NAM

Campaign to acquire SCPT at the G-station locations of the Seismic Monitoring Network (operated by KNMI)

FUGRO

Datum October 2019

Editors Jan van Elk & Dirk Doornhof

General Introduction

In May 2019, Seismic Cone Penetration Tests (SCPT) surveys were acquired near 14 G-stations of the KNMI Seismic Monitoring Network. These were acquired by FUGRO and commissioned by Kennisprogramma Effecten Mijnbouw (KEM). The details of this campaign and the results can be found at the NLOG.nl website (https://www.nlog.nl/scpt-data or https://www.nlog.nl/en/scpt-data). KEM is a knowledge programme initiated by the Dutch Minister of Economic Affairs, aiming to enhance the understanding of hazard and risk resulting from mining activities in The Netherlands.

As part of the NAM-led research programme, additional 40 SCPT were acquired near the remaining G-stations in September and October 2019. The current report contains the results of this second campaign and of the initial campaign in an appendix.

The numerical seismic results are provided in a separate directory file in GEF-S format, similar to the GEF-format used for CPT-results in the Netherlands. In the header of the file a description of the information included in the file is provided.

A detailed description of the shallow sub-surface of the Groningen area was prepared by Deltares (Ref. 1 to 5). These reports also contain a detailed inventorisation of CPT and SCPT data already available. The SCPT acquired in this campaign will be used in the further development of the Ground Motion Prediction Model (V6) (Ref. 6).

References

1. Geological schematisation of the shallow subsurface of Groningen. For site response to earthquakes for the Groningen gas field. part 1, Pauline Kruiver, Ger de Lange, Ane Wiersma, Piet Meijers, Mandy Korff, Jan Peeters, Jan Stafleu, Ronald Harting, Roula Dambrink, Freek Busschers and Jan Gunnink, Deltares and NAM, June 2015.
2. Geological schematisation of the shallow subsurface of Groningen. For site response to earthquakes for the Groningen gas field. part 2, Pauline Kruiver, Ger de Lange, Ane Wiersma, Piet Meijers, Mandy Korff, Jan Peeters, Jan Stafleu, Ronald Harting, Roula Dambrink, Freek Busschers and Jan Gunnink, Deltares and NAM, June 2015.
3. Geological schematisation of the shallow subsurface of Groningen. For site response to earthquakes for the Groningen gas field. part 3, Pauline Kruiver, Ger de Lange, Ane Wiersma, Piet Meijers, Mandy Korff, Jan Peeters, Jan Stafleu, Ronald Harting, Roula Dambrink, Freek Busschers and Jan Gunnink, Deltares and NAM, June 2015.
4. Modifications of the Geological model for Site response at the Groningen Field, P. Kruiver, Deltares, June 2016.
5. Background document NAM database of subsurface information - Version date of database - 29 March 2018, Pauline Kruiver, Fred Kloosterman, Ger de Lange, Pieter Doornenbal, Deltares, Mar 2018.
6. V6 Ground-Motion Model (GMM) for Induced Seismicity in the Groningen Field - With Assurance Letter, Julian J Bommer, Benjamin Edwards, Pauline P Kruiver, Adrian Rodriguez-Marek, Peter J Stafford, Bernard Dost, Michail Ntinalexis, Elmer Ruigrok and Jesper Spetzler, December 2019

NAM

Title	**Campaign to acquire SCPT at the location of the G-stations of the Seismic Monitoring Network (operated by KNMI)**	**Date**	October 2019
		Initiator	NAM
Autor(s)	Fugro	**Editors**	Jan van Elk Dirk Doornhof
Organisation	Fugro	**Organisation**	NAM
Place in the Study and Data Acquisition Plan	Study Theme: Shallow geology of Groningen area and Ground Motion Prediction Comment: In May 2019, Seismic Cone Penetration Tests (SCPT) surveys were acquired near 14 G-stations of the KNMI Seismic Monitoring Network. These were acquired by FUGRO and commissioned by Kennisprogramma Effecten Mijnbouw (KEM). The details of this campaign and the results can be found at the NLOG.nl website (https://www.nlog.nl/scpt-data or https://www.nlog.nl/en/scpt-data). KEM is a knowledge programme initiated by the Dutch Minister of Economic Affairs, aiming to enhance the understanding of hazard and risk resulting from mining activities in The Netherlands. As part of the NAM-led research programme additional 40 SCPT were acquired near the remaining G-stations in September and October 2019. The current report contains the results of this second campaign and of the initial campaign in an appendix. The numerical seismic results are provided in a separate directory file in GEF-S format, similar to the GEF-format used for CPT-results in the Netherlands. In the header of the file a description of the information included in the file is provided. A detailed description of the shallow sub-surface of the Groningen area was prepared by Deltares. These reports also contain a detailed inventorisation of CPT and SCPT data already available. The SCPT acquired in this campaign will be used in the further development of the Ground Motion Prediction Model (V6).		
Directly linked research	• Ground Motion Prediction		
Used data	SCPT data acquired as part of the NAM-led research program and the KEM research program.		
Associated organisation	KEM		
Assurance			

Geotechnical Site Investigation
Seismic CPT's KNMI G-stations Groningen

Document Nr.: 1019-153172_21.KR01
Revision: 2.0
Date: November 26, 2019

Client	Nederlandse Aardolie Maatschappij B.V. Postbus 28000 9400 HH ASSEN
Contractor	Fugro NL Land B.V. Pop Dijkemaweg 72a 9731 BG Groningen T 050 54 12432
Project manager	ing. R. Tjemmes

Revision control

Rev.	Description	Prepared By	Checked	Approved	Date
1.0	First revision	UGU	GHE	RTJ	06-11-2019
2.0	Supplemental CPT's and presentation seismic results	UGU	GHE	RTJ	26-11-2019

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REPORTING OVERVIEW

Project description: Seismic CPT's KNMI G-stations Groningen
Project number: 1019-153172

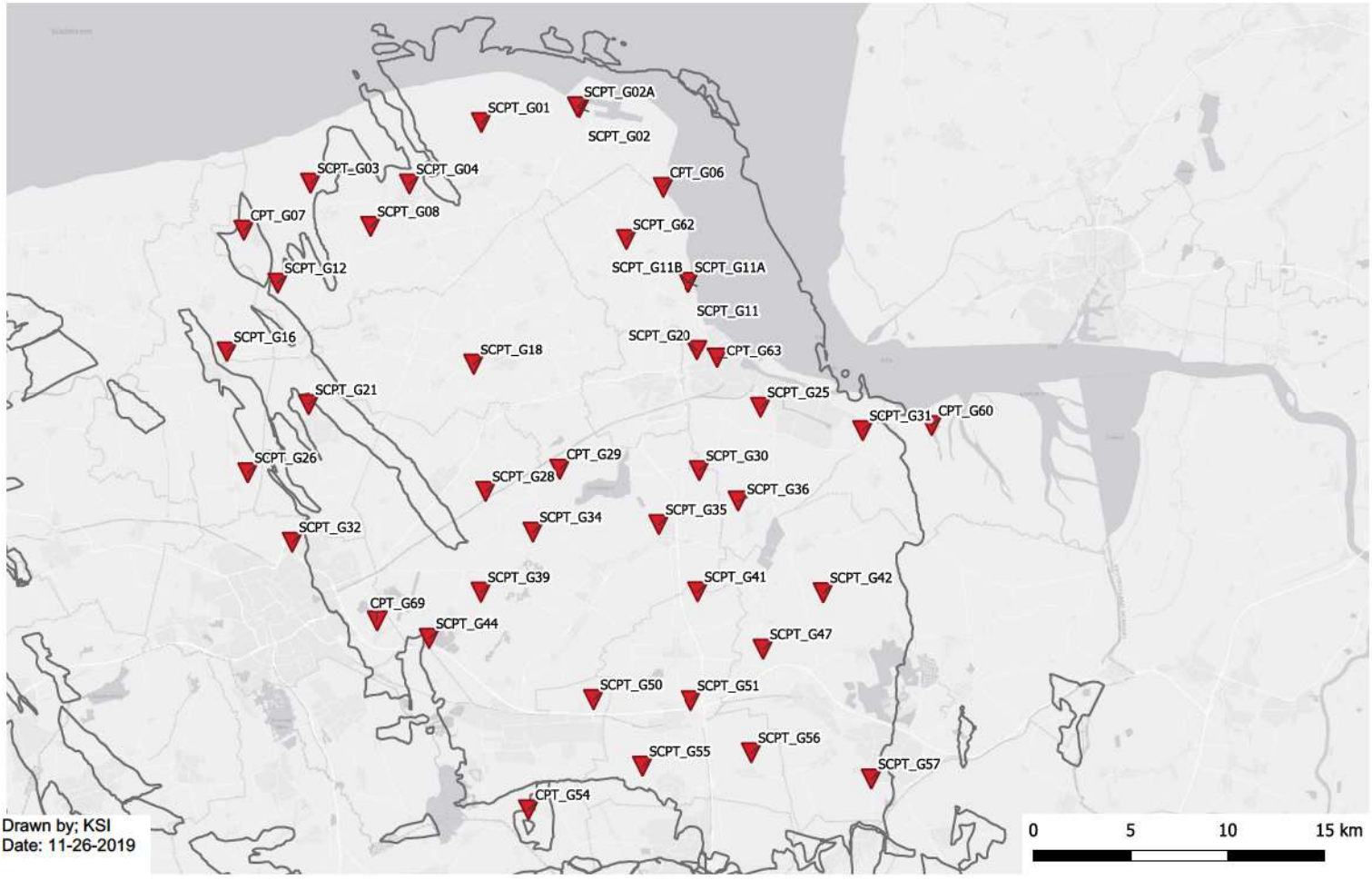
Name	RD Coördinates (m)		Elevation (m) to	Depth (m) to	Remarks
	X	Y	NAP	NAP	
SCPT_G01	244305.9	607084.7	+1.22	-16.47	Terminated, buckling danger
SCPT_G02	249358.4	607859.9	+1.05	-24.37	Terminated, obstacle
SCPT_G02A	249257.6	607898.2	+1.40	-24.99	Terminated, buckling danger
SCPT_G03	235505.4	603968.3	+1.65	-28.56	
SCPT_G04	240601.6	603923.2	+1.22	-23.67	Terminated, buckling danger
SCPT_G05					Not accessible
CPT_G06	253679.2	603751.3	+1.07		
CPT_G07	232070.9	601542.8	+1.47		Terminated, buckling danger
SCPT_G08	238603.6	601741.6	+1.06	-22.30	Terminated, buckling danger
SCPT_G11	254996.7	598870.9	+1.22	-18.97	Terminated, buckling danger
SCPT_G11A	254997.3	598870.6	+1.22	-19.98	Terminated, buckling danger
SCPT_G11B	254997.7	598870.4	+1.24	-22.92	Terminated, buckling danger
SCPT_G12	233816.8	598826.5	+1.40	-28.82	
SCPT_G16	231201.7	595281.9	+0.63	-29.52	
SCPT_G17					Not accessible
SCPT_G18	243913.0	594621.0	+0.33	-29.88	
SCPT_G20	255453.0	595366.2	-0.17	-22.96	Terminated, buckling danger
SCPT_G21	235408.5	592544.2	-0.47	-26.64	Terminated, buckling danger
SCPT_G25	258731.4	592408.9	-0.73	-23.98	Terminated, buckling danger
SCPT_G26	232275.2	589040.9	+0.14	-30.11	
SCPT_G27					Not accessible
SCPT_G28	244527.0	588082.0	-0.64	-31.70	
CPT_G29	248344.6	589225.4	-1.69		Terminated, max. penetration force
SCPT_G30	255578.0	589148.4	-0.53	-30.77	
SCPT_G31	263989.3	591209.4	-0.35	-31.10	
SCPT_G32	234561.4	585466.5	+0.54	-29.66	
SCPT_G33					Not accessible
SCPT_G34	246962.9	585988.3	-1.20	-10.26	Terminated, buckling danger
SCPT_G35	253451.1	586375.7	-0.86	-31.18	
SCPT_G36	257576.2	587591.8	-1.79	-24.03	Terminated, buckling danger
SCPT_G39	244289.4	582894.0	-1.82	-29.65	Terminated, buckling danger
SCPT_G41	255493.6	582912.3	-1.25	-27.15	Terminated, buckling danger
SCPT_G42	261955.2	582867.7	-0.62	-30.71	
SCPT_G44	241618.2	580513.3	-0.89	-28.68	Terminated, buckling danger
SCPT_G47	258861.8	579964.3	-0.64	-30.83	
SCPT_G50	250082.1	577368.5	+0.76	-25.33	Terminated, buckling danger
SCPT_G51	255129.1	577317.8	-0.09	-29.04	Terminated, buckling danger
SCPT_G55	252607.4	573940.8	+2.57	-28.09	
CPT_G54	246735.2	571702.2	+2.40		
SCPT_G56	258259.8	574632.0	-1.10	-25.11	Terminated, buckling danger
SCPT_G57	264431.2	573283.9	+2.19	-28.01	
CPT_G60	267533.4	591468.6	+0.21		
SCPT_G62	251778.0	601072.1	+0.95	-27.20	Terminated, buckling danger

REPORTING OVERVIEW

Project description: Seismic CPT's KNMI G-stations Groningen
Project number: 1019-153172

Name	RD Coördinates (m)		Elevation (m) to	Depth (m) to	Remarks
	X	Y	NAP	NAP	
CPT_G63	256489.6	594971.6	+0.22		
CPT_G69	238940.5	581418.9	-1.19		

1019-153172 Appendix 1: Locations CPT and SCPT



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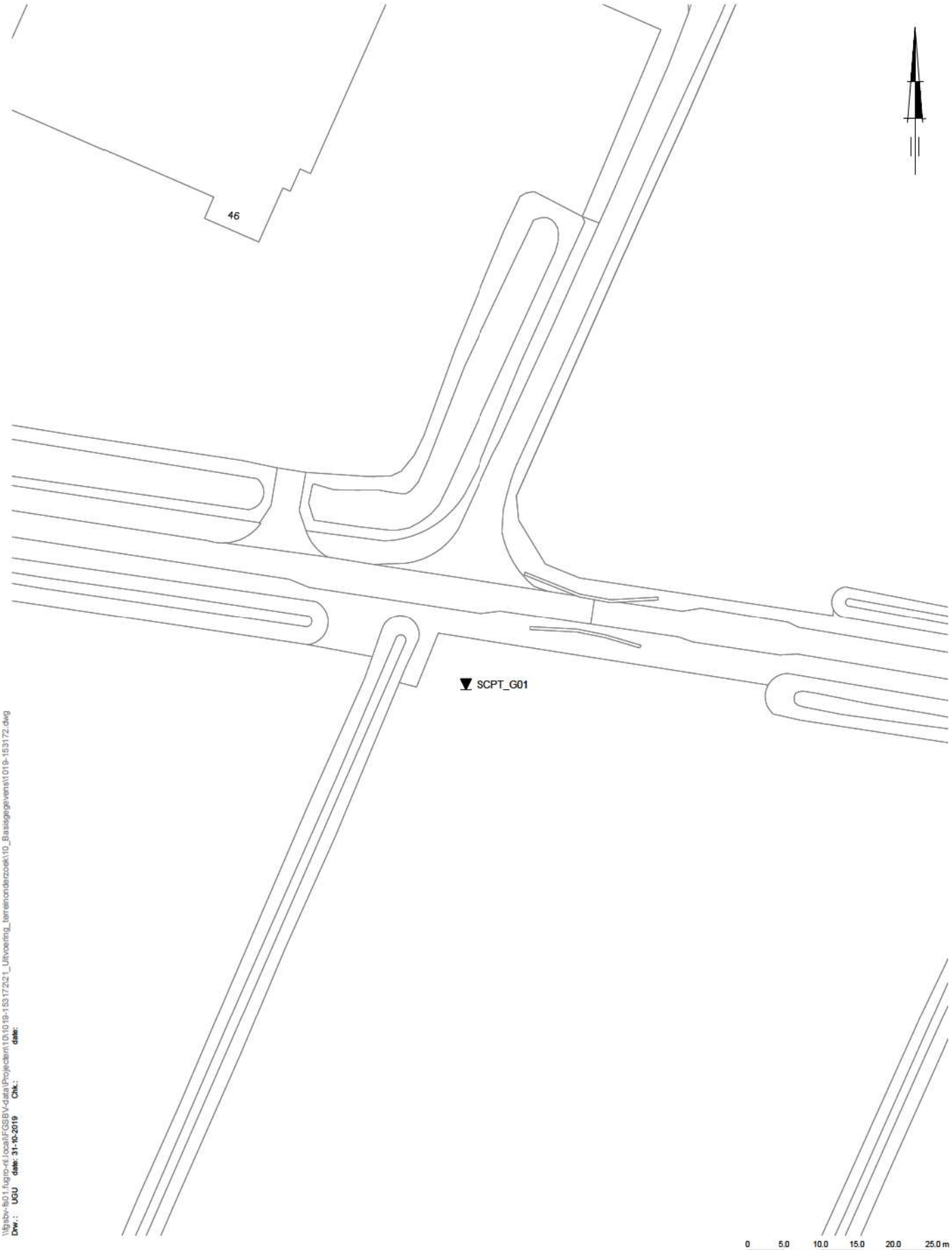

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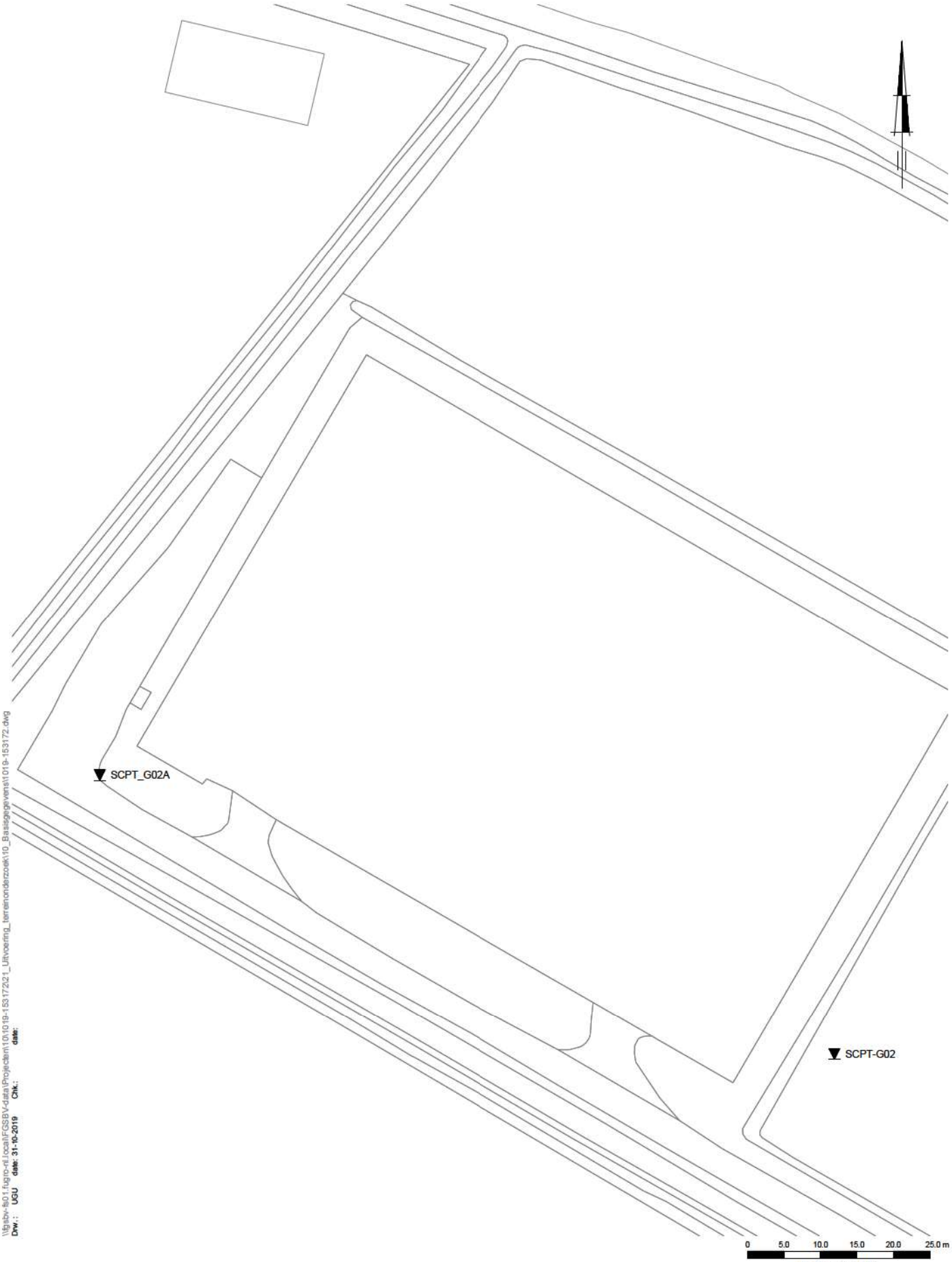

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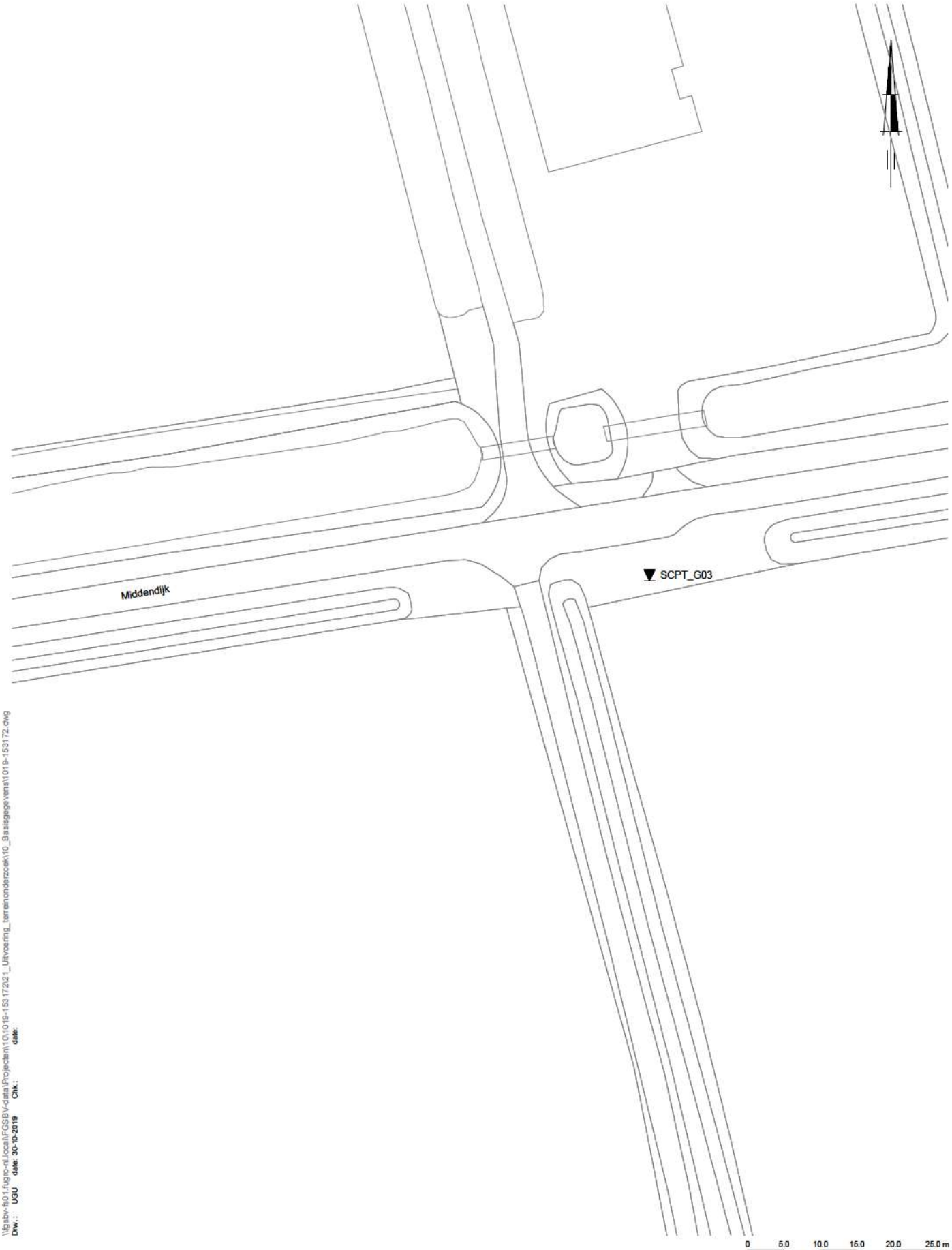

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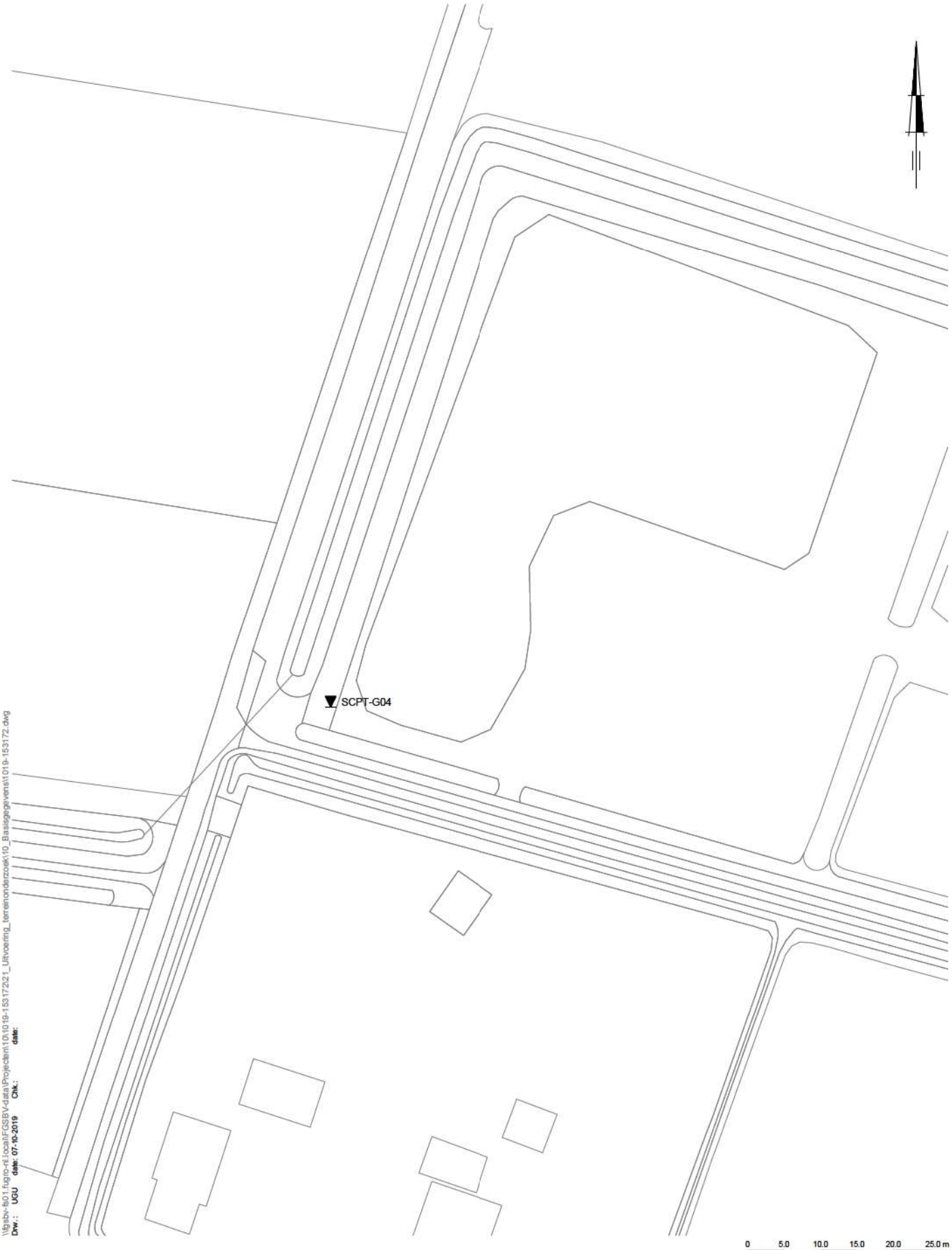

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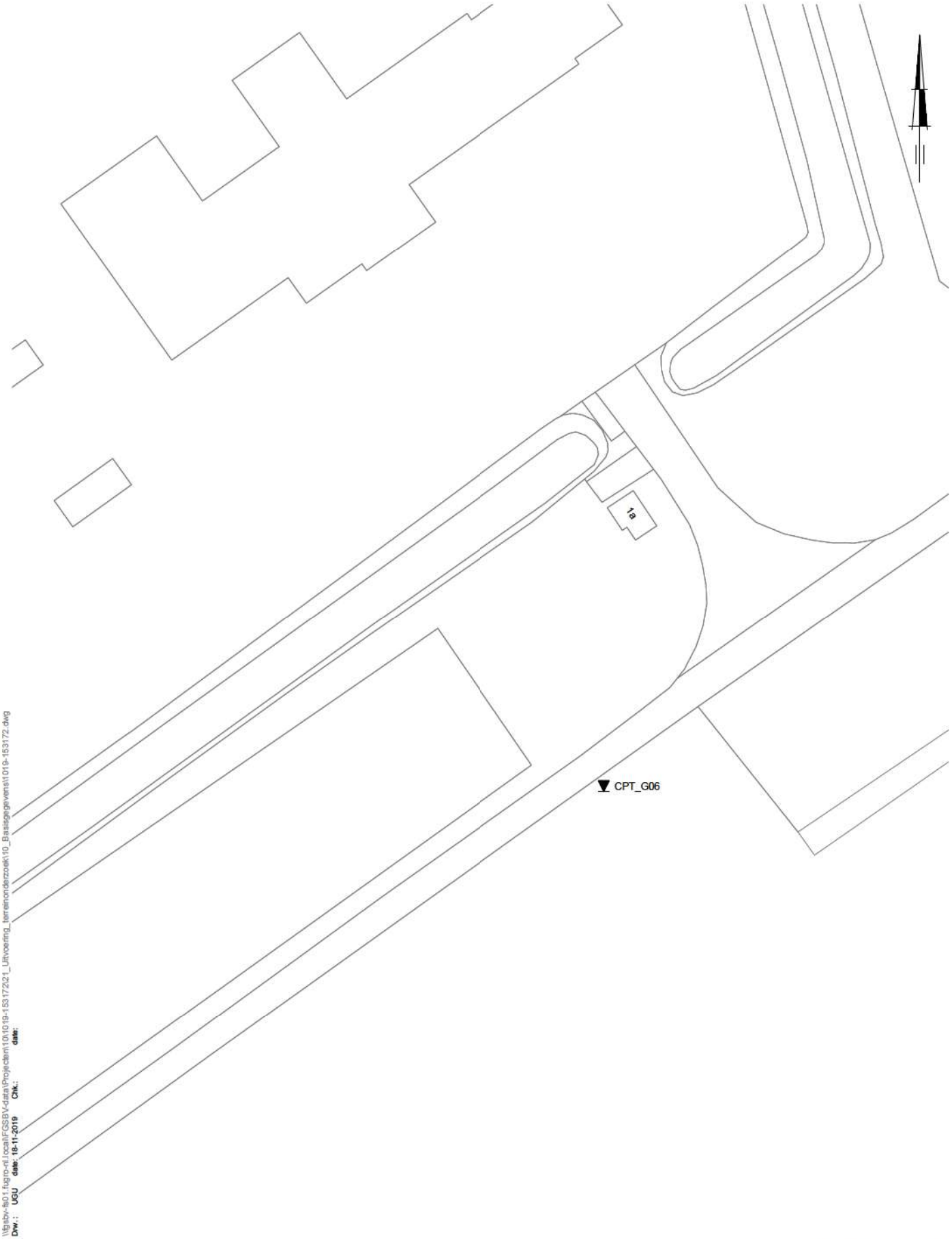

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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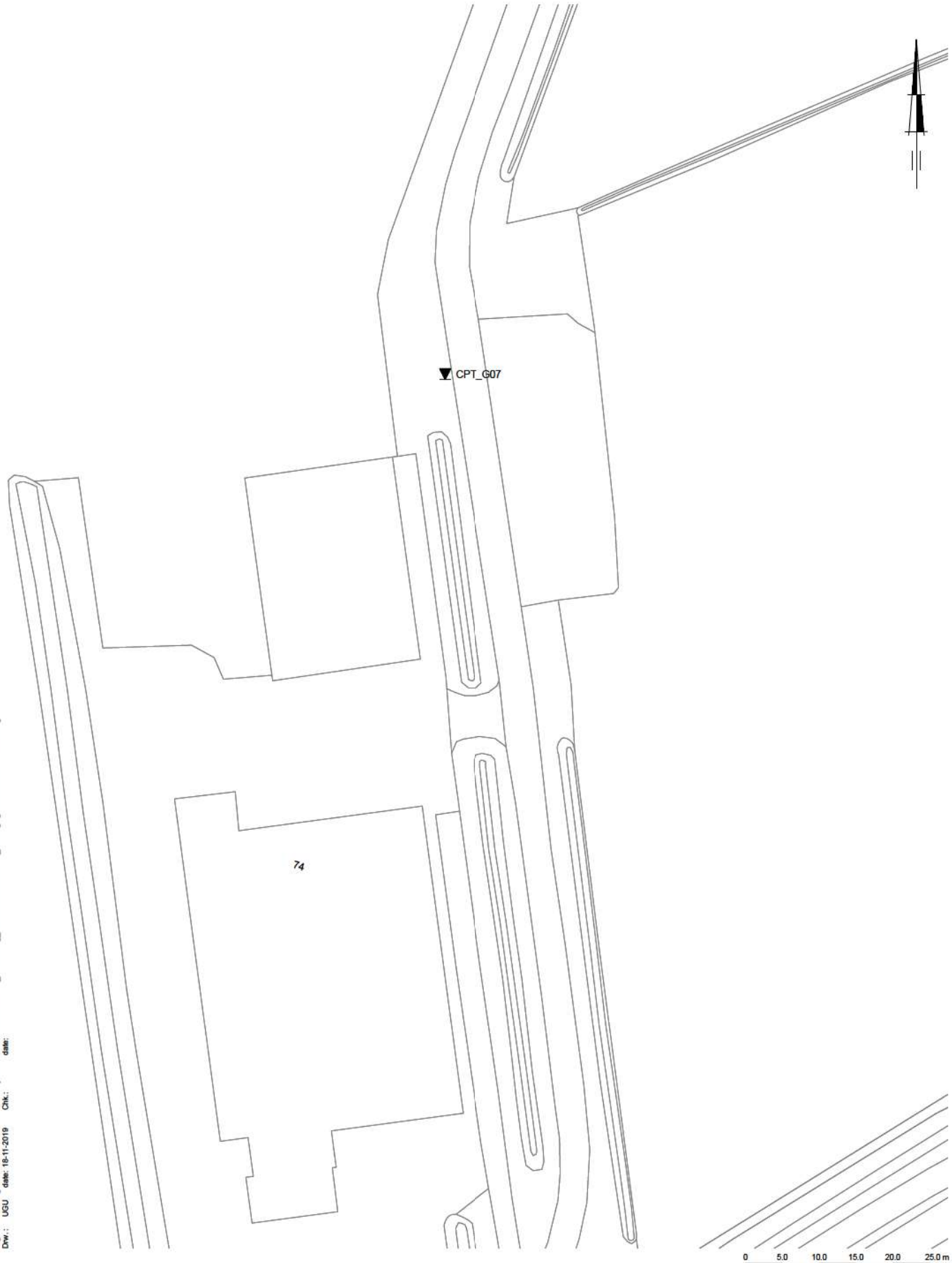

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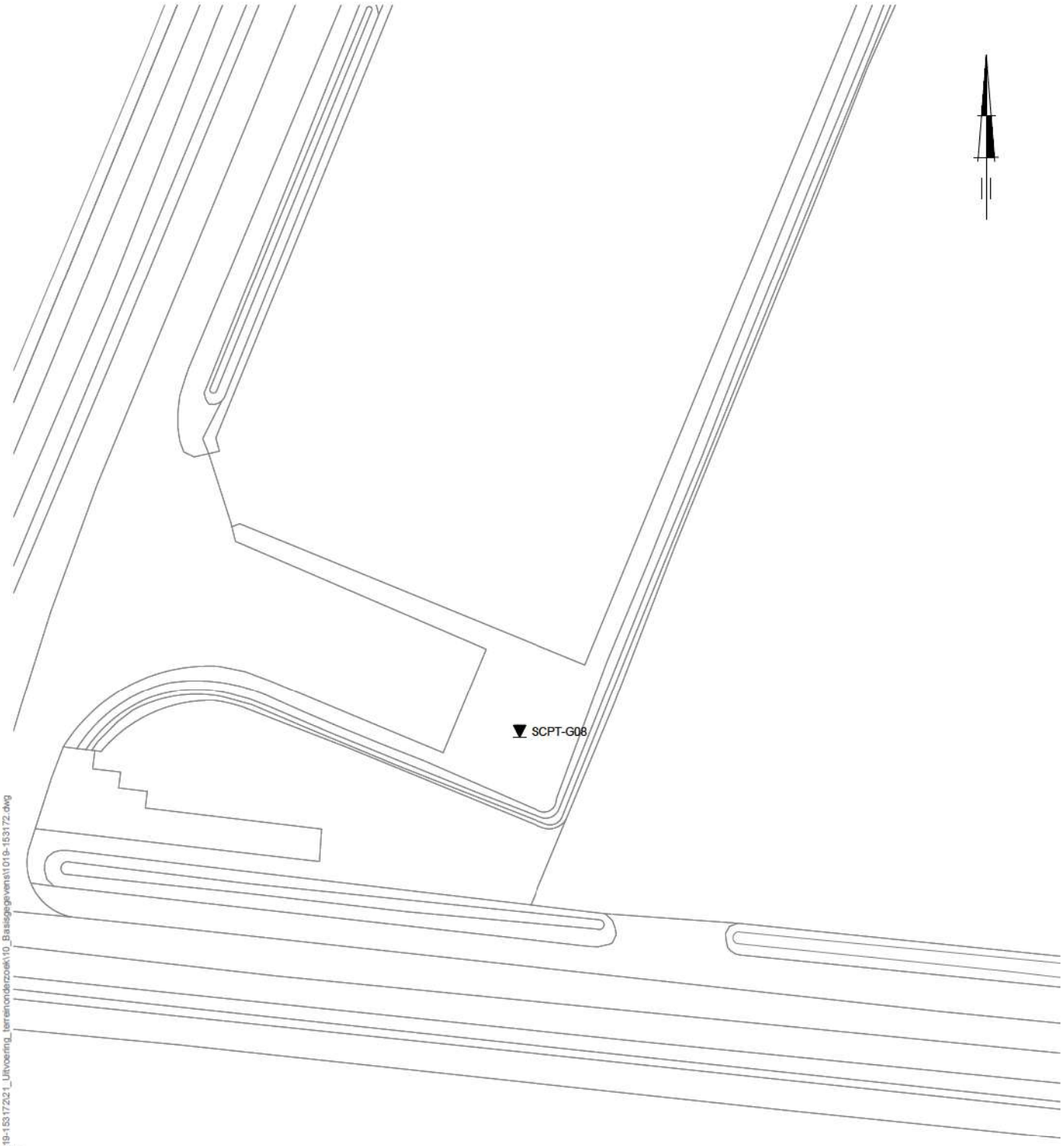

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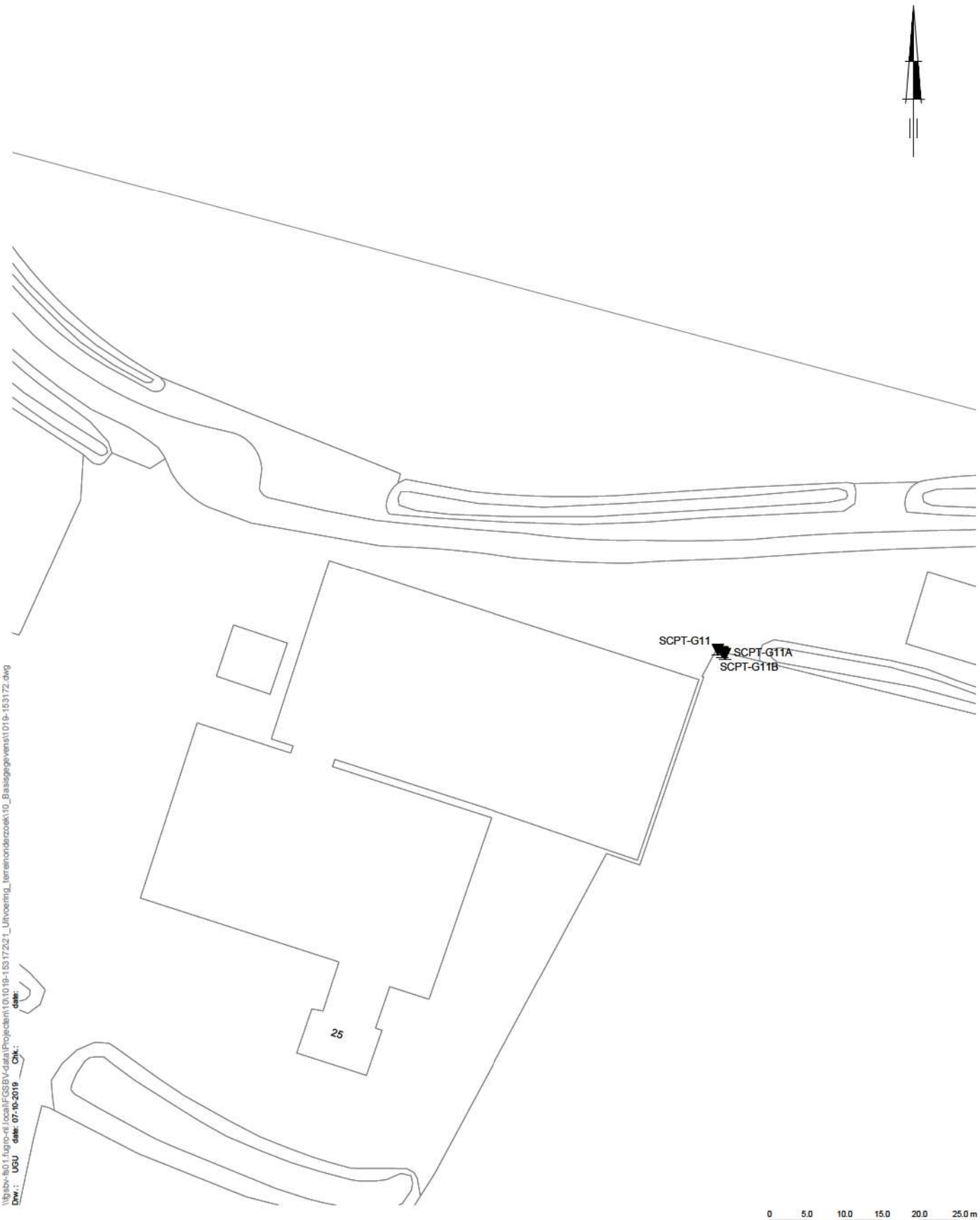

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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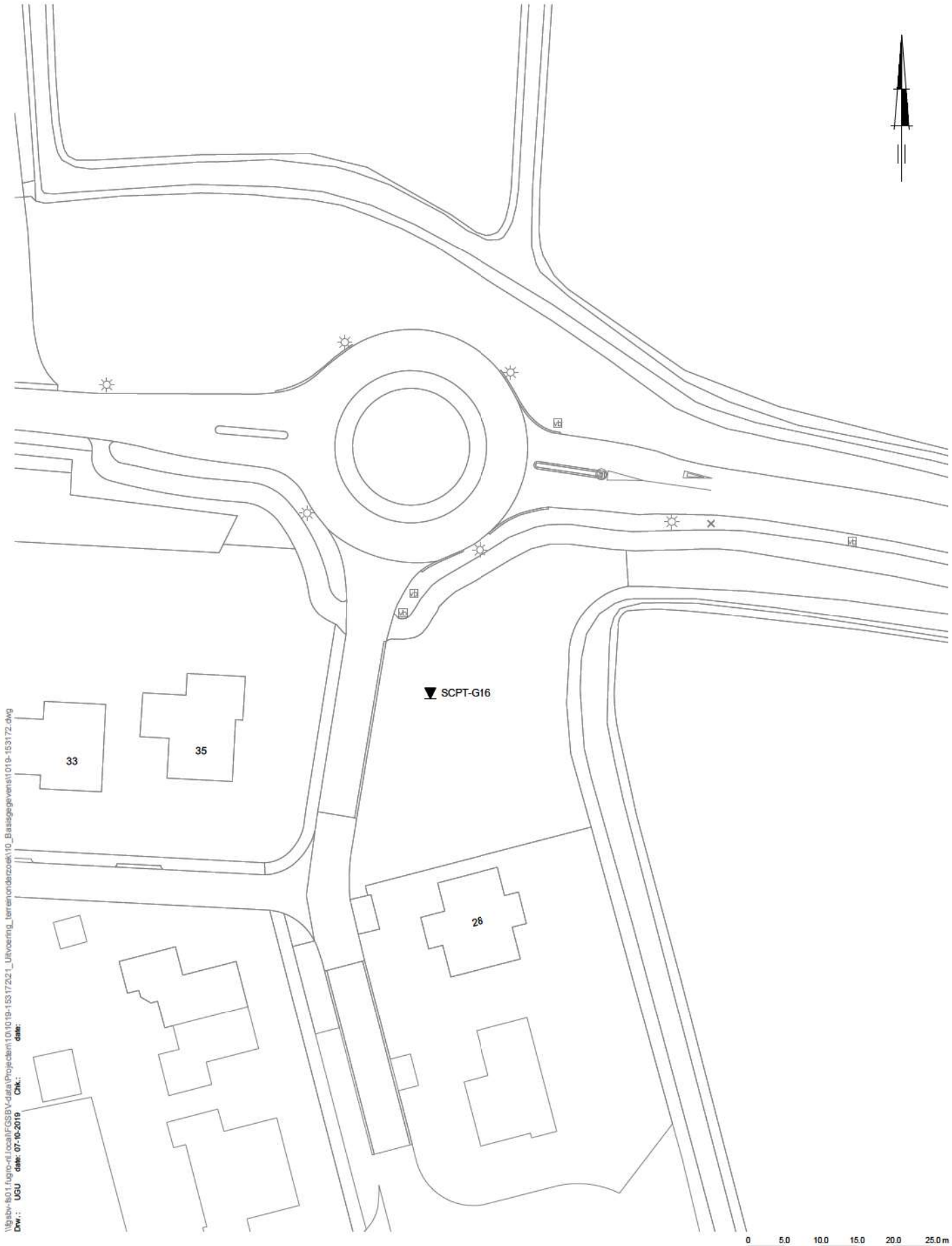

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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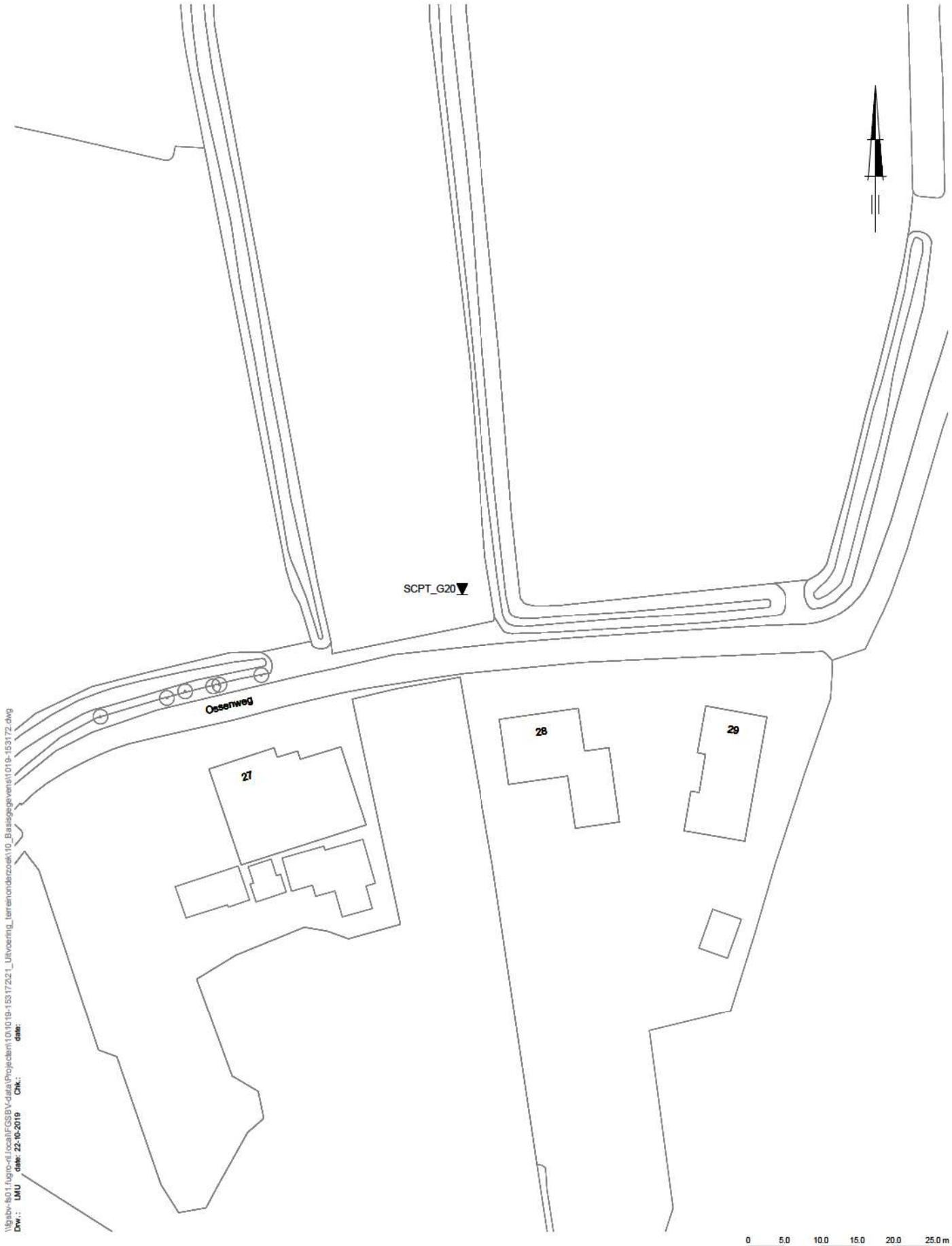

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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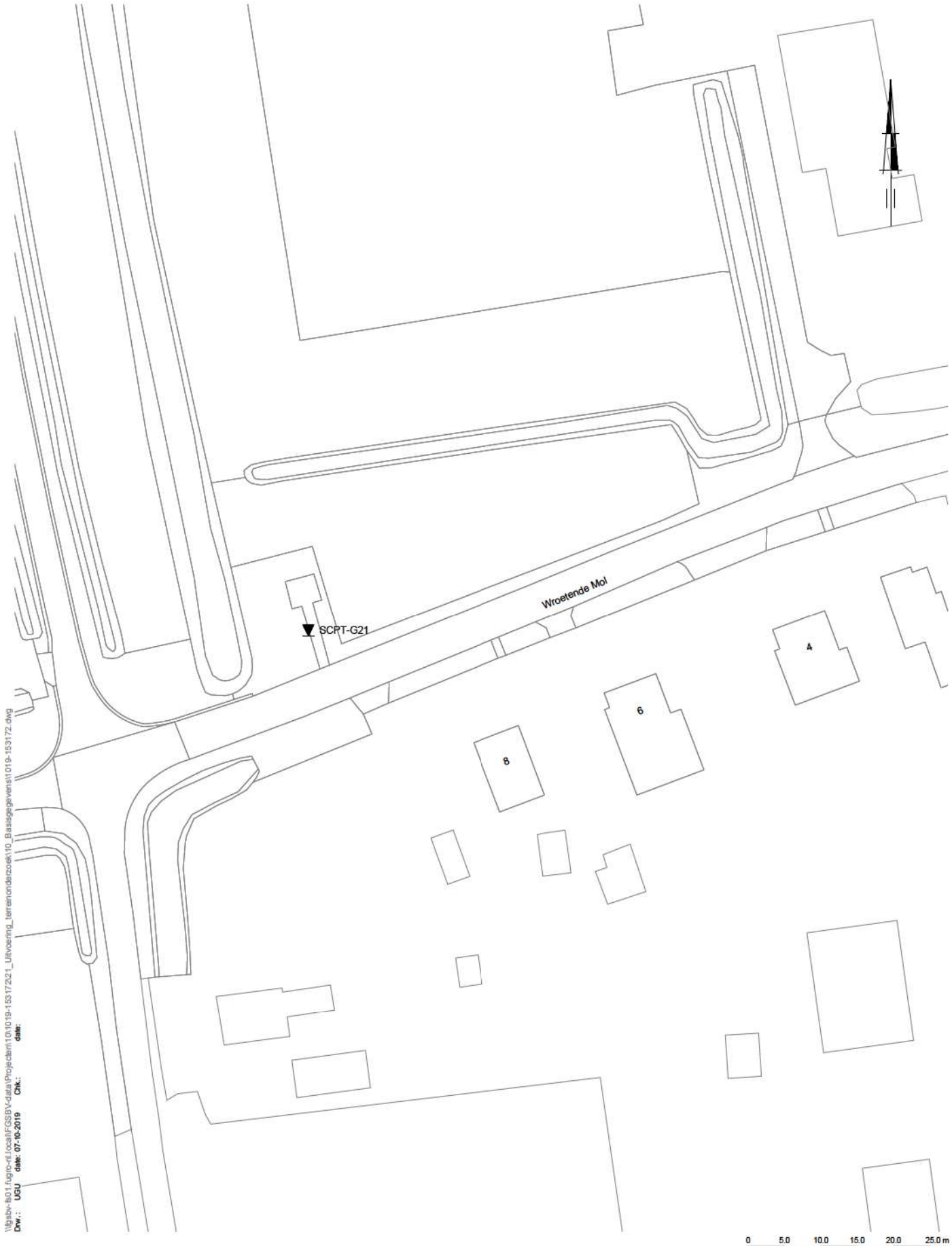

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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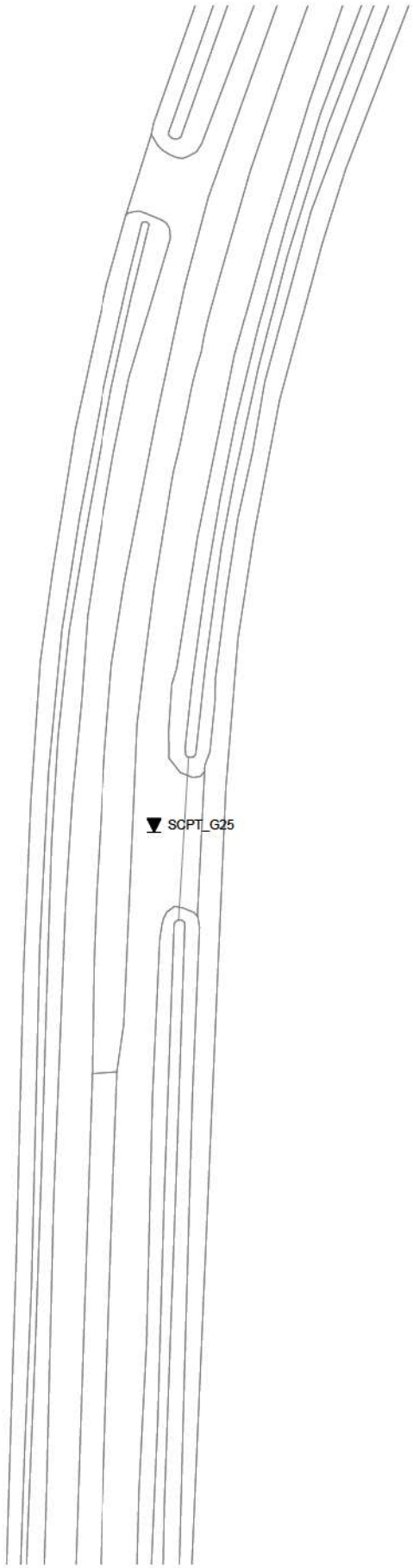

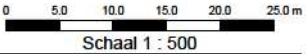

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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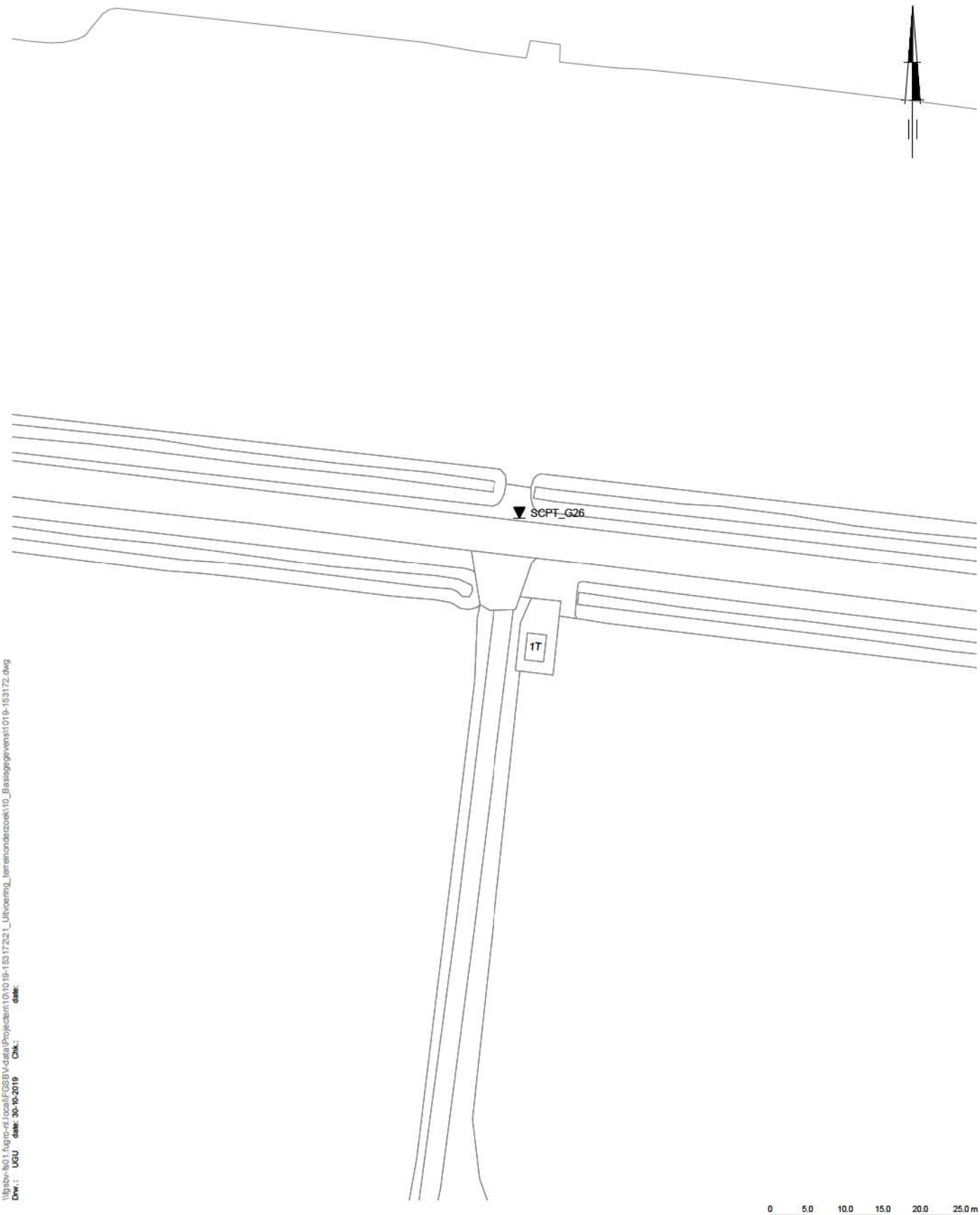

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SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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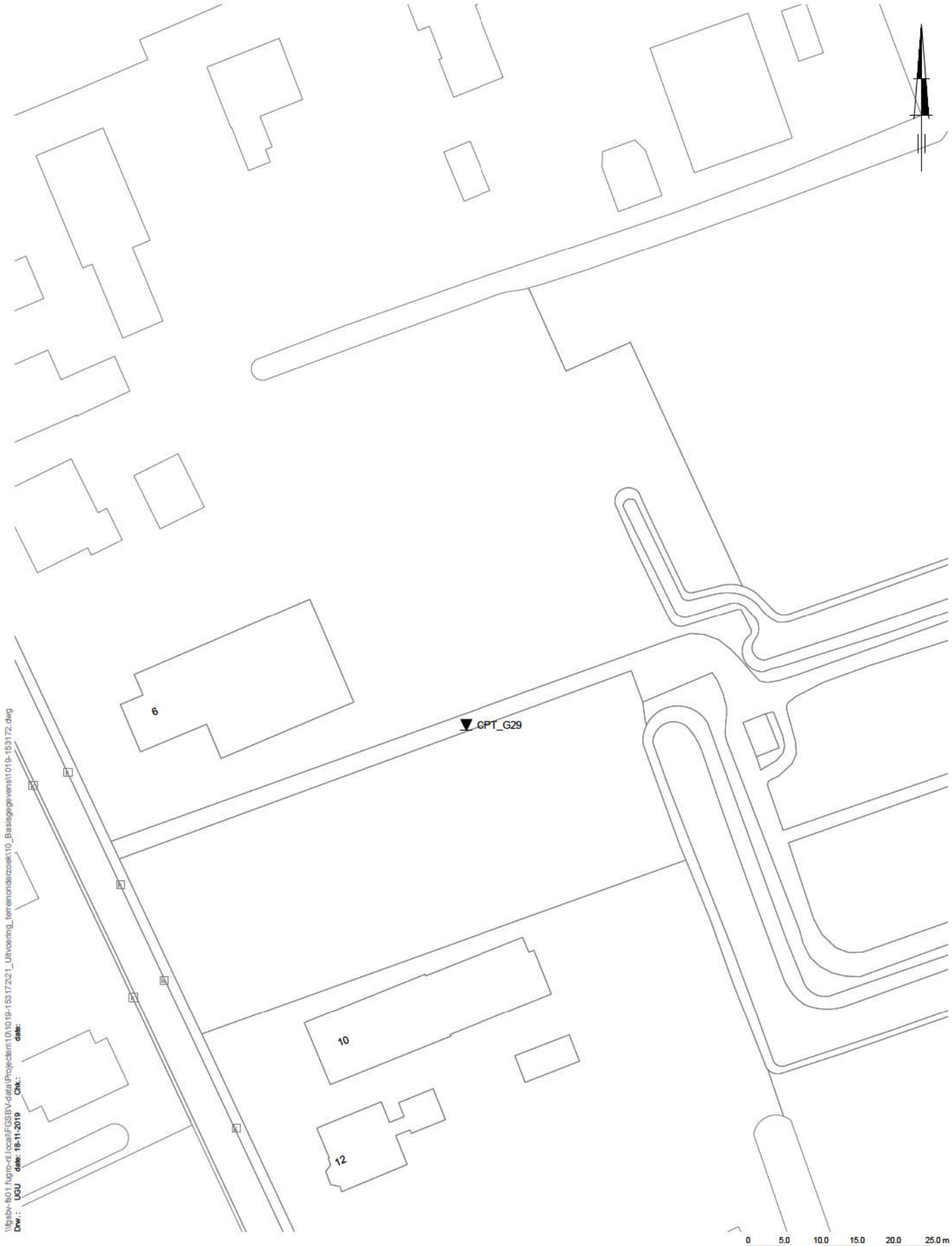

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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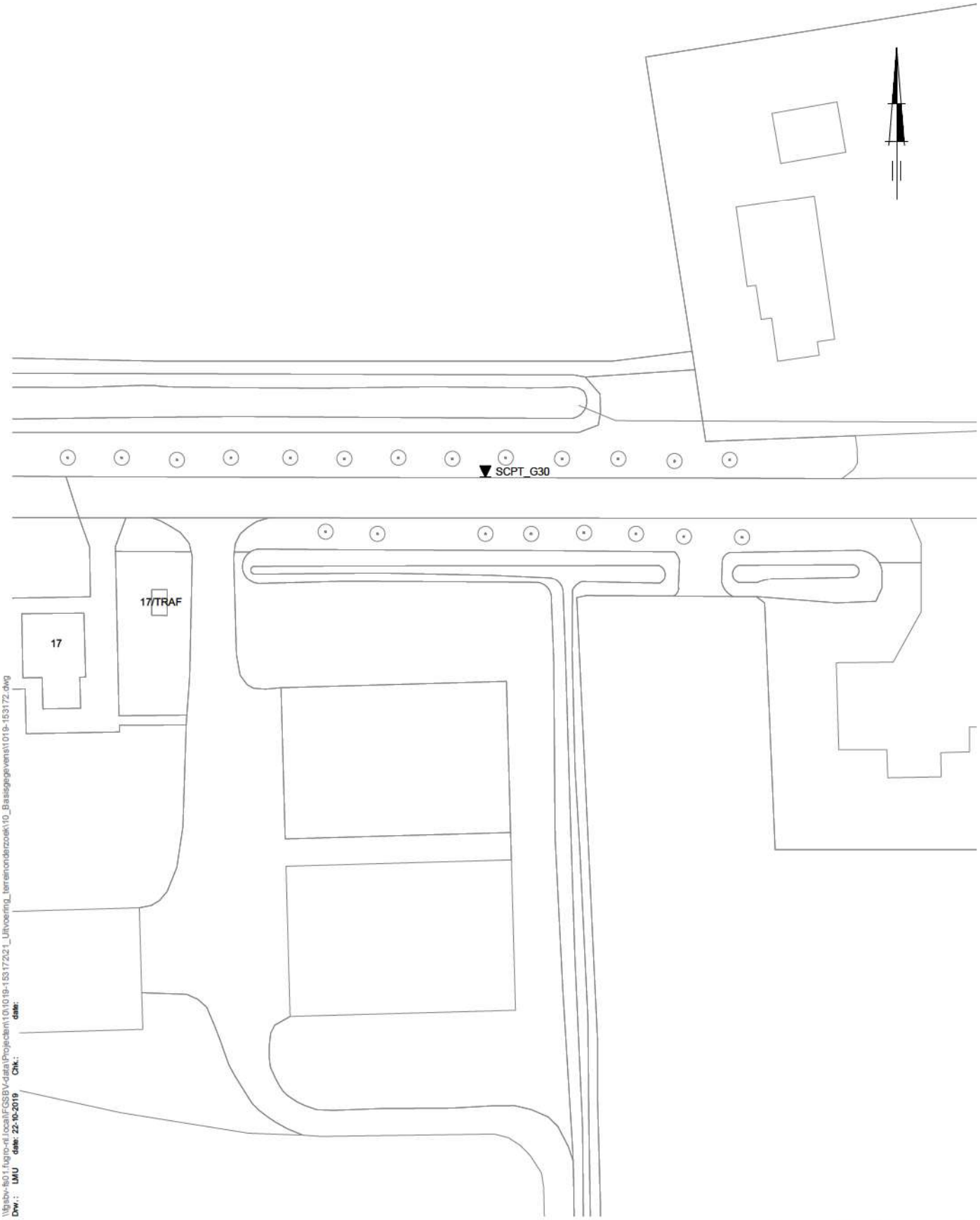

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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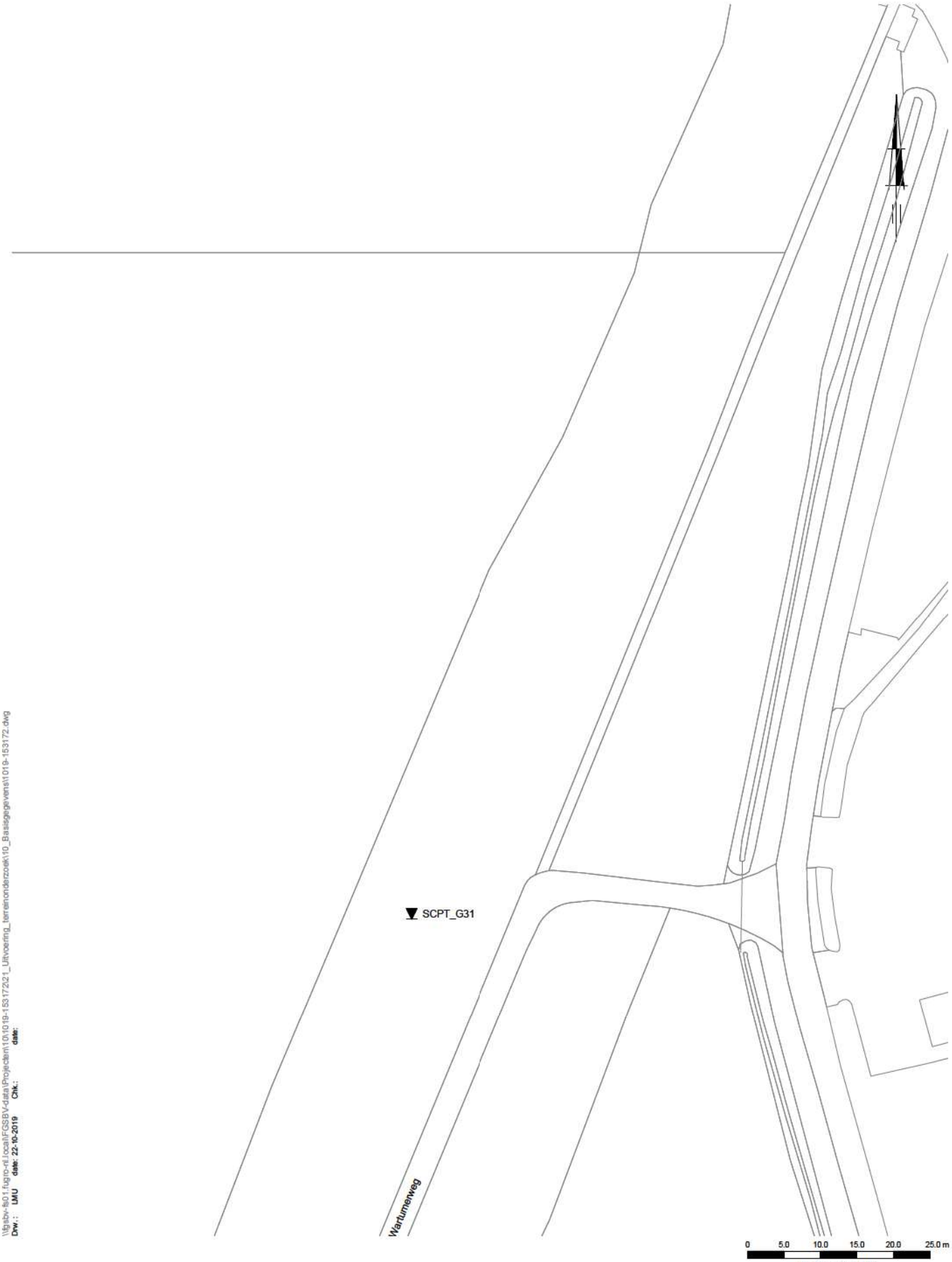

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SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

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Proj. : 1019-153172

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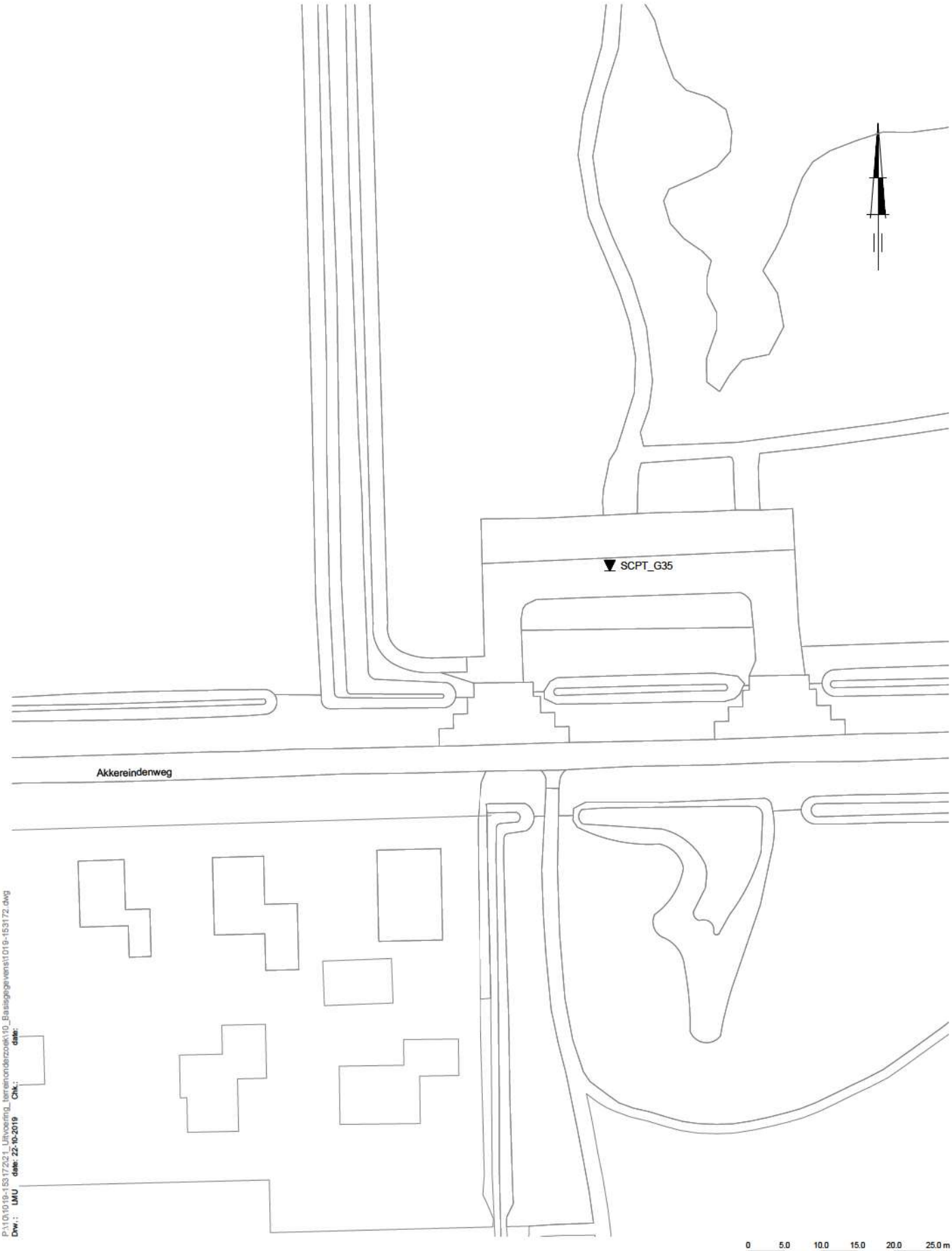
App. : G34



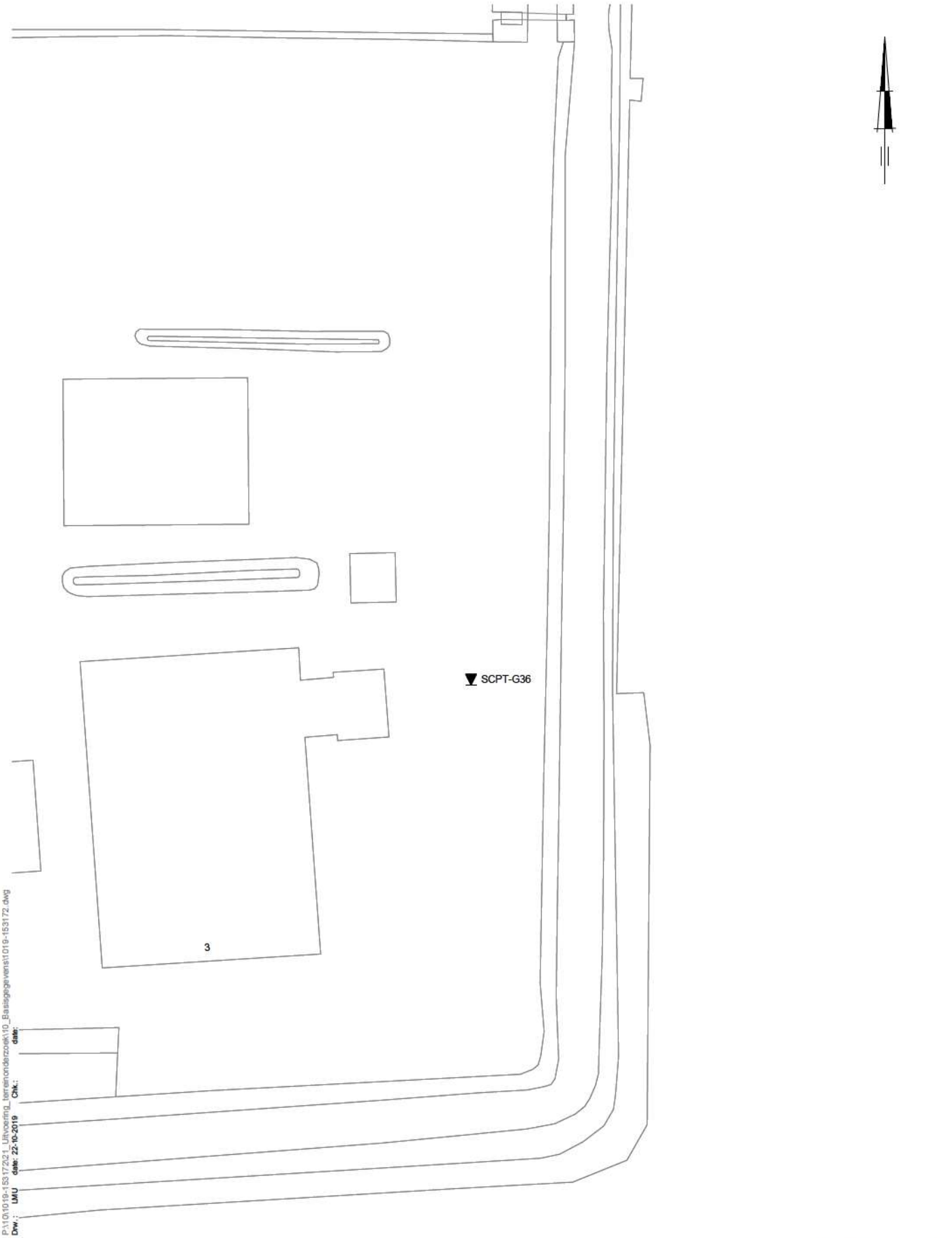
P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw. : LMU date: 22-10-2019 Chk. : date:

0 5.0 10.0 15.0 20.0 25.0 m
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G35



0 5.0 10.0 15.0 20.0 25.0 m

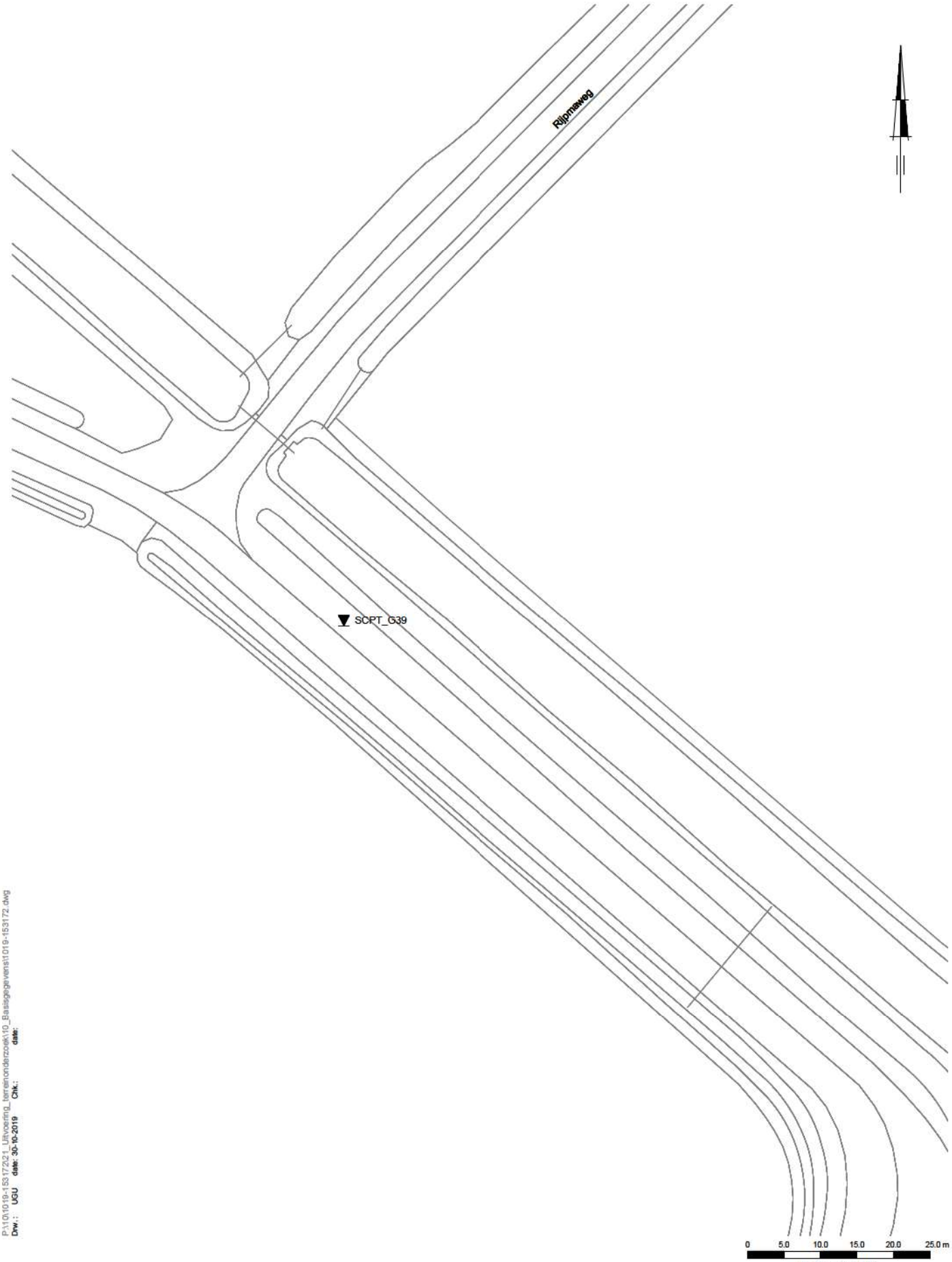
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172

App. : G36

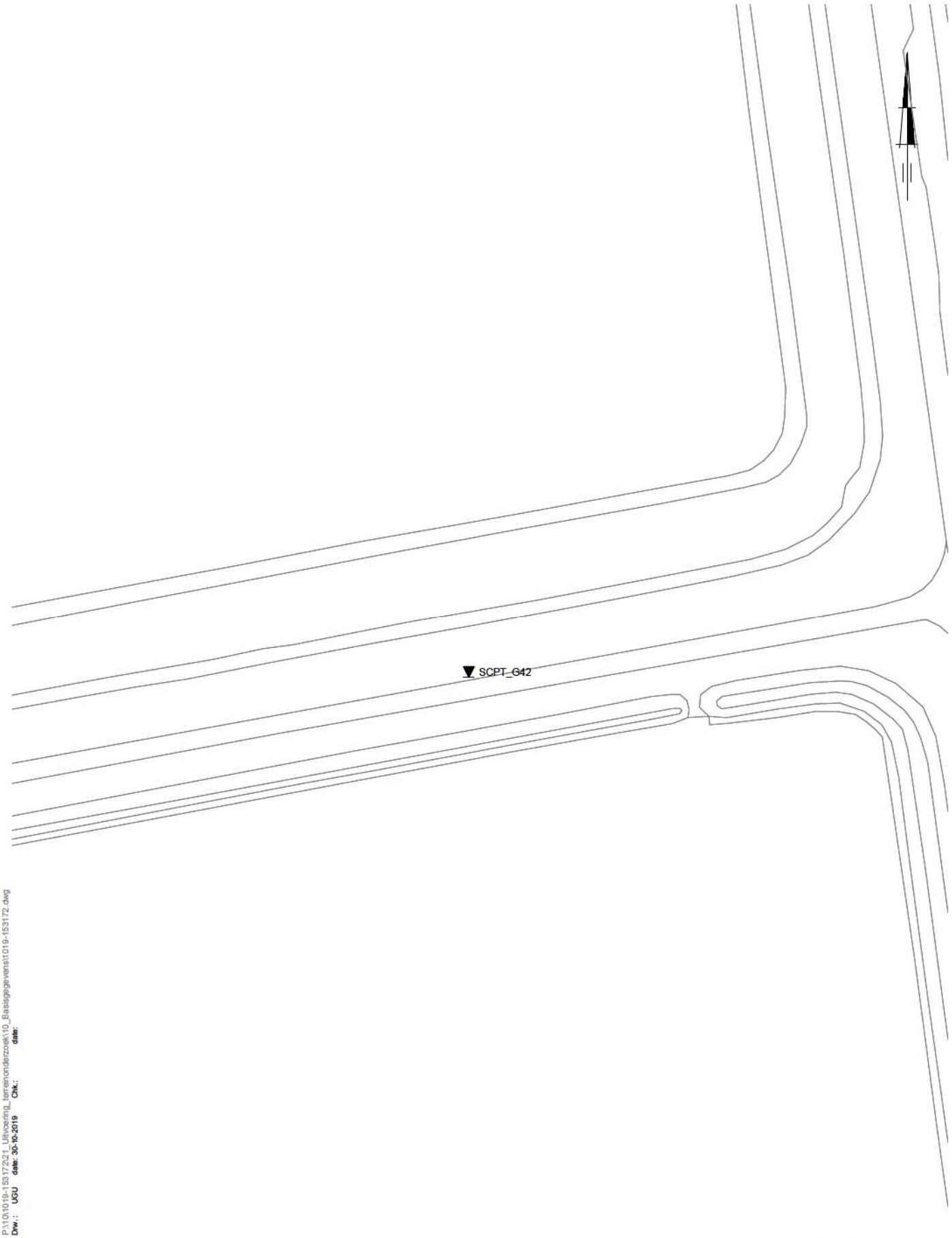


P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 30-10-2019 Chk.: date:

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G39



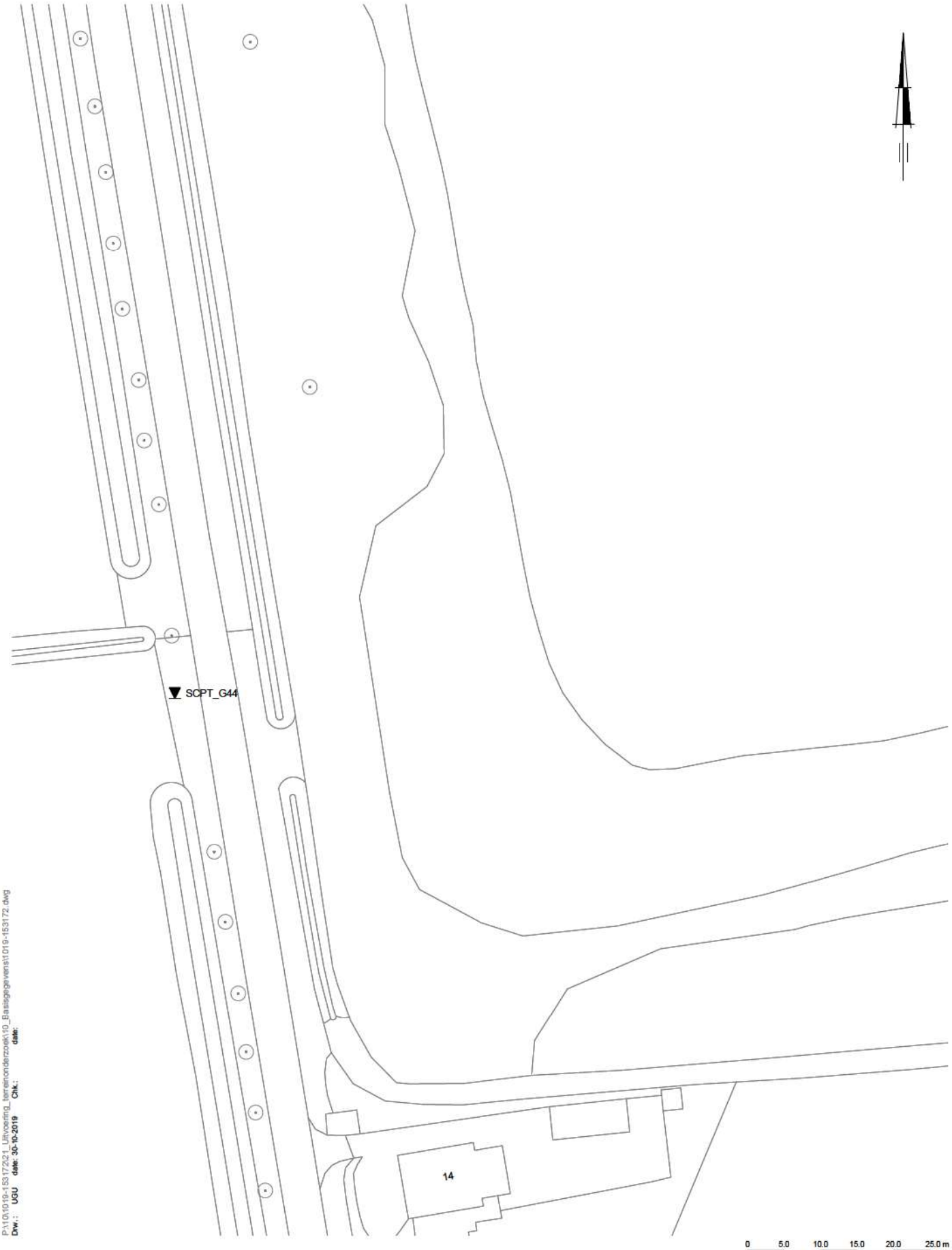
P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 30-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G42



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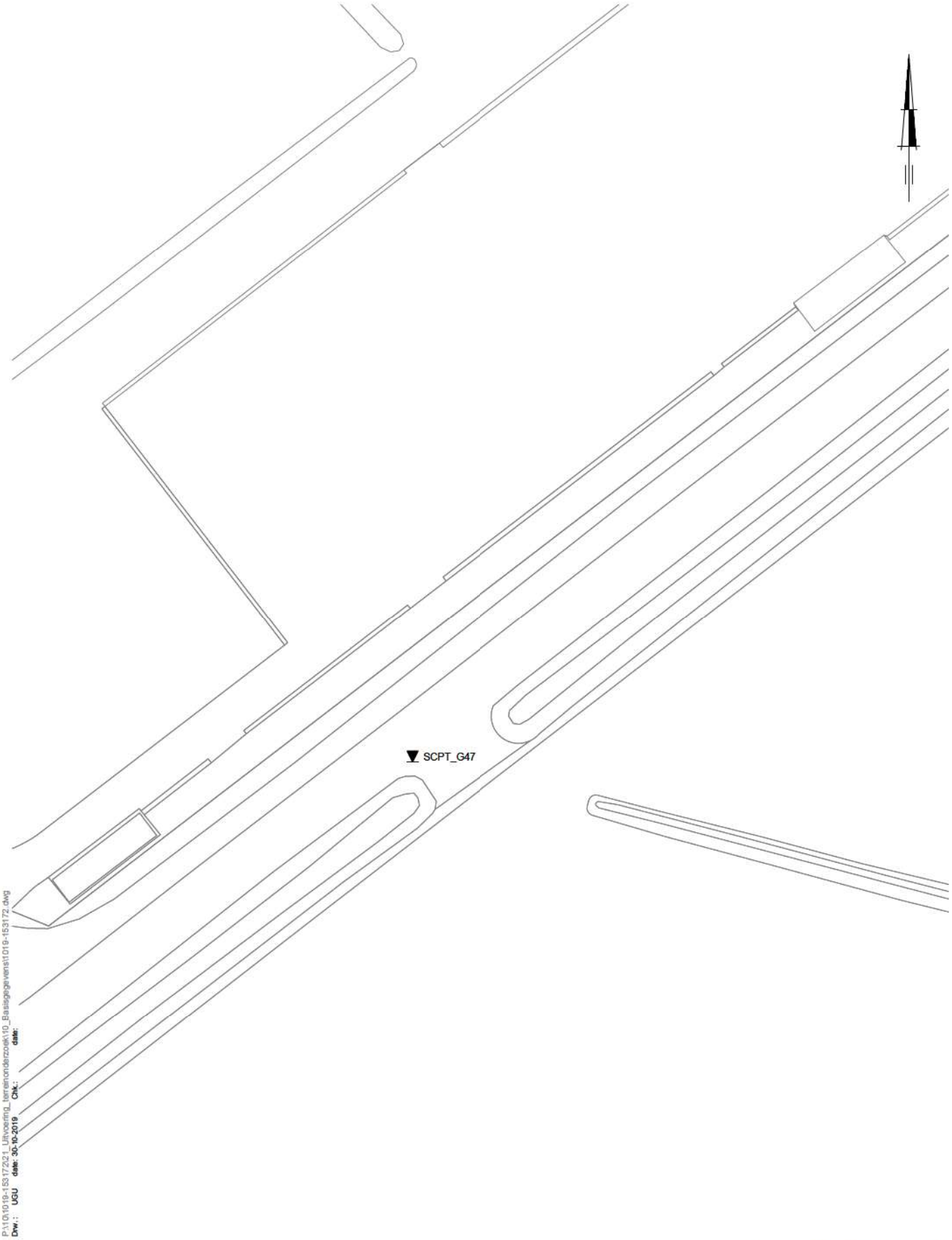
Drw.: UGU date: 30-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G44



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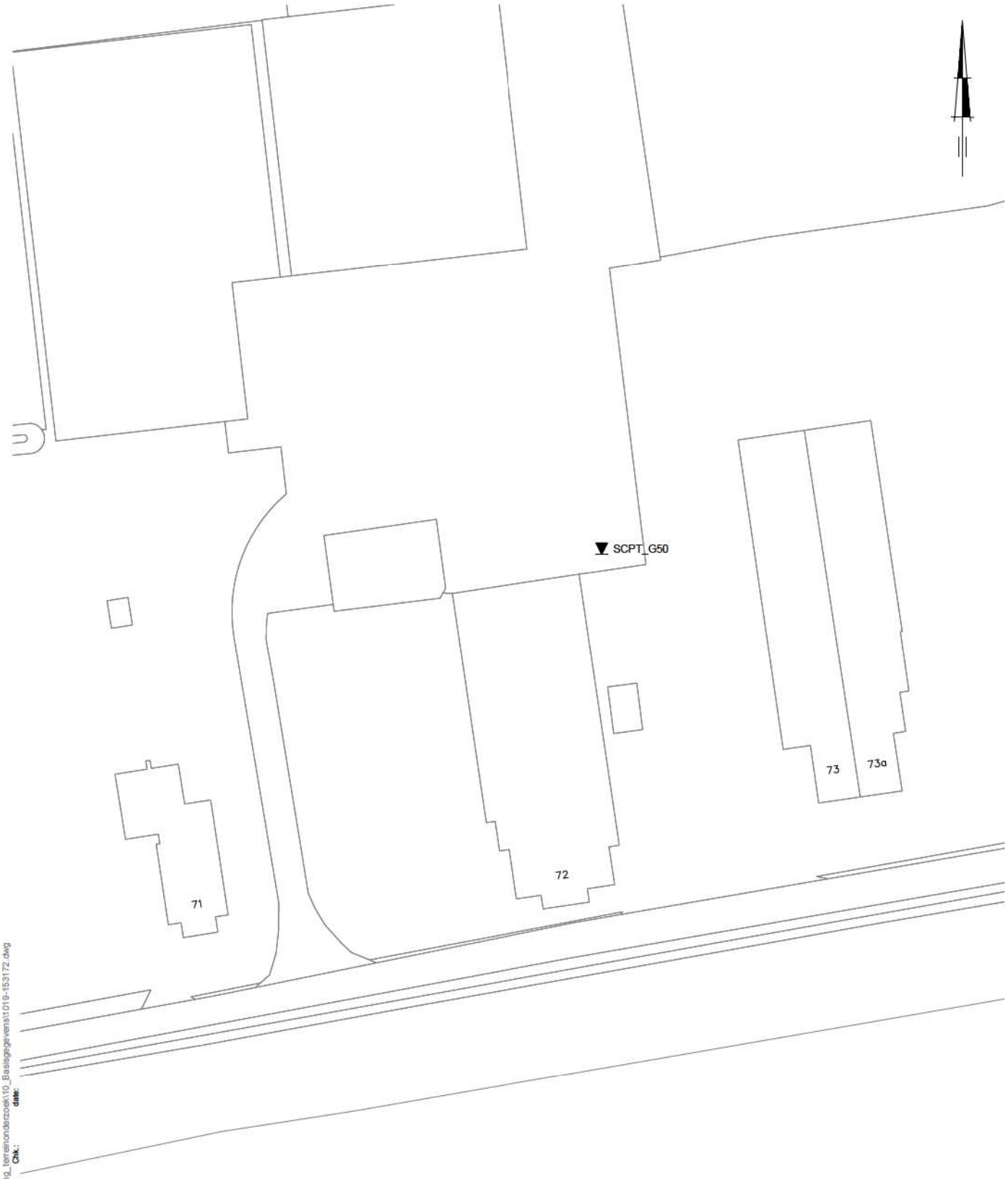
Drw.: UGU date: 30-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G47



P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 30-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G50

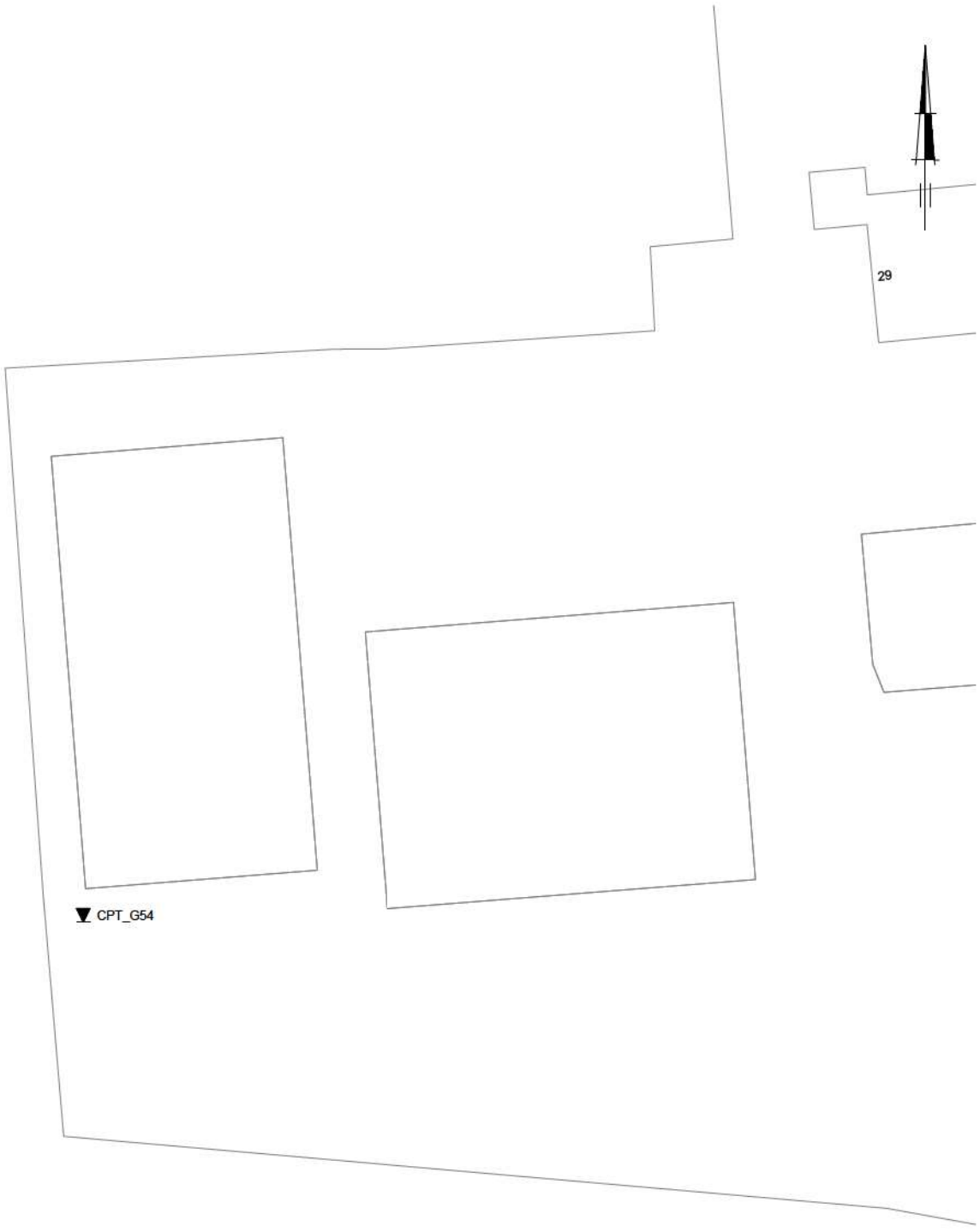
P:\1\0\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 31-10-2019 Chk.: date:

Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G51



0 5.0 10.0 15.0 20.0 25.0 m

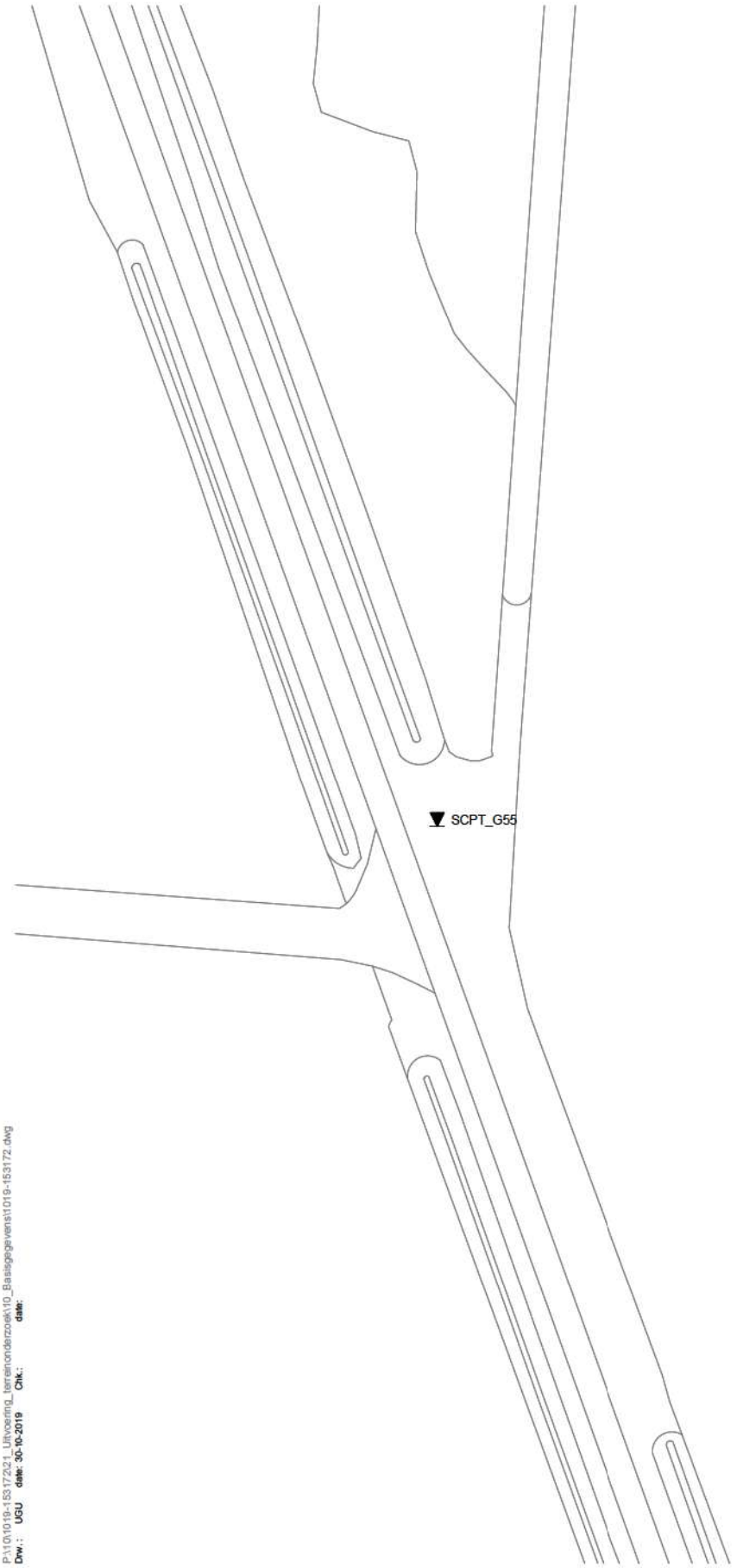
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172

App. : G54



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Drw.: UGU date: 30-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m

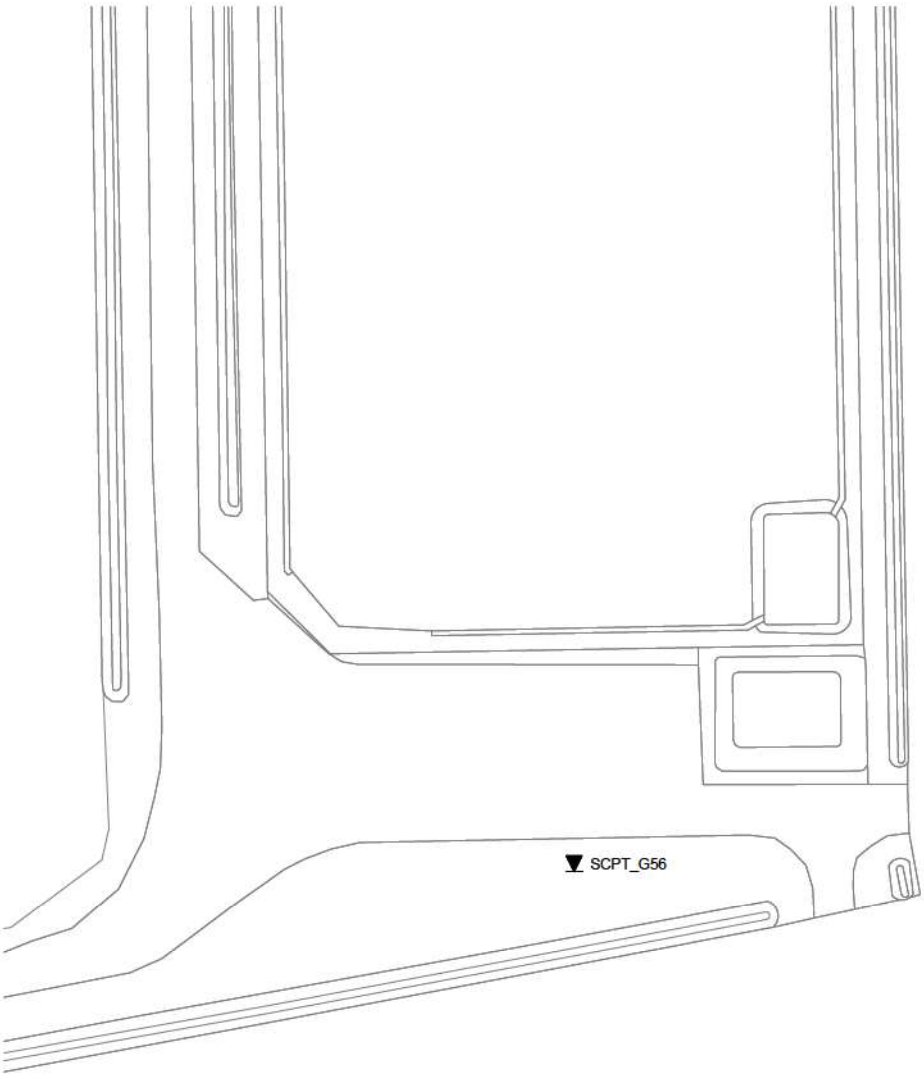
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172

App. : G55



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Drw.: UGU date: 30-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m

Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172

App. : G56

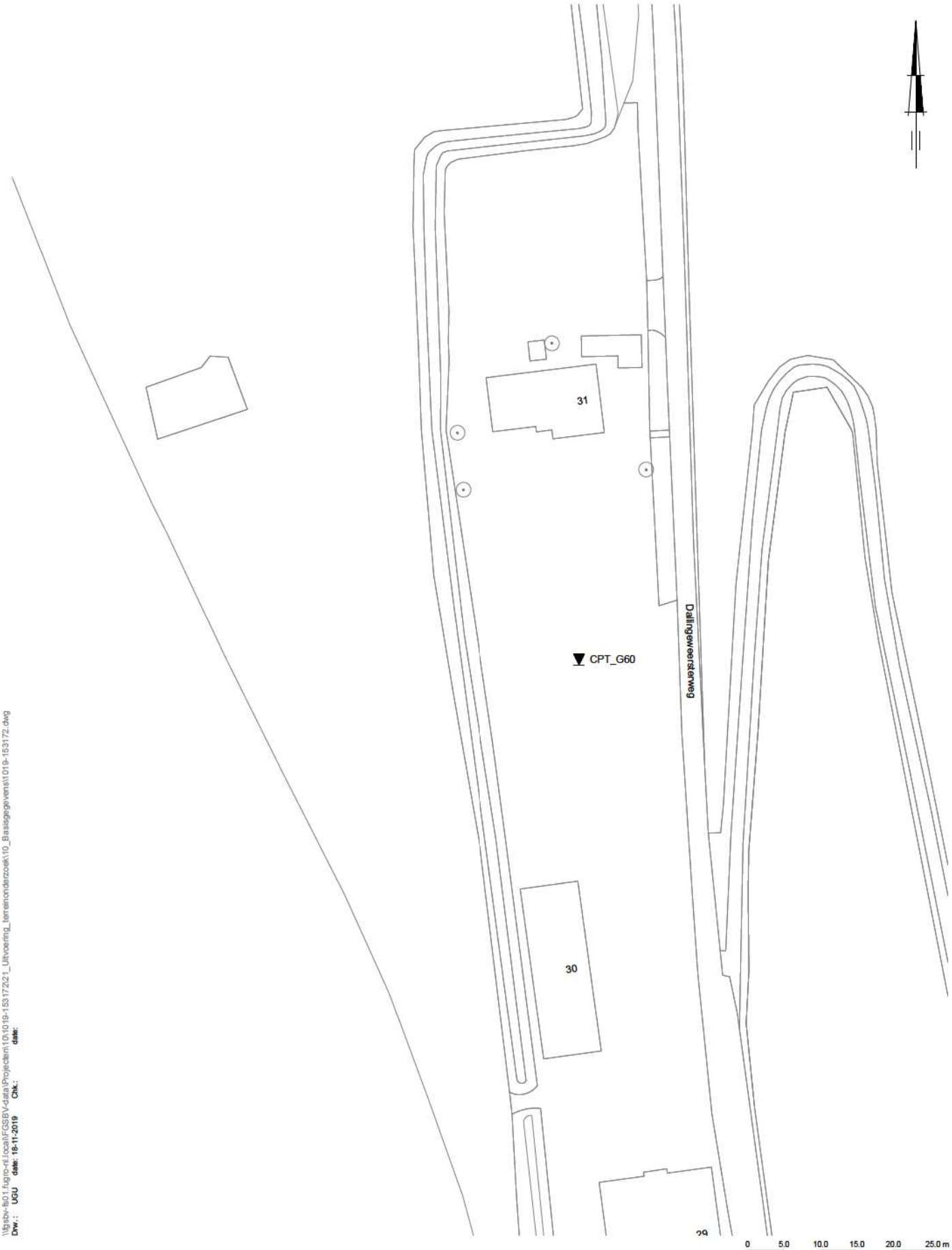
Schaal 1 : 500

SITUATIE

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G57

P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw. : UGU date: 30-10-2019 Chk.: date:



\\gsbv-fs01.fugro-nl.local\FGSBV-data\Projecten\10\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 18-11-2019 Chk.: date:

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G60

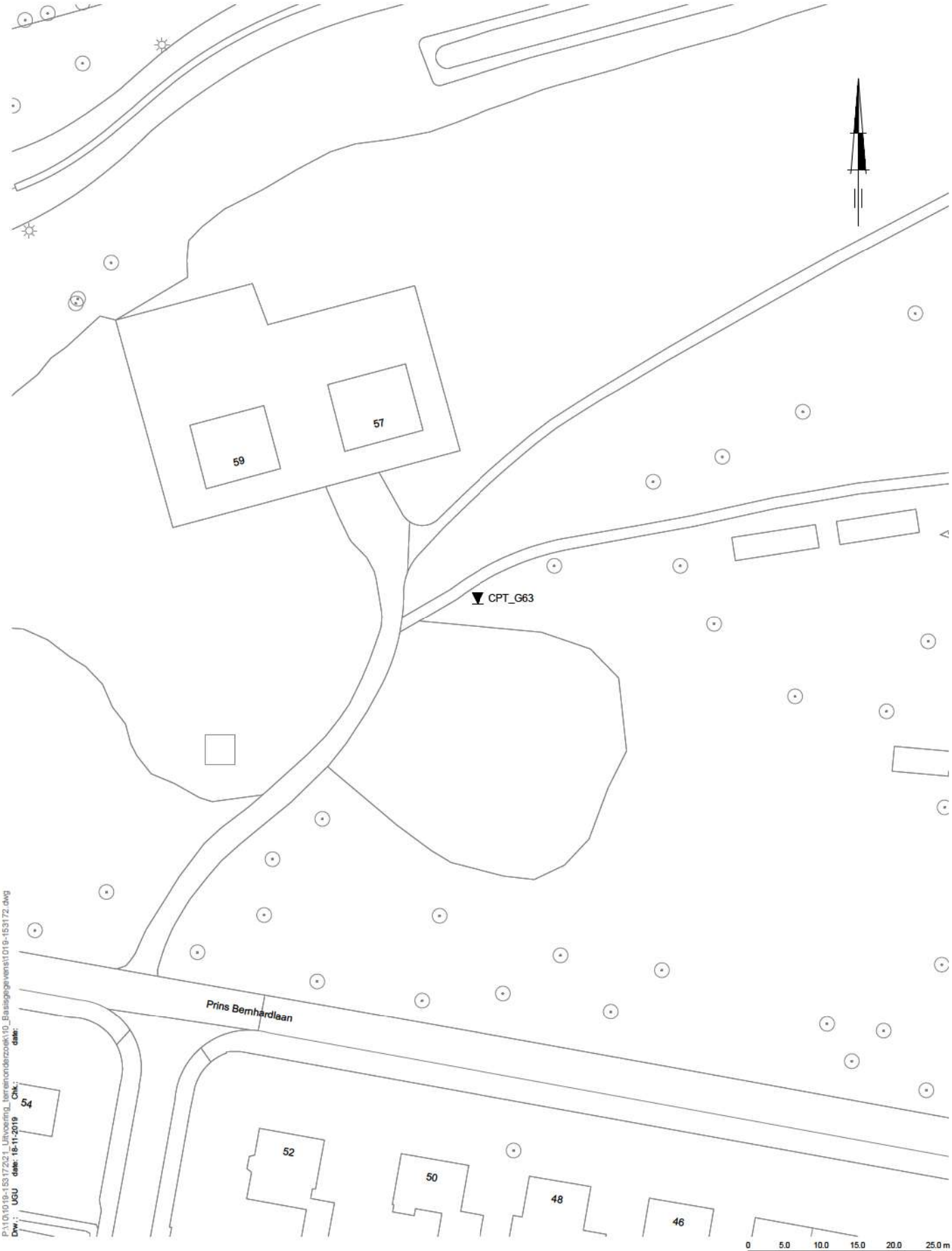
P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 07-10-2019 Chk.: date:

0 5.0 10.0 15.0 20.0 25.0 m
Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G62



P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Dwn.: UGU date: 18-11-2019 Chk.: date:

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G63

P:\1\1019-153172\21_Uitvoering_terreinonderzoek\10_Basisgegevens\1019-153172.dwg
Drw.: UGU date: 18-11-2019 Chk.: date:

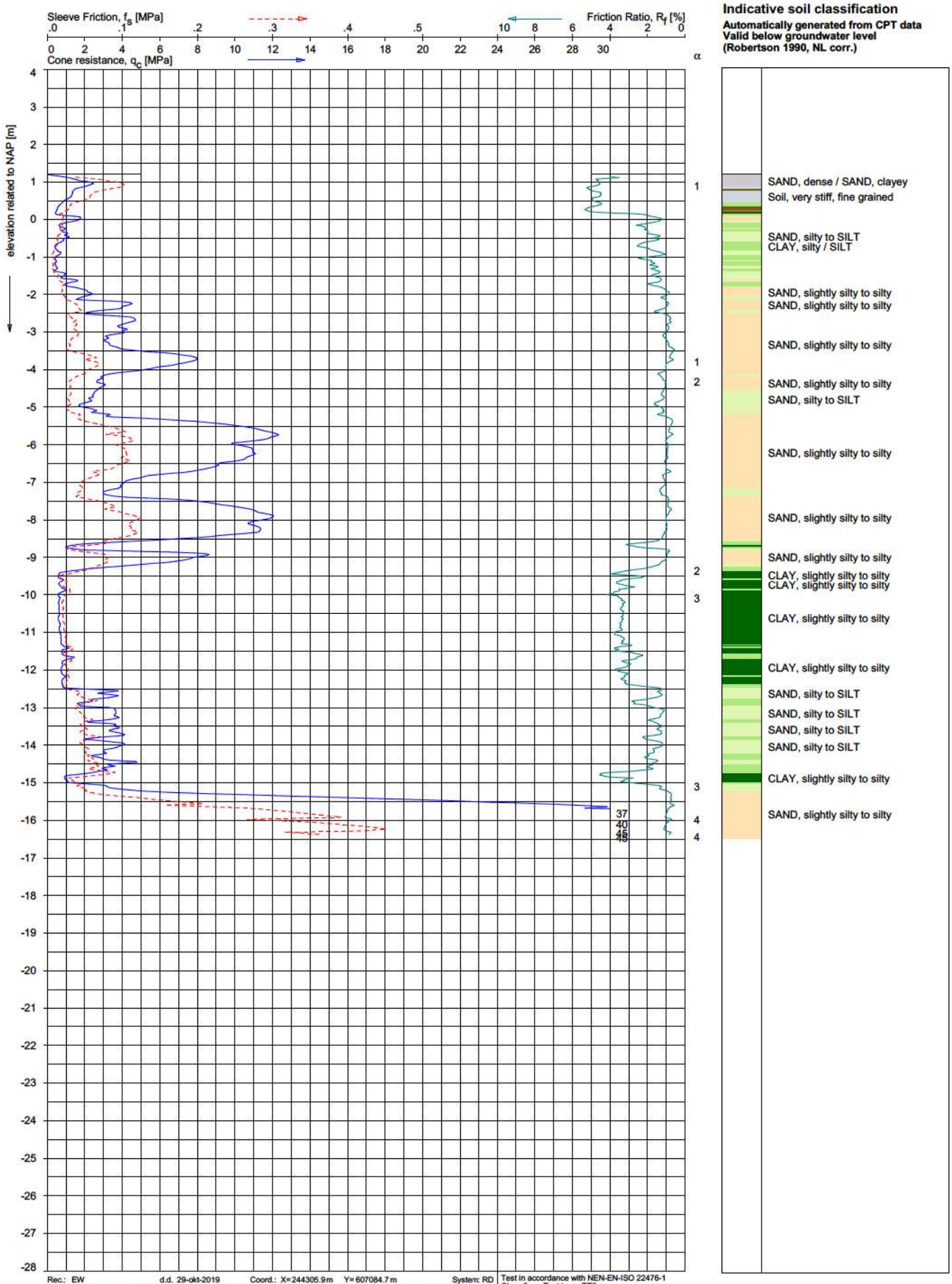
0 5.0 10.0 15.0 20.0 25.0 m

Schaal 1 : 500

SITE PLAN

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. : 1019-153172
App. : G69



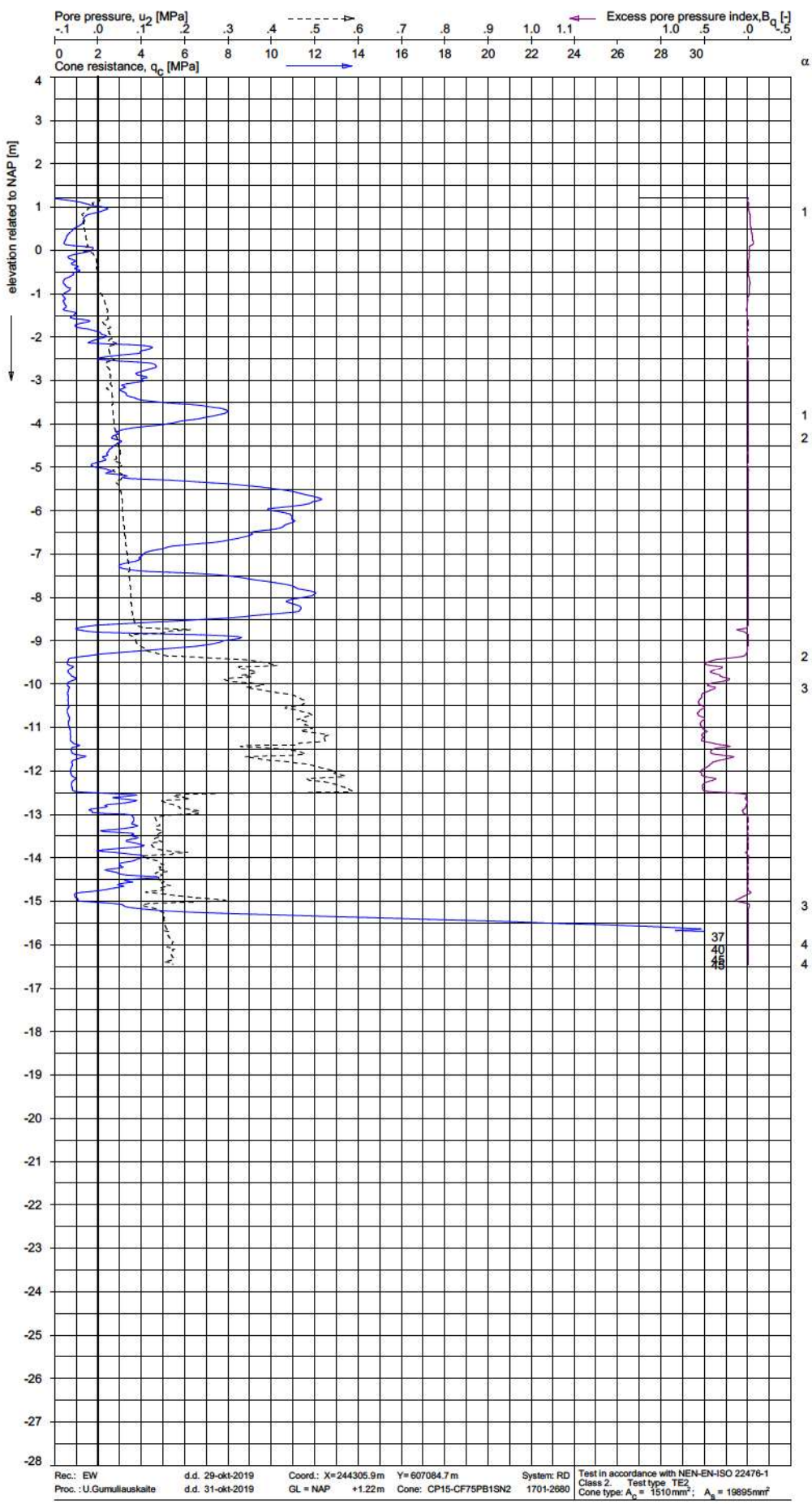
Rec.: EW d.d. 29-okt-2019 Coord.: X= 244305.9 m Y= 607084.7 m System: RD
Proc. : U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

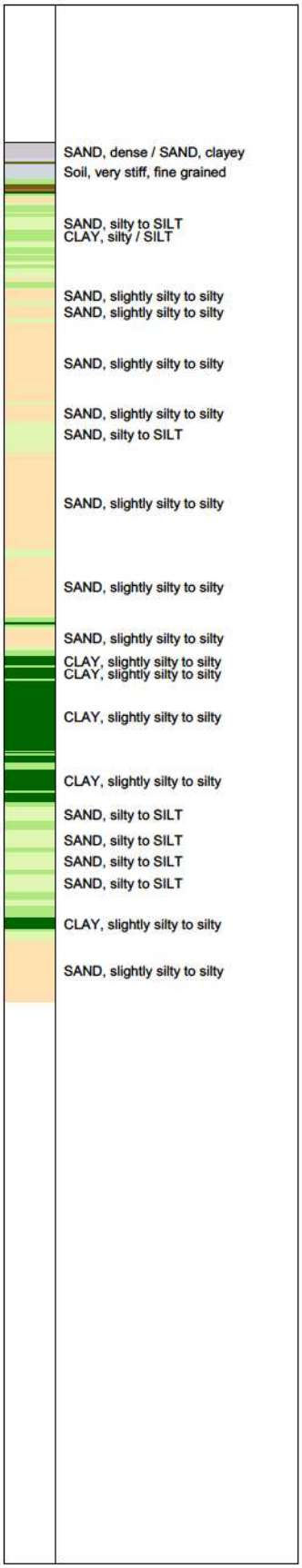
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G01



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



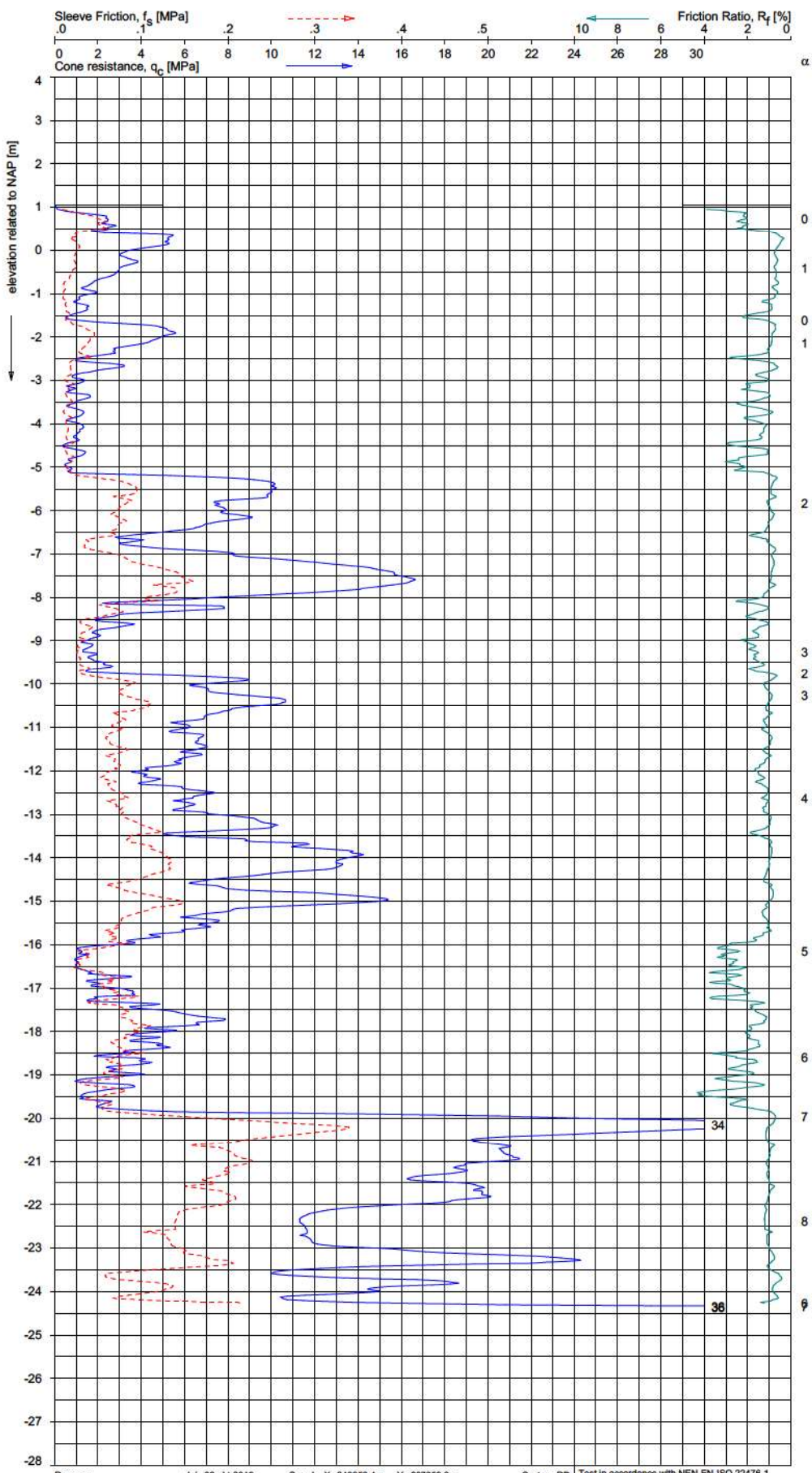
Rec.: EW d.d. 29-okt-2019 Coord.: X=244305.9m Y=607084.7m System: RD
Proc.: U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP +1.22m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510mm²; A_s = 19895mm²

PIEZO CONE PENETRATION TEST

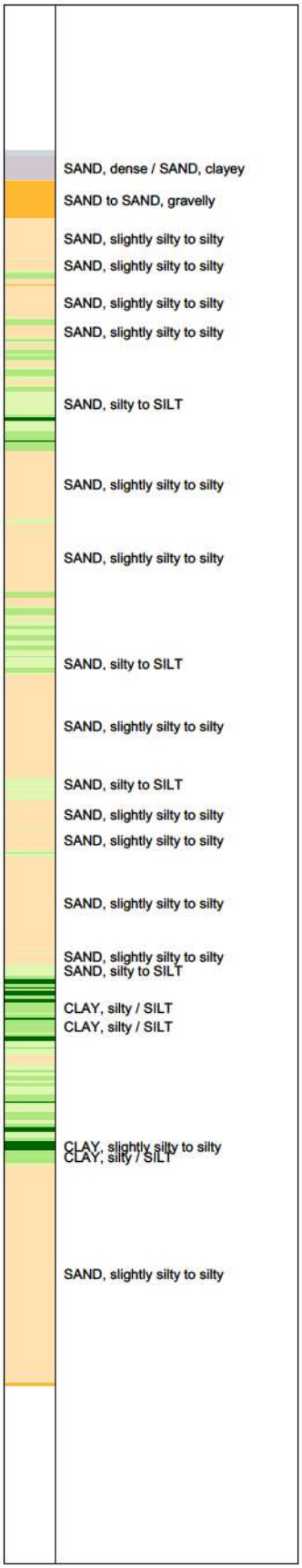
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G01



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



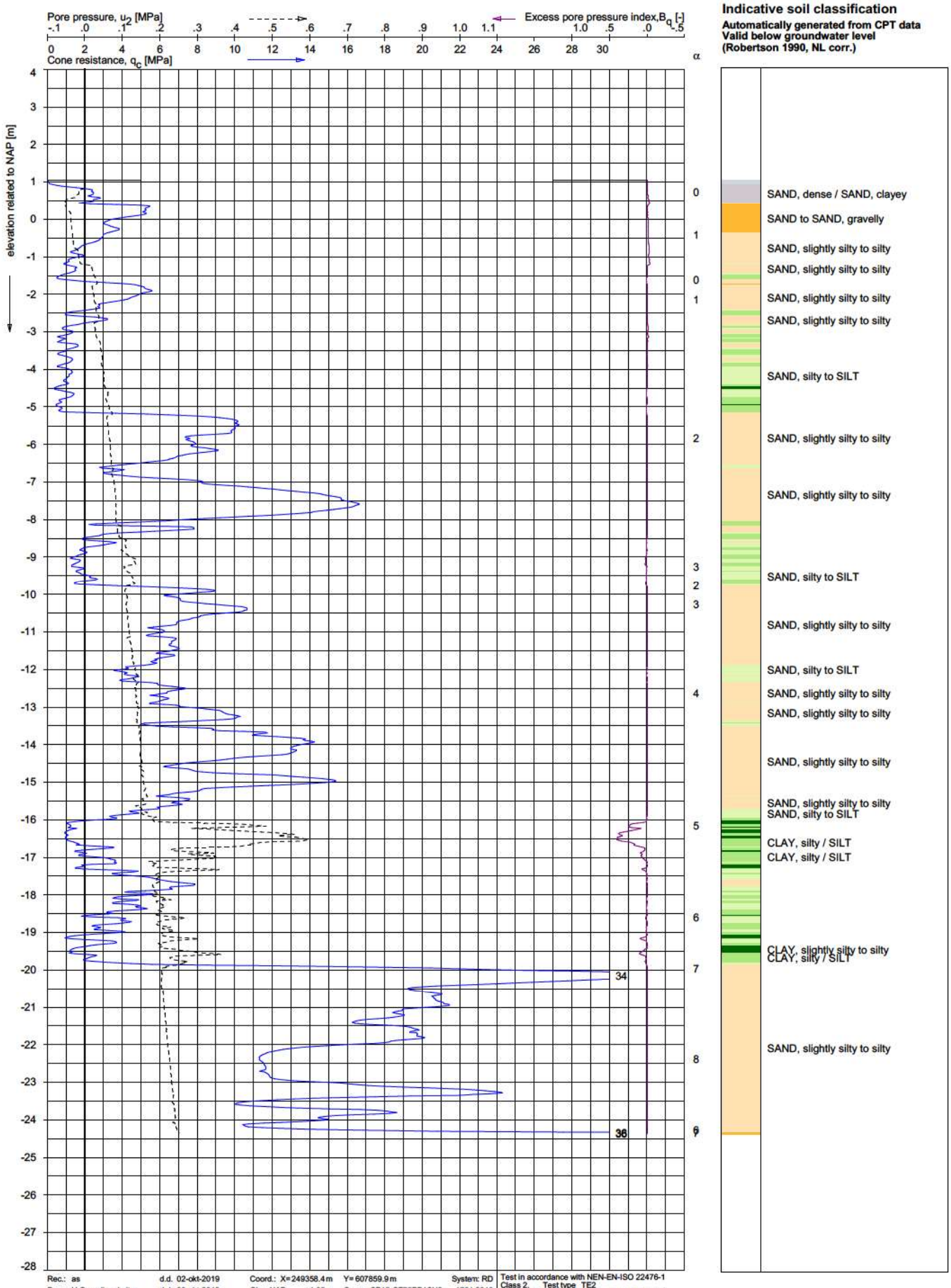
Rec.: as d.d. 02-okt-2019 Coord.: X= 249358.4 m Y= 607859.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 09-okt-2019 GL = NAP +1.05 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G02



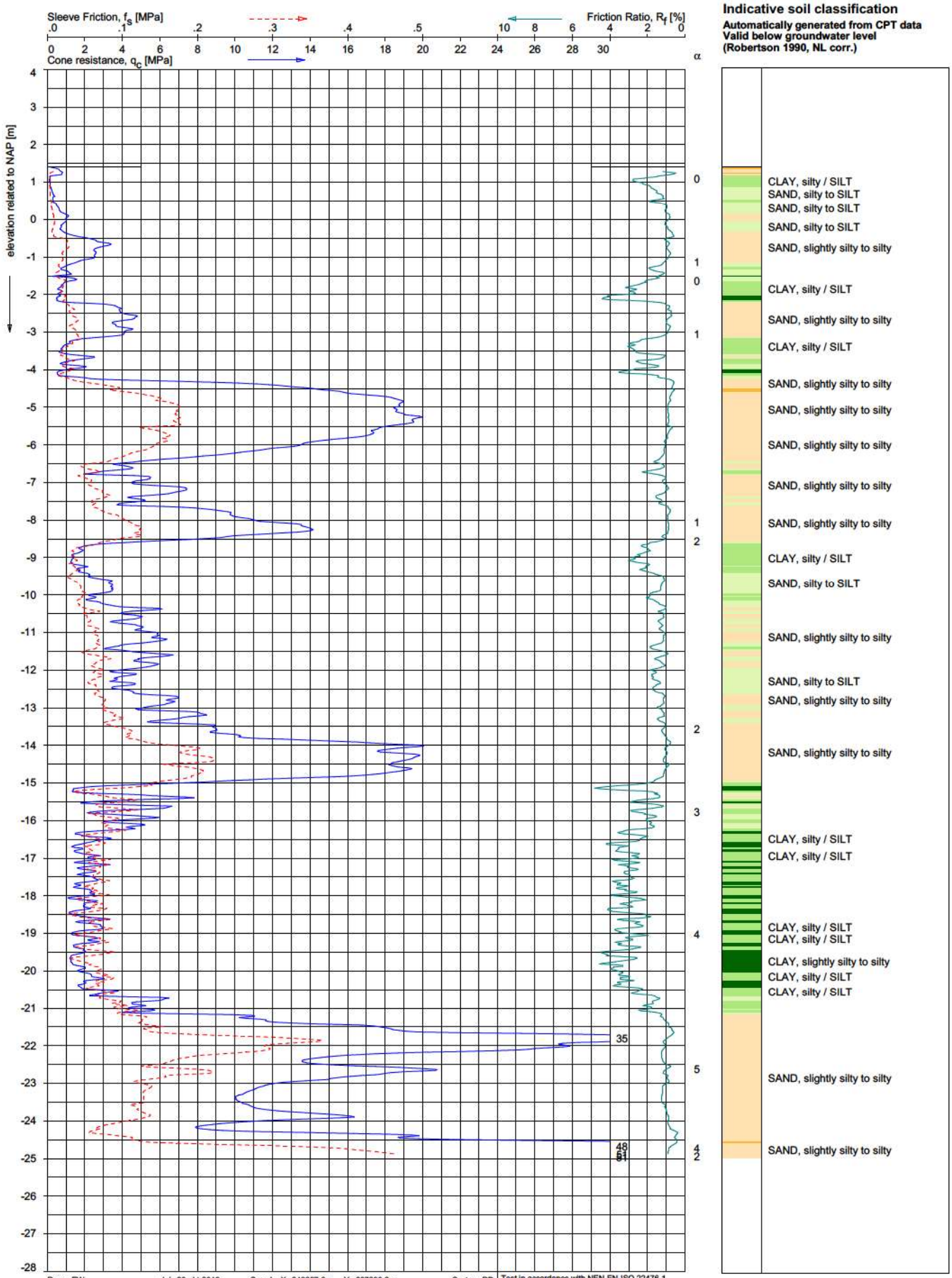
Rec.: as d.d. 02-okt-2019 Coord.: X= 249358.4 m Y= 607859.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 09-okt-2019 GL = NAP +1.05 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G02



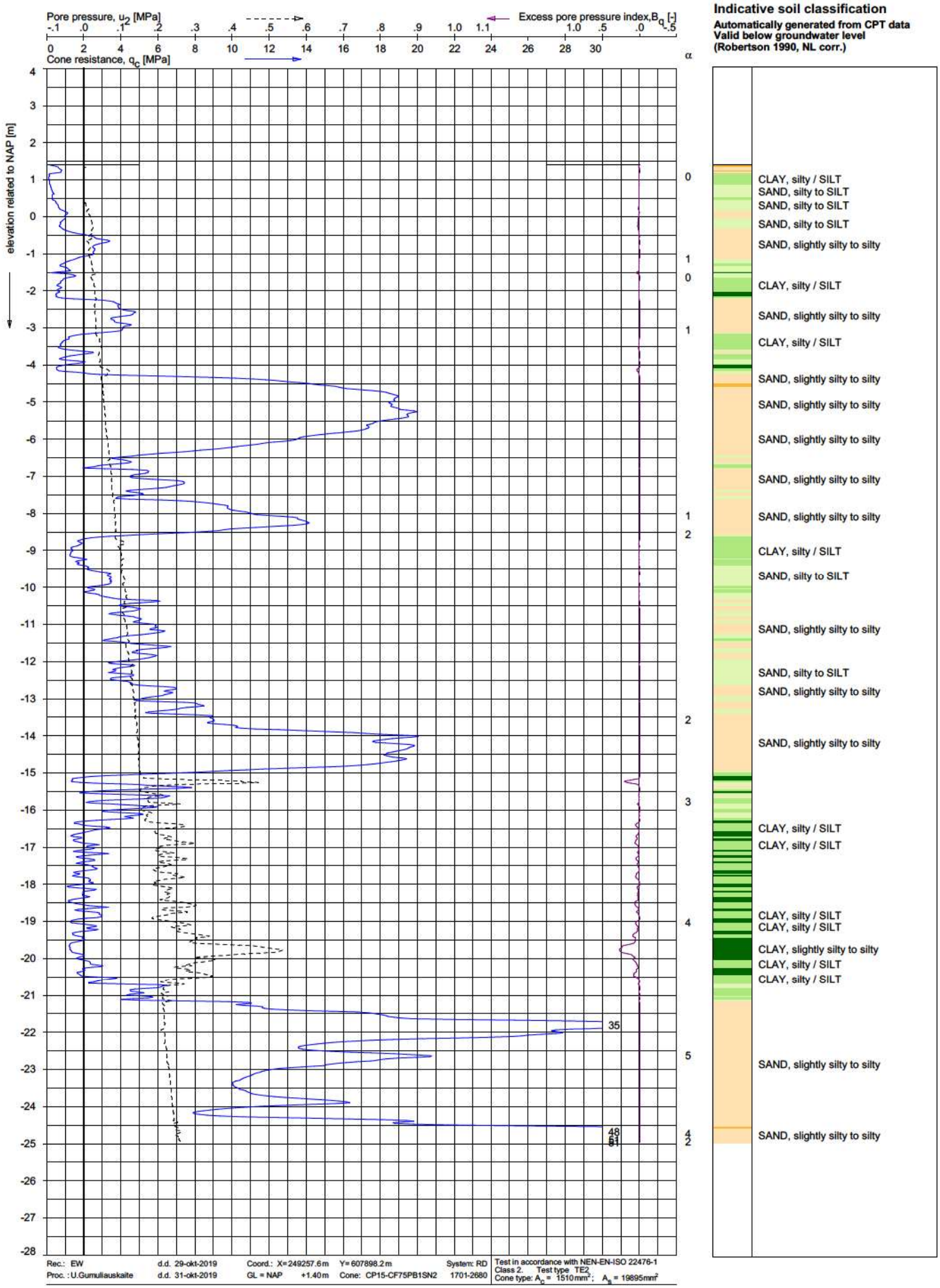
Rec.: EW d.d. 29-okt-2019 Coord.: X= 249257.6 m Y= 607898.2 m System: RD
Proc. : U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP +1.40 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G02A



Rec.: EW d.d. 29-okt-2019 Coord.: X= 249257.6 m Y= 607898.2 m System: RD
Proc. : U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP +1.40 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

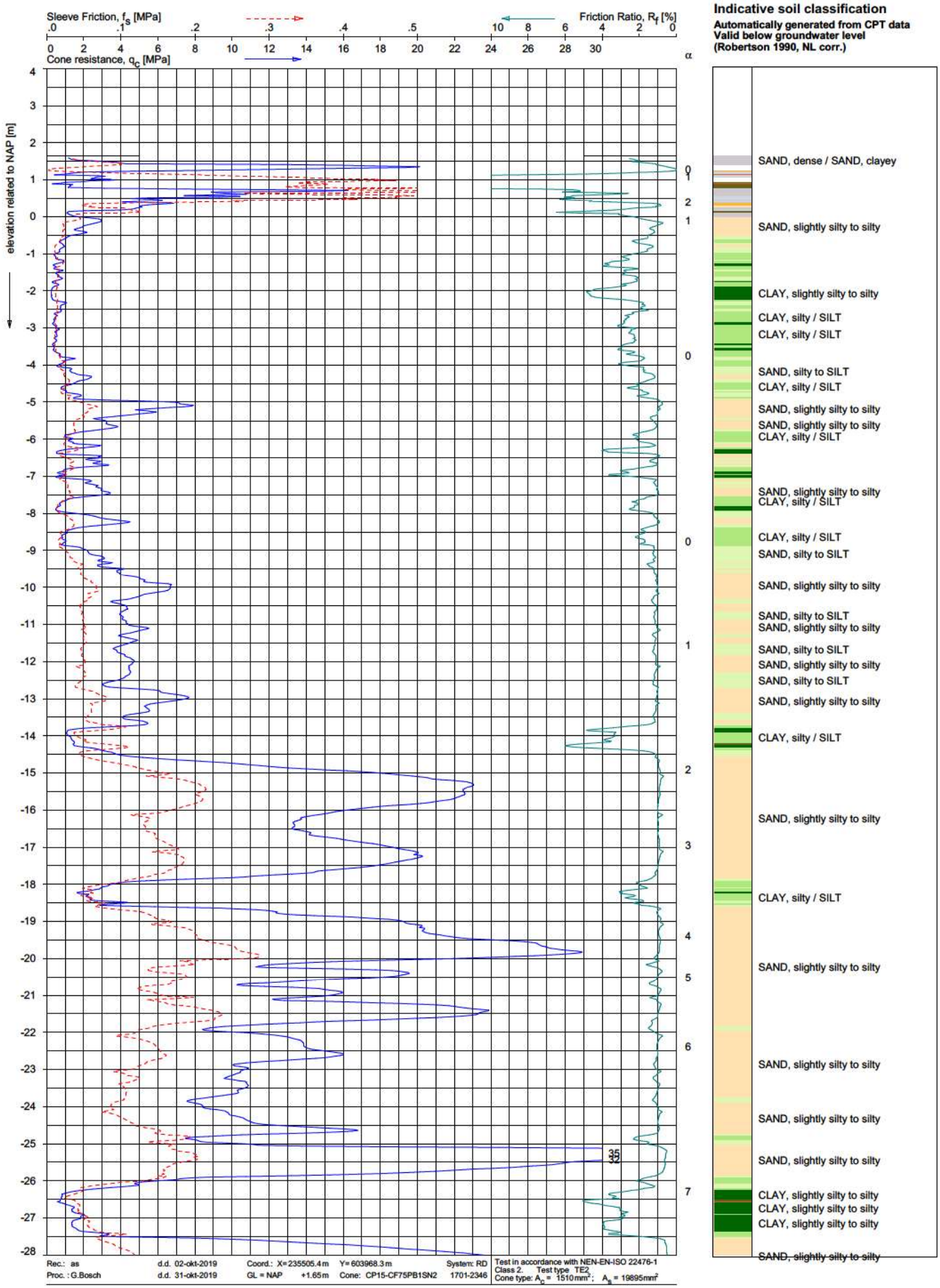
PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G02A

1019-153172

SCPT_G02A -1



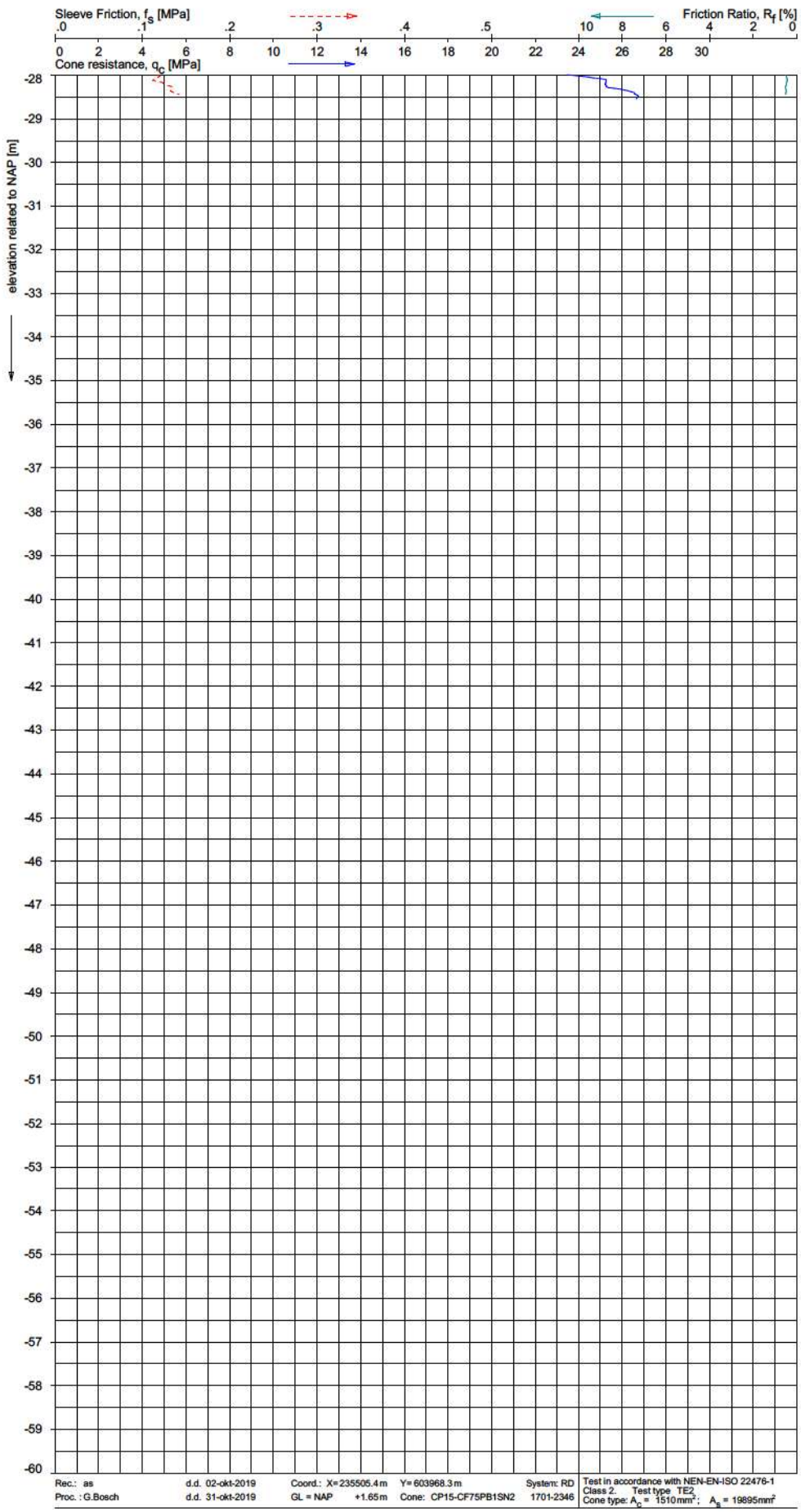
Rec.: as d.d. 02-okt-2019 Coord.: X= 235505.4 m Y= 603968.3 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP +1.65 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G03



Rec.: as d.d. 02-okt-2019 Coord.: X= 235505.4 m Y= 603968.3 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP +1.65 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

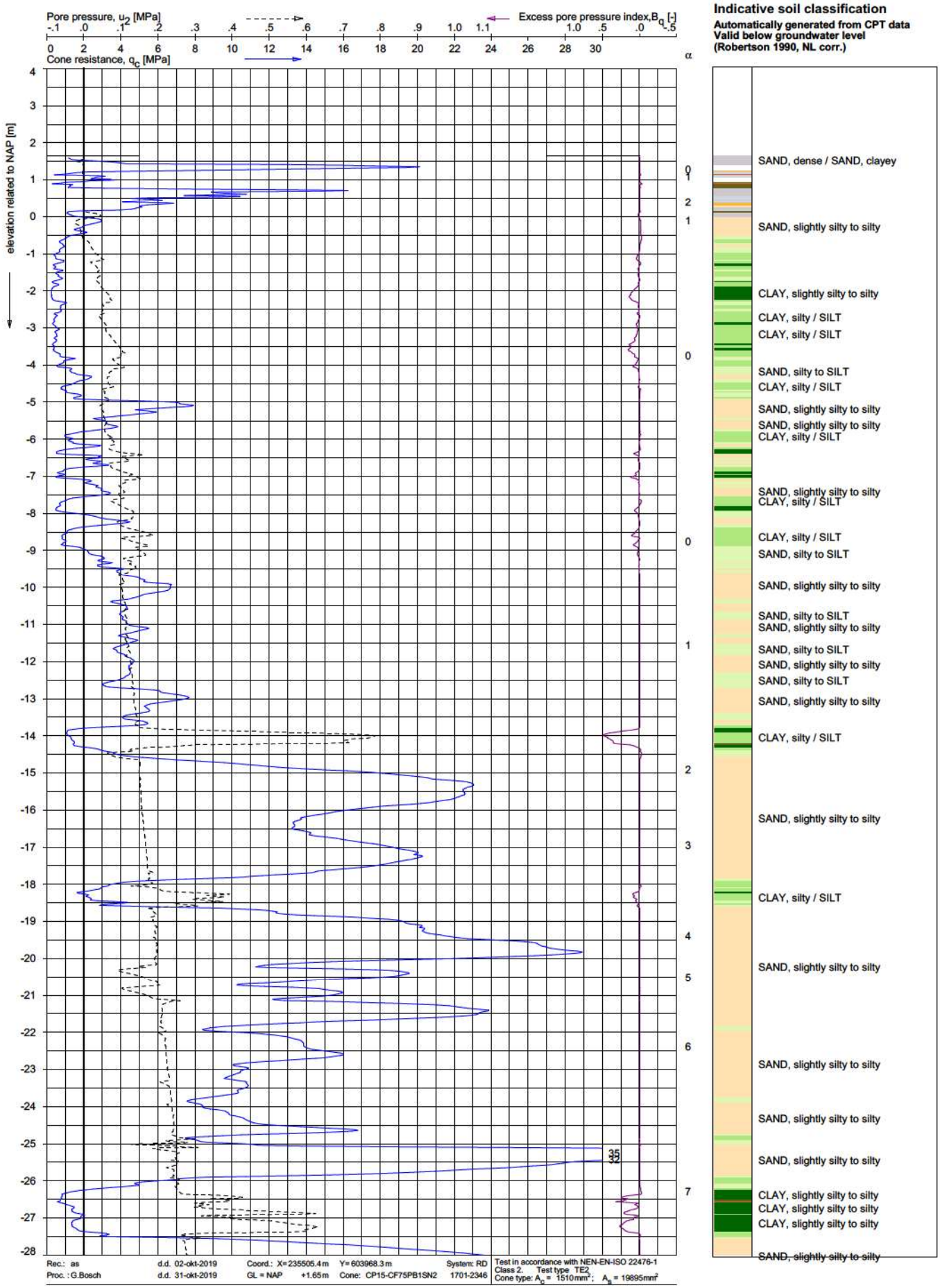
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

	SAND, slightly silty to silty

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

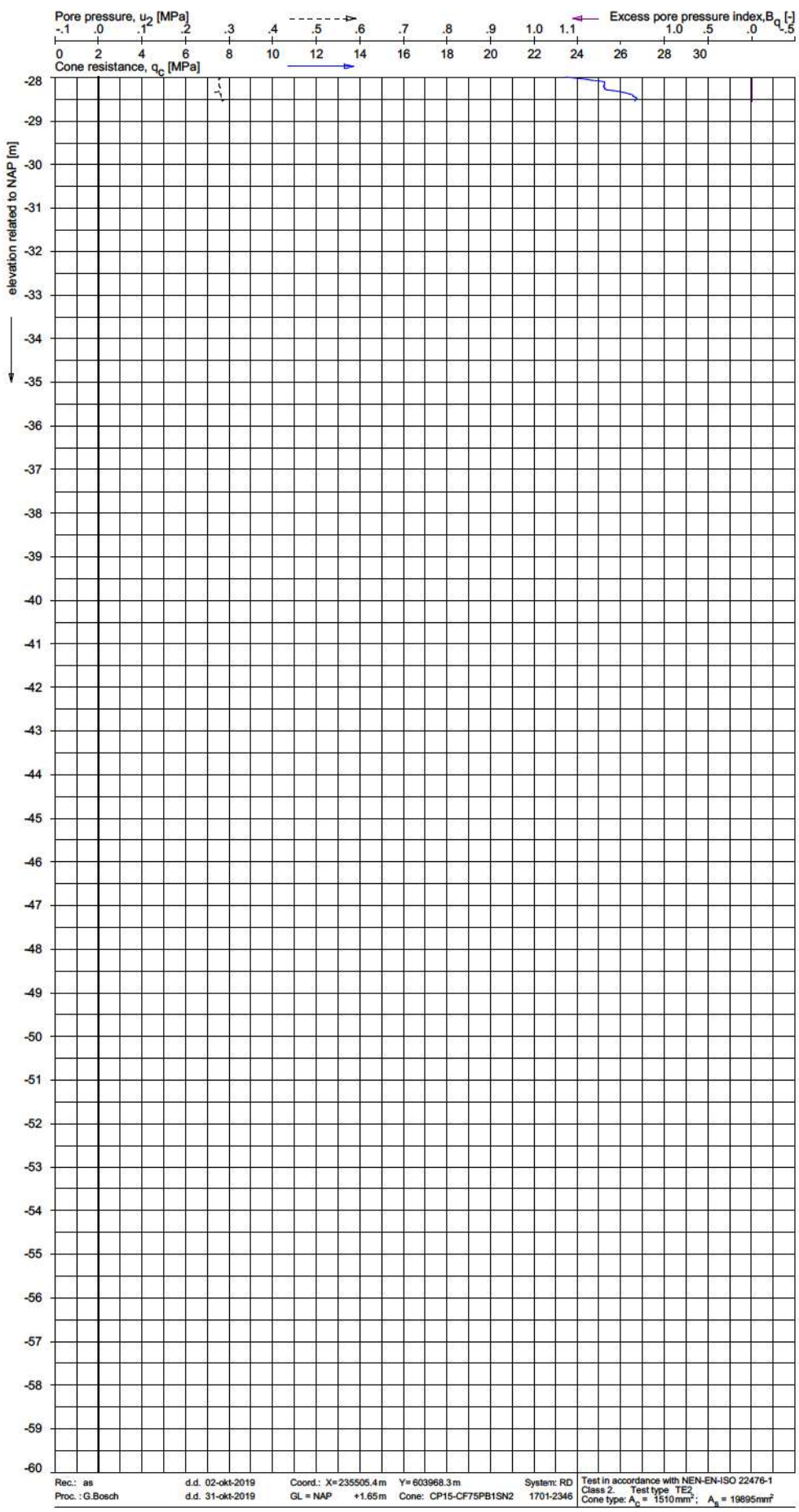
Proj. 1019-153172
Cpt SCPT_G03



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G03



Rec.: as d.d. 02-okt-2019 Coord.: X= 235505.4 m Y= 603968.3 m System: RD
Proc.: G.Bosch d.d. 31-okt-2019 GL = NAP +1.65 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

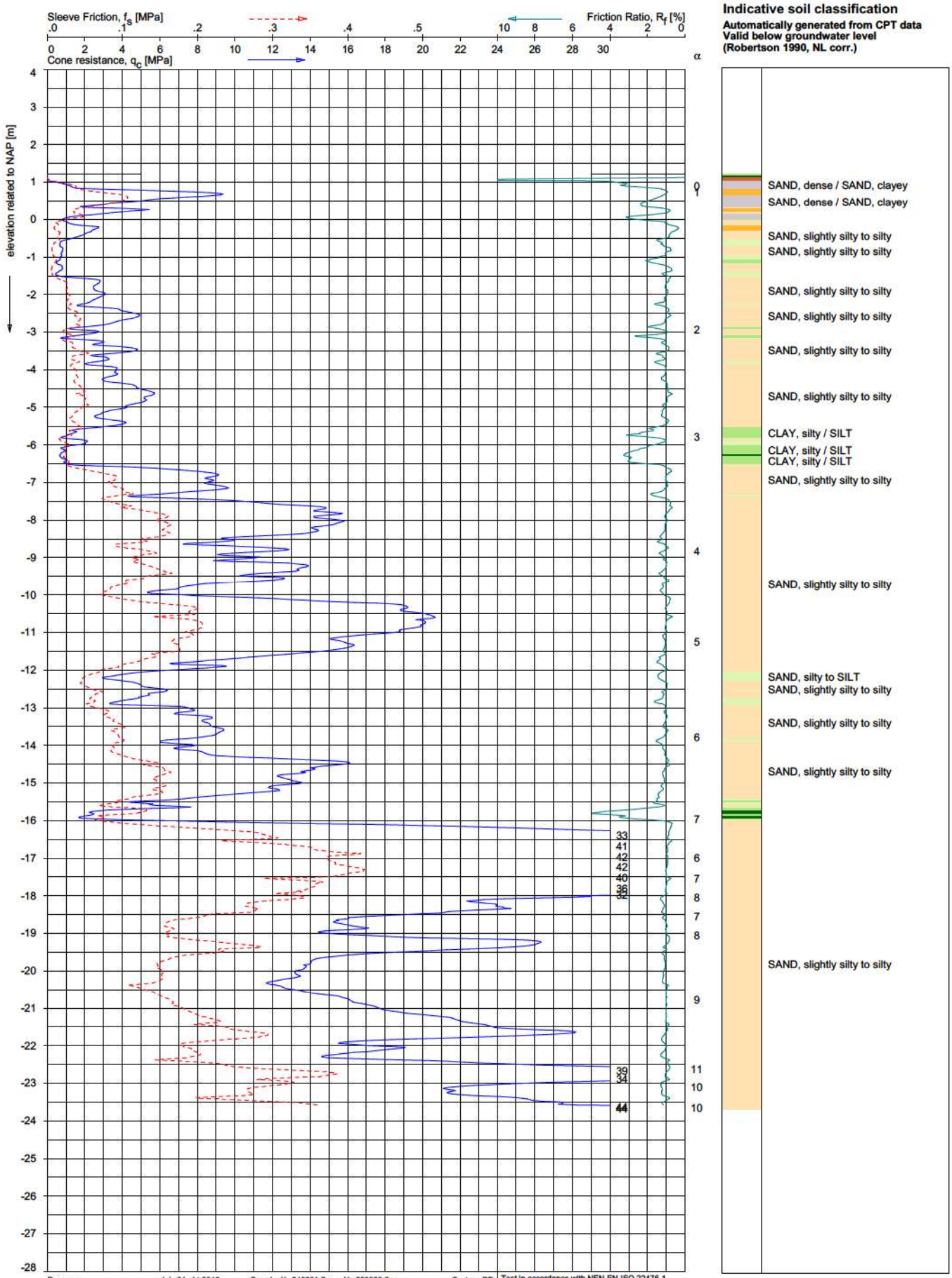
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

	SAND, slightly silty to silty

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G03



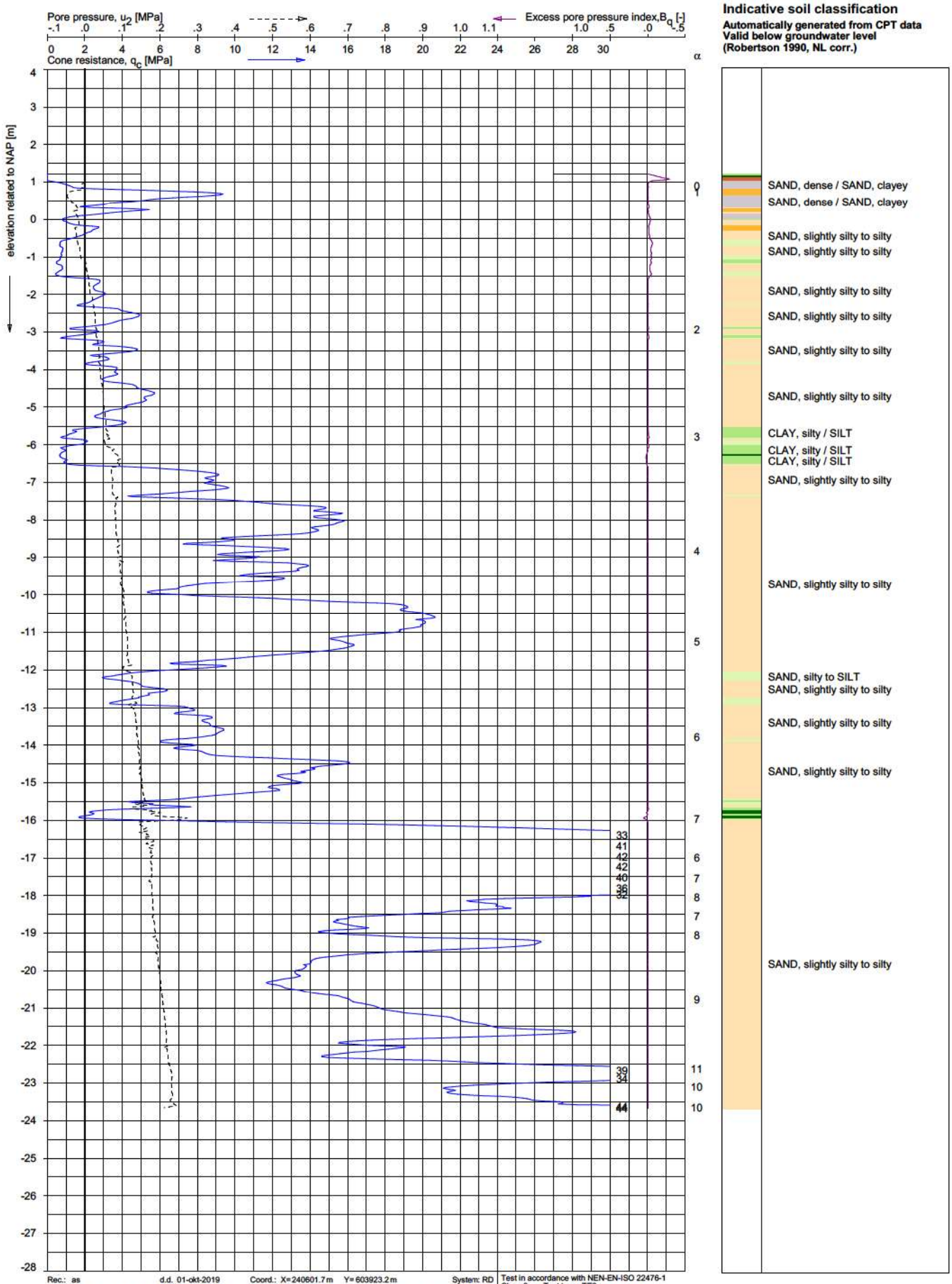
Rec.: as d.d. 01-okt-2019 Coord.: X= 240601.7 m Y= 603923.2 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G04



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND, dense / SAND, clayey
- SAND, dense / SAND, clayey
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, silty to SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty

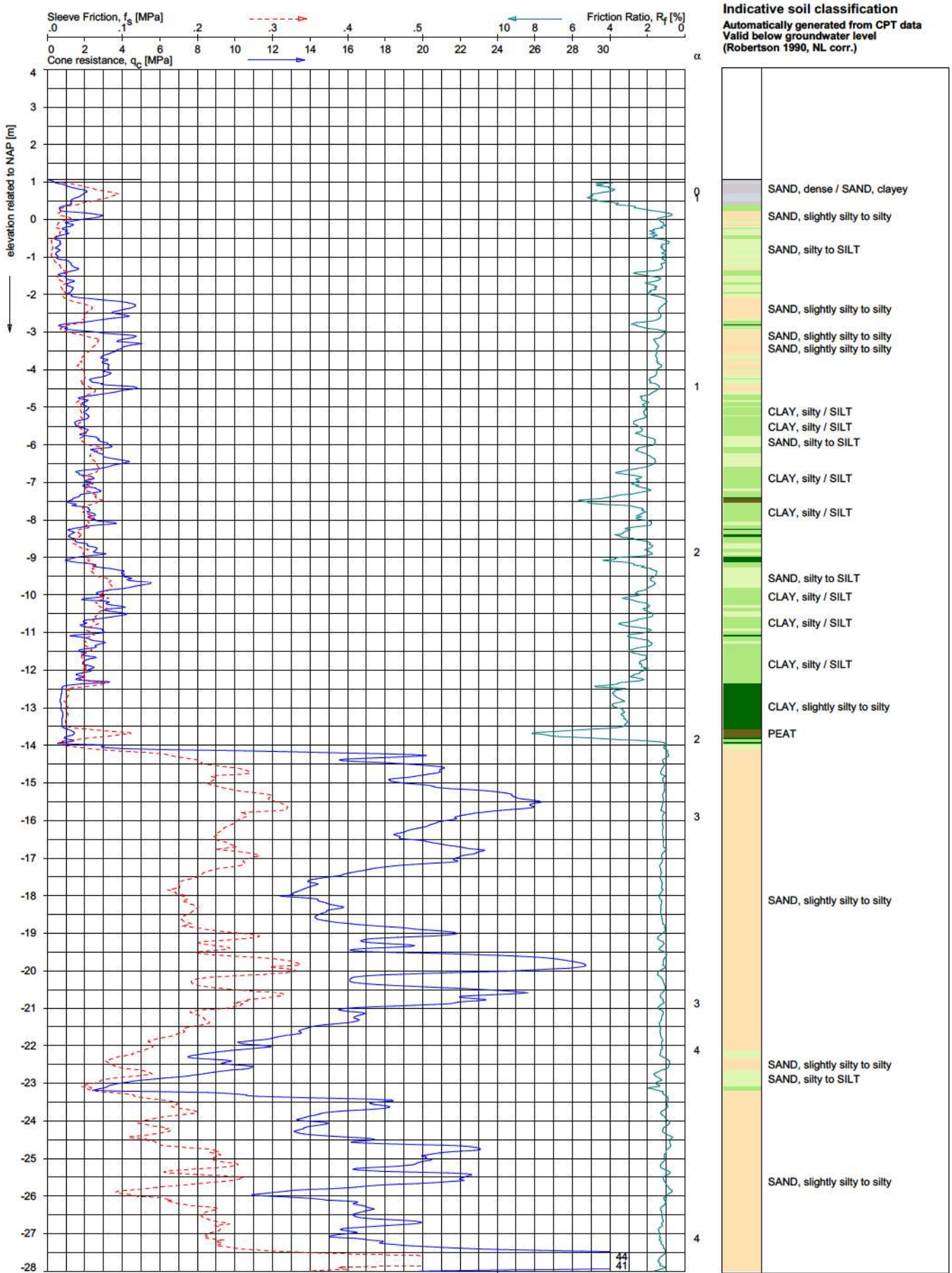
Rec.: as d.d. 01-okt-2019 Coord.: X= 240601.7 m Y= 603923.2 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G04



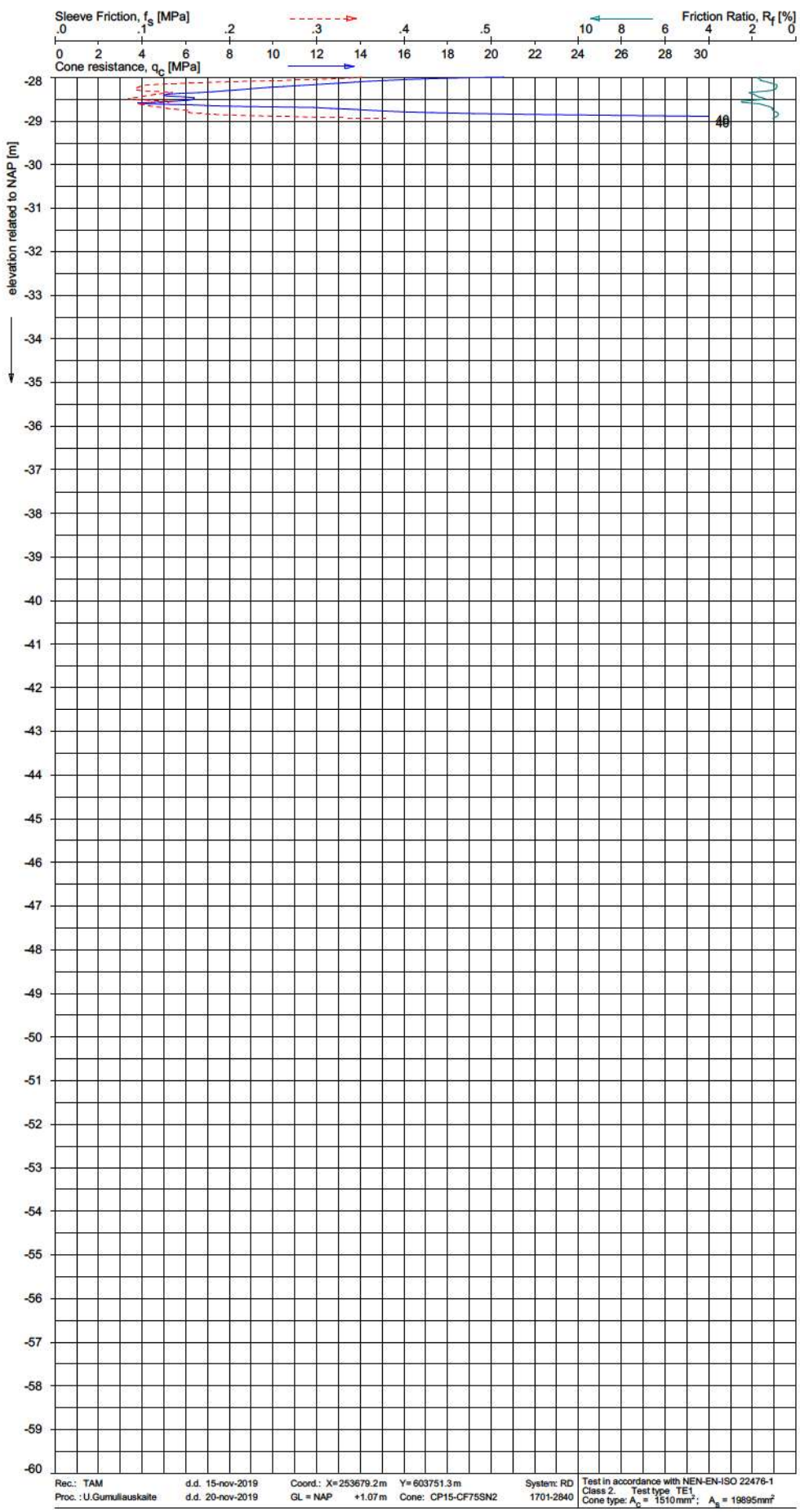
Rec.: TAM d.d. 15-nov-2019 Coord.: X= 253679.2 m Y= 603751.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP +1.07 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

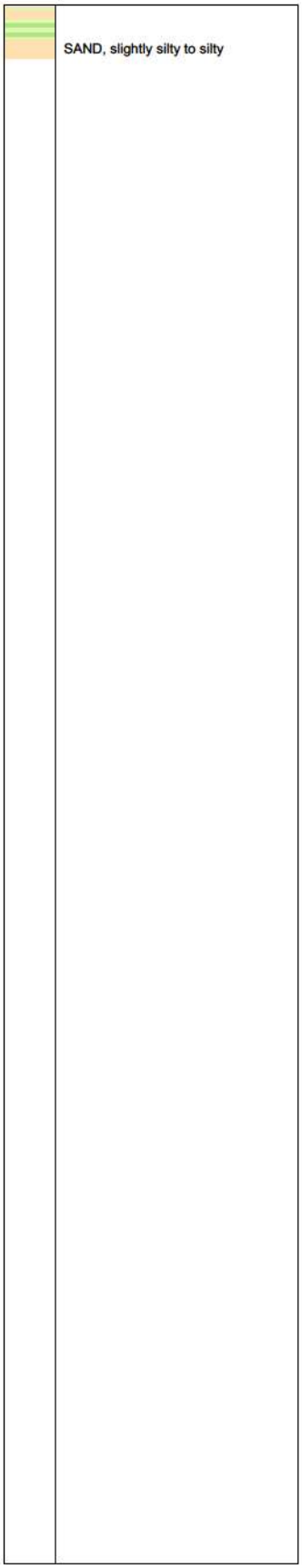
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G06



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



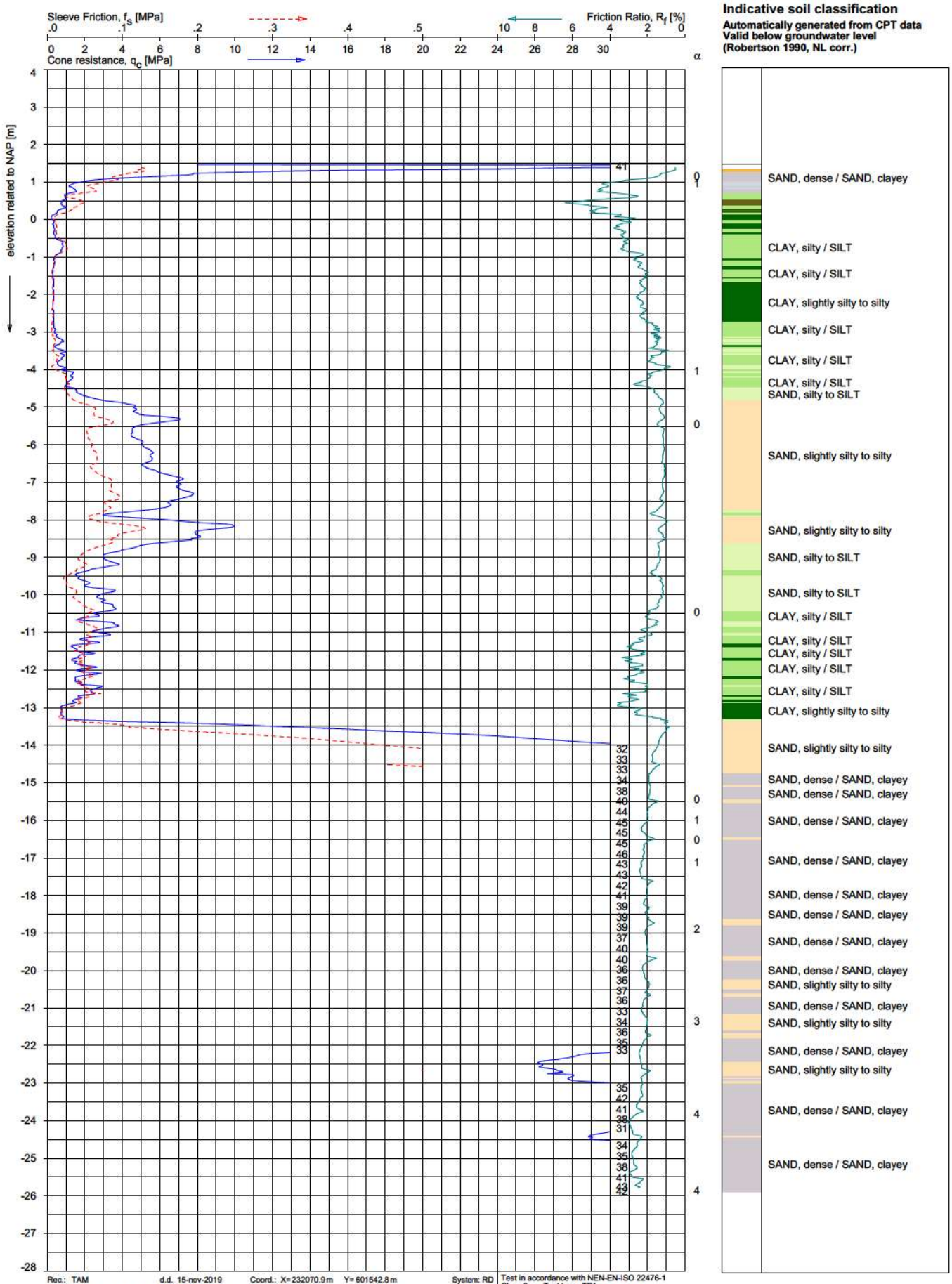
Rec.: TAM d.d. 15-nov-2019 Coord.: X= 253679.2 m Y= 603751.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP +1.07 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

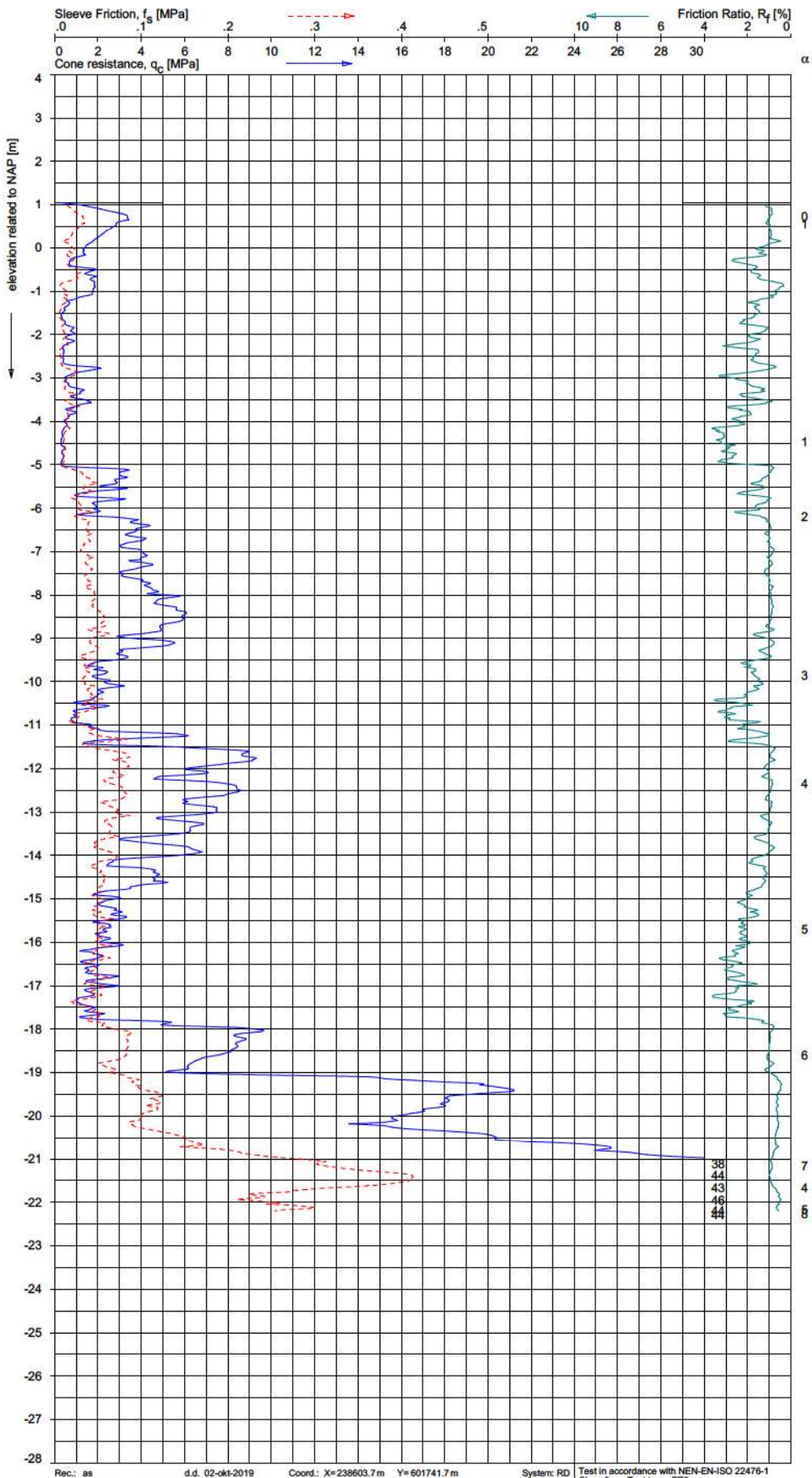
Proj. 1019-153172
Cpt CPT_G06



CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G07



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND to SAND, gravelly
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND, silty to SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, silty to SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- CLAY, silty / SILT
- SAND, silty to SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND to SAND, gravelly

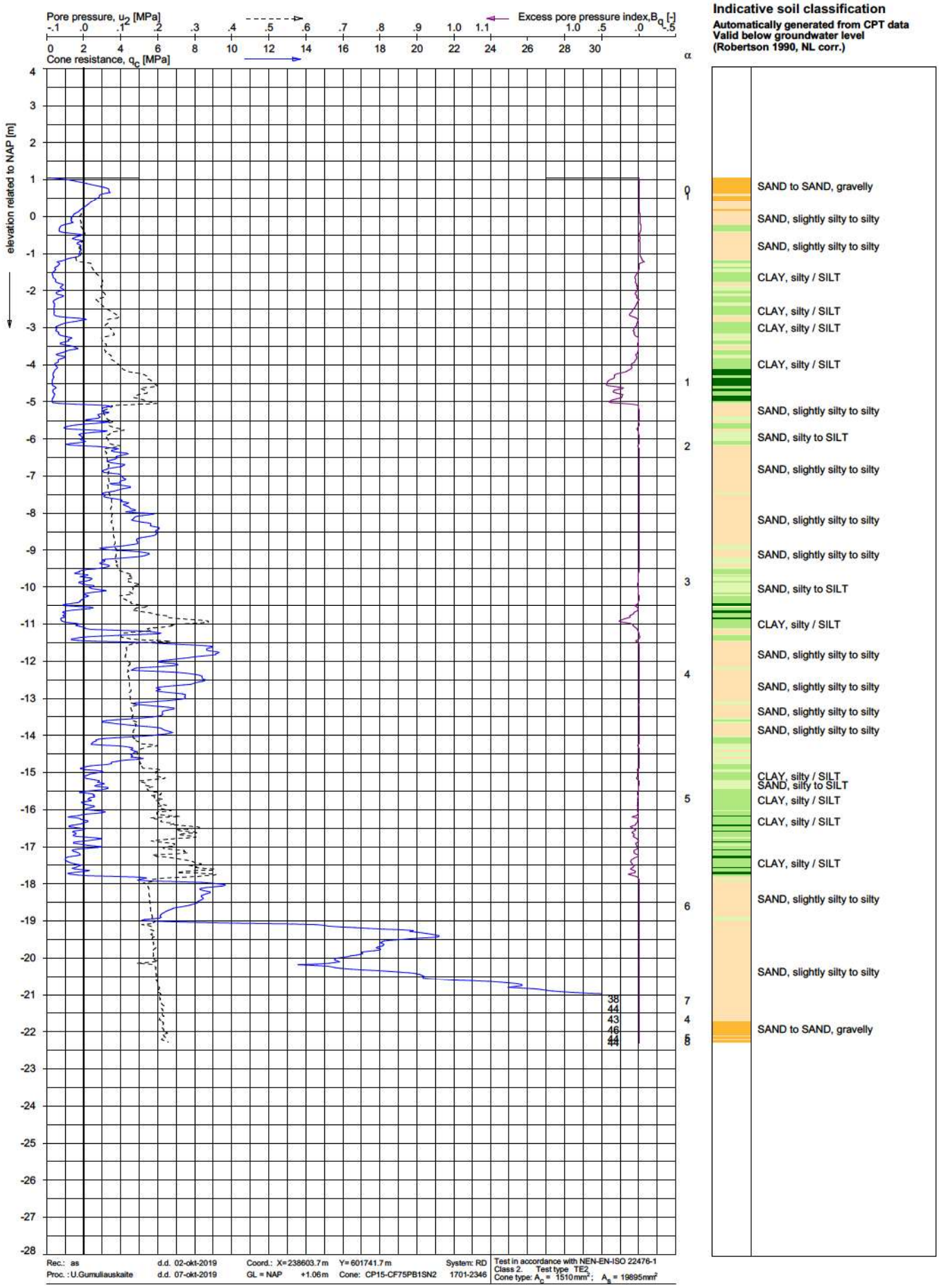
Rec.: as d.d. 02-okt-2019 Coord.: X= 238603.7 m Y= 601741.7 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.06 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G08



PIEZO CONE PENETRATION TEST

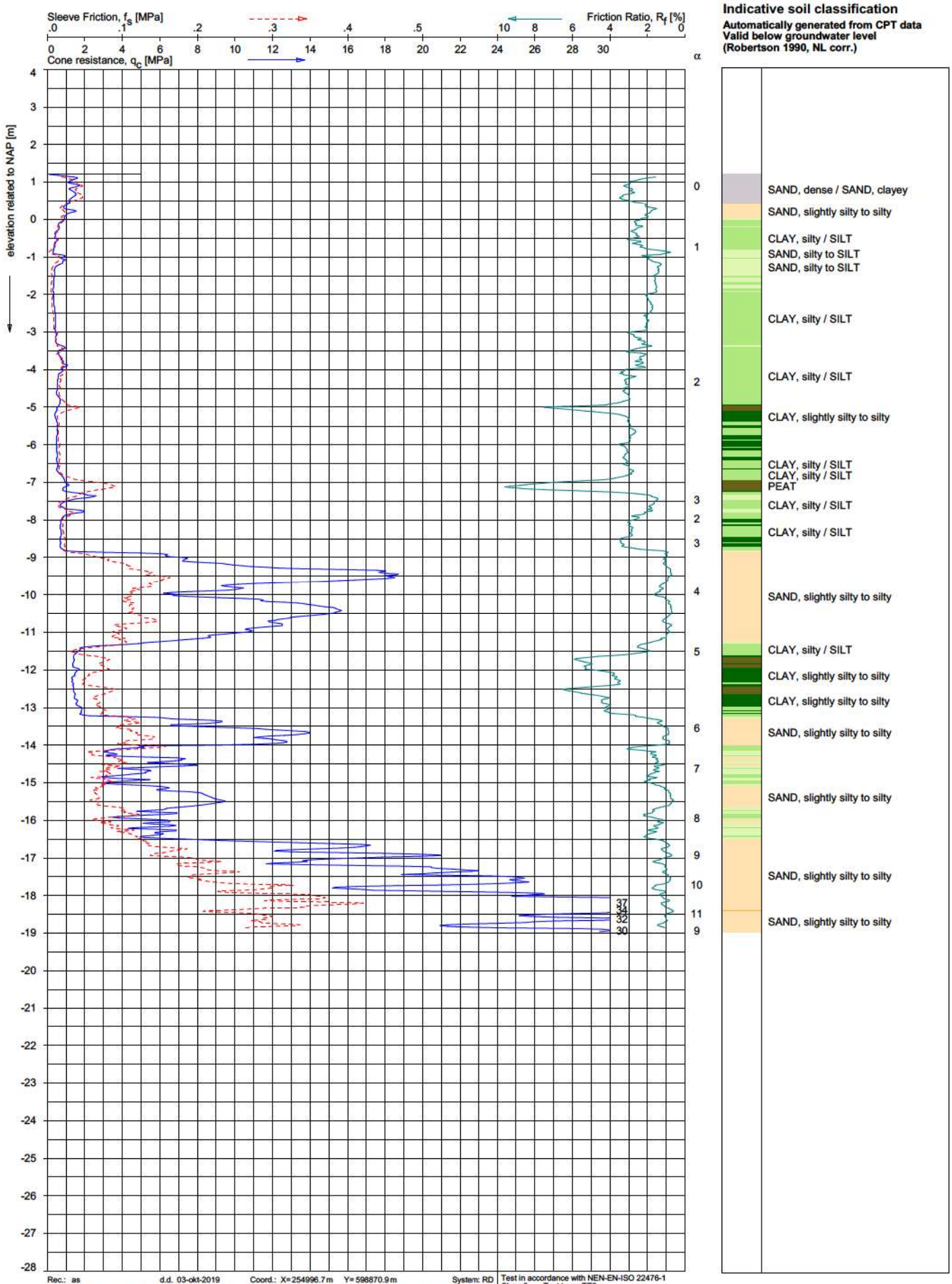
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G08

UNIPLOT 05.36.nl / Qdu2Class-R3.ucf / 2019-11-01 08:35:33

1019-153172

SCPT_G08 -1



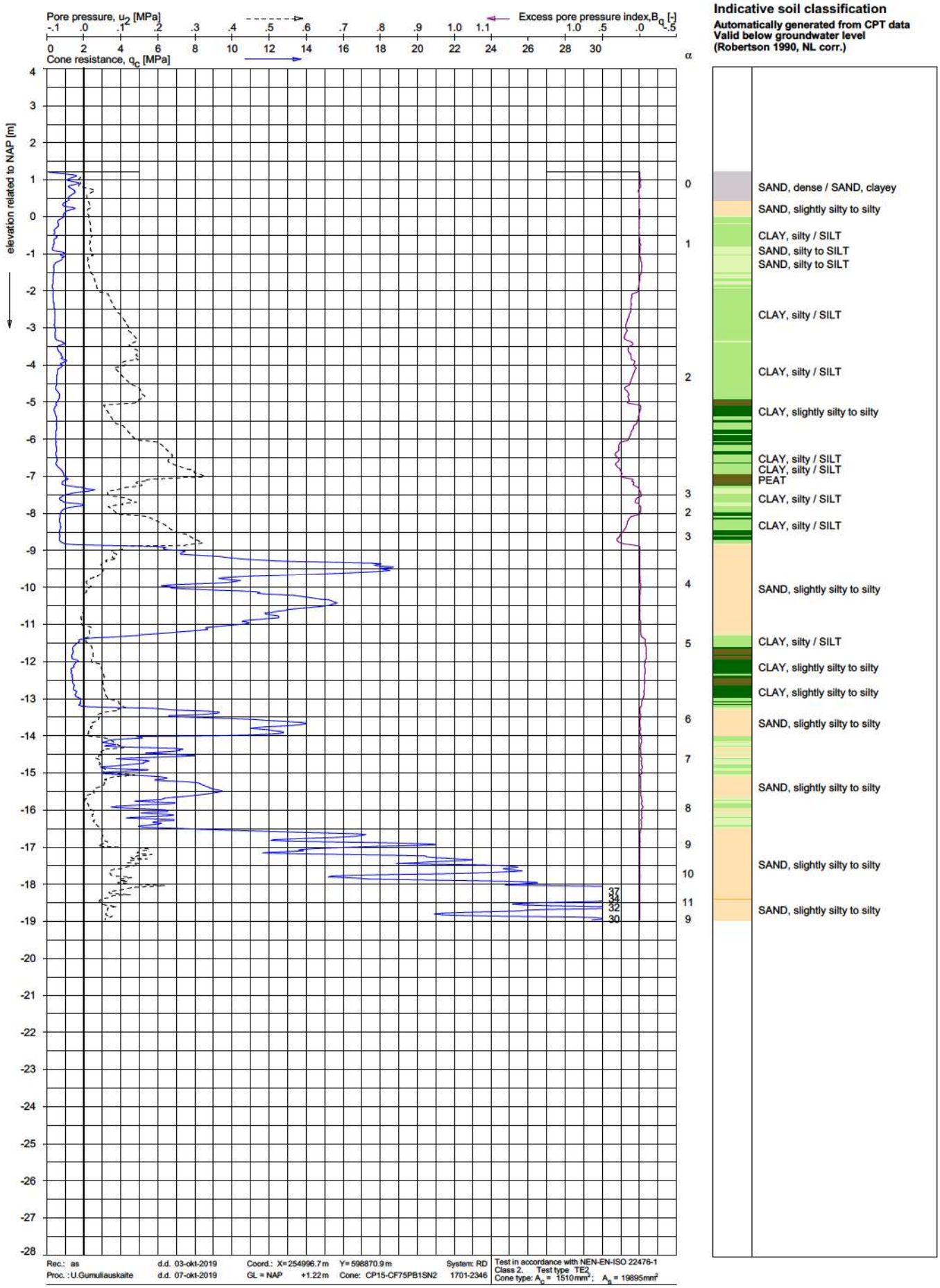
Rec.: as d.d. 03-okt-2019 Coord.: X= 254996.7 m Y= 598870.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G11



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND, dense / SAND, clayey
- SAND, slightly silty to silty
- CLAY, silty / SILT
- SAND, silty to SILT
- SAND, silty to SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, slightly silty to silty
- CLAY, silty / SILT
- CLAY, silty / SILT
- PEAT
- CLAY, silty / SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- CLAY, silty / SILT
- CLAY, slightly silty to silty
- CLAY, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty

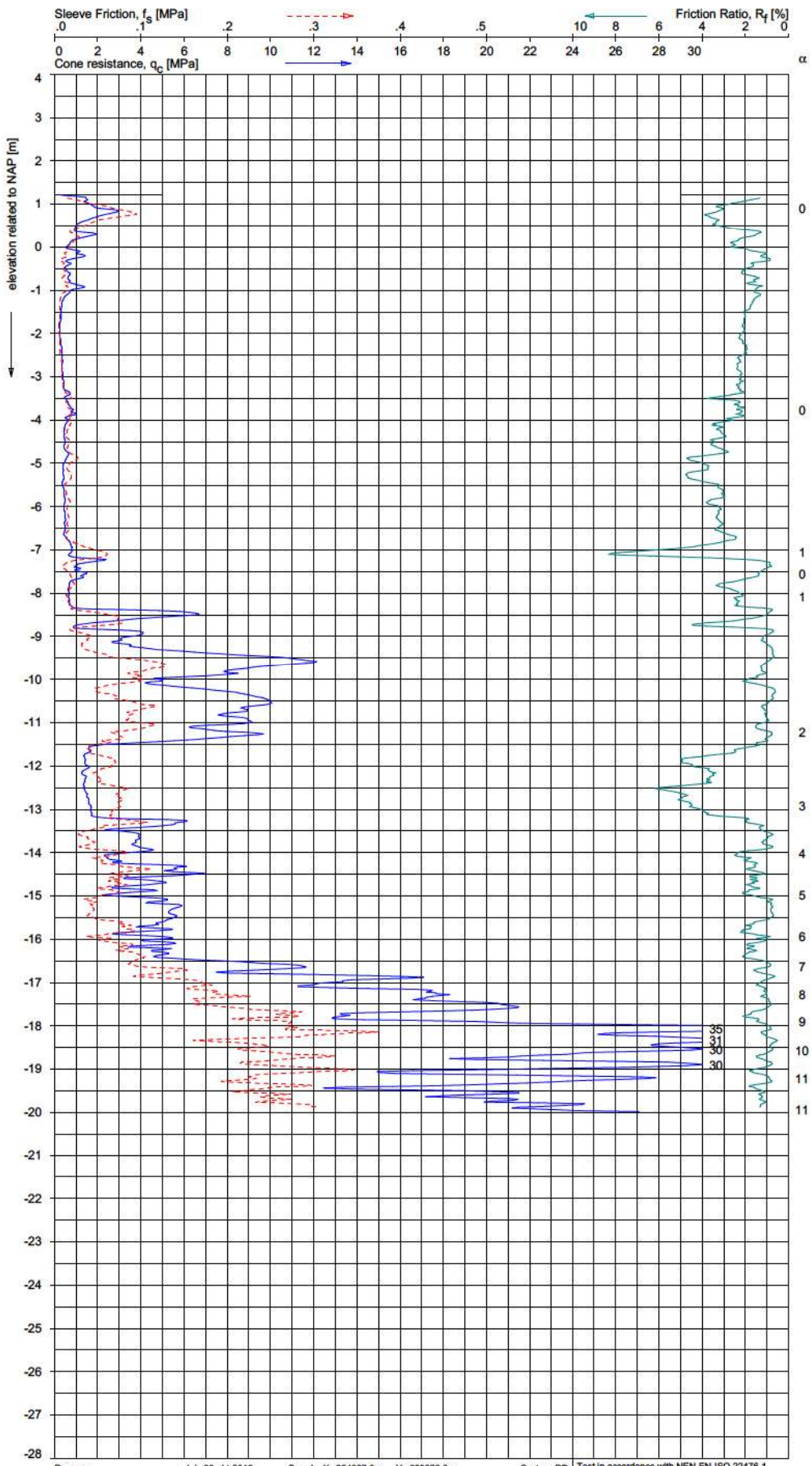
Rec.: as d.d. 03-okt-2019 Coord.: X= 254996.7 m Y= 598870.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

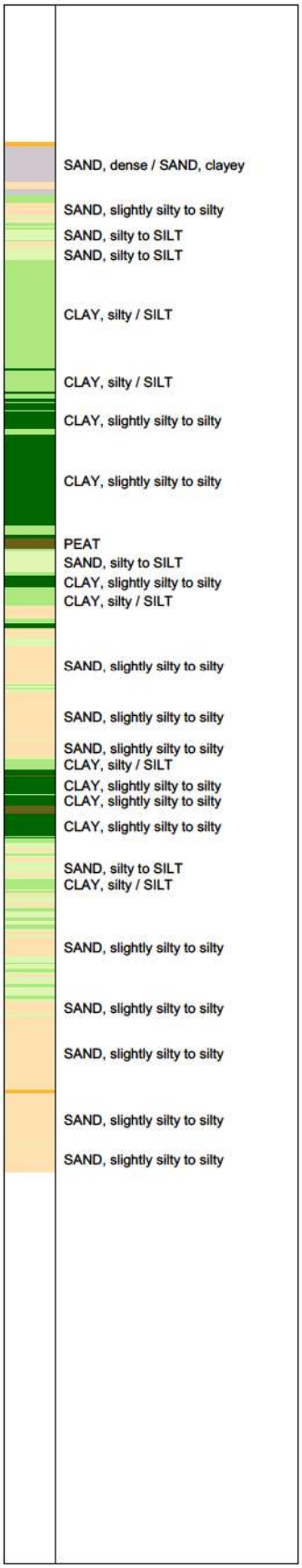
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G11



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



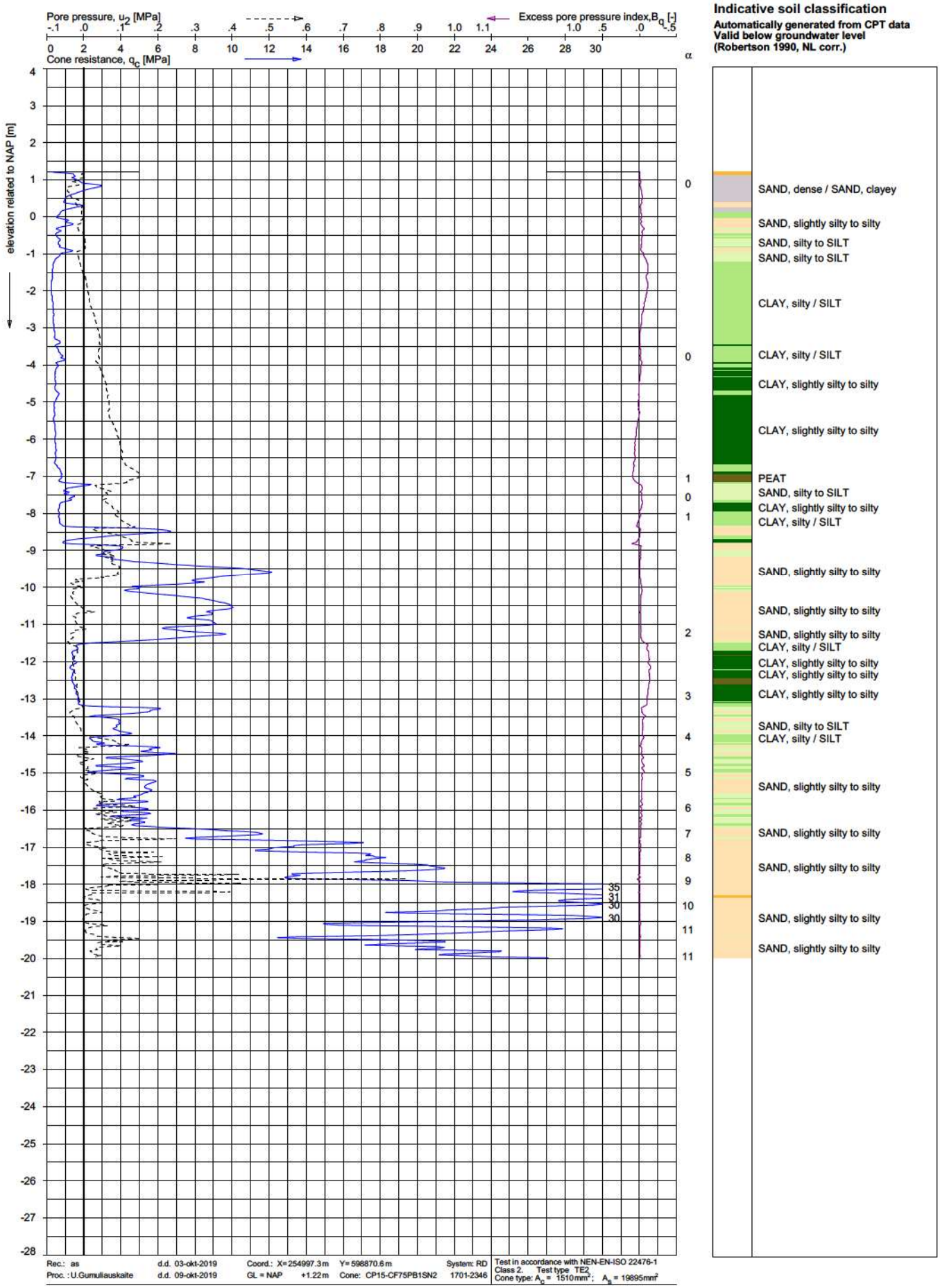
Rec.: as d.d. 03-okt-2019 Coord.: X= 254997.3 m Y= 598870.6 m System: RD
Proc. : U.Gumuliauskaite d.d. 09-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G11A



Rec.: as d.d. 03-okt-2019 Coord.: X= 254997.3 m Y= 598870.6 m System: RD
Proc. : U.Gumuliauskaite d.d. 09-okt-2019 GL = NAP +1.22 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G11A

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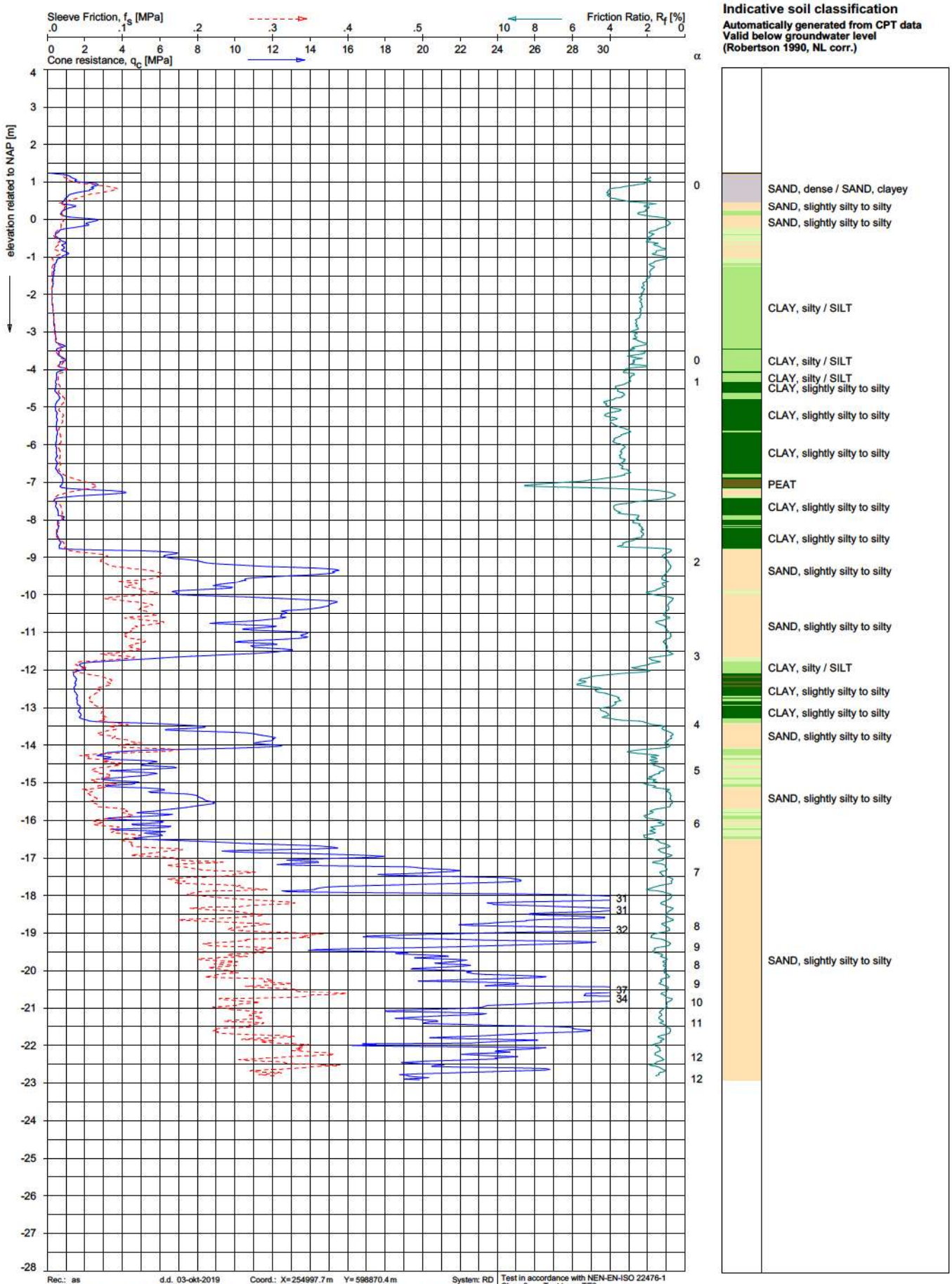
1019-153172

SCPT_G11A -1



Rec.: as d.d. 03-okt-2019 Coord.: X= 254997.7 m Y= 598870.4 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.24 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

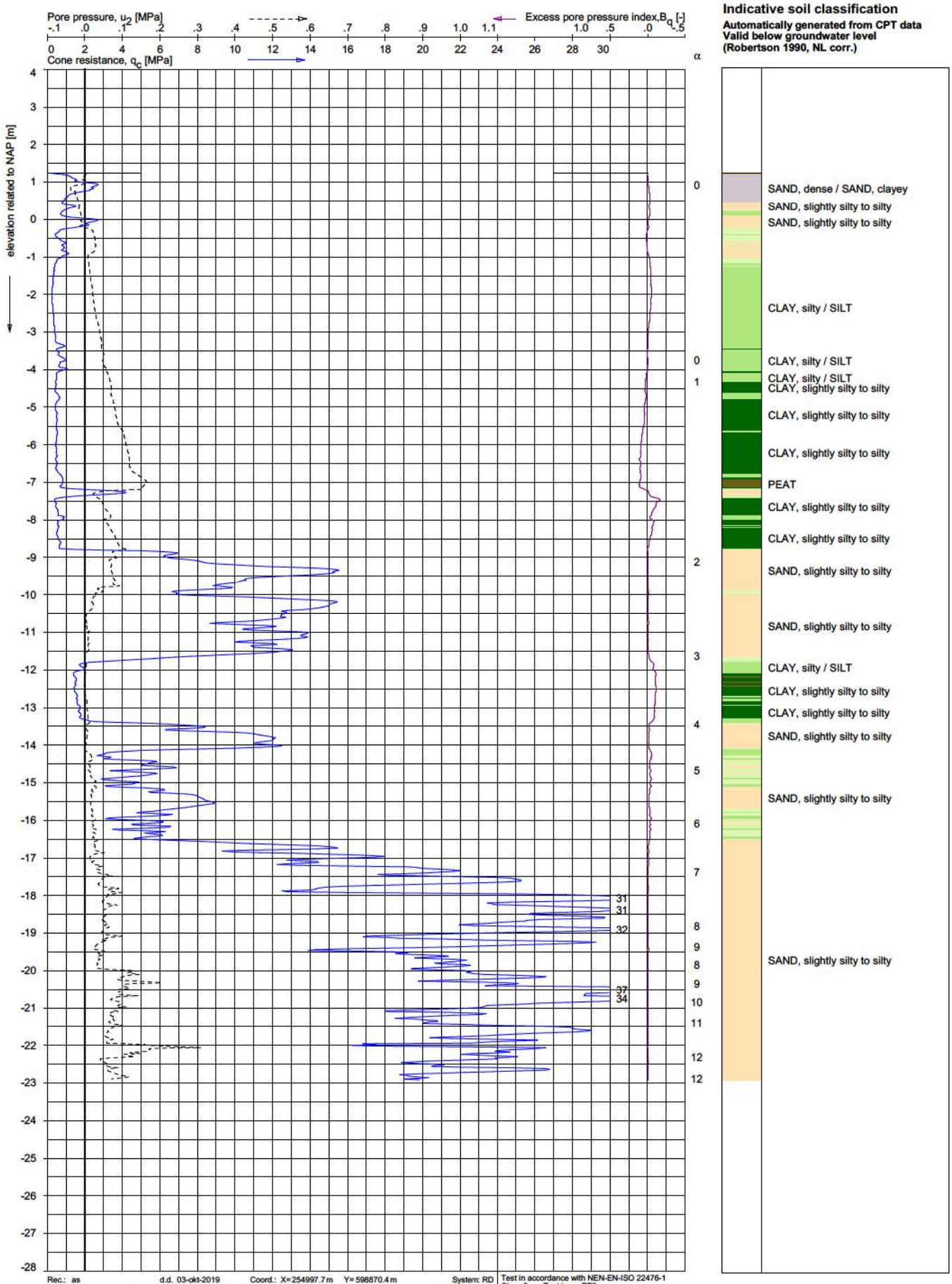
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G11B

UNIPLOT 05.36.nl / QoFaClass-R3.usf / 2019-11-01 08:06:37

1019-153172

SCPT_G11B - 1



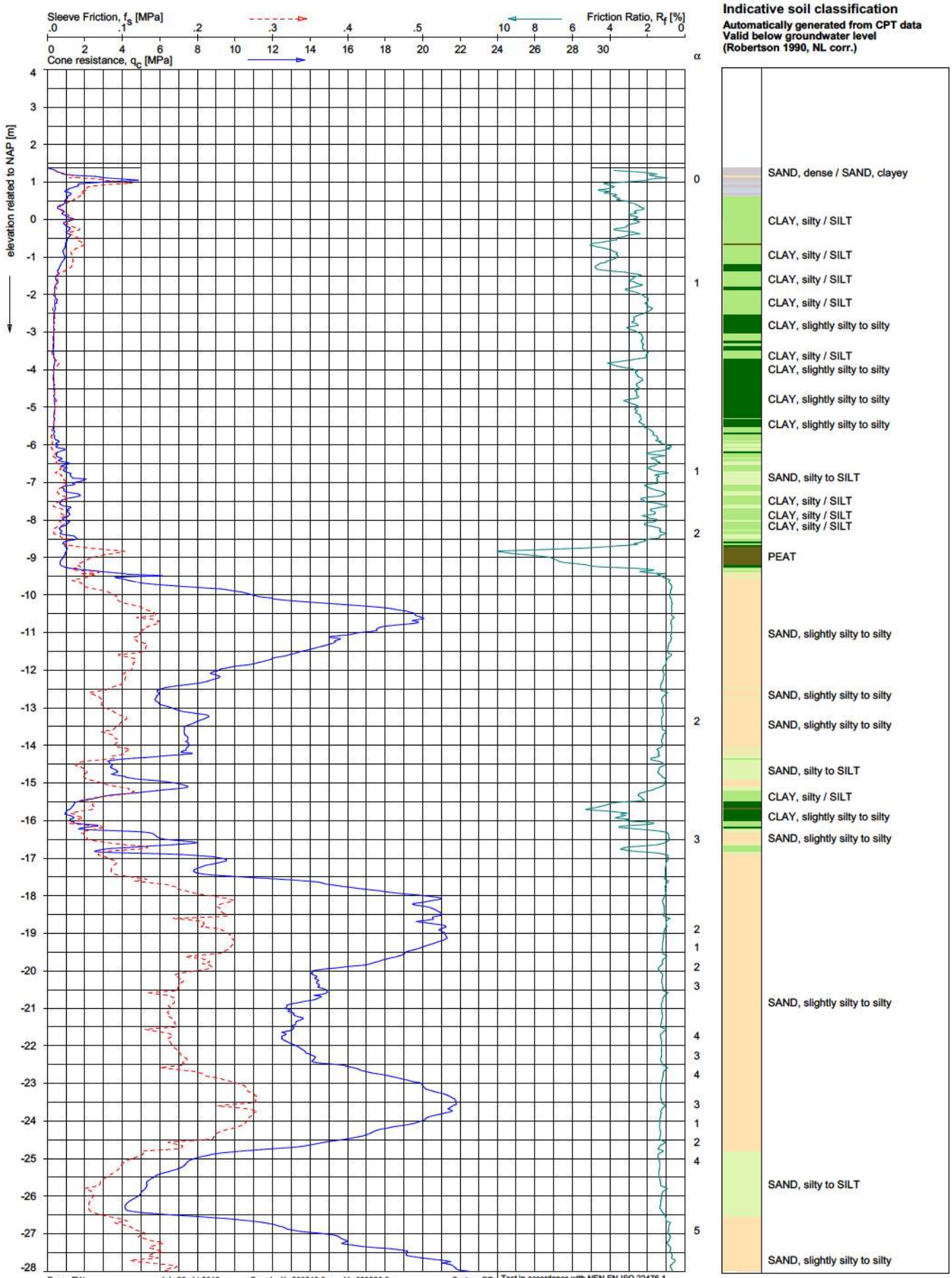
Rec.: as d.d. 03-okt-2019 Coord.: X= 254997.7 m Y= 598870.4 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +1.24 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G11B



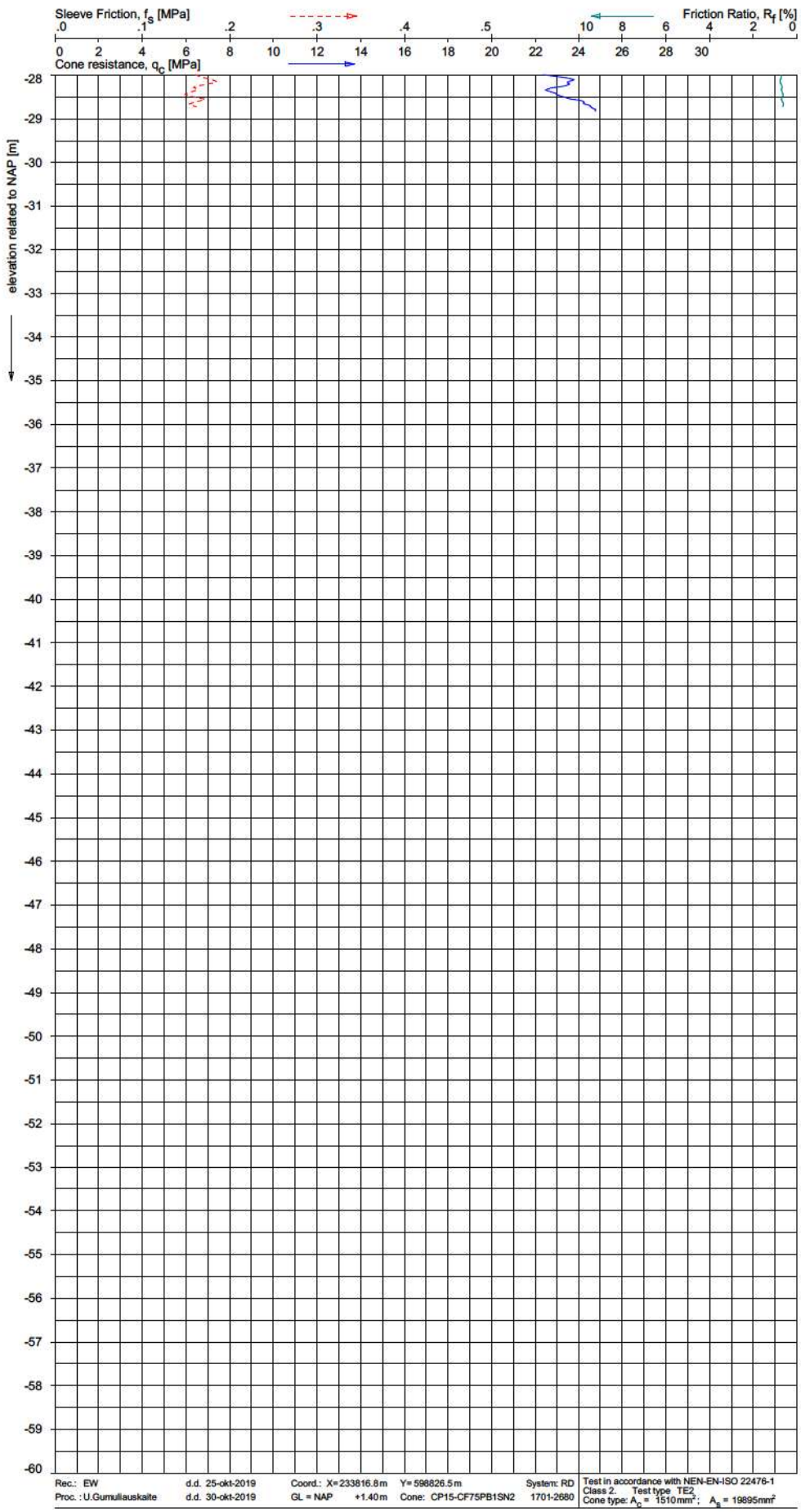
Rec.: EW d.d. 25-okt-2019 Coord.: X= 233816.8 m Y= 598826.5 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +1.40 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G12



Rec.: EW d.d. 25-okt-2019 Coord.: X= 233816.8 m Y= 598826.5 m System: RD

Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +1.40 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

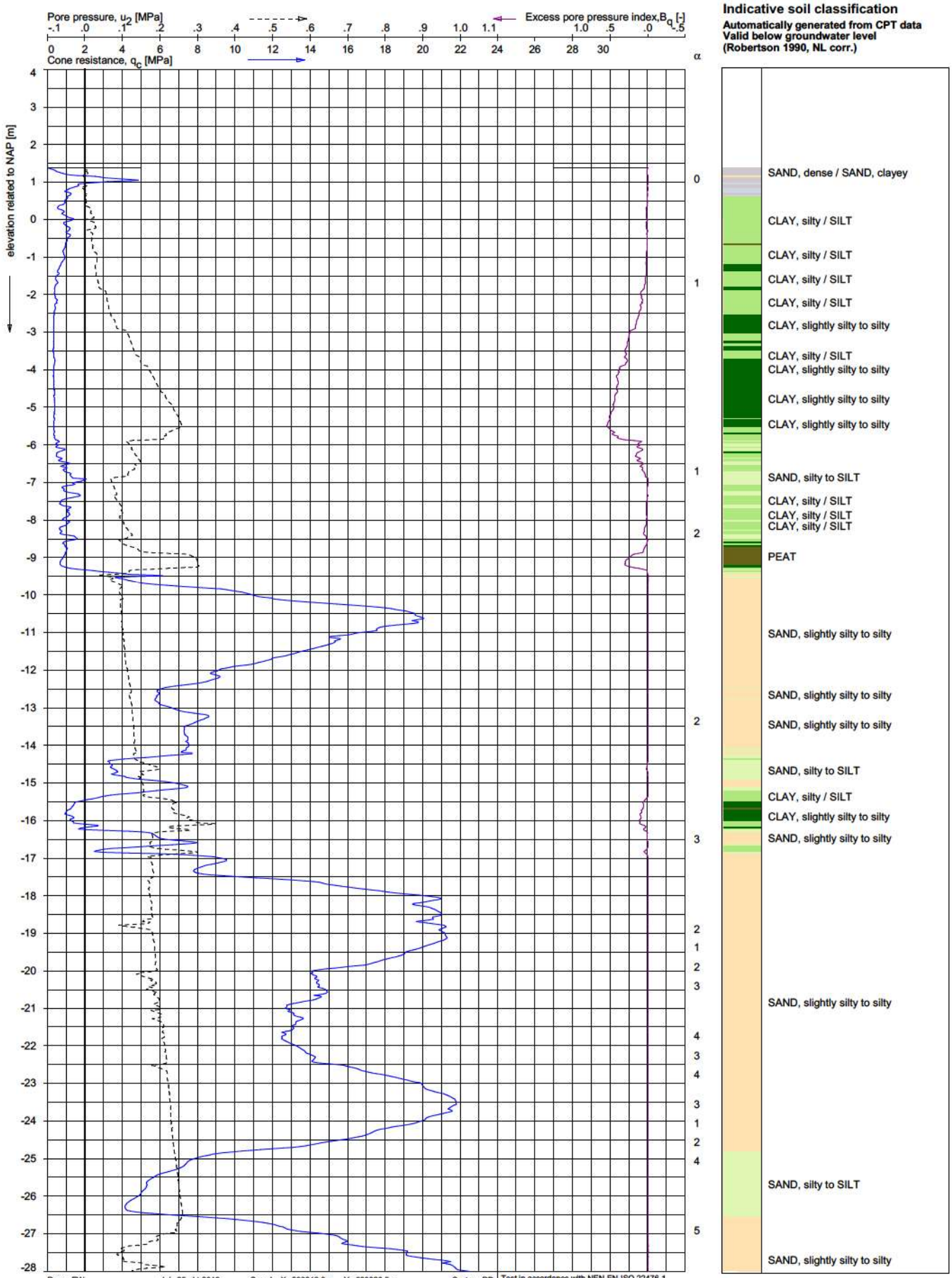
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

	SAND, slightly silty to silty

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G12



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND, dense / SAND, clayey
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, slightly silty to silty
- CLAY, silty / SILT
- CLAY, slightly silty to silty
- CLAY, slightly silty to silty
- CLAY, slightly silty to silty
- SAND, silty to SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- PEAT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, silty to SILT
- CLAY, silty / SILT
- CLAY, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, silty to SILT
- SAND, slightly silty to silty

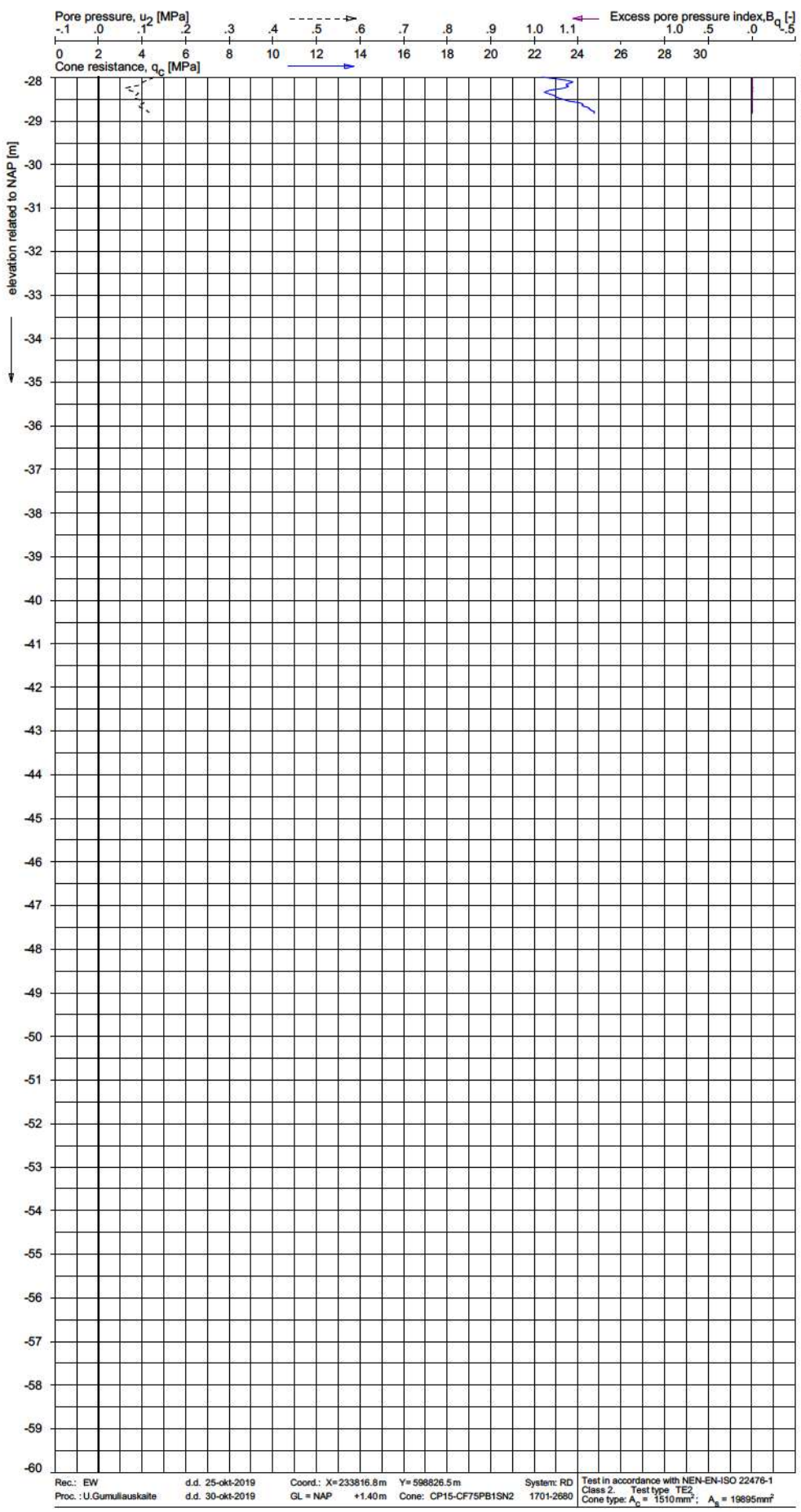
Rec.: EW d.d. 25-okt-2019 Coord.: X= 233816.8 m Y= 598826.5 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +1.40 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G12



Rec.: EW d.d. 25-okt-2019 Coord.: X=233816.8m Y=598826.5m System: RD
Proc.: U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +1.40m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510mm²; A_s = 19895mm²

Indicative soil classification

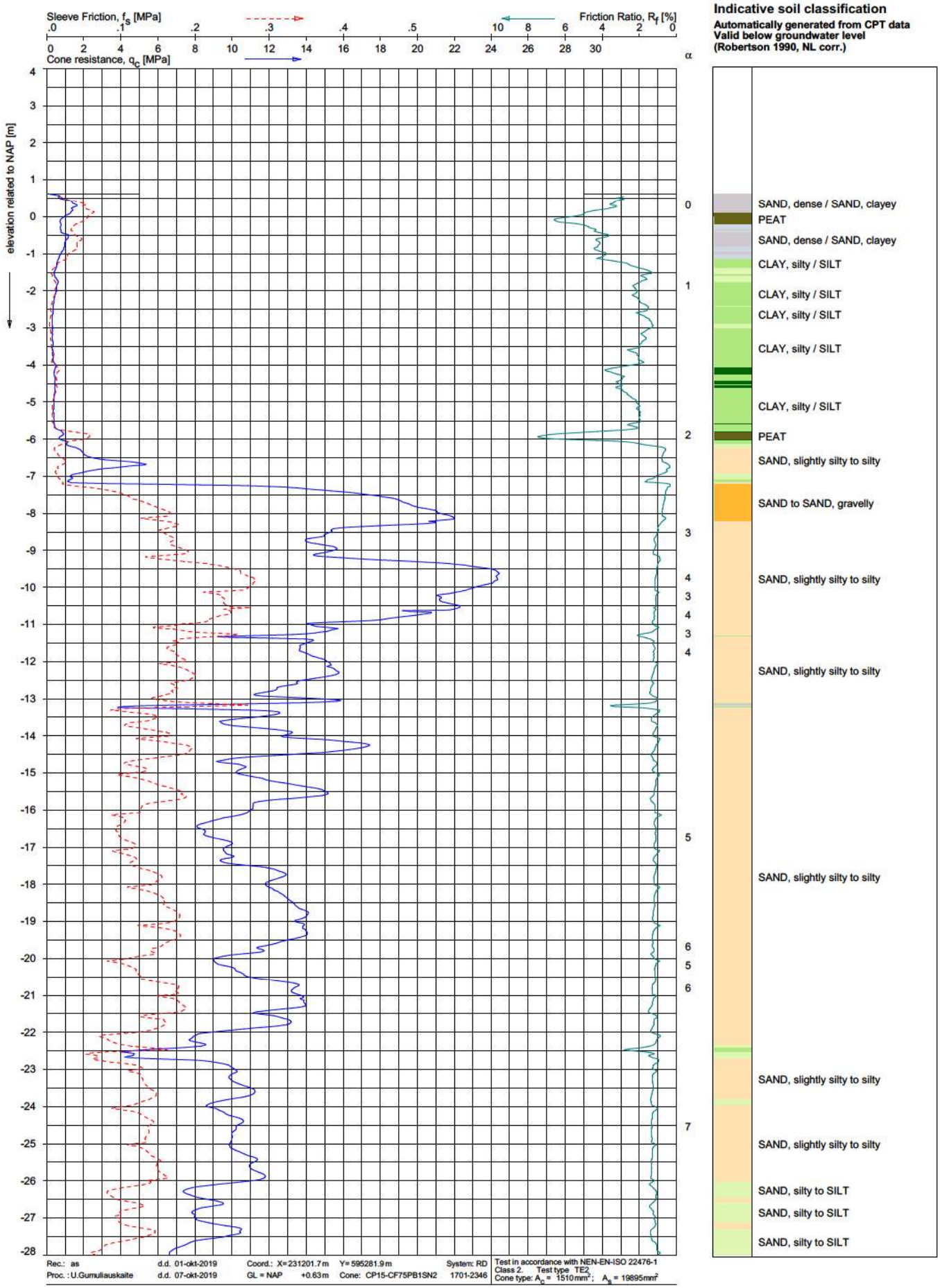
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

	SAND, slightly silty to silty

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G12



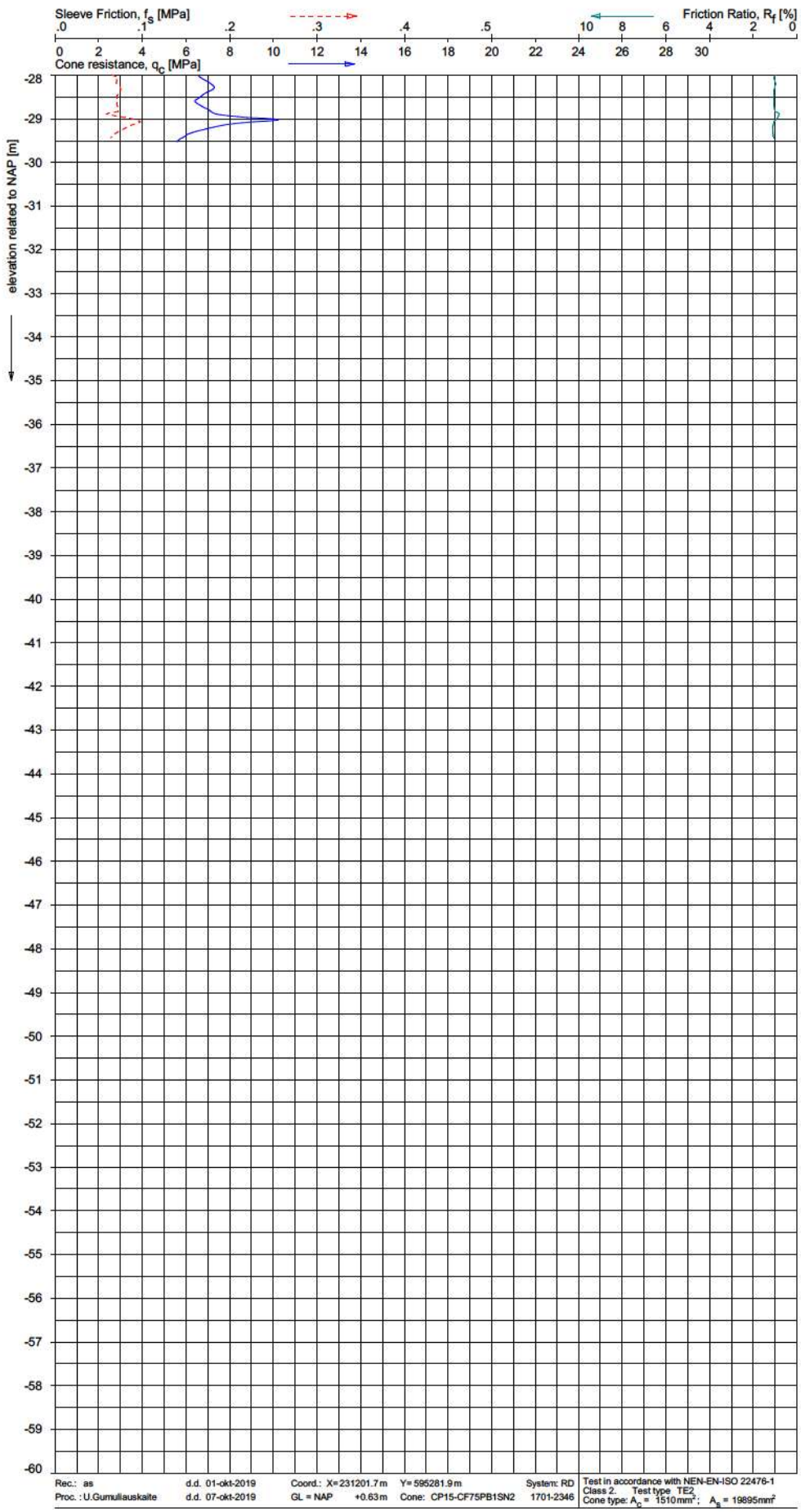
Rec.: as d.d. 01-okt-2019 Coord.: X= 231201.7 m Y= 595281.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +0.63 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

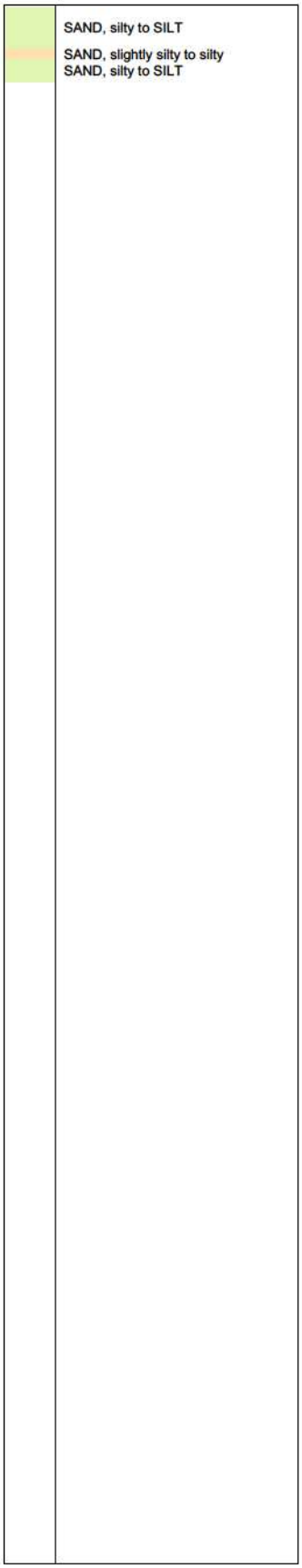
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G16



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



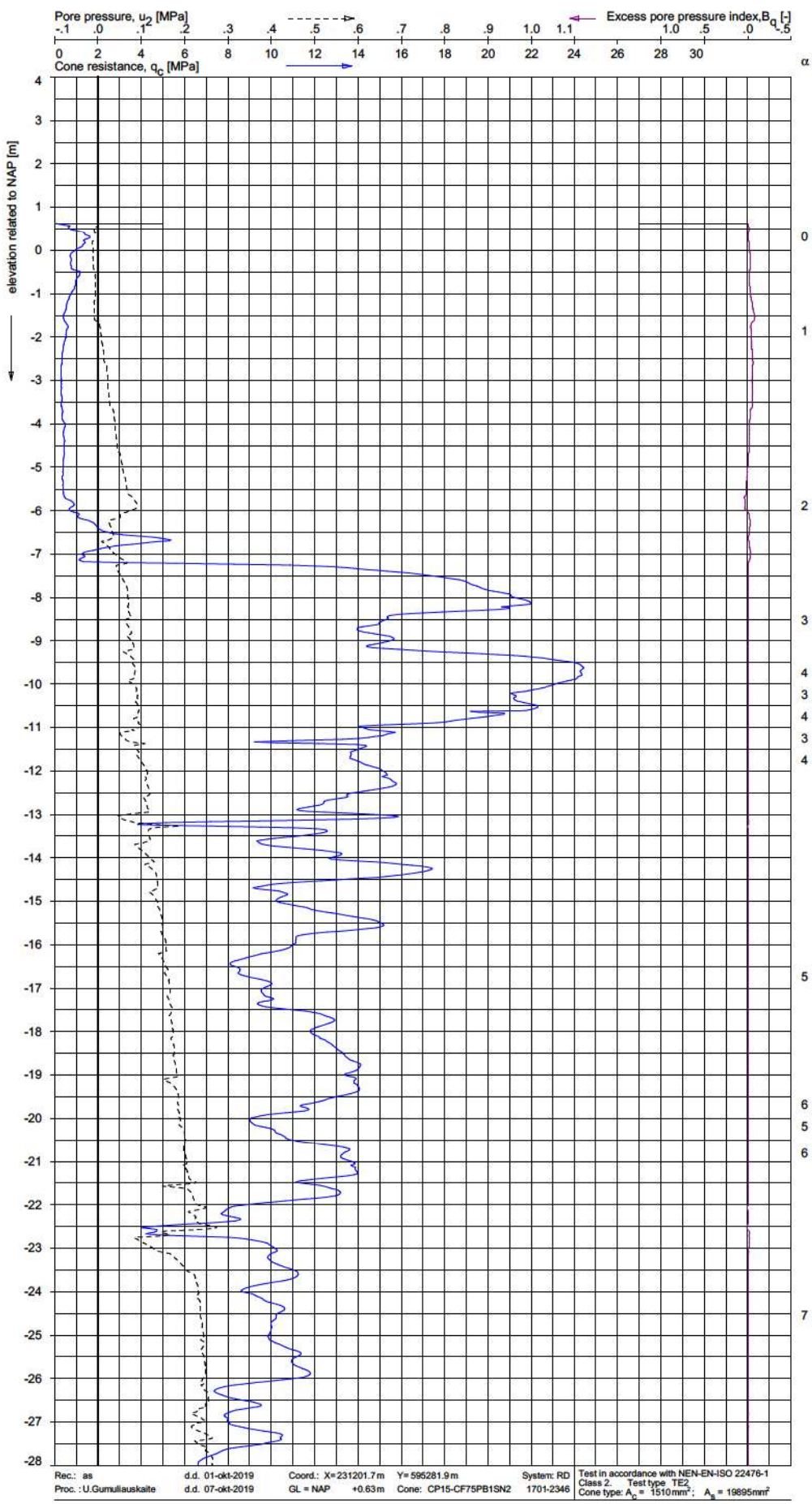
Rec.: as d.d. 01-okt-2019 Coord.: X= 231201.7 m Y= 595281.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +0.63 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

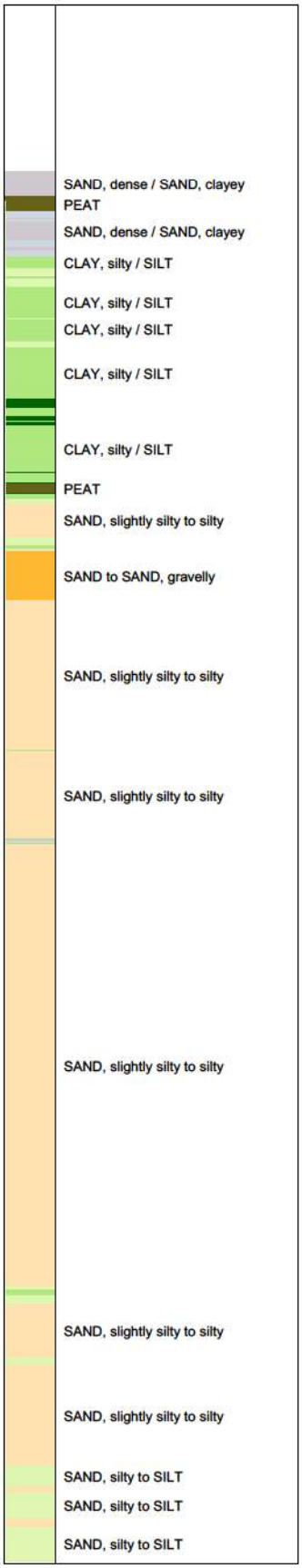
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G16



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



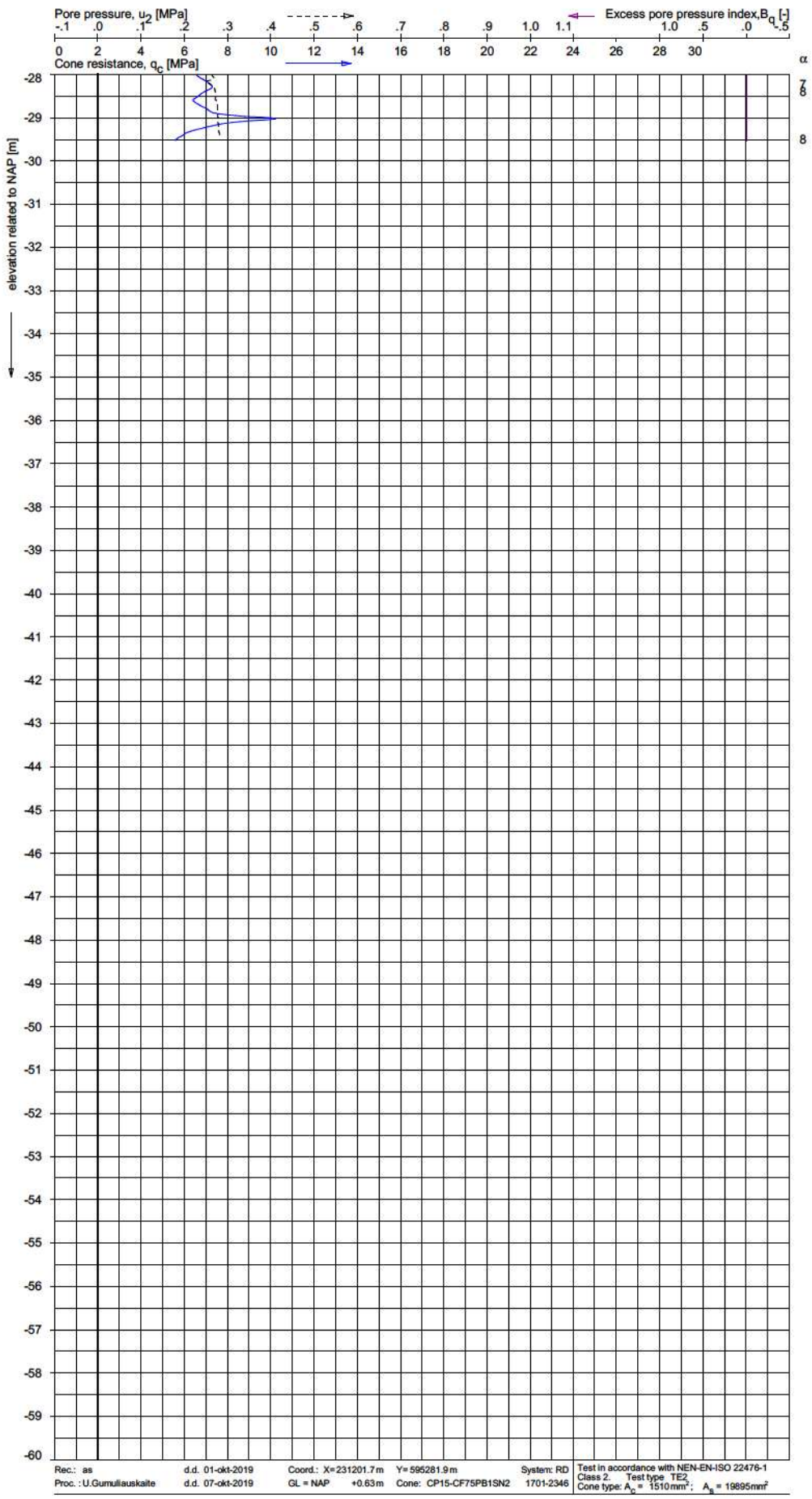
Rec.: as d.d. 01-okt-2019 Coord.: X= 231201.7 m Y= 595281.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +0.63 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G16



Rec.: as d.d. 01-okt-2019 Coord.: X= 231201.7 m Y= 595281.9 m System: RD

Proc. : U.Gumuliauskaite d.d. 07-okt-2019 GL = NAP +0.63 m Cone: CP15-CF75PB1SN2 1701-2346

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

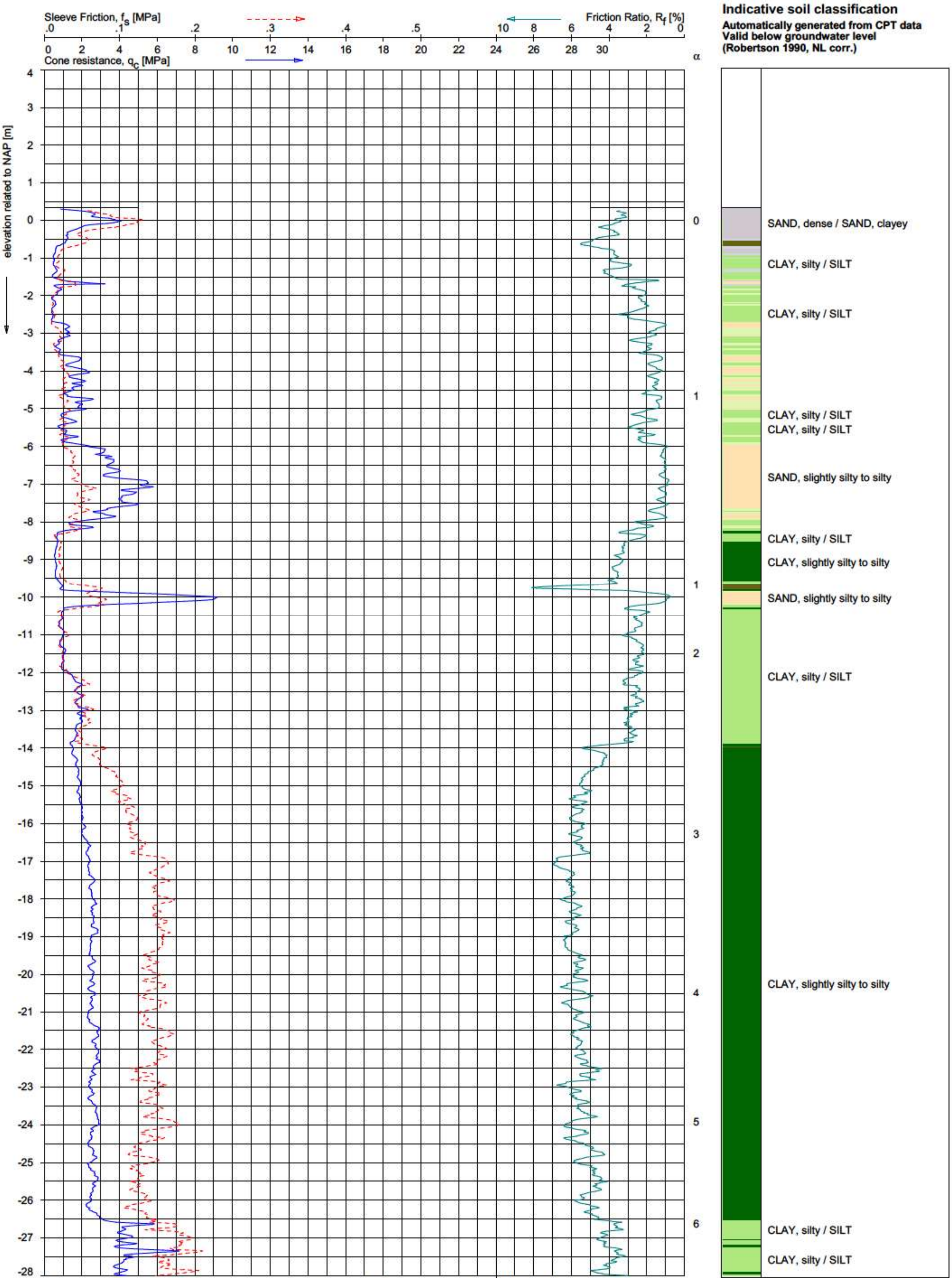
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND, silty to SILT
- SAND, slightly silty to silty
- SAND, silty to SILT

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G16



Rec.: EW d.d. 15-okt-2019 Coord.: X= 243913.0 m Y= 594621.0 m System: RD

Proc.: G.Bosch d.d. 31-okt-2019 GL = NAP +0.33 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1 Class 2. Test type TE2 Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G18

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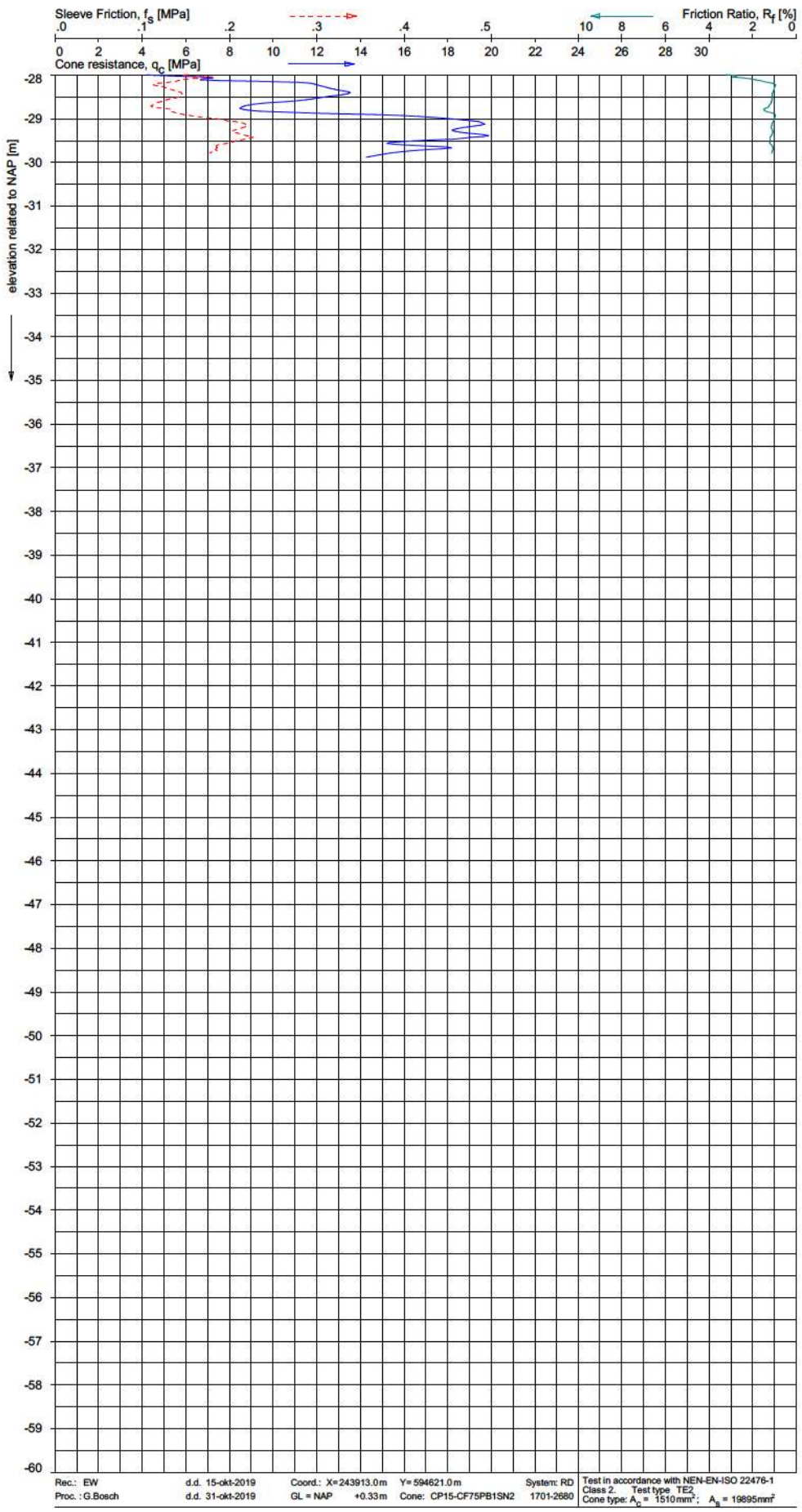
1019-153172

SCPT_G18 - 1



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty
SAND, silty to SILT
SAND, slightly silty to silty

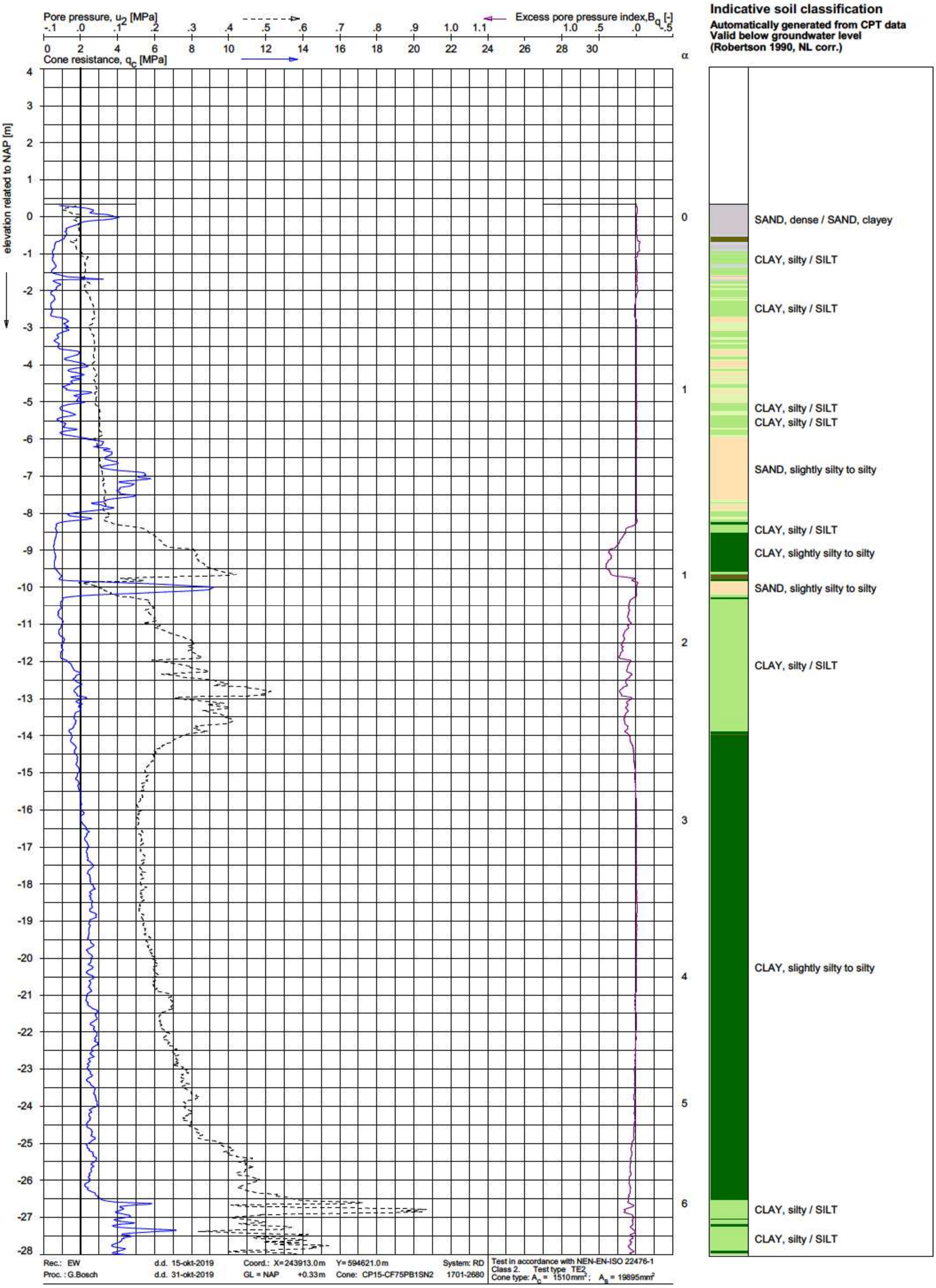
Rec.: EW d.d. 15-okt-2019 Coord.: X= 243913.0 m Y= 594621.0 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP +0.33 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G18



Rec.: EW d.d. 15-okt-2019 Coord.: X= 243913.0m Y= 594621.0m System: RD
Proc.: G.Bosch d.d. 31-okt-2019 GL = NAP +0.33m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510mm²; A_s = 19895mm²

PIEZO CONE PENETRATION TEST

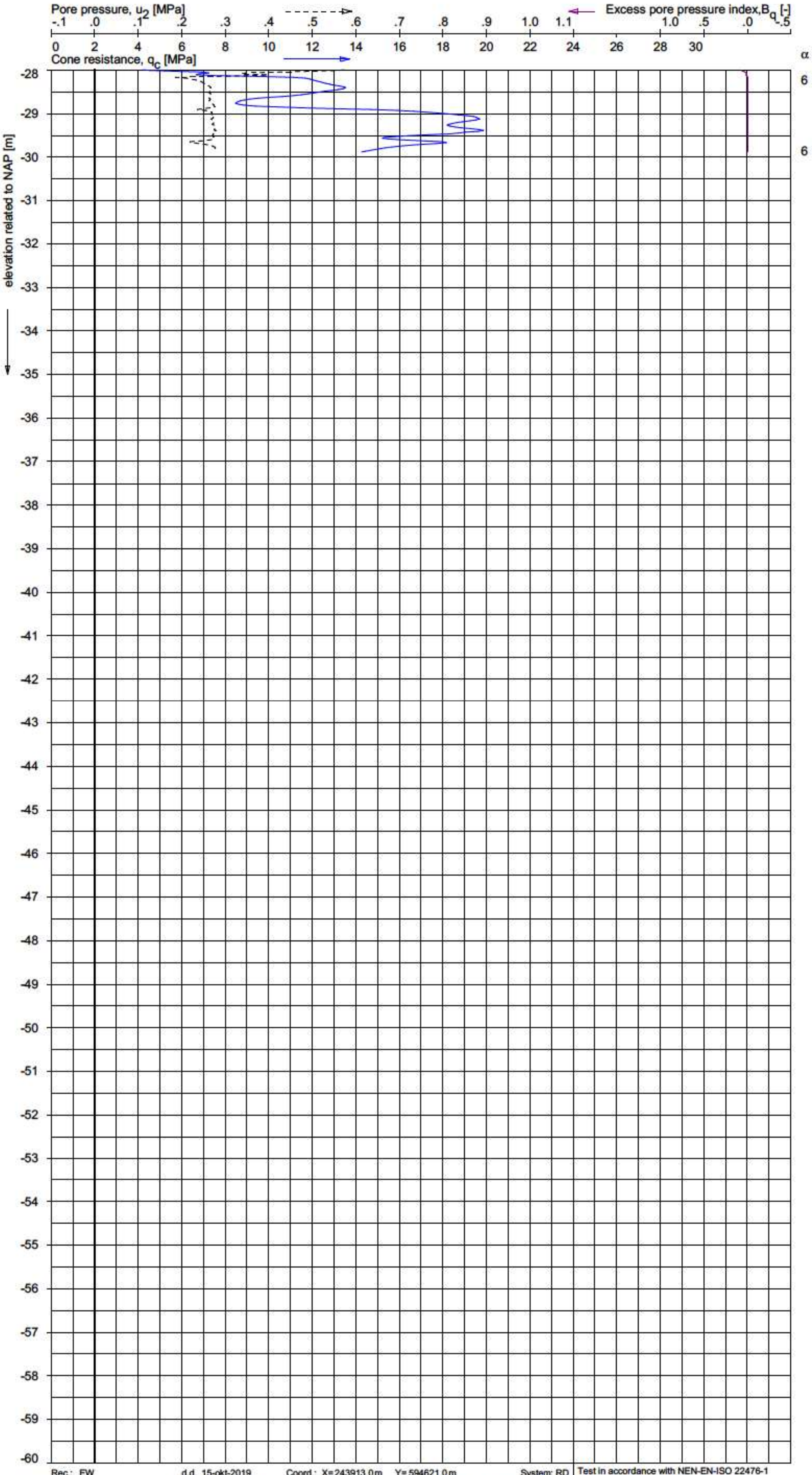
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G18

UNIPLOT 05.36.nl / PorClay_Qcl2Class-R3.uxf / 2019-11-01 08:48:53

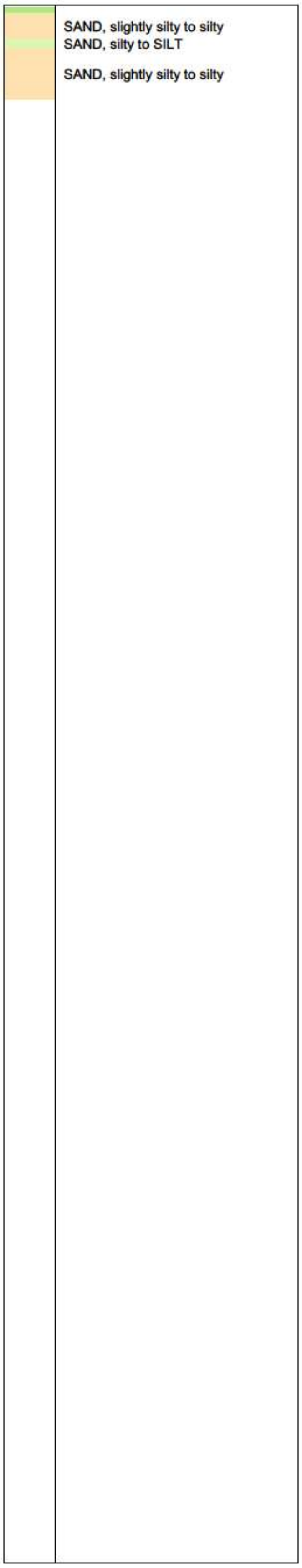
1019-153172

SCPT_G18 - 1



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



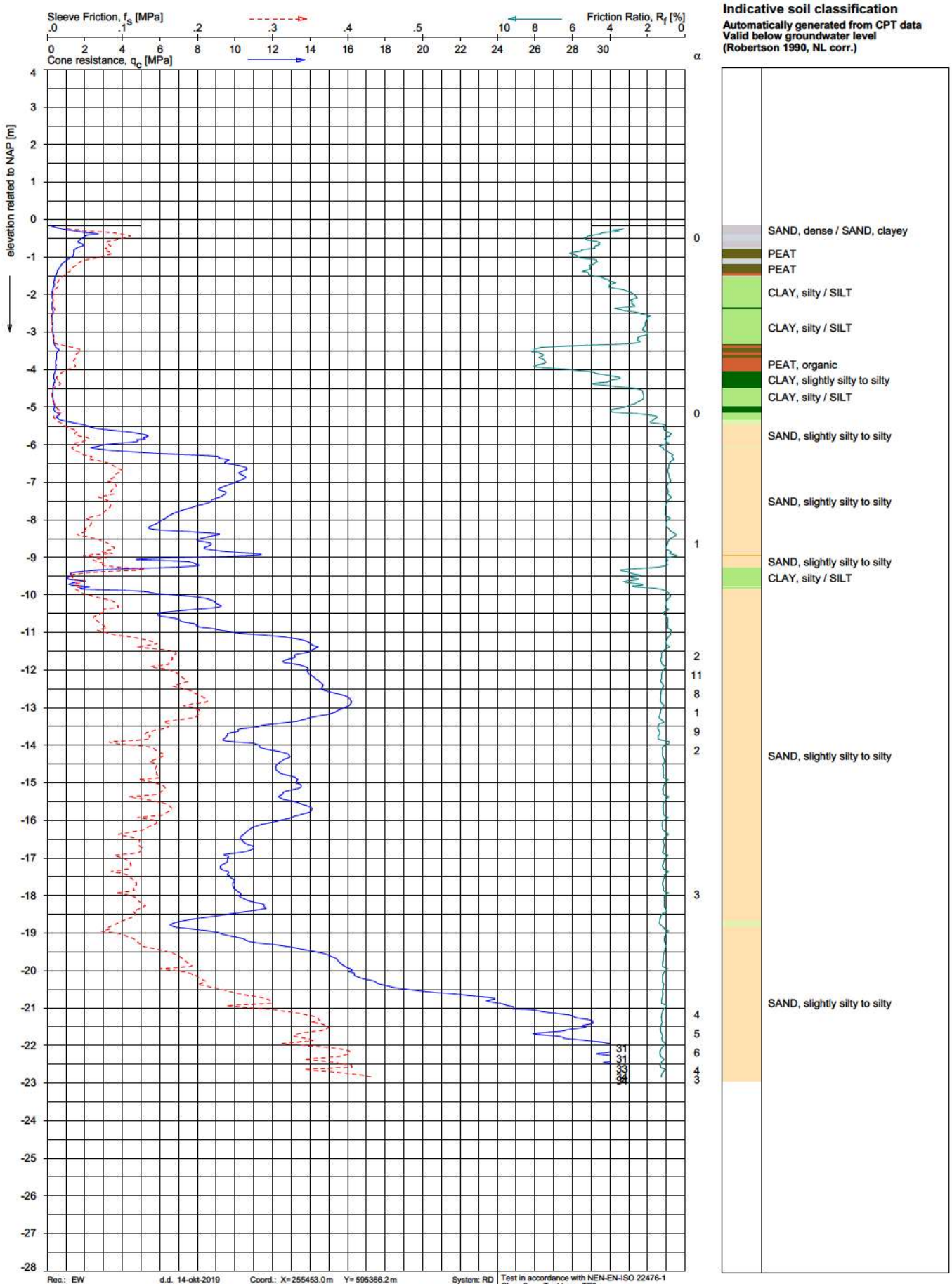
UNIPLOT 05.36.nl / PorClay_Qcl2Class-R3.udf / 2019-11-01 08:48:53

Rec.: EW	d.d. 15-okt-2019	Coord.: X= 243913.0 m	Y= 594621.0 m	System: RD	Test in accordance with NEN-EN-ISO 22476-1
Proc.: G.Bosch	d.d. 31-okt-2019	GL = NAP +0.33 m	Cone: CP15-CF75PB1SN2	1701-2680	Class 2. Test type TE2 Cone type: A_c = 1510mm²; A_s = 19895mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G18



Rec.: EW d.d. 14-okt-2019 Coord.: X= 255453.0 m Y= 595366.2 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.17 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

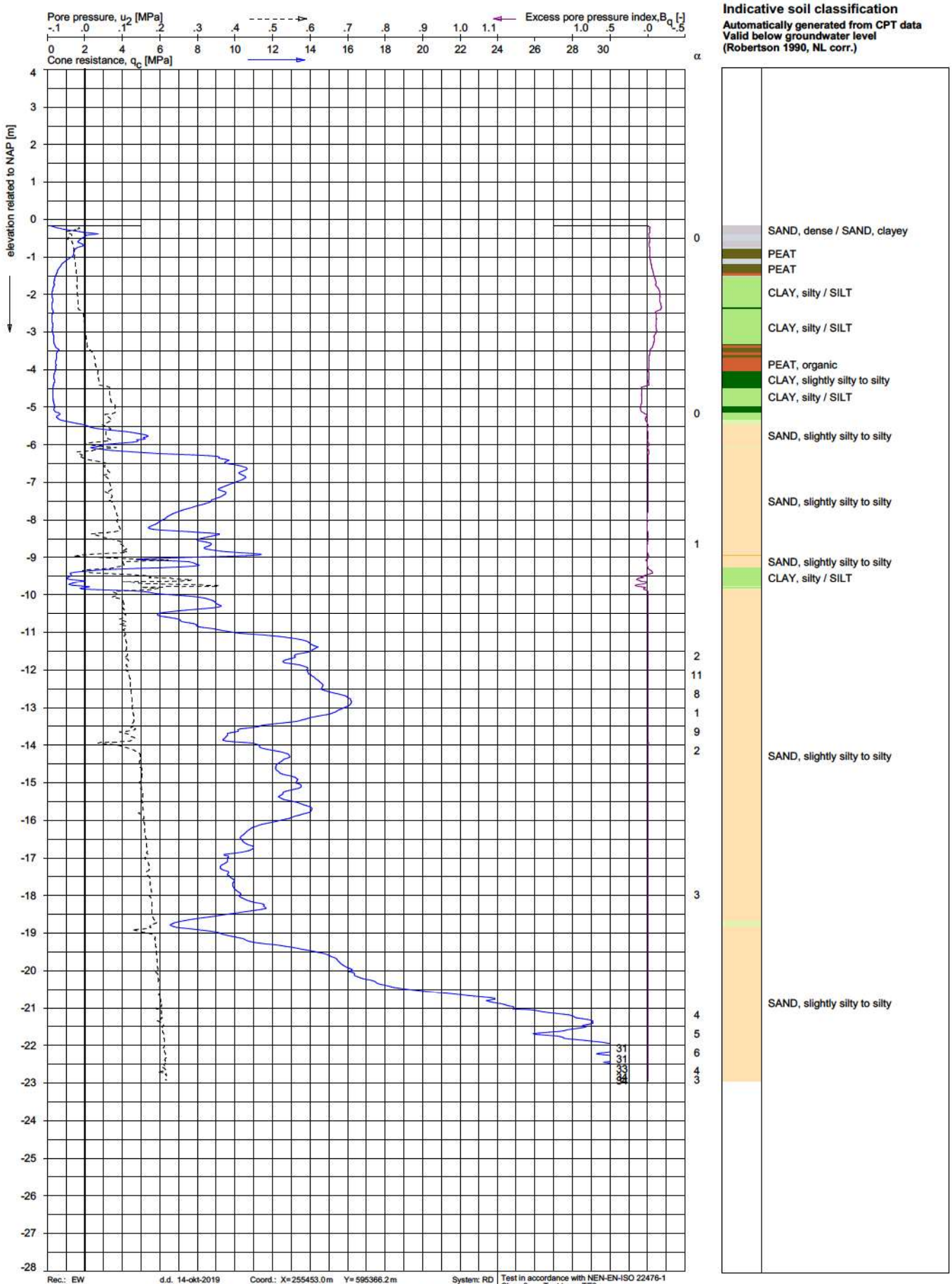
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G20

UNIPLOT 05.36.nl / QoFaClass-R3.uof / 2019-11-01 08:09:51

1019-153172

SCPT_G20 - 1



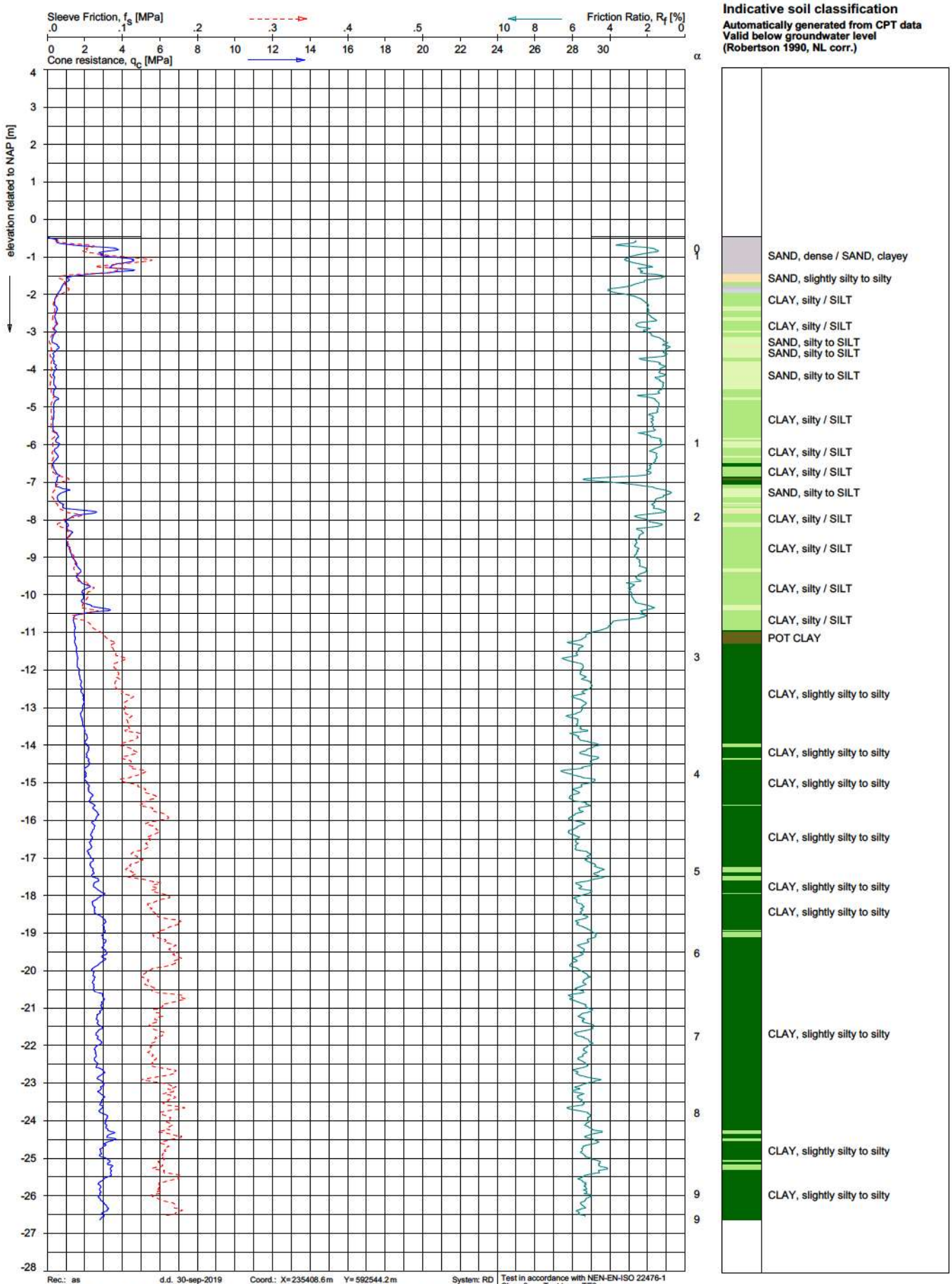
Rec.: EW d.d. 14-okt-2019 Coord.: X= 255453.0 m Y= 595366.2 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.17 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

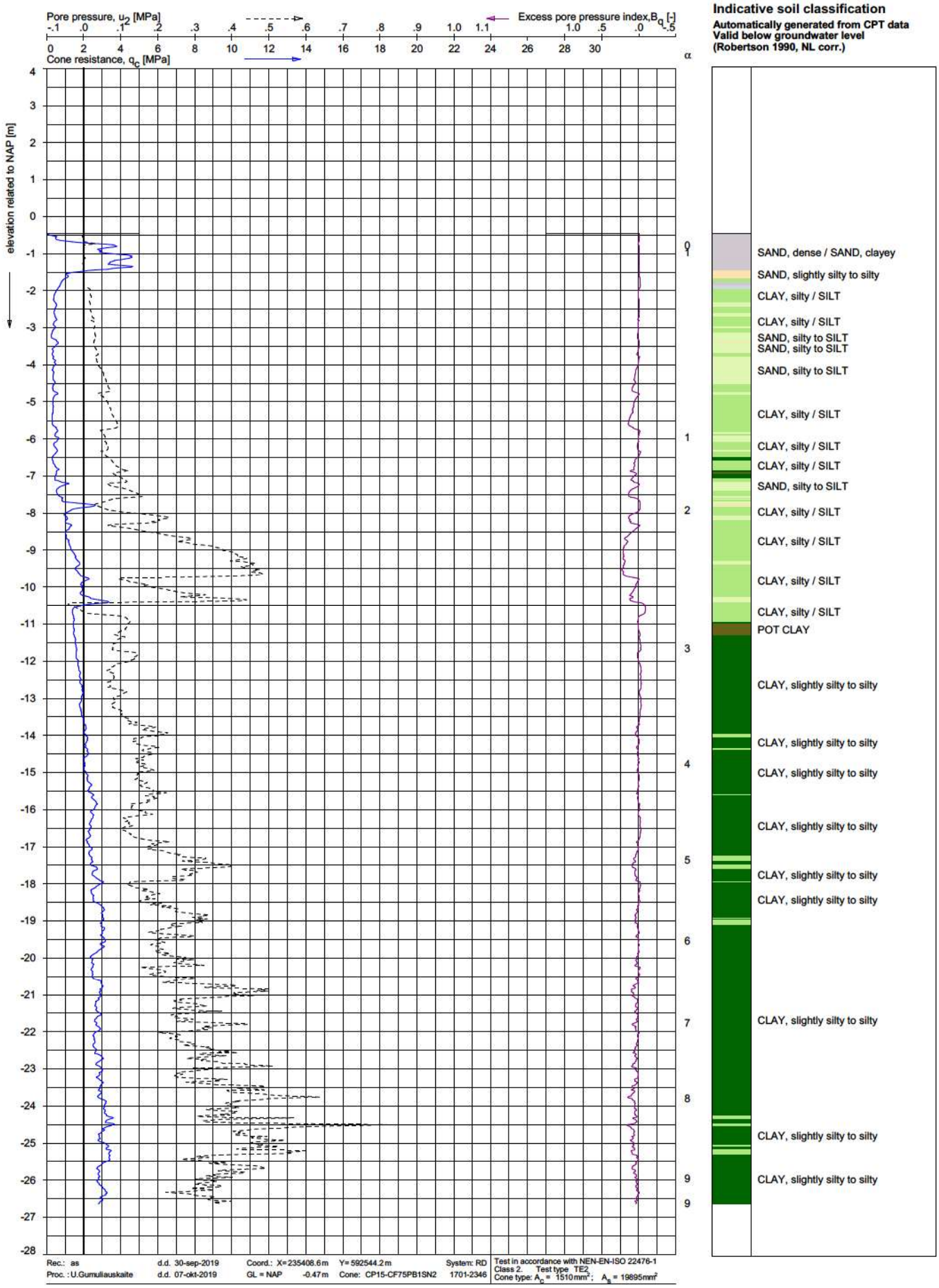
Proj. 1019-153172
Cpt SCPT_G20



CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G21



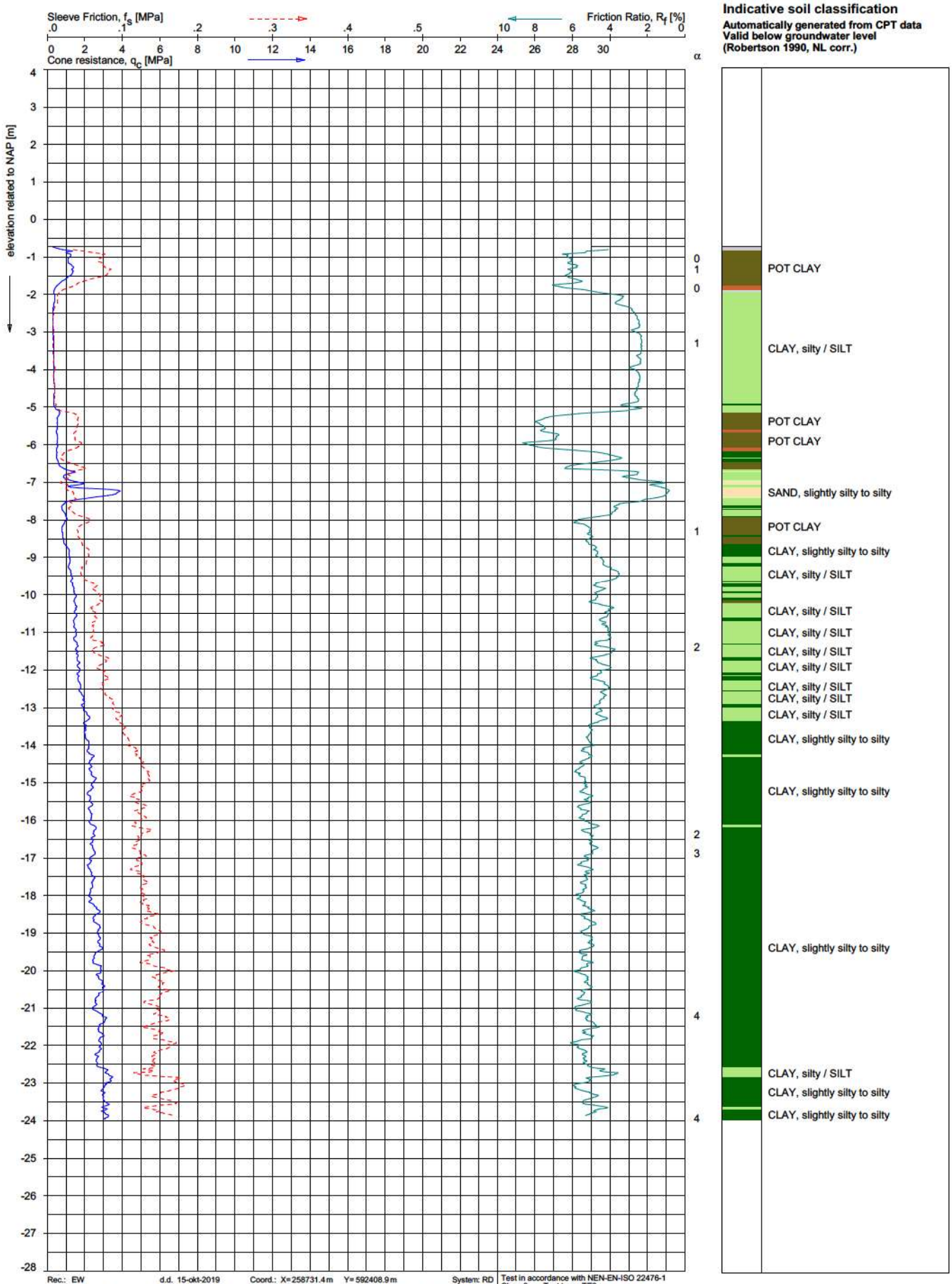
PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G21

1019-153172

SCPT_G21 -1



Rec.: EW d.d. 15-okt-2019 Coord.: X= 258731.4 m Y= 592408.9 m System: RD
Proc. : L.Murenaite d.d. 22-okt-2019 GL = NAP -0.73 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

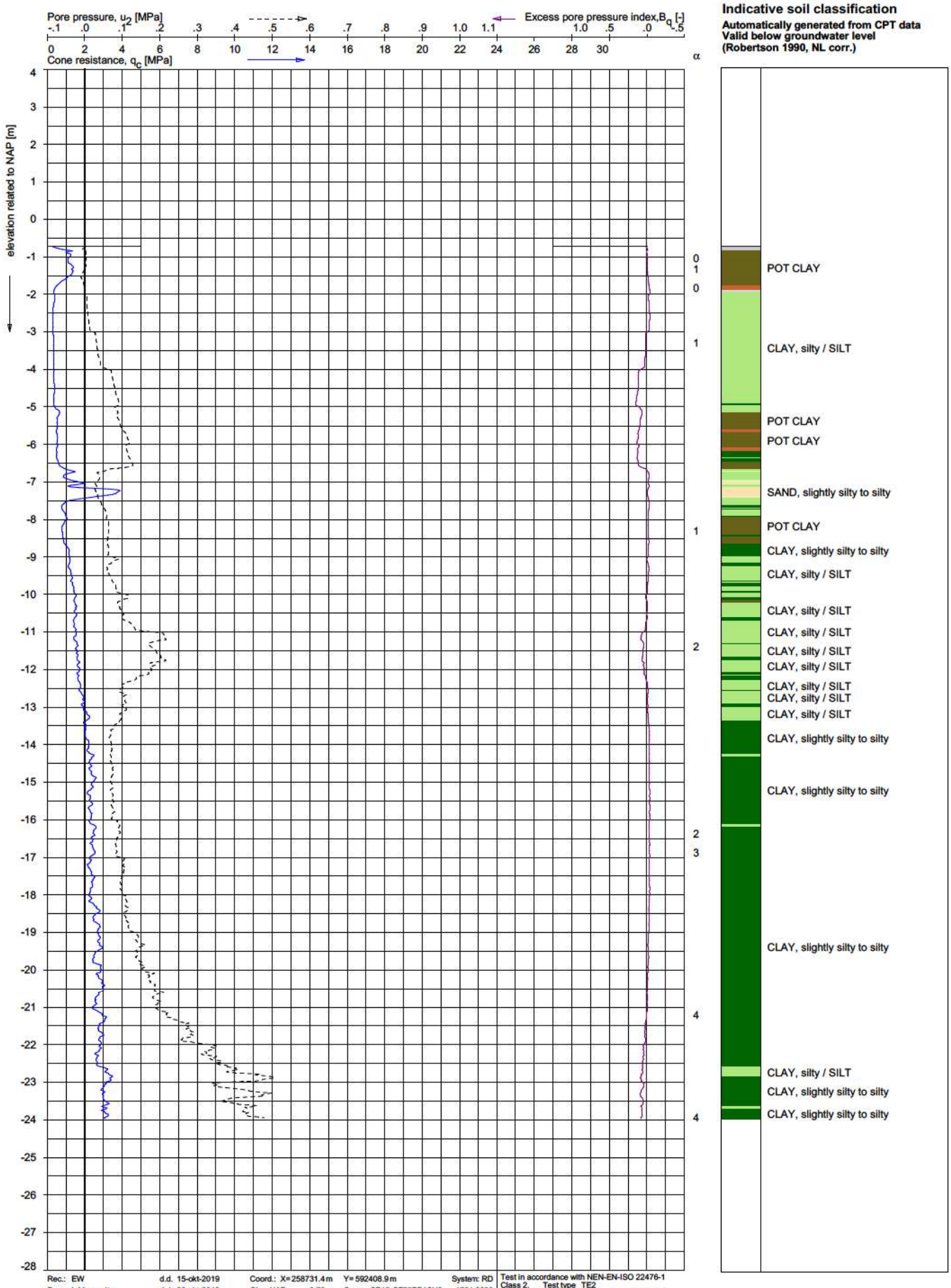
CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G25

1019-153172

SCPT_G25 - 1



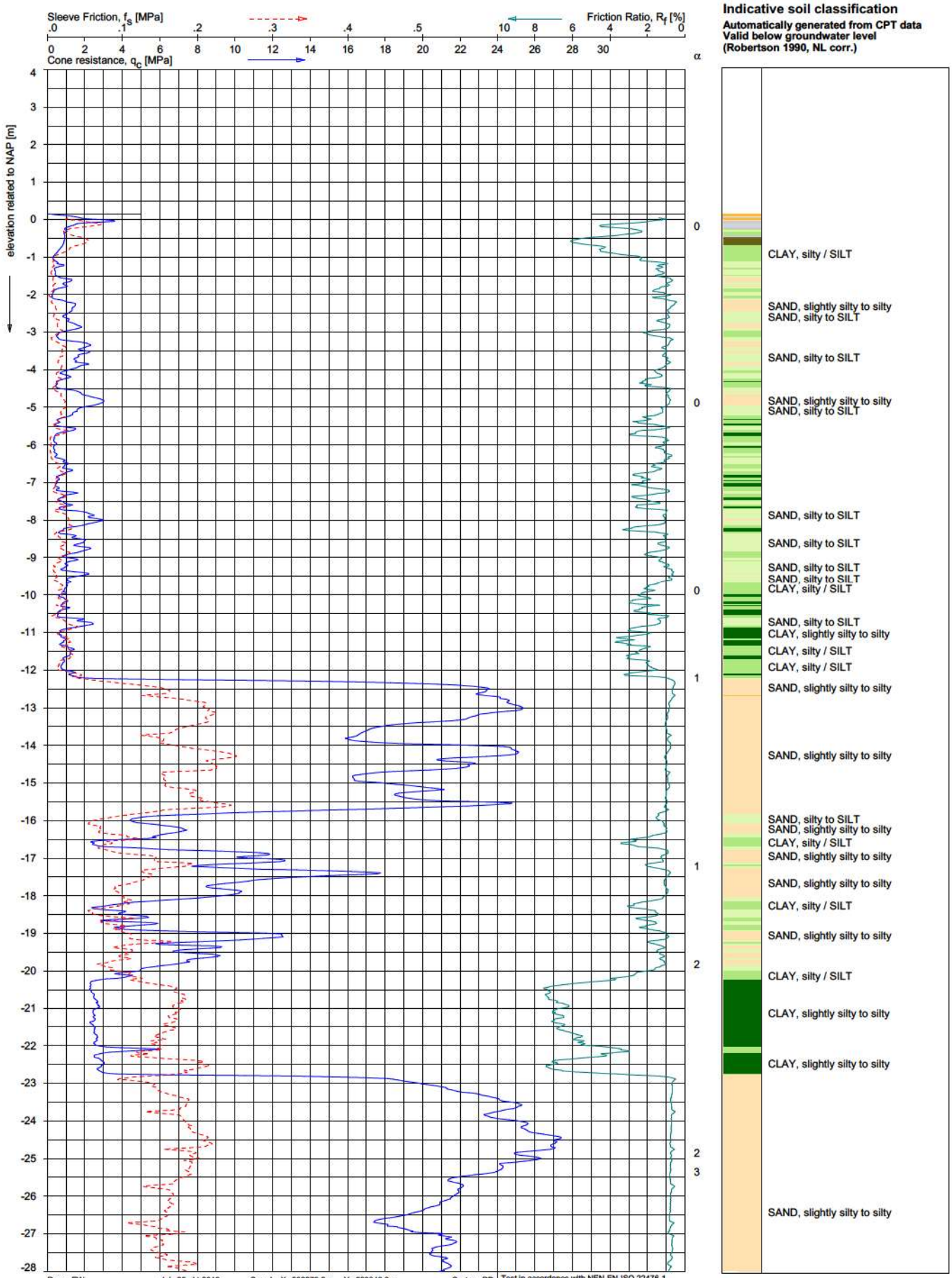
Rec.: EW d.d. 15-okt-2019 Coord.: X= 258731.4 m Y= 592408.9 m System: RD
Proc. : L.Murenaite d.d. 22-okt-2019 GL = NAP -0.73 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G25



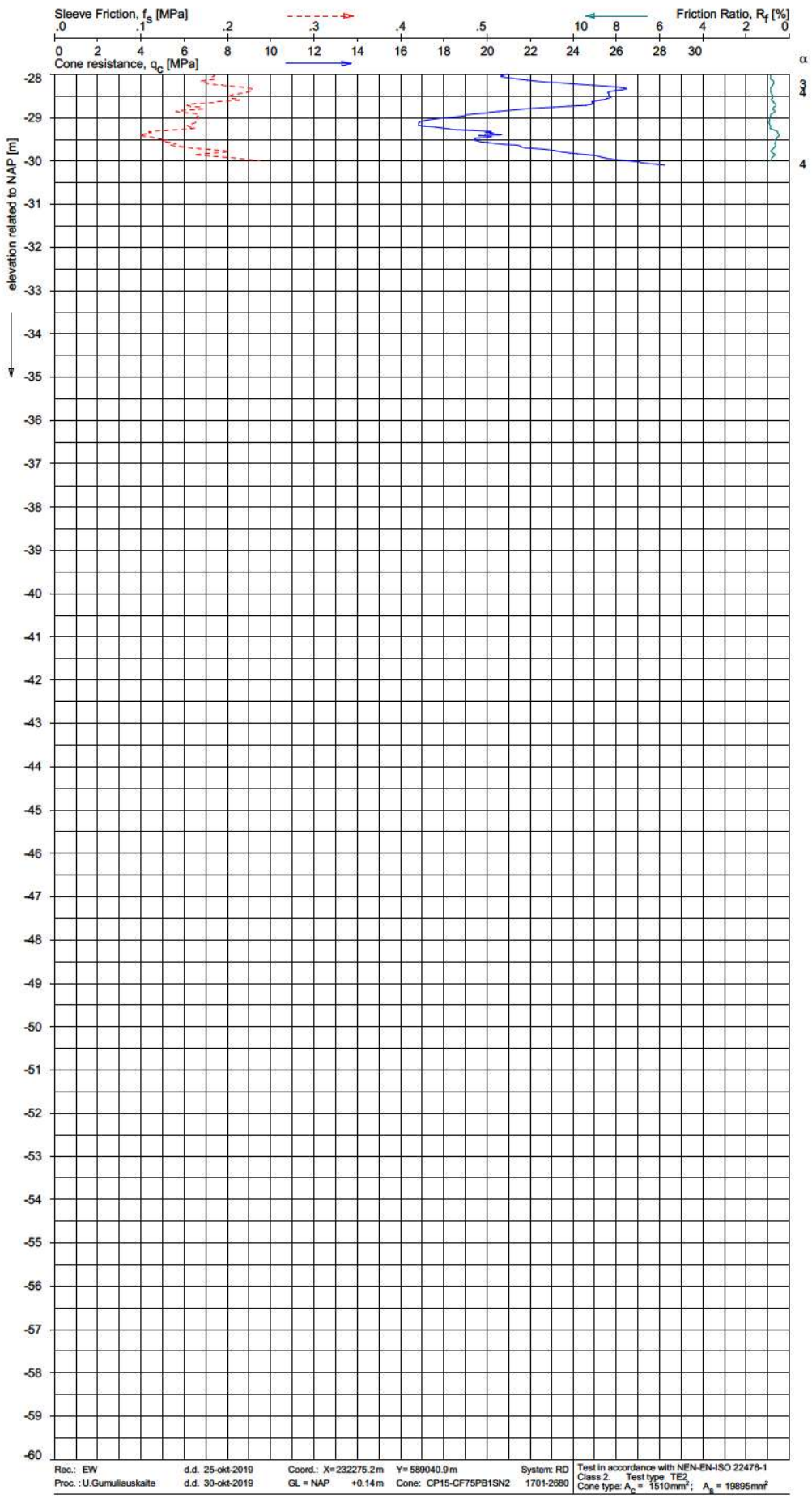
Rec.: EW d.d. 25-okt-2019 Coord.: X= 232275.2 m Y= 589040.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +0.14 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G26



Rec.: EW d.d. 25-okt-2019 Coord.: X= 232275.2 m Y= 589040.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +0.14 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

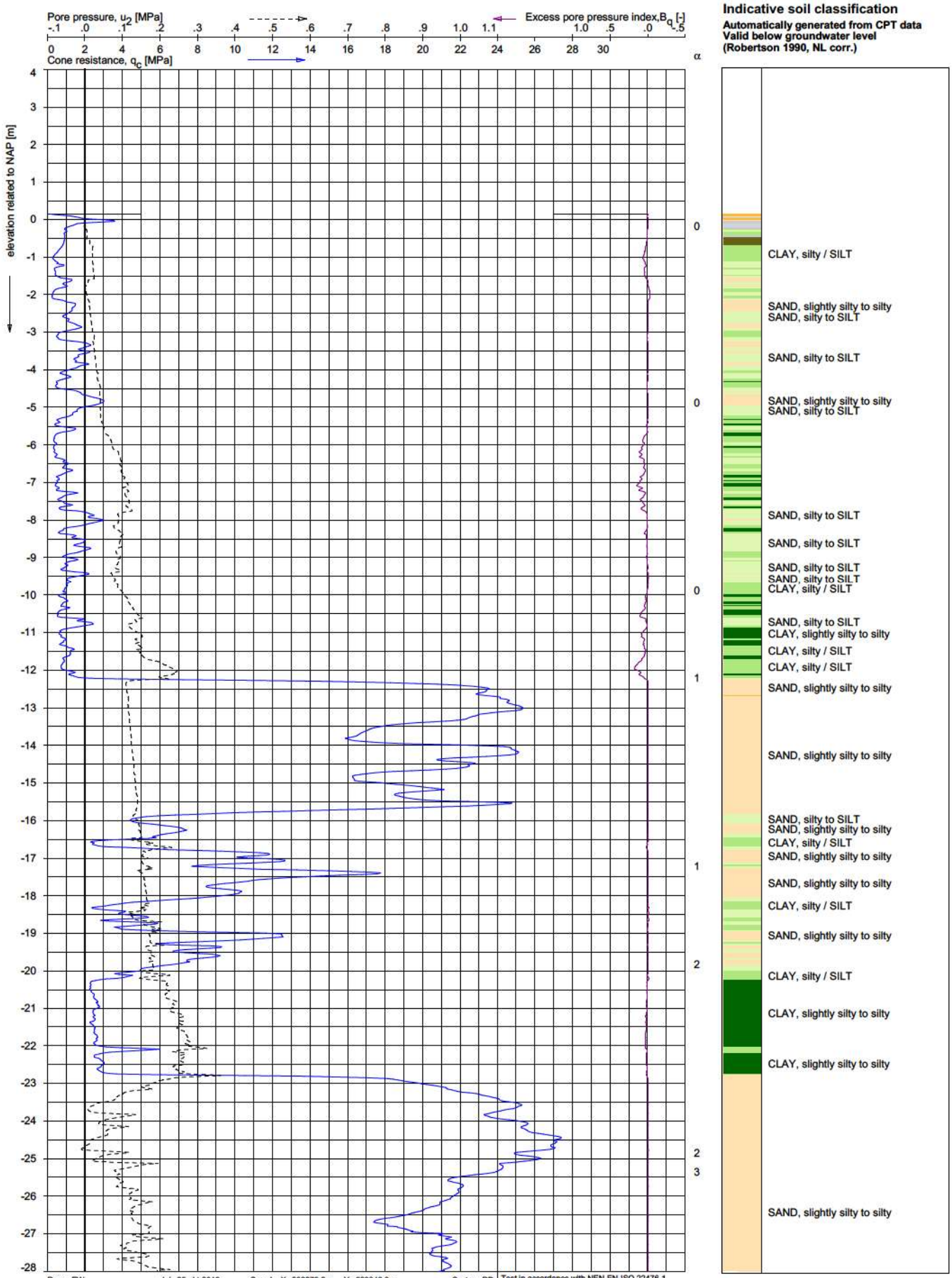
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G26



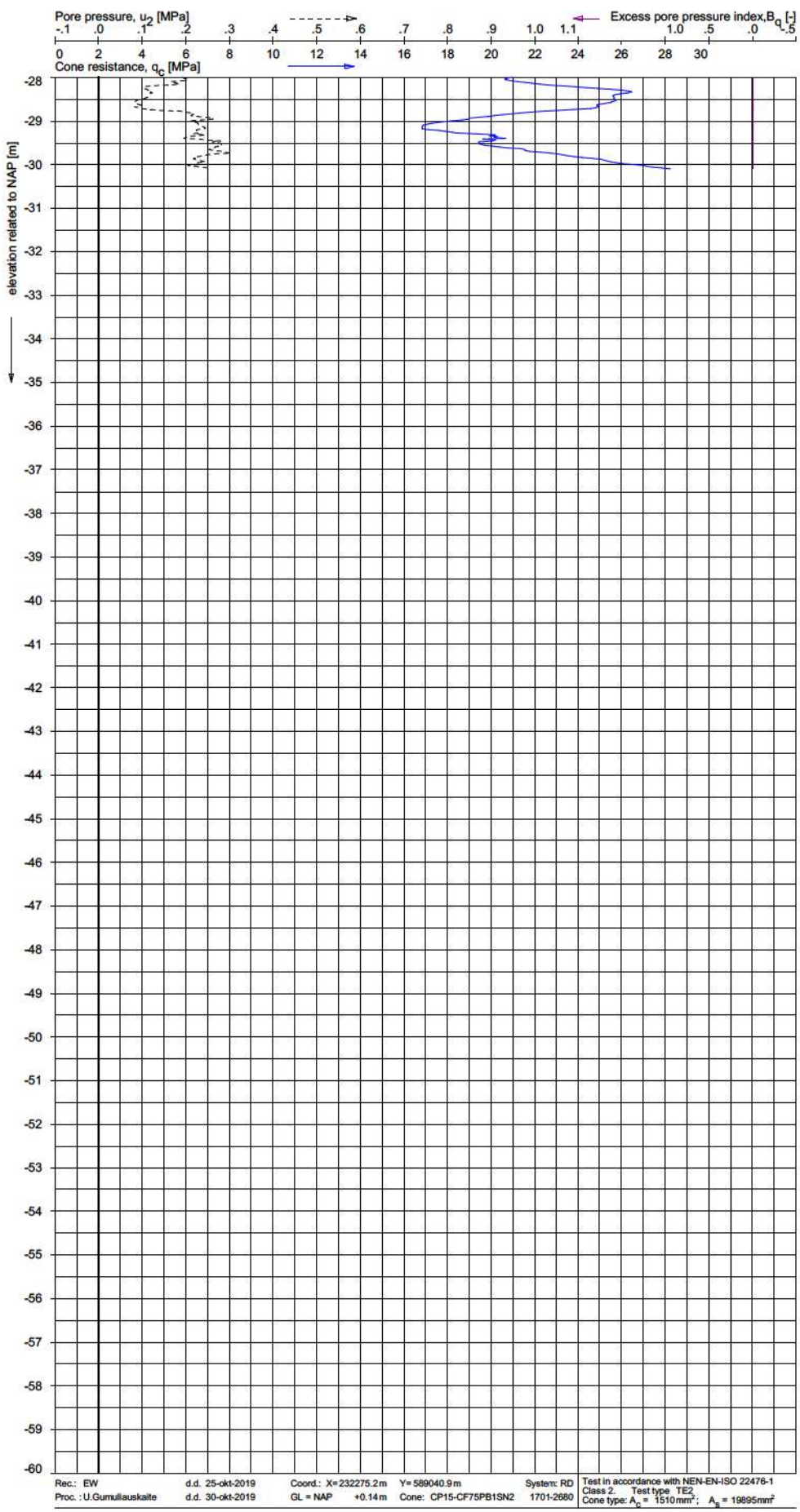
Rec.: EW d.d. 25-okt-2019 Coord.: X= 232275.2 m Y= 589040.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +0.14 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G26



Rec.: EW d.d. 25-okt-2019 Coord.: X= 232275.2 m Y= 589040.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +0.14 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

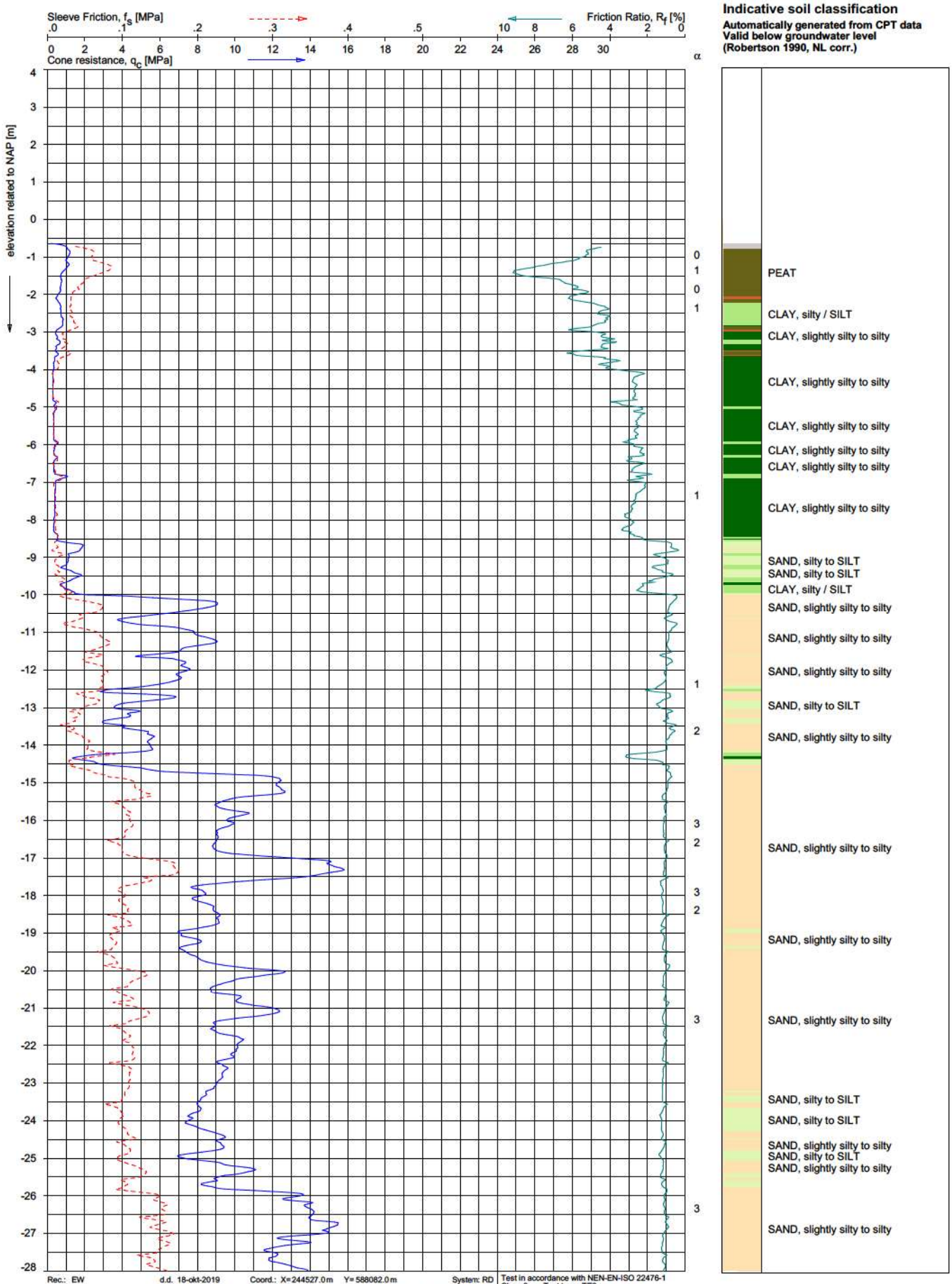
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G26



CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G28

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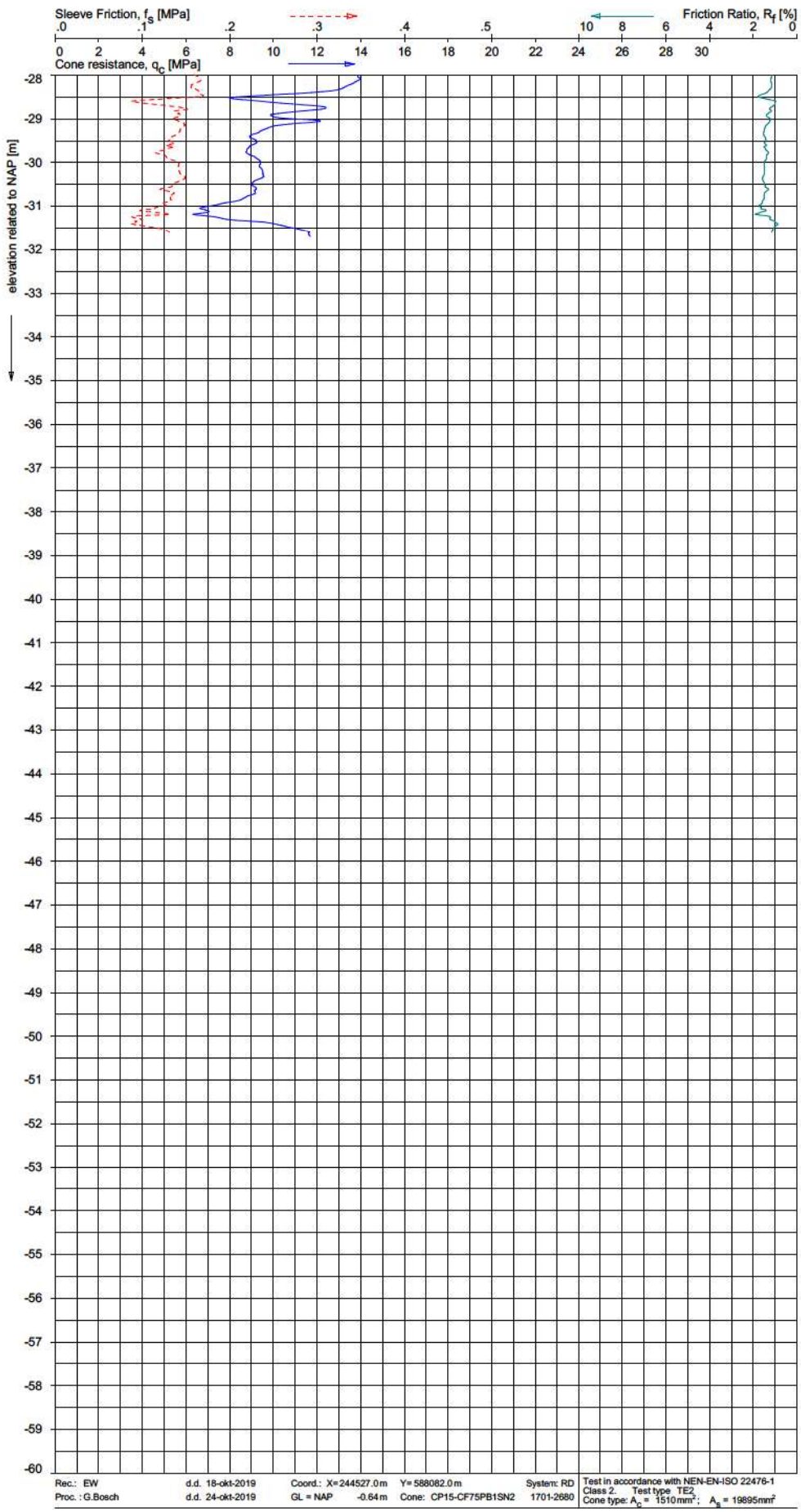
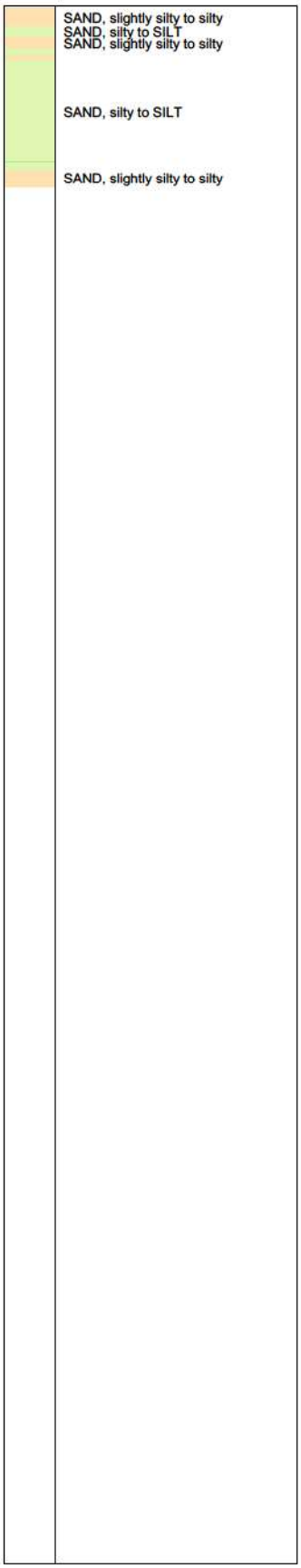
1019-153172

SCPT_G28 - 1



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



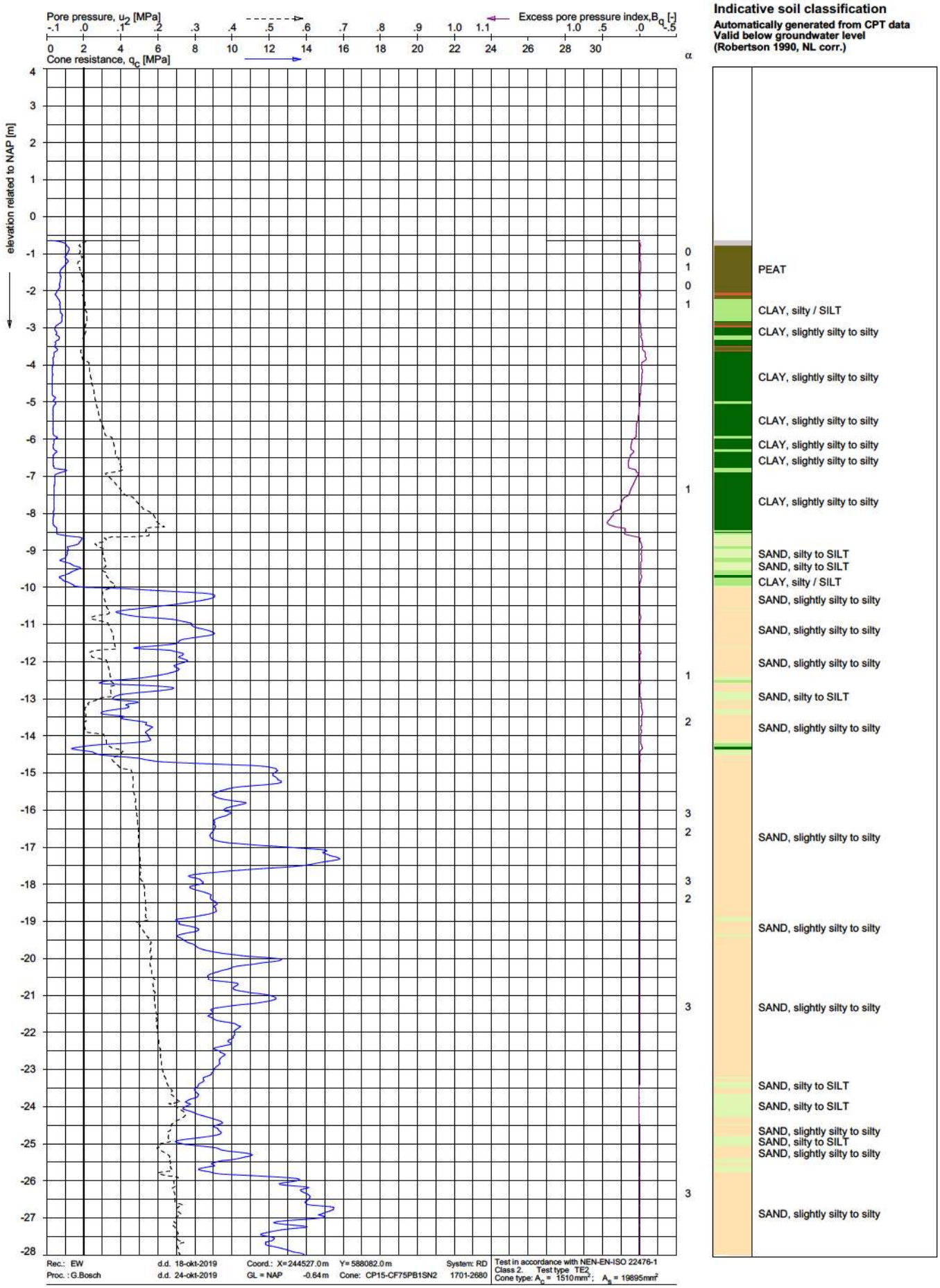
Rec.: EW d.d. 18-okt-2019 Coord.: X= 244527.0 m Y= 588082.0 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.64 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G28



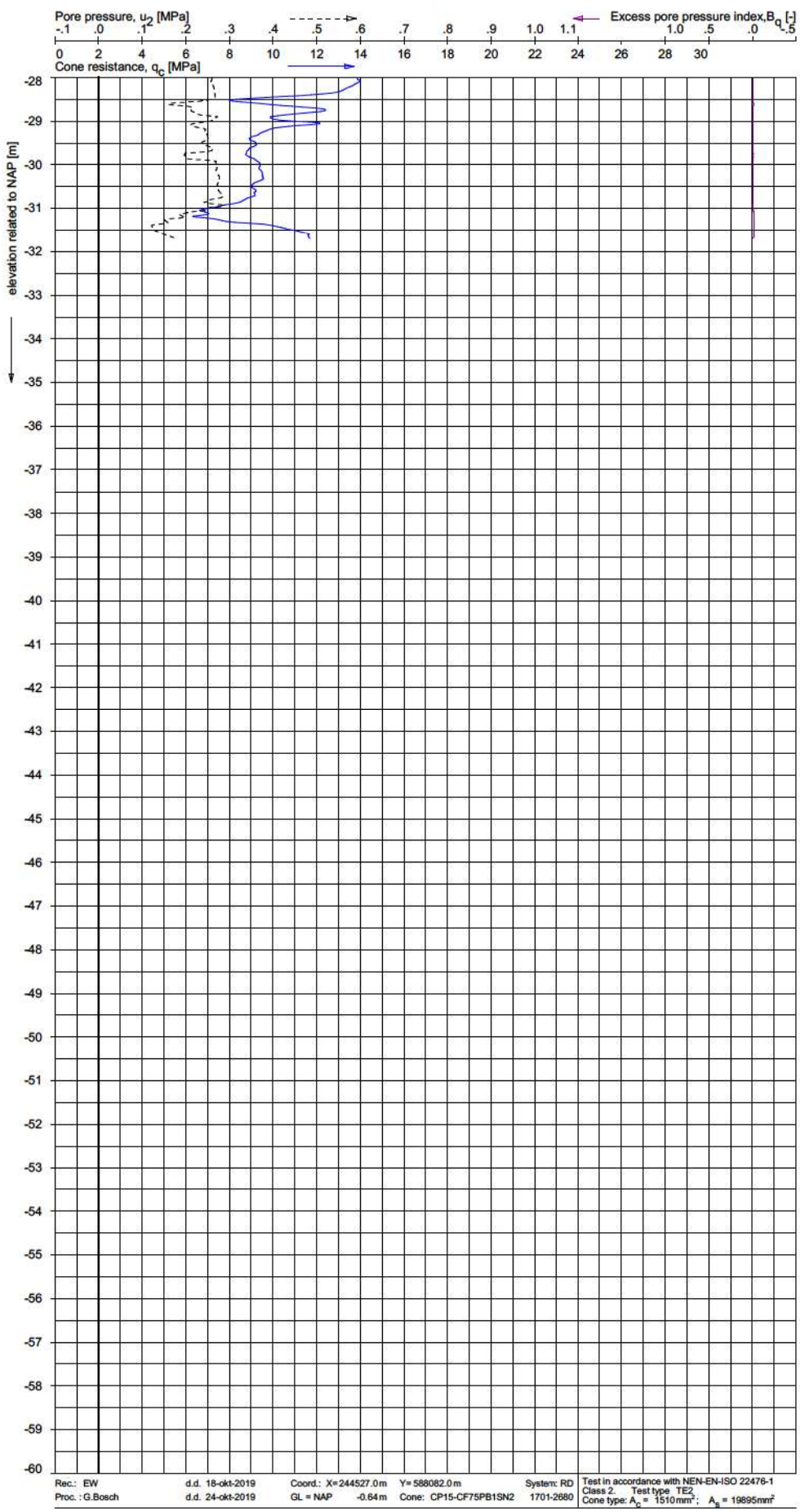
PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G28

1019-153172

SCPT_G28 -1



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND, slightly silty to silty
- SAND, silty to SILT
- SAND, slightly silty to silty
- SAND, silty to SILT
- SAND, slightly silty to silty

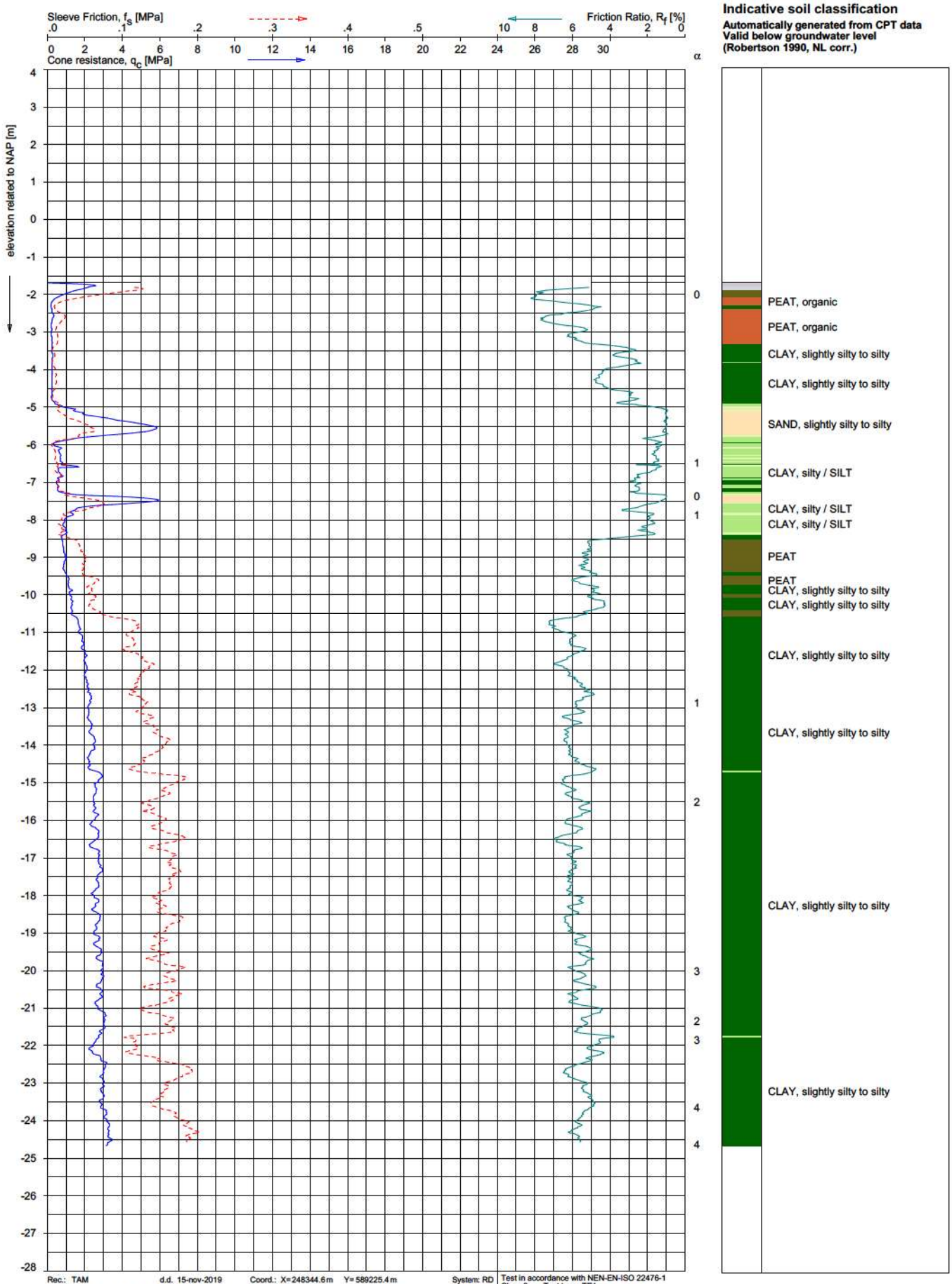
Rec.: EW d.d. 18-okt-2019 Coord.: X= 244527.0 m Y= 588082.0 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.64 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G28



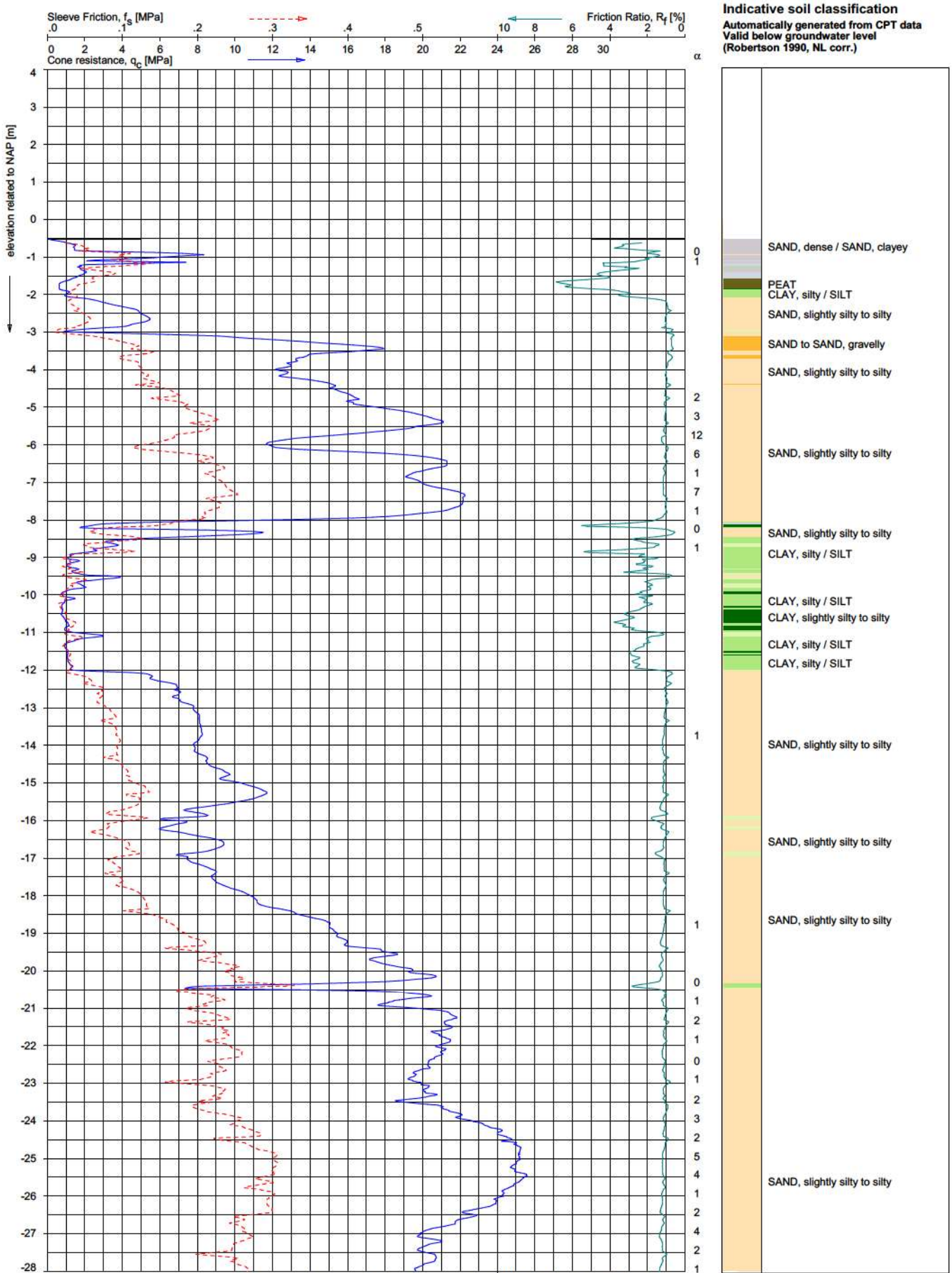
Rec.: TAM d.d. 15-nov-2019 Coord.: X= 248344.6 m Y= 589225.4 m System: RD
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP -1.69 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G29



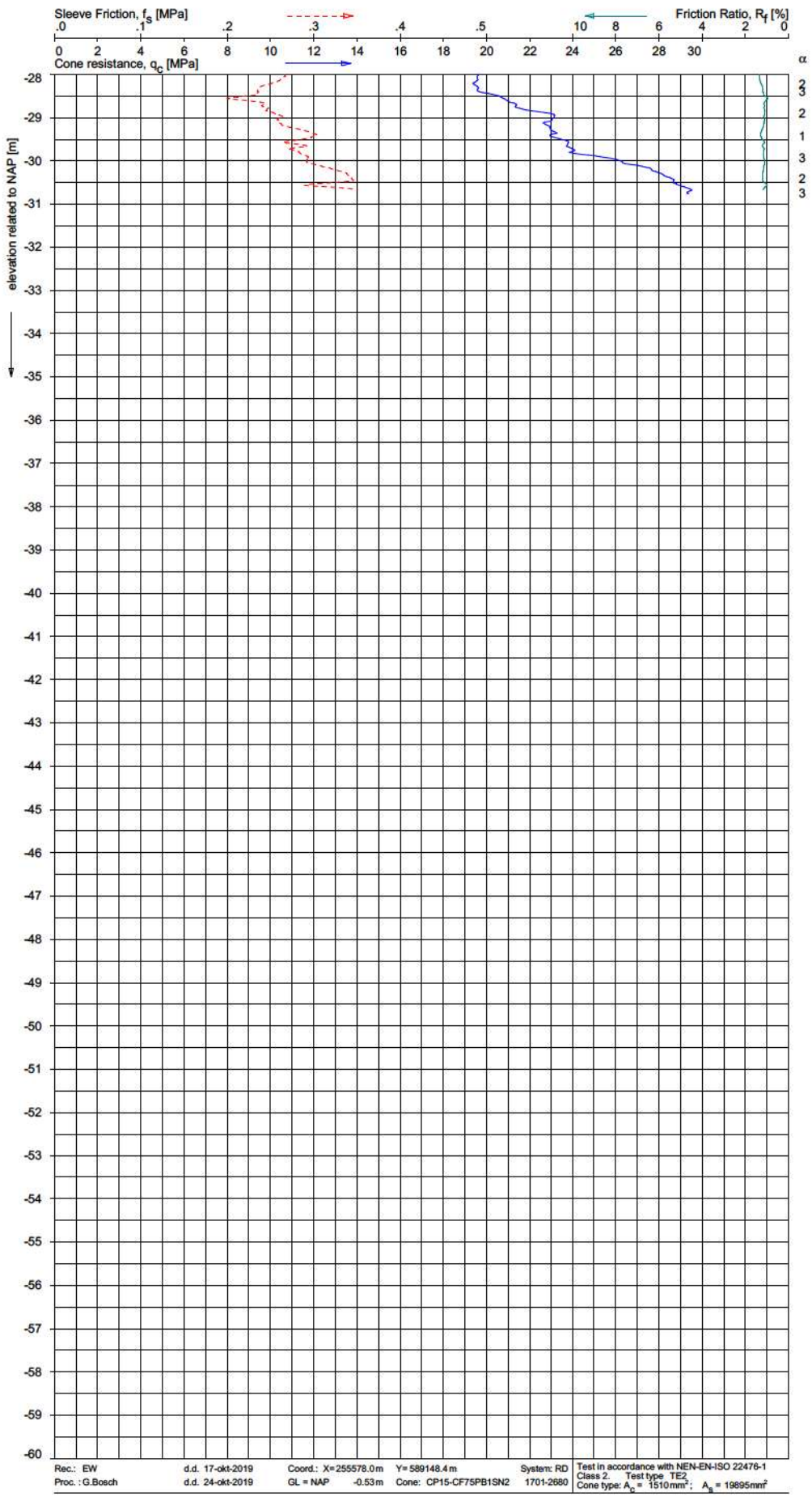
Rec.: EW d.d. 17-okt-2019 Coord.: X= 255578.0 m Y= 589148.4 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.53 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G30



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty

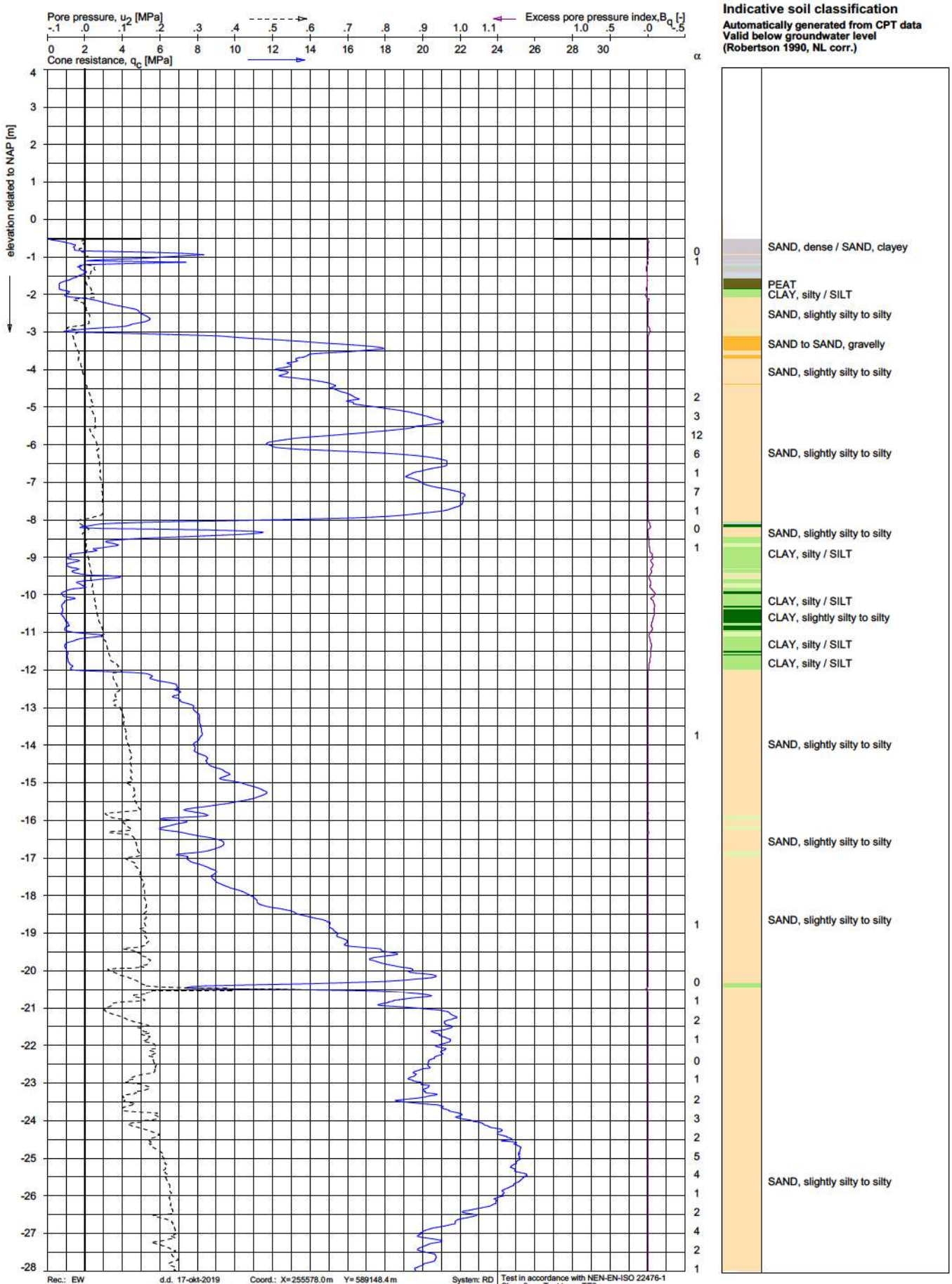
Rec.: EW d.d. 17-okt-2019 Coord.: X= 255578.0 m Y= 589148.4 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.53 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G30



Rec.: EW
Proc. : G.Bosch
d.d. 17-okt-2019
d.d. 24-okt-2019
Coord.: X= 255578.0 m
GL = NAP -0.53 m
Y= 589148.4 m
Cone: CP15-CF75PB1SN2
System: RD
1701-2680
Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G30

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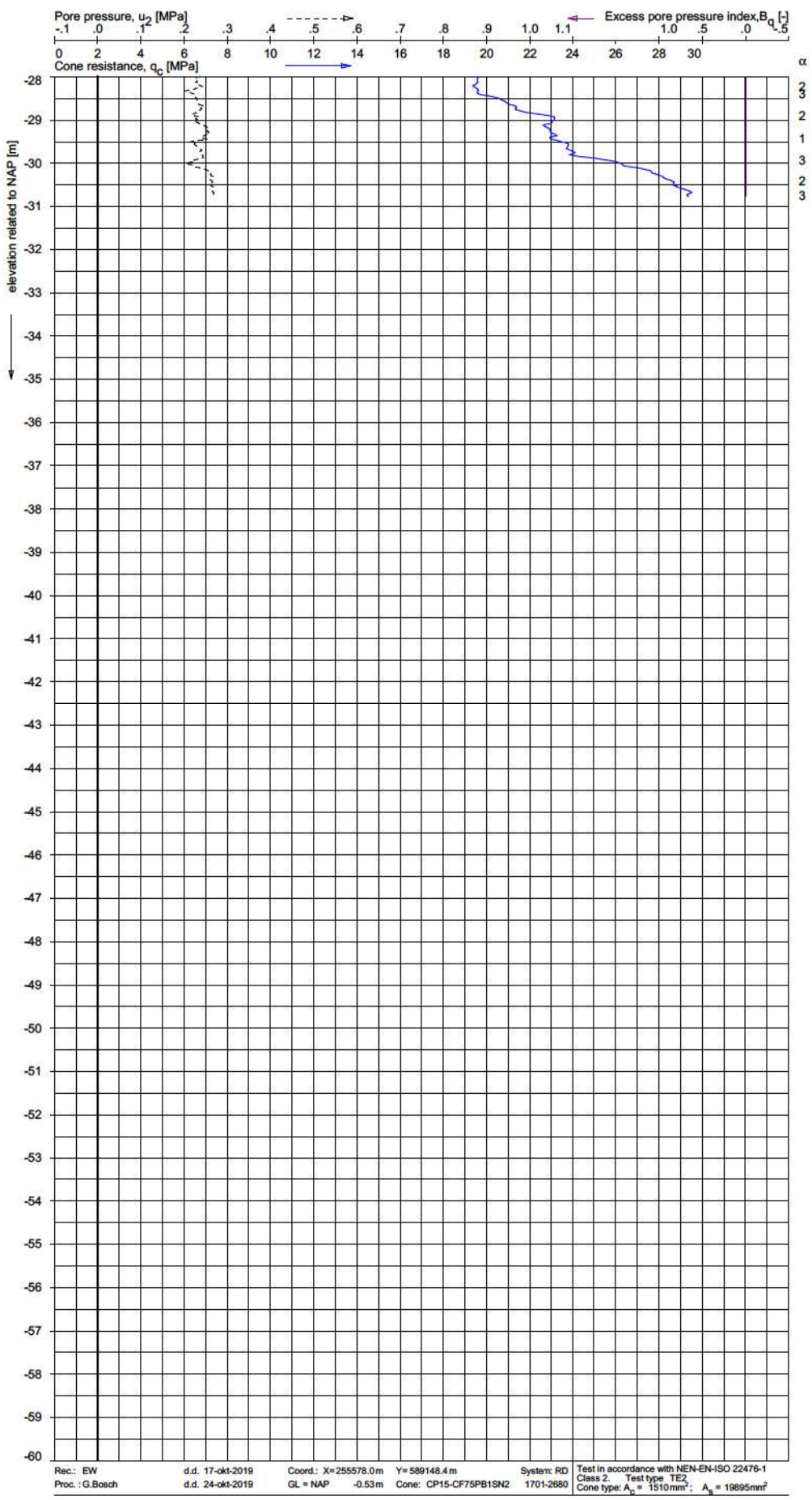
1019-153172

SCPT_G30 -1



Rec.: EW d.d. 17-okt-2019 Coord.: X= 255578.0 m Y= 589148.4 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.53 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

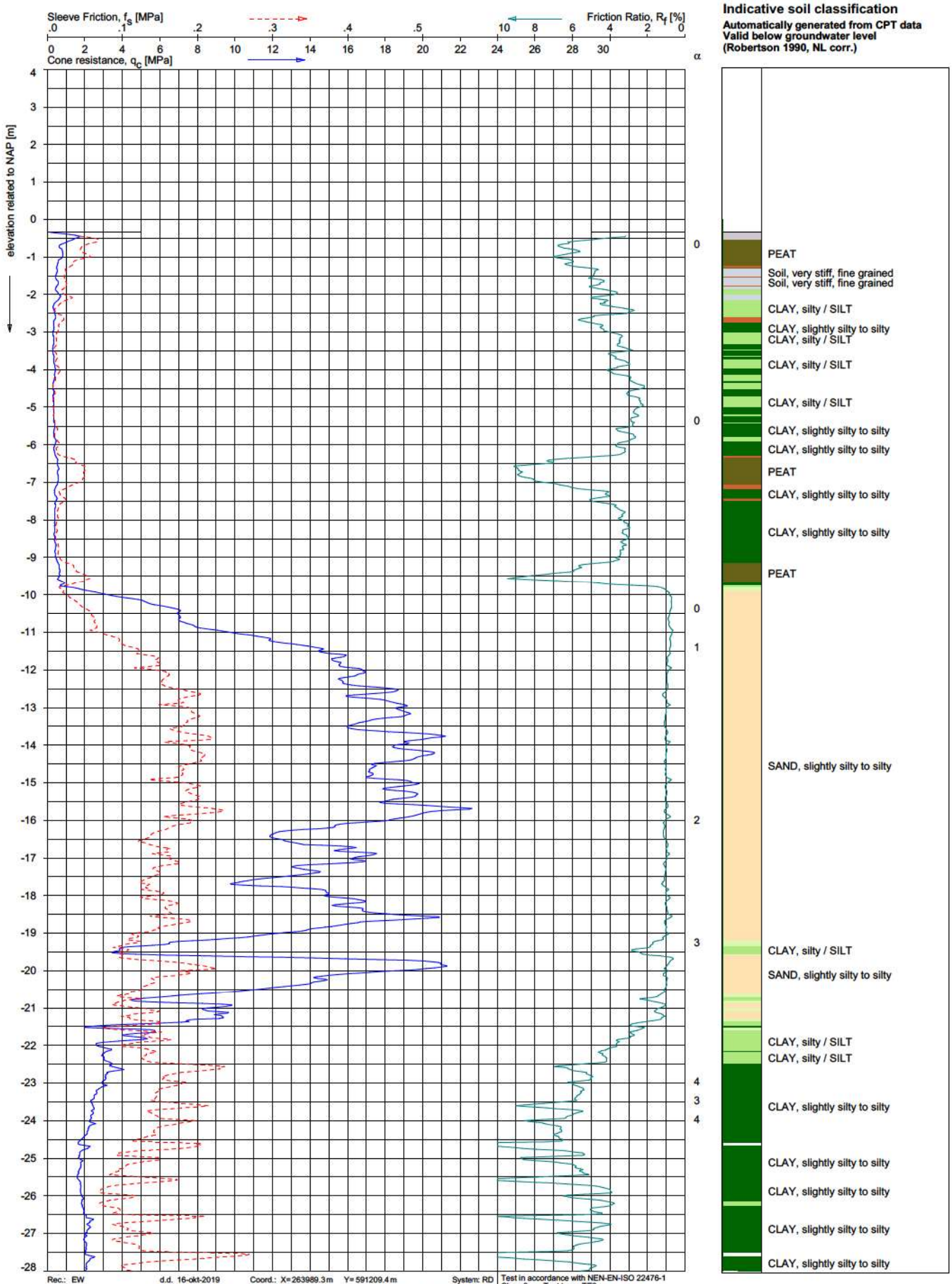
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

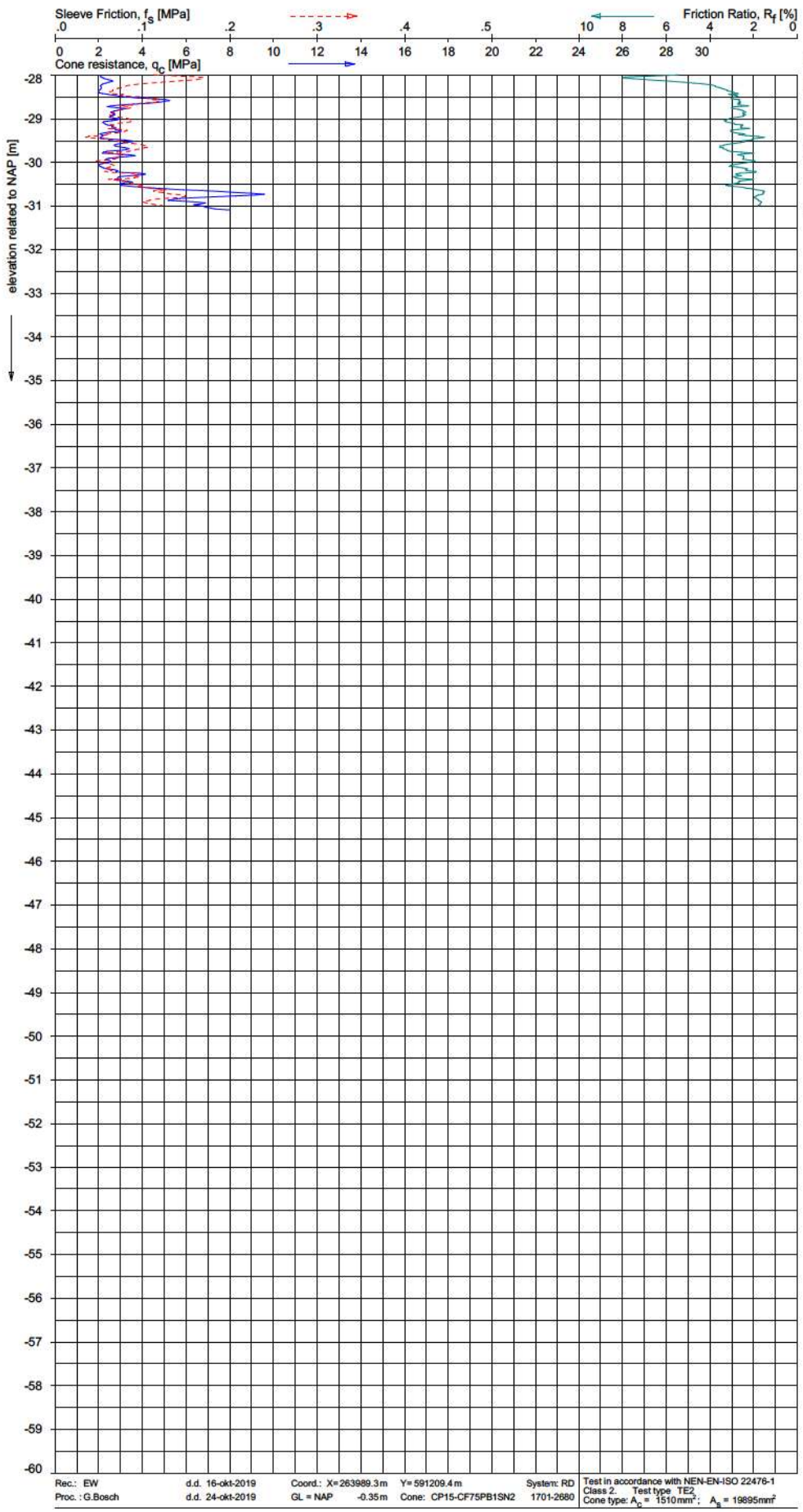
Proj. 1019-153172
Cpt SCPT_G30



CONE PENETRATION TEST WITH LOCAL FRICTION

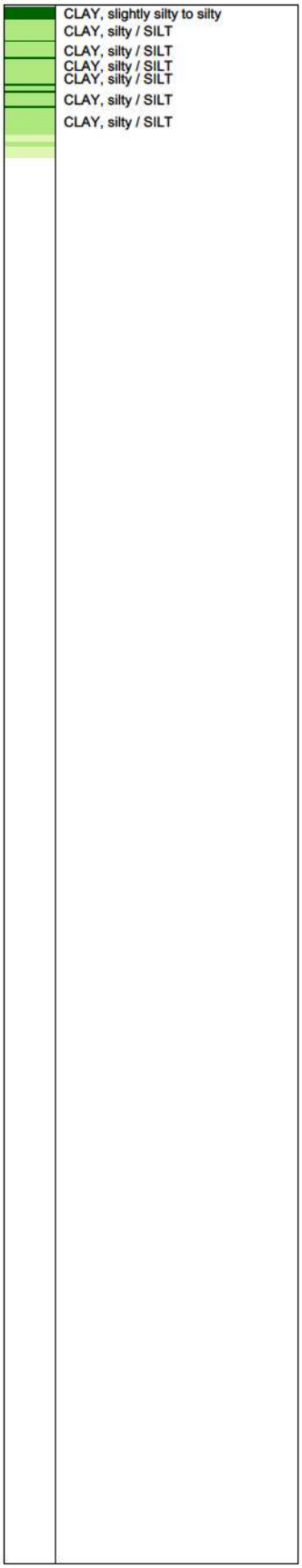
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G31



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



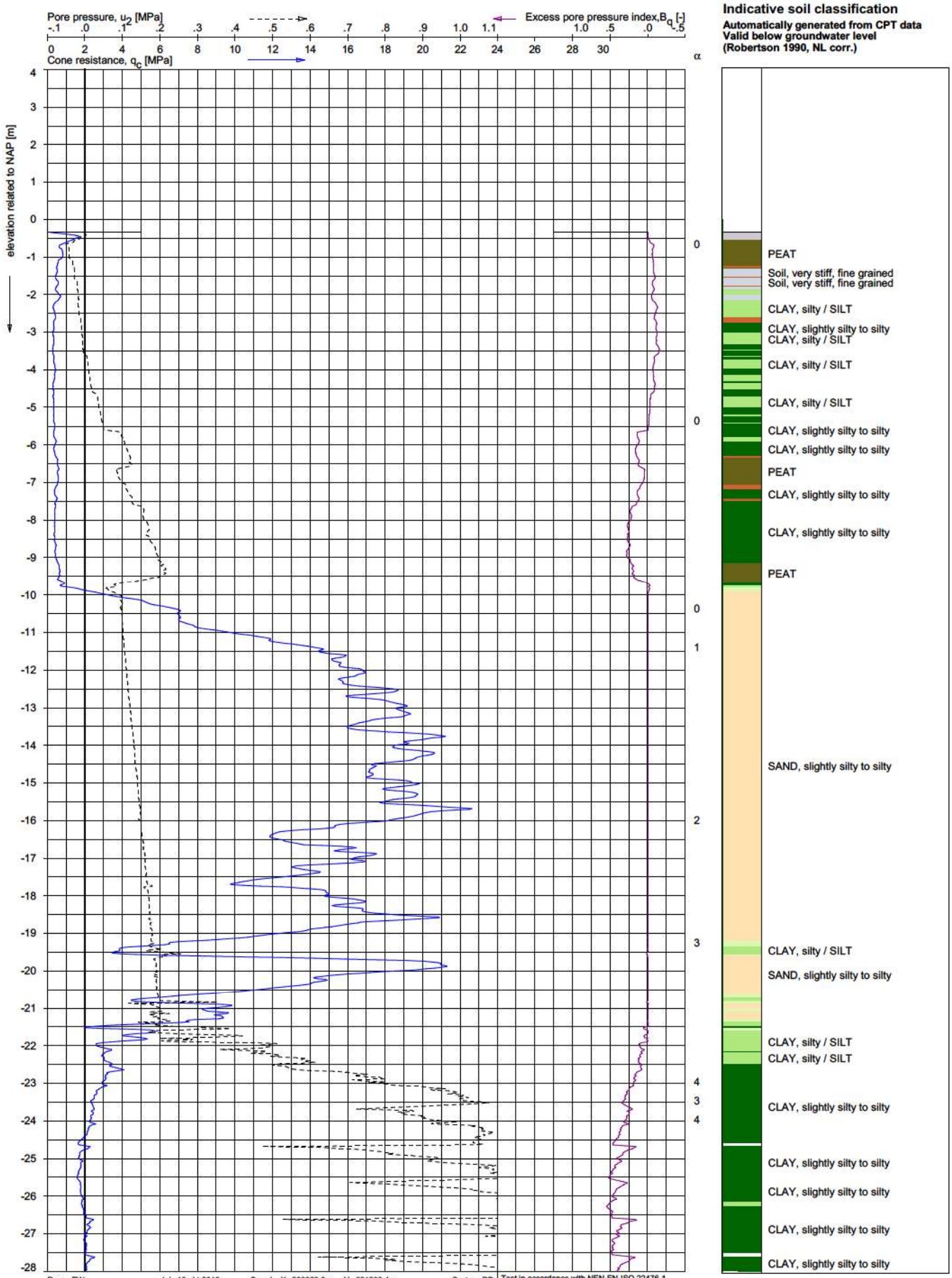
Rec.: EW d.d. 16-okt-2019 Coord.: X= 263989.3 m Y= 591209.4 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.35 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G31



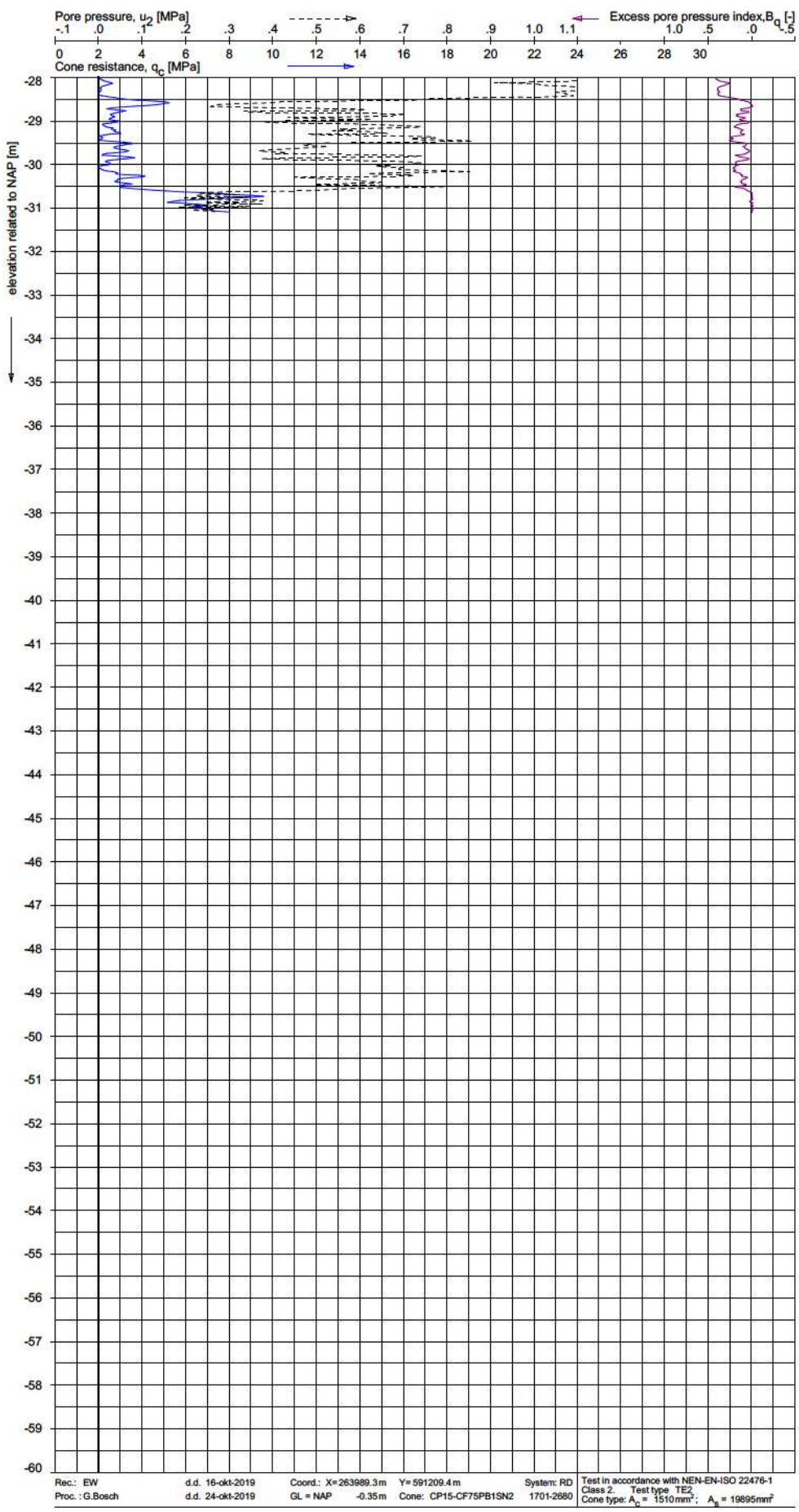
Rec.: EW d.d. 16-okt-2019 Coord.: X=263989.3 m Y=591209.4 m System: RD
Proc.: G.Bosch d.d. 24-okt-2019 GL = NAP -0.35 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

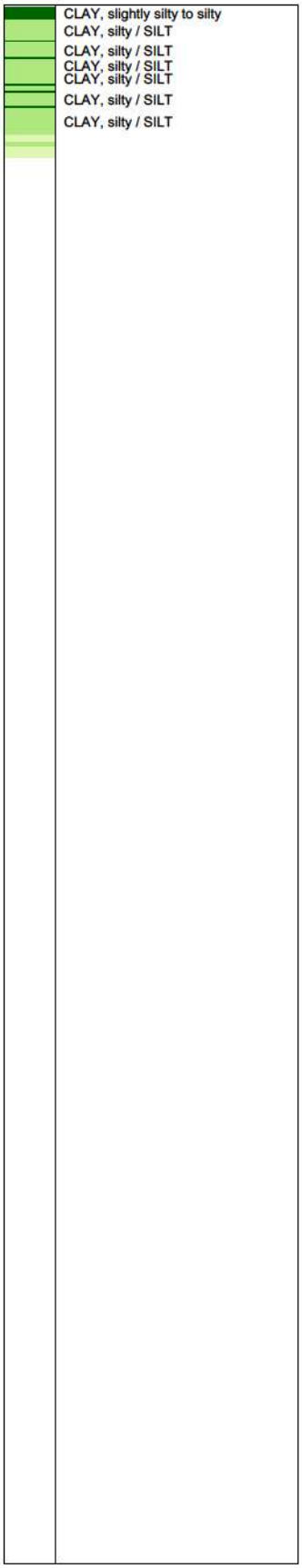
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G31



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



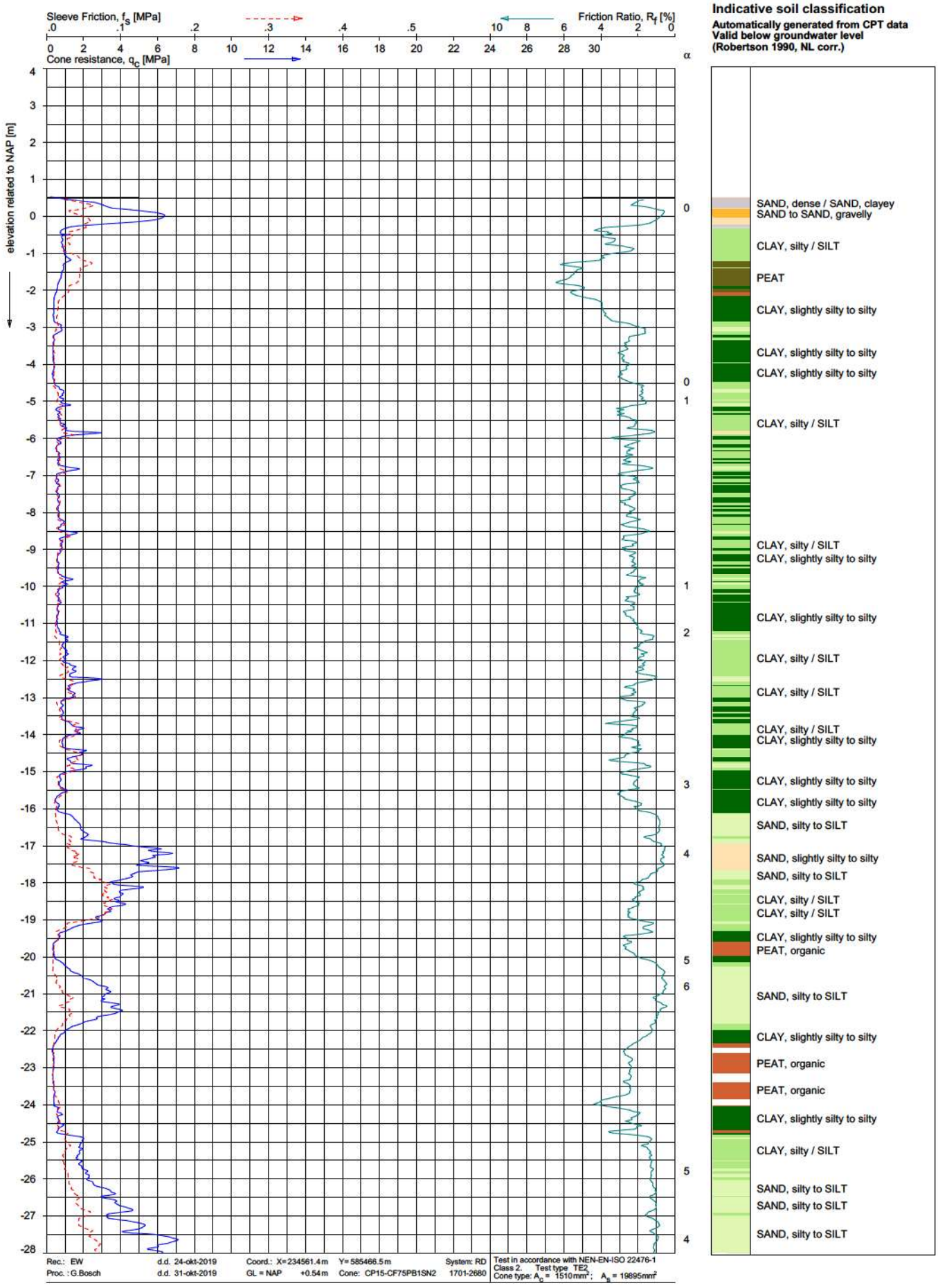
Rec.: EW d.d. 16-okt-2019 Coord.: X= 263989.3 m Y= 591209.4 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.35 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G31



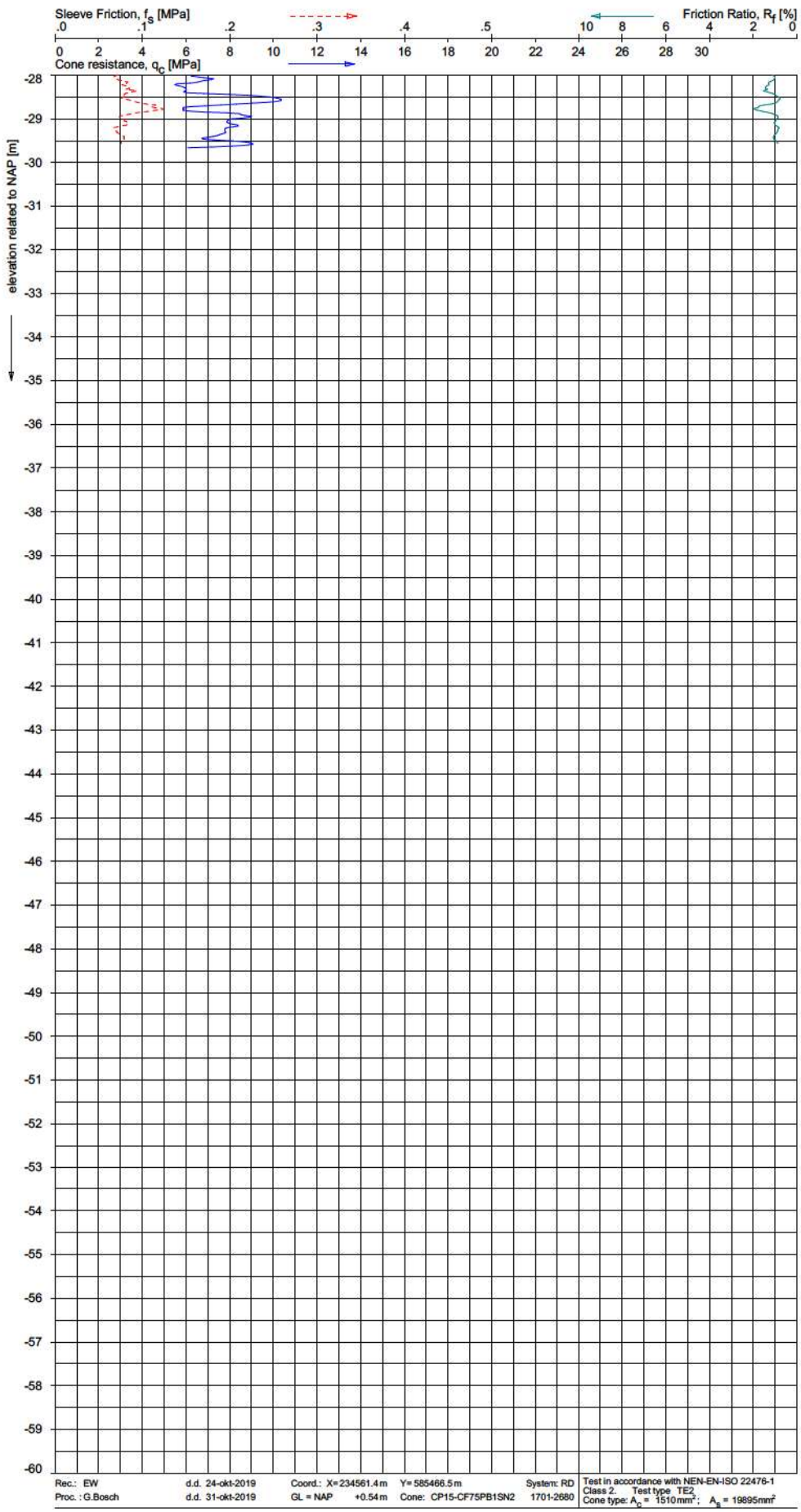
Rec.: EW d.d. 24-okt-2019 Coord.: X= 234561.4 m Y= 585466.5 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP +0.54 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

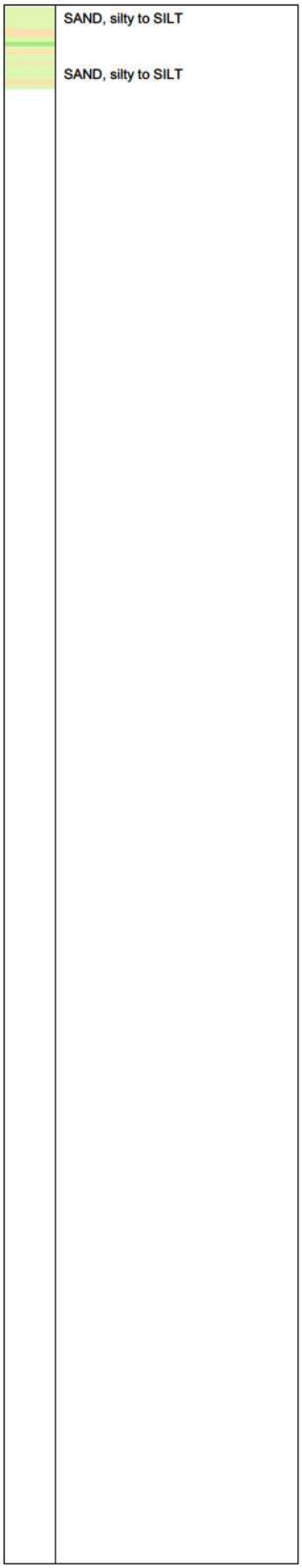
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G32



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



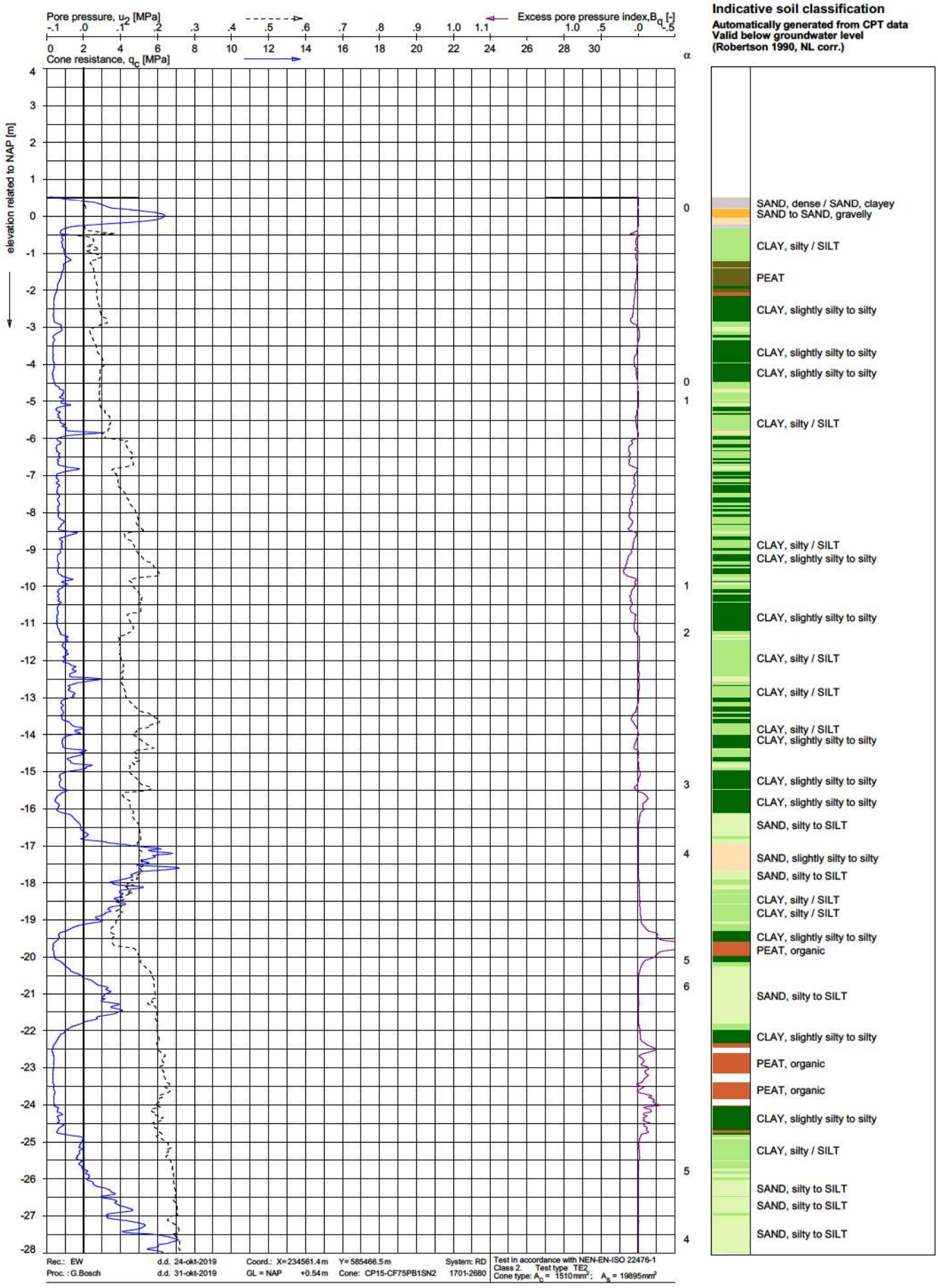
Rec.: EW d.d. 24-okt-2019 Coord.: X= 234561.4 m Y= 585466.5 m System: RD
Proc.: G.Bosch d.d. 31-okt-2019 GL = NAP +0.54 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G32



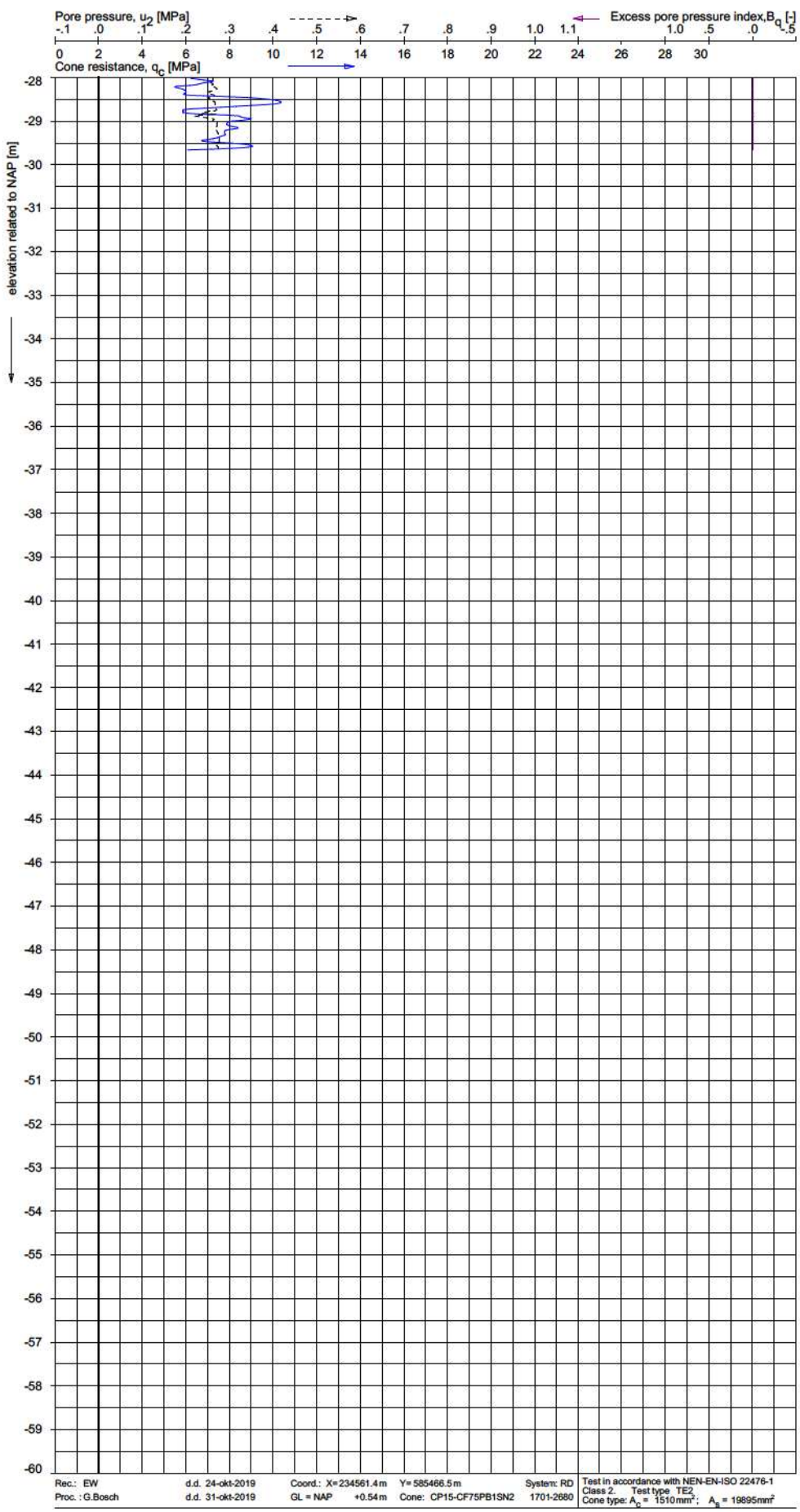
Rec.: EW d.d. 24-okt-2019 Coord.: X= 234561.4 m Y= 585466.5 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP +0.54 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

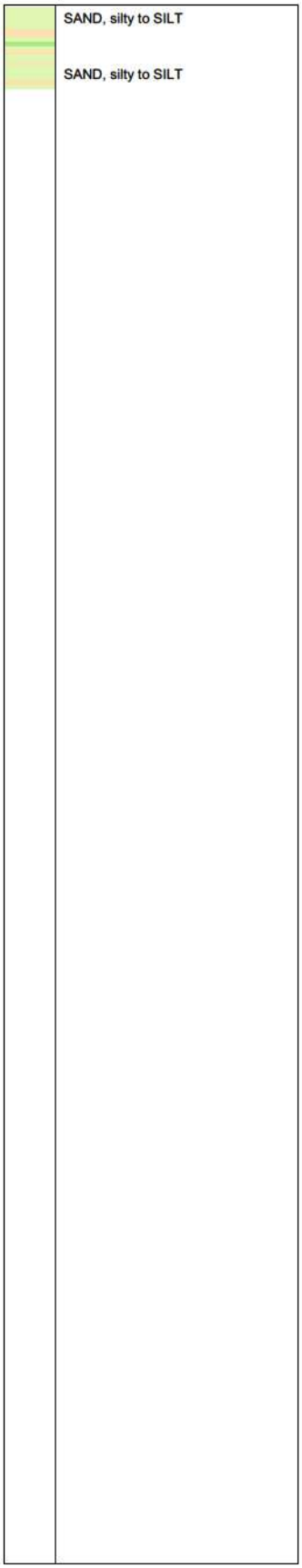
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G32



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



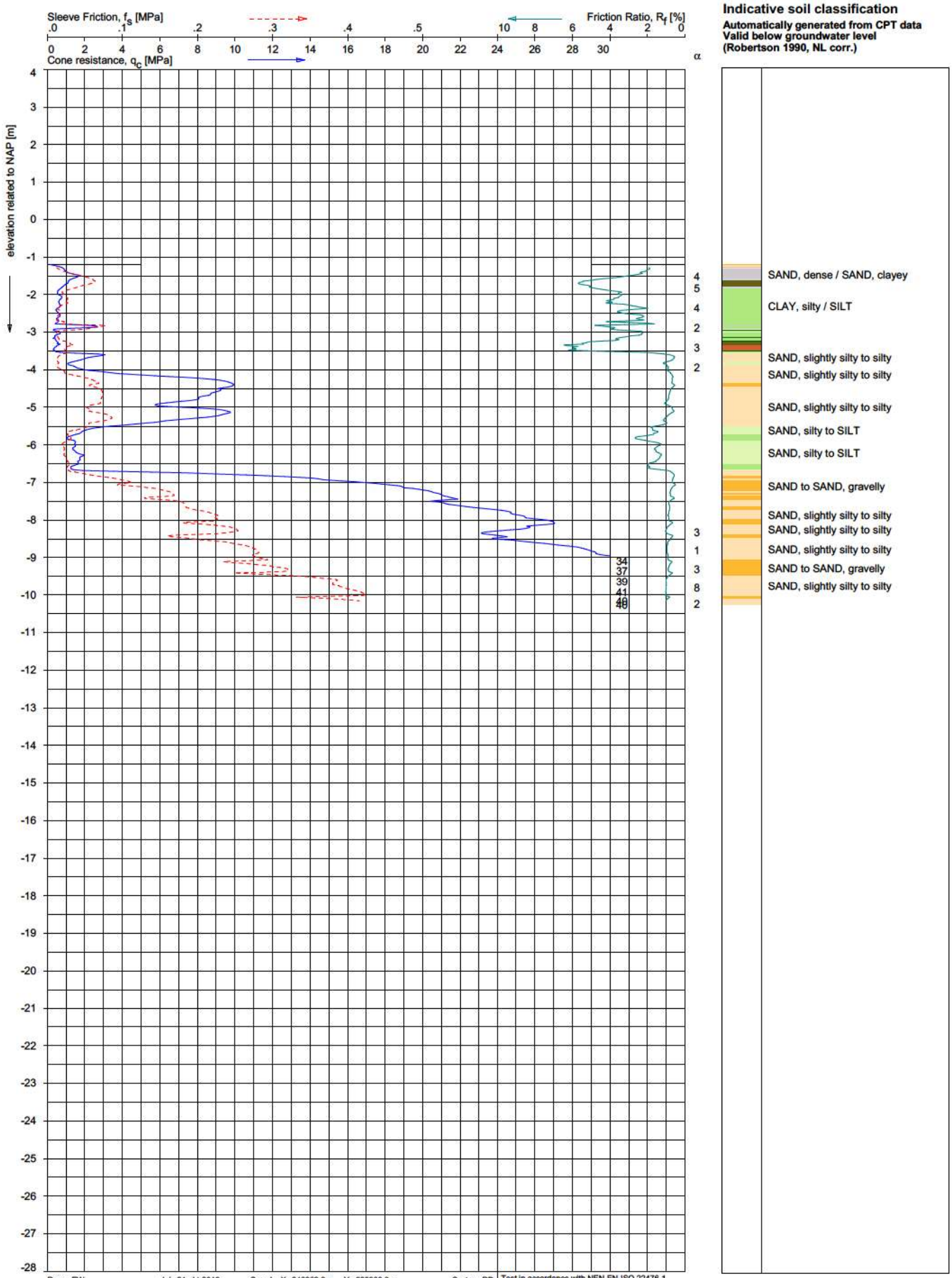
Rec.: EW d.d. 24-okt-2019 Coord.: X= 234561.4 m Y= 585466.5 m System: RD
Proc.: G.Bosch d.d. 31-okt-2019 GL = NAP +0.54 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G32



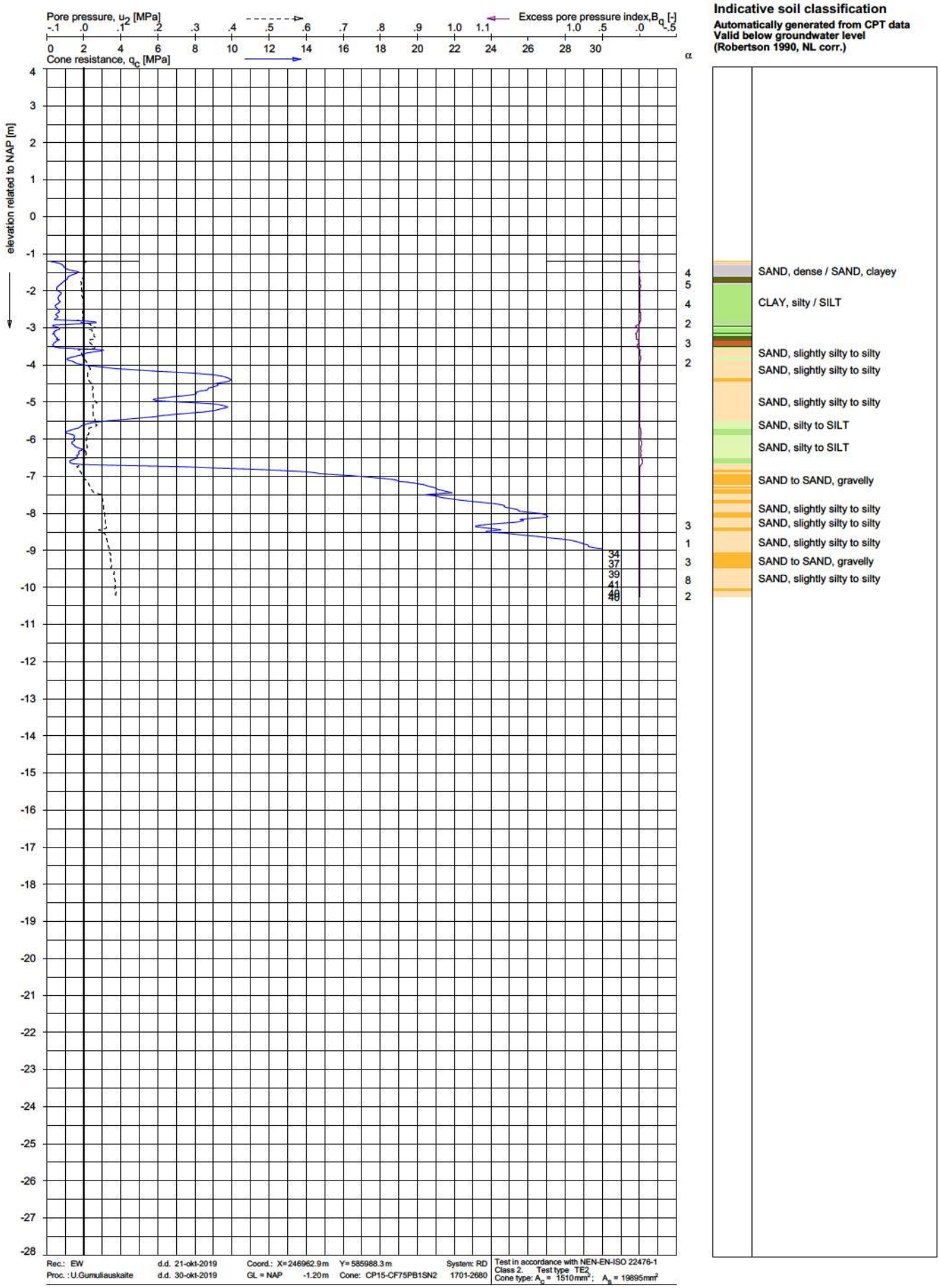
Rec.: EW d.d. 21-okt-2019 Coord.: X= 246962.9 m Y= 585988.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -1.20 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

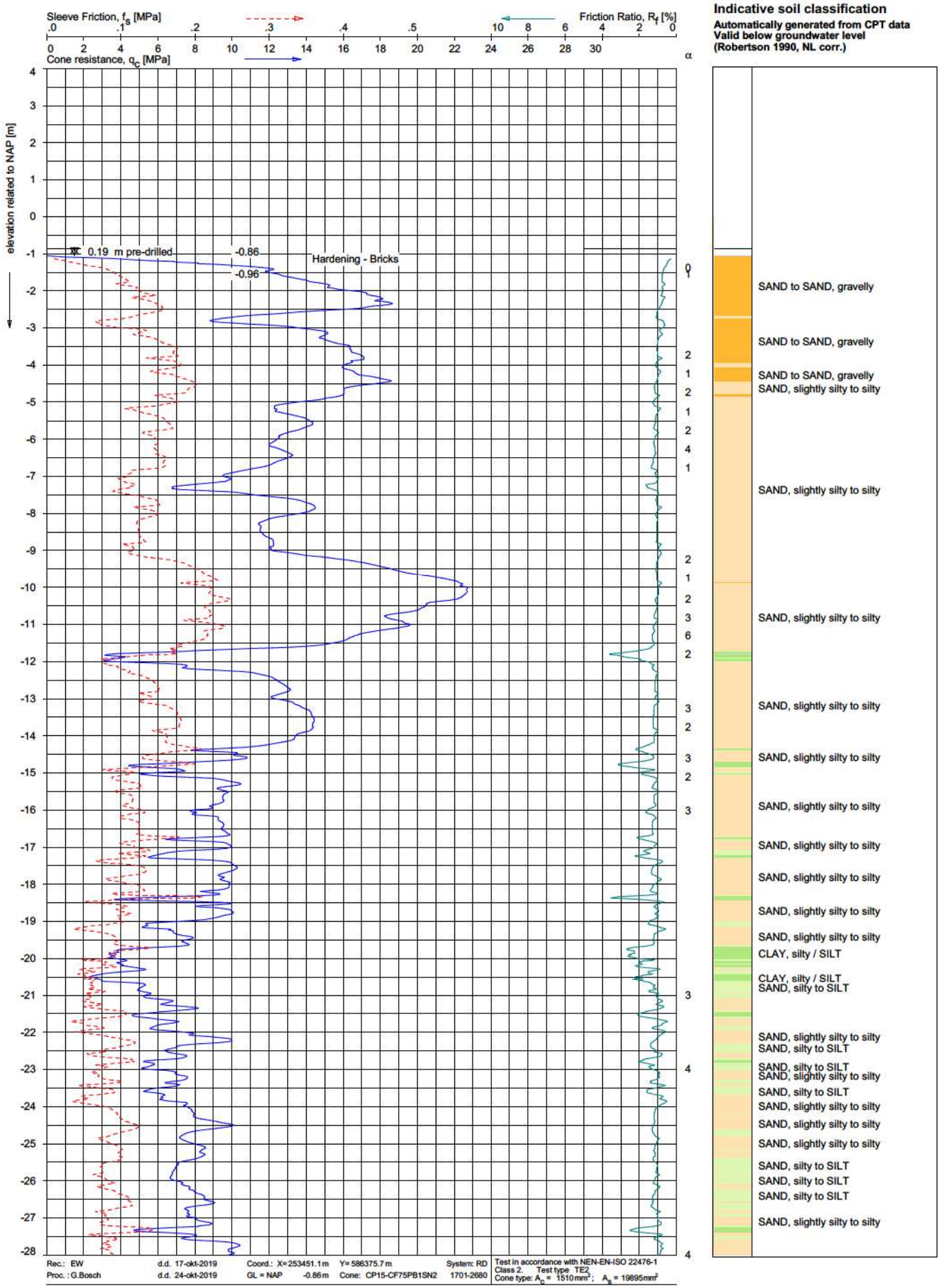
Proj. 1019-153172
Cpt SCPT_G34



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

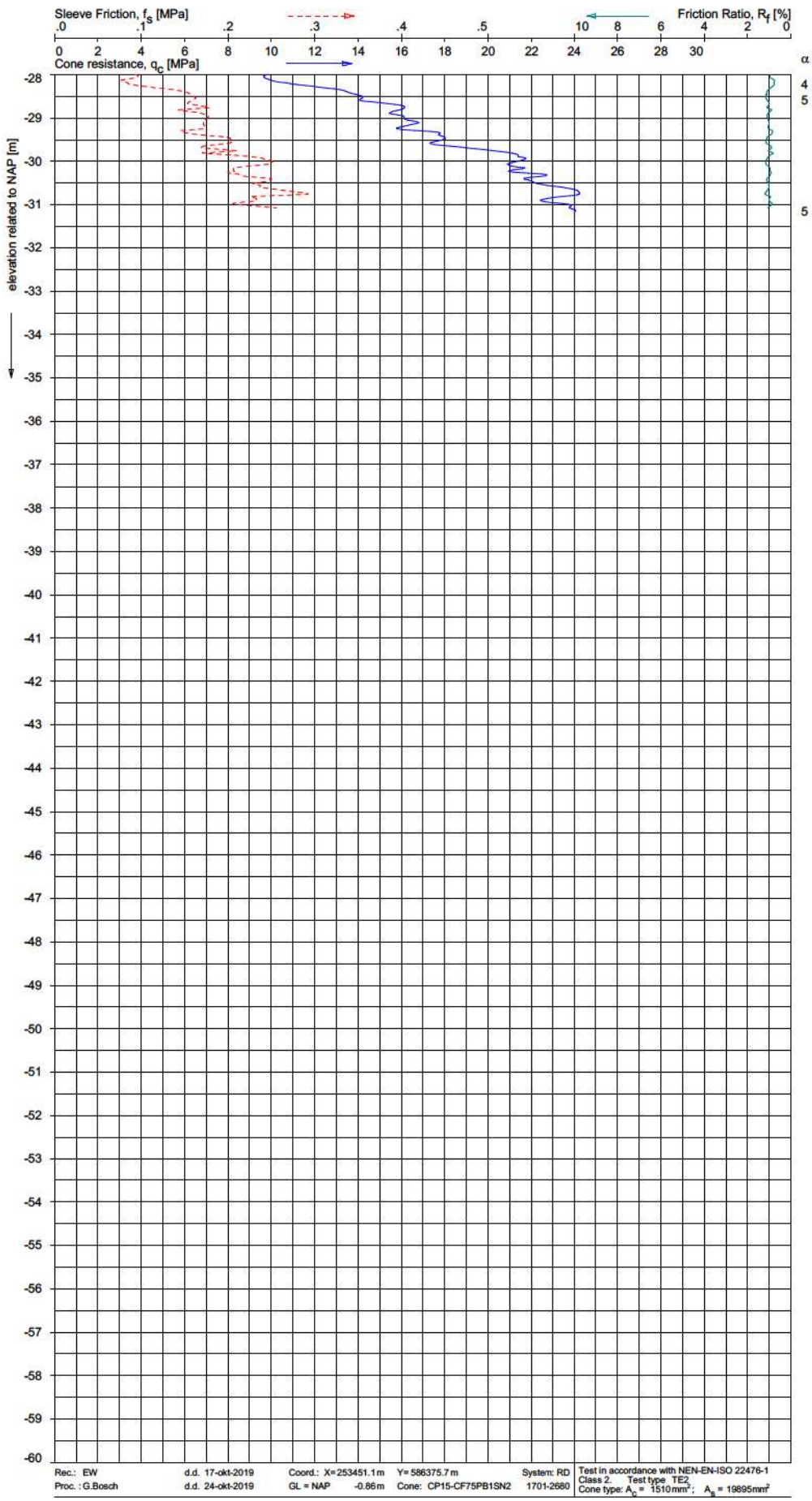
Proj. 1019-153172
Cpt SCPT_G34



CONE PENETRATION TEST WITH LOCAL FRICTION

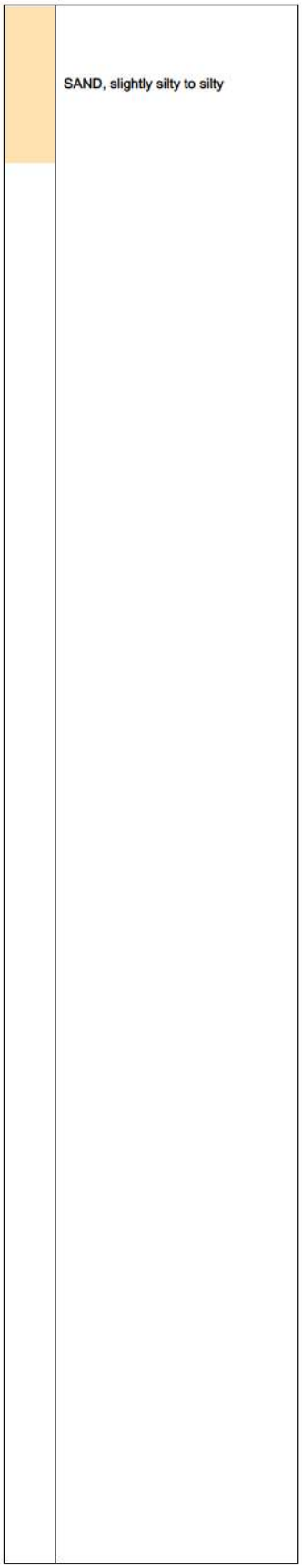
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G35



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



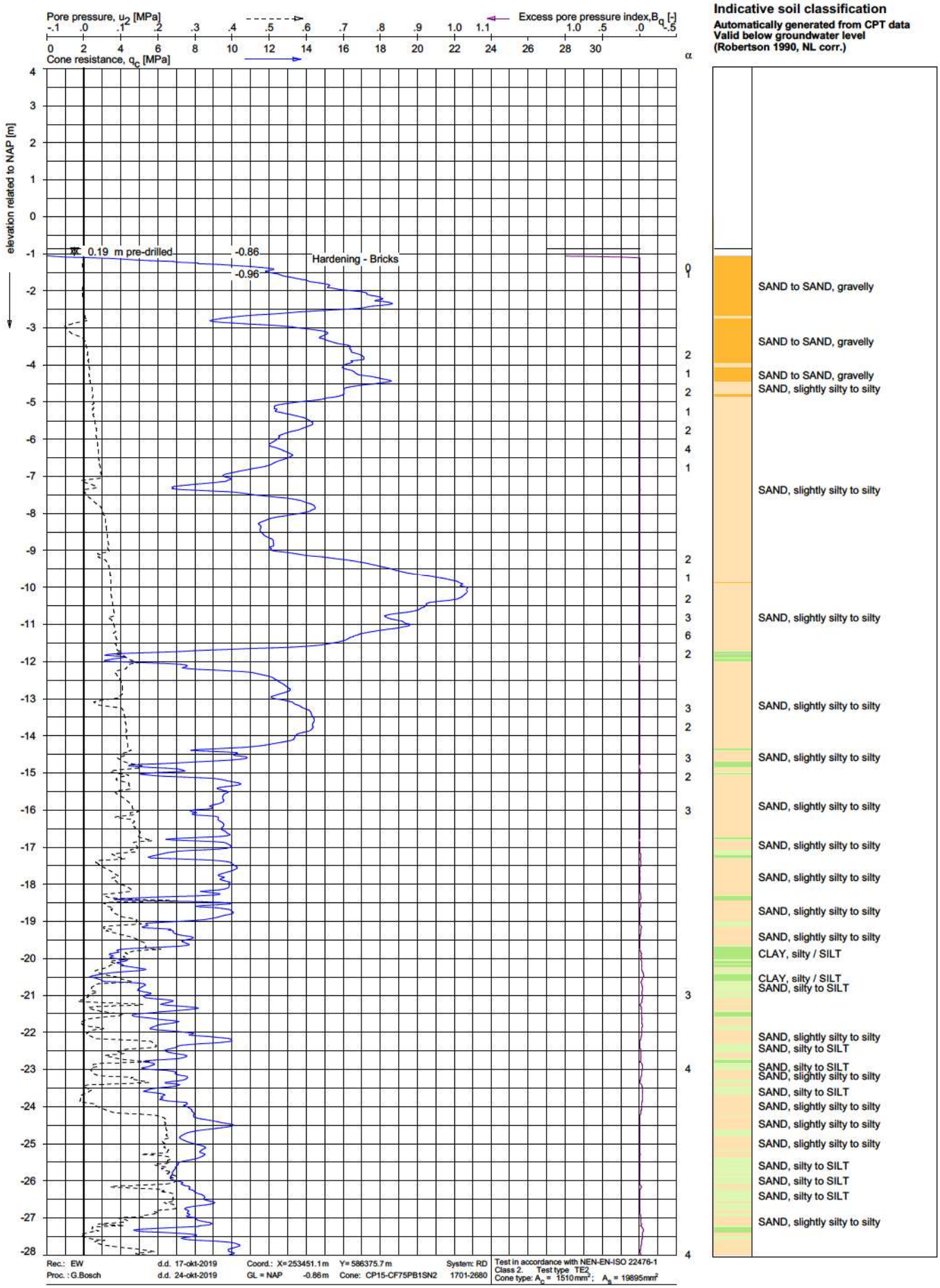
Rec.: EW d.d. 17-okt-2019 Coord.: X= 253451.1 m Y= 586375.7 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.86 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

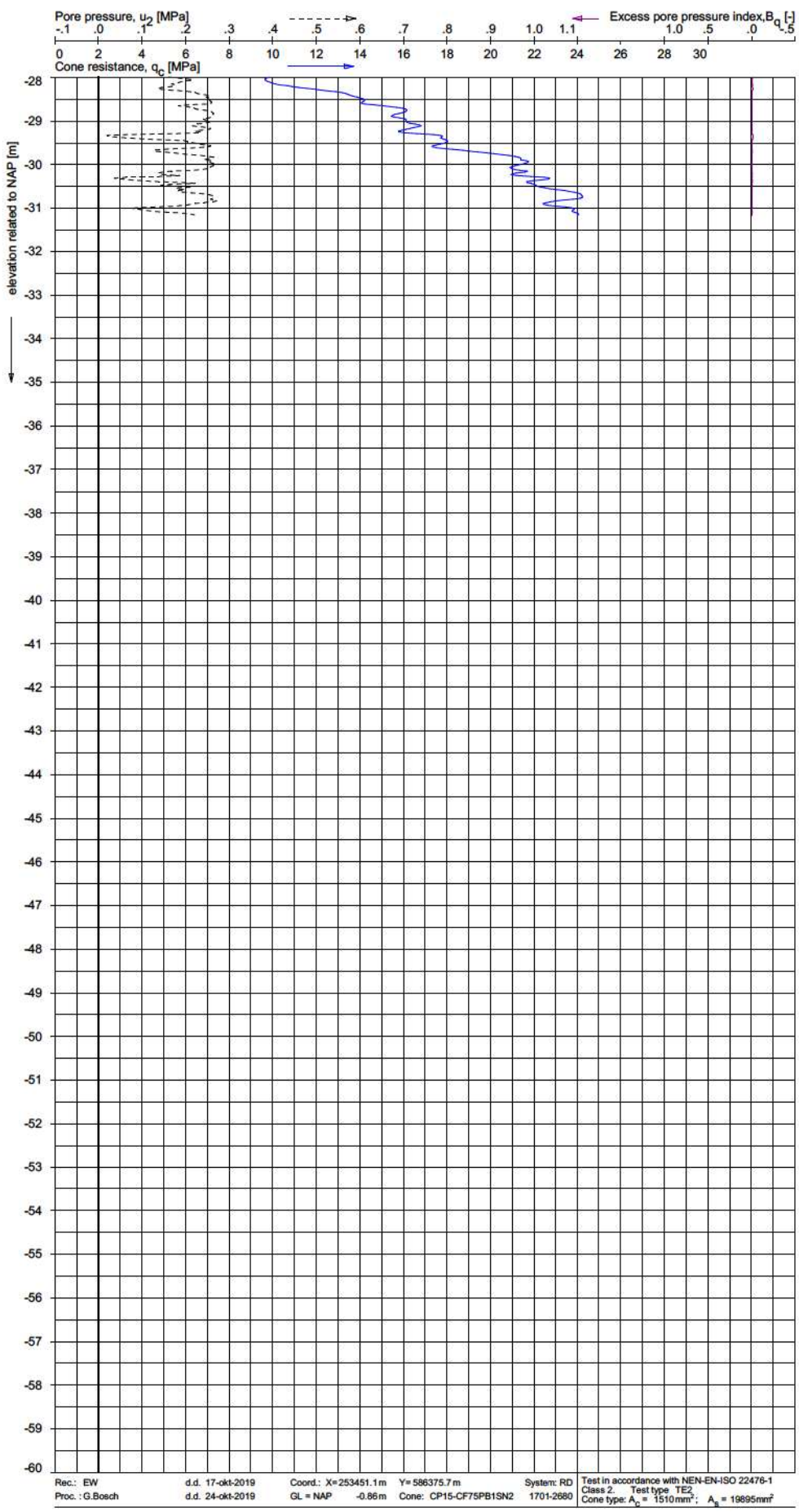
Proj. 1019-153172
Cpt SCPT_G35



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G35

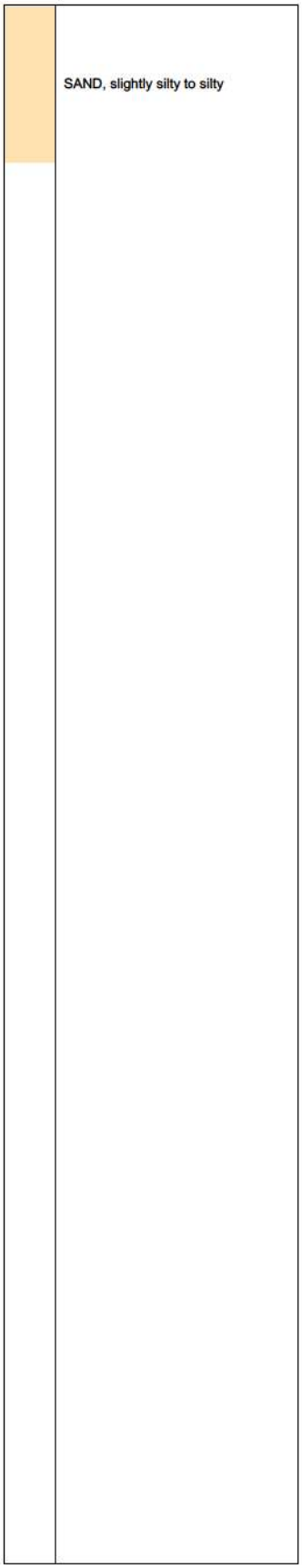


Rec.: EW d.d. 17-okt-2019 Coord.: X= 253451.1 m Y= 586375.7 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -0.86 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

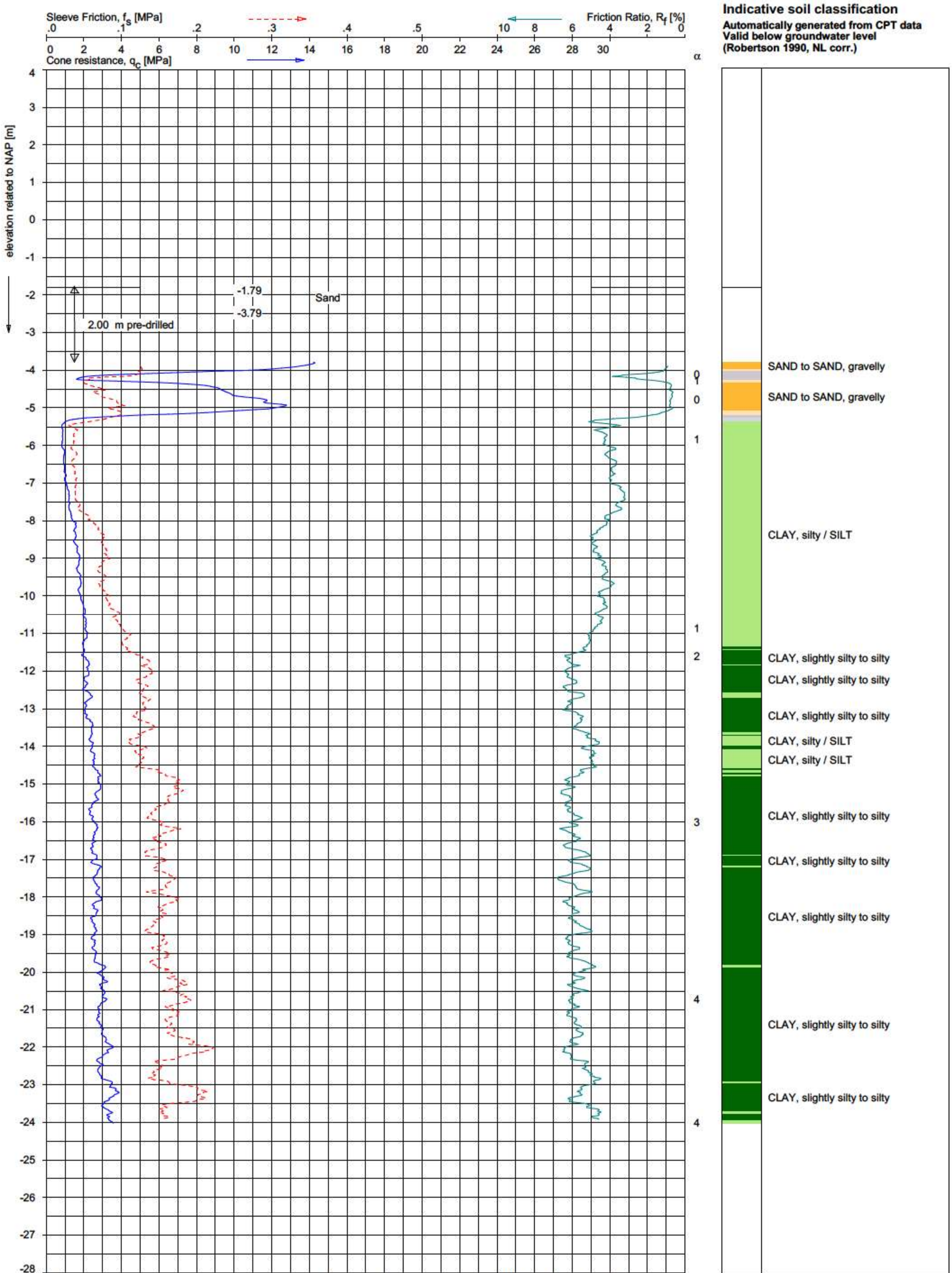
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G35



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1019-153172

SCPT_G36 - 1

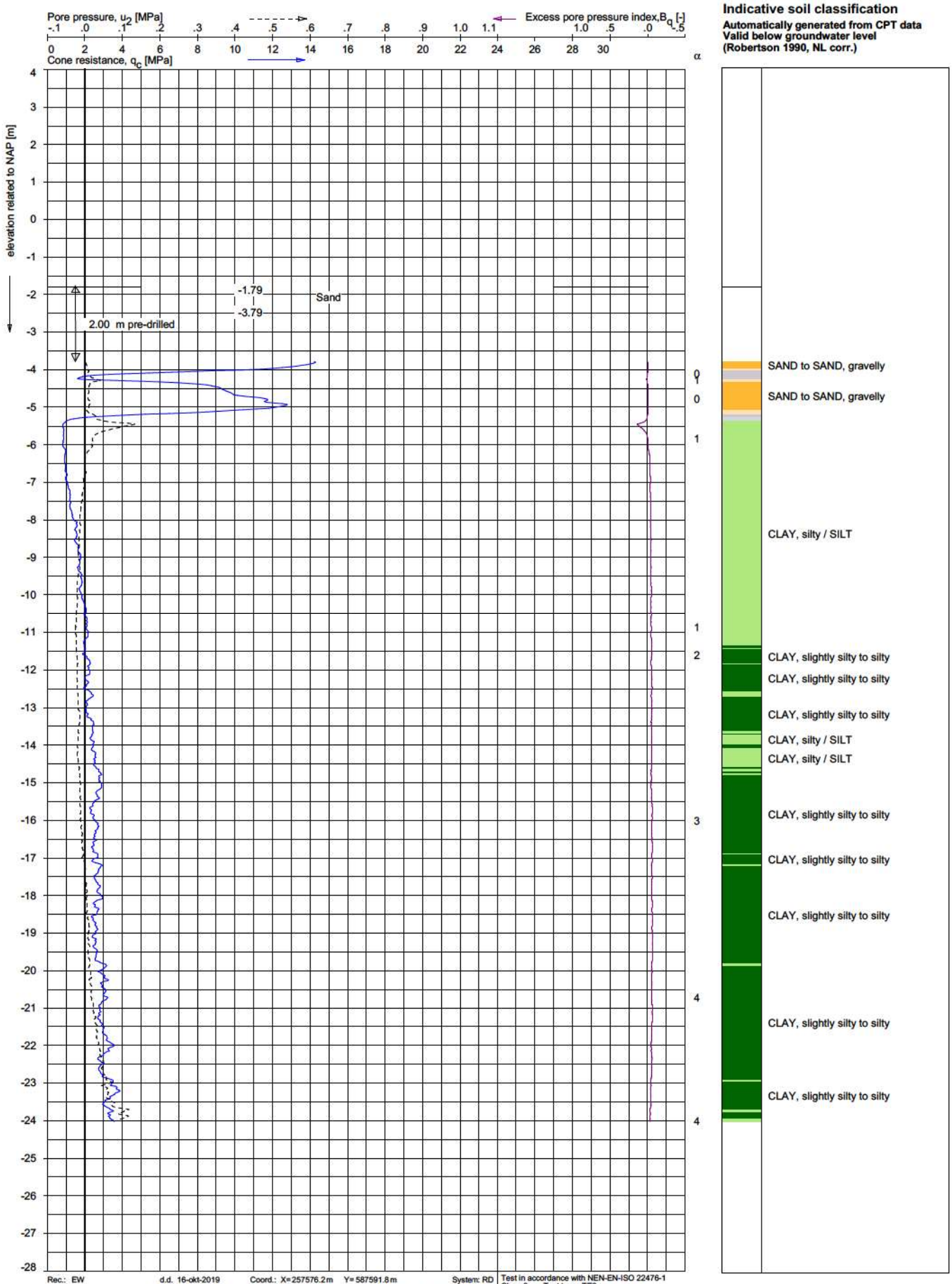
Rec.: EW d.d. 16-okt-2019 Coord.: X= 257576.2 m Y= 587591.8 m System: RD Test in accordance with NEN-EN-ISO 22476-1 Class 2. Test type TE2

Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -1.79 m Cone: CP15-CF75PB1SN2 1701-2680 Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G36



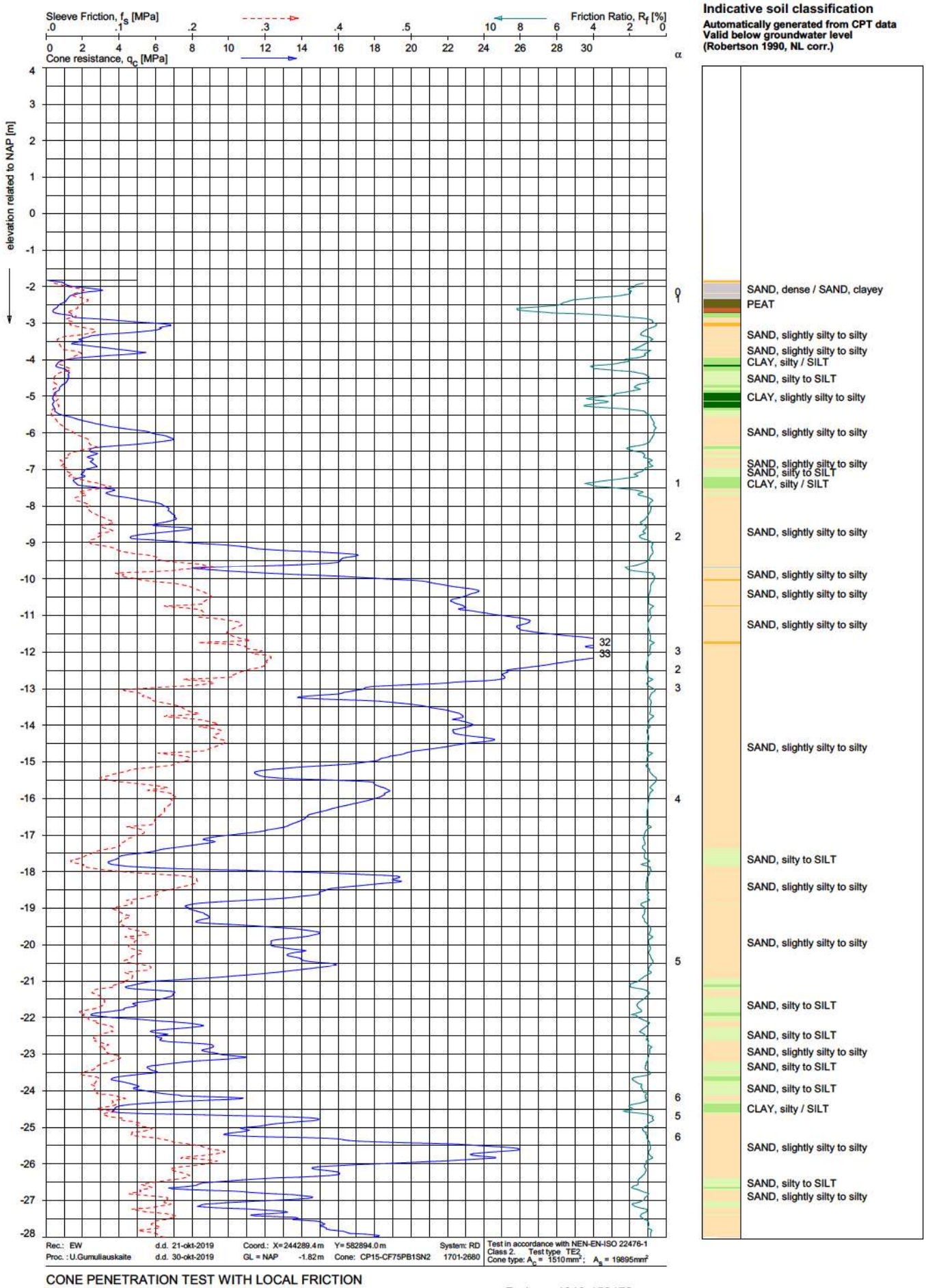
Rec.: EW d.d. 16-okt-2019 Coord.: X= 257576.2 m Y= 587591.8 m System: RD
Proc. : G.Bosch d.d. 24-okt-2019 GL = NAP -1.79 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G36



Rec.: EW d.d. 21-okt-2019 Coord.: X= 244289.4 m Y= 582894.0 m System: RD

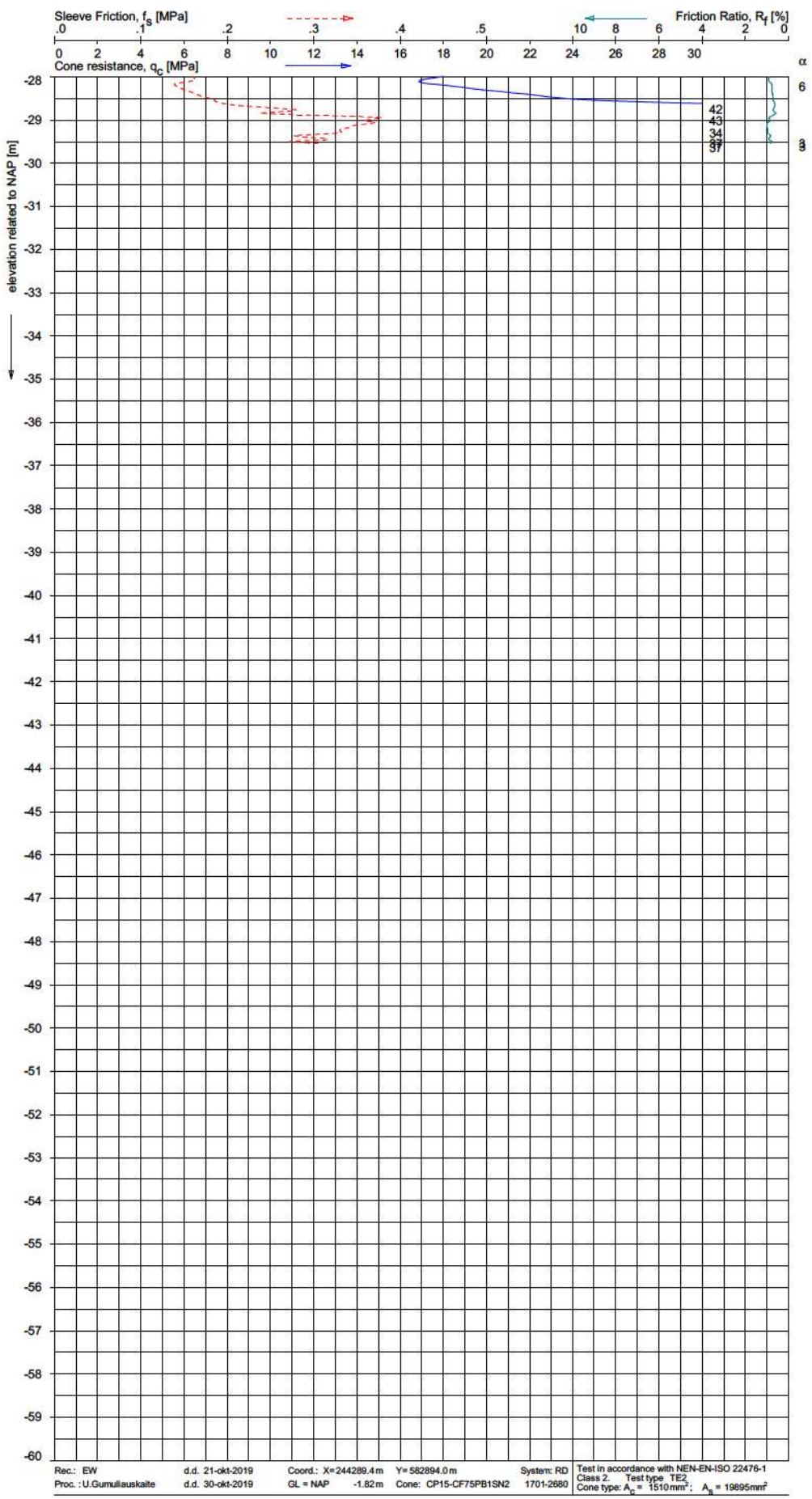
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -1.82 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G39



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty

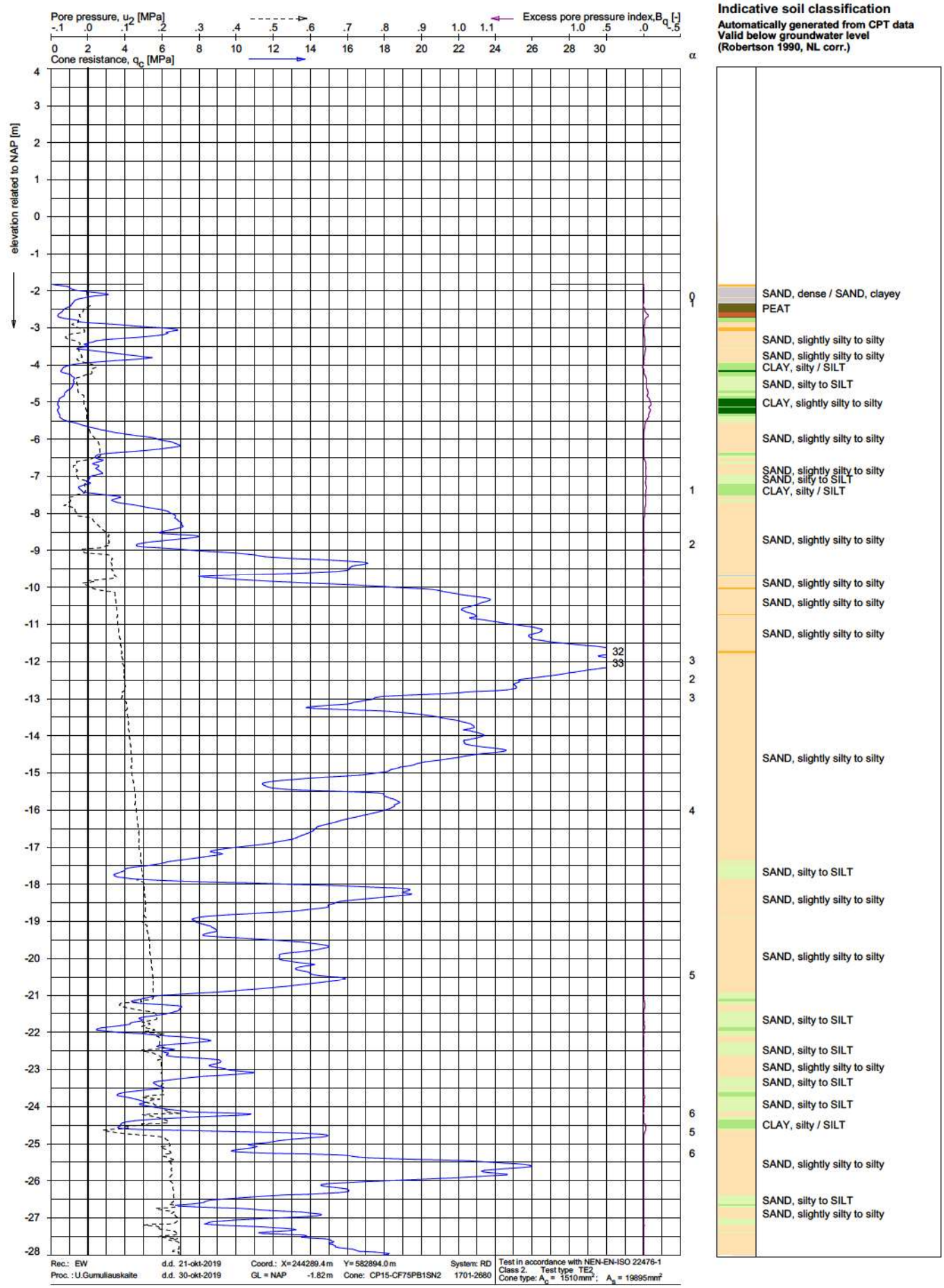
Rec.: EW d.d. 21-okt-2019 Coord.: X= 244289.4 m Y= 582894.0 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -1.82 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G39



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G39

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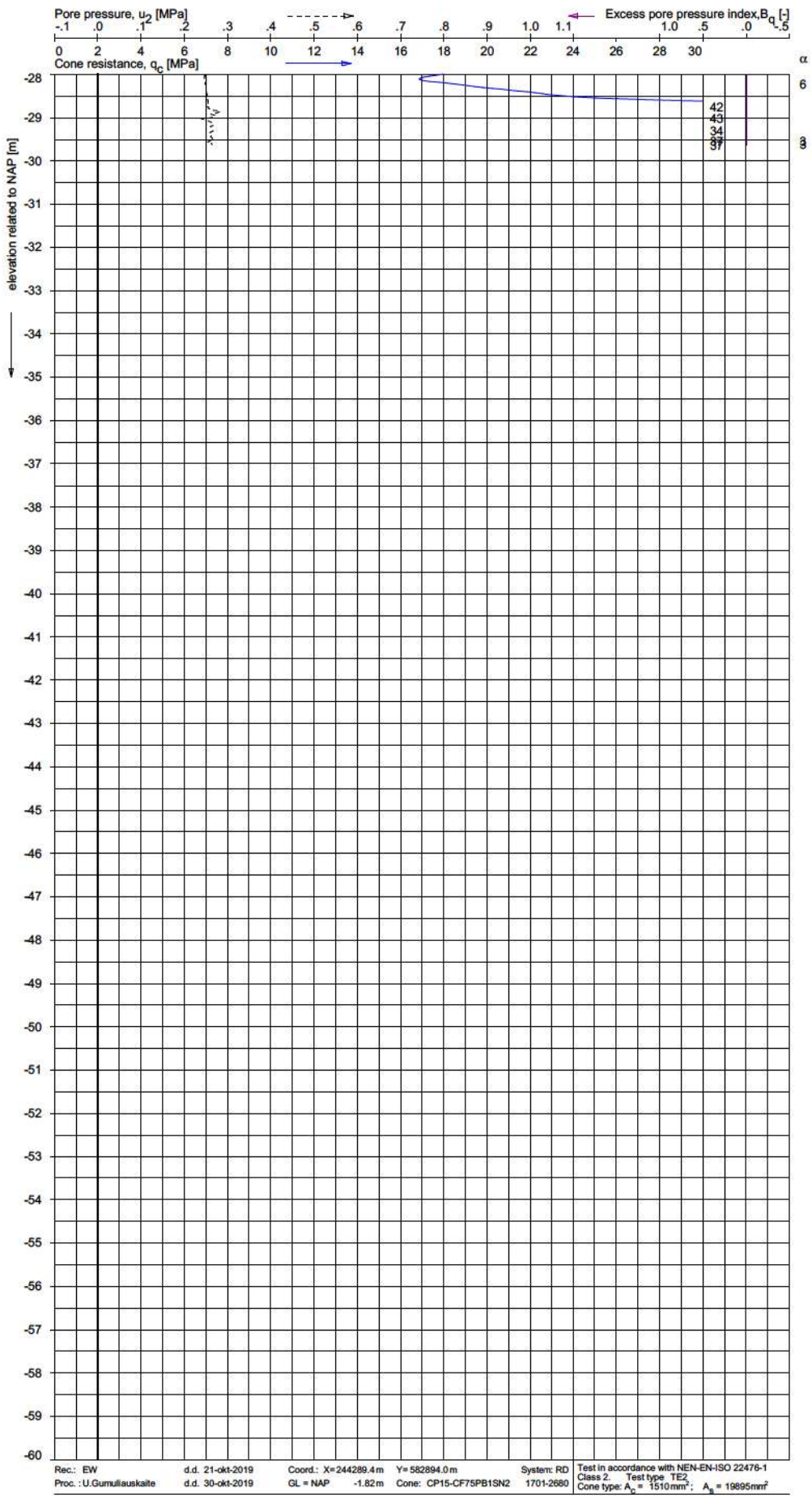
1019-153172

SCPT_G39 -1



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

SAND, slightly silty to silty

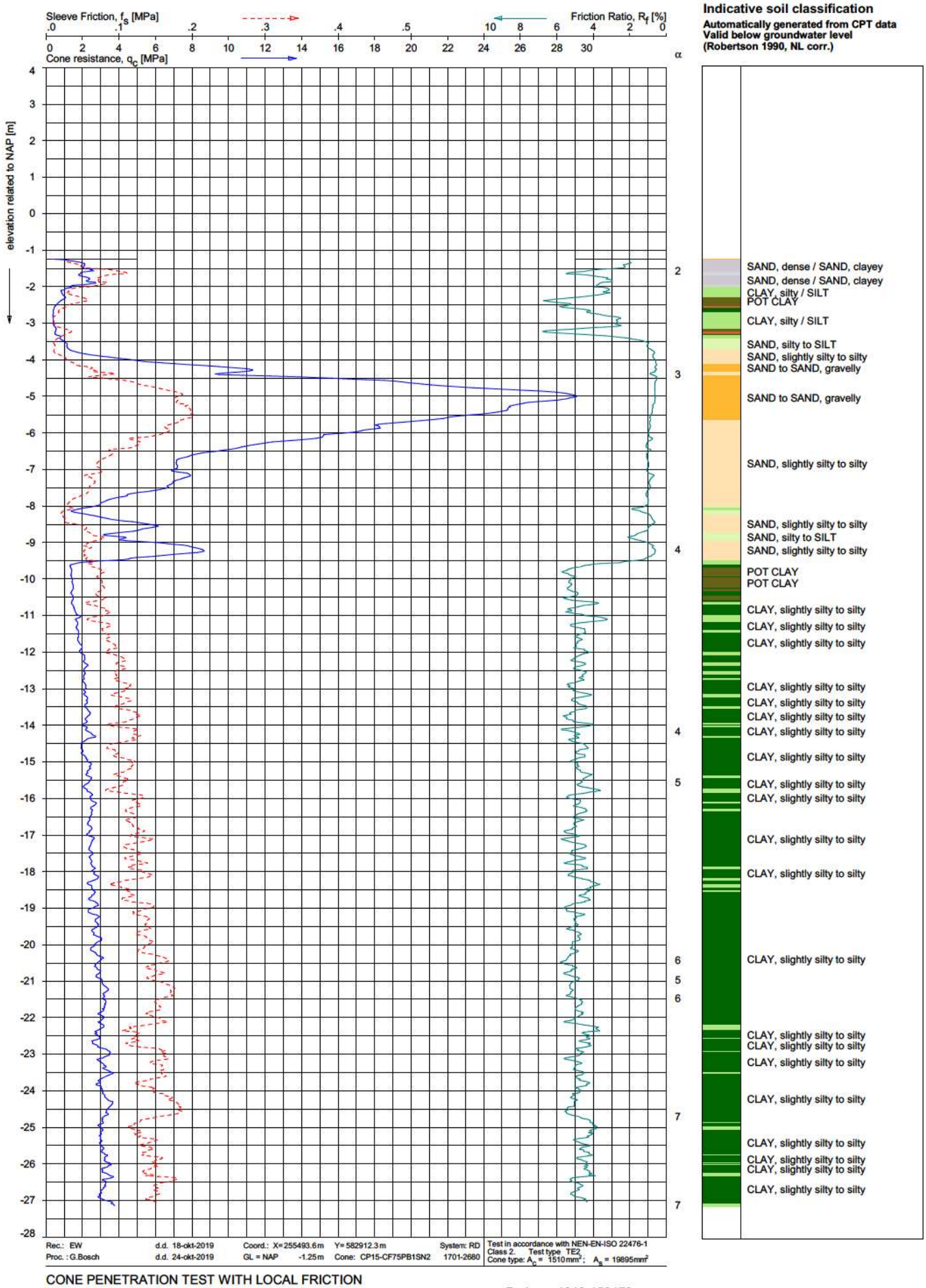
Rec.: EW d.d. 21-okt-2019 Coord.: X= 244289.4 m Y= 582894.0 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -1.82 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G39



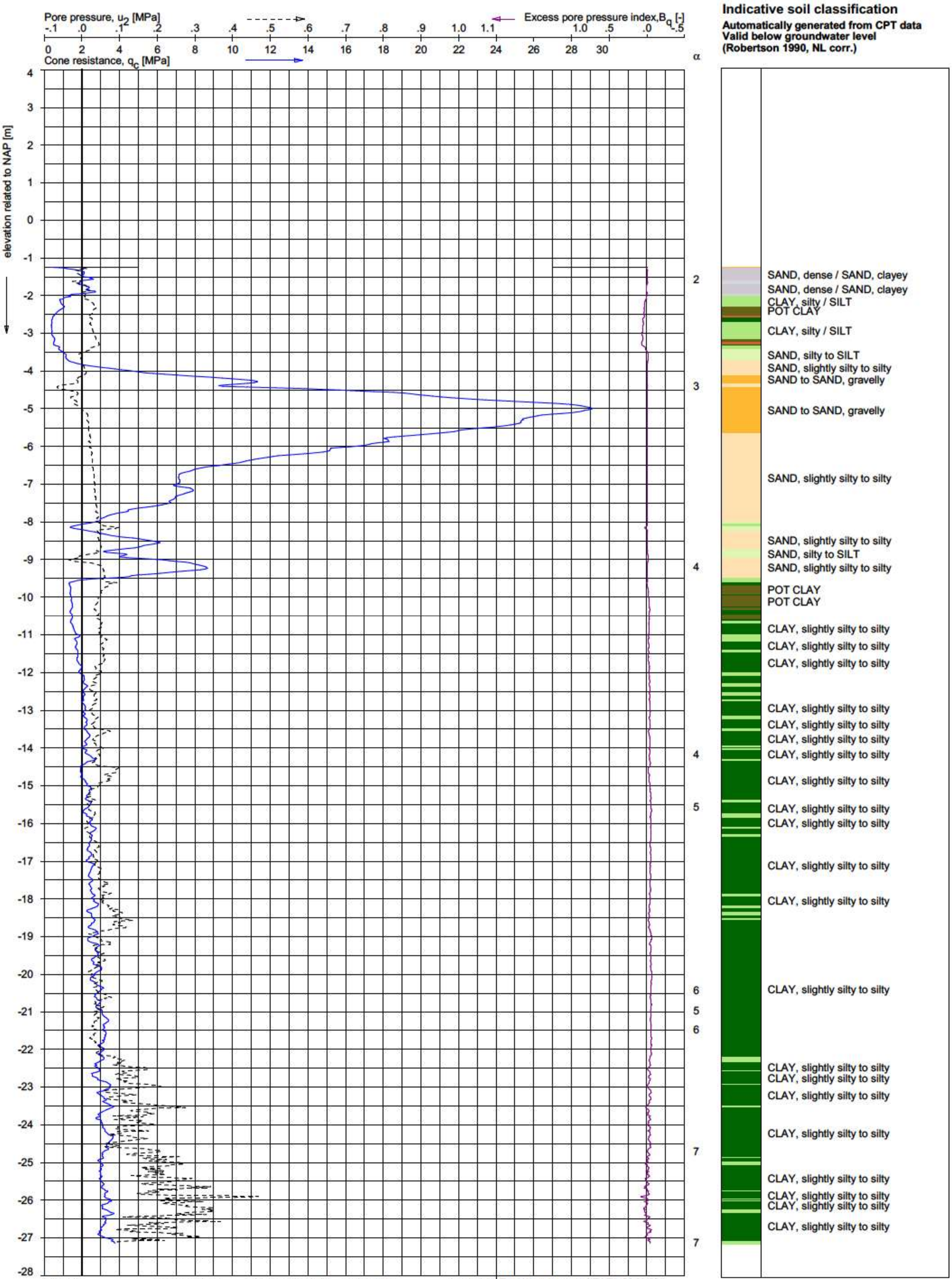
CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G41

1019-153172

SCPT_G41 - 1



Rec.: EW | d.d. 18-okt-2019 | Coord.: X= 255493.6 m Y= 582912.3 m | System: RD | Test in accordance with NEN-EN-ISO 22476-1
Proc.: G.Bosch | d.d. 24-okt-2019 | GL = NAP -1.25 m Cone: CP15-CF75PB1SN2 | 1701-2680 | Class 2. Test type TE2 Cone type: A_c = 1510mm²; A_s = 19895mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G41

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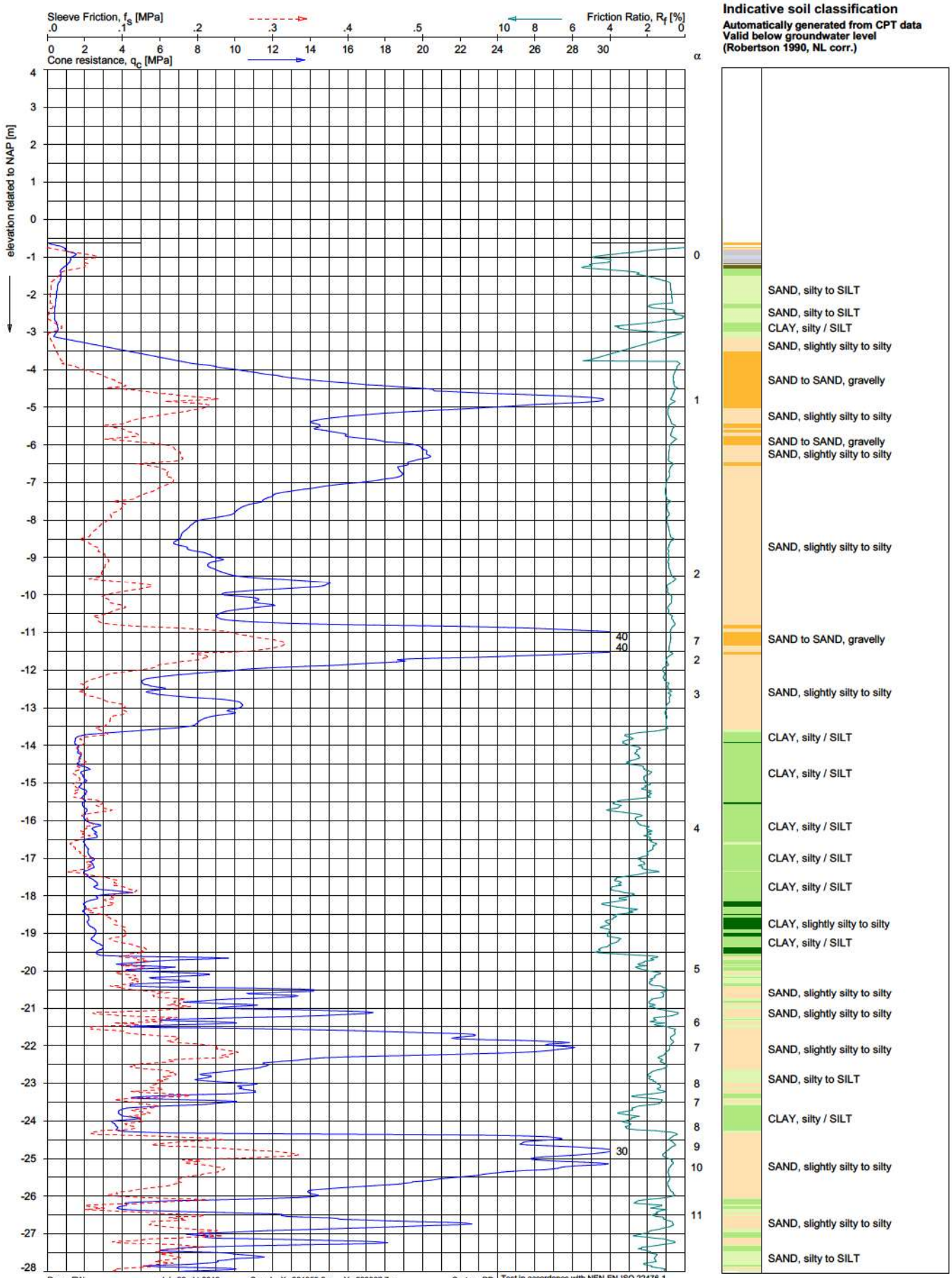
1019-153172

SCPT_G41 - 1



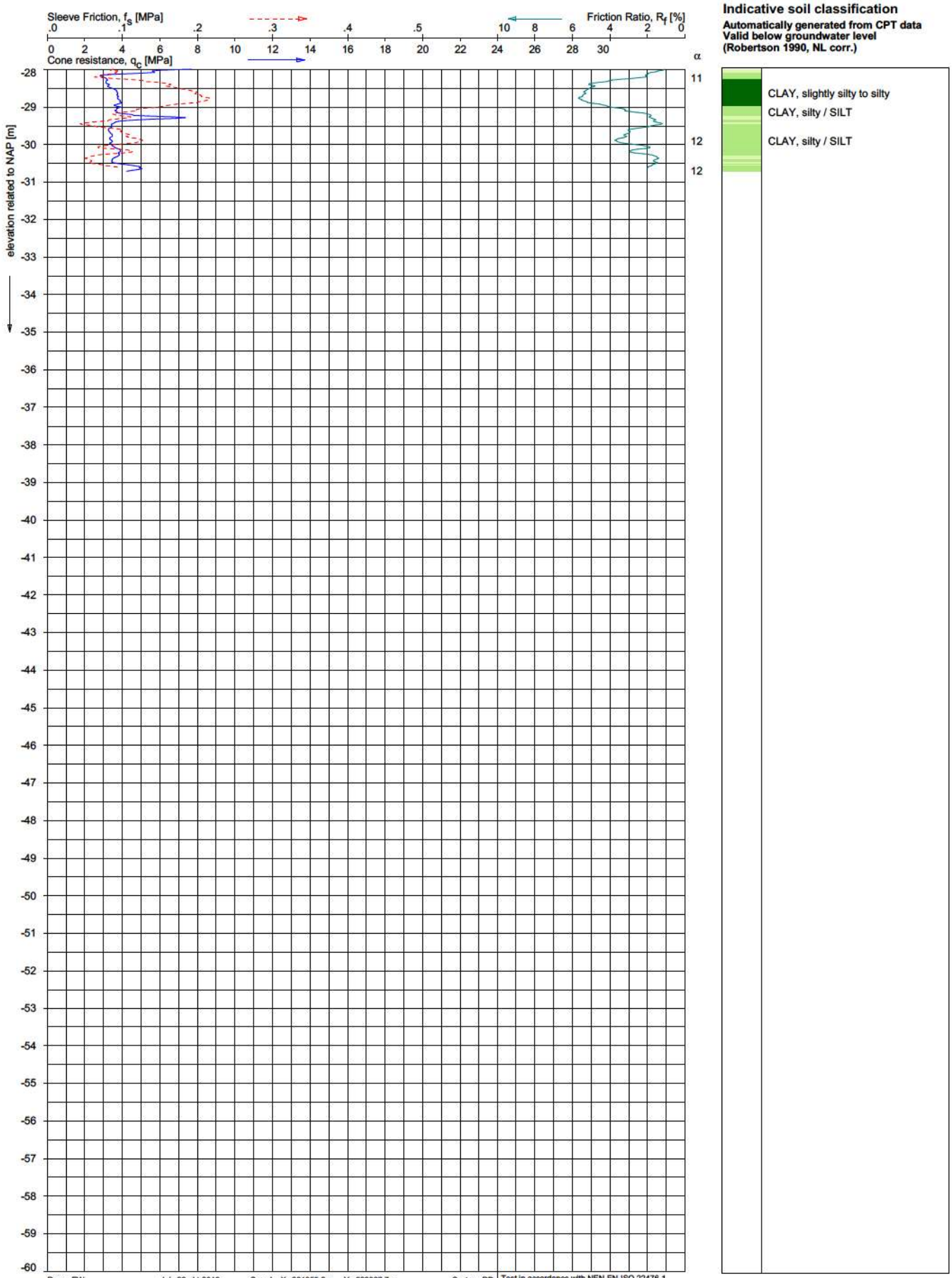
Rec.: EW d.d. 22-okt-2019 Coord.: X= 261955.2 m Y= 582867.7 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP -0.62 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G42



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

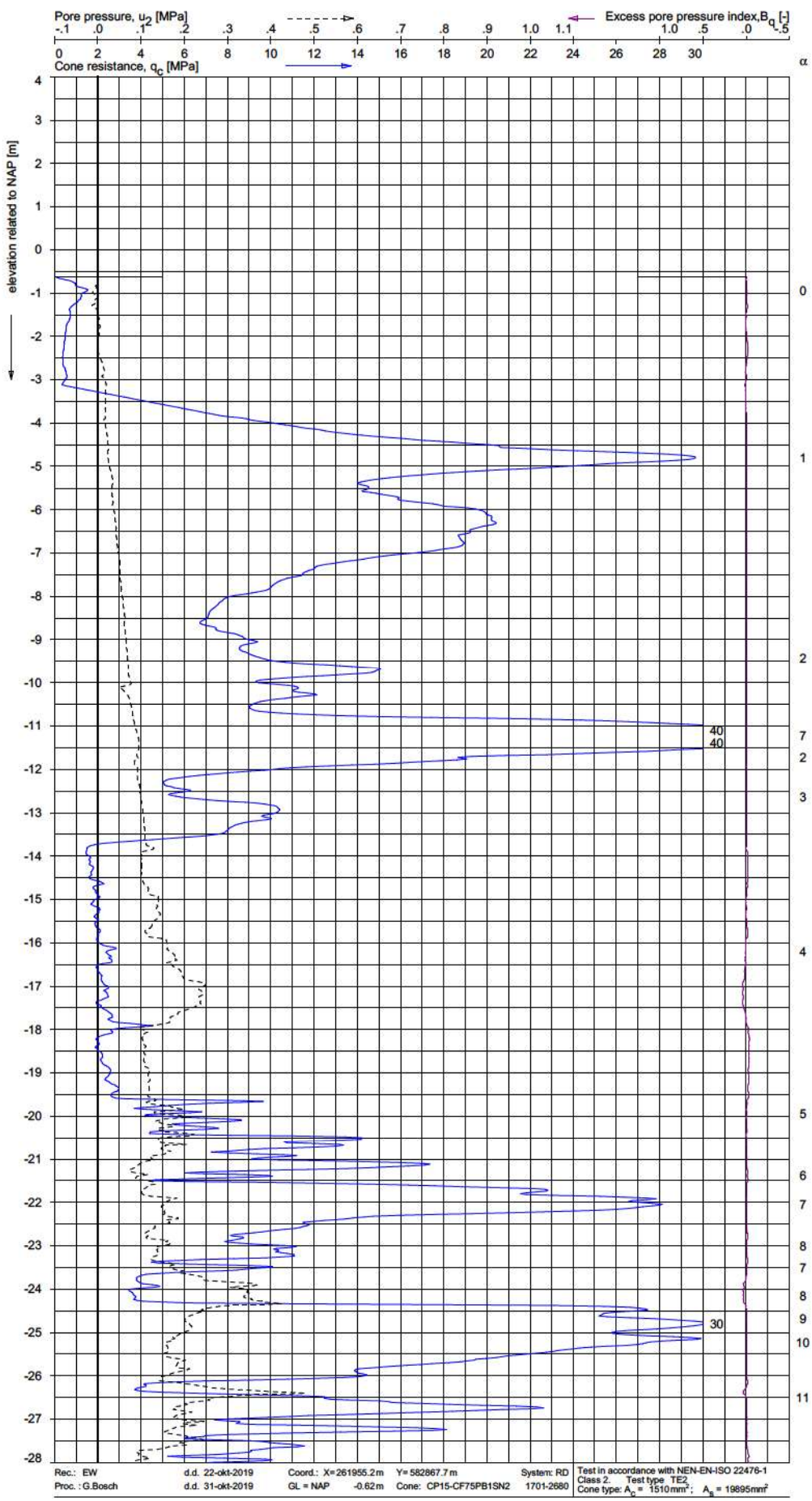
Rec.: EW d.d. 22-okt-2019 Coord.: X= 261955.2 m Y= 582867.7 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP -0.62 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G42



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- SAND, silty to SILT
- SAND, silty to SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND to SAND, gravelly
- SAND, slightly silty to silty
- SAND to SAND, gravelly
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND to SAND, gravelly
- SAND, slightly silty to silty
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, silty / SILT
- CLAY, slightly silty to silty
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, silty to SILT
- CLAY, silty / SILT
- SAND, slightly silty to silty
- SAND, slightly silty to silty
- SAND, silty to SILT

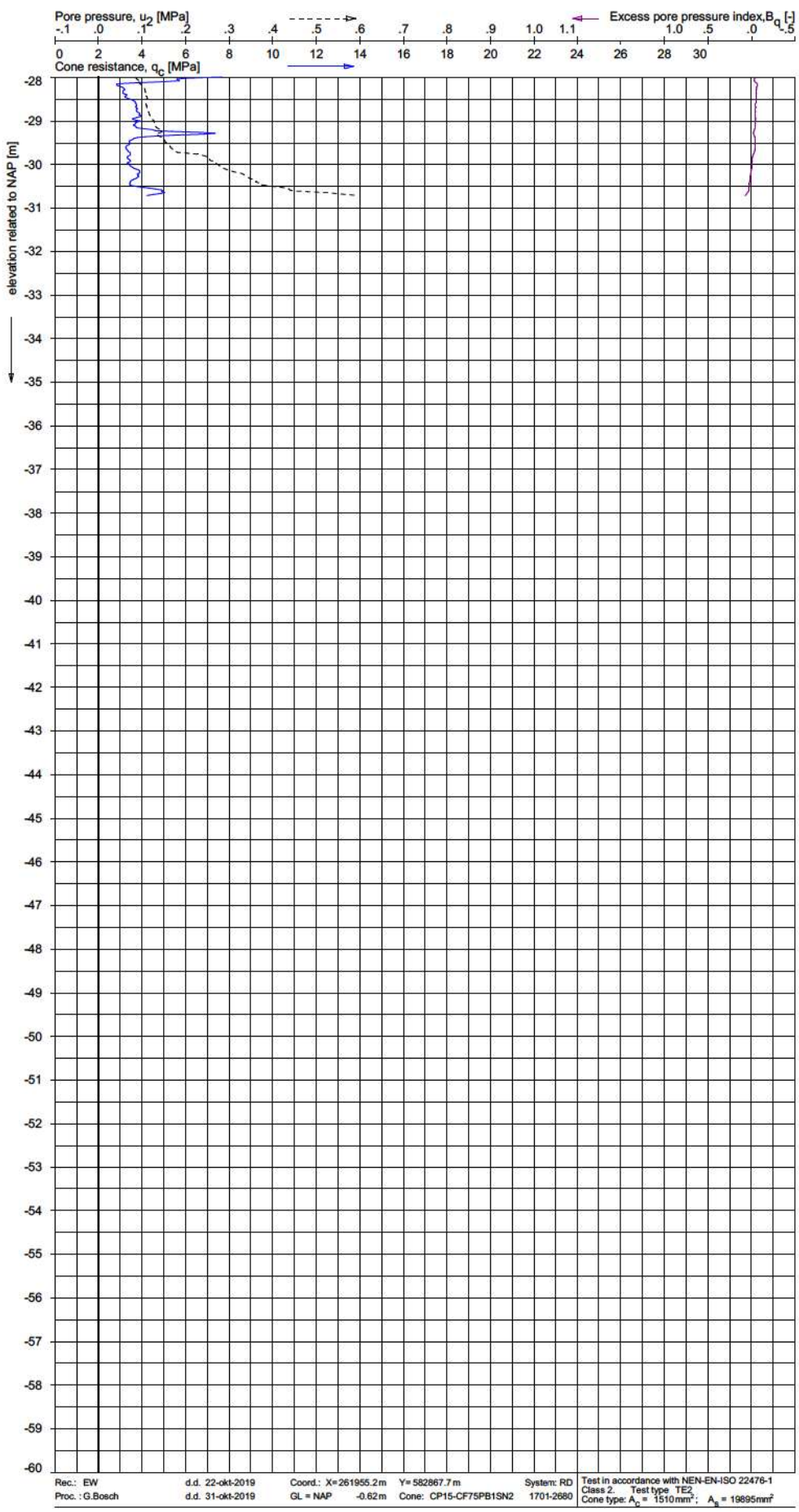
Rec.: EW
Proc.: G.Bosch
d.d. 22-okt-2019
d.d. 31-okt-2019
Coord.: X= 261955.2 m
GL = NAP -0.62 m
Y= 582867.7 m
Cone: CP15-CF75PB1SN2
System: RD
1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G42

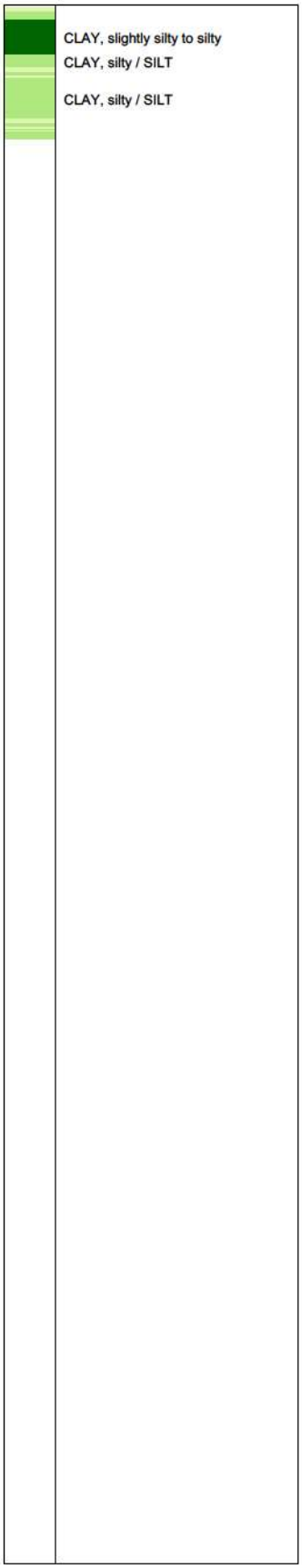


Rec.: EW d.d. 22-okt-2019 Coord.: X= 261955.2 m Y= 582867.7 m System: RD
Proc. : G.Bosch d.d. 31-okt-2019 GL = NAP -0.62 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

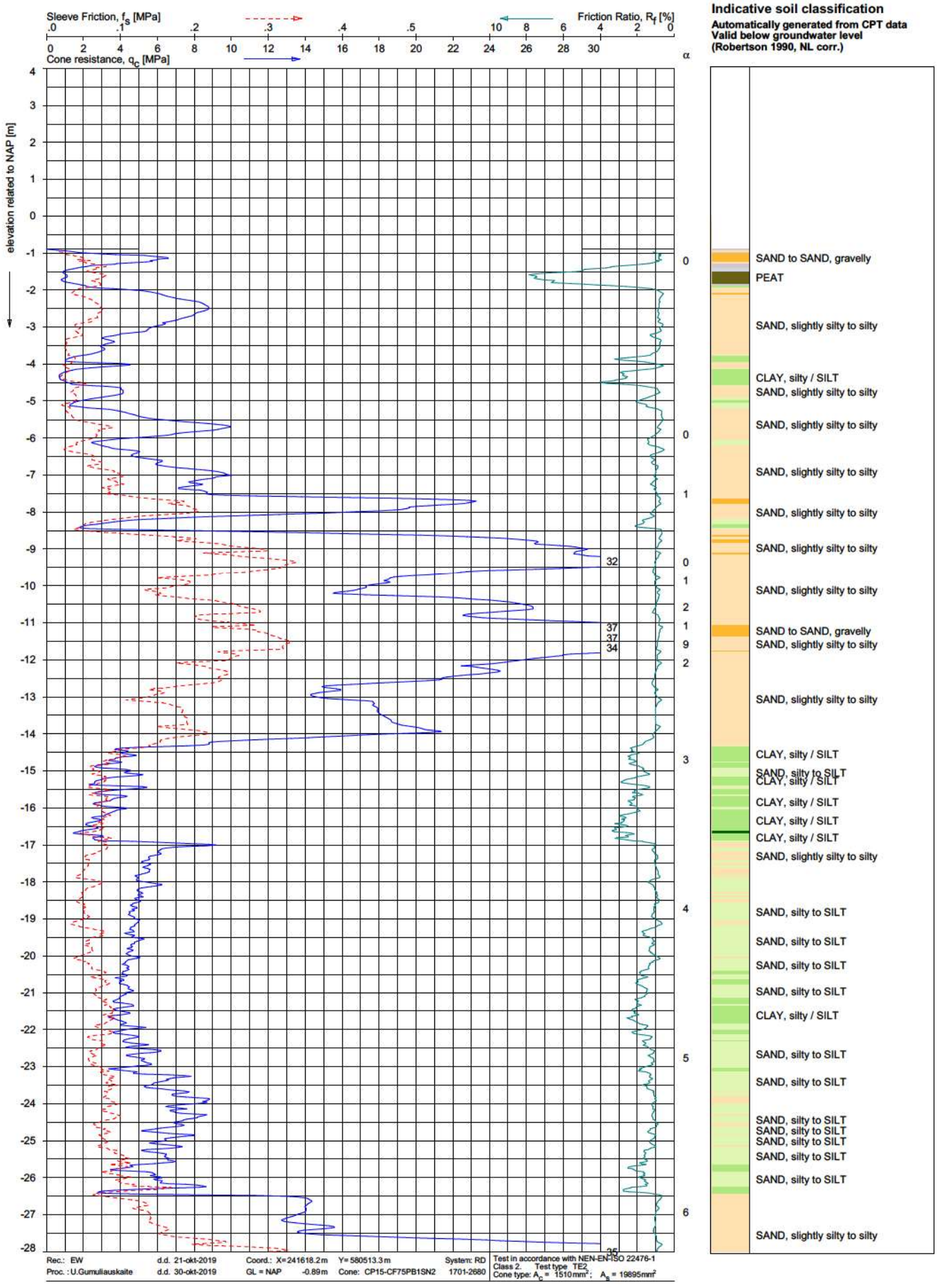
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

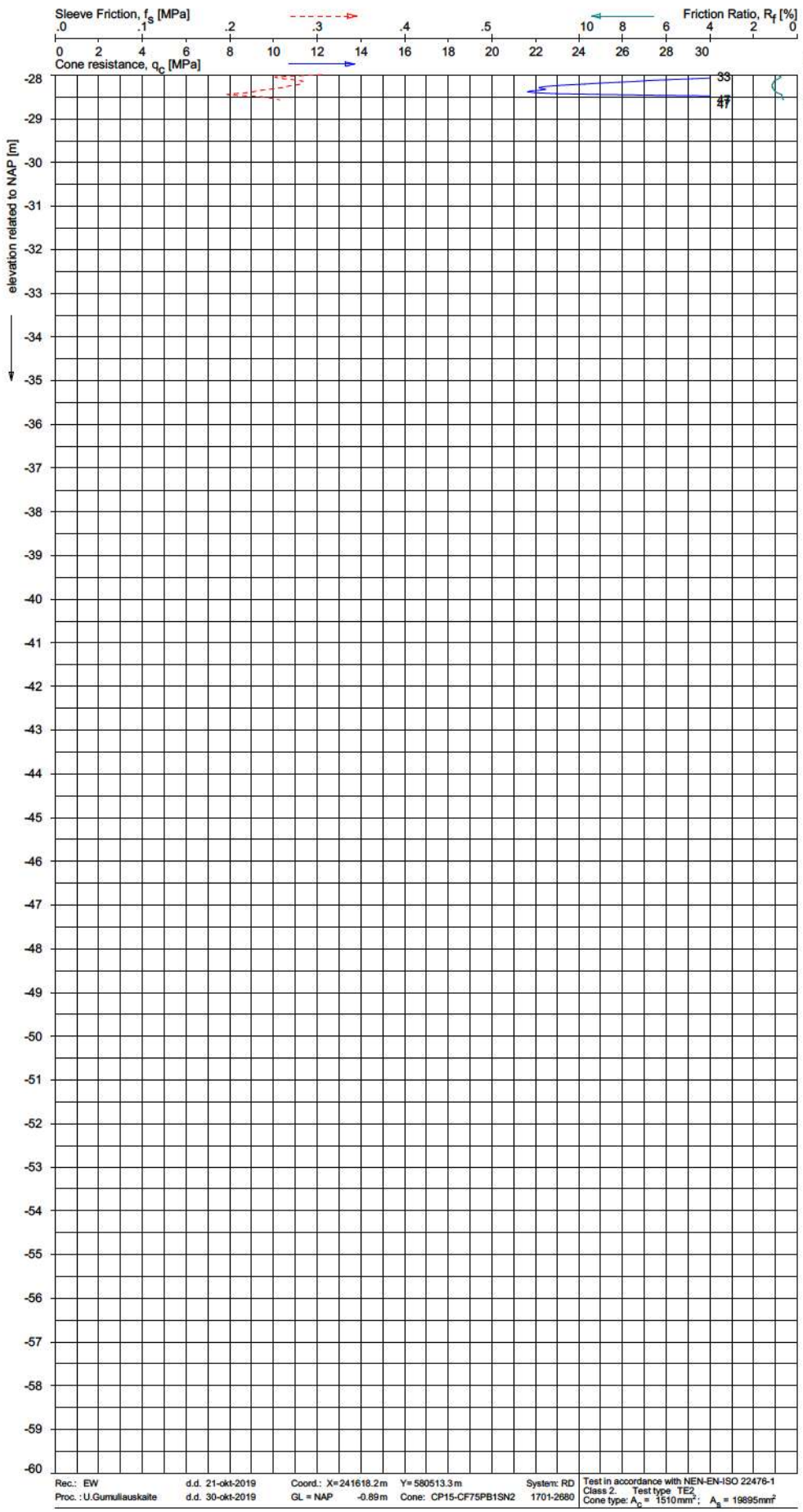
Proj. 1019-153172
Cpt SCPT_G42



CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G44



Rec.: EW d.d. 21-okt-2019 Coord.: X= 241618.2 m Y= 580513.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -0.89 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

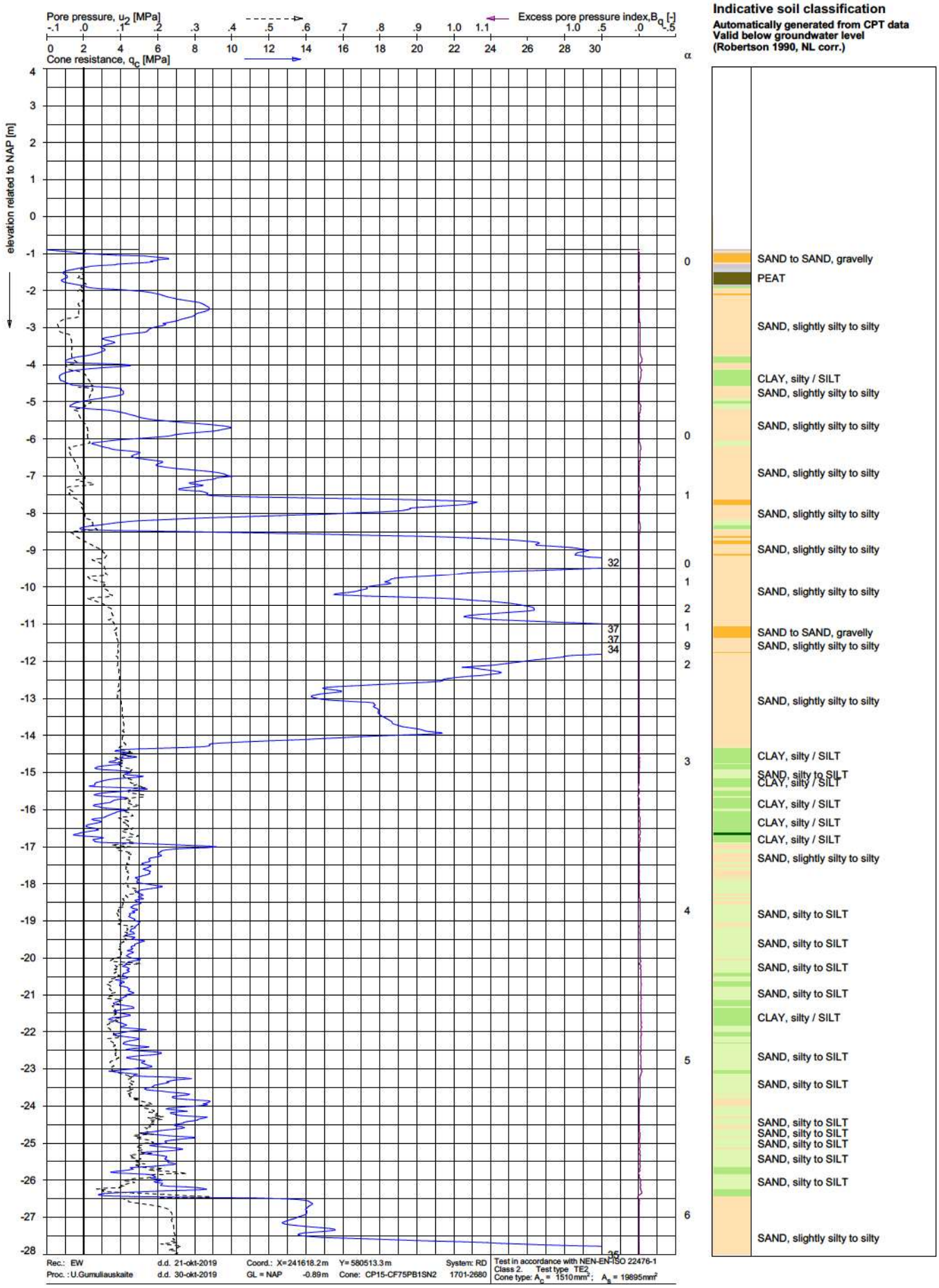
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

	SAND, slightly silty to silty

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

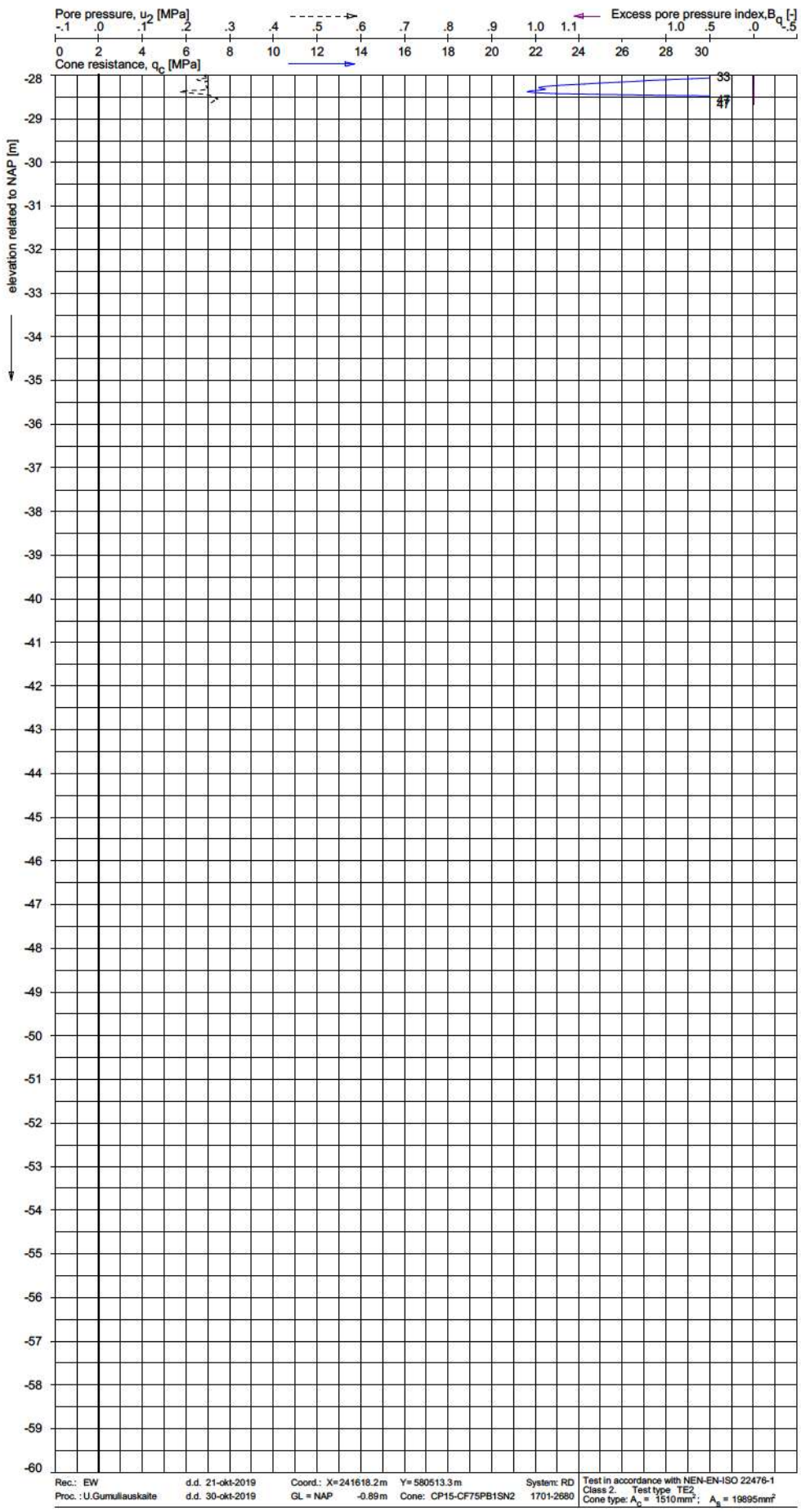
Proj. 1019-153172
Cpt SCPT_G44



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G44



Rec.: EW d.d. 21-okt-2019 Coord.: X=241618.2m Y=580513.3m System: RD
Proc.: U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -0.89m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510mm²; A_s = 19895mm²

Indicative soil classification

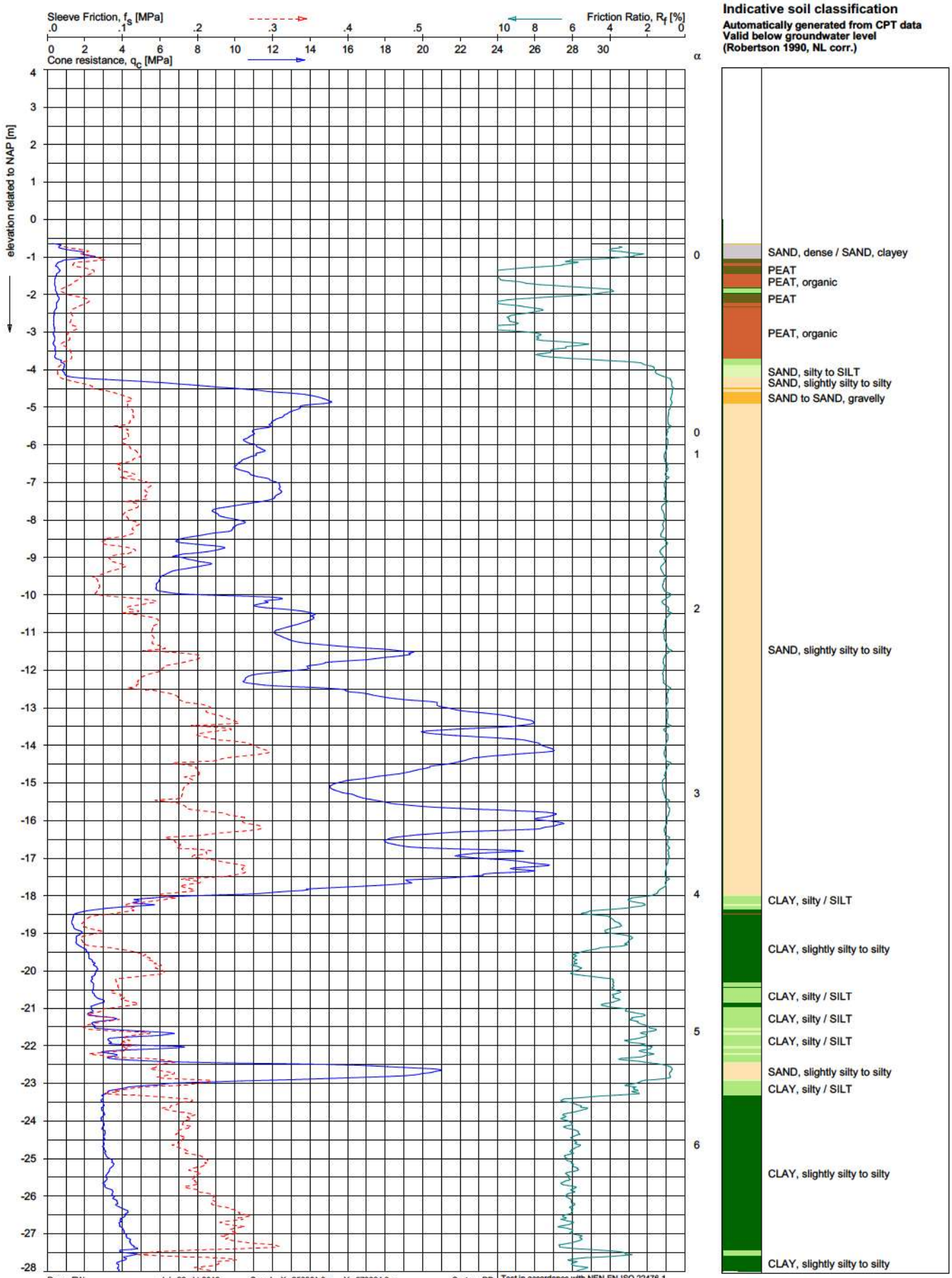
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

	SAND, slightly silty to silty

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G44



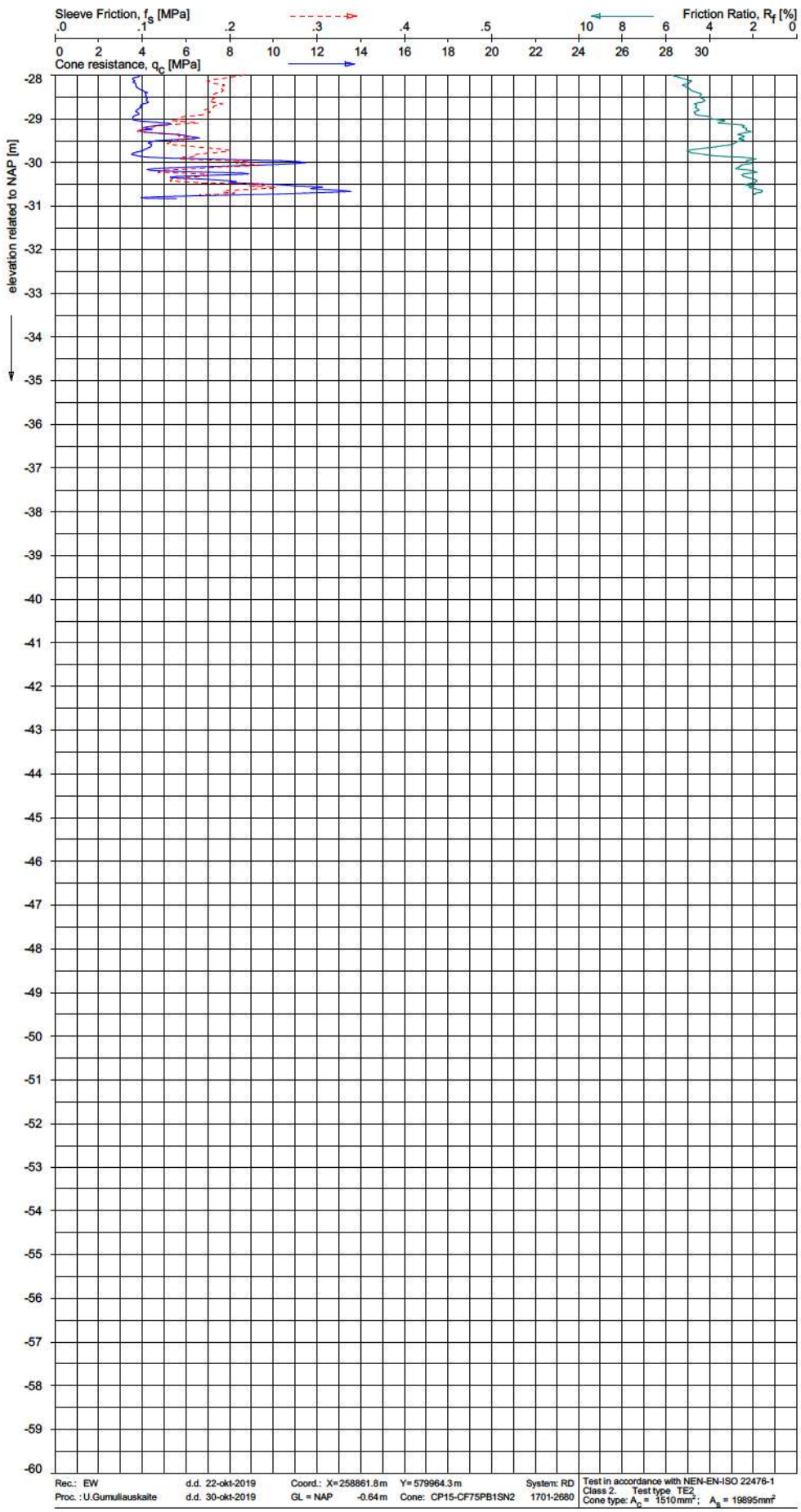
Rec.: EW d.d. 22-okt-2019 Coord.: X= 258861.8 m Y= 579964.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -0.64 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

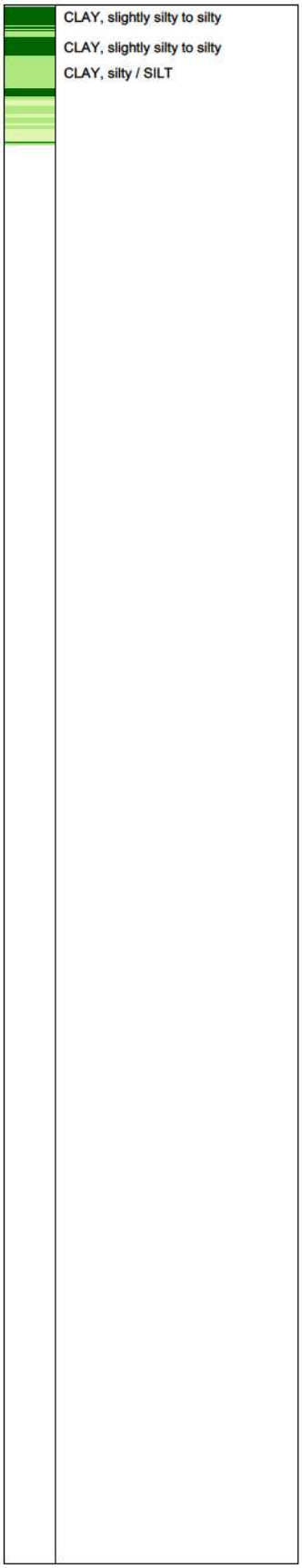
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G47



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



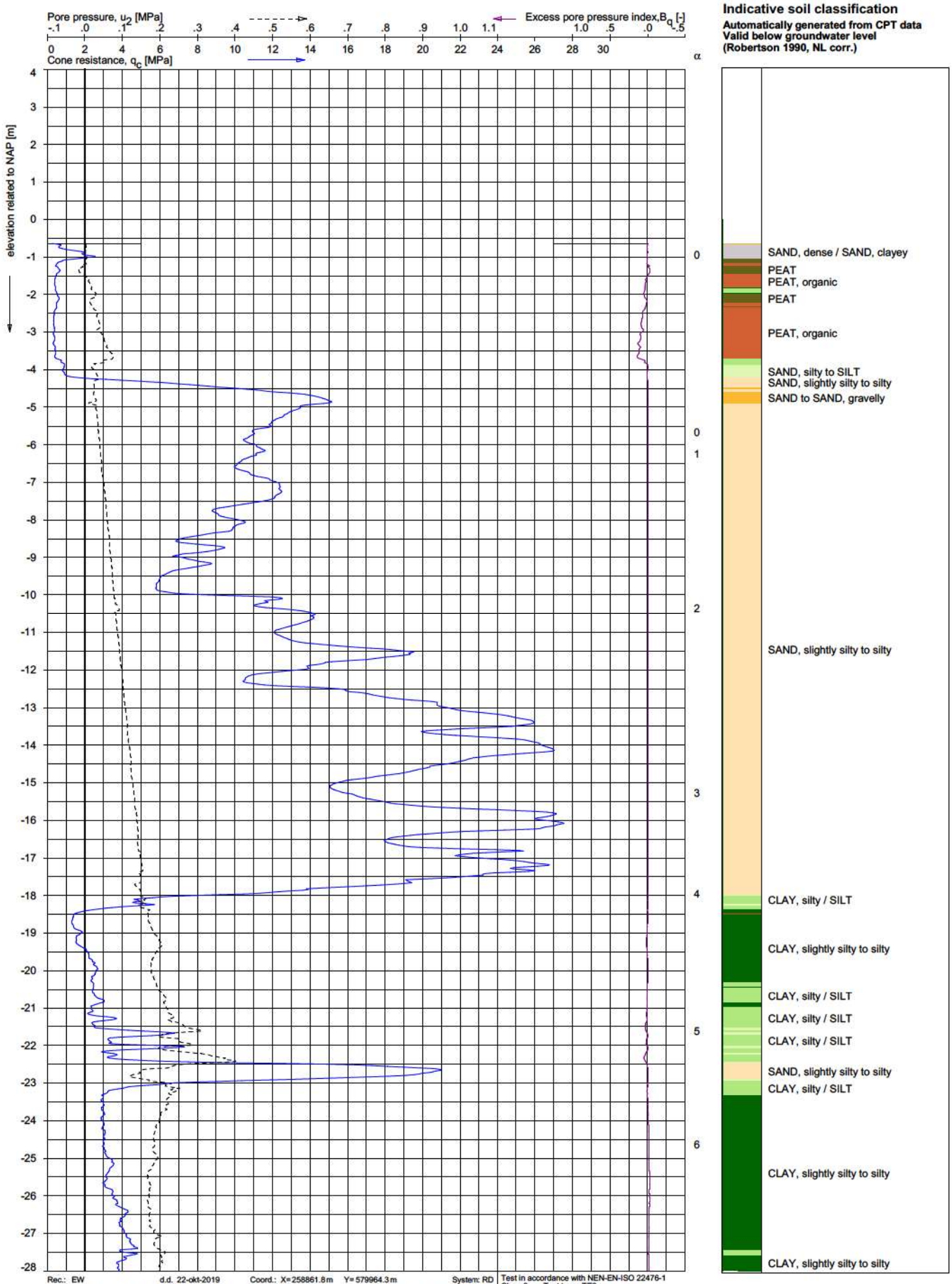
Rec.: EW d.d. 22-okt-2019 Coord.: X= 258861.8 m Y= 579964.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -0.64 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G47



Rec.: EW d.d. 22-okt-2019 Coord.: X= 258861.8 m Y= 579964.3 m System: RD
Proc.: U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -0.64 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

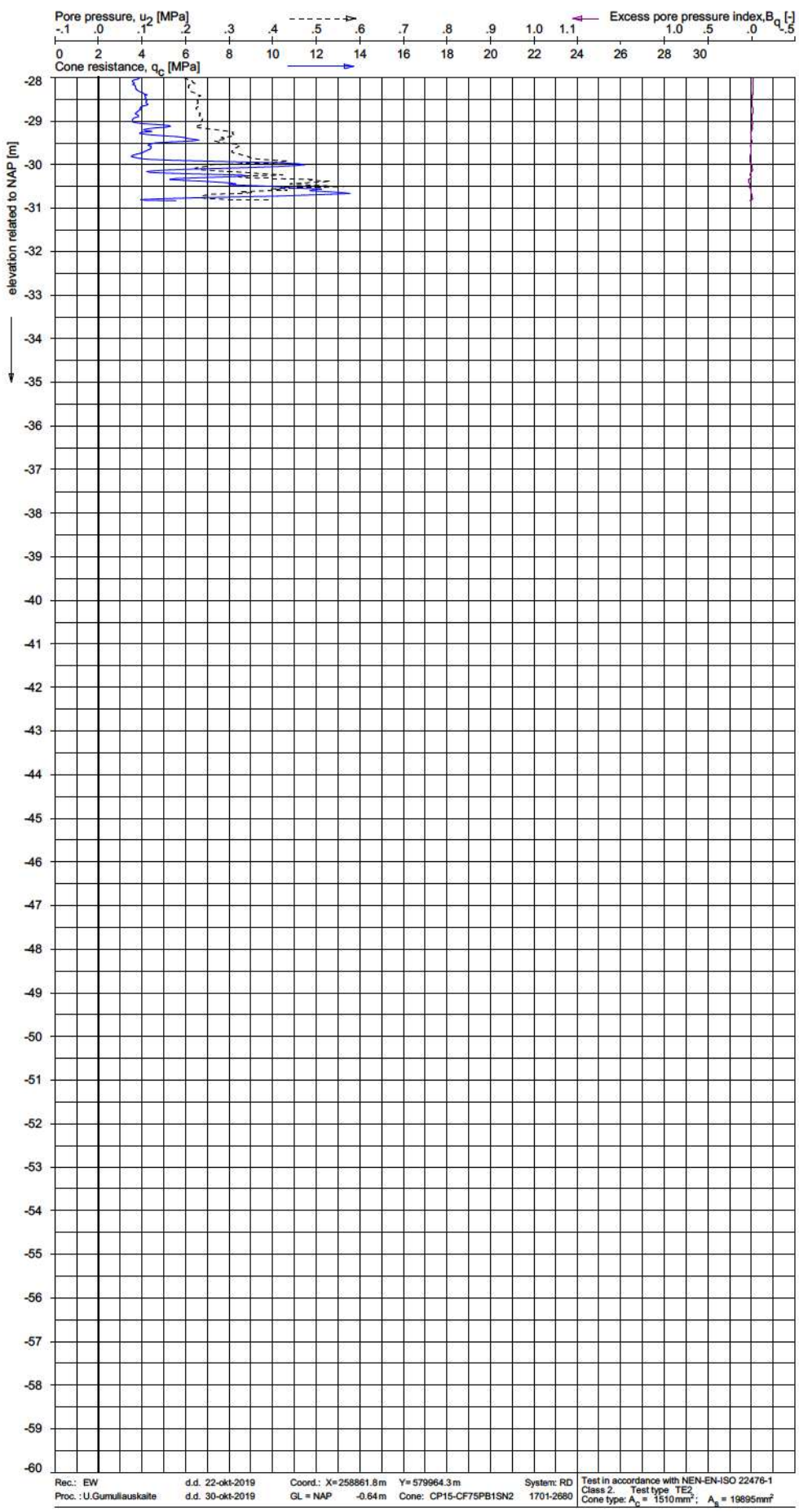
PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G47

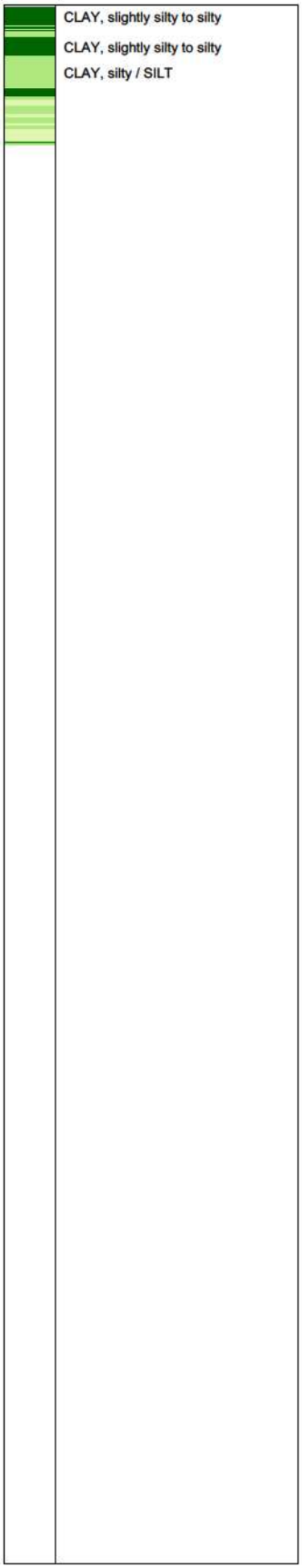
1019-153172

SCPT_G47 -1



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



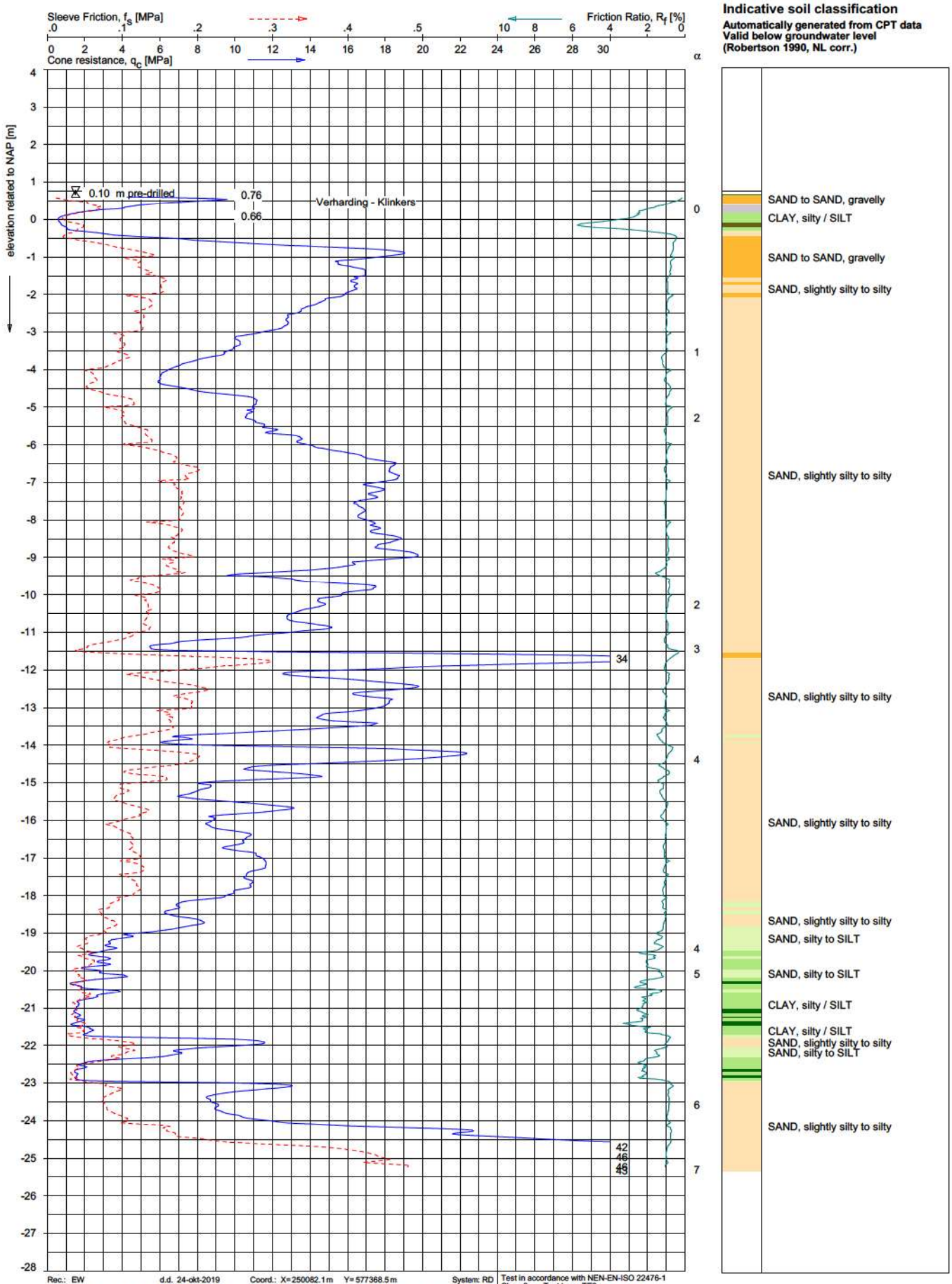
Rec.: EW d.d. 22-okt-2019 Coord.: X= 258861.8 m Y= 579964.3 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -0.64 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G47



Rec.: EW d.d. 24-okt-2019 Coord.: X= 250082.1 m Y= 577368.5 m System: RD

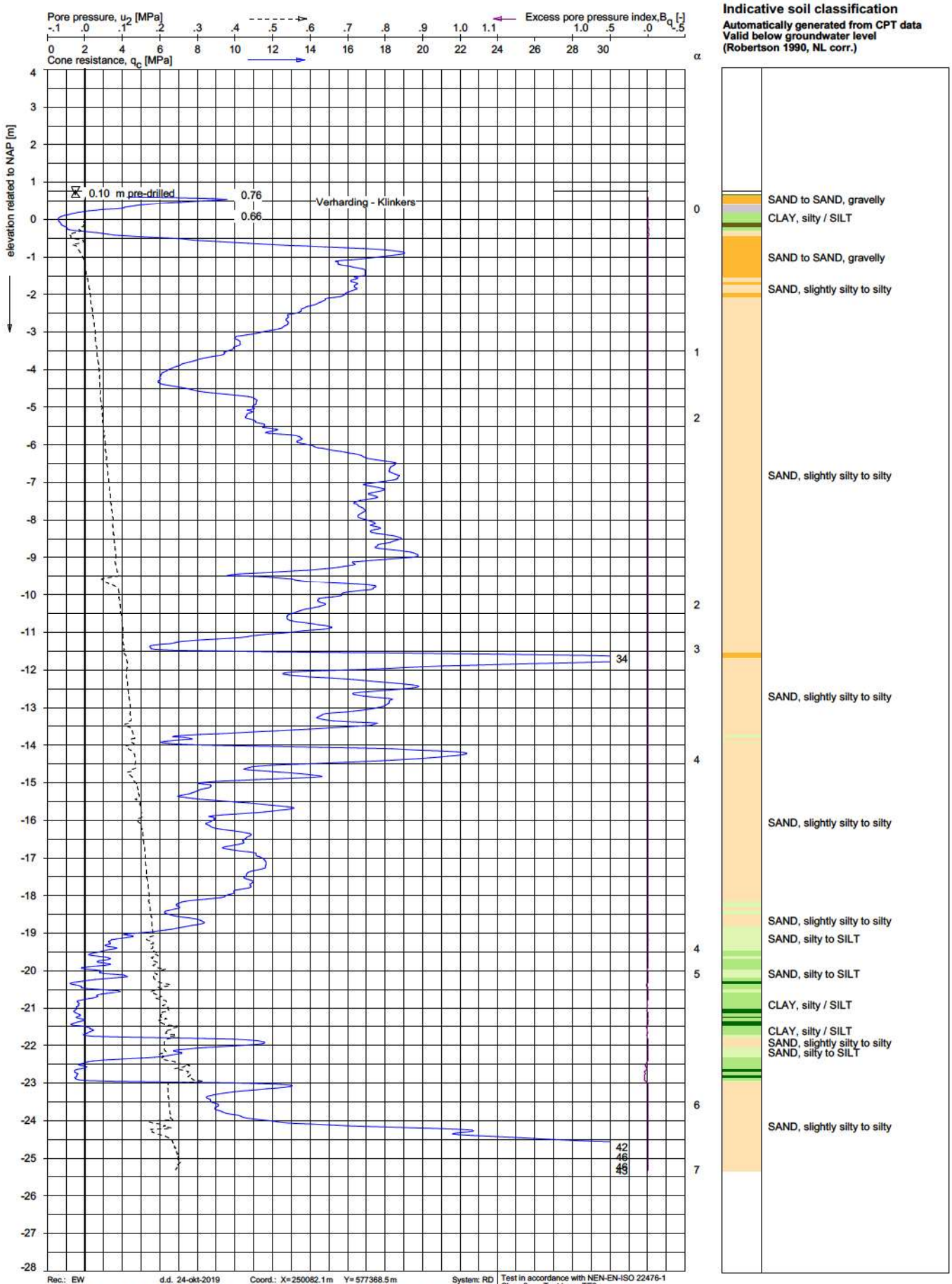
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +0.76 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G50



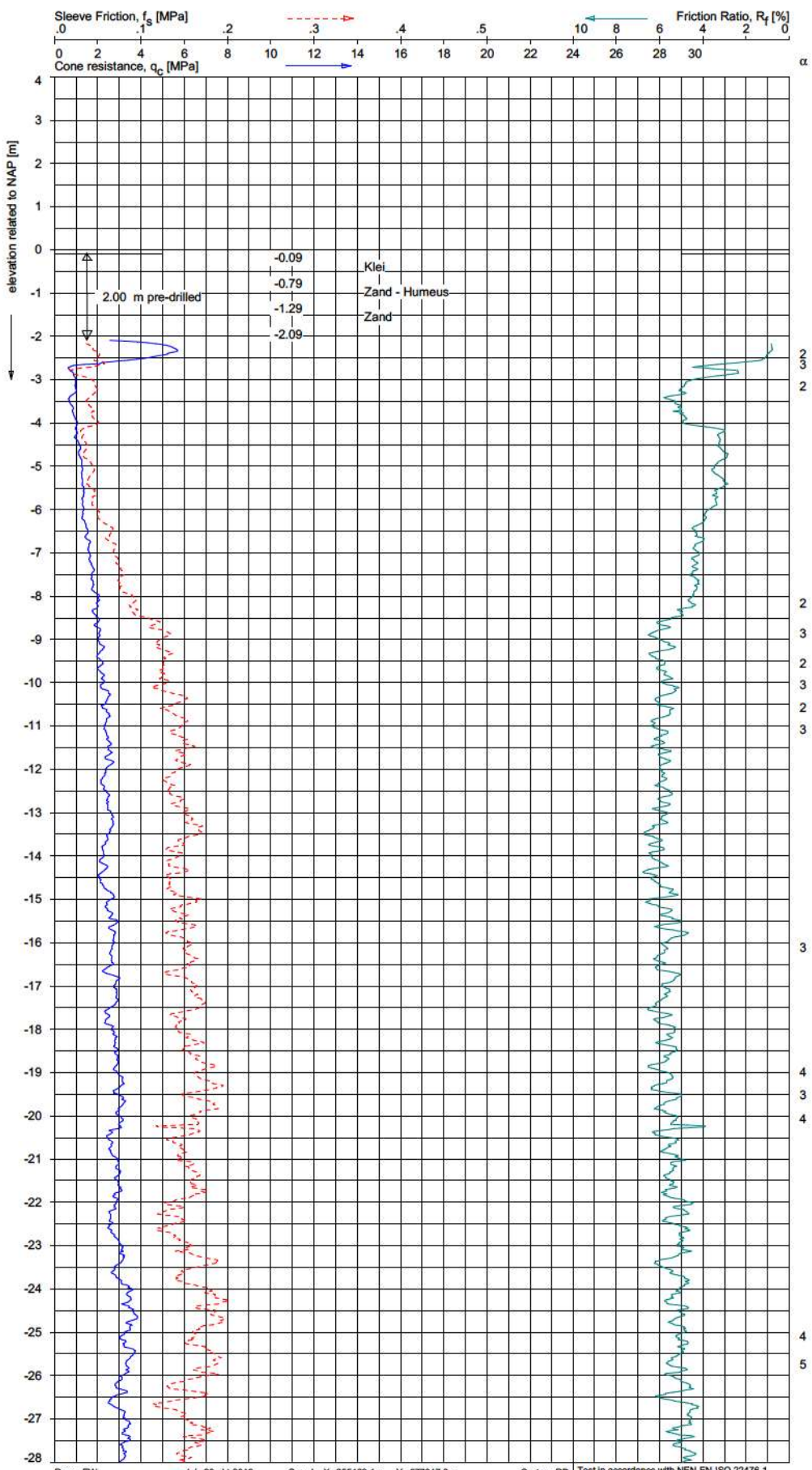
Rec.: EW d.d. 24-okt-2019 Coord.: X= 250082.1 m Y= 577368.5 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +0.76 m Cone: CP15-CF75PB1SN2 1701-2680

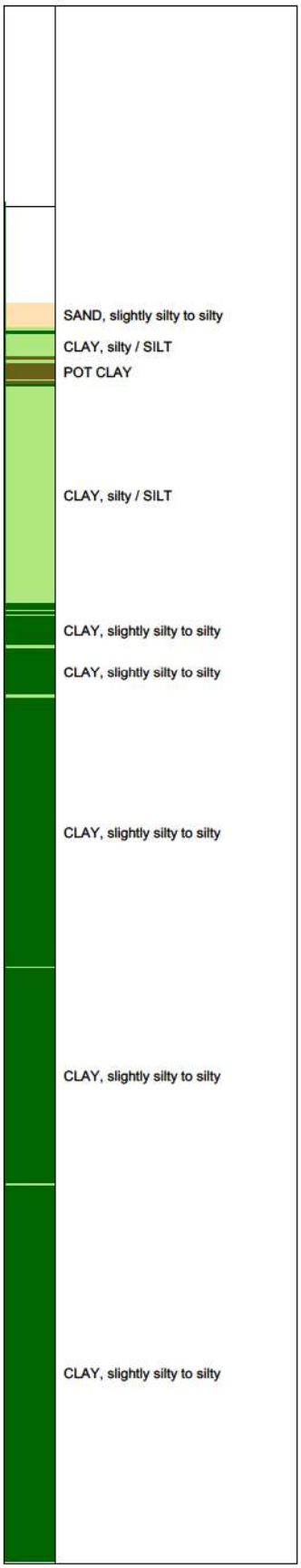
Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G50





Indicative soil classification
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

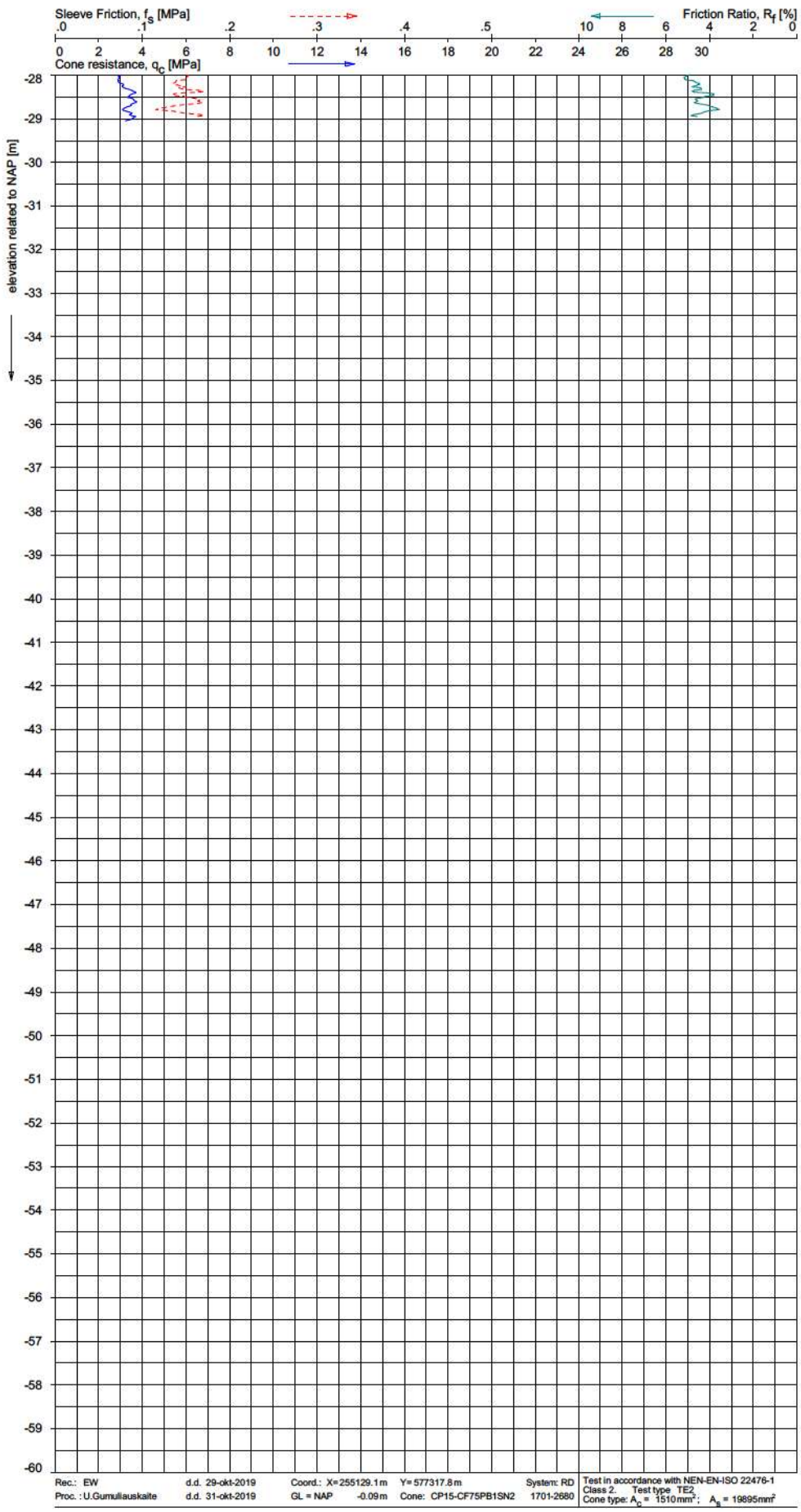
Rec.: EW d.d. 29-okt-2019 Coord.: X= 255129.1 m Y= 577317.8 m System: RD
Proc. : U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP -0.09 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G51



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

- CLAY, slightly silty to silty
- CLAY, slightly silty to silty

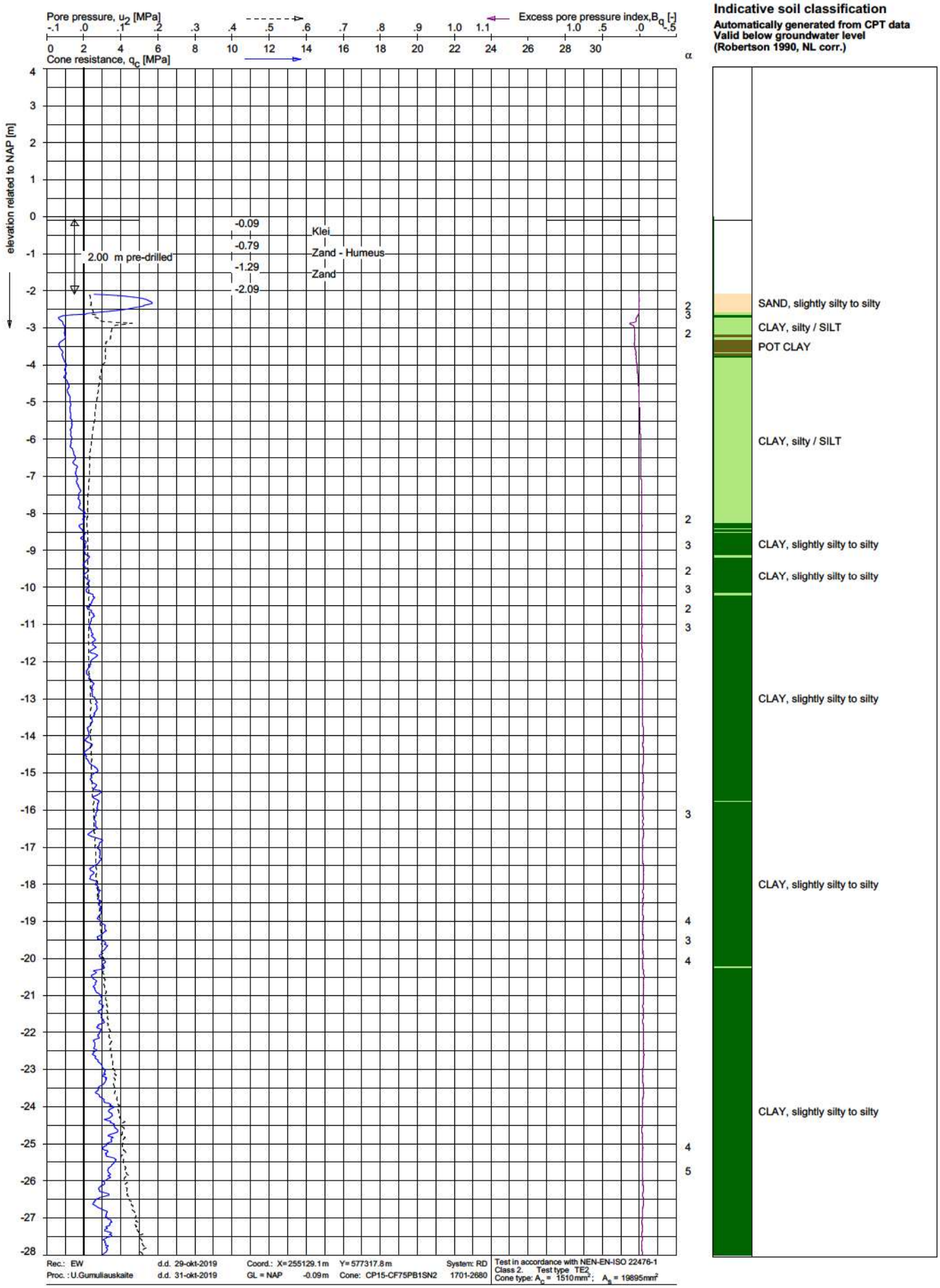
Rec.: EW d.d. 29-okt-2019 Coord.: X= 255129.1 m Y= 577317.8 m System: RD
Proc. : U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP -0.09 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G51



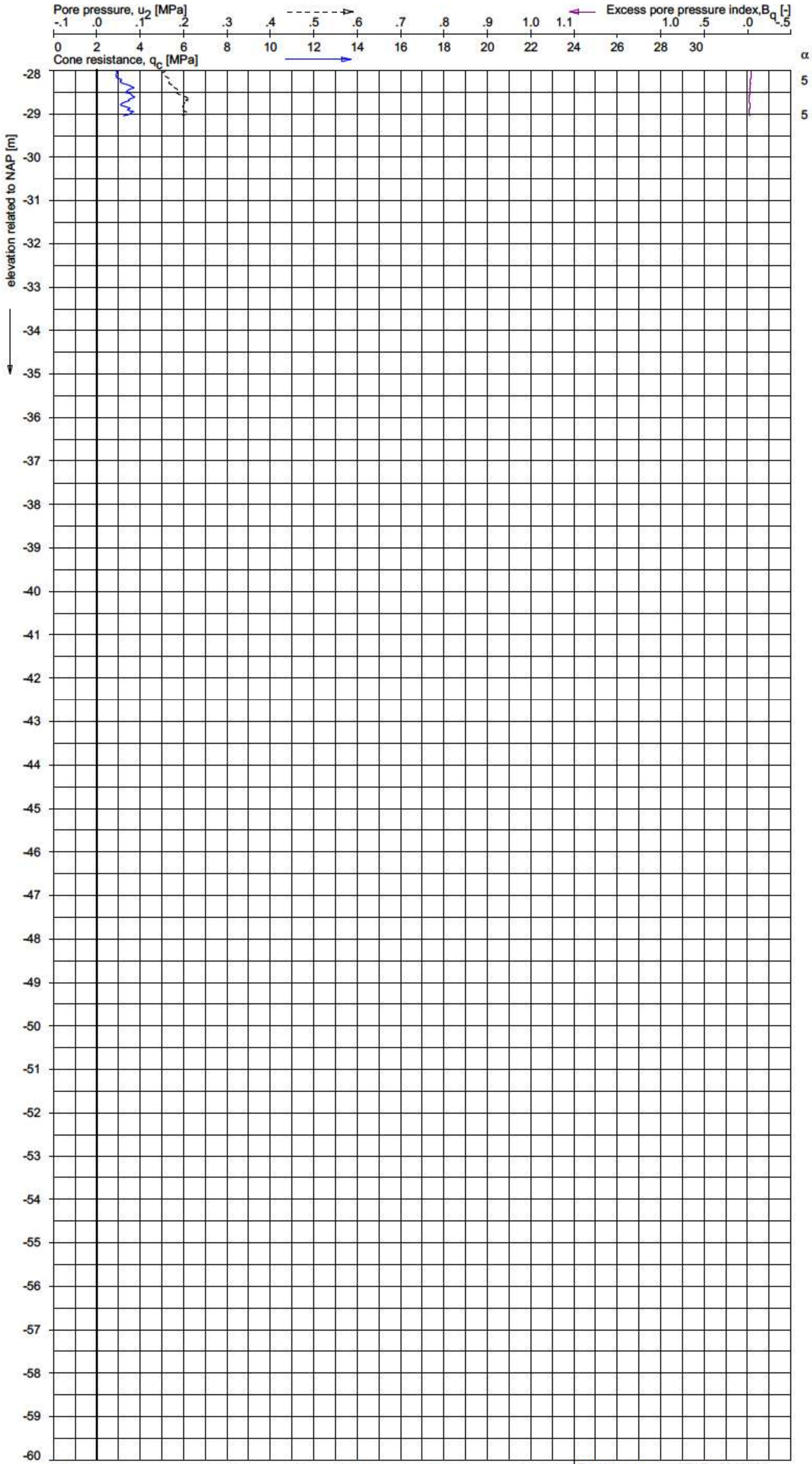
Rec.: EW d.d. 29-okt-2019 Coord.: X= 255129.1 m Y= 577317.8 m System: RD
Proc. : U.Gumuliauskaite d.d. 31-okt-2019 GL = NAP -0.09 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G51



Indicative soil classification
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

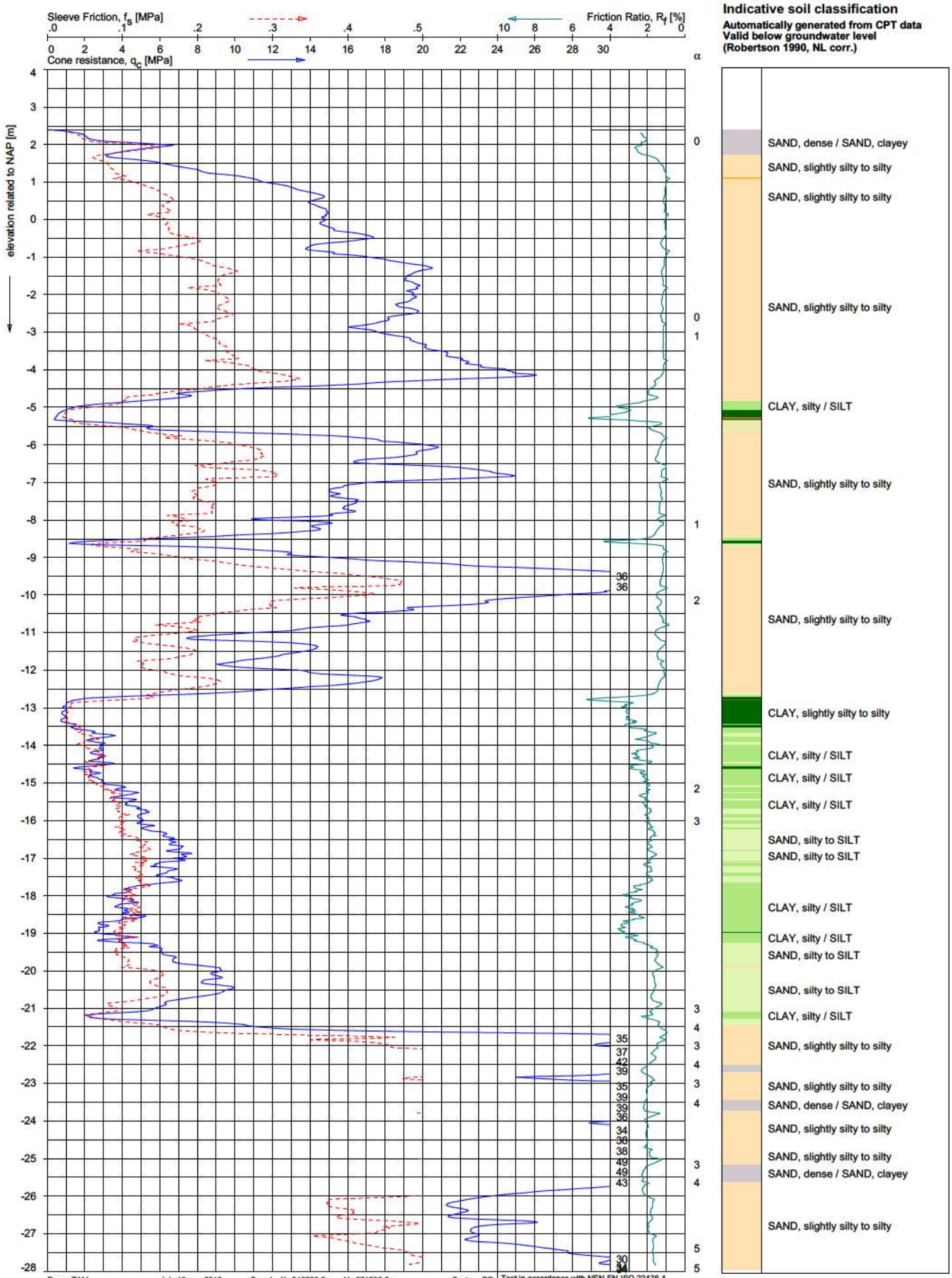
CLAY, slightly silty to silty
CLAY, slightly silty to silty

Rec.: EW	d.d. 29-okt-2019	Coord.: X= 255129.1 m Y= 577317.8 m	System: RD	Test in accordance with NEN-EN-ISO 22476-1
Proc. : U.Gumuliauskaite	d.d. 31-okt-2019	GL = NAP -0.09 m Cone: CP15-CF75PB1SN2	1701-2680	Class 2. Test type TE2 Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G51



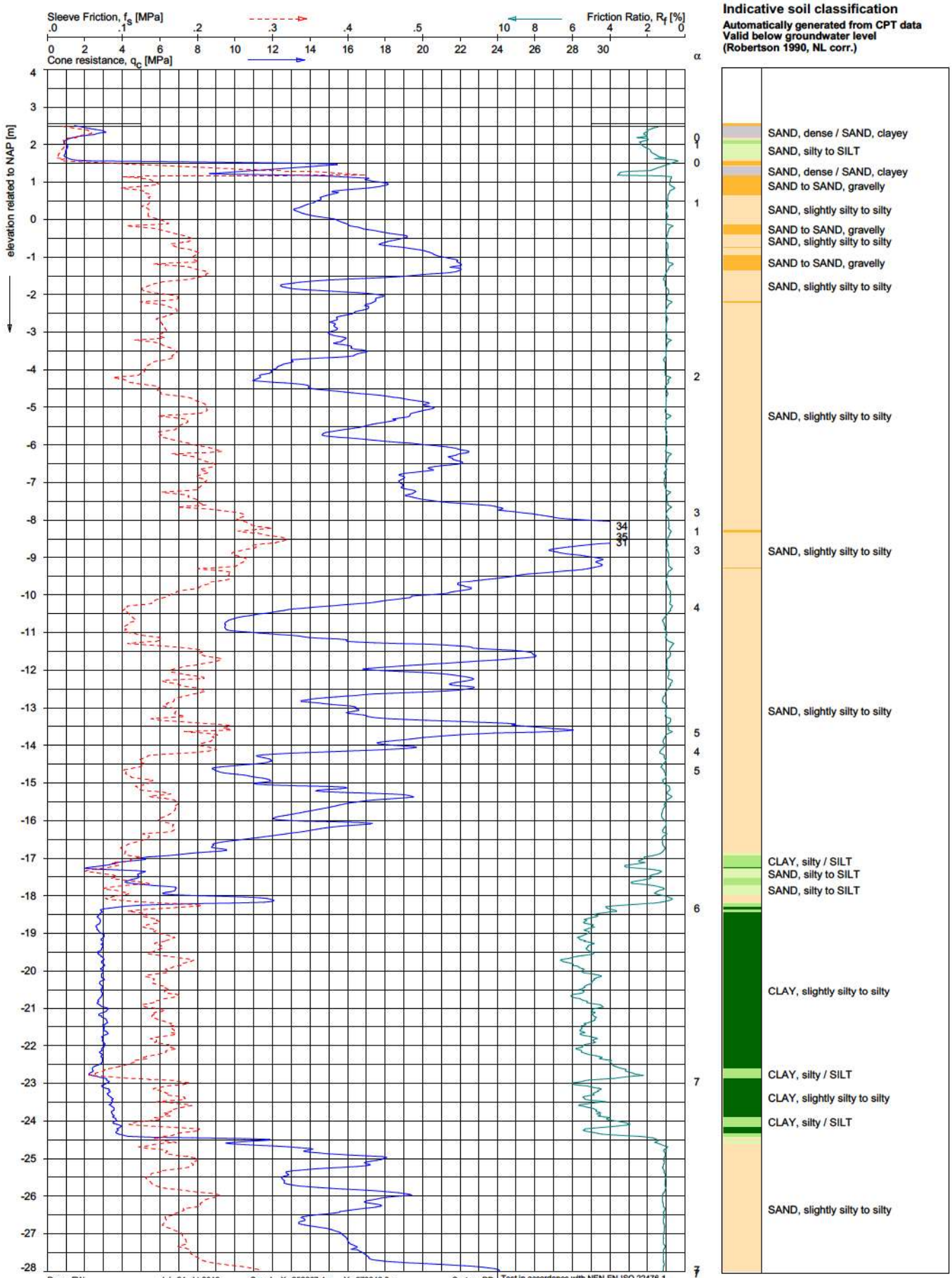
Rec.: TAM d.d. 19-nov-2019 Coord.: X= 246735.2 m Y= 571702.2 m System: RD
Proc.: G.Bosch d.d. 22-nov-2019 GL = NAP +2.40 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G54



Rec.: EW d.d. 24-okt-2019 Coord.: X= 252607.4 m Y= 573940.8 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +2.57 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

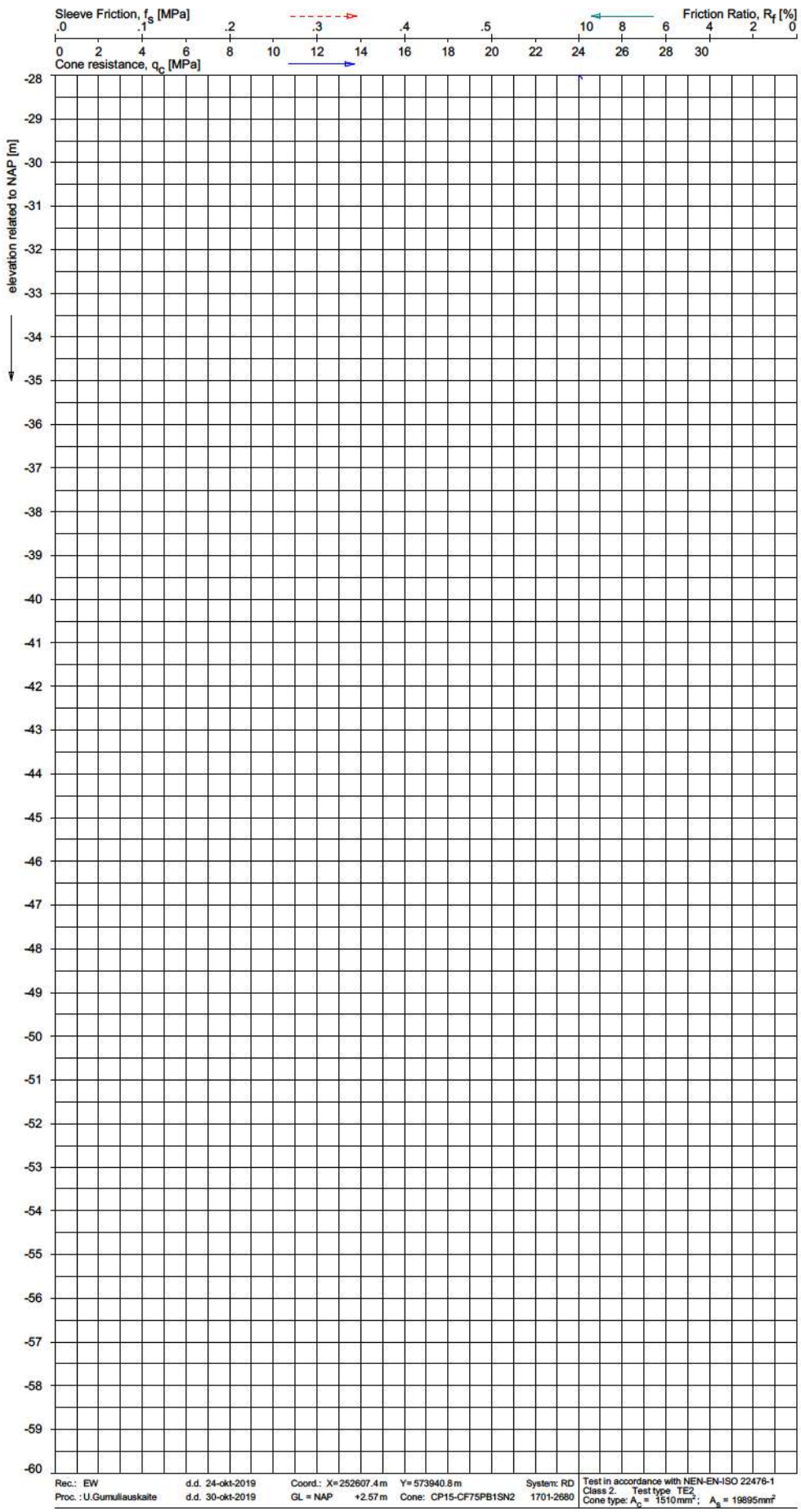
CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G55

1019-153172

SCPT_G55 - 1

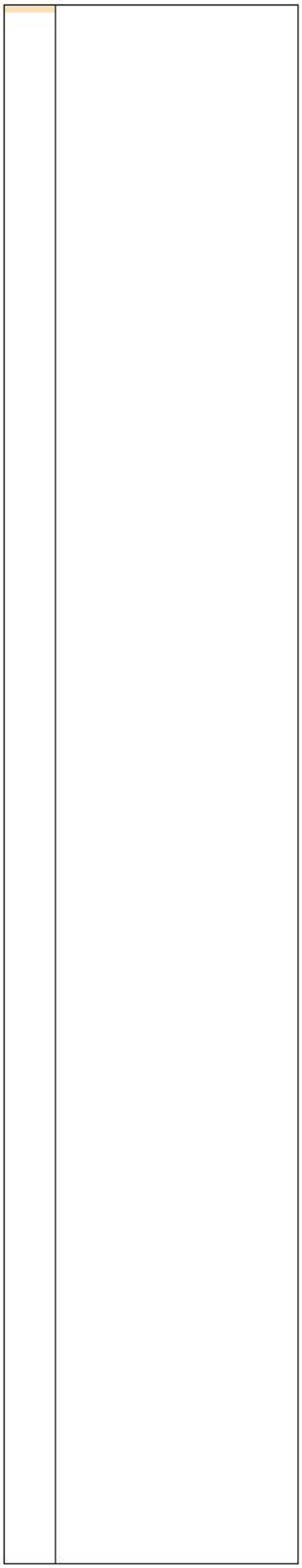


Rec.: EW d.d. 24-okt-2019 Coord.: X= 252607.4 m Y= 573940.8 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +2.57 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

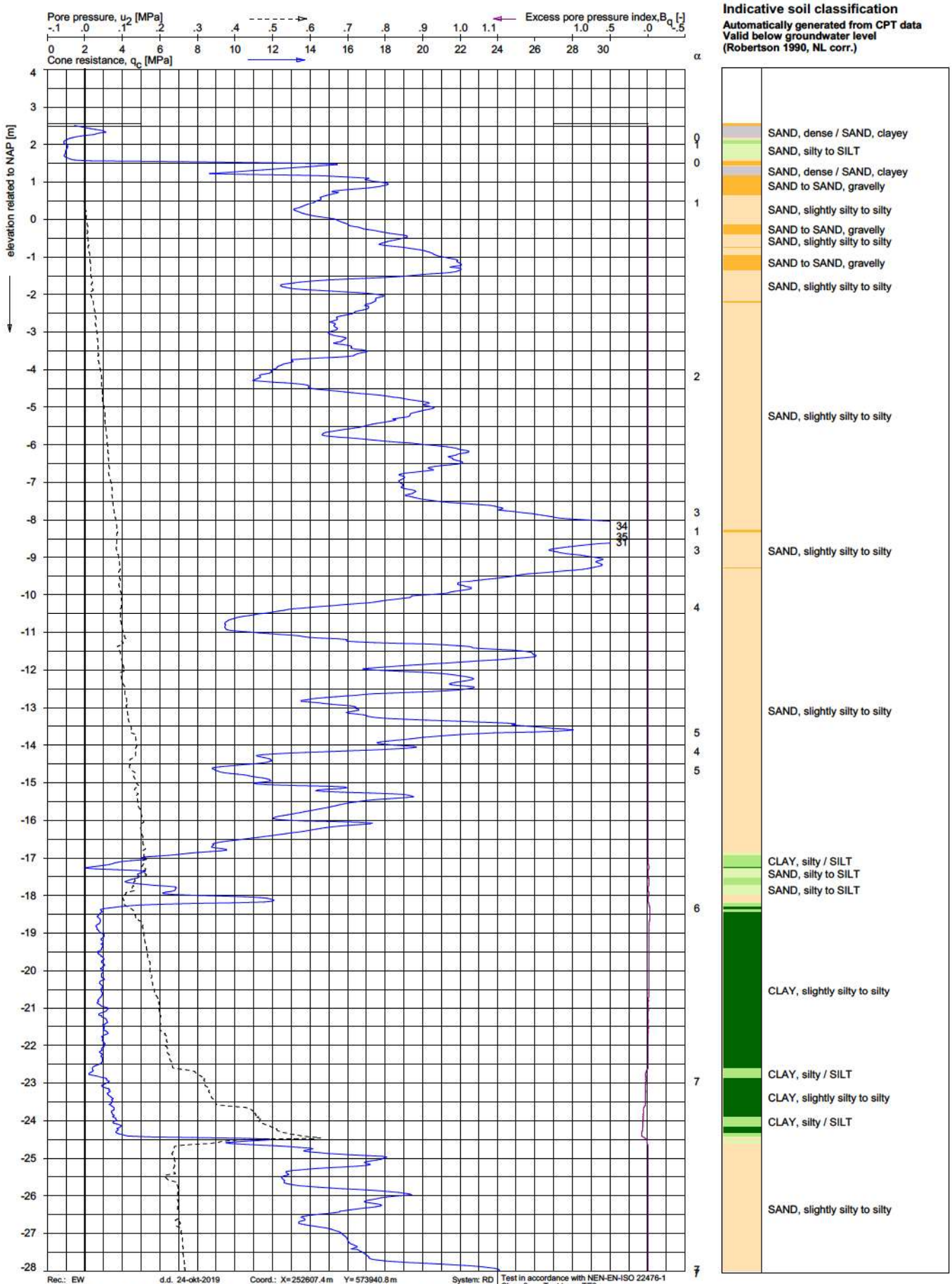
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G55



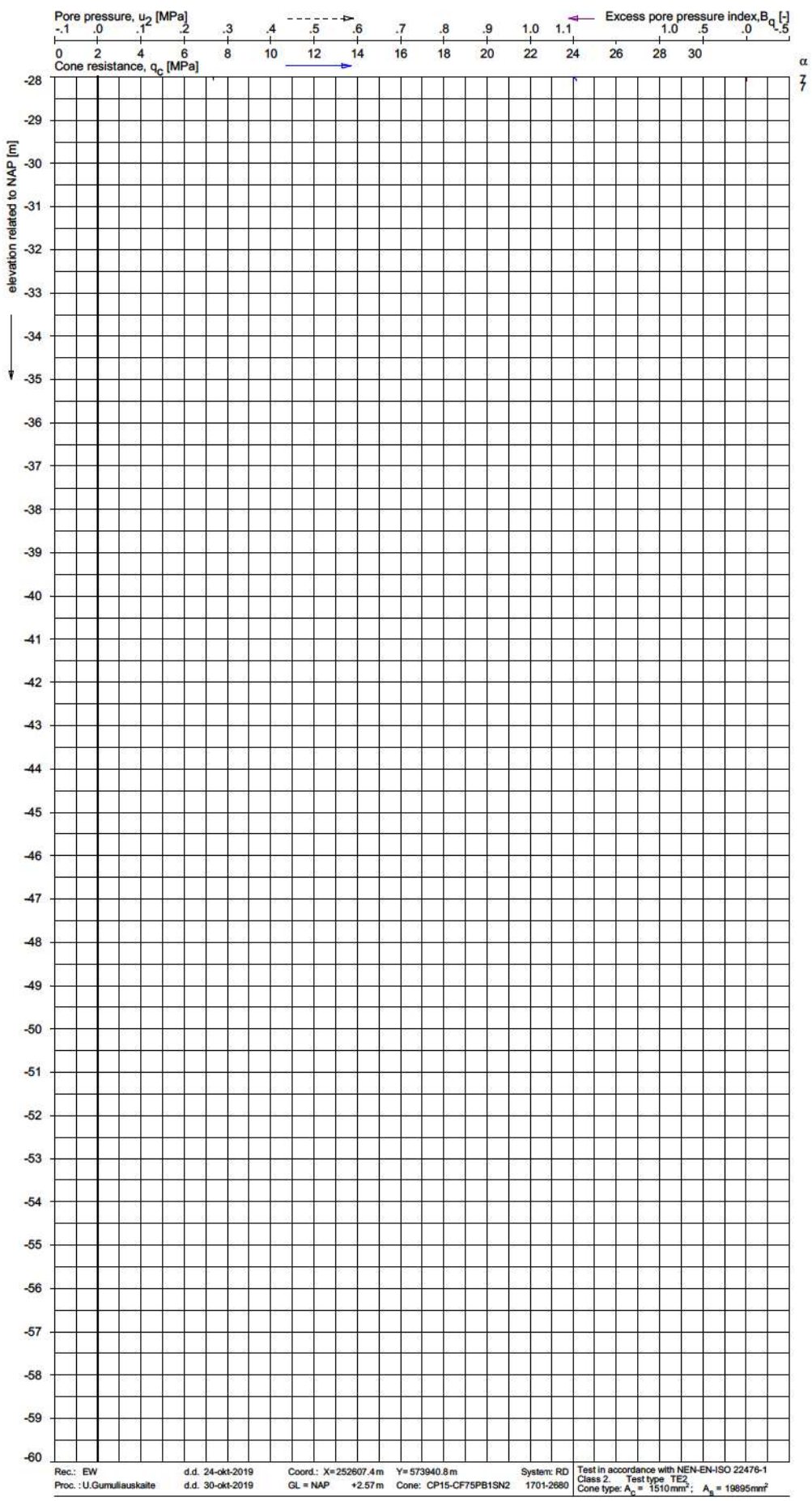
Rec.: EW d.d. 24-okt-2019 Coord.: X= 252607.4 m Y= 573940.8 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +2.57 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G55



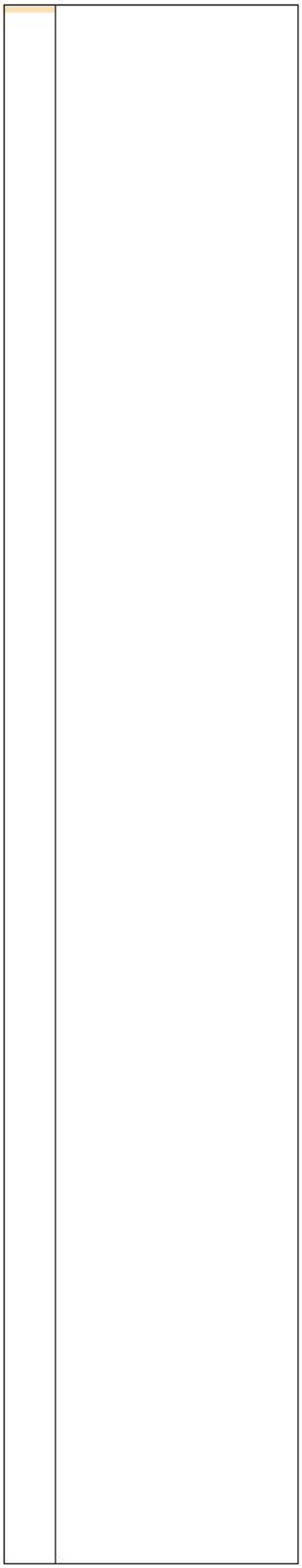
Rec.: EW d.d. 24-okt-2019 Coord.: X= 252607.4 m Y= 573940.8 m System: RD

Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +2.57 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

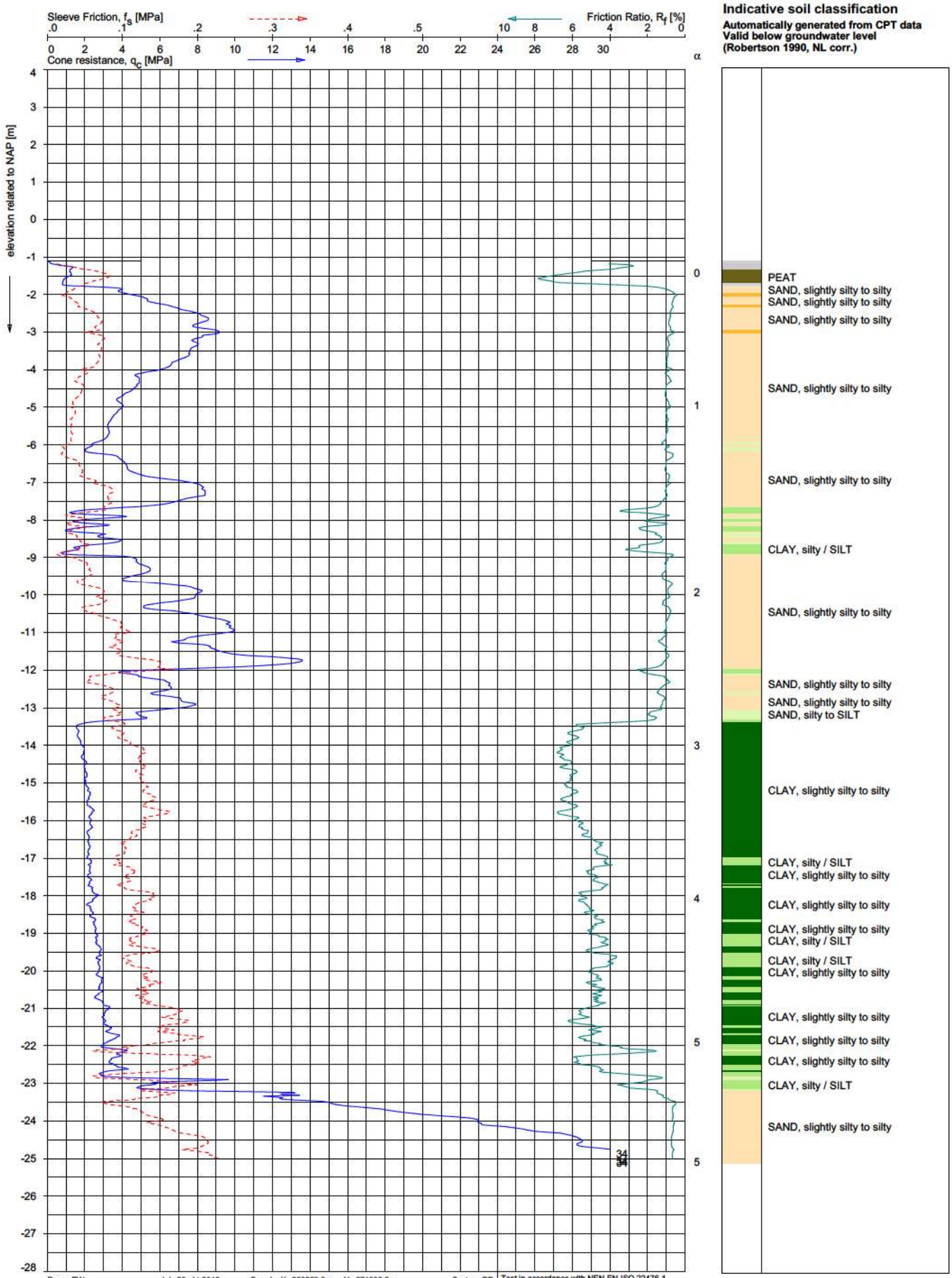
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G55



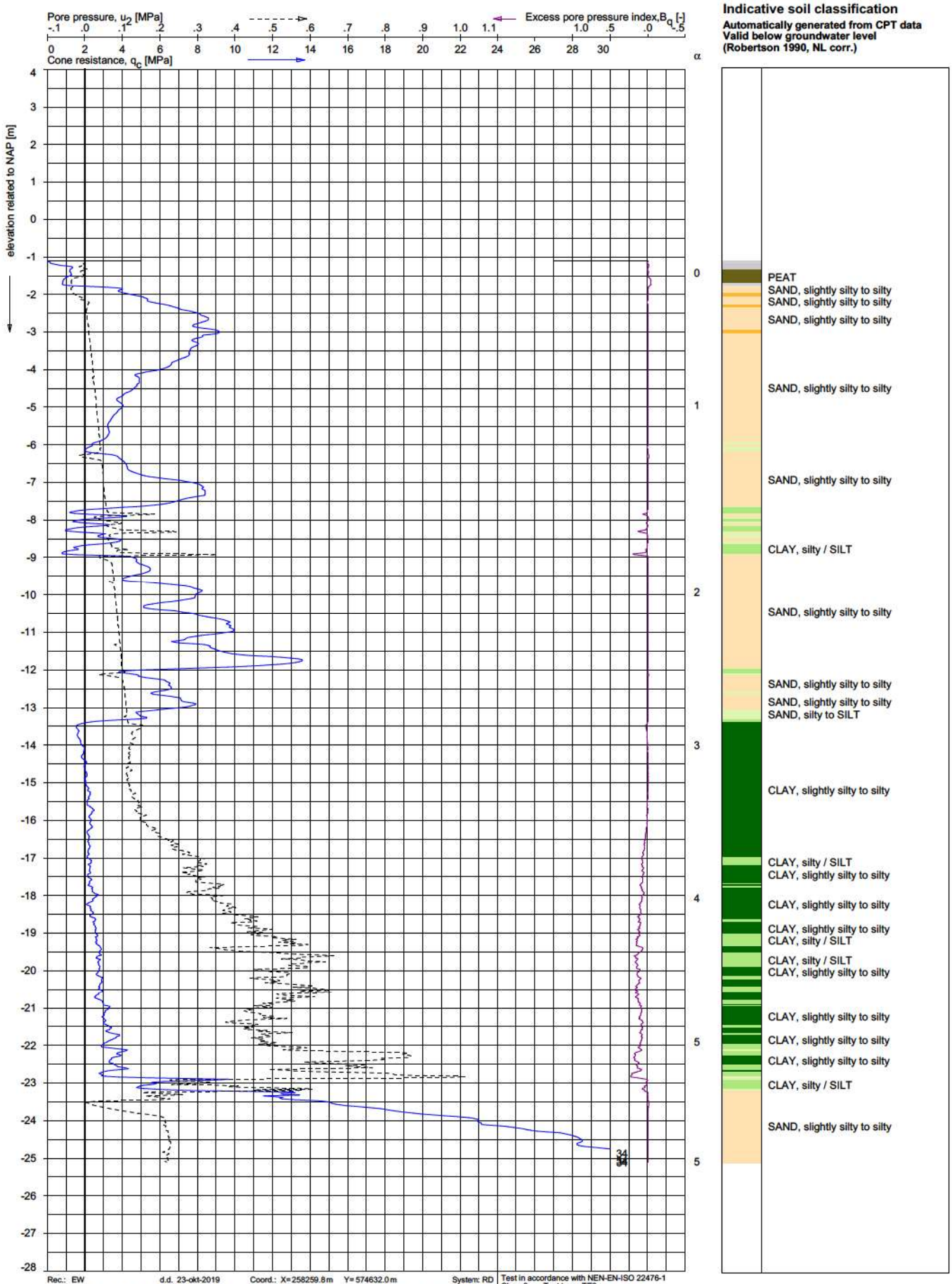
Rec.: EW d.d. 23-okt-2019 Coord.: X= 258259.8 m Y= 574632.0 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP -1.10 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

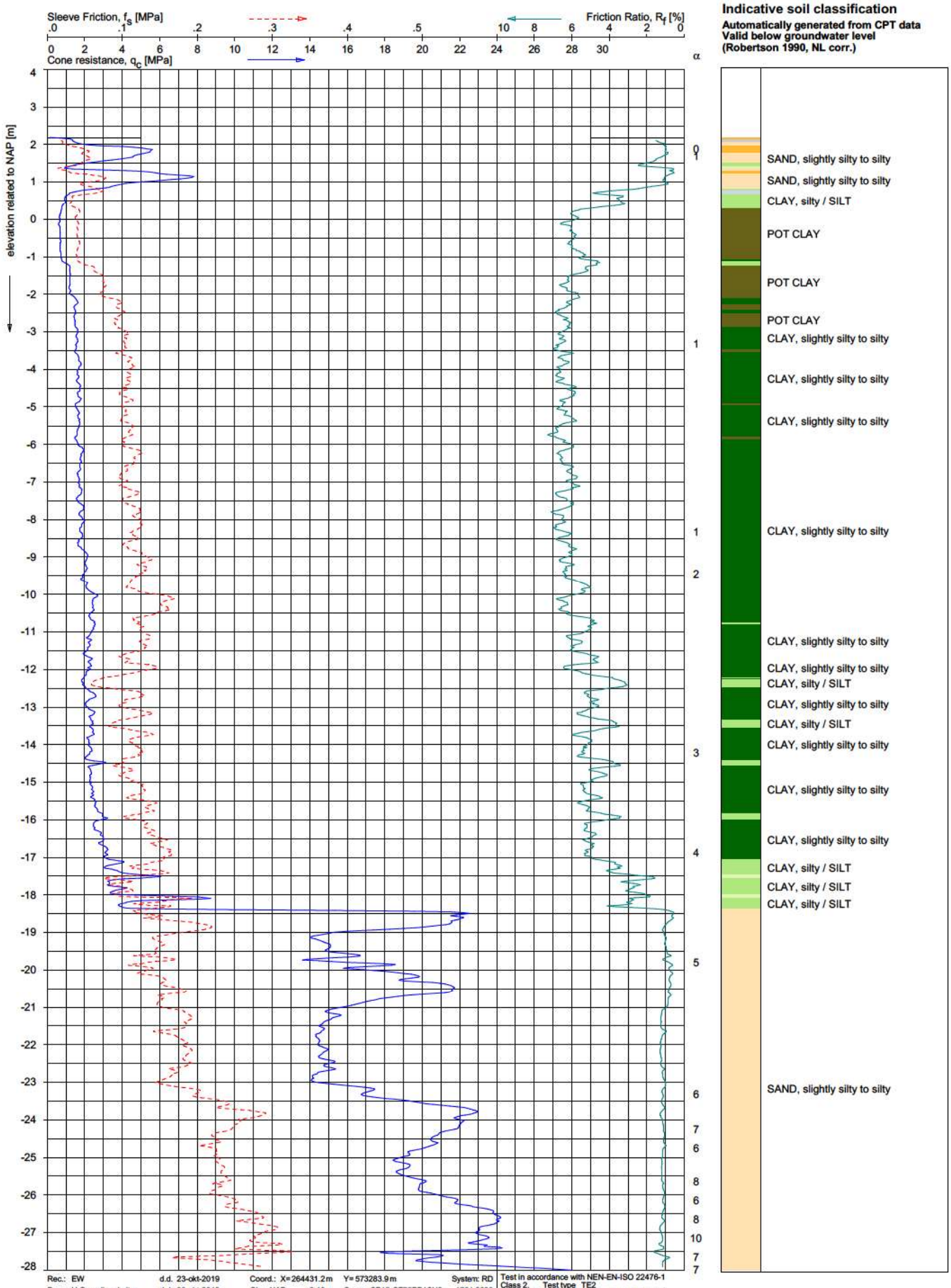
Proj. 1019-153172
Cpt SCPT_G56



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G56



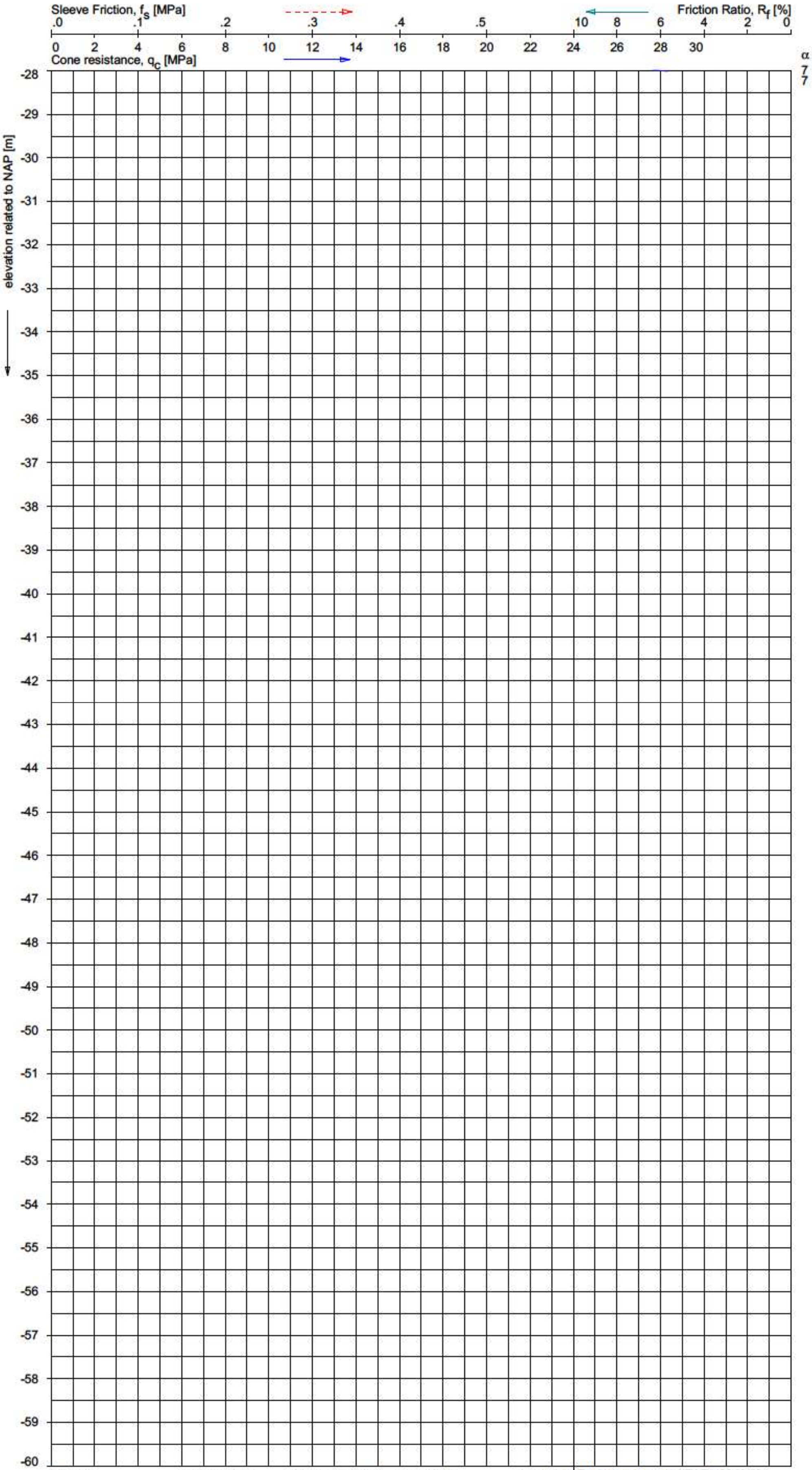
Rec.: EW d.d. 23-okt-2019 Coord.: X= 264431.2 m Y= 573283.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 30-okt-2019 GL = NAP +2.19 m Cone: CP15-CF75PB1SN2 1701-2680

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G57



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

Rec.: EW	d.d. 23-okt-2019	Coord.: X= 264431.2 m Y= 573283.9 m	System: RD	Test in accordance with NEN-EN-ISO 22476-1
Proc. : U.Gumuliauskaite	d.d. 30-okt-2019	GL = NAP +2.19 m Cone: CP15-CF75PB1SN2	1701-2680	Class 2. Test type TE2 Cone type: A_c = 1510mm²; A_s = 19895mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

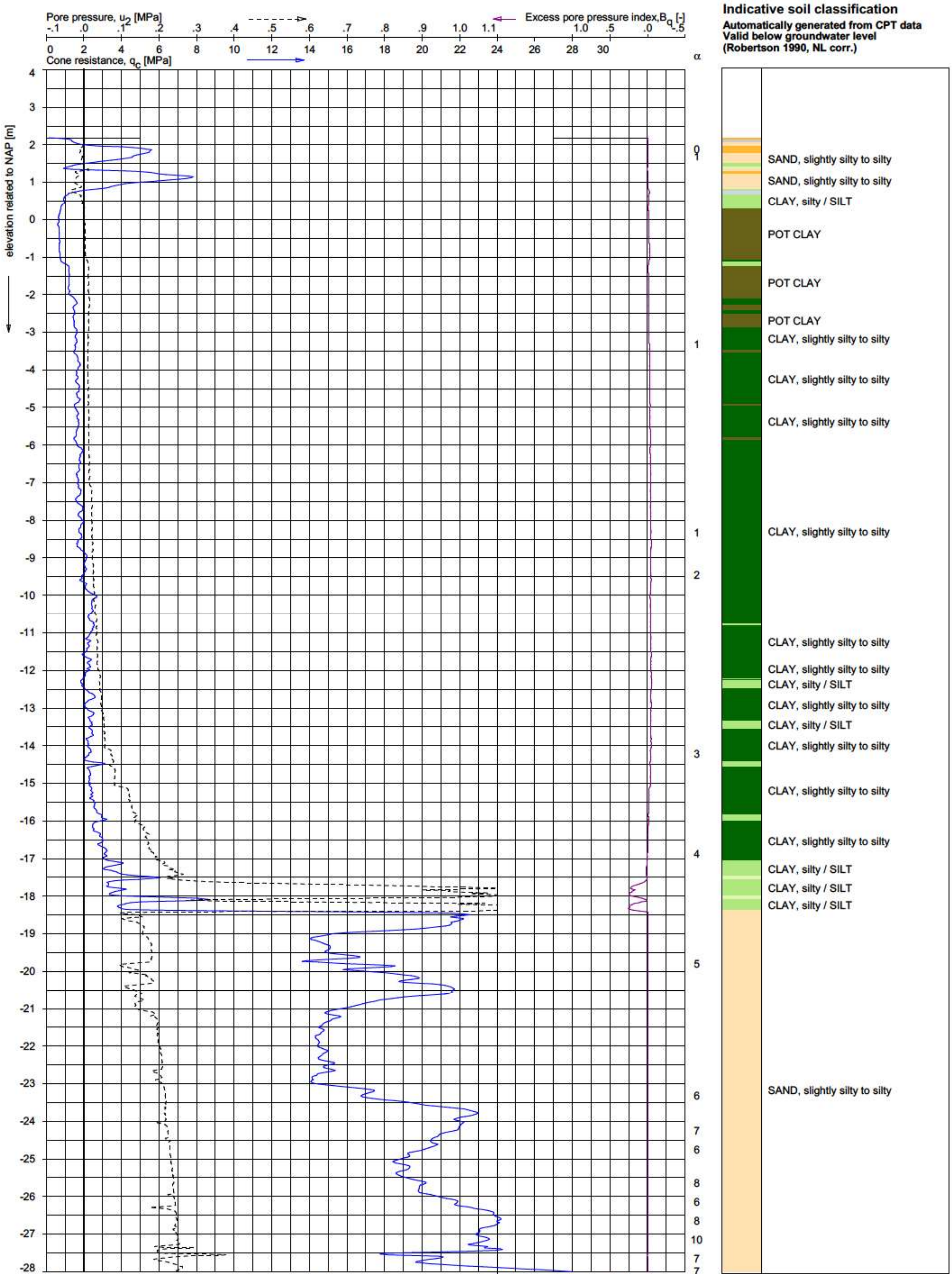
Proj. 1019-153172
Cpt SCPT_G57

UNIPLOT 05.36.nl / PolClay_QcFsClass-R3.udf / 2019-11-01 08:33:30

1019-153172

SCPT_G57 - 2

UNIPLOT 05.36.nl / PotClay_Oct2Class-R3.udf / 2019-11-01 08:48:38



Rec.: EW	d.d. 23-okt-2019	Coord.: X= 264431.2 m	Y= 573283.9 m	System: RD	Test in accordance with NEN-EN-ISO 22476-1
Proc.: U.Gumuliauskaite	d.d. 30-okt-2019	GL = NAP	+2.19 m	Cone: CP15-CF75PB1SN2 1701-2680	Class 2. Test type TE2 Cone type: A_c = 1510 mm²; A_s = 19895 mm²

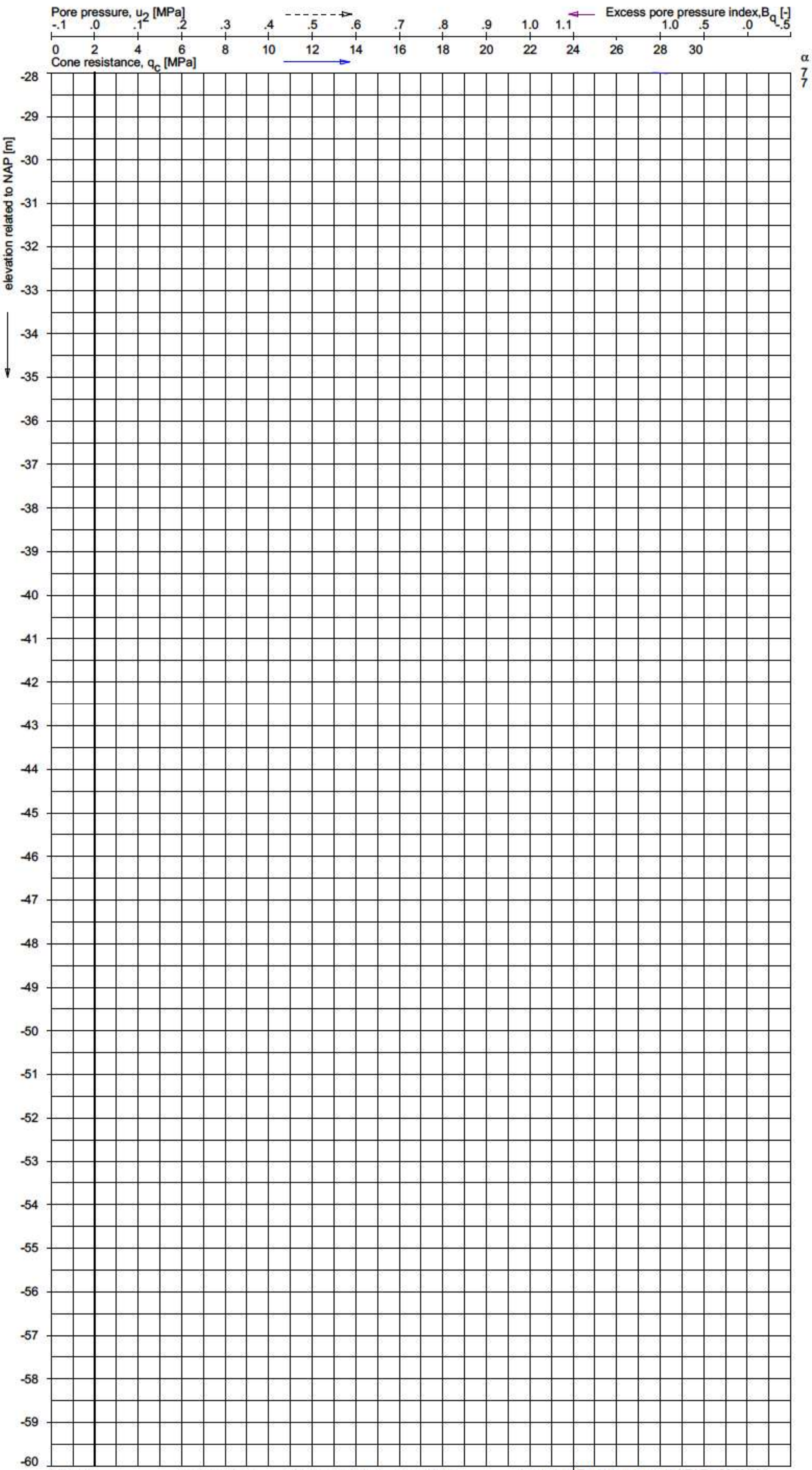
PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G57

1019-153172

SCPT_G57 - 1



Indicative soil classification
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

Rec.: EW	d.d. 23-okt-2019	Coord.: X= 264431.2 m Y= 573283.9 m	System: RD	Test in accordance with NEN-EN-ISO 22476-1
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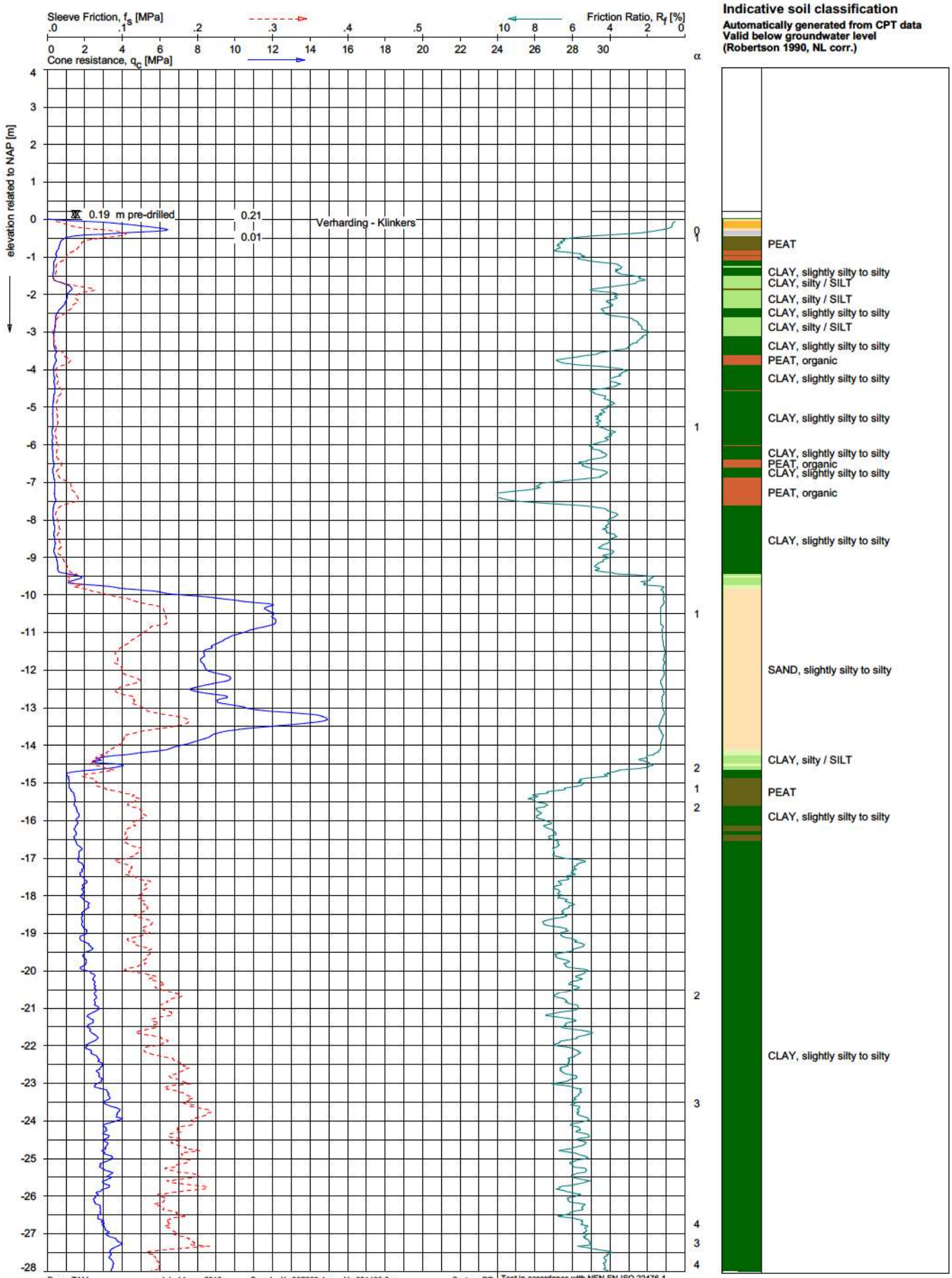
PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G57

1019-153172

SCPT_G57 - 2



Rec.: TAM d.d. 14-nov-2019 Coord.: X= 267533.4 m Y= 591468.6 m System: RD
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP +0.21 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

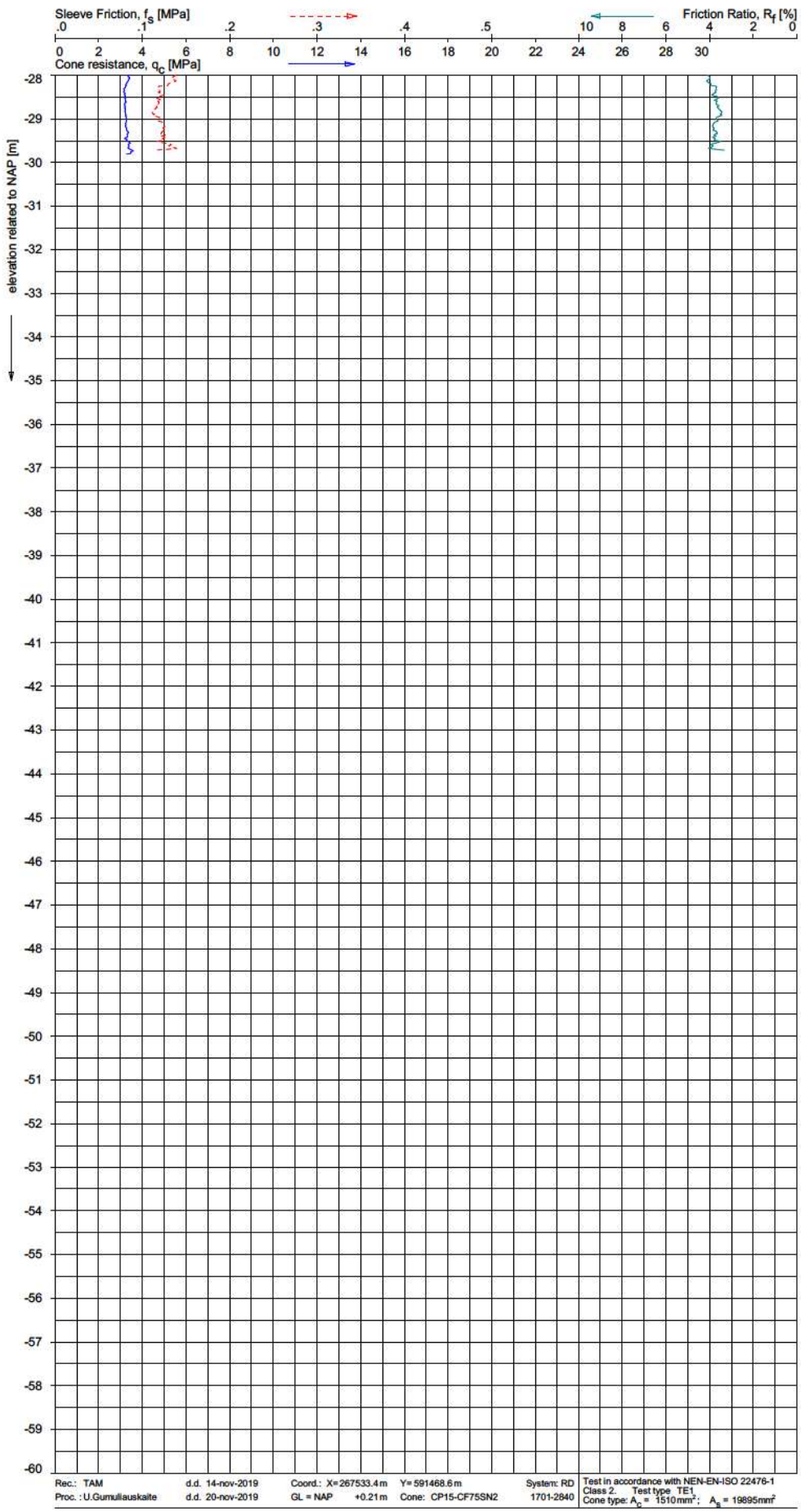
CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G60

1019-153172

CPT_G60 - 1



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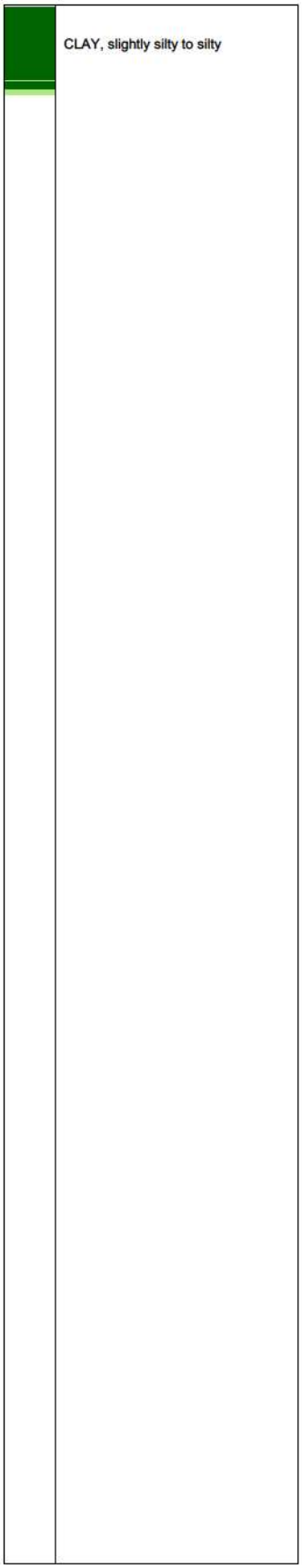
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP +0.21 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

Indicative soil classification

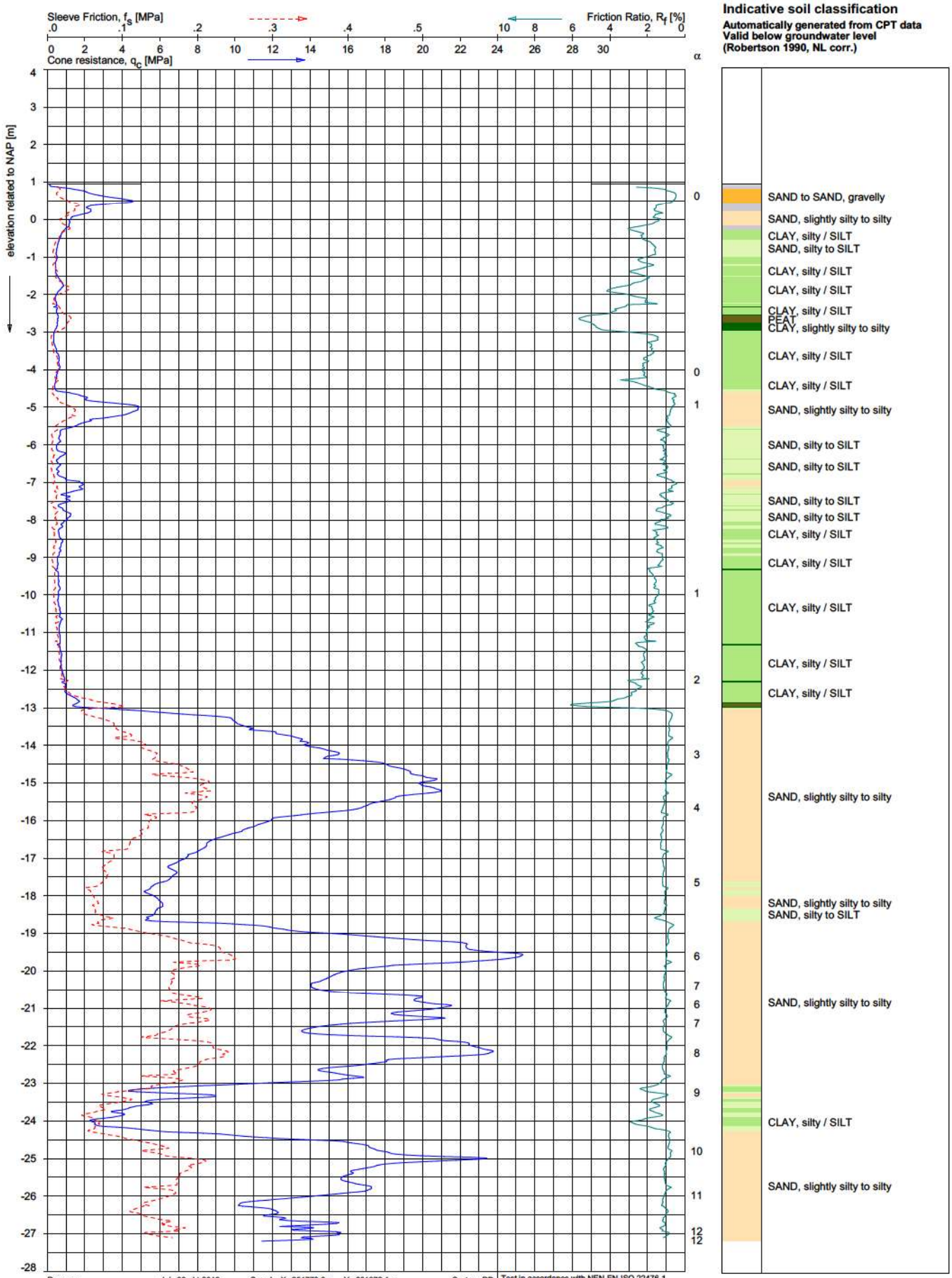
Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G60



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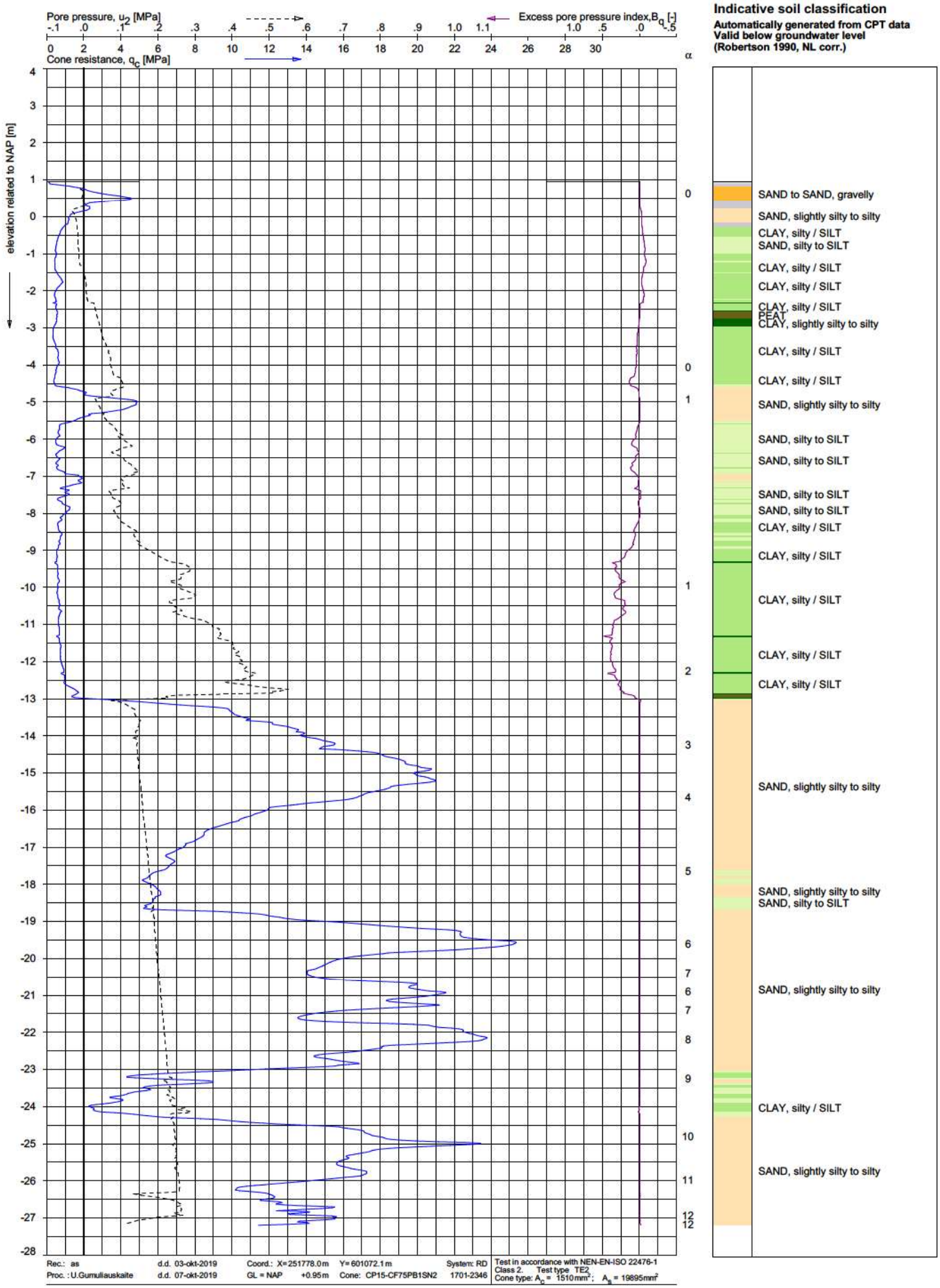
Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE2
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

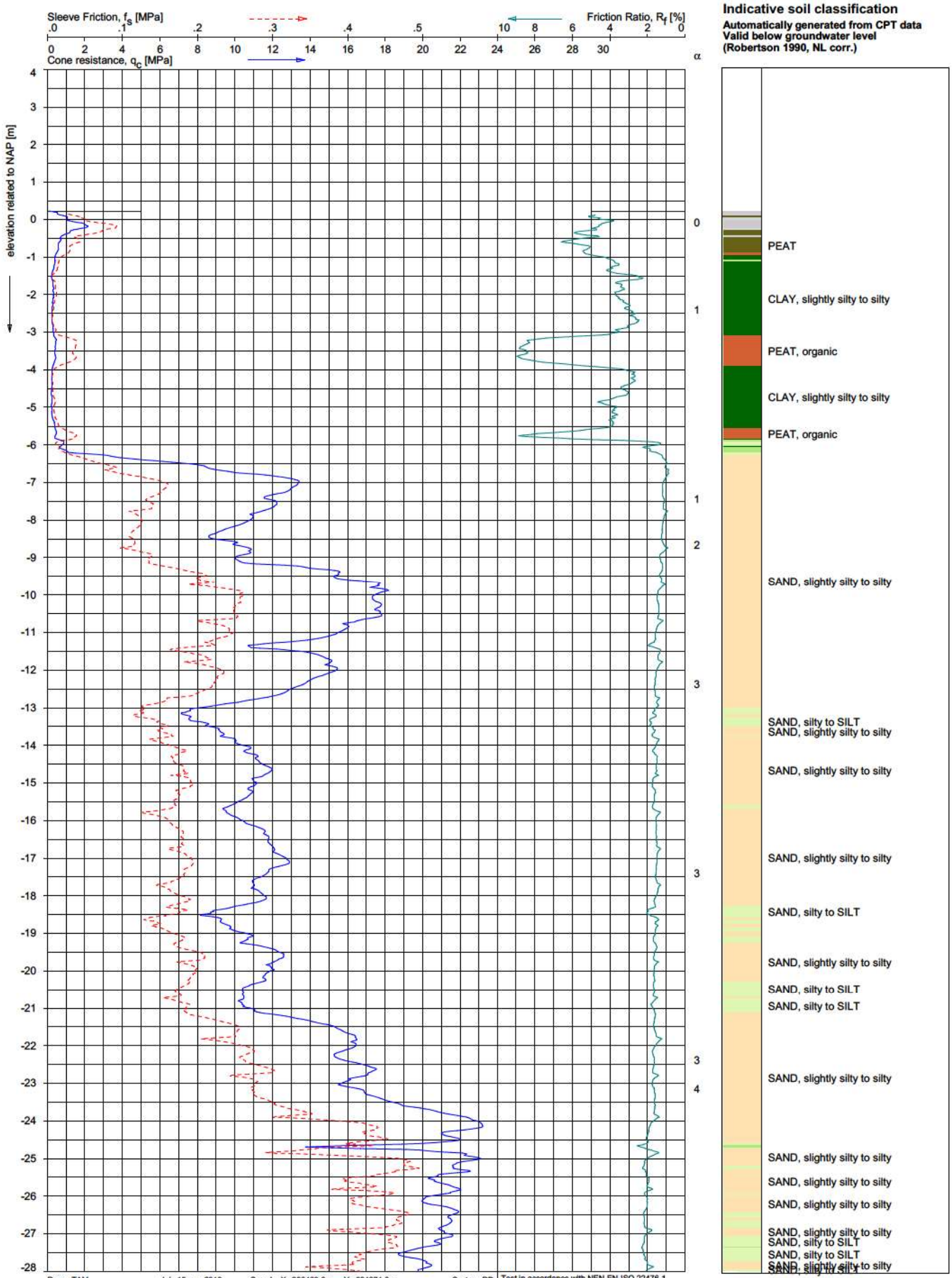
Proj. 1019-153172
Cpt SCPT_G62



PIEZO CONE PENETRATION TEST

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt SCPT_G62



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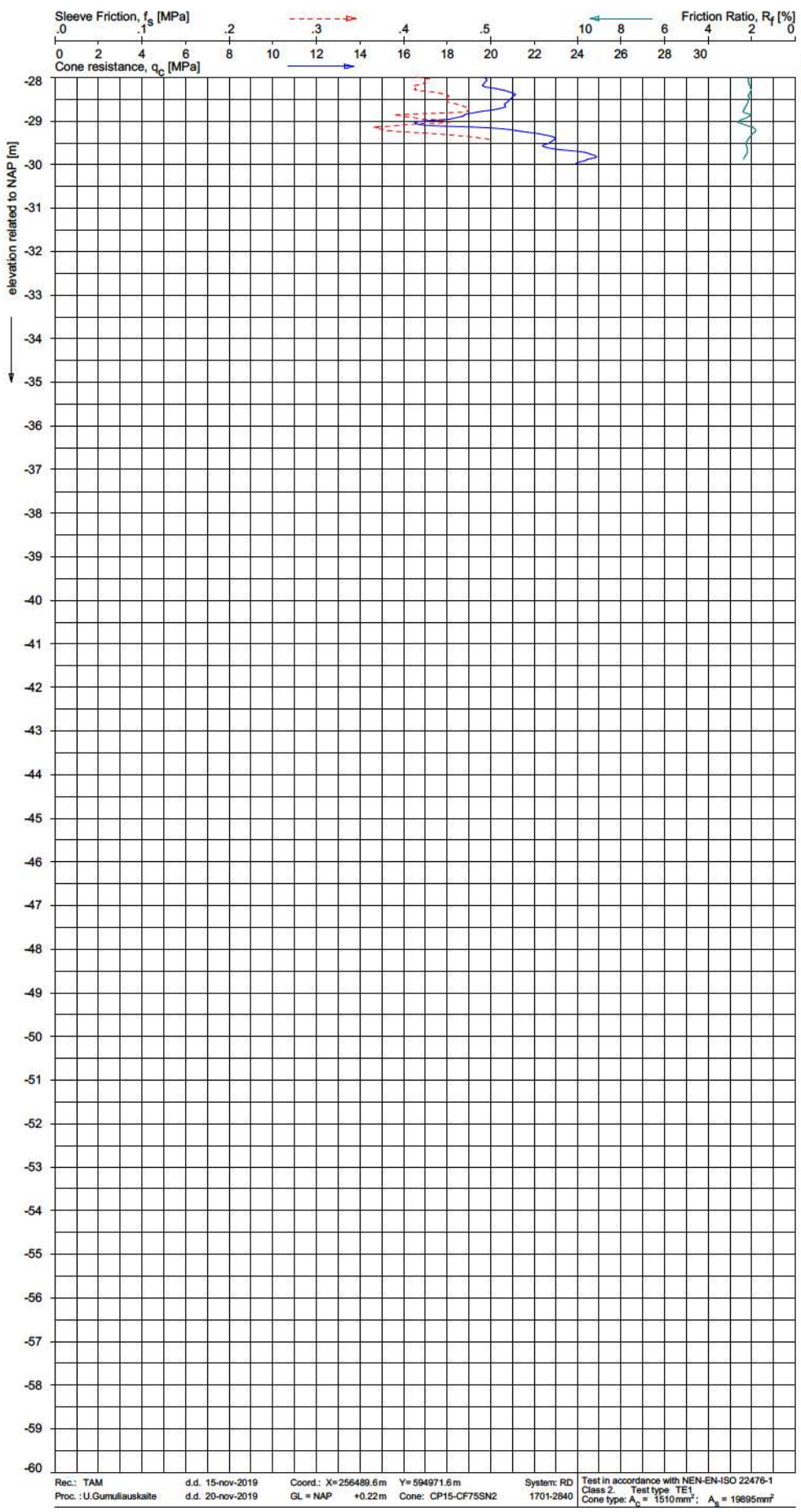
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP +0.22 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

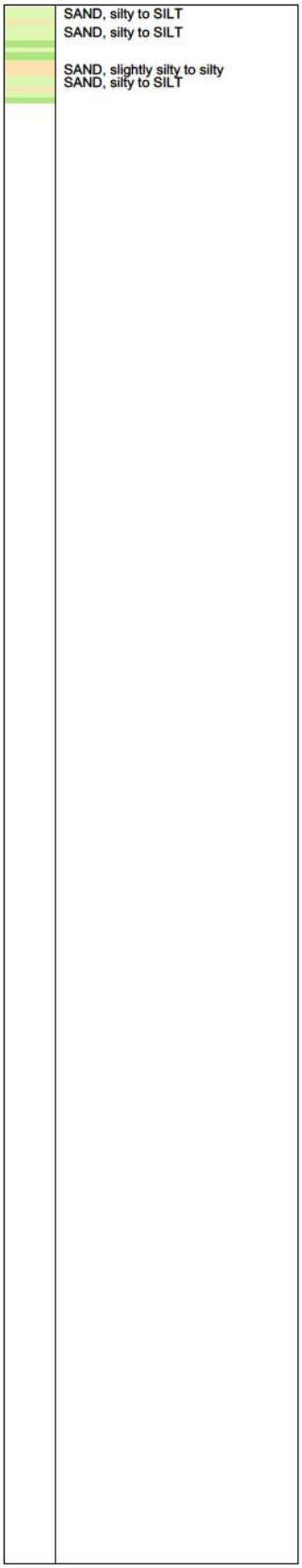
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G63



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)

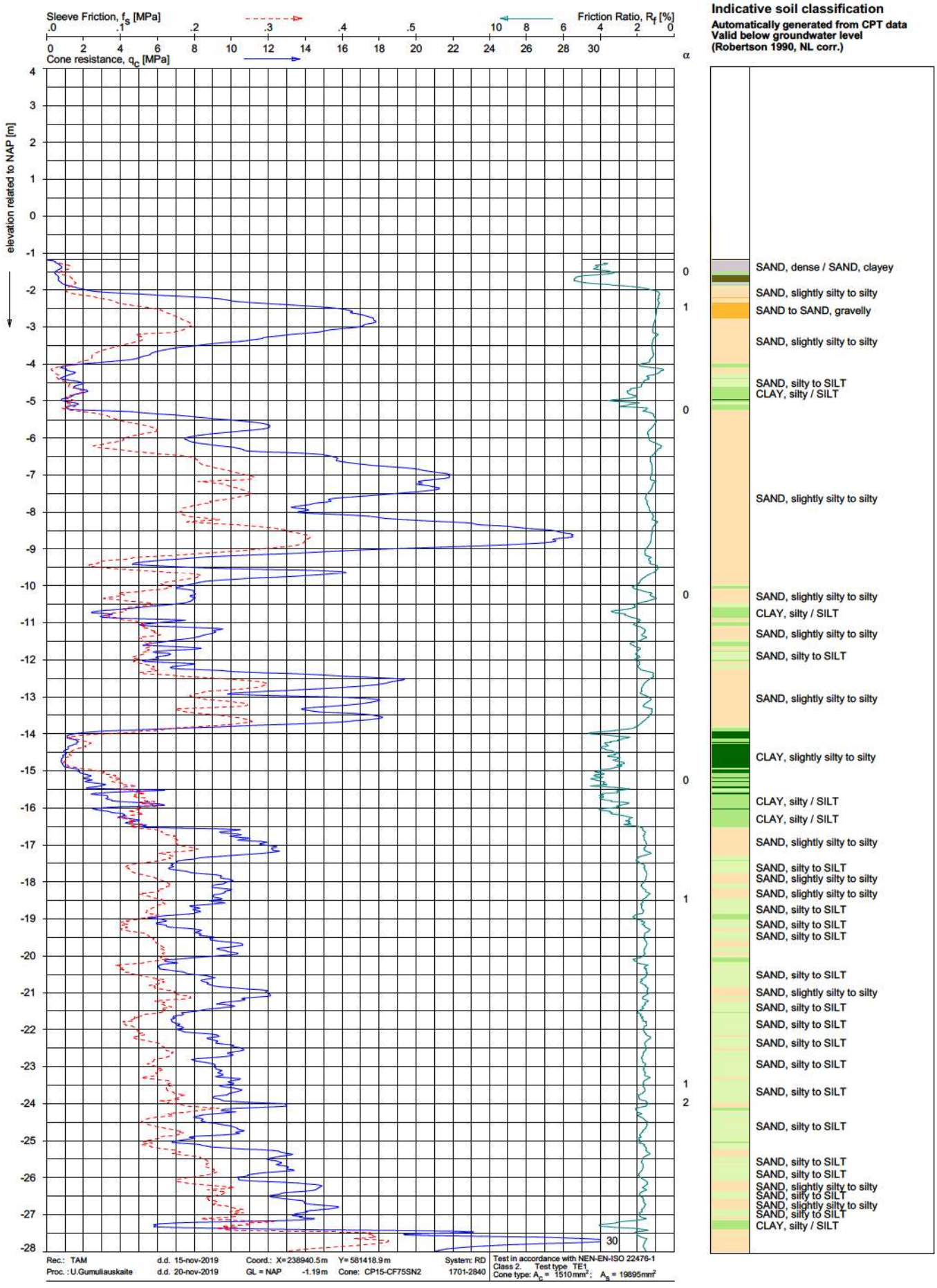


Rec.: TAM	d.d. 15-nov-2019	Coord.: X= 256489.6 m	Y= 594971.6 m	System: RD	Test in accordance with NEN-EN-ISO 22476-1
Proc. : U.Gumuliauskaite	d.d. 20-nov-2019	GL = NAP +0.22 m	Cone: CP15-CF75SN2	1701-2840	Class 2. Test type TE1
					Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G63



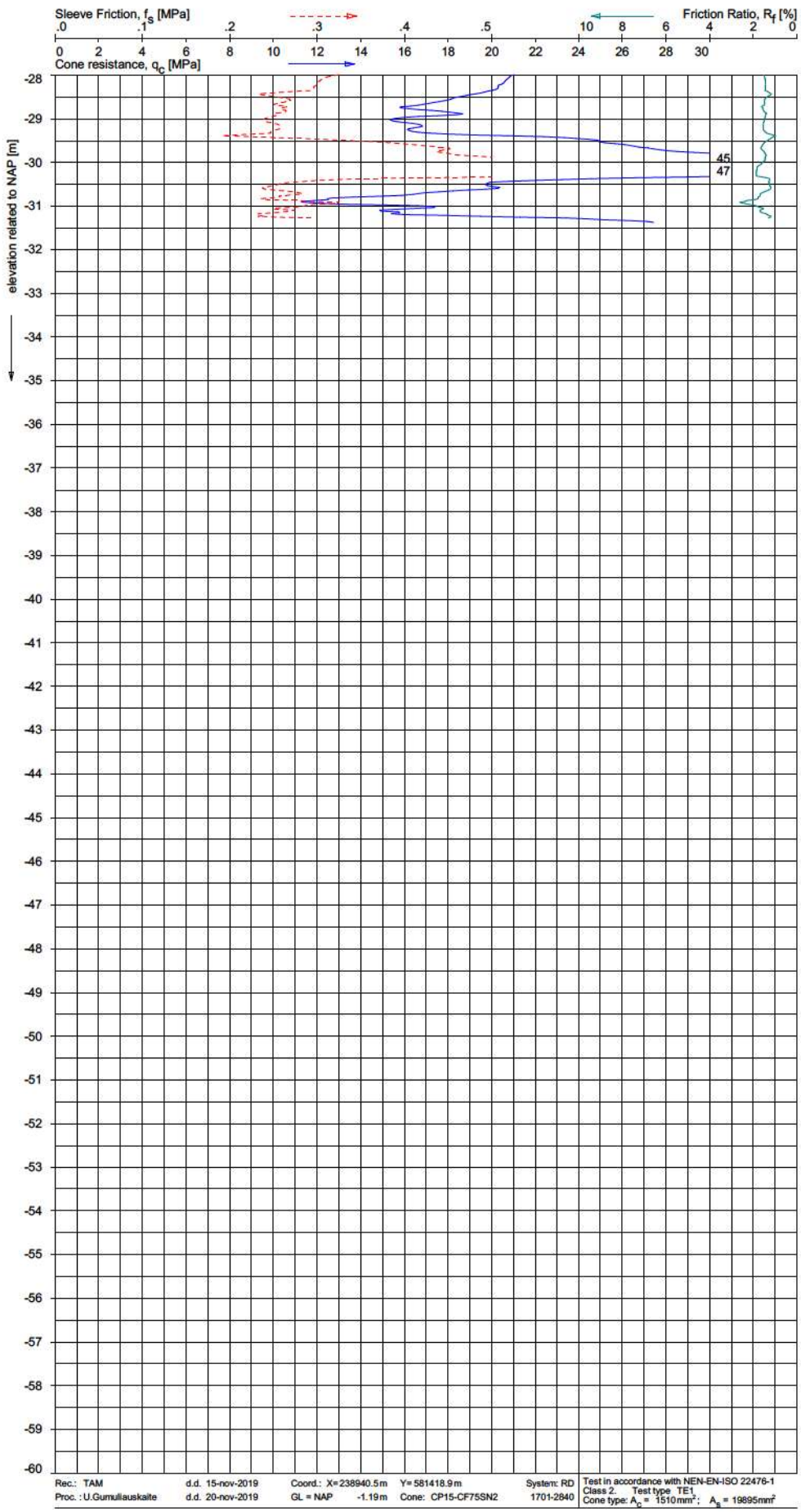
Rec.: TAM d.d. 15-nov-2019 Coord.: X= 238940.5 m Y= 581418.9 m System: RD
Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP -1.19 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

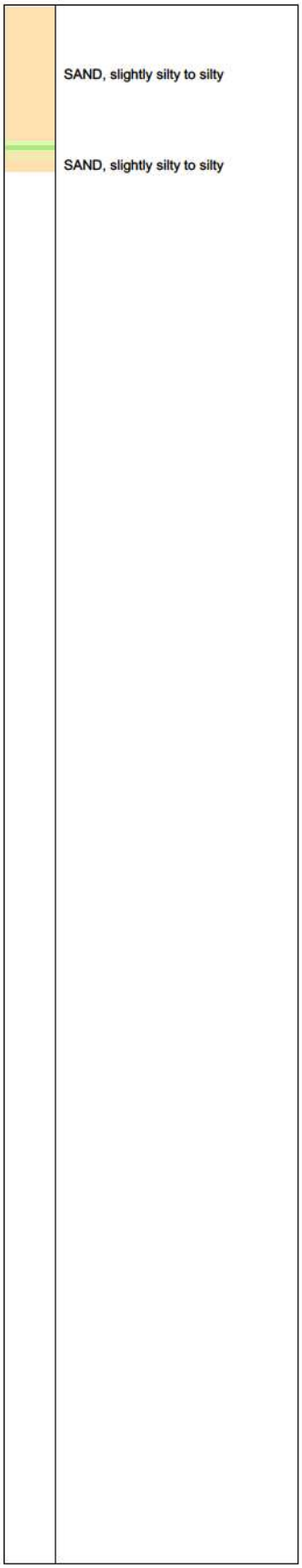
SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G69



Indicative soil classification

Automatically generated from CPT data
Valid below groundwater level
(Robertson 1990, NL corr.)



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Proc. : U.Gumuliauskaite d.d. 20-nov-2019 GL = NAP -1.19 m Cone: CP15-CF75SN2 1701-2840

Test in accordance with NEN-EN-ISO 22476-1
Class 2. Test type TE1
Cone type: A_c = 1510 mm²; A_s = 19895 mm²

CONE PENETRATION TEST WITH LOCAL FRICTION

SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

Proj. 1019-153172
Cpt CPT_G69

EXPLANATION GEOTECHNICAL SITE INVESTIGATION

COORDINATES AND HEIGHT OF RESEARCH POINTS

If the level and the coordinates of the Ground Investigation locations are surveyed in RD (X, Y) and NAP (Z) coordinates, the maximum deviation of the measurement of coordinates is 10 cm, the maximum deviation of the measurement of the level is 5 cm. For projects where Ground Investigation location(s) have been surveyed relative to a local fixed point, the maximum deviation of the measurement of the level is 5 cm, the maximum deviation of the measurement of coordinates is 25 cm.

If Ground Investigation sites are not referenced to a fixed reference, the investigation does not conform to requirements set in NEN-EN-ISO 22476-1.

The level determination of the investigation location(s) is to enable the soil and/or rock profile to a known reference level. The survey data is not suitable for any purposes other than this site investigation.

CONE PENETRATION TESTING

The CPT's are performed in accordance with existing directives and the NEN-EN-ISO-22476-1. A description of the measurement and registration method is given in the appendix "Electric Cone Penetration Testing".

DRILLING

Drilling of the boreholes (are) carried out using the standard tools and sinker bars and temporary threaded steel casing as the ground conditions dictate. All sampling and in-situ testing are performed in accordance with the work instruction or as directed by the (client) Engineer. Specific technical details of any equipment shall be held in the Fugro office and can be provided on request

Manually drilling is performed by a hand auger.

The work is performed in accordance with the NEN-EN-ISO 22475-1.

The standpipe installed in the boreholes are performed in accordance with the NEN-EN-ISO 22475-1. The filter depth, gravel pack and bentonite are indicated on the drilling graphics. The boreholes with standpipes are with corresponding symbol shown on the site plan.

Undisturbed samples during mechanical drilling can be acquired by:
- pressing or driving a liner (Ackermann) into the soil
- pressing a Piston liner
- pressing a Gelpush sample

For manual drilling soil sampling is performed with a Van der Horst core sampler.

During drilling activities disturbed samples are taken and classified on site. If laboratory work is performed after the fieldwork, the samples will be classified in additional detail in the laboratory. In case of differences between the field and laboratory classification, the laboratory classification is leading.

The classification of the soil is carried out in accordance with NEN 5104.

GROUNDWATER LEVELS

The (ground)water level(s) are a single measurement and intended as exploratory data. The groundwater level may fluctuate over time under influence of the weather and the seasons

QUALITY ASSURANCE

All work is performed in accordance with the management system of Fugro NL Land B.V. that complies with the ISO 9001:2008 and SCC ** 2008/05. The calibration sheet(s) of used cone(s) can be acquired upon request.

Measurement

In 1965 Fugro developed an electrical cone penetrometer, of which the shape and dimensions formed the basis for the present cone penetrometer designs. During penetration measurements of the cone penetrometer: cone resistance, sleeve friction and inclination are recorded simultaneously. Since February 2013 the new standard *NEN-EN-ISO 22476-1:2012/C1:2013* applies instead of the old Dutch NEN 5140. NEN-EN-ISO 22476-1:2012 deals with the accuracy requirements of measurement, the execution of and reporting on electrical cone and piezo cone penetration tests as part of geotechnical investigation and testing according to EN 1997-1 and EN 1997-2.

When performing a penetrometer test in accordance with NEN-EN-ISO 22476-1: 2012 / C1:2013, the cone penetration resistance will be measured, while pushing the cone penetrometer with a nominal apex angle of 60° and a cross-sectional area of 1,000 mm^2 with uniform penetration rate of about 20 mm/s (approximately 1 inch per second) into the ground. Hence, a 20 m CPT can be completed (start to finish) in about 30 minutes. The friction sleeve is situated directly above the cone tip with a nominal surface area of 15,000 mm^2 to allow measurement of the sleeve friction. The force on the cone (cone penetration resistance in MPa) and the local friction along the friction jacket (local sleeve friction in MPa) are continuously measured by strain gauges in the cone. According to NEN-EN-ISO 22476-1 no correction factors have to be applied when the base area of the cone varies between 5 (mini-cone) and 20 cm^2 (large cone). Fugro uses commonly a standard cone with a base area of 15 cm^2 and a friction sleeve area of 200 cm^2, which are more robust and can be applied in dense soil conditions.

The measurement signals are sent directly to an electrical measurement unit, and stored along with depth and time. Final processing is carried out in the office. Continuous recording of measured cone and sleeve friction is an accurate method to determine the stratification of the soil layers and resistance obtained from the soil. The cone penetrometer also includes an electrical inclinometer for measuring of deviations from the vertical. Depth measurements are usually corrected for inclination.

Interpretation of the cone penetration test with sleeve friction

With measurement of the cone penetration resistance q_c and the sleeve friction f_s it is possible to determine the friction ratio R_f. The friction ratio R_f is expressed as a percentage of the sleeve friction f_s, over the cone penetration resistance, q_c, at the same depth ($R_f = f_s/q_c$).

The friction ratio R_f together with the cone penetration resistance q_c gives a good indication of the soil stratigraphy and soil type *below* the ground water table. It is noted that the above interpretation applies to cylindrical cone penetrometers only and to soils permanently below the ground water table. The interpretation is indicative and should be verified, for example by correlation with boreholes or other locally available information as geology and/or experience.

Soil type	Friction ratio in %	Soil type	Friction ratio in %
Gravel, coarse sand	0.2 – 0.6	Clay ; organic clay	3.0 – 5.0
Sand	0.6 – 1.2	Glacial clay; overconsolidated	5.0 – 7.0
Silt, loam, löss	1.2 – 4.0	Peat	5.0 – 10.0

In disturbed soil and soil above ground water table this correlation is less / not suitable.

Other types of penetrometers

In addition to the measurement of cone penetration resistance and sleeve friction, it is possible to carry out (combinations of) other measurements. In the table below some possibilities are indicated. Detailed information can be provided on request.

Type of sensor	Results	Application
Pore pressure u1 or u2	Pore pressure at the tip (u1) Pore pressure behind the tip (u2)	detection low permeability soil layers indication of the piezometric head interpretation of statigraphy and geotechnical soil behaviour
Magnetometer	Magnetic field in 3 orthogonal directions (X, Y,Z)	Investigation of unexploded shell, underground obstacles (steel pipes, ground anchors), pile tip elevation, battered piles, bottom sheet pile
Electrical conductivity	Electrical conductivity of the ground and ground water	Identification water quality, investigation of fresh/brackish water boundary, dispersion of pollutants
Temperature	Measurement of temperature on different depths	measurement of thermal conductivity of soil measurement of in-situ temperature gradient with depth
Seismic	Dynamic soil parameters on different depths	determination of low strain stiffness for machine or wind turbine foundations
Acceleration	acceleration on different depths	measurement of vibrations resulting from pile driving or traffic
MIP (membrane interface probe)	Vertical dispersion of vaporized (chlorinated) hydrocarbons	Investigation of weak / sumps layers and/or vaporized (chlorinated) hydrocarbons.
ROST (rapid optical screening tool)	Vertical dispersion of (aromatic) hydrocarbons	Investigation of weak / sumps layers and/or (chlorinated) hydrocarbons.

CPTU Equipment

Fugro piezo-cone penetrometers give a continuous registration of the pore water pressure, the cone penetration resistance and also the sleeve friction. Included in the cone penetrometer is an internal sensor for measuring (pore) pressure either at the face of the cone (u_1) or at the cylindrical extension of the cone tip (u_2), see figure 1. The u_3 location immediately above the friction sleeve is exceptional. Fugro penetrometers are always equipped with a non-directional inclinometer.

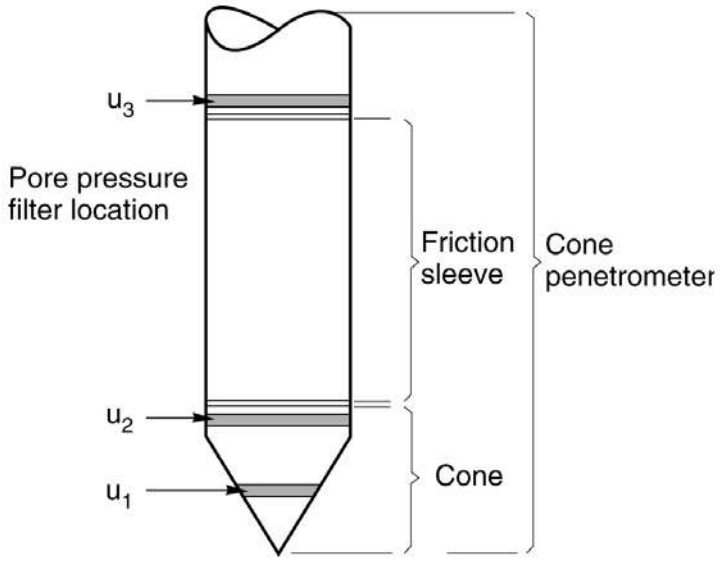


Figure 1 Piezo-cone penetrometer

The pressure sensor is located at the same level as the filter and has direct contact to the pore water. The construction of the penetrometer is such that no air is entrapped, that could possibly disturb the response of the pressure sensor. The pressure sensor used requires a minimum flow of water and provides a high output. Only a volume of 0.2 mm^3 is necessary for full scale output. The measuring range is chosen on basis of the expected excess pore water pressures during penetration. In stiff clays these values may exceed 3 MPa (300 m of water) or higher.

Procedure of the CPTU

The entire measuring system should be fully de-aired and filled with non-compressible liquid in order to measure pore water pressures correctly. Loss of saturation by leakage of liquid may occur when penetrating unsaturated zones above the groundwater table. For that reason a high viscosity liquid is used for saturation of the filter (either ceramic or stainless steel) and the cone. Additionally, the cone is fitted with a rubber membrane.

In case of a relatively high ground water table the CPTU is executed preferably from a predrilled bore hole to avoid loss of saturation and problems with the rubber membrane. The (excess) pore water pressure and the cone penetration resistance are recorded continuously during cone penetration.

Interpretation of the CPTU

Results of electric PCPTs include cone penetration resistance (q_c), local sleeve friction (f_s), friction ratio (R_f), measured pore water pressure (u_1 in the cone or u_2 at the cylindrical extension of the cone) and the pore pressure ration (B_q).

With respect to the interpretation of the soil profile the measured pore water pressures during cone penetration provide important additional information in geotechnical and geohydrological point of view. Combining the measured cone penetration resistance and pore water pressure and, preferably, the sleeve friction, yields optimal use of the CPT methodology. Furthermore, it allows for efficient planning of additional soil investigation.

The excess pore water pressure (increase in pore water pressure due to penetration of the cone) plays an important role when interpreting CPTU results.

The (excess) pore water pressures during cone penetration allow for detection of thin cohesive layers interbedded in a sand layer or thin sand layers interbedded in a clay layer that cannot be detected from the friction ratio because of averaging the friction resistance over the height of the friction sleeve. These layers may have a large influence on the settlement of foundations and on the (vertical) permeability of the soil.

The piezo-cone, in particular with u_1-measuring, provides additional information to be able to distinguish thin bedded soil layers from homogeneous soil layers. This refers to both sand and clay layers. In these soils friction ratio and cone penetration resistance alone often provides insufficient information. For this purpose, measuring u_1 is more suitable for identification of soils than measuring with u_2.

Pore pressure ratio B_q

The pore pressure ratio B_q allows for a more reliable soil classification. This ratio is defined as the excess pore water pressure divided by the net cone penetration resistance q_{net}. Parameter q_{net} is the measured cone penetration resistance q_c including corrections for hydrostatic and transient pore pressures, in-situ stress, and cone construction, in formula:

$$B_q = \beta \cdot (u_1 - u_0) / q_{net} \quad \text{or} \quad B_q = (u_2 - u_0) / q_{net}$$

where:

β = adjustment factor for the ratio of pore pressure at the cylindrical extension above the base of the cone (u_2) to pore pressure on the cone face (u_1). Default value is 0.8 as for normally consolidated clay, see table below;

q_{net} = $q_t - \sigma_{v0}$ = net cone penetration resistance;

q_t = $q_c + (1-a)\cdot\{\beta\cdot(u_1 - u_0) + u_0\}$ filter at the face of the cone;
= $q_c + (1-a)\cdot u_2$ filter at the cylindrical extension of the cone;
σ_{v0} = in-situ vertical stress at the cone base, relative to ground surface or seabed. This is a calculated value, using bulk density of 14 kN/m^3 and ground water table at 1 m below ground surface (estimated averages) for standard onshore processing;
a = net area ratio of the cross-sectional steel area (at the gap between cone and friction sleeve) to the cone base area.
u_1 = pore pressure at the face of the cone, relative to the reference level of the test;
u_2 = pore pressure at the cylindrical extension above the base of the cone, relative to the reference level of the test;
u_0 = hydrostatic pore pressure at the cone, relative to the phreatic surface. This is a calculated value using a ground water table at 1 m below ground surface as default value.

The table below gives β-values for various types of soil.

Soil type	β - factor
Clay, normally consolidated	0.6 - 0.8
Clay, slightly over consolidated	0.5 - 0.7
Clay, heavily over consolidated	0[1)] - 0.3
Silt, loose, compressible	0.5 - 0.6
Silt, dense, dilative	0[1)] - 0.2
Sand, silty, loose	0.2 - 0.4

[1)] Occasionally, negative pore pressures are measured at the cylindrical extension above the base of the cone. These values provide only information on the soil behaviour and hardly on the permeability.

Pore pressure dissipation test
A penetration interruption may be used to perform a pore pressure dissipation test. With this test the dissipation of the excess pore water pressure as a function of time is measured. The penetration is continued after completion of the dissipation test.

In permeable soils the dissipation test is used to provide information on the hydrostatic pore water pressure and the piezometric head. Due to measuring uncertainties the accuracy is limited. More accurate evaluation is possible by executing a number of dissipation tests in the same soil layer and calculating the average value. From experience the inaccuracy is estimated at 0.5 m.
Recording the water table in standpipes during an extended period of time reveals more accurate values of piezometric head and its fluctuations.

In low permeable, cohesive soils the dissipation test is used to provide information on the coefficient of consolidation and on the coefficient of permeability in vertical direction. In this case, the duration of the dissipation test needs to be long enough to allow for a decrease in excess pore water pressure of at least 50%. In average a dissipation test in sand takes about 5 to 10 minutes to reach a constant value. In cohesive layers this process takes, depending on the consistency, usually 30 to 45 minutes or more. From calculations and qualitative comparisons of measuring results, information is obtained on the consolidation behaviour of the soil.

In clayey soils the dissipation test is not suitable to determine the hydrostatic pore water pressure because of the long time to reach 100% dissipation and the inaccuracy.

Classification according to EN-ISO 22476-1
Before starting the execution of SPT-tests the required application class as described in the standard **EN-ISO 22476-1** should be determined in order to select the appropriate equipment. The application class depends on the soil conditions and allowable minimum accuracy of the measured parameters and relates to the accuracy of the measured parameters. (Note: Not to the accuracy of the cone penetrometer instrument).

Application classes according to NEN-EN-ISO 22476-1:2012

Application class	Type of cone penetration test	Measured parameter	Allowable minimum accuracy [a]	Maximum length between measurements	Suggested use	
					Soil type [b]	Interpretation [c]
1	TE 2	Cone resistance, q_c Sleeve friction, f_s Pore pressure, u Inclination, i Penetration depth, l	35 kPa of 5 % 5 kPa of 10 % 10kPa of 2 % 2° 0.1 m of 1%	20 mm	A	G, H
2	TE1 TE2	Cone resistance, q_c Sleeve friction, f_s Pore pressure, u Inclination, i Penetration depth, l	100 kPa of 5 % 15 kPa of 15 % 25 kPa of 3 % 2° 0.1 m of 1 %	20 mm	A B C D	G, H* G, H G, H G, H
3	TE1 TE2	Cone resistance, q_c Sleeve friction, f_s Pore pressure [d], u Inclination, i Penetration depth, l	200 kPa of 5 % 25 kPa of 15 % 50 kPa of 5 % 5° 0.2 m of 2 %	50 mm	A B C D	G G, H* G, H G, H
4	TE1	Cone resistance, q_c Sleeve friction, f_s Penetration depth, l	500 kPa of 5 % 50 kPa of 20 % 0.2 m of 1 %	50 mm	A B C D	G* G* G* G*

Annotation 1 For extremely soft soils, even higher demands on the accuracy can be needed.

[a] The allowable minimum accuracy of the measured parameter is the larger value of the two quoted. The relative or % accuracy applies to the measurement rather than the measuring range or capacity.

[b] According to ISO 14688-2:

- A Homogeneously bedded soils existing of very weak tot stiff clay (and silt) (typically $q_c < 3$ MPa)
- B Mixed bedded soils with weak to stiff clays ($q_c \leq 3$ MPa) and moderate to dense sand (typically 5 MPa $\leq q_c < 10$ MPa)
- C Mixed bedded soils with stiff clays (typically 1.5 MPa $\leq q_c < 3$ MPa) and very dense sand (typically $q_c > 20$ MPa)
- D Very stiff to hard clays (typically $q_c \geq 3$ MPa) and very dense to gravely soils ($q_c \geq 20$ MPa)

[c]

- G profiling and material identification with low associated uncertainty level
- G* indicative profiling and material identification with high associated uncertainty level
- H interpretation in terms of design with low associated uncertainty level
- H* indicative interpretation in terms of design with high associated uncertainty level

[d] Pore pressure can only be measured if TE2 is used.

For projects where the parameters are derived from table 2.b. NEN 9997-1, a higher accuracy is desired. However it is almost impossible to meet/fulfil the requirements for class 1 for soil profiles with both very weak soils and very dense sands with high cone resistance as shown in the table above.

Experiences have shown that Fugro's measurement for standard cone penetration testing is very accurate by using digital cones, strict quality control and regular calibrations.
In practice it is found that Fugro's standard penetration testing results for the greater part (> 95%) are within in the range for application Class 2.

Application class 1 penetration tests can only be performed by special sensitive cones with a limited range of measurement, a clay soil profile with q_c < 3 MPa and procedures to eliminate temperature effects as much as possible.

In soil profiles with both very weak soil layers as very dense sand layers, the highest measurement accuracy of Class 1 can only be approximated by additional measurements and procedures.
Application class 2 penetration tests can only be used for soil profiles with both very weak soil layers and very dense sand layers with the use of digital cones and regular calibrations, additional execution measurements and quality control.
Application class 1 is not feasible in these type of soils.
The only practical indication of the achieved penetration class is checking the calibrations and zero-points between the start and end of the CPT.

Occasionally, the ground level is not measured relative to a reference point. These CPTs are not meeting the standard EN-ISO 22476-1.

LEGEND SITE INVESTIGATION TESTS AND SOIL TYPES

Borings □Monitoring wells

- Mechanical boring □BH□
- Hand auger boring □BH□
- Mechanical boring not performed
- Hand auger boring not performed
- Mechanical boring with monitoring well
- Mechanical boring with monitoring well□ shallow and deep well screen
- Mechanical boring with monitoring well□shallow□ intermediate and deep well screen
- Hand auger boring with monitoring well
- Hand auger boring with monitoring well□ shallow and deep well screen
- Boring third part□
- Boring third part□with monitoring well
- Push-in monitoring well□small diameter standpipe
- Push-in monitoring well not performed

Other s□mbols

- Measuring point
- Height
- Electrical Resistivit□Test

T□pe of test

SPT	Standard Penetration Test
CPT	Cone Penetration Test
DPSH	D□namic Probe Test□Super Heav□

Soil T□pe - Main soil t□pe□secondar□soil t□pe

Gravel

- Gravel□silt□
- Gravel□slightl□sand□
- Gravel□moderatel□sand□
- Gravel□ver□sand□
- Gravel□e□tremel□sand□

Sand

- Sand□cla□e□
- Sand□slightl□silt□
- Sand□moderatel□silt□
- Sand□ver□silt□
- Sand□e□tremel□silt□

Peat

- Peat□low mineral content
- Peat□slightl□cla□e□
- Peat□ver□cla□e□
- Peat□slightl□sand□
- Peat□ver□sand□

Cla□

- Cla□□slightl□silt□
- Cla□□moderatel□silt□
- Cla□□ver□silt□
- Cla□□e□tremel□silt□
- Cla□□slightl□sand□
- Cla□□moderatel□sand□
- Cla□□ver□sand□

Loam

- Loam□slightl□sand□
- Loam□ver□sand□

Other secondar□soil t□pes

- slightl□organic
- moderatel□organic
- ver□organic
- slightl□gravel□
- moderatel□gravell□
- ver□gravell□
- debris□Rubble

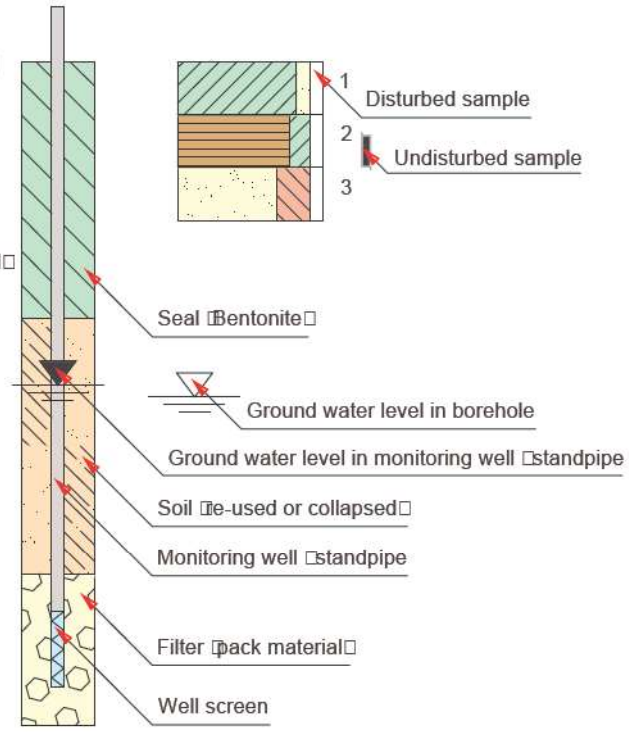
Cone Penetrations Tests □CPT□

- CPT
- CPT not performed
- CPT with sleeve friction measurement
- CPT with sleeve friction measurement not performed
- DPSH □SPT
- Manual □mechanical CPT
- Penetration test with push-in groundwater sampling probe
- Penetration test with push-in groundwater sampling probe not performed
- Penetration test with ball probe
- Penetration test with ball probe not performed
- Electrical piezometer
- Electrical piezometer not performed
- CPT performed b□third part□
- CPT with sleeve friction measurement performed b□third part□
- Inclinometer casing installed
- Inclinometer casing not installed

Additional measurements

HPT	H□draulic Profiling Tool
U	Pore pressure
M	Magnetic field strength
E	Electrical conductivit□
S	Shear wave velocit□ □Seismic Down Hole Test□
T	Temperature

Monitoring well



SEISMIC CPT TEST GRONINGEN

Introduction

Seismic Cone Penetration Tests (SCPT) consist of a combination of ordinary Cone Penetration Tests (CPT) and Seismic Downhole Tests. With this combi-cone the normal CPT parameters like point resistance, sleeve friction, slope and pore pressure can be measured. The Seismic 'down-hole' test measures the travel time interval of body waves travelling between a wave source on the surface ground and an array of geophones incorporated in the seismic cone penetrometer.
The Fugro seismic dual cone penetrometer contains two 3-axial geophones, 50 cm apart. The measurements are taken in the x-, y-, and z-direction. This way both the horizontal as the vertical components of low strain in-situ compression (P) and shear (S) wave velocities can be measured. For proper signals the y-mark on the cone is directed parallel to the steel beam, so signals in the y- direction are used for picking the proper first arrival. The P-wave and S-waves velocities are directly related to the soil elastic constants of Poisson's ratio, shear modulus, bulk modulus and Young's modulus.

Procedure

A dual seismic cone is pushed into the ground. To measure the S-wave, a steel beam is coupled to the ground surface by placing it under the CPT truck. Shear waves are generated by horizontally striking the steel beam by a sledge hammer, see figure 1. The sledgehammer that strikes the beam/plate acts as a trigger, initiating the recording of the seismic wave trace. Before measurements are taken, the rods are decoupled from the CPT truck to prevent energy transmission down the rods.

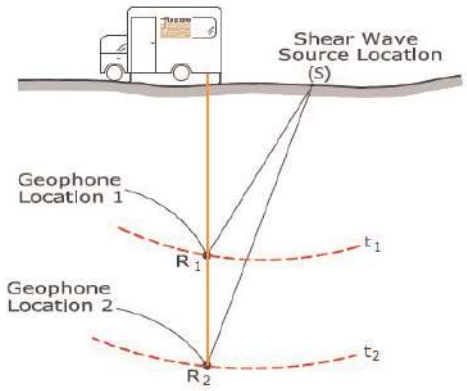


Figure 1: Steel beam with sledge hammer

At least three waves are recorded for each test depth so the operator can check consistency of the waveforms. Shear wave data is sampled at a frequency of 20kHz (20,000 samples per second). To maintain a desired signal resolution, the input sensitivity (gain) is increased with depth.
Offset distances of the beam from the cone and the location of the geophone are all taken into account in the calculations.

The test procedure includes the following:

- Interrupting the CPT test at fixed distances for performing seismic tests
- Activating the seismic wave source and recording of the geophone signals, if necessary with re-activating to permit stacking.
- Resuming CPT test

The data is recorded with a seismic data acquisition system.

Test results
In total 31 seismic CPT's were performed and only the S-waves were sampled.

The location of seismic S-CPT's are given in the total overview in the beginning of the report. In the reporting overview the RD coordinates and NAP level are given per CPT.

The results are presented in graphs at the following pages.

A few locations that were foreseen at the start of this project were not accessible. These locations are: G05, G17, G27 and G33.

At location G02 the first seismic CPT was performed at a location that was situated to far from the planned location. In a later stage CPT G02A was performed at the right location. Both seismic CPT's were analysed and reported.

Also some S-CPT's couldn't reach the depth of 25 of 30 m below ground level. Due to buckling danger the S-CPT's were terminated at a higher level. At location G11 there were 2 extra S-CPT's made to try to reach a deeper level. The third attempt is analysed and reported. Due to specific terrain conditions at G34, a second attempt was not possible to perform.

The shear-wave velocities were derived using the SC3RAV software of Baziw Consulting Engineers Ltd using the automatic cross-correlation option of the stacked data, after checking for erratic triggers.

Because of the clear data no filtering is used. The velocity data is presented in the tables 2 up to 15.

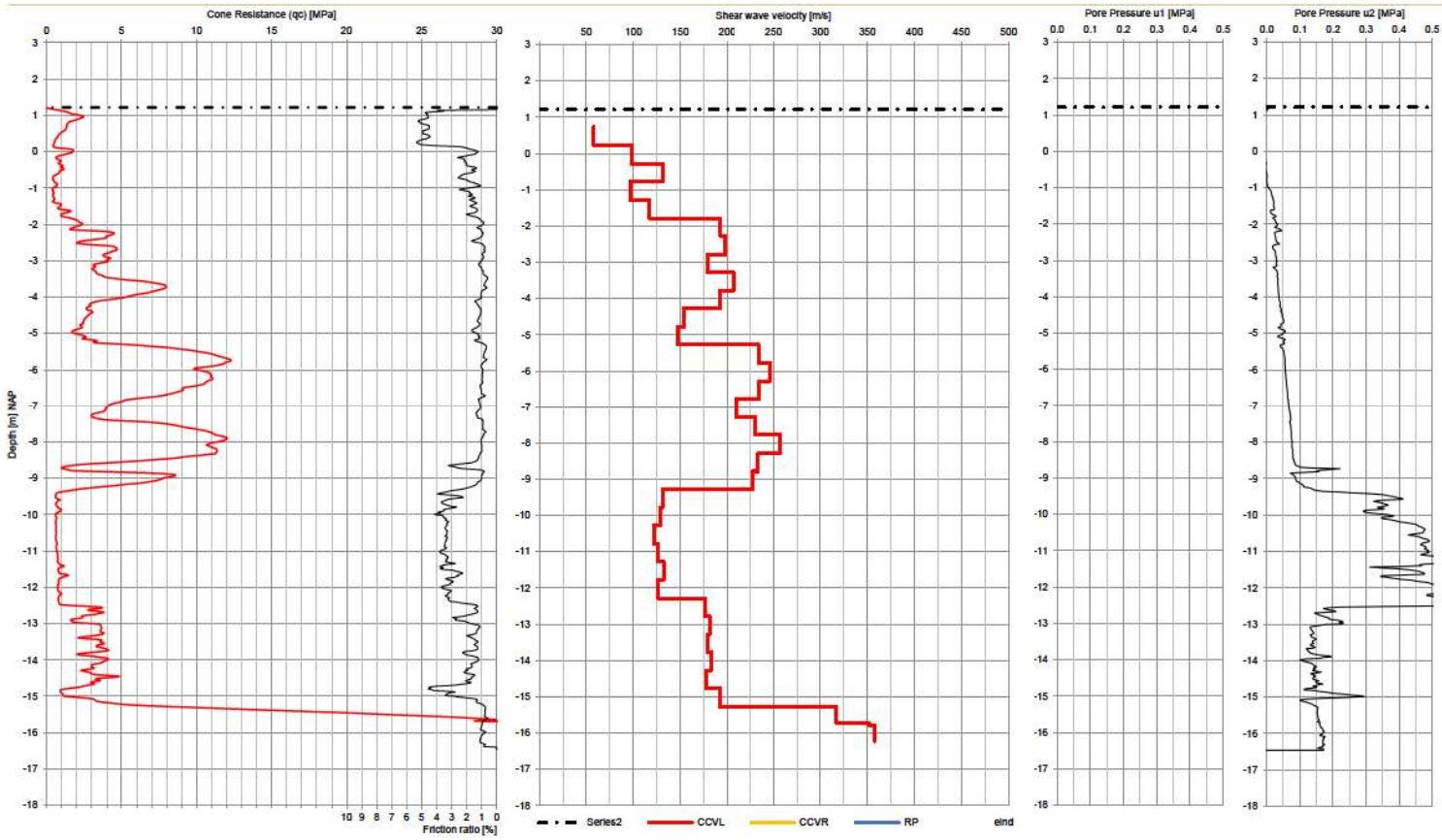
The Vs profiles showed in some instances zigzag profiles, therefore the records were separated into sets of true direct interval measurements and true indirect interval measurements of respectively the upper and lower geophone sets. And for some intervals the first arrival times were handpicked.

Literature

[1] P.K. Robertson, K.L. Cabal, Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 2015 6th Edition.

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

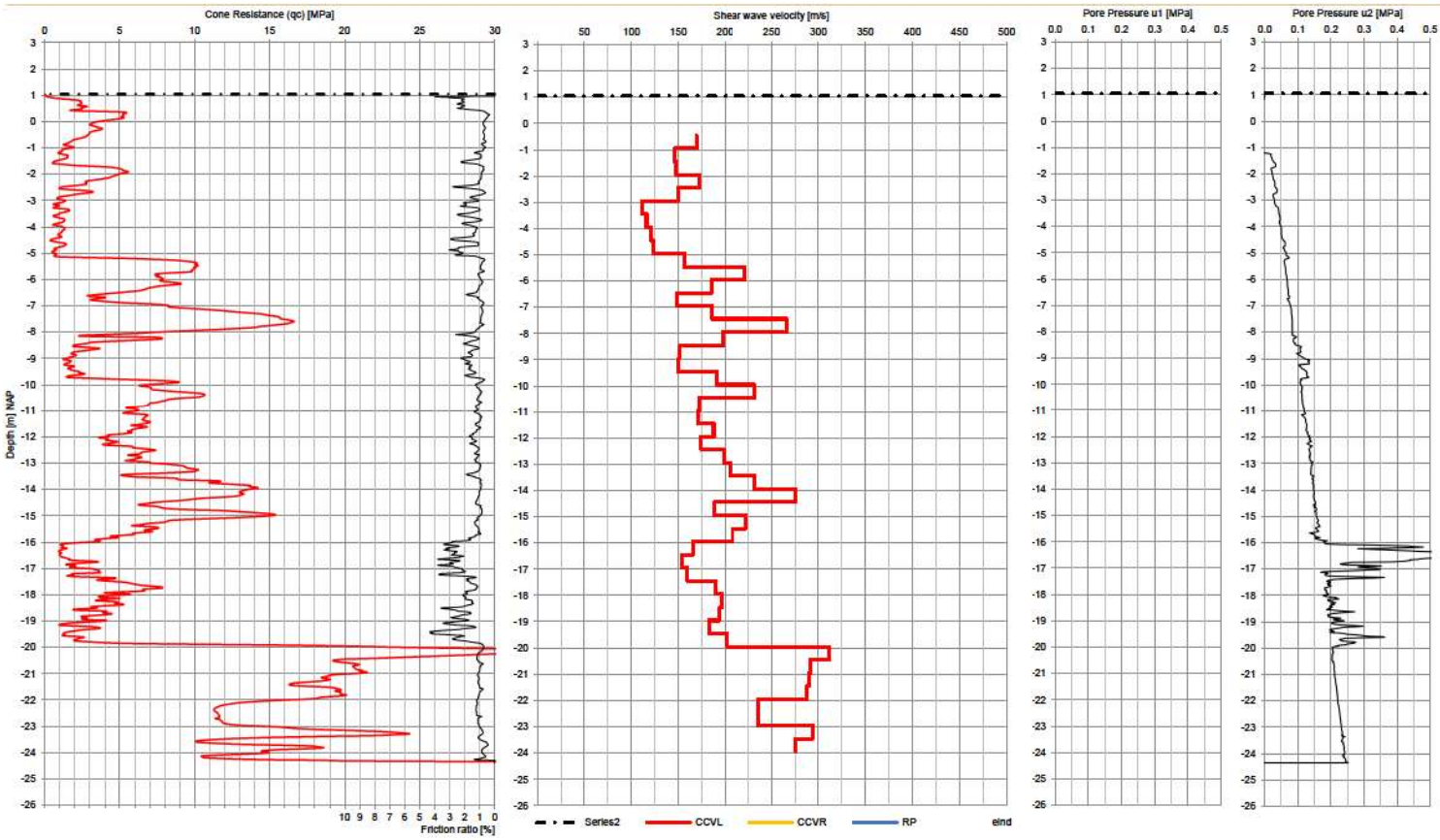
CPT ID: SCPT_G01



						Time-stamp	25-11-2019 16:39
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_29	x	244305.88 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G01_20191115.gef			y	607084.69 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	1.22 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G02



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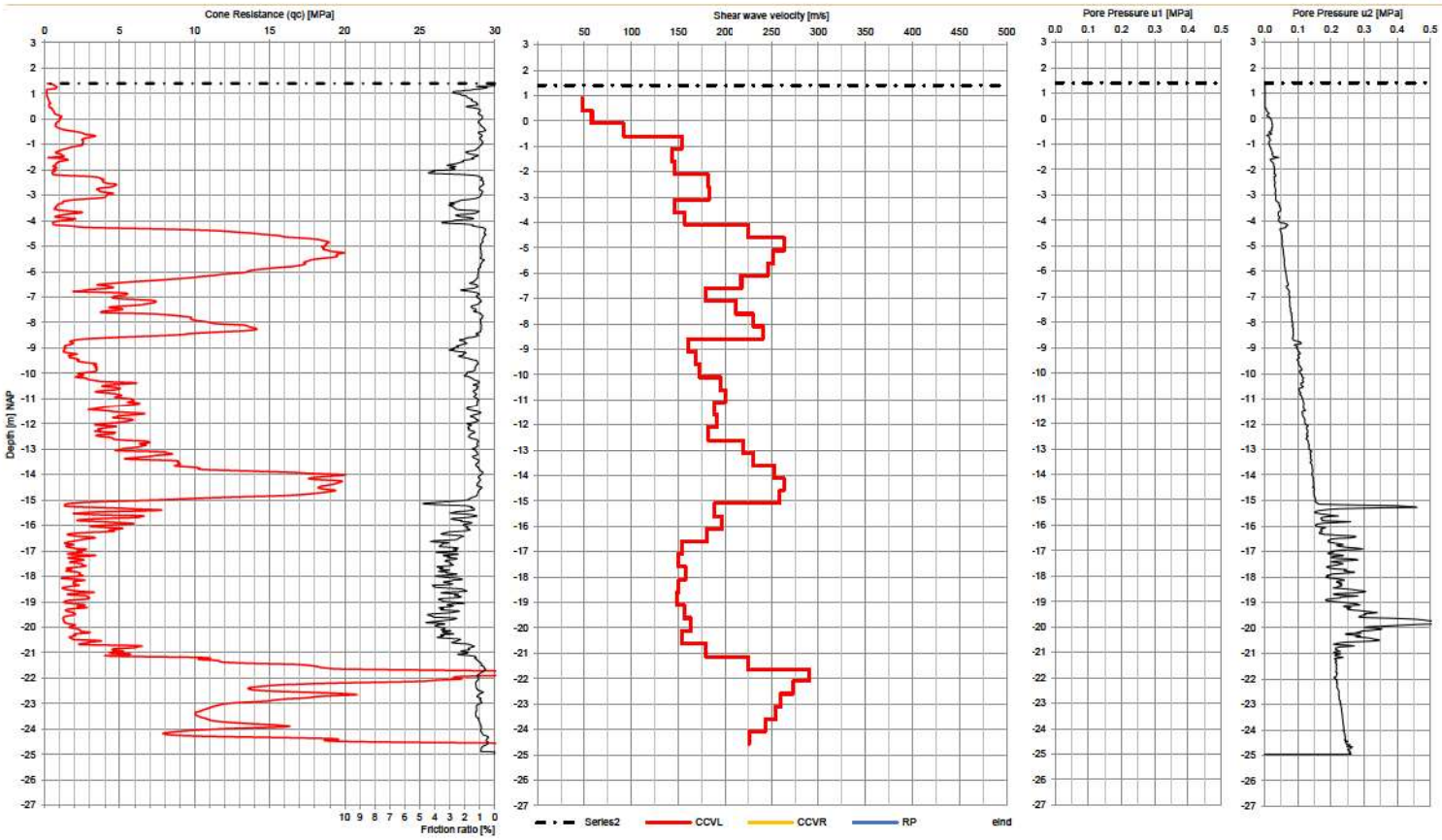
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_02	x	249358.42 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G02_20191115.gef			y	607859.93 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	1.05 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G02A



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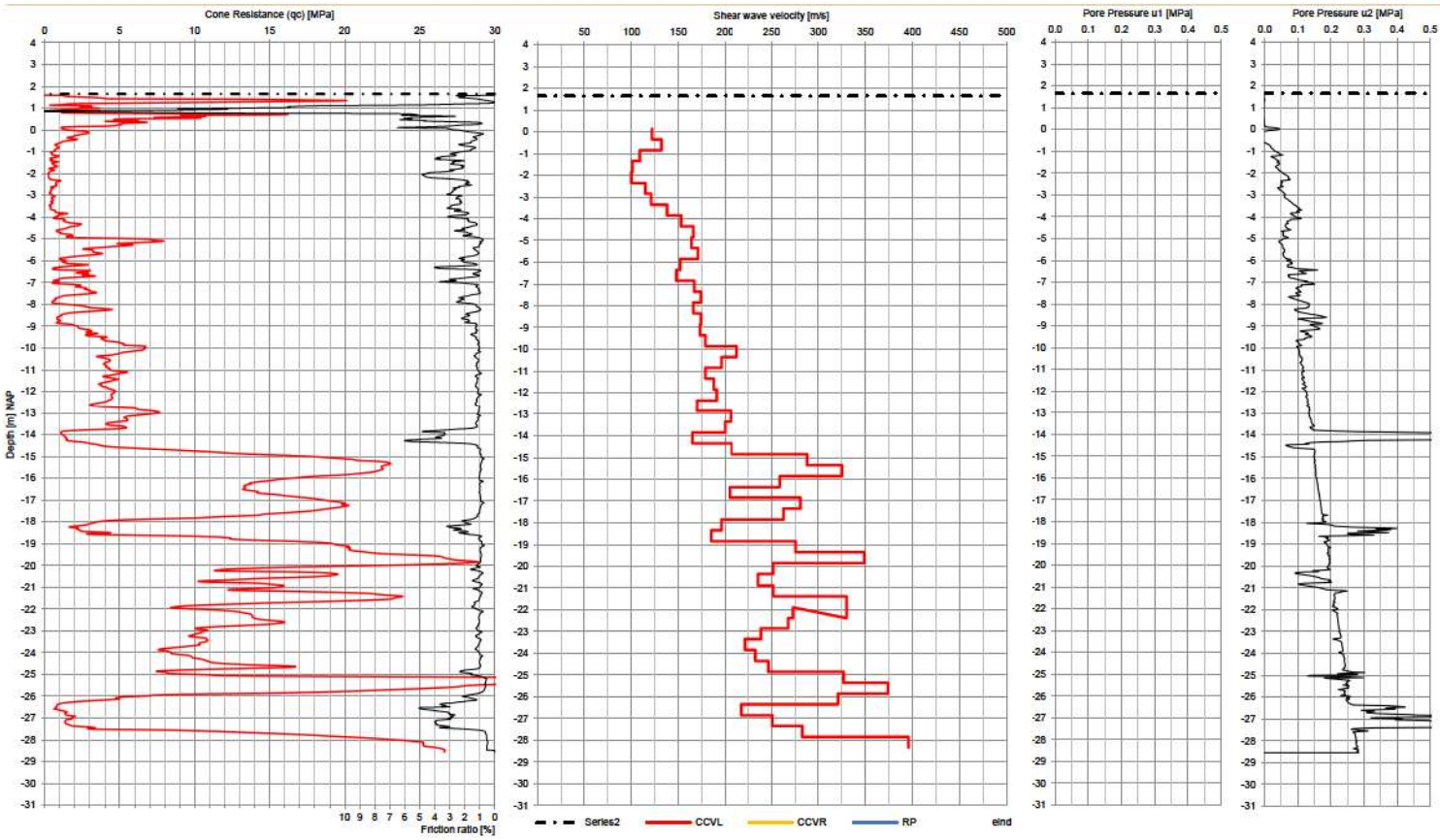
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_29	x	249257.58 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G02A_20191115.gef			y	607898.2 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	1.4 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G03



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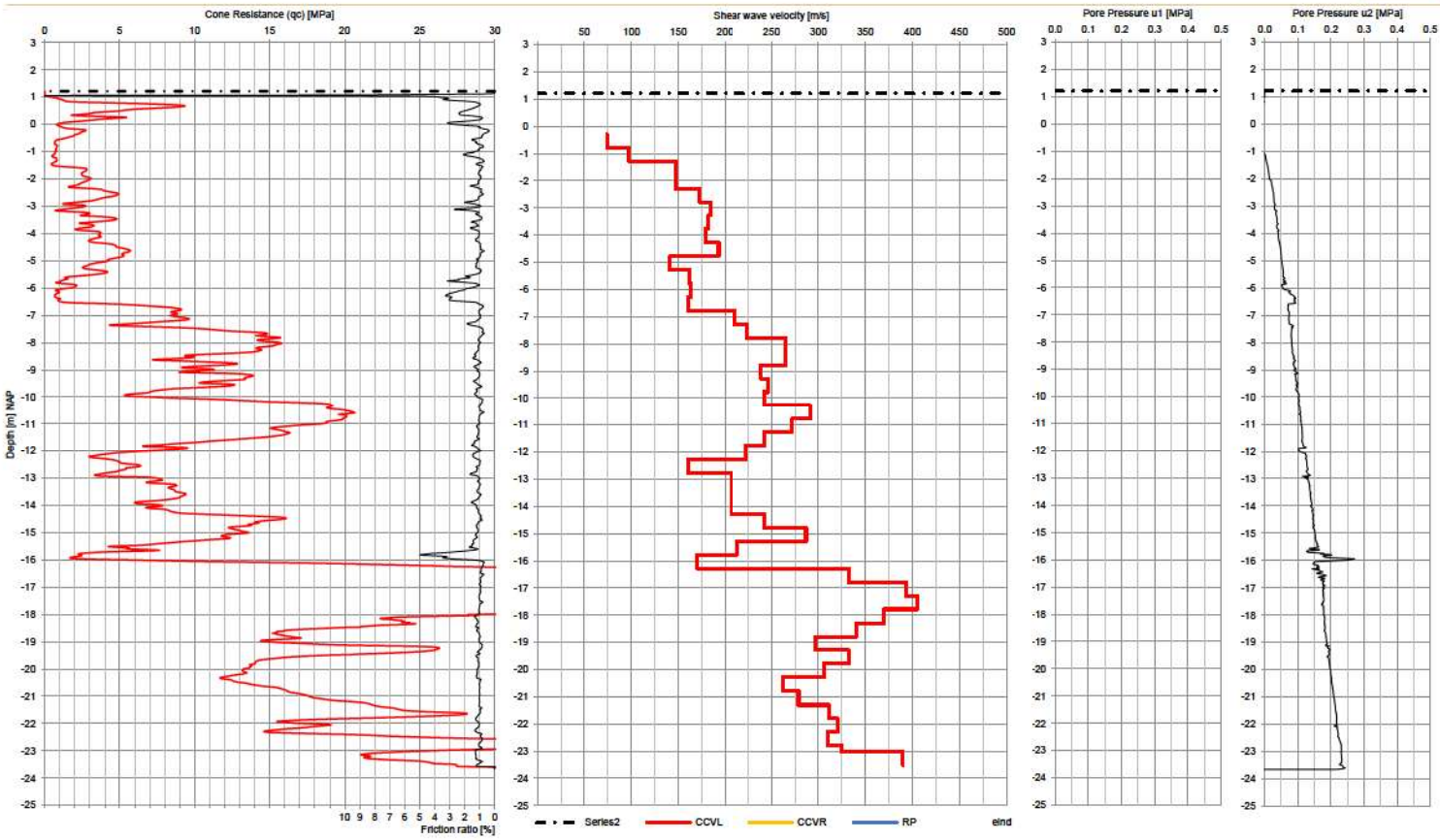
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_02	x	235505.41 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G03_20191115.gef			y	603968.29 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	1.65 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G04



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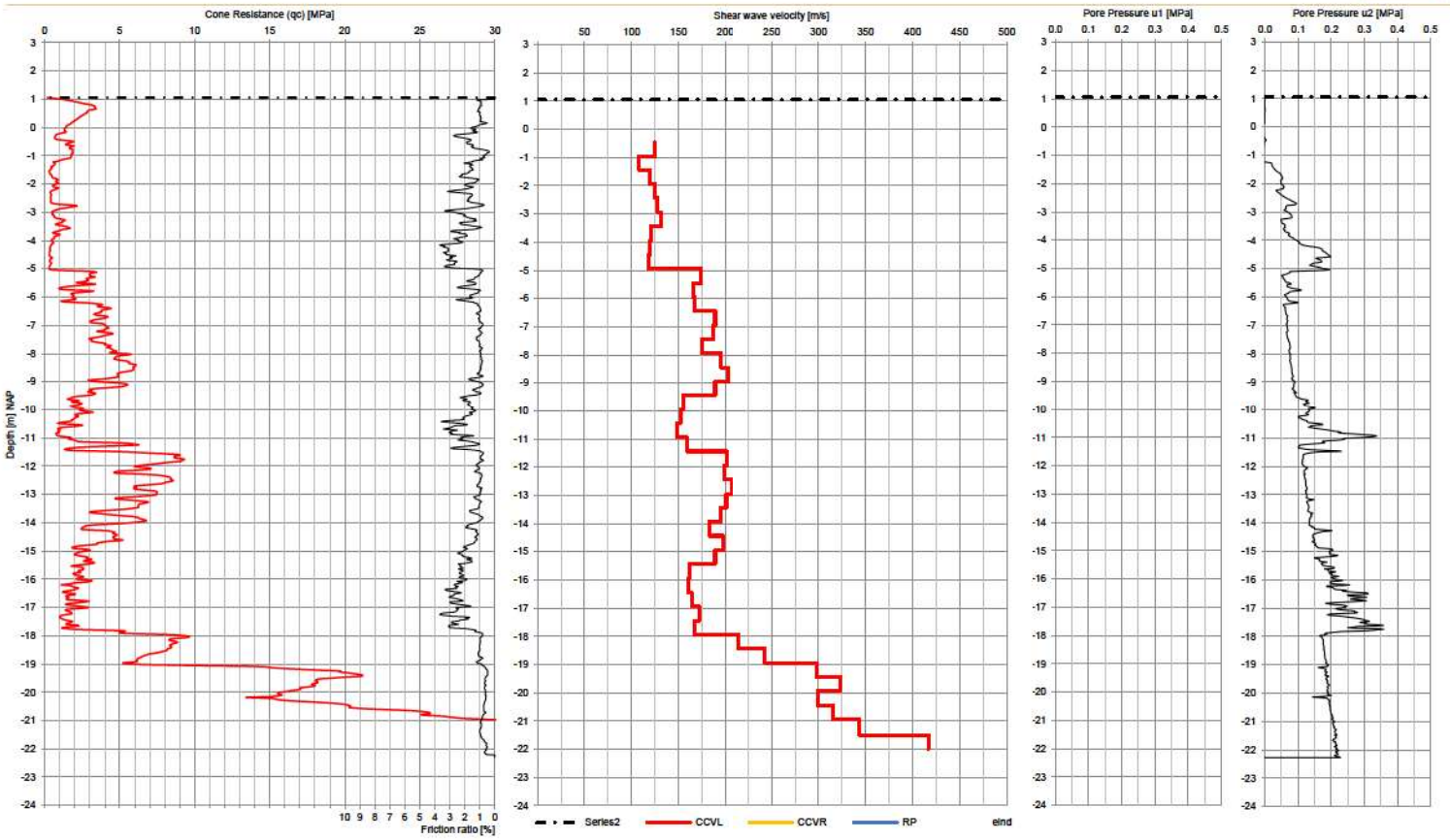
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_01	x	240601.68 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G04_20191115.gef			y	603923.24 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	1.22 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G08



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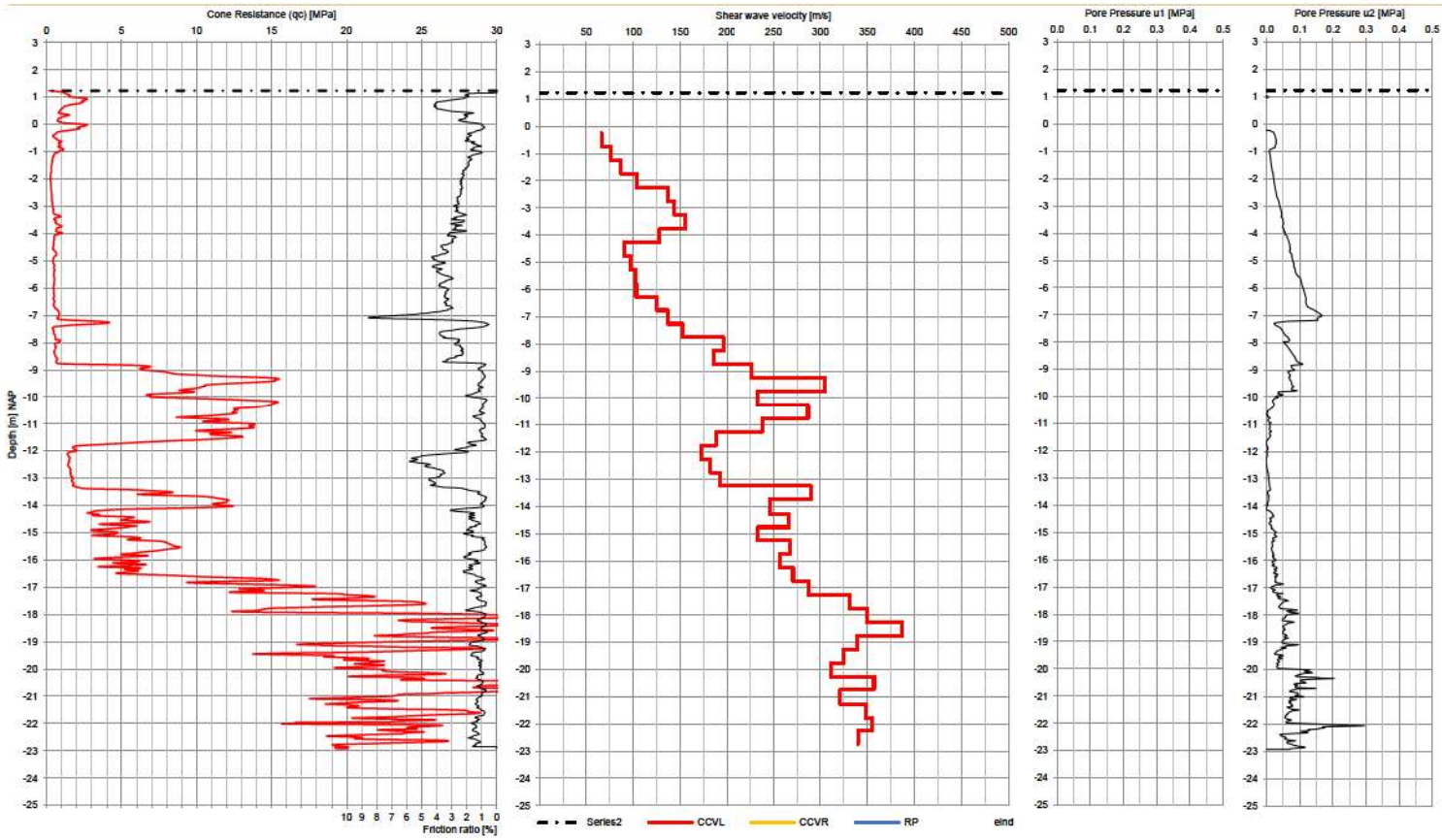
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_02	x	238603.7 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G08_20191115.gef			y	601741.7 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	1.06 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G11B



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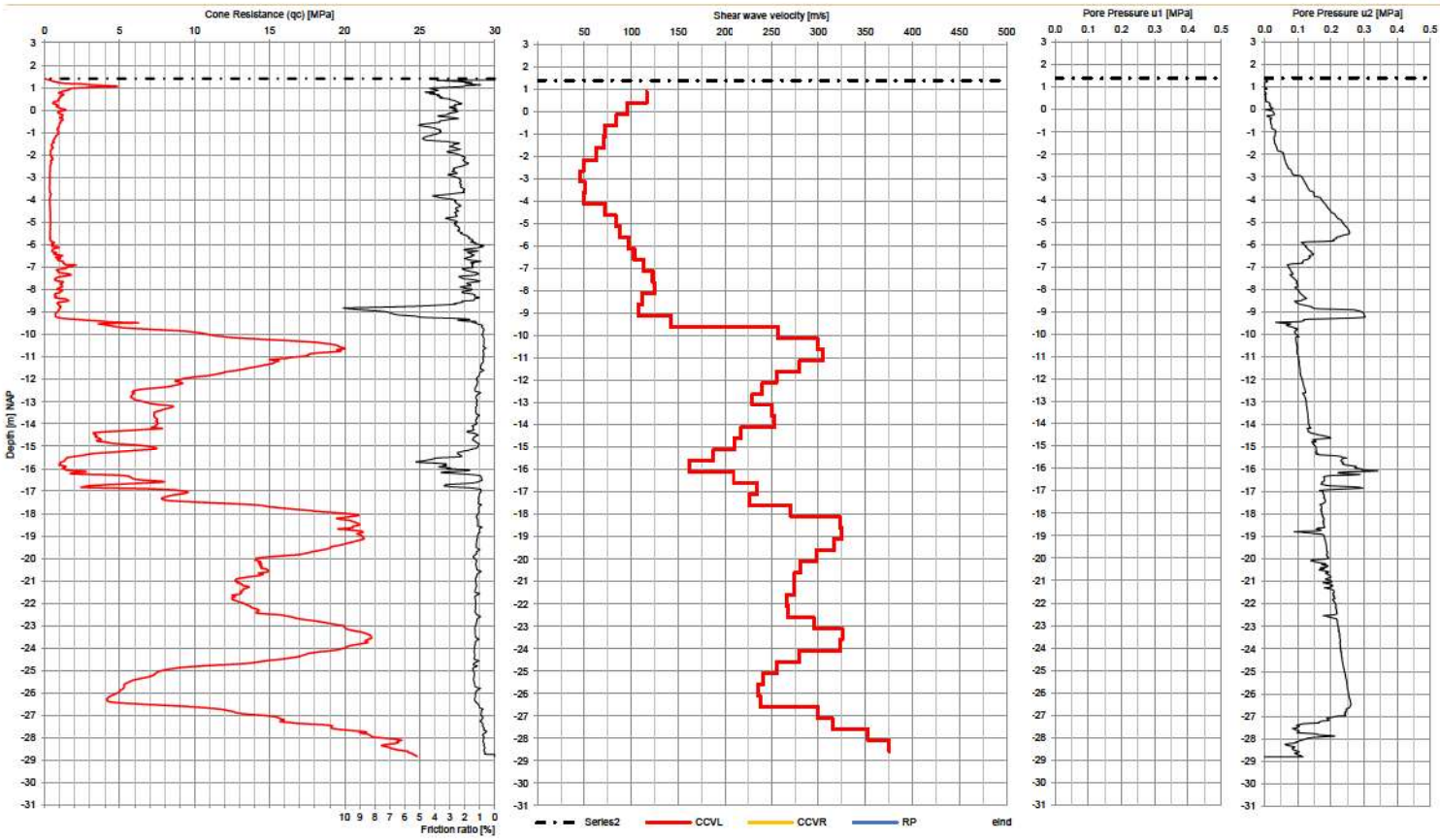
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_03	x	254997.67 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G11B_20191115.gef			y	598870.36 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	1.24 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G12



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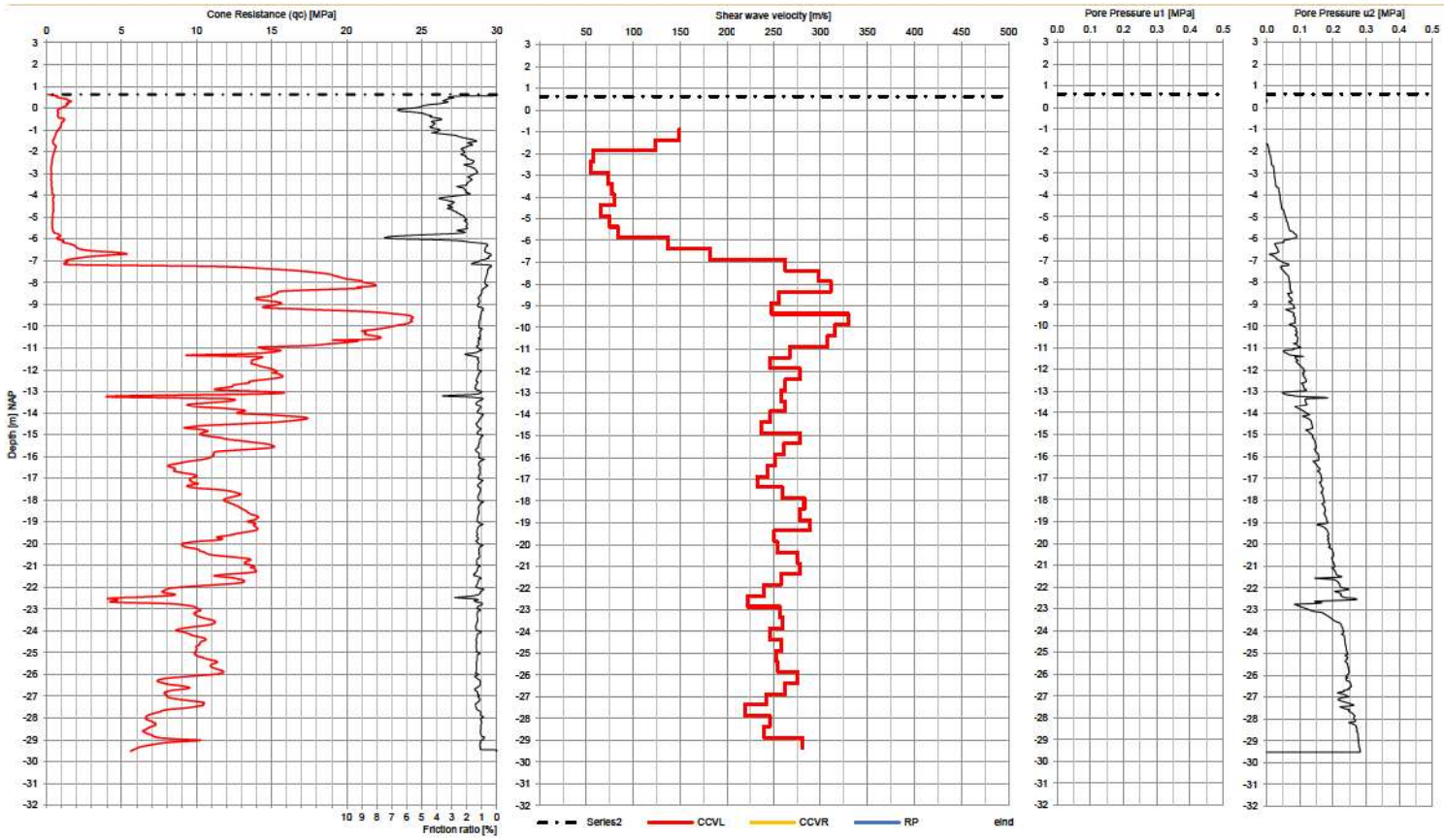
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_25	x	233816.82 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G12_20191115.gef			y	598826.55 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	1.4 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G16



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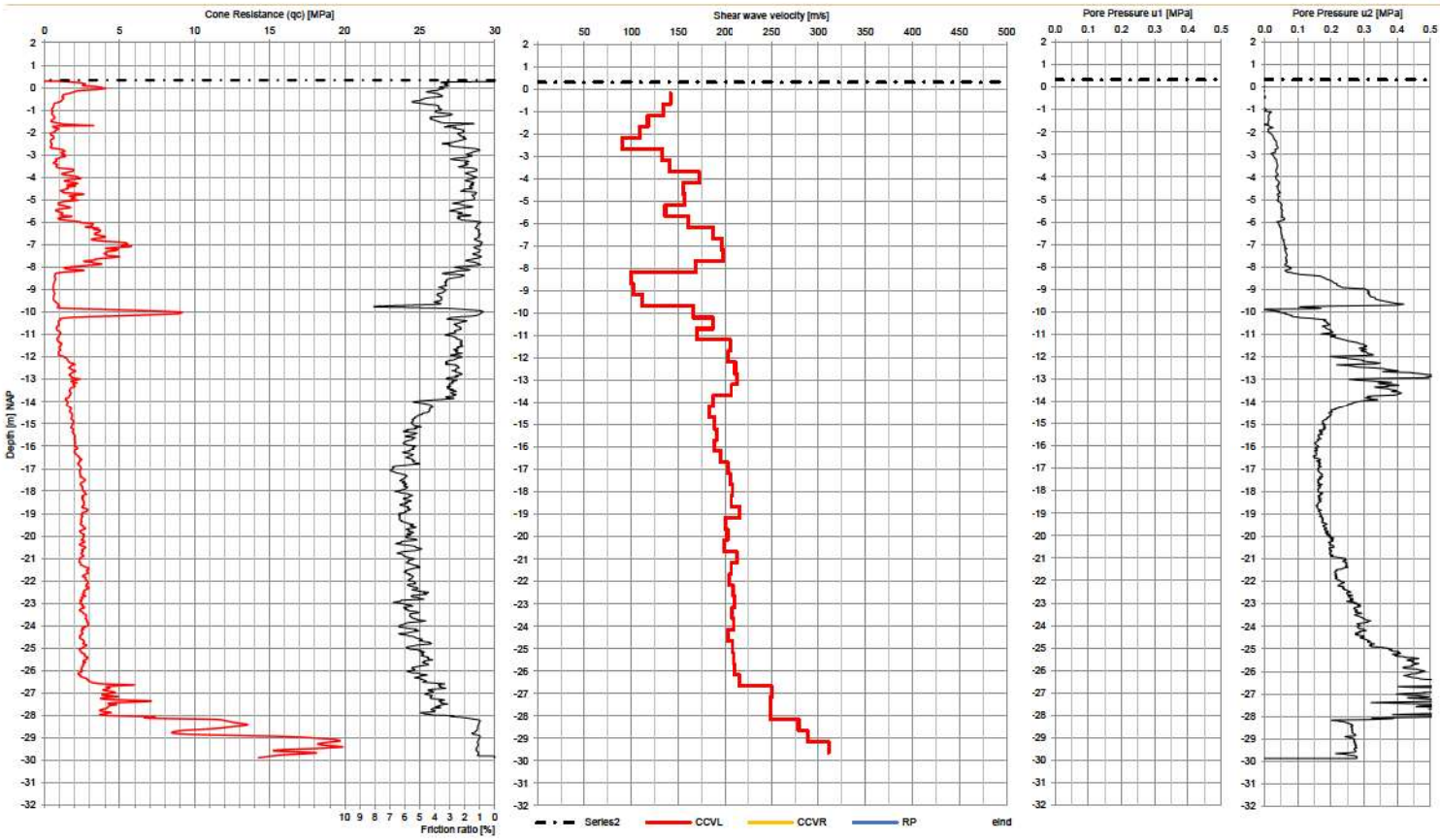
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_01	x	231201.66 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G16_20191115.gef			y	595281.92 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	0.63 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G18



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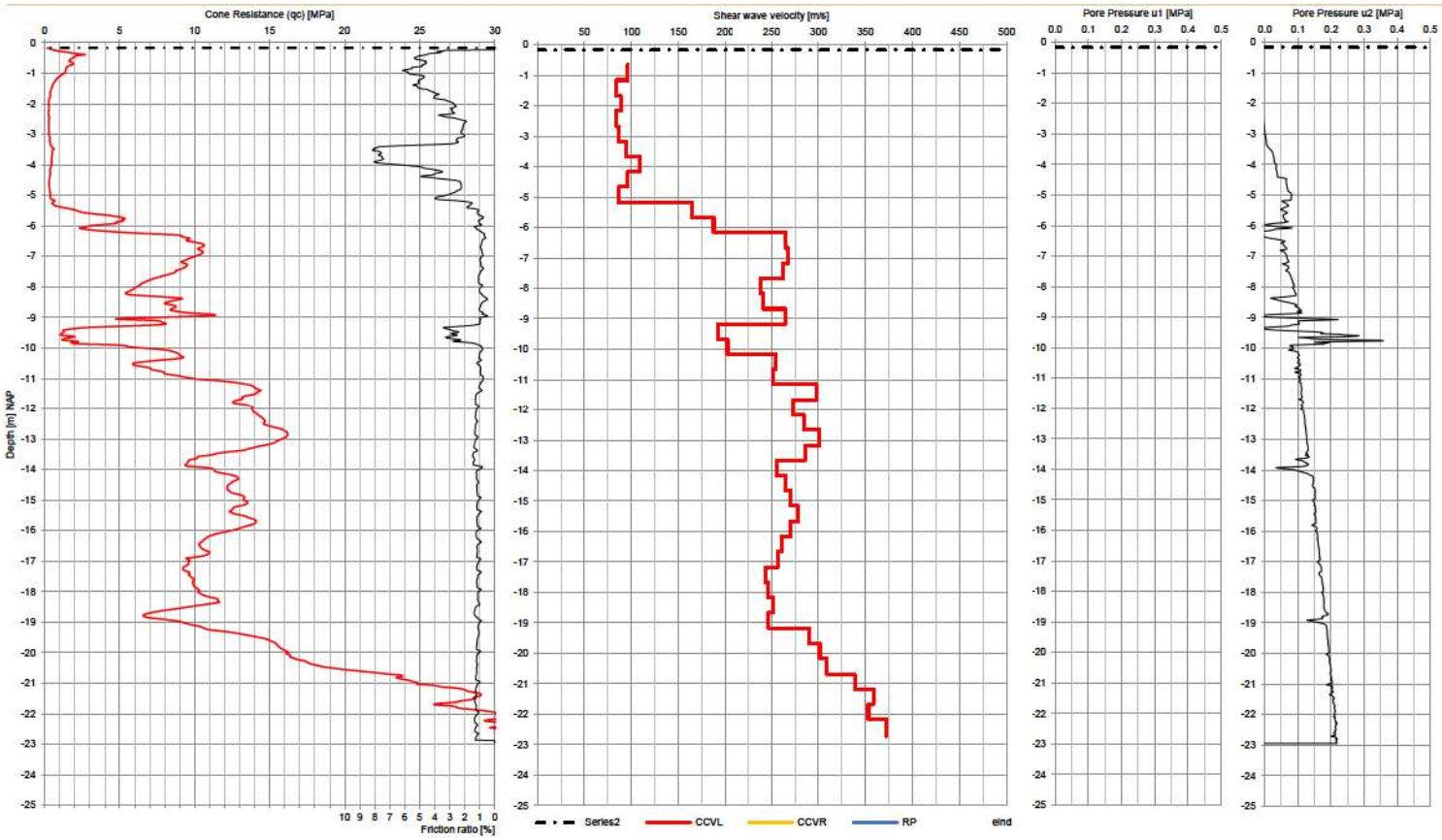
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_15	x	243913.03 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G18_20191115.gef			y	594620.96 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	0.33 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G20



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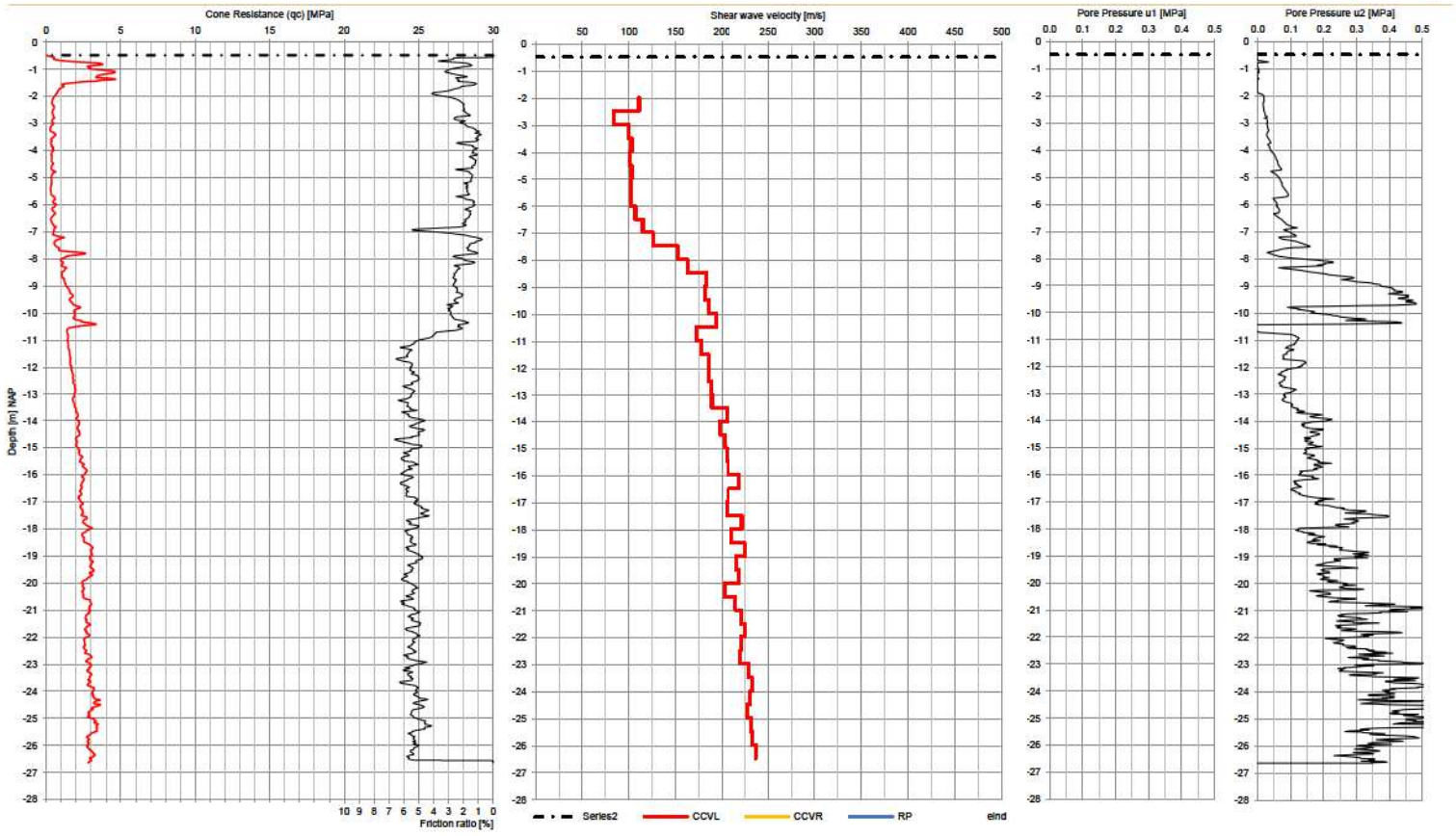
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_14	x	255453 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G20_20191115.gef			y	595366.18 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.17 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G21



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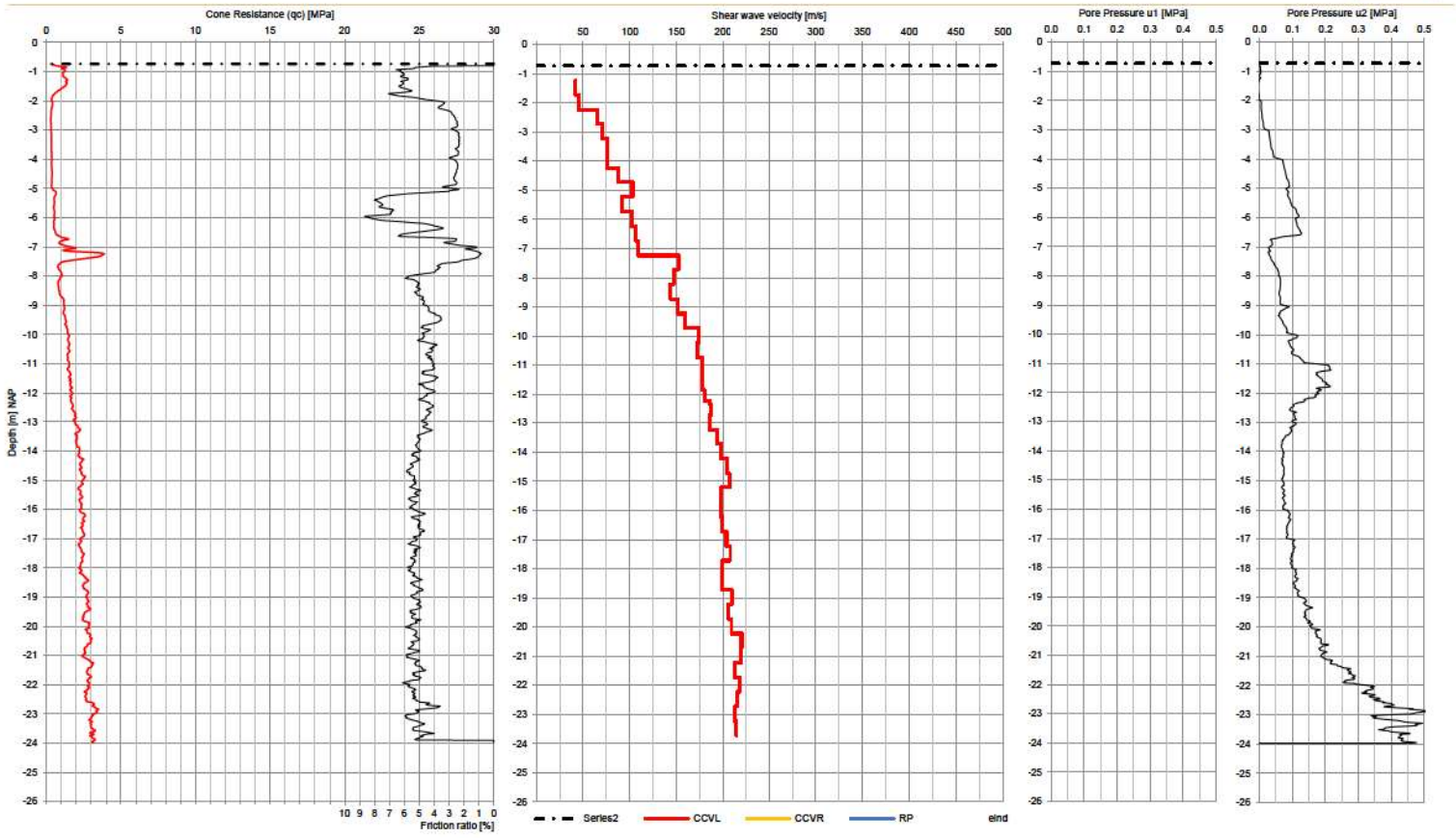
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_09_30	x	235408.57 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G21_20191115.gef			y	592544.19 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	-0.47 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

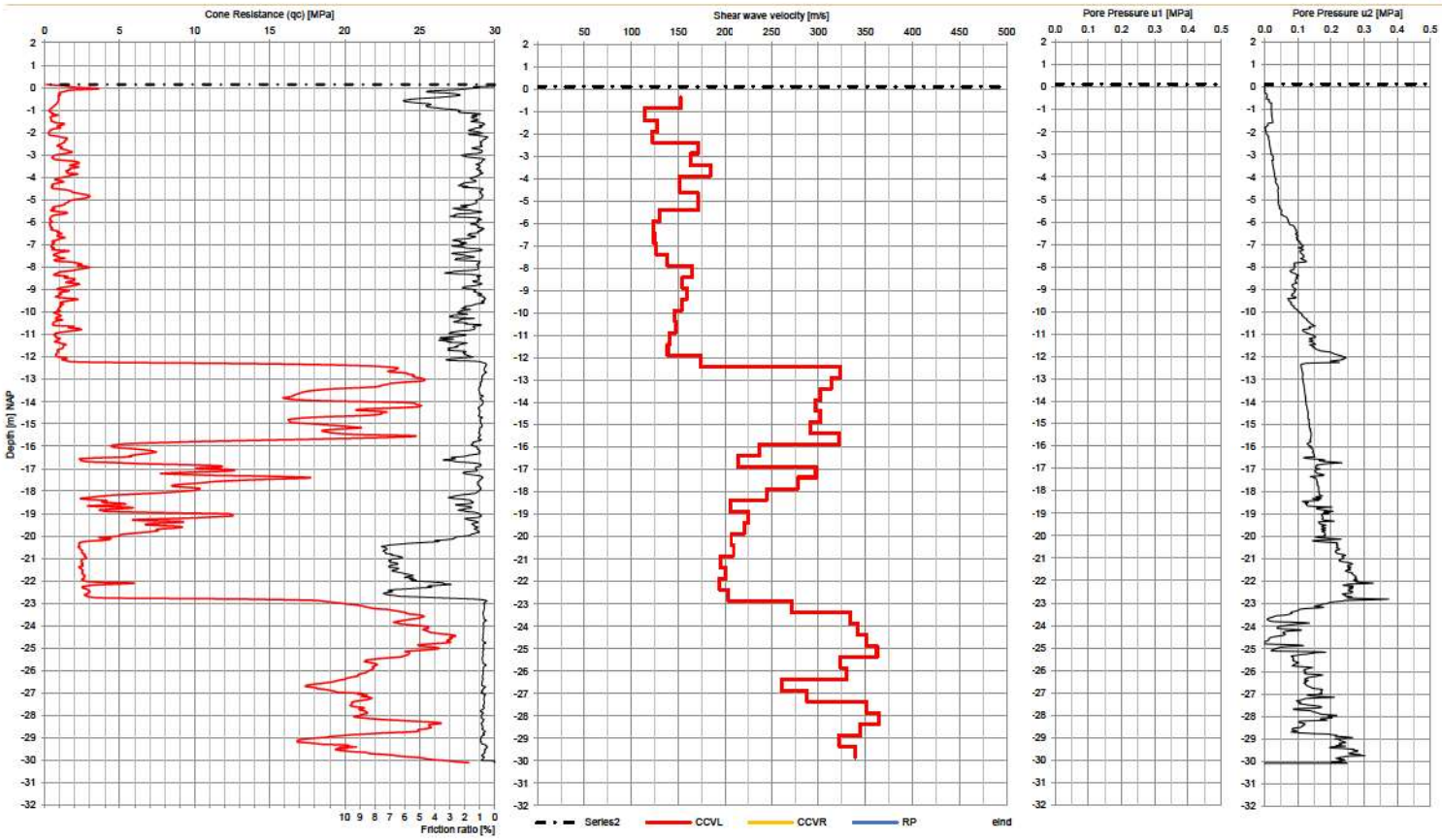
CPT ID: SCPT_G25



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_15	x	258731.37 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G25_20191115.gef			y	592408.94 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.73 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

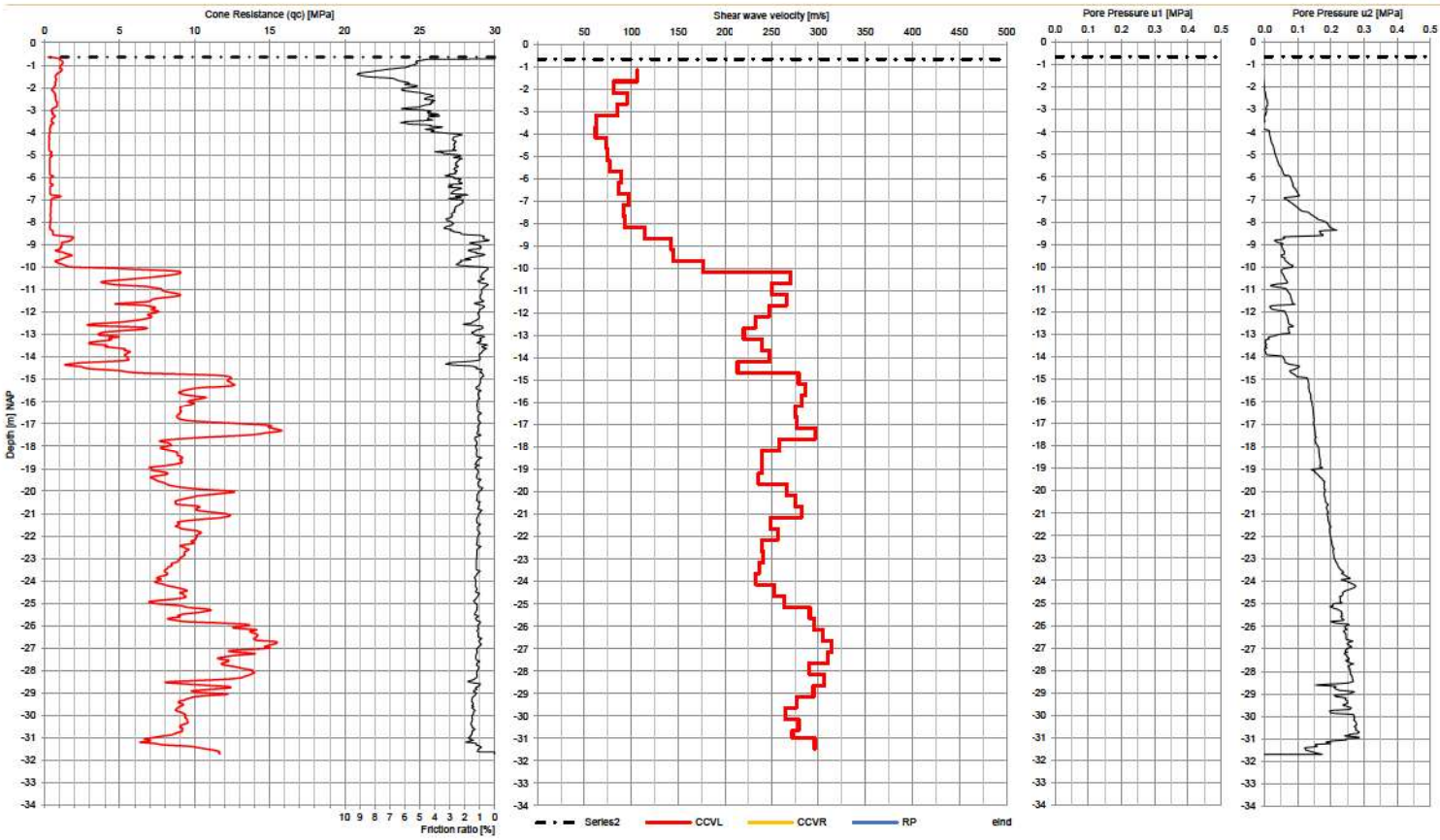
CPT ID: SCPT_G26



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_25	x	232275.16 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G26_20191115.gef			y	589040.91 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	0.14 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G28



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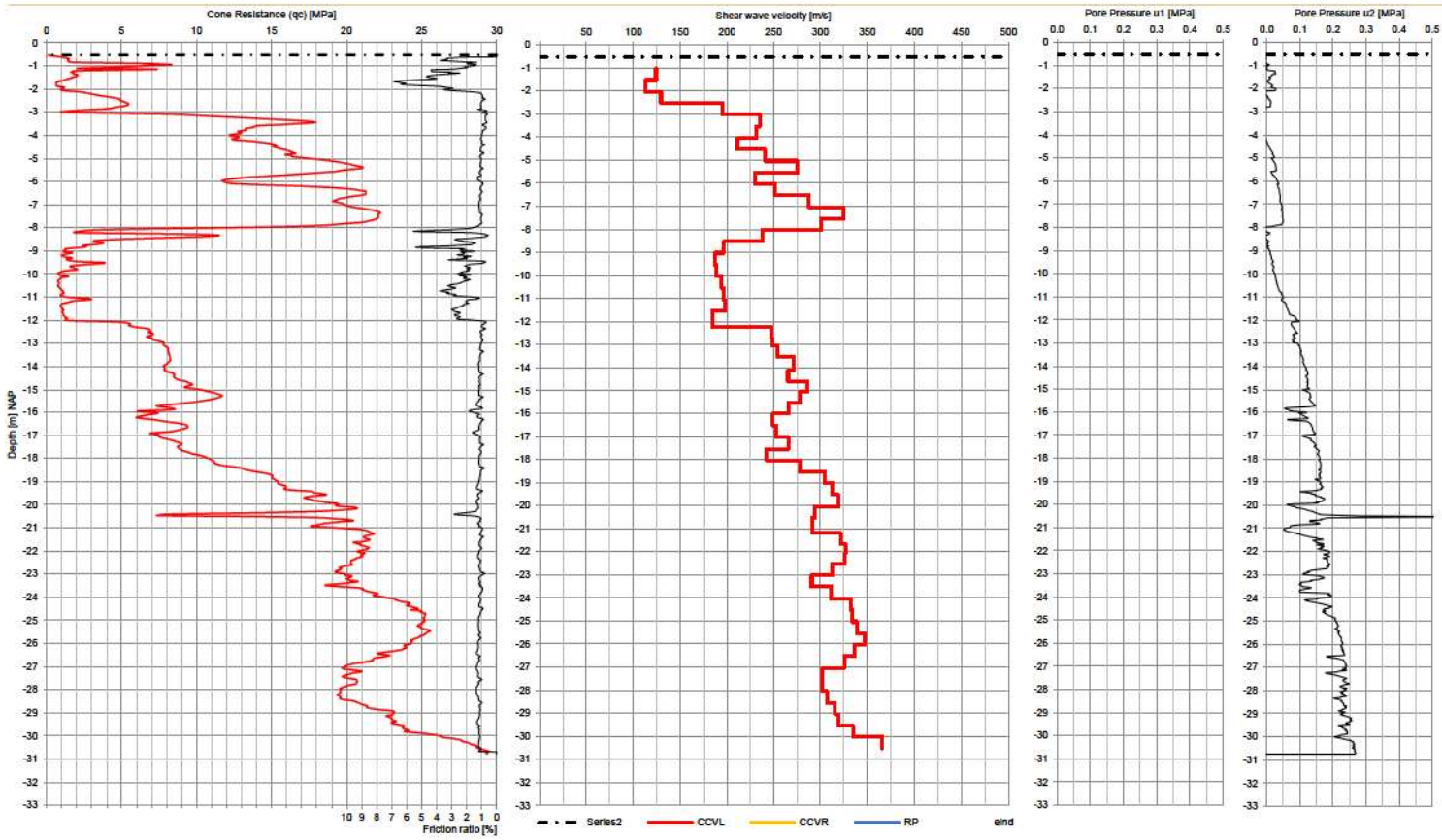
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_18	x	244526.97 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G28_20191115.gef			y	588082 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.64 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G30



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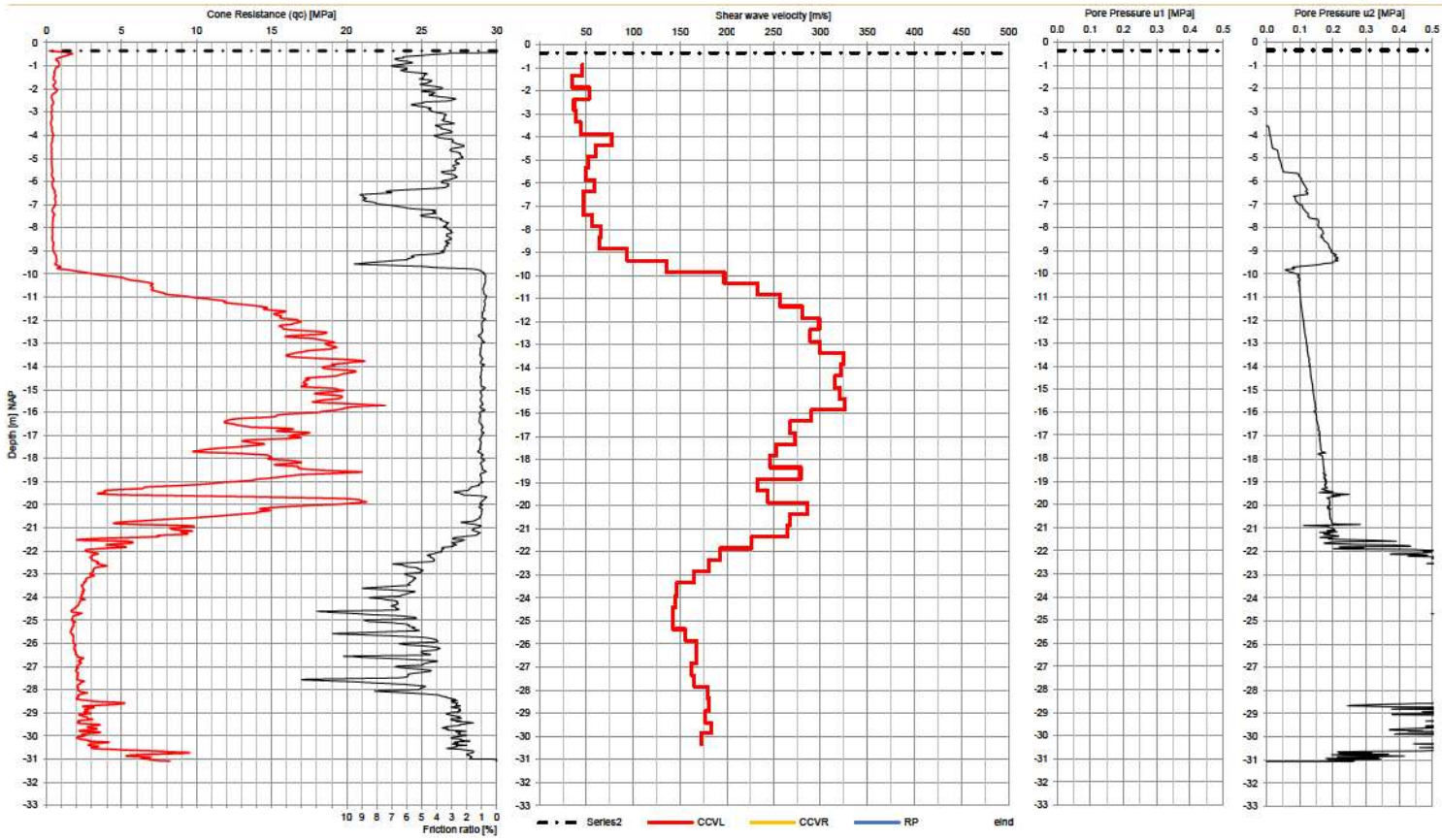
CPT Company	Fugro NL Land B.V					Coordinates		
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_17	x	255577.96	[m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G30_20191115.gef			y	589148.38	[m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.53	[m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

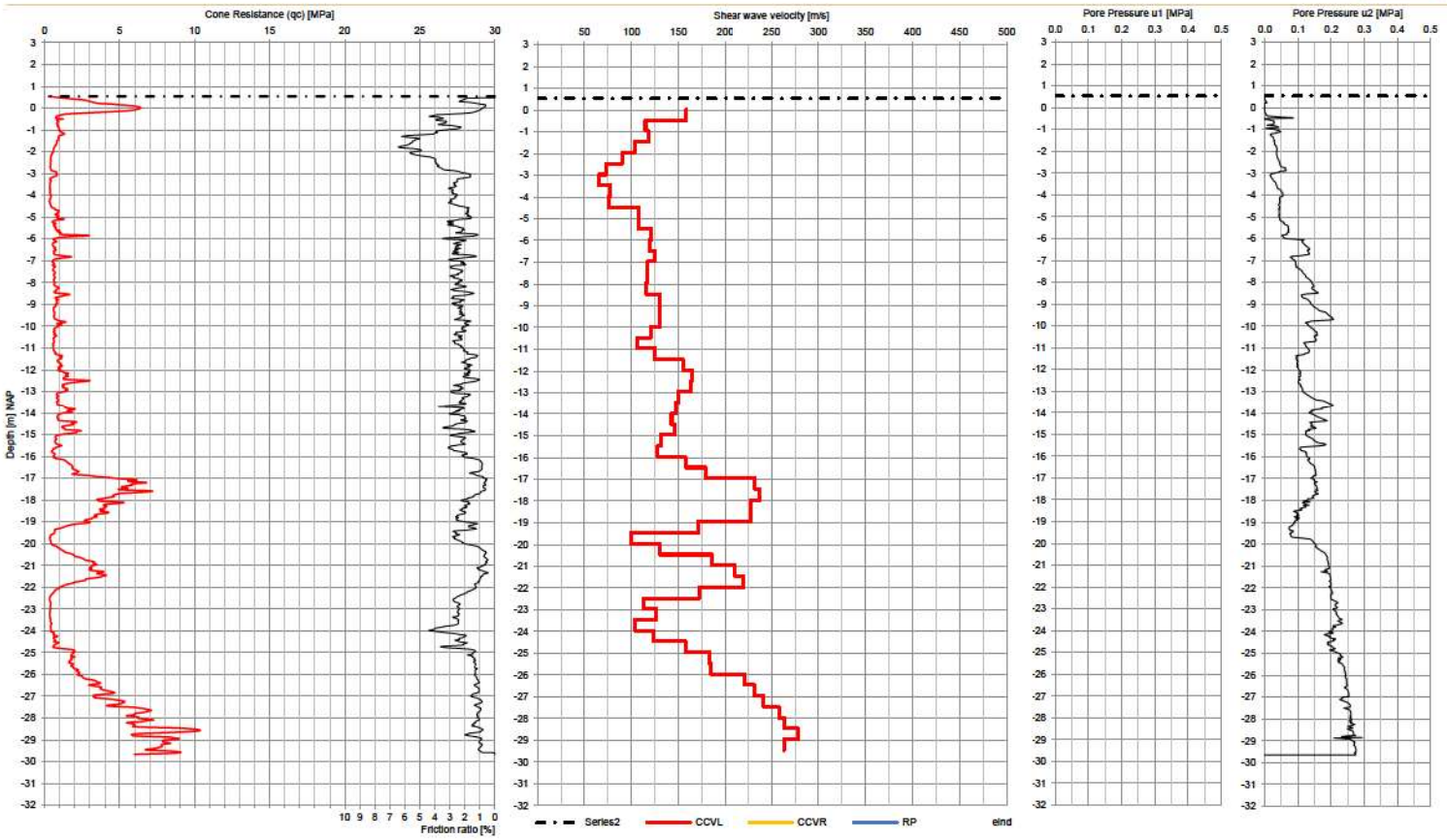
CPT ID: SCPT_G31



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_16	x	263989.32 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G31_20191115.gef			y	591209.44 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.35 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

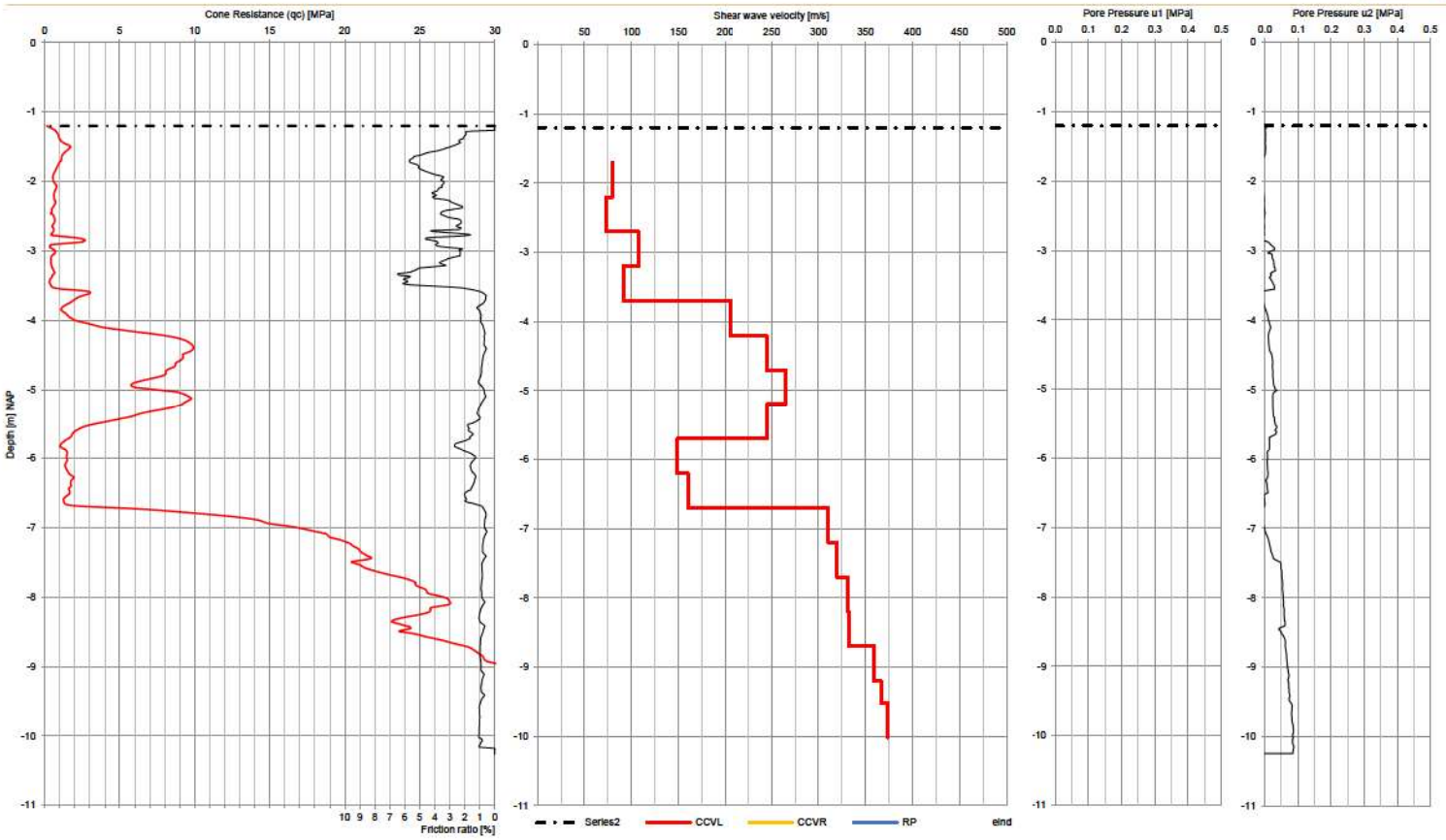
CPT ID: SCPT_G32



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_24	x	234561.39 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G32_20191115.gef			y	585466.52 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	0.54 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

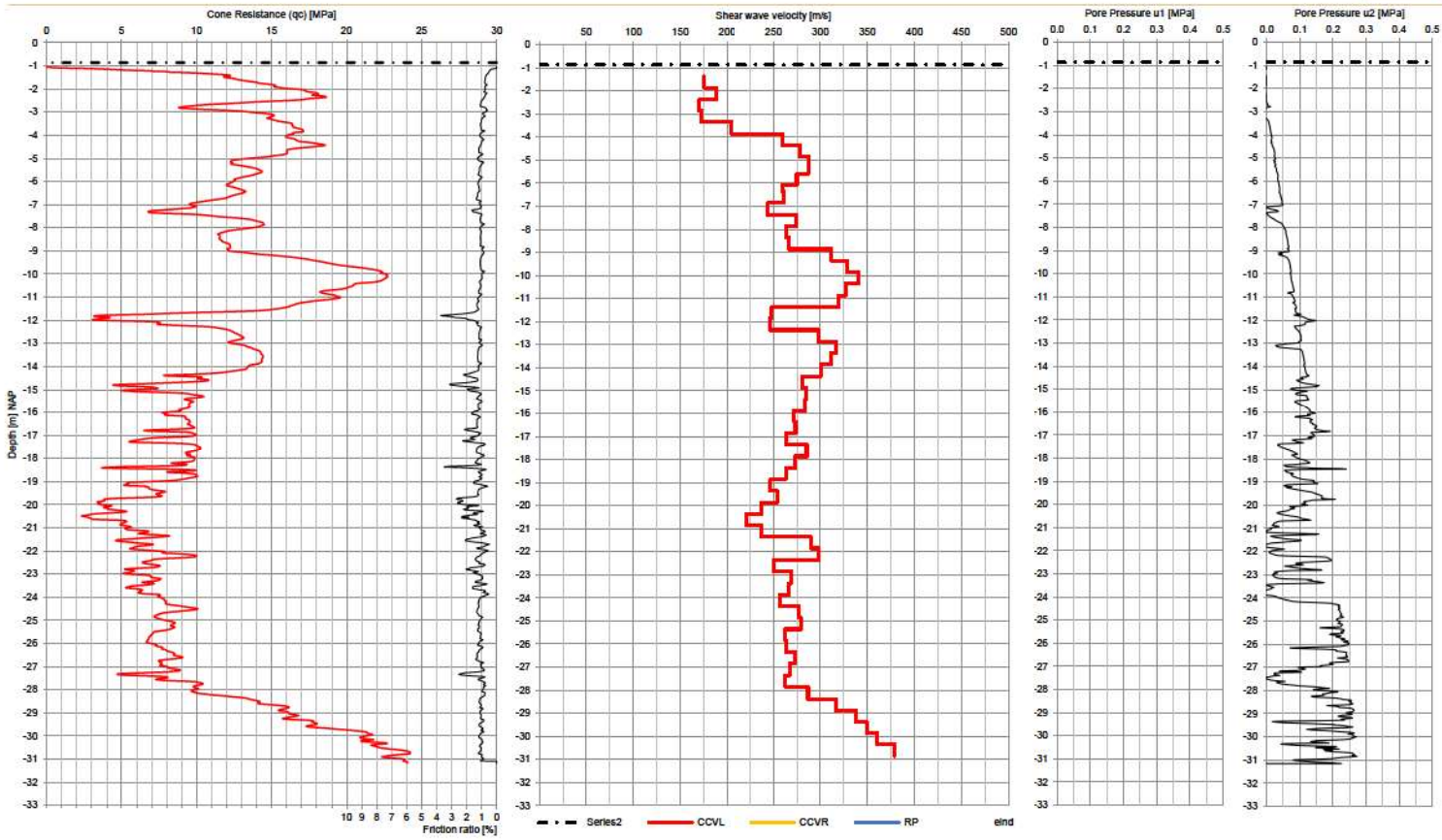
CPT ID: SCPT_G34



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_21	x	246962.86 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G34_20191115.gef			y	585988.3 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-1.2 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

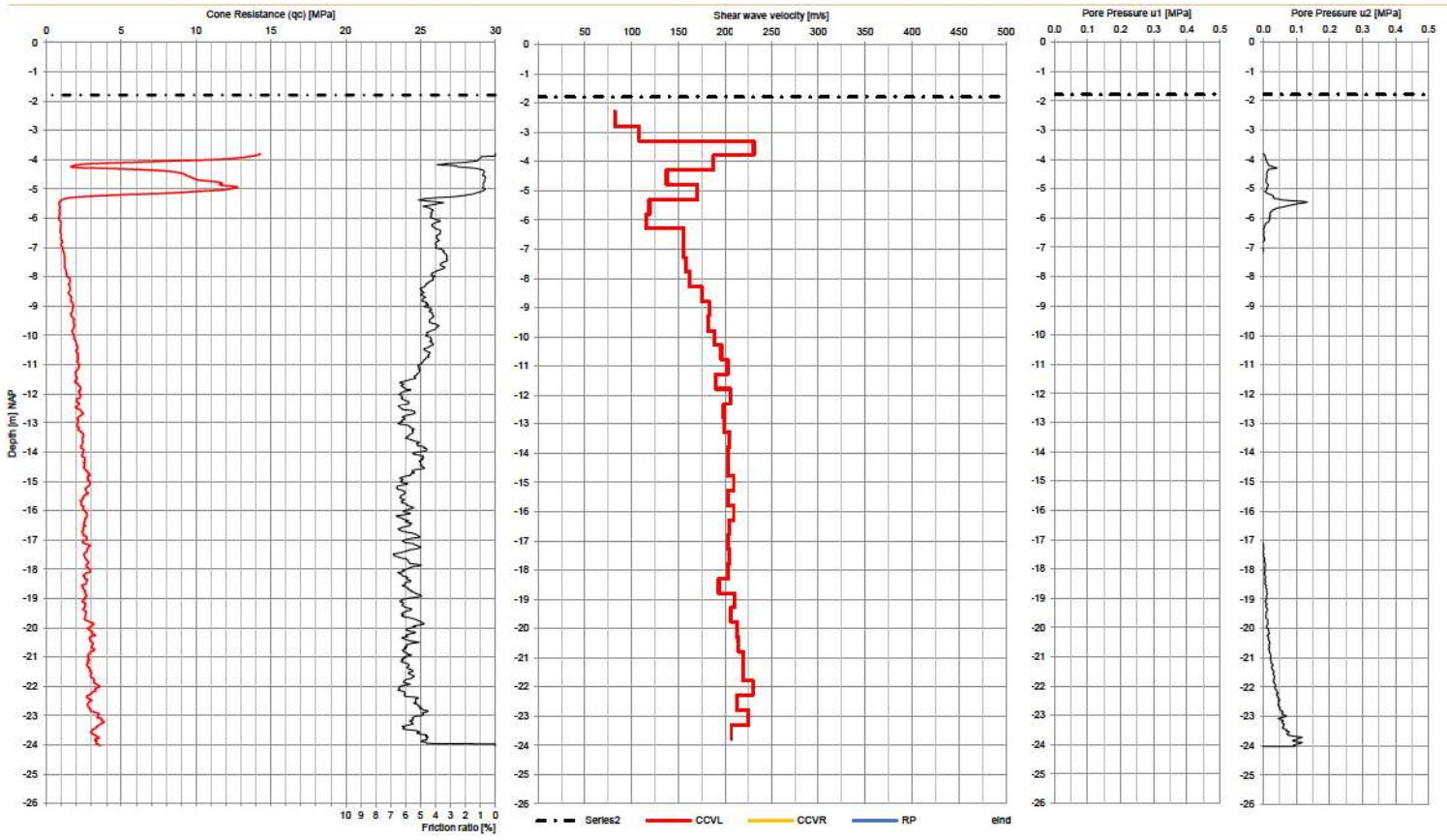
CPT ID: SCPT_G35



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_17	x	253451.09 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G35_20191115.gef			y	586375.74 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.86 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

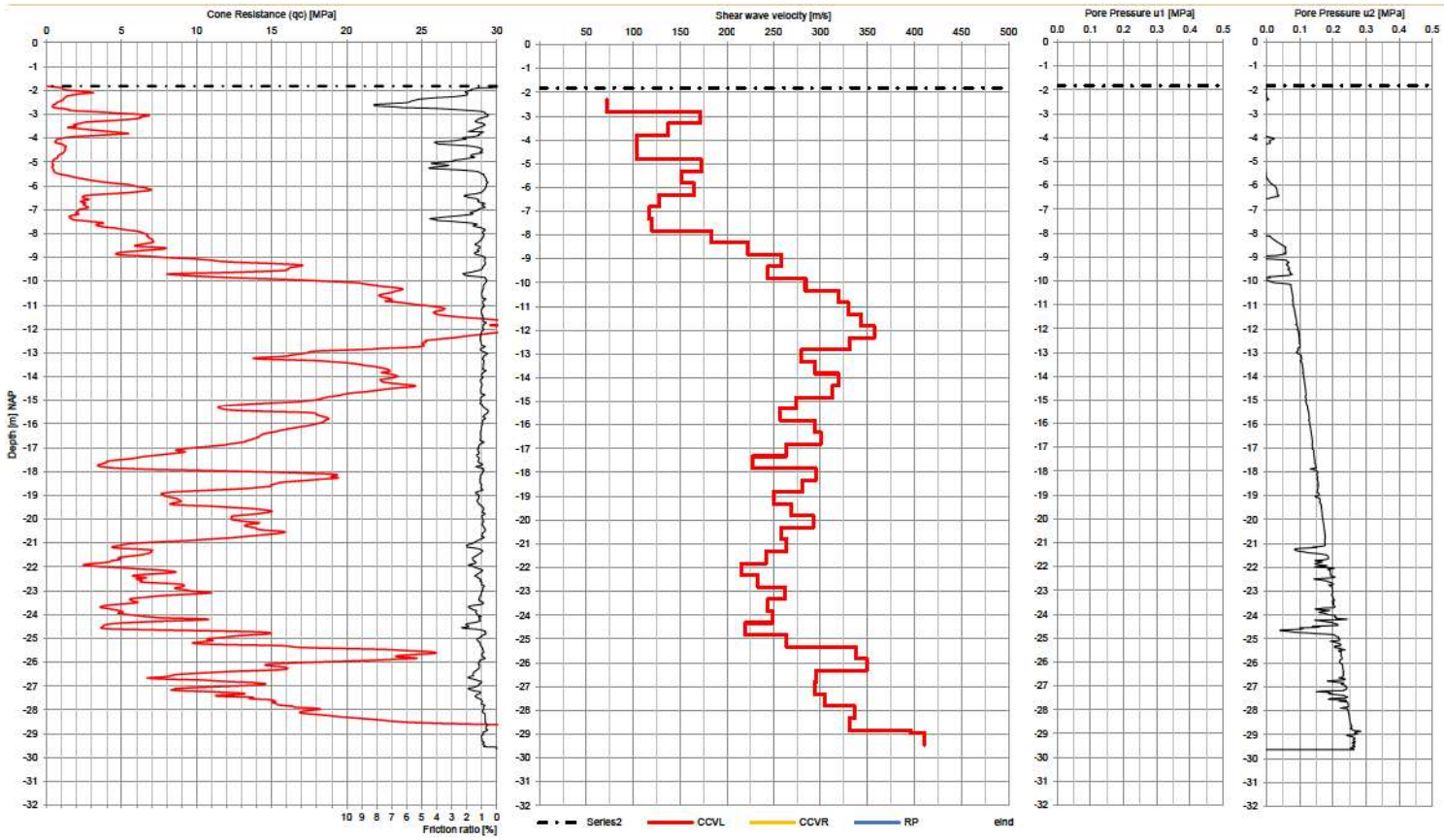
CPT ID: SCPT_G36



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_16	x	257576.21 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G36_20191115.gef			y	587591.83 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-1.79 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

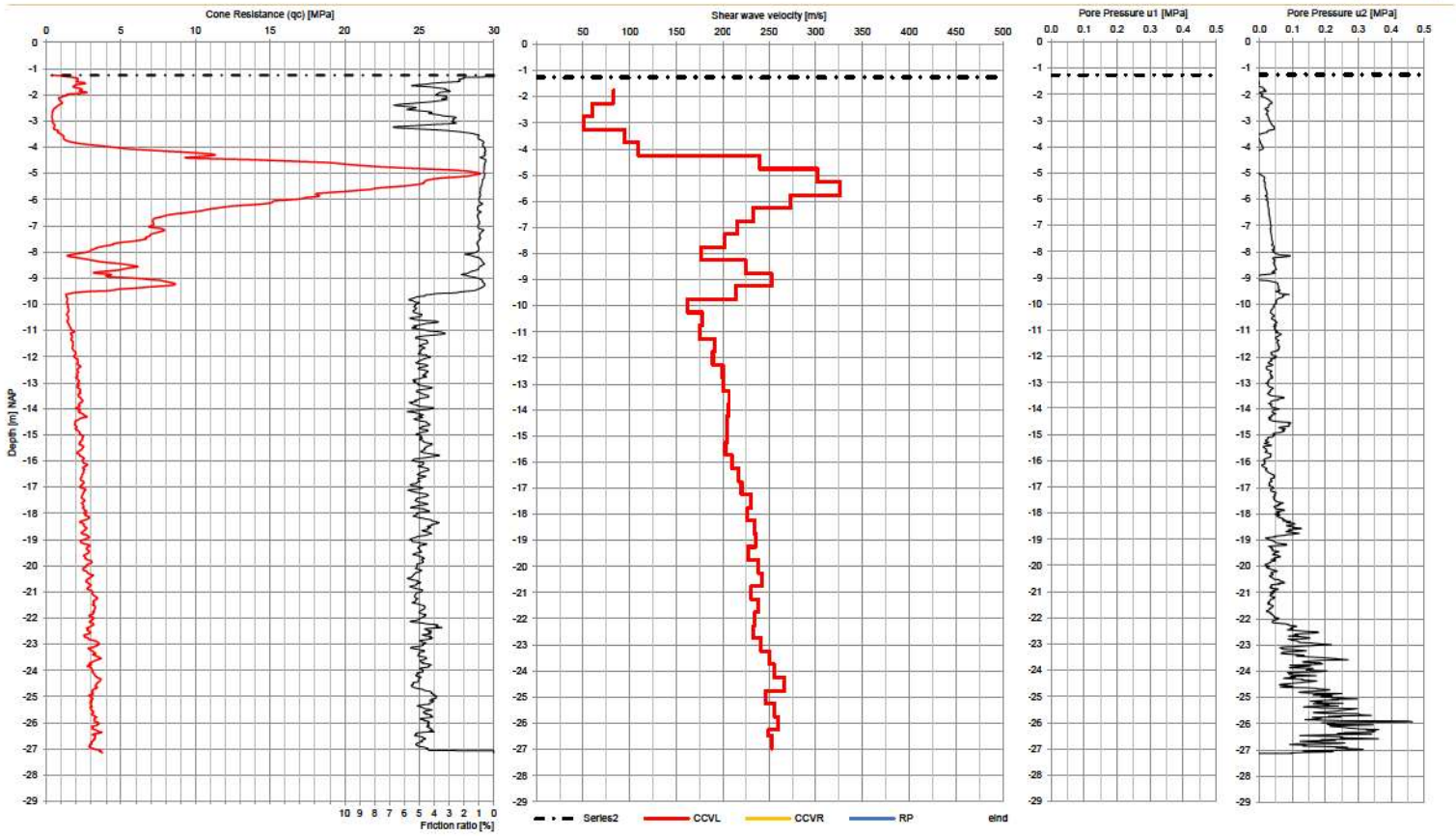
CPT ID: SCPT_G39



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_21	x	244289.37 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G39_20191115.gef			y	582893.98 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-1.82 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

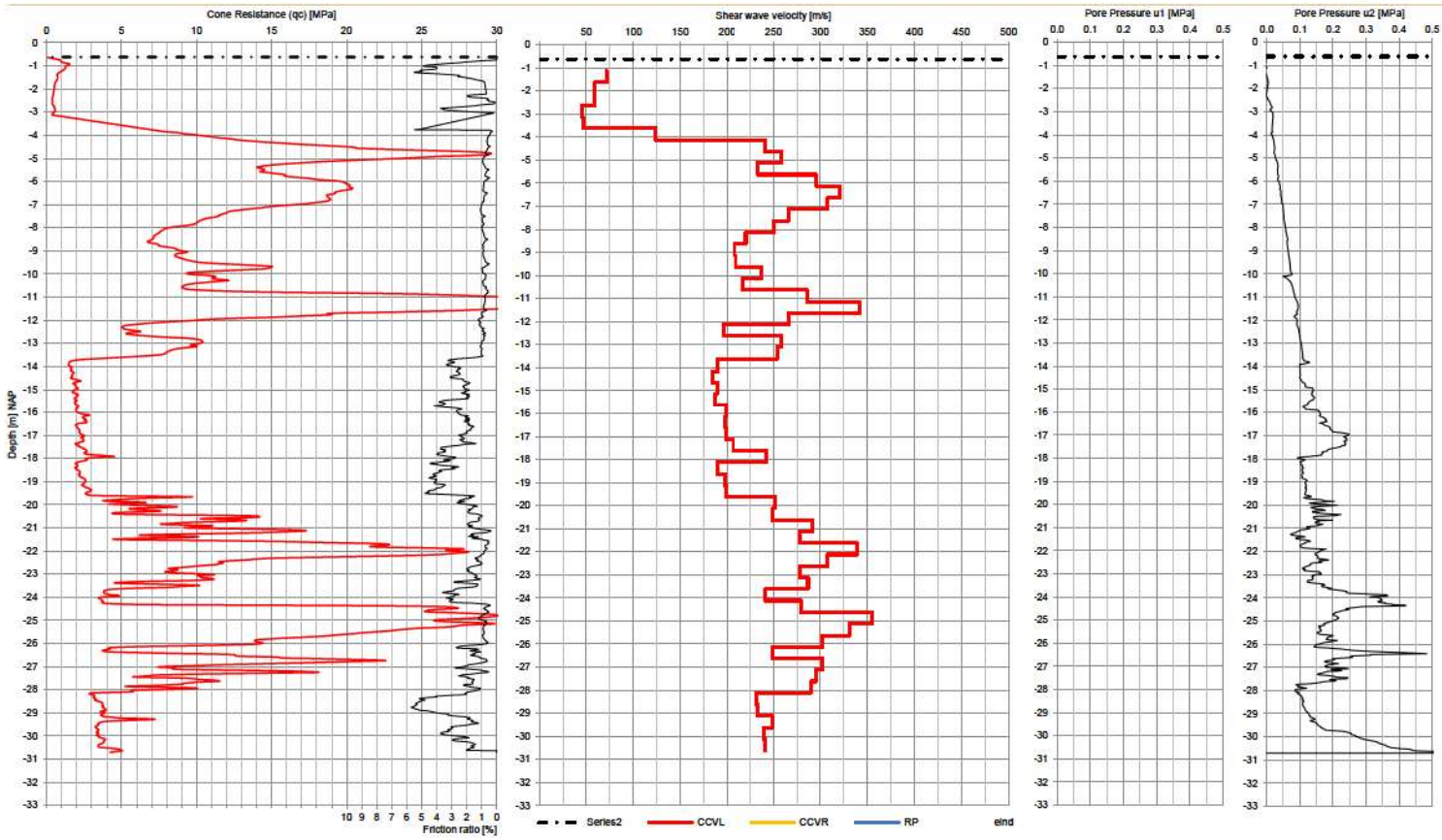
CPT ID: SCPT_G41



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_18	x	255493.56 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G41_20191115.gef			y	582912.3 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-1.25 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

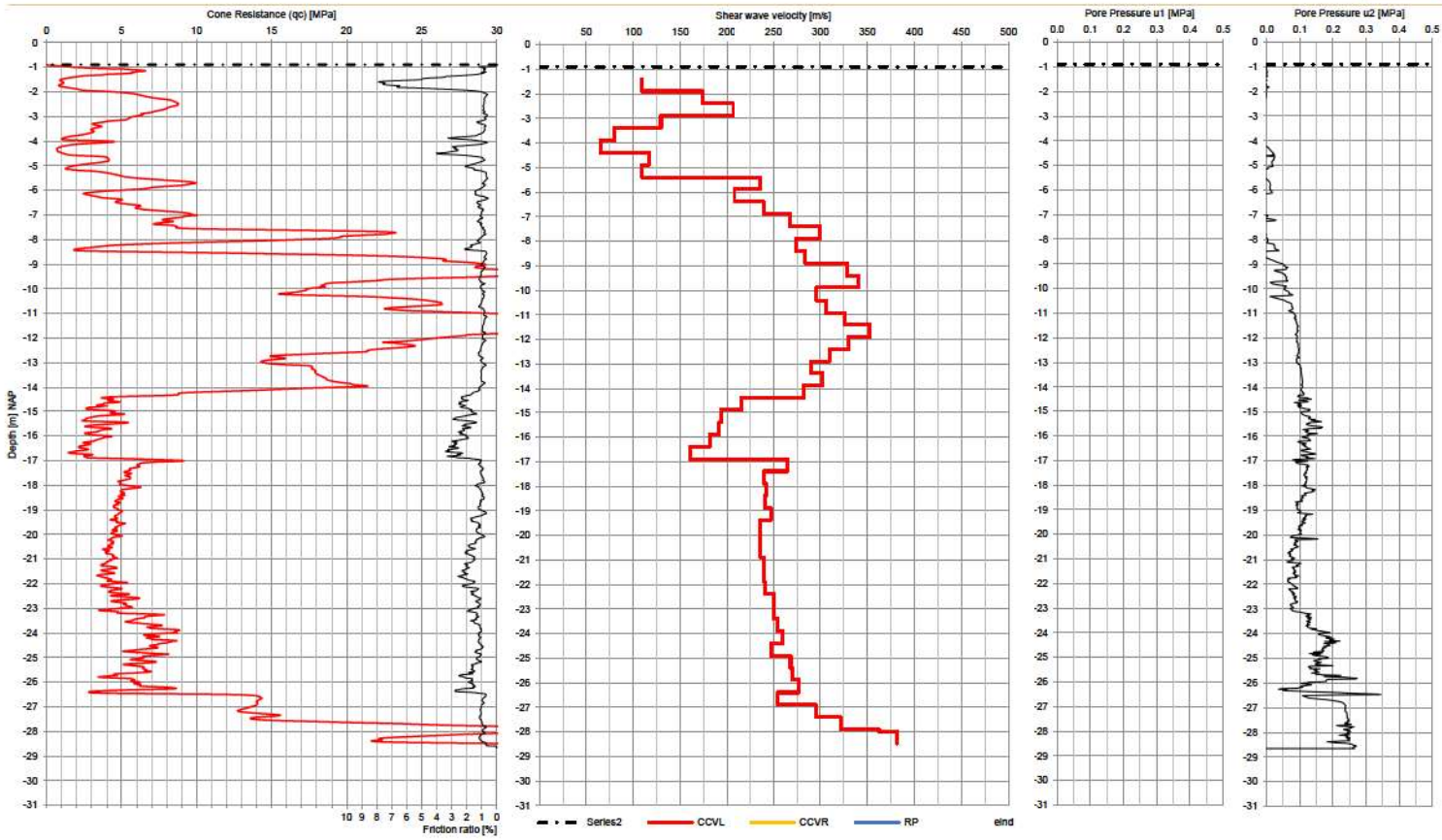
CPT ID: SCPT_G42



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_22	x	261955.19 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G42_20191115.gef			y	582867.7 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.62 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

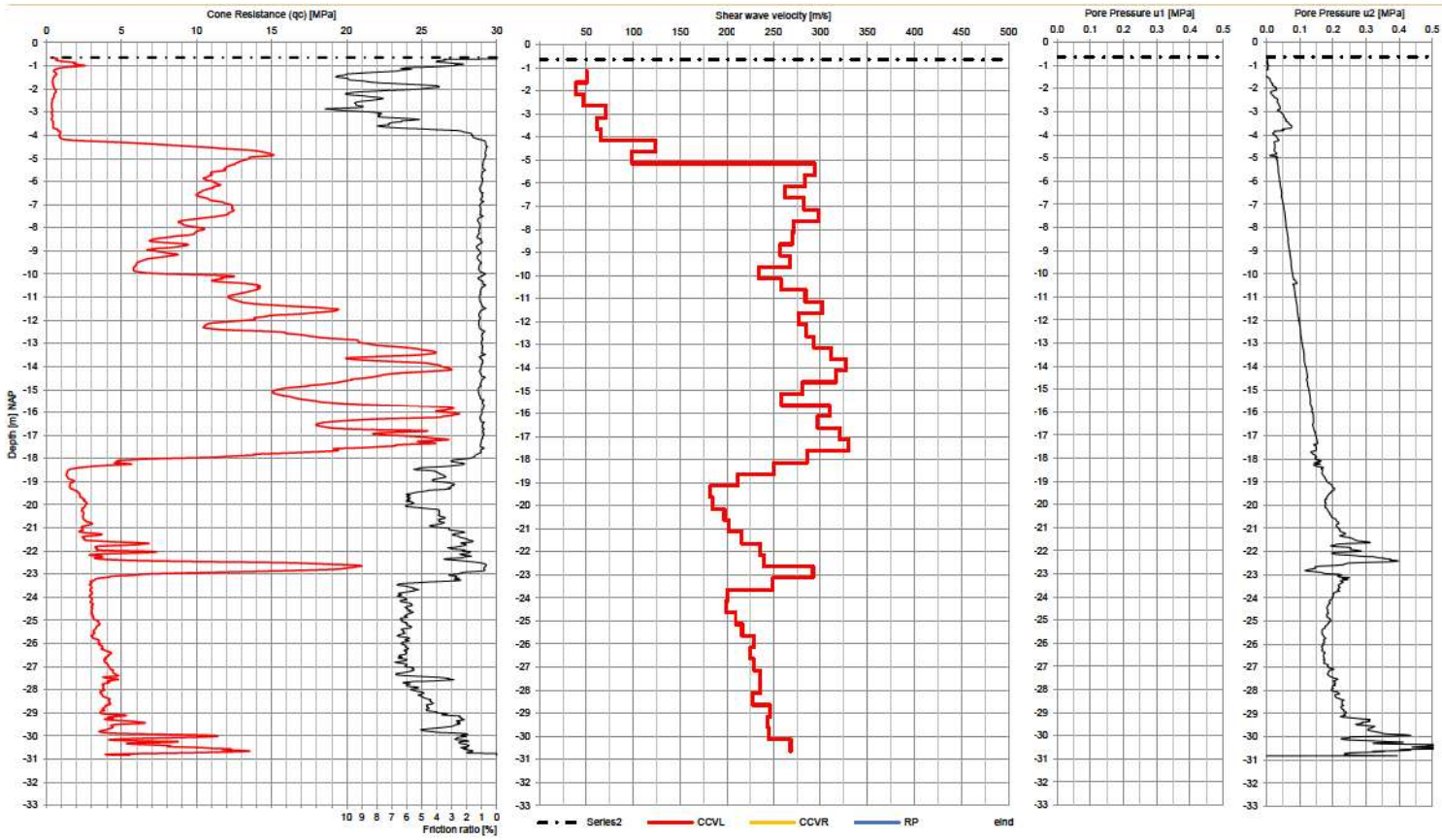
CPT ID: SCPT_G44



						Time-stamp	25-11-2019 16:40
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_21	x	241618.23 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G44_20191115.gef			y	580513.31 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.89 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

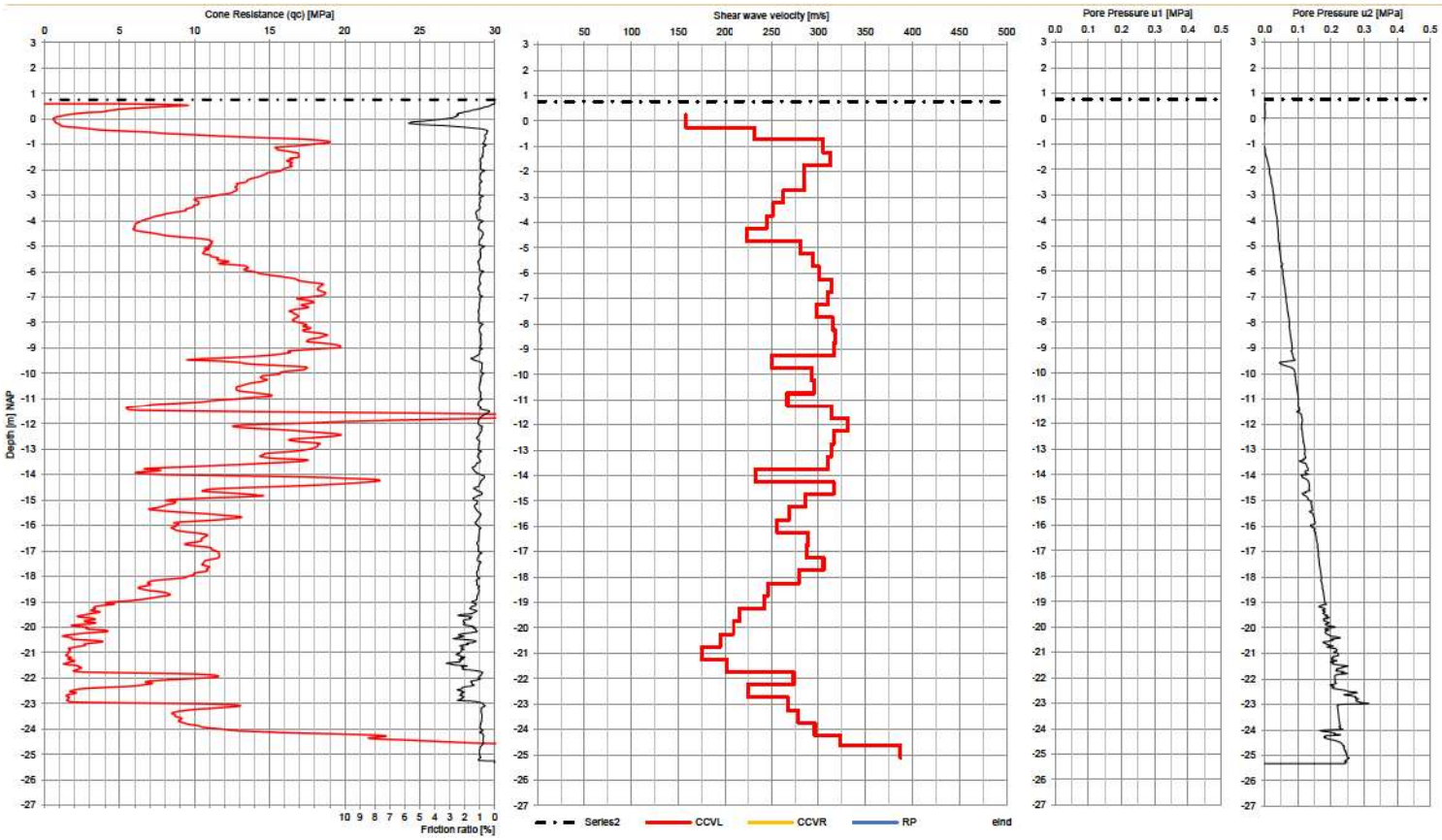
CPT ID: SCPT_G47



						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_22	x	258861.77 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G47_20191115.gef			y	579964.26 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.64 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

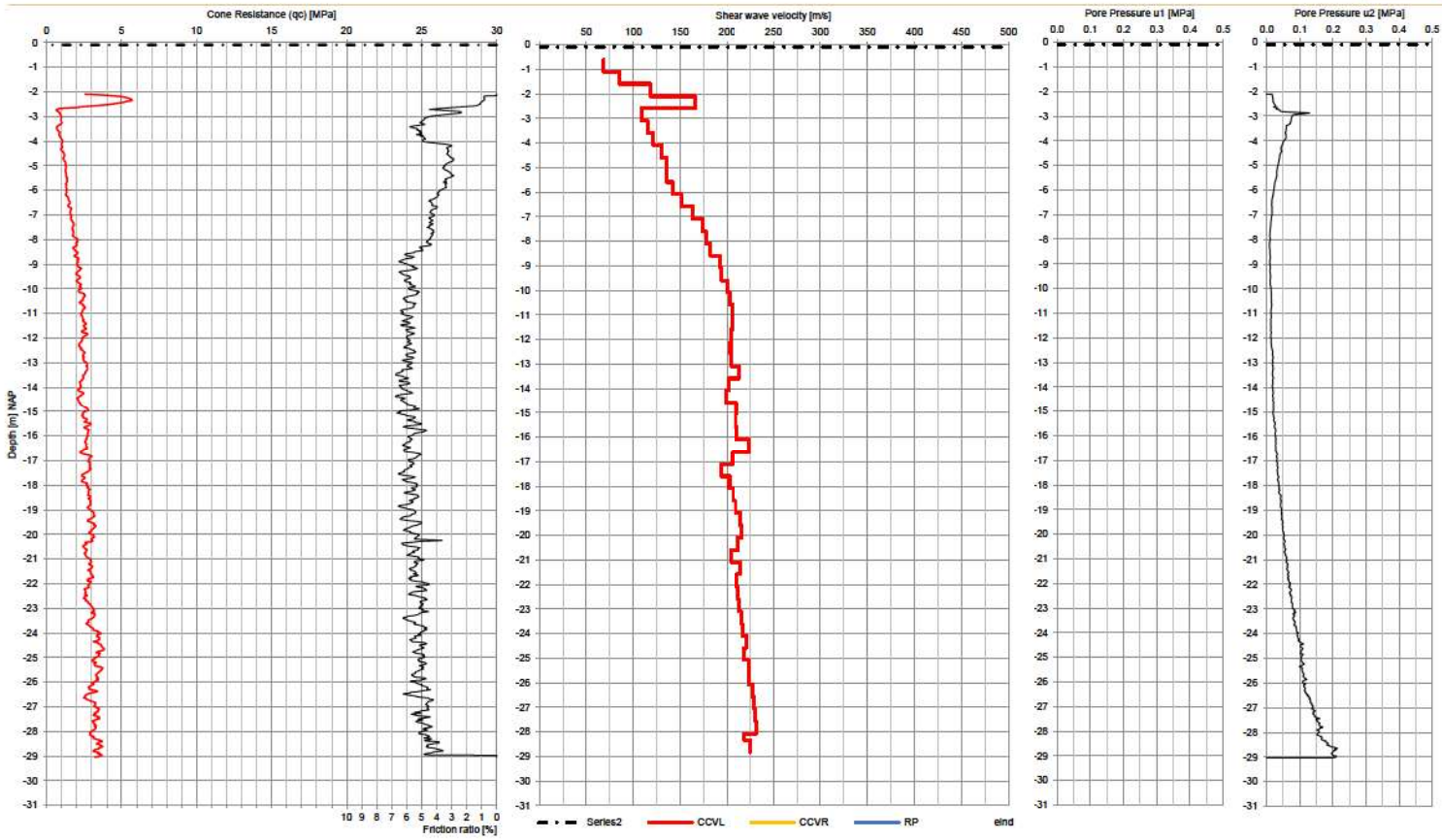
CPT ID: SCPT_G50



						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_24	x	250082.06 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G50_20191115.gef			y	577368.51 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	0.76 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

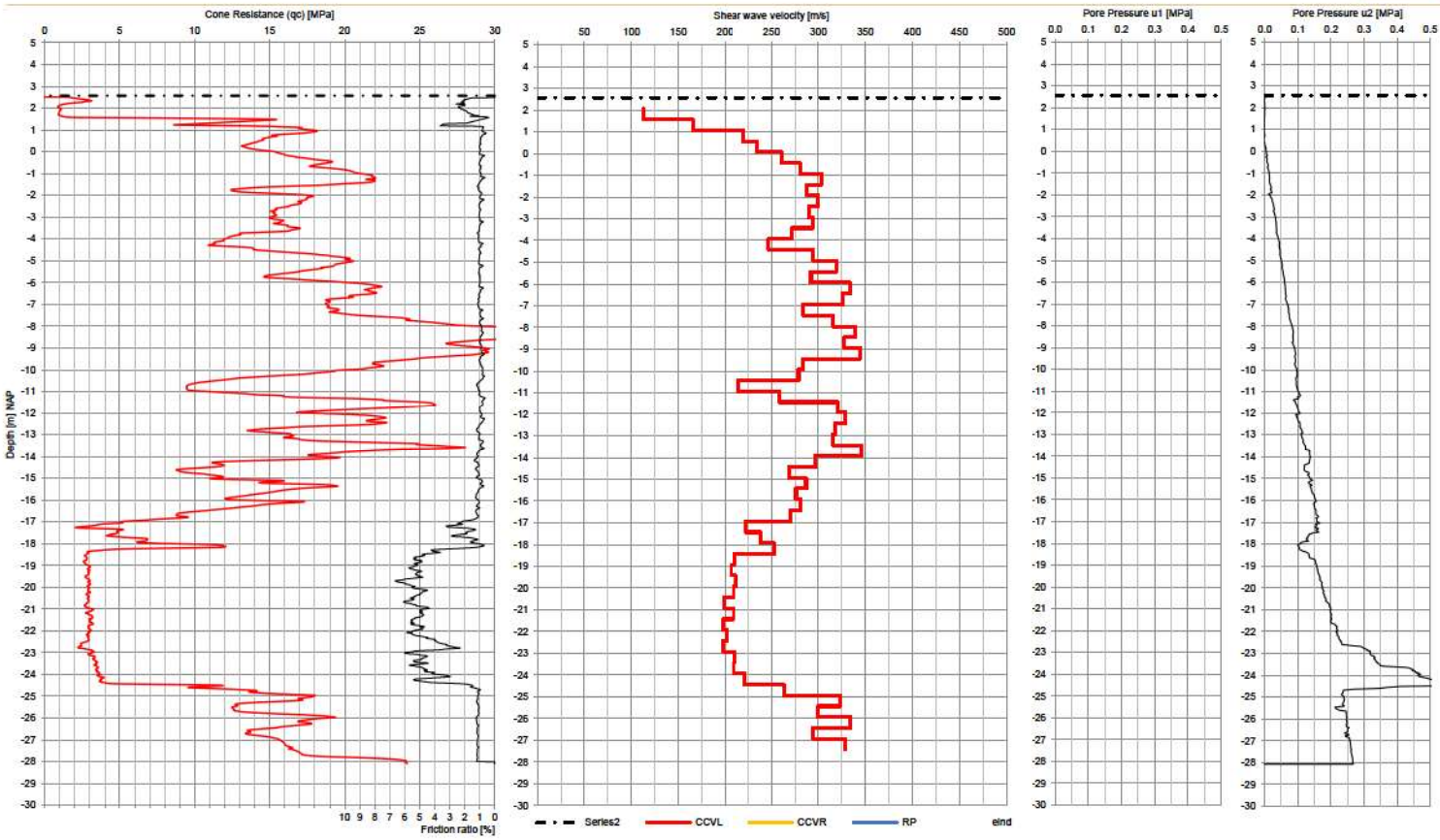
CPT ID: SCPT_G51



						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_29	x	255129.13 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G51_20191115.gef			y	577317.81 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-0.09 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

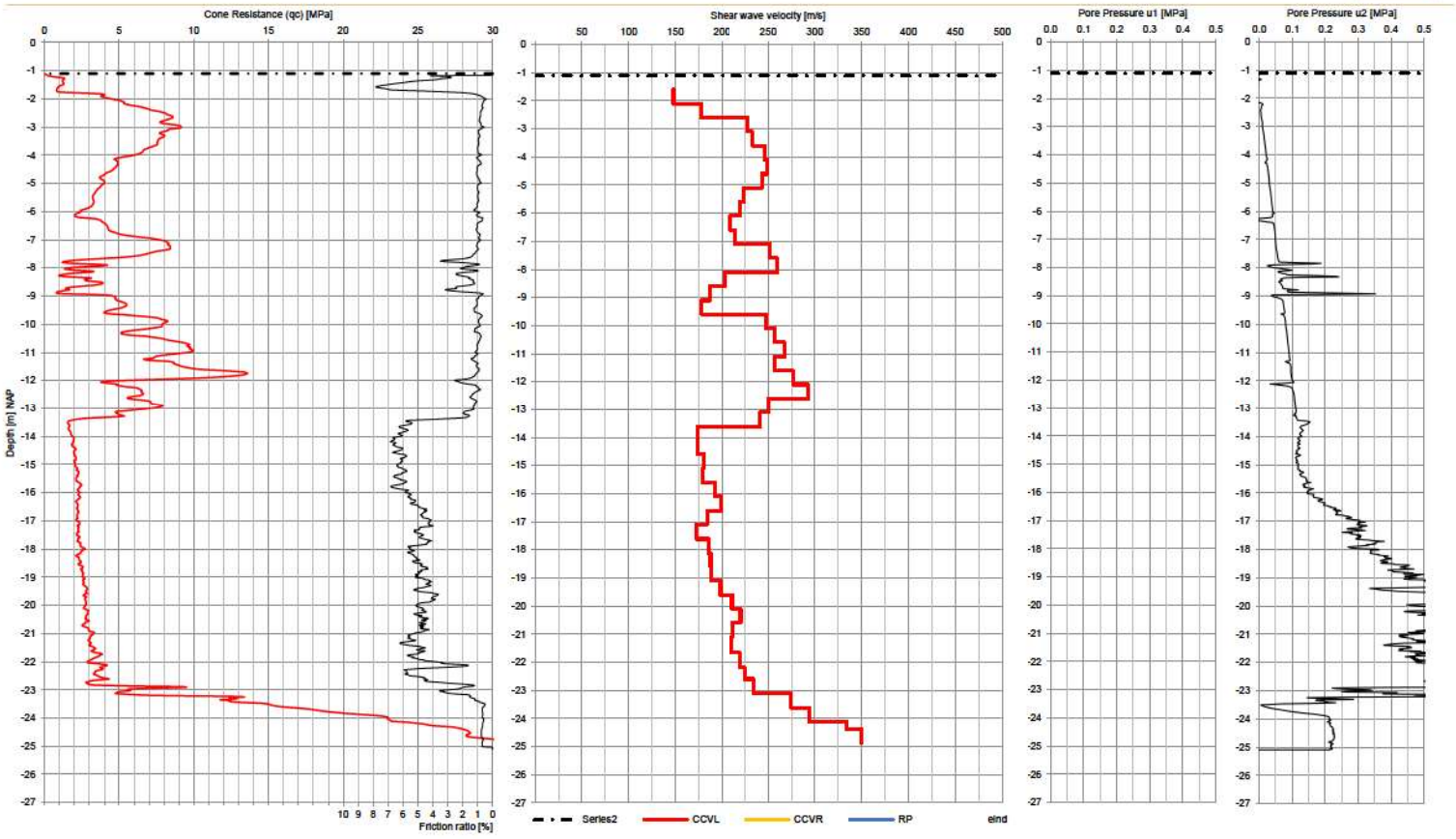
CPT ID: SCPT_G55



						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_24	x	252607.38 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G55_20191115.gef			y	573940.76 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	2.57 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

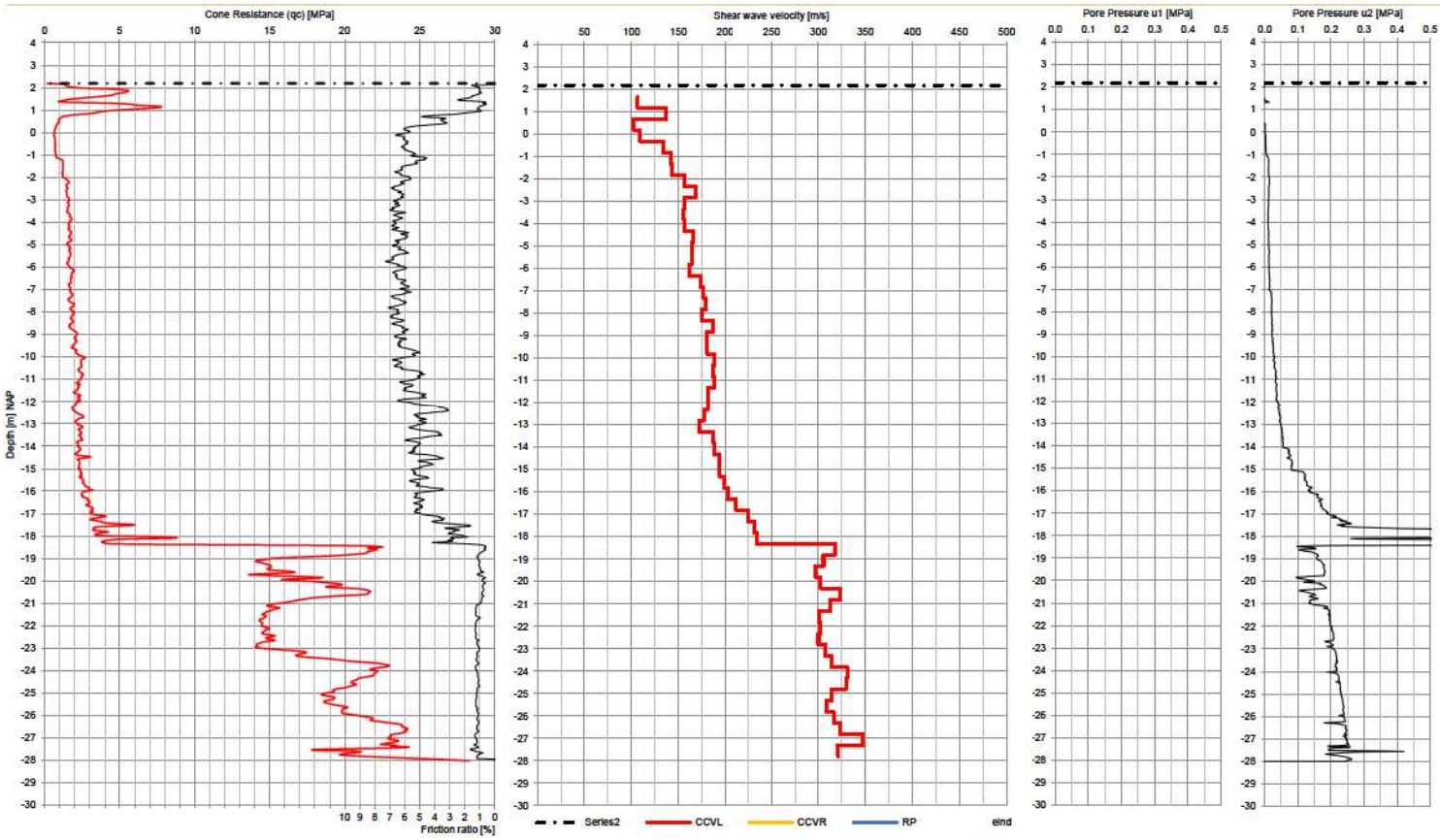
CPT ID: SCPT_G56



						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_23	x	258259.79 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G56_20191115.gef			y	574631.99 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	-1.1 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

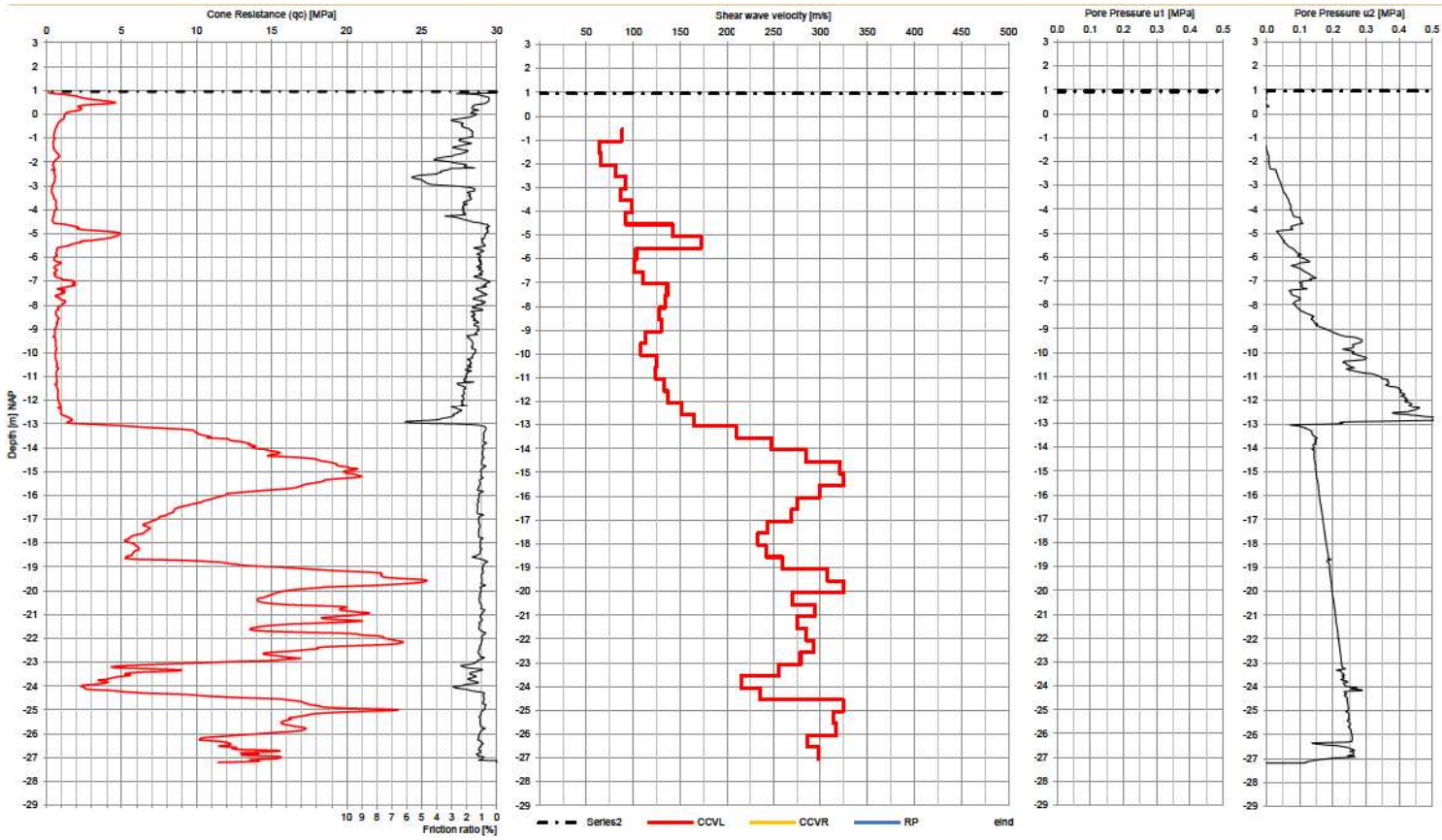
CPT ID: SCPT_G57



						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_23	x	264431.21 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G57_20191115.gef			y	573283.9 [m]
Cone Type	CP15-CF75PB1SN2/1701-2680	Depth has been adjusted for inclination				z	2.19 [m]

1019-153172 SEISMIC CPT'S KNMI G-STATIONS GRONINGEN

CPT ID: SCPT_G62

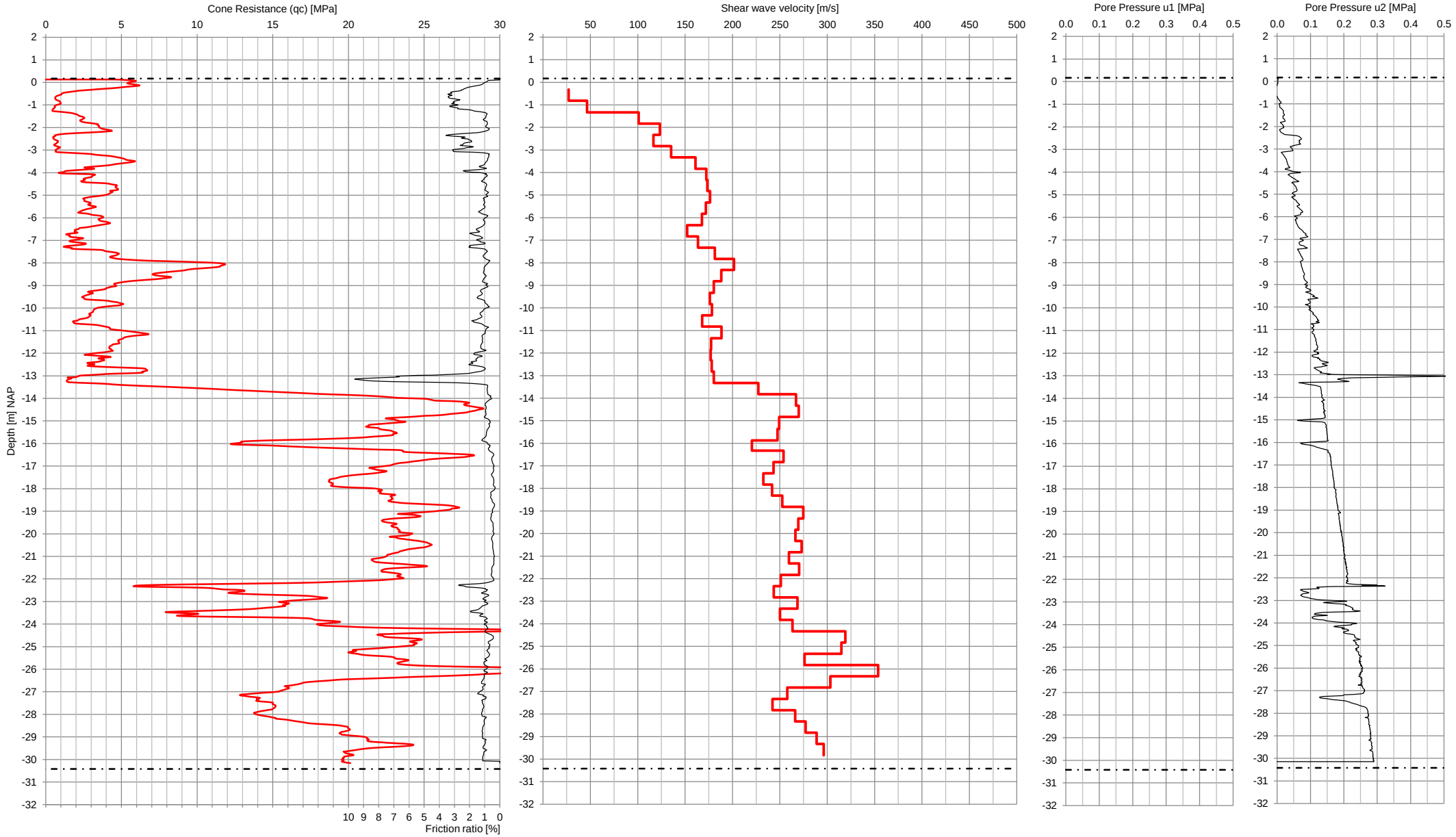


						Time-stamp	25-11-2019 16:41
CPT Company	Fugro NL Land B.V					Coordinates	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_11_15	CPT Start date	2019_10_03	x	251777.95 [m]
Cone Tip Area [mm²]	1510	Path GEF	processed\1019-153172_SCPT_G62_20191115.gef			y	601072.08 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				z	0.95 [m]

Attachment

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G09

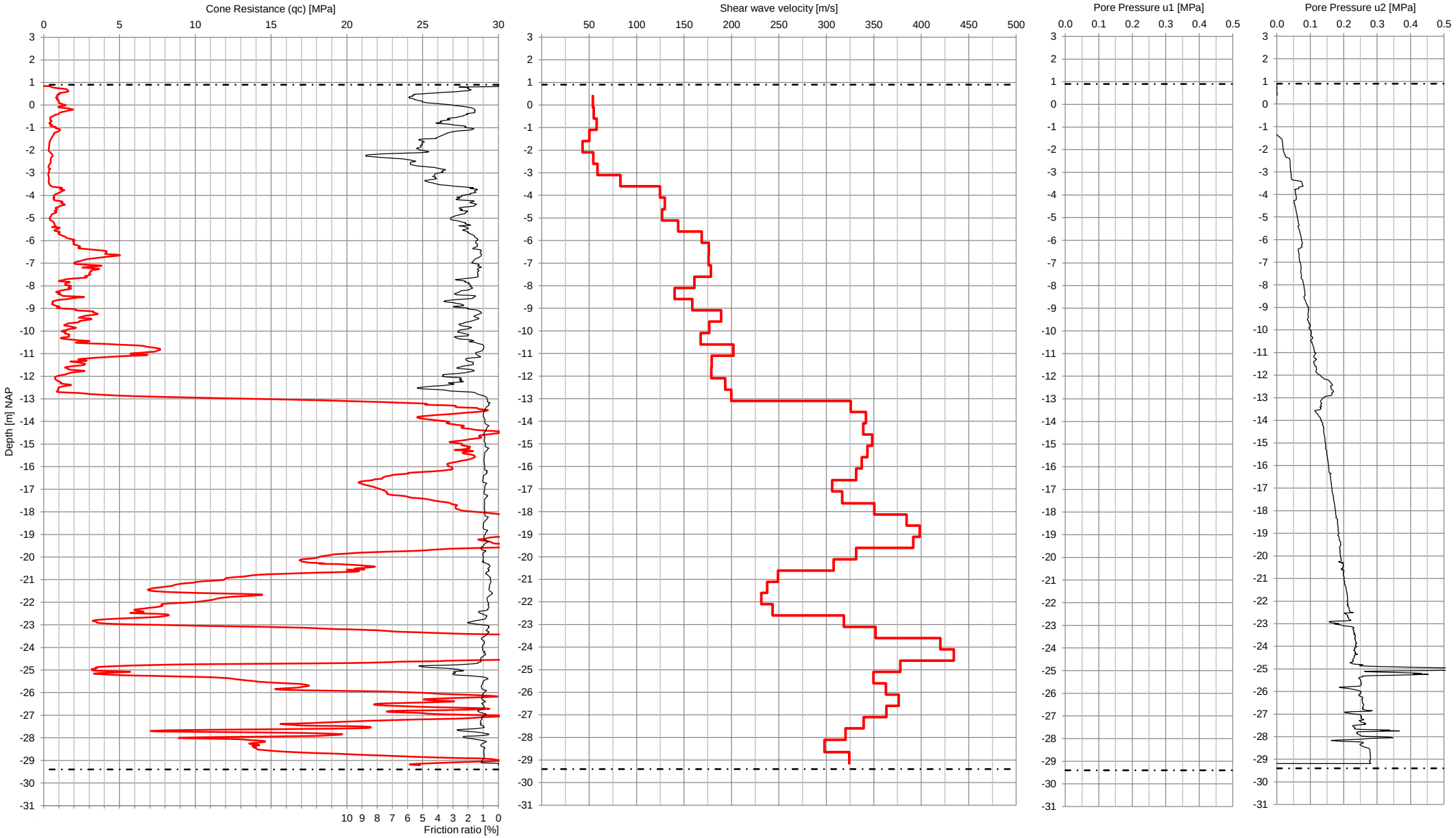


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:03
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_08	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G09_20190515.gef			x	243981.04 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	600978.23 [m]
						z	0.17 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G10

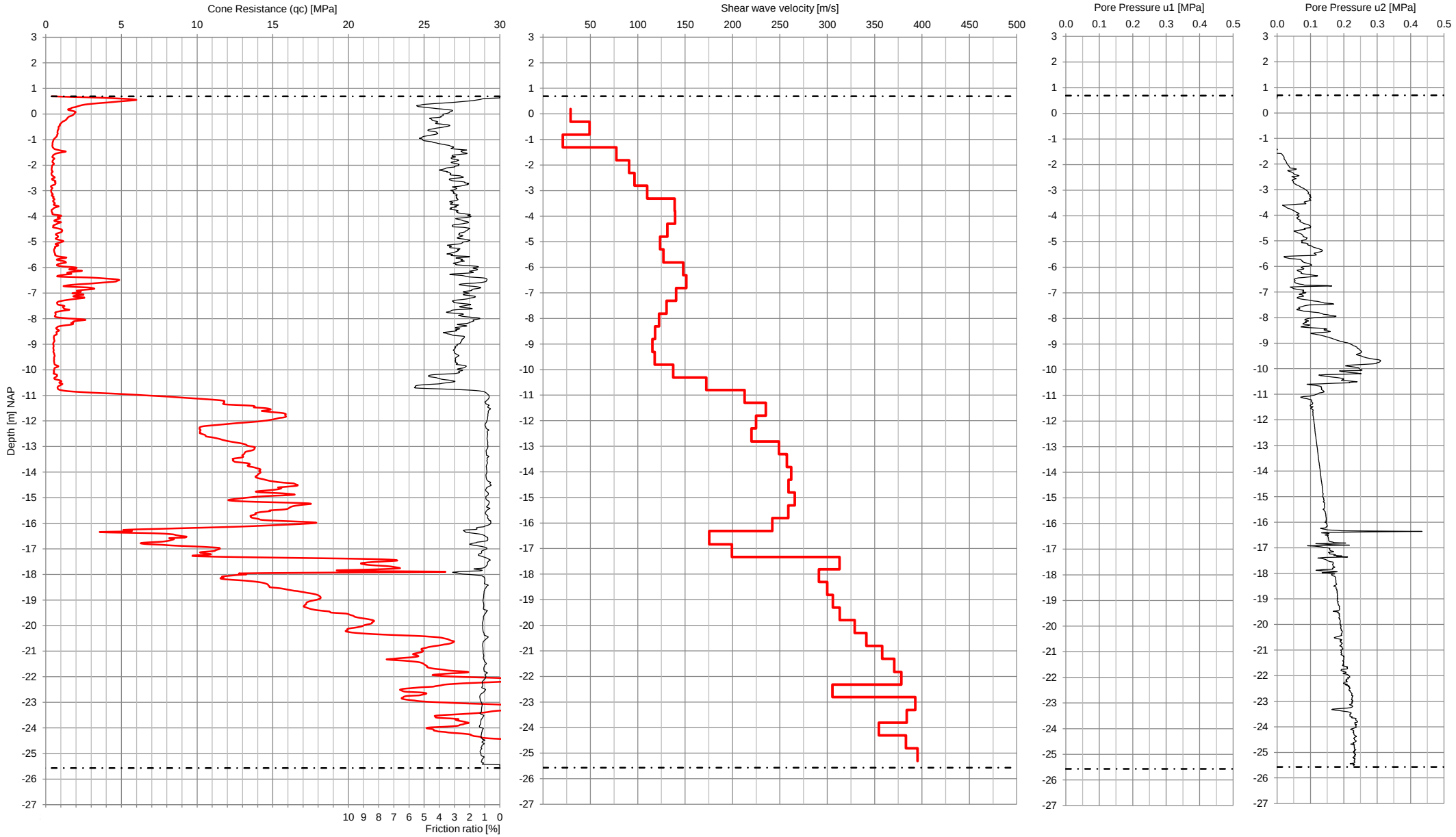


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:03	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_09	Coordinates		
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G10_20190515.gef			x	249291.63	[m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	600090.59	[m]
						z	0.9	[m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G13

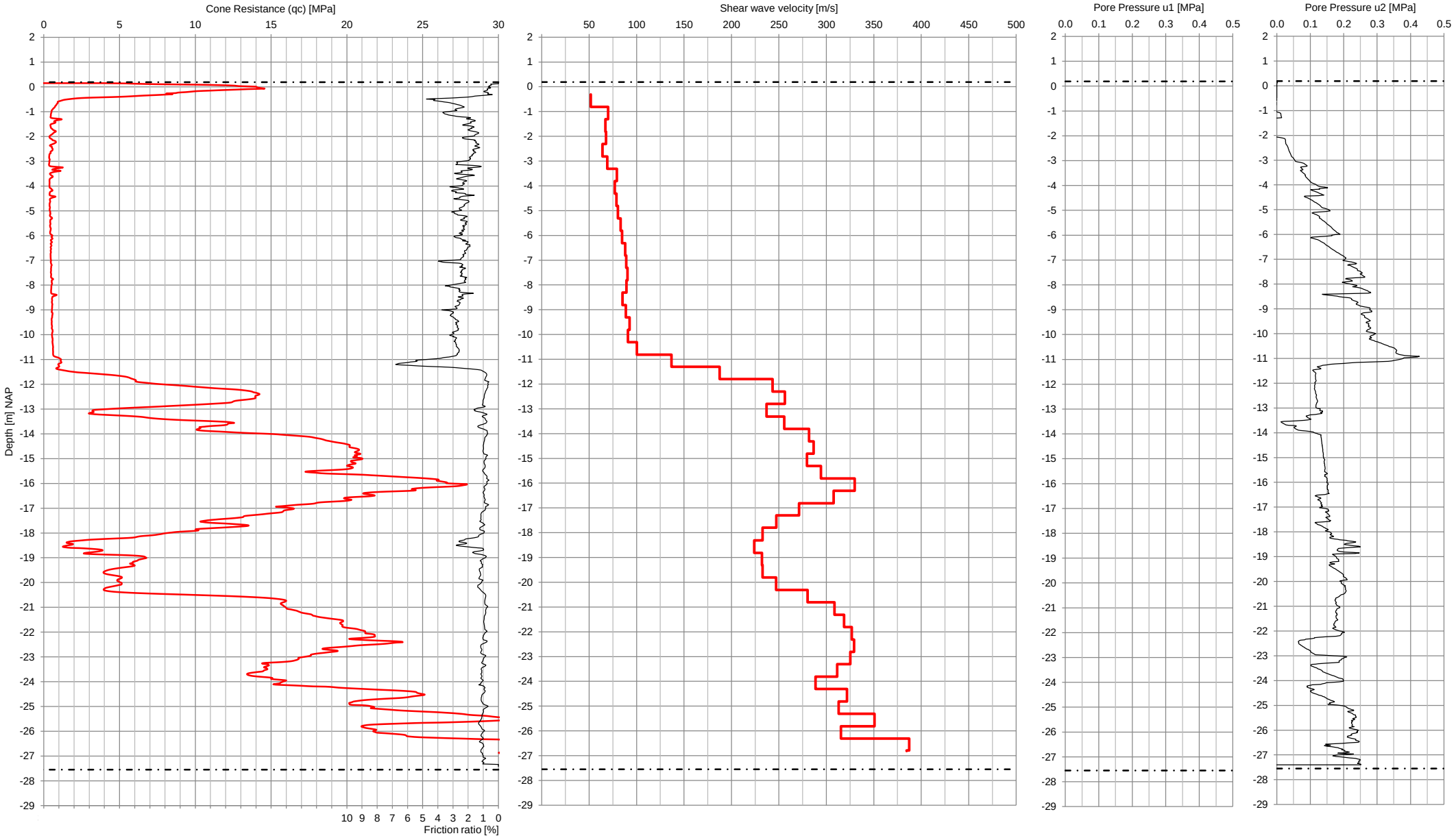


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:03	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_07	Coordinates		
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G13_20190515.gef			x	240330.45	[m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	596632.42	[m]
						z	0.69	[m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G14

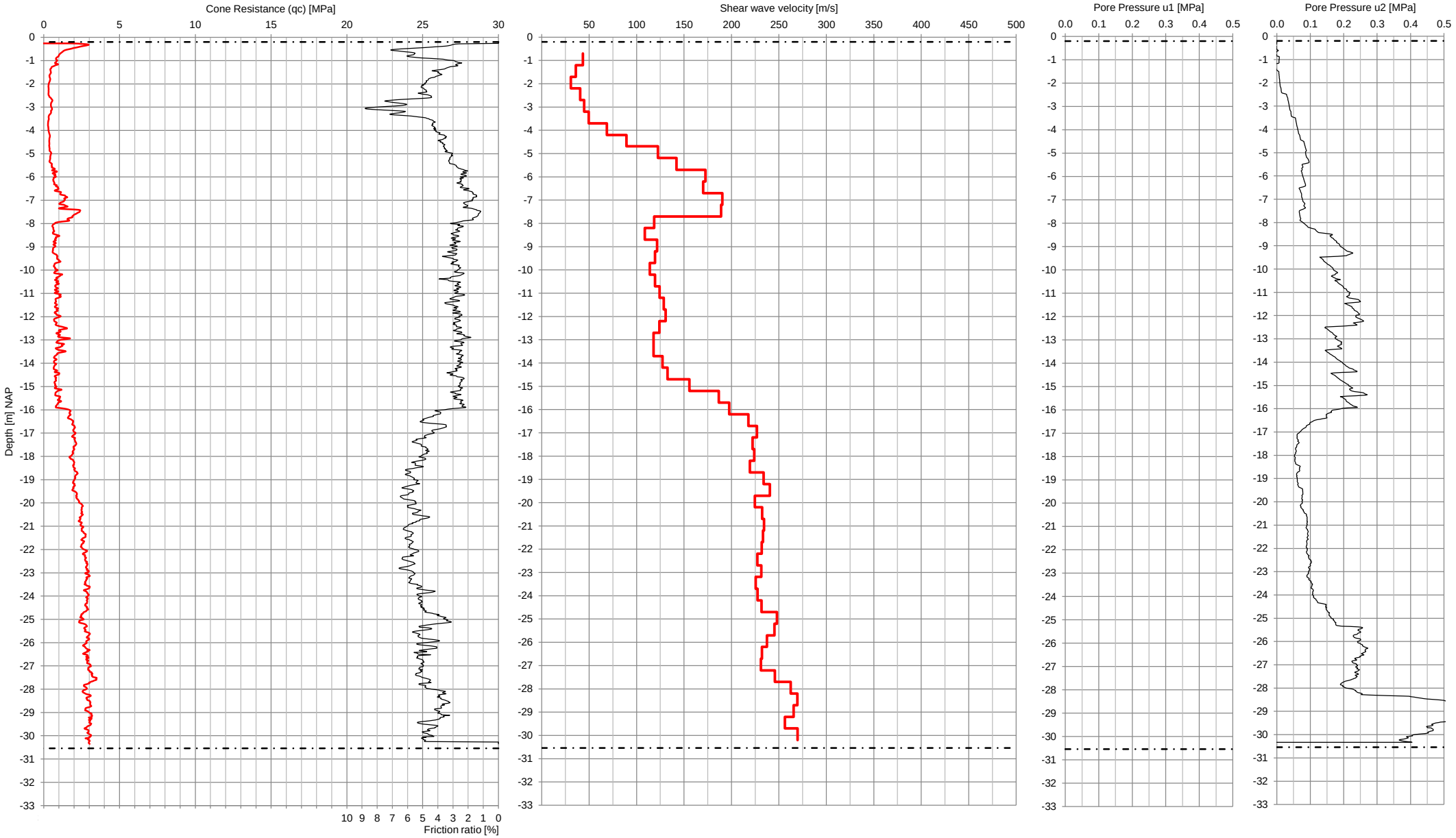


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V				Time-stamp	10-9-2019 07:04	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_09	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G14_20190515.gef			x	247123.62 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	597787.82 [m]
						z	0.19 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G19

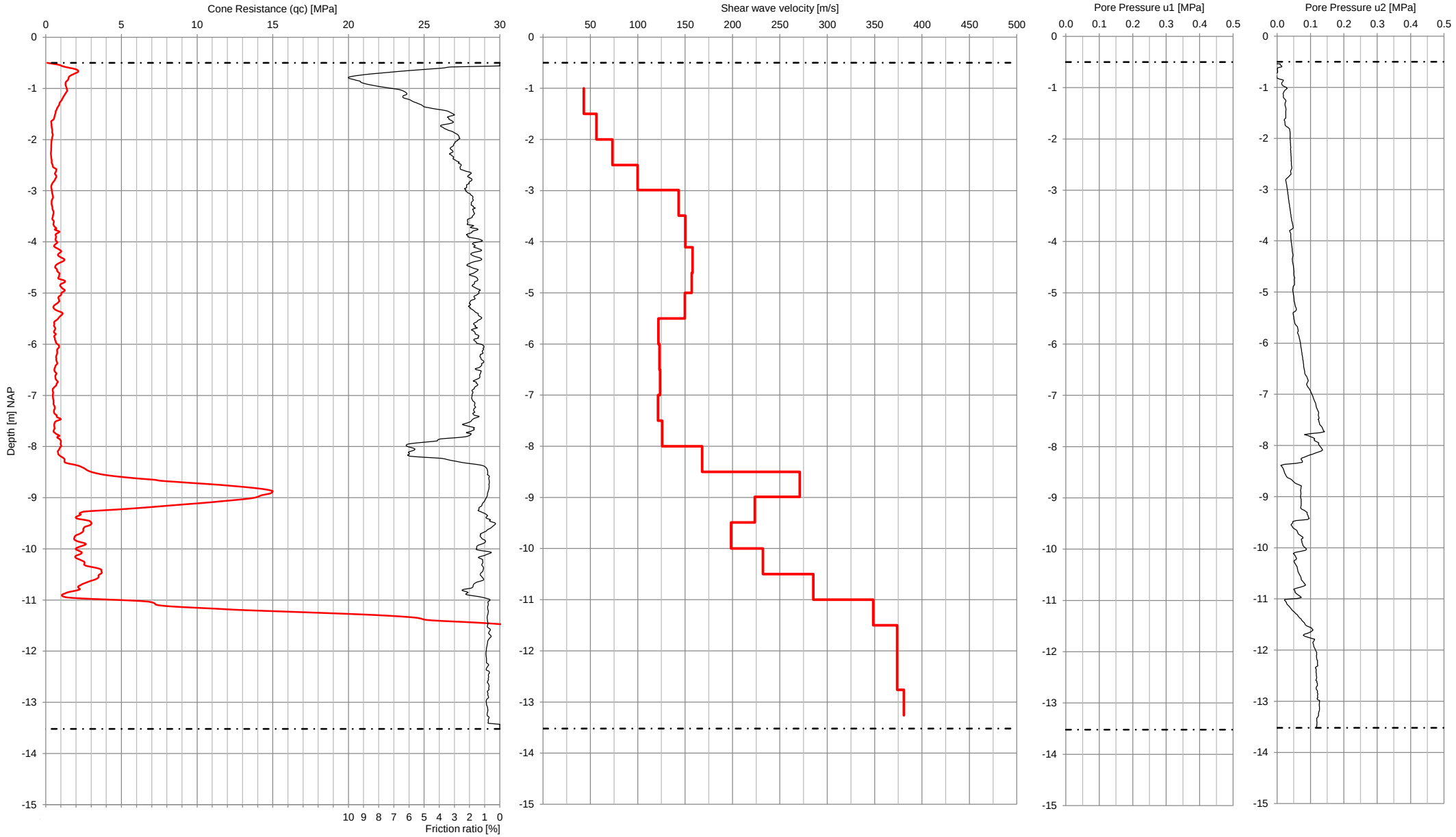


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_10	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G19_20190515.gef			x	250236.1 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	595535.82 [m]
						z	-0.2 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G22

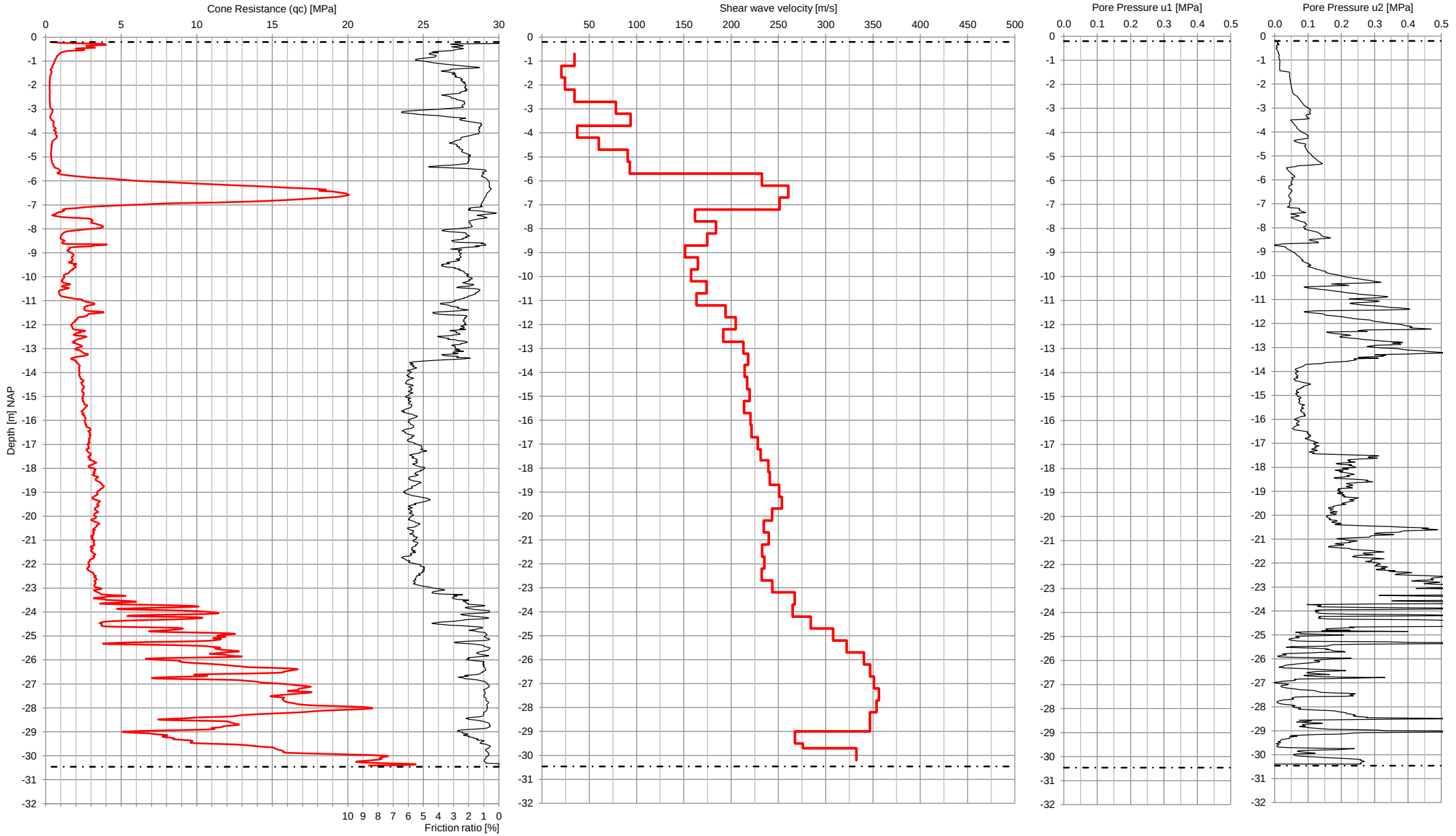


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_07	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G22_20190515.gef			x	240996.39 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	592318.87 [m]
						z	-0.5 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G23

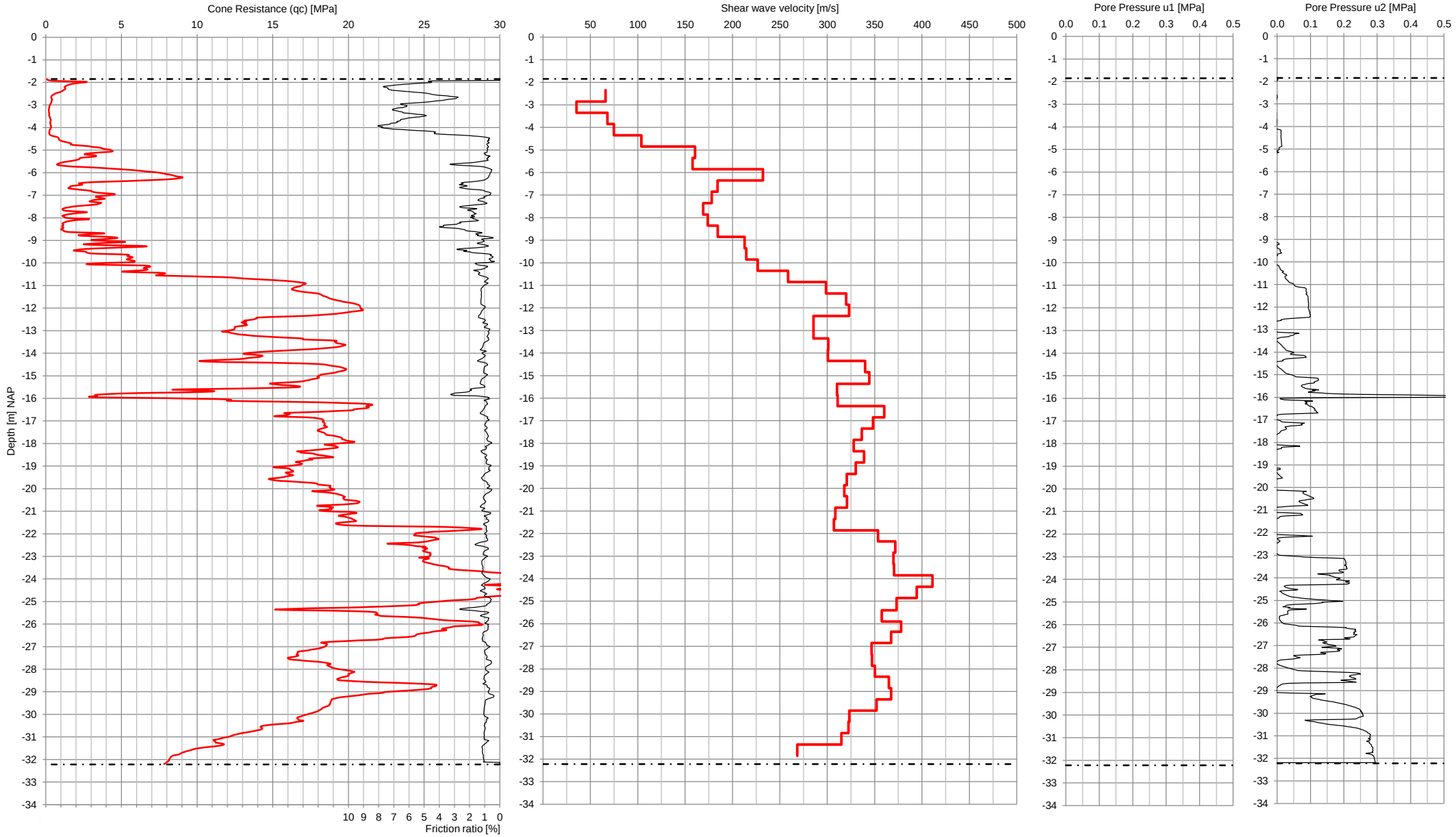


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04	
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_06	Coordinates		
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G23_20190515.gef			x	247016.62	[m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	592312.96	[m]
						z	-0.2	[m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G24

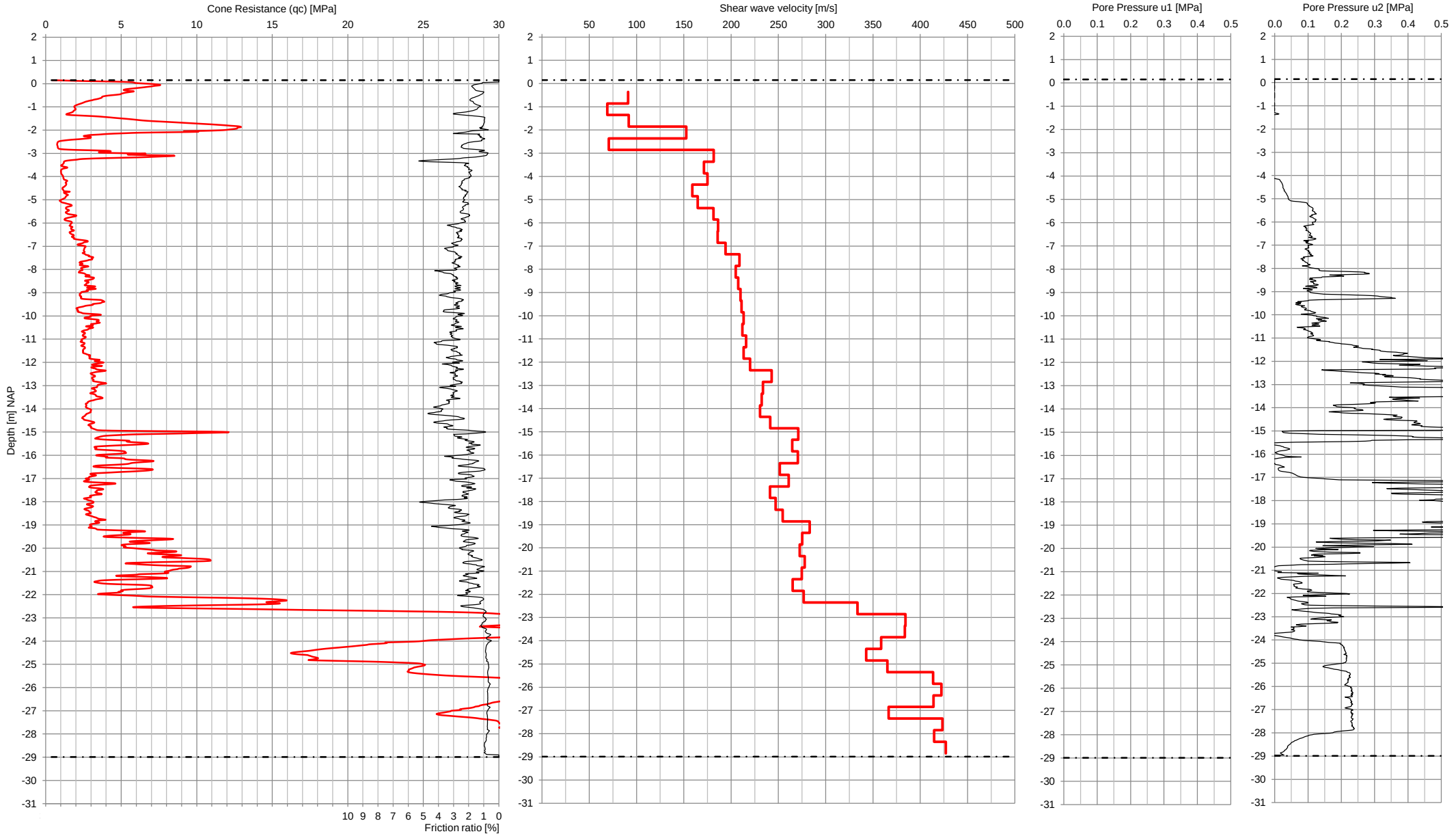


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_03	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G24_20190515.gef			x	252956.62 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	590266.18 [m]
						z	-1.85 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G40

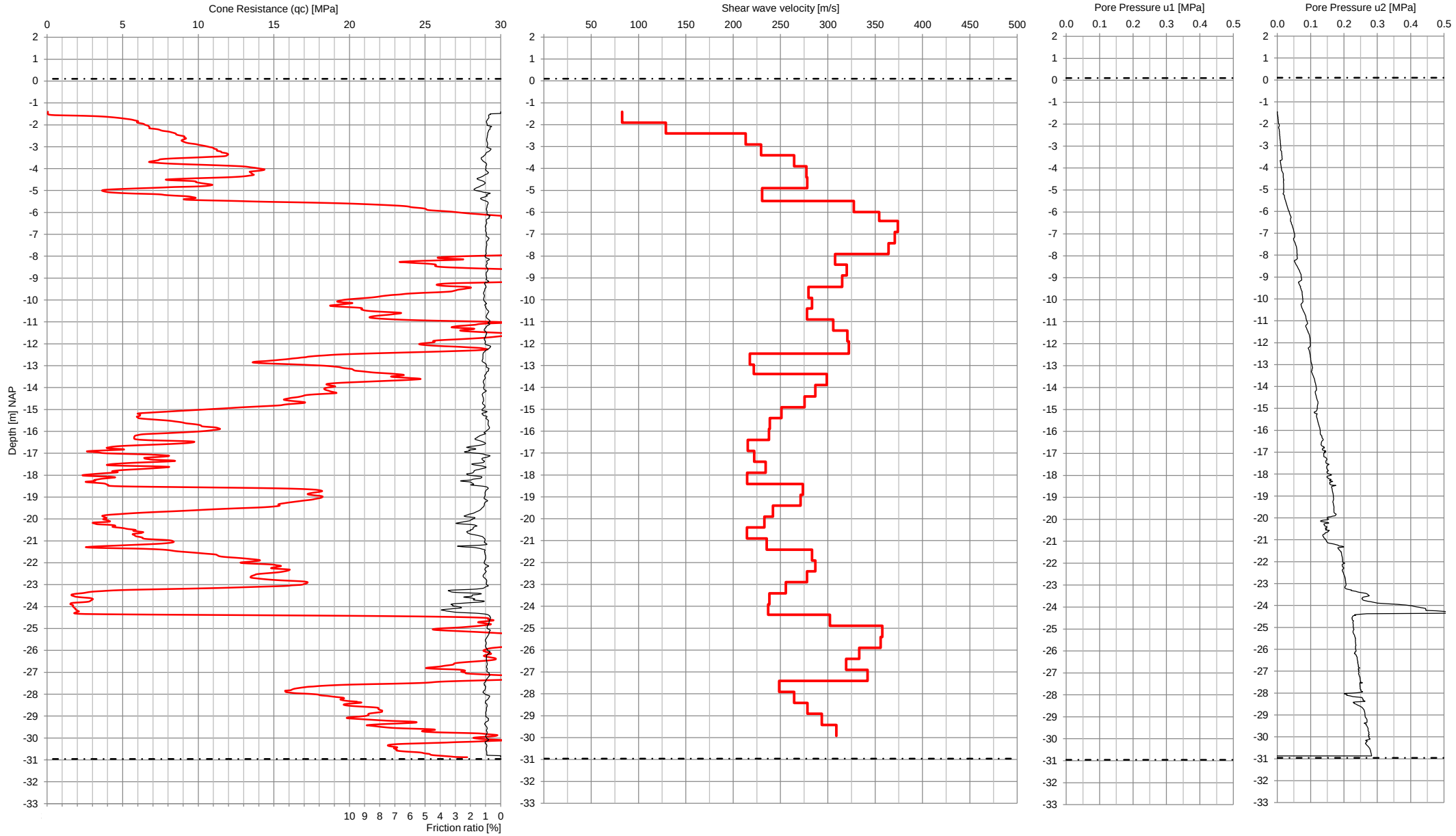


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_03	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G40_20190515.gef			x	250014.41 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	582972.2 [m]
						z	0.15 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G45

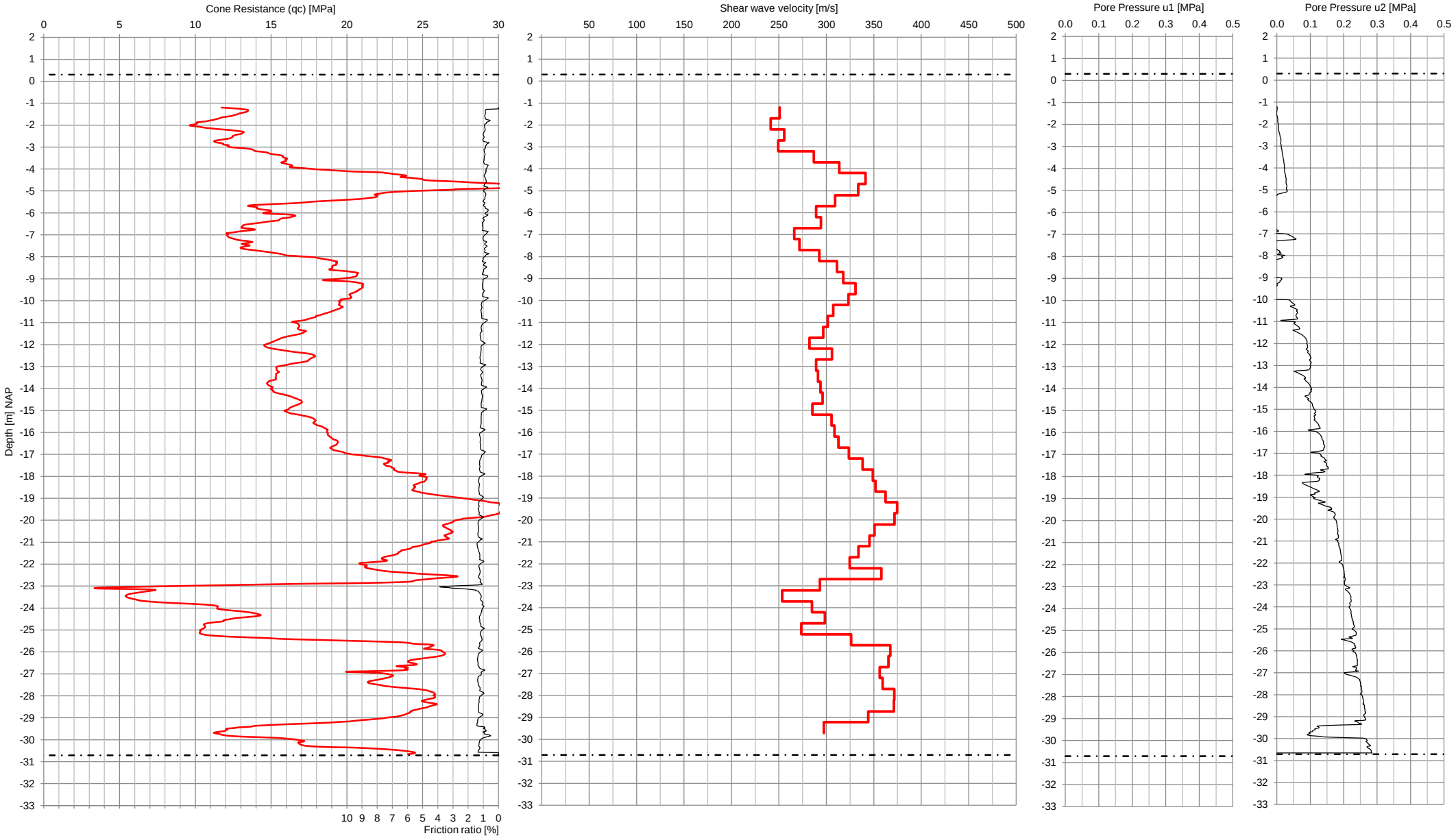


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V				Time-stamp	10-9-2019 07:04	
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_02	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G45_20190515.gef			x	247002.23 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	580116.66 [m]
						z	0.1 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G46

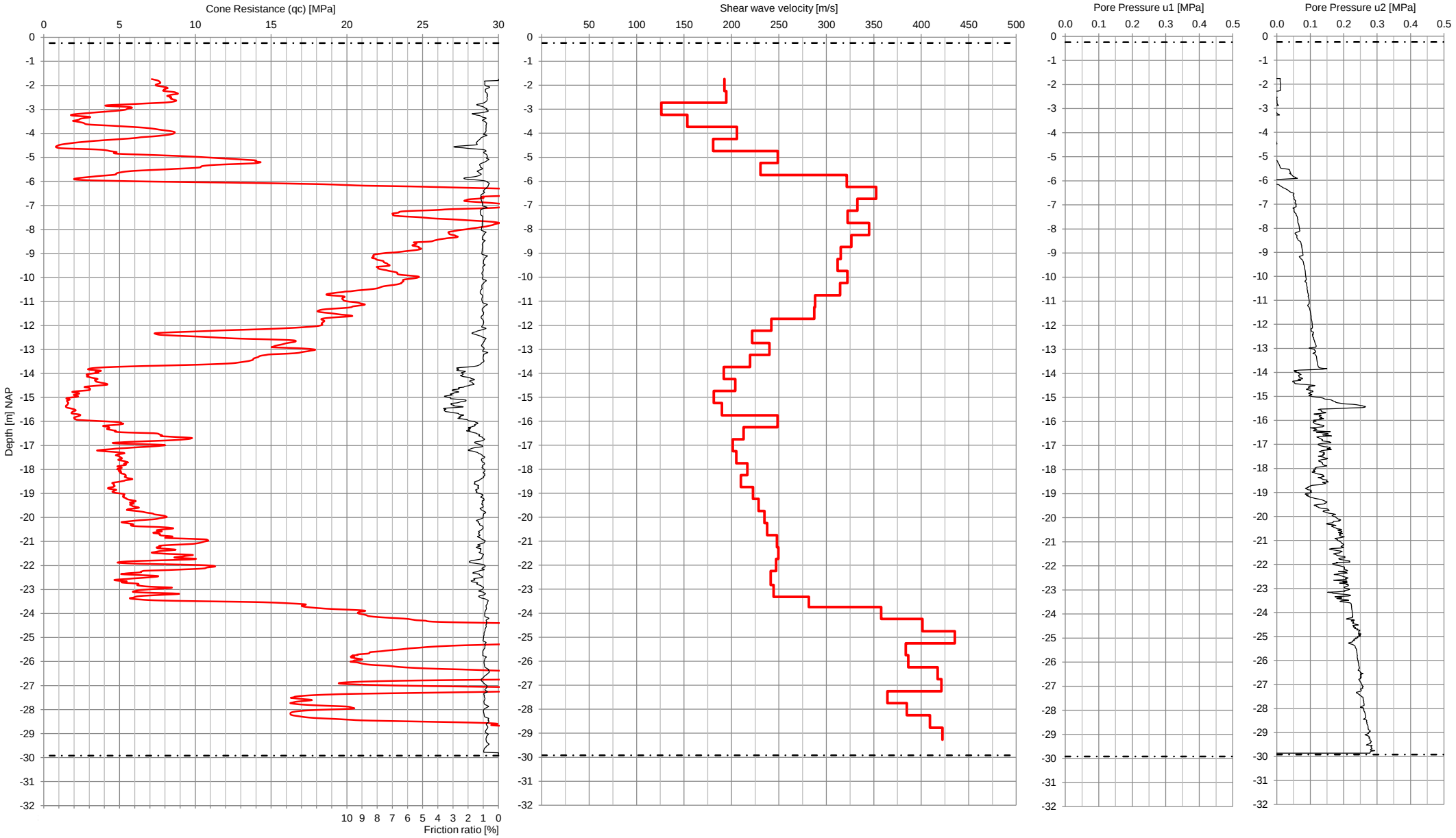


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_03	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G46_20190515.gef			x	252740.9 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	580009.35 [m]
						z	0.3 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G49

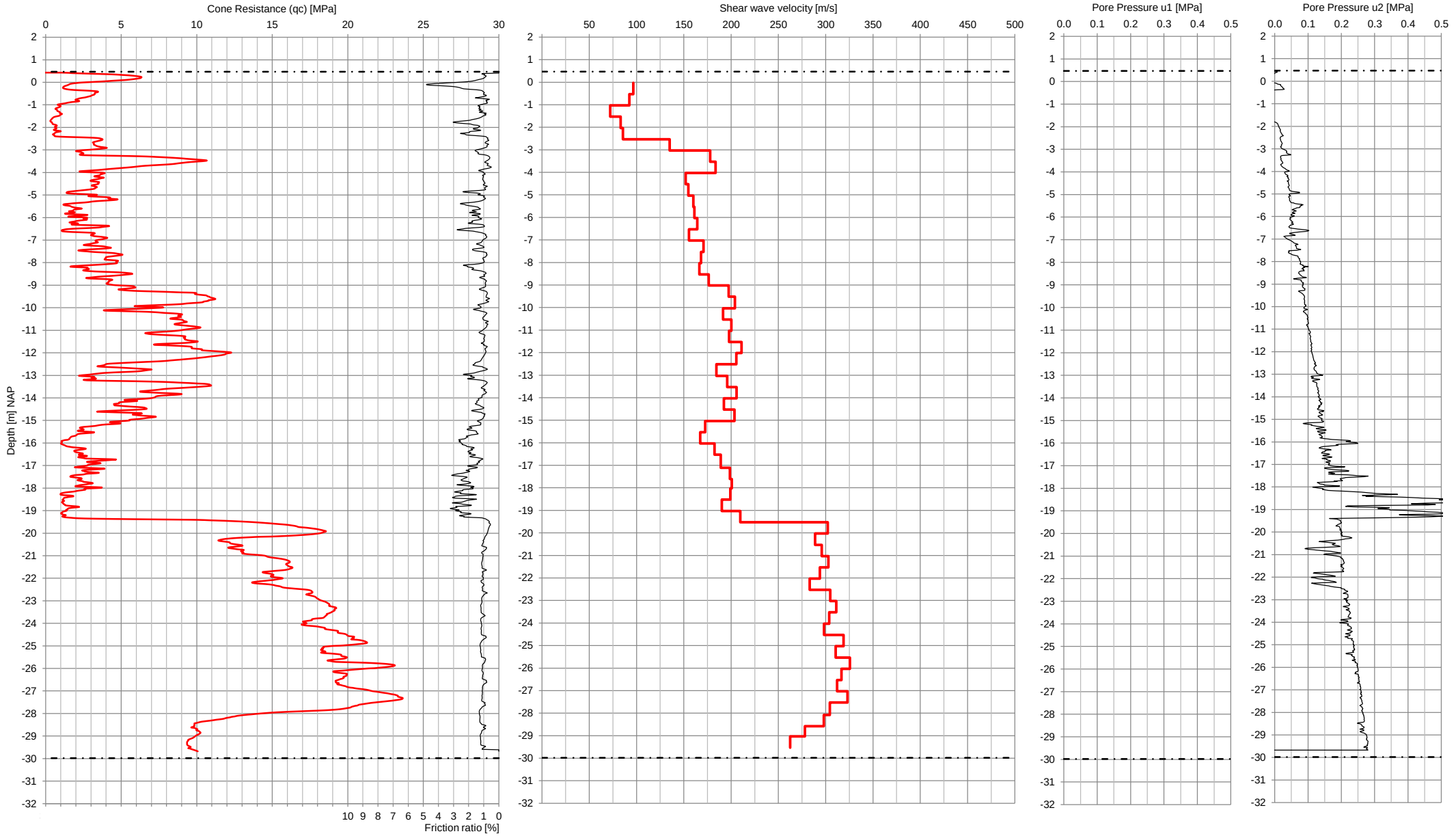


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_02	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G49_20190515.gef			x	244819.2 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	577476.52 [m]
						z	-0.24 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G61

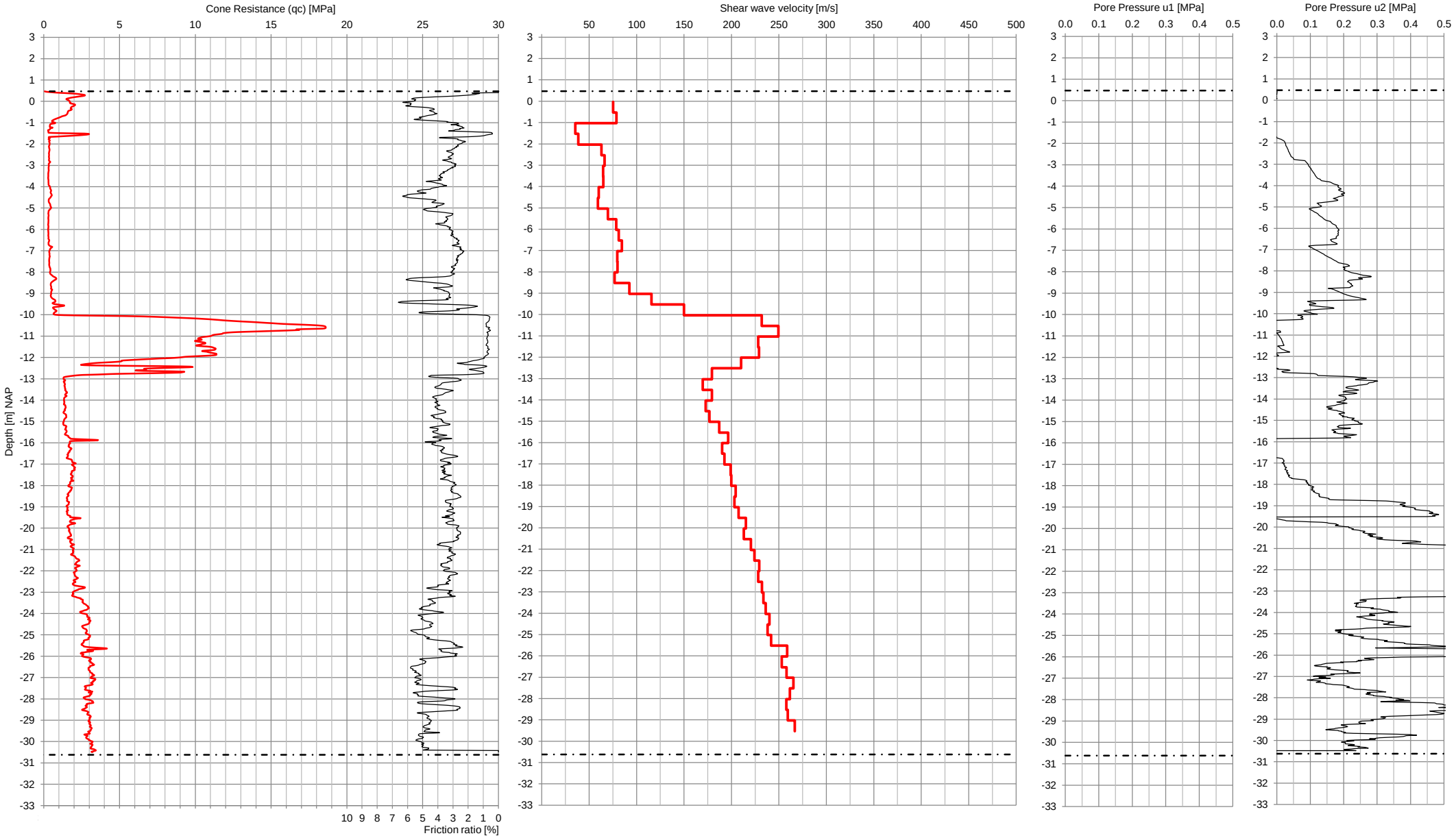


This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V				Time-stamp	10-9-2019 07:04	
CPT Class	ISO 22476-1 2012 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_09	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G61_20190515.gef			x	241115.43 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	600280.84 [m]
						z	0.47 [m]

1018-0338-210 DATA DRIVEN STUDY ON SEISMIC STRUCTURAL FEATURES OF GRONINGEN GROUND MOTION (IUC201804097)

CPT ID: SCPT-G67



This file has been automaticly processed. Please check the data carefully before using it

CPT Company	Fugro NL Land B.V					Time-stamp	10-9-2019 07:04
CPT Class	ISO 22476-1 Toepassingsklasse 2	CPT File Date	2019_05_15	CPT Start date	2019_05_06	Coordinates	
Cone Tip Area [mm²]	1510	Path GEF	processed\1018-0338-210_SCPT-G67_20190515.gef			x	250658.15 [m]
Cone Type	CP15-CF75PB1SN2/1701-2346	Depth has been adjusted for inclination				y	593722.43 [m]
						z	0.47 [m]