13	0.000	0.000	0.000
2169	21.68	21.69	0.01	21.69	1.46	248.47	0.13	0.000	0.000	0.000
2170	21.69	21.70	0.01	21.70	1.46	251.97	0.13	0.000	0.000	0.000
2171	21.70	21.71	0.01	21.71	1.46	256.04	0.13	0.000	0.000	0.000
2172	21.71	21.72	0.01	21.72	1.45	262.29	0.13	0.000	0.000	0.000
2173	21.72	21.73	0.01	21.73	1.45	270.03	0.13	0.000	0.000	0.000
2174	21.73	21.74	0.01	21.74	1.45	277.85	0.13	0.000	0.000	0.000
2175	21.74	21.75	0.01	21.75	1.45	286.55	0.13	0.000	0.000	0.000
2176	21.75	21.76	0.01	21.76	1.45	295.75	0.13	0.000	0.000	0.000
2177	21.76	21.77	0.01	21.77	1.45	304.24	0.13	0.000	0.000	0.000
2178	21.77	21.78	0.01	21.78	1.45	312.72	0.13	0.000	0.000	0.000
2179	21.78	21.79	0.01	21.79	1.45	321.12	0.13	0.000	0.000	0.000
2180	21.79	21.80	0.01	21.80	1.45	329.89	0.13	0.000	0.000	0.000
2181	21.80	21.81	0.01	21.81	1.45	339.27	0.13	0.000	0.000	0.000
2182	21.81	21.82	0.01	21.82	1.45	349.90	0.13	0.000	0.000	0.000
2183	21.82	21.83	0.01	21.83	1.44	359.83	0.13	0.000	0.000	0.000
2184	21.83	21.84	0.01	21.84	1.44	374.44	0.13	0.000	0.000	0.000
2185	21.84	21.85	0.01	21.85	1.44	383.26	0.13	0.000	0.000	0.000
2186	21.85	21.86	0.01	21.86	1.44	390.91	0.13	0.000	0.000	0.000
2187	21.86	21.87	0.01	21.87	1.44	394.16	0.13	0.000	0.000	0.000
2188	21.87	21.88	0.01	21.88	1.44	397.86	0.13	0.000	0.000	0.000

Total primary settlement: 6.13**Total secondary settlement: 2.90****Total calculated settlement: 9.02****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep

Project:
Location:

Settlements calculation according to theory of elasticity*



Calculation properties

Footing type: Rectangular
Footing width: 10.00 (m)
L/B: 2.0
Footing pressure: 16.50 (kPa)
Embedment depth: 0.00 (m)
Footing is rigid: Yes
Remove excavation load: Yes
Apply 20% rule: No
Calculate secondary settlements: Yes
Time period for primary consolidation: 6 months
Time period for second. settlements: 12 months

* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_{sec} = S_{p} \left(1 - e^{-\frac{t}{t_p}} \right)$$

where t_p is the duration of primary consolidation

:: Tabular results ::

Point No	Start depth (m)	End depth (m)	Thickness (m)	Relative depth (m)	Delta P (kPa)	$M_{(CPT)}$ (MPa)	Iz	Settlement (cm)	Second. settlement (cm)	Overall settlement (cm)
2163	21.62	21.63	0.01	21.63	2.19	215.25	0.13	0.000	0.000	0.000
2164	21.63	21.64	0.01	21.64	2.19	221.48	0.13	0.000	0.000	0.000
2165	21.64	21.65	0.01	21.65	2.19	227.15	0.13	0.000	0.000	0.000
2166	21.65	21.66	0.01	21.66	2.19	232.57	0.13	0.000	0.000	0.000
2167	21.66	21.67	0.01	21.67	2.19	237.72	0.13	0.000	0.000	0.000
2168	21.67	21.68	0.01	21.68	2.19	244.21	0.13	0.000	0.000	0.000
2169	21.68	21.69	0.01	21.69	2.19	248.47	0.13	0.000	0.000	0.000
2170	21.69	21.70	0.01	21.70	2.18	251.97	0.13	0.000	0.000	0.000
2171	21.70	21.71	0.01	21.71	2.18	256.04	0.13	0.000	0.000	0.000
2172	21.71	21.72	0.01	21.72	2.18	262.29	0.13	0.000	0.000	0.000
2173	21.72	21.73	0.01	21.73	2.18	270.03	0.13	0.000	0.000	0.000
2174	21.73	21.74	0.01	21.74	2.18	277.85	0.13	0.000	0.000	0.000
2175	21.74	21.75	0.01	21.75	2.18	286.55	0.13	0.000	0.000	0.000
2176	21.75	21.76	0.01	21.76	2.18	295.75	0.13	0.000	0.000	0.000
2177	21.76	21.77	0.01	21.77	2.18	304.24	0.13	0.000	0.000	0.000
2178	21.77	21.78	0.01	21.78	2.17	312.72	0.13	0.000	0.000	0.000
2179	21.78	21.79	0.01	21.79	2.17	321.12	0.13	0.000	0.000	0.000
2180	21.79	21.80	0.01	21.80	2.17	329.89	0.13	0.000	0.000	0.000
2181	21.80	21.81	0.01	21.81	2.17	339.27	0.13	0.000	0.000	0.000
2182	21.81	21.82	0.01	21.82	2.17	349.90	0.13	0.000	0.000	0.000
2183	21.82	21.83	0.01	21.83	2.17	359.83	0.13	0.000	0.000	0.000
2184	21.83	21.84	0.01	21.84	2.17	374.44	0.13	0.000	0.000	0.000
2185	21.84	21.85	0.01	21.85	2.16	383.26	0.13	0.000	0.000	0.000
2186	21.85	21.86	0.01	21.86	2.16	390.91	0.13	0.000	0.000	0.000
2187	21.86	21.87	0.01	21.87	2.16	394.16	0.13	0.000	0.000	0.000
2188	21.87	21.88	0.01	21.88	2.16	397.86	0.13	0.000	0.000	0.000

Total primary settlement: 9.19**Total secondary settlement: 2.90****Total calculated settlement: 12.09****Abbreviations**

Start depth:	Start depth of soil layer (penetration depth measured from ground free surface)
End depth:	End depth of soil layer (penetration depth measured from ground free surface)
Thickness:	Thickness of soil layer
Relative depth:	Depth of calculation relative to footing
Iz:	Stress influence factor
Delta P:	Footing imposed stress:
Eff. stress:	Effective stress
$M_{(CPT)}$:	Constrained modulus from CPT
Settlement:	Primary settlement
Second. settlement:	Secondary settlements due to creep