Annex A Damage consequence class and quick clay grade class

1 Lanner 1

Damage consequence class

		Konsekvens, score						
Faktorer	**Vekttall**	**3**	**2**	**1**	**0**	**Score**	**Poeng**	**Kommentar**
Boligenheter, antall	4	Tett>5	Spredt>5	Spredt<5	Ingen	0	0	Ingen
Næringsbygg, personer	3	>50	10 - 50	<10	Ingen	0	0	Ingen
Annen bebyggelse, verdi	1	Stor	Betydelig	Begrenset	Ingen	0	0	Ingen
Vei, ÅDT	2	>5000	1001-5000	100-1000	<100	3	6	E18 (>5000)
Toglinje, baneprioritet	2	1-2	3-4	5	Ingen	0	0	Ingen
Kraftnett	1	Sentral	Regional	Distribusjon	Lokal	0	0	Ingen
Oppdemning/ flom	2	Alvorlig	Middels	Liten	Ingen	0	0	Ingen
Sum poeng		45	30	15	0		**6**	
% av maksimal poengsum		100 %	67 %	33 %	0 %		13 %	

Skadekonsekvensklasse		
Meget alvorlig	Alvorlig	Mindre alvorlig
23-45 poeng	7-22	0-6

quick clay grade class

					Faregrad, score			
Faktorer	**Vekt-tall**	**Score**	**Poeng**	**Kommentar**	**3**	**2**	**1**	**0**
Tidligere skredaktivitet	1	0	0	Ikke registrert.	Høy	Noe	Lav	Ingen
Skråningshøyde	2	0	0	Største skråning <15 m høyde	>30	20-30	15-20	<15
Tidligere/ nåværende terrengnivå (OCR)	2	2	4	Usikker. Antar noen overkonsolidert (~1,2)	1,0-1,2	1,2-1,5	1,5-2,0	>2,0
Poretrykk, overtrykk	3	0	0	Hydrostatisk	>+30	10-30	0-10	Hydrostatisk
Poretrykk, undertrykk	-3	0	0	Hydrostatisk	>-50	-(20-50)	-(0-20)	Hydrostatisk
Kvikkleiremektighet	2	3	6	Større enn H/2	>H/2	H/2-H/4	<H/4	Tynt lag
Sensitivitet	1	2	2	Varierende men mer enn 30 og mindre enn 100	>100	30-100	20-30	<20
Erosjon	3	0	0	Ingen erosjon	Aktiv/ glidn.	Noe	Lite	Ingen
Inngrep, forverring	3	0	0	Ingen forverring	Stor	Noe	Liten	Ingen
Inngrep, forbedring	-3	2	-6	Liten forbedring da ny vei vil ligge høyere enn dagens vei.	Stor	Noe	Liten	Ingen
Poeng			**6**					
Faregradsklasse			Lav					

Faregradsklasse		
Lav	Middels	Høy
0-17	18-25	26-51

2 Lanner 2

Damage consequence class

		Konsekvens, score						
Faktorer	**Vektall**	**3**	**2**	**1**	**0**	**Score**	**Poeng**	**Kommentar**
Boligenheter, antall	4	Tett>5	Spredt >5	Spredt <5	Ingen	0	0	Ingen
Næringsbygg, personer	3	>50	10 - 50	<10	Ingen	0	0	Ingen
Annen bebyggelse, verdi	1	Stor	Betydelig	Begrenset	Ingen	0	0	Ingen
Vei, ÅDT	2	>5000	1001-5000	100-1000	<100	3	6	E18 (>5000)
Toglinje, baneprioritet	2	1-2	3-4	5	Ingen	0	0	Ingen
Kraftnett	1	Sentral	Regional	Distribusjon	Lokal	0	0	Ingen
Oppdemning/ flom	2	Alvorlig	Middels	Liten	Ingen	0	0	Ingen
Sum poeng		45	30	15	0		**6**	
% av maksimal poengsum		100 %	67 %	33 %	0 %		13 %	

Skadekonsekvensklasse		
Meget alvorlig	Alvorlig	Mindre alvorlig
23-45 poeng	7-22	0-6

quick clay grade class

					Faregrad, score			
Faktorer	**Vekt-tall**	**Score**	**Poeng**	**Kommentar**	**3**	**2**	**1**	**0**
Tidligere skredaktivitet	1	0	0	Ikke registrert.	Høy	Noe	Lav	Ingen
Skråningshøyde	2	0	0	Største skråning <15 m høyde	>30	20-30	15-20	<15
Tidligere/ nåværende terrengnivå (OCR)	2	2	4	Usikker. Antar noen overkonsolidert (~1,2)	1,0-1,2	1,2-1,5	1,5-2,0	>2,0
Poretrykk, overtrykk	3	0	0	Hydrostatisk	>+30	10-30	0-10	Hydrostatisk
Poretrykk, undertrykk	-3	0	0	Hydrostatisk	>-50	-(20-50)	-(0-20)	Hydrostatisk
Kvikkleiremektighet	2	2	4	Varierende. Velger H/2 – H/4.	>H/2	H/2-H/4	<H/4	Tynt lag
Sensitivitet	1	2	2	Varierende men mer enn 30 og mindre enn 100	>100	30-100	20-30	<20
Erosjon	3	2	6	Noe erosjon	Aktiv/ glidn.	Noe	Lite	Ingen
Inngrep, forverring	3	0	0	Ingen forverring	Stor	Noe	Liten	Ingen
Inngrep, forbedring	-3	3	-9	Forbedring da ny vei vil ligge i senkningen sånn at ny vei vill bli som en motfylling	Stor	Noe	Liten	Ingen
Poeng			**7**					
Faregradsklasse			Lav					

Faregradsklasse		
Lav	Middels	Høy
0-17	18-25	26-51

3 Kjørholt

Damage consequence class

		Konsekvens, score						
Faktorer	**Vektall**	**3**	**2**	**1**	**0**	**Score**	**Poeng**	**Kommentar**
Boligenheter, antall	4	Tett> 5	Spredt >5	Spredt <5	Ingen	1	4	Spredt
Næringsbygg, personer	3	>50	10 - 50	<10	Ingen	0	0	Ingen
Annen bebyggelse, verdi	1	Stor	Betydelig	Begrenset	Ingen	0	0	Begrenset
Vei, ÅDT	2	>5000	1001-5000	100-1000	<100	1	2	Noen lokalvei. E18 på behørig avstand
Toglinje, baneprioritet	2	1-2	3-4	5	Ingen	0	0	Ingen
Kraftnett	1	Sentral	Regional	Distribusjon	Lokal	0	0	Ingen
Oppdemning/ flom	2	Alvorlig	Middels	Liten	Ingen	0	0	Ingen
Sum poeng		45	30	15	0		**6**	
% av maksimal poengsum		100 %	67 %	33 %	0 %		13 %	

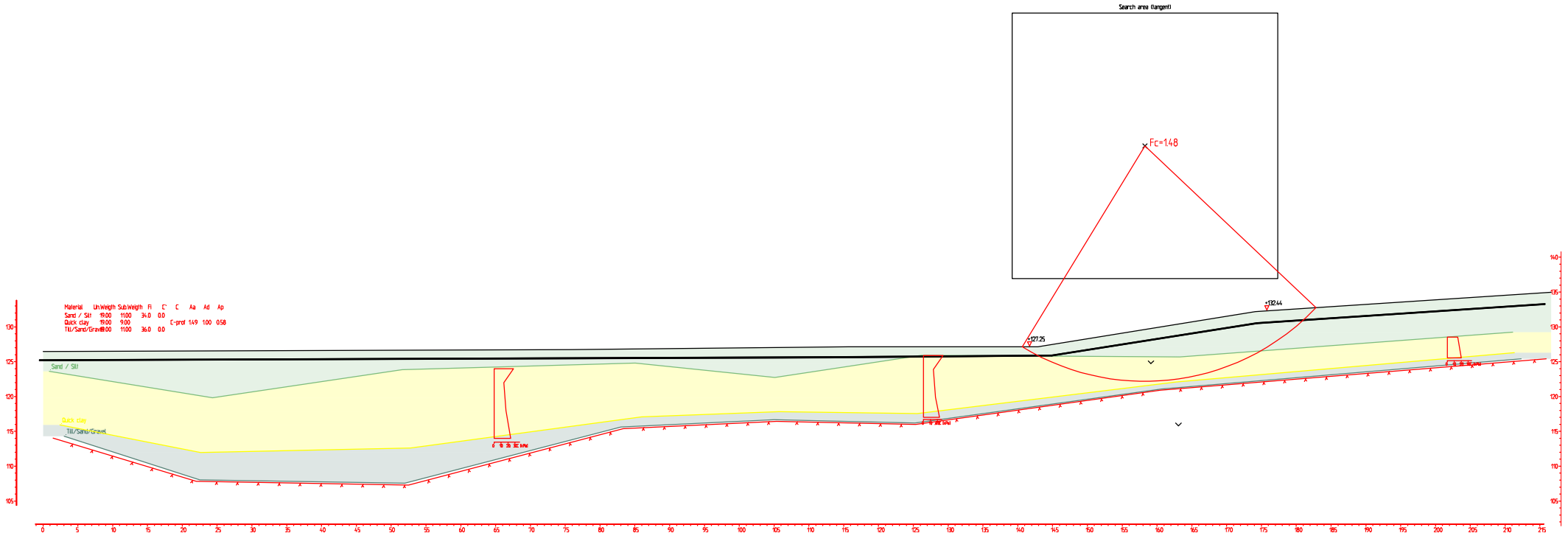
Skadekonsekvensklasse		
Meget alvorlig	Alvorlig	Mindre alvorlig
23-45 poeng	7-22	0-6

quick clay grade class

					Faregrad, score			
Faktorer	**Vekt-tall**	**Score**	**Poeng**	**Kommentar**	**3**	**2**	**1**	**0**
Tidligere skredaktivitet	1	0	0	Ikke registrert.	Høy	Noe	Lav	Ingen
Skråningshøyde	2	0	0	Største skråning <15 m høyde	>30	20-30	15-20	<15
Tidligere/ nåværende terrengnivå (OCR)	2	2	4	Usikker. Antar noen overkonsolidert (~1,2)	1,0-1,2	1,2-1,5	1,5-2,0	>2,0
Poretrykk, overtrykk	3	0	0	Hydrostatisk	>+30	10-30	0-10	Hydrostatisk
Poretrykk, undertrykk	-3	0	0	Hydrostatisk	>-50	-(20-50)	-(0-20)	Hydrostatisk
Kvikkleiremektighet	2	2	4	Varierende. Velger H/2 – H/4. Mye usikker.	>H/2	H/2-H/4	<H/4	Tynt lag
Sensitivitet	1	1	1	Varierende men mindre enn 30	>100	30-100	20-30	<20
Erosjon	3	0	0	Ingen bekk	Aktiv/ glidn.	Noe	Lite	Ingen
Inngrep, forverring	3	0	0	Ingen forverring	Stor	Noe	Liten	Ingen
Inngrep, forbedring	-3	1	-3	Tiltaket (ny E18) vil innebære forbedring da det vil fungere som en motfylling. En viss effekt på forbedring av stabiliteten.	Stor	Noe	Liten	Ingen
Poeng			**6**					
Faregradsklasse			Lav					

Faregradsklasse		
Lav	Middels	Høy
0-17	18-25	26-51

Annex B1 Calculations Area Stability

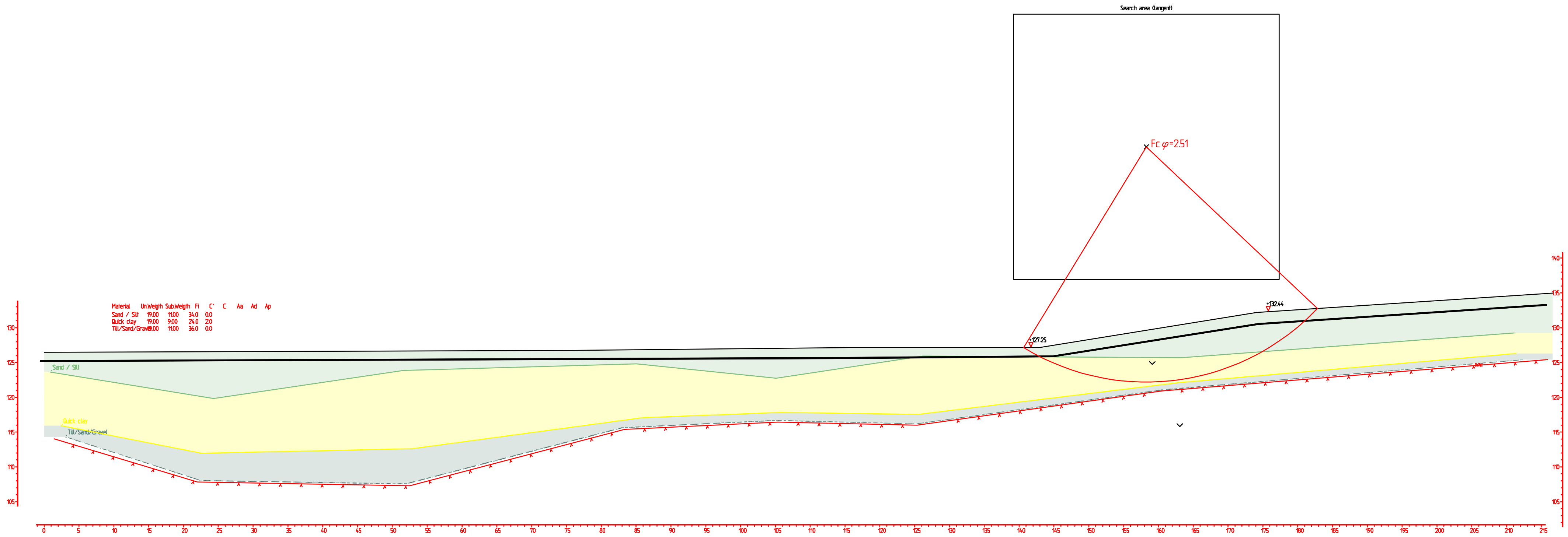


I:\19756 e18 langangen - rugtvedt\02 arbeidskatalog\12 fagt\rtg\geoteknikk\091 geosuite gamle boringer\stabgraf.rtf\antitl t1-t1.dwg

Eiffage
E18 Langangen Rugtvedt
Snitt L1-L1 Area Stability. Undrained analyse
A4 Scale 1:800

2021-06-18
BG

Annex B2 Calculations Area Stability



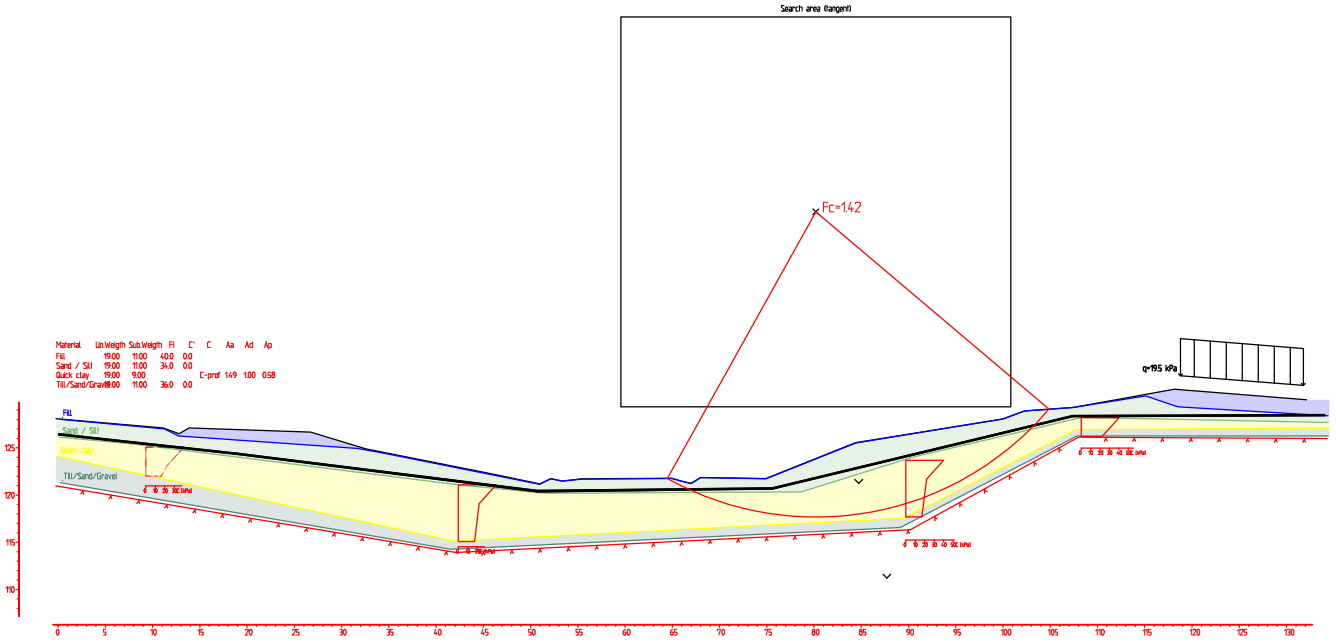
t:\19756 e18 langangen - rugtvedt\02 arbeidskatalog\12 fag\rig\geoteknikk\091 geosuite gamle boringer\stabgraf.rit\snitt l1-l1 dr.dwg

Eiffage
E18 Langangen Rugtvedt
Snitt L1-L1 Area Stability. Drained analyse
A4 Scale 1:800

2021-06-18

BG

Annex B3 Calculations Area Stability

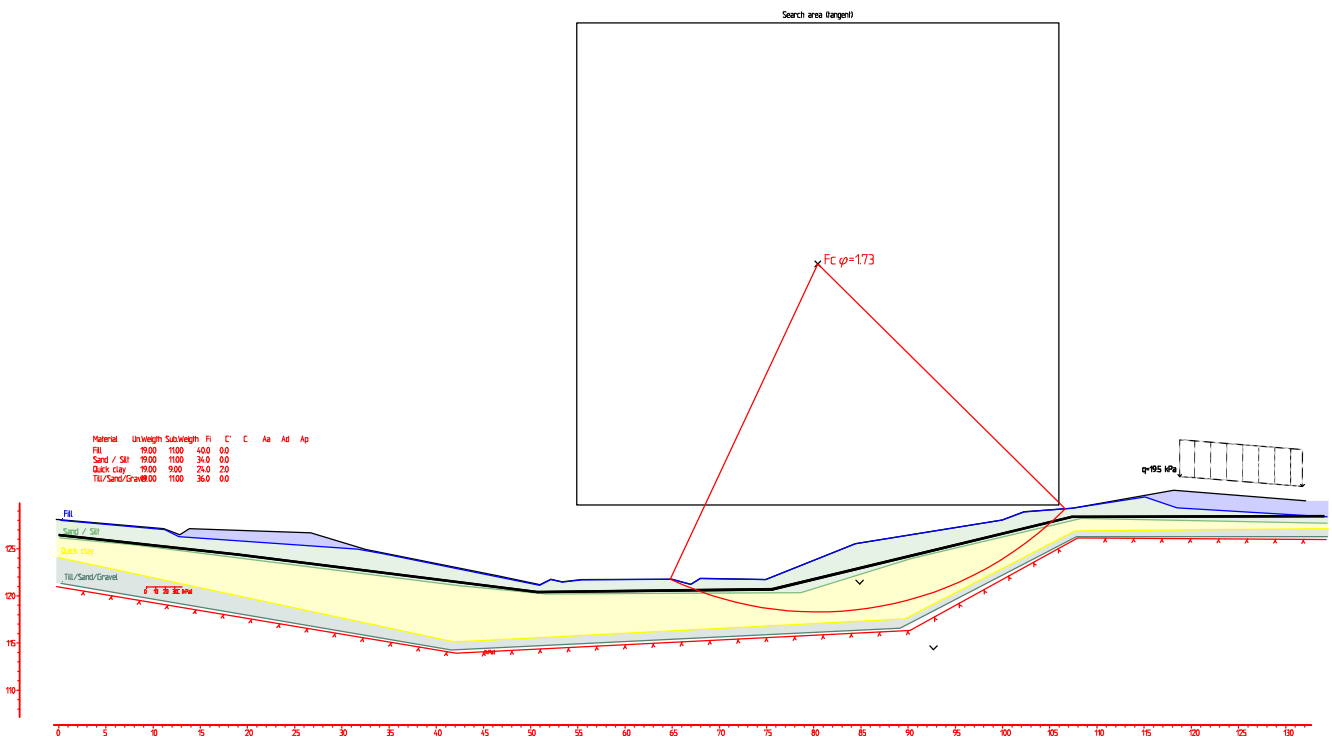


\\19756 e18 langangen - rugtvedt\02 arbeidsmateriale\12 fag\rib\geoteknikk\091 grasulte gamle boringer\stabilitet\l1\snitt l2-l2.dwg

Effage
E18 Langangen Rugtvedt
Snitt L2-L2 Area Stability, Undrained analyse
A4 Scale 1:800

2021-06-18
BG

Annex B4 Calculations Area Stability

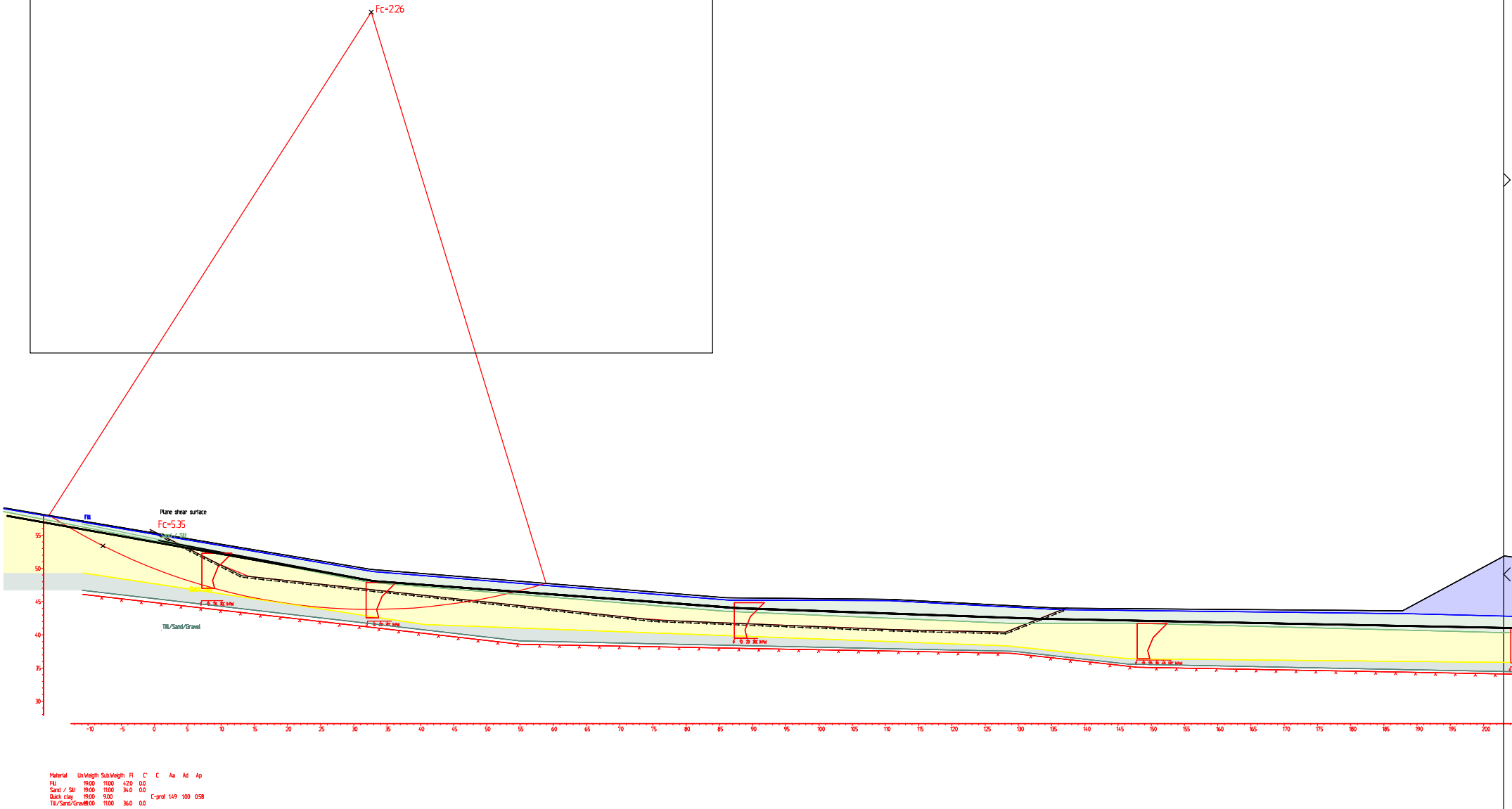


Elfage
E18 Langangen Rugtvedt
Snitt L2-L2 Area Stability. Drained analyse
A4 Scale 1:800

2021-06-18

BG

Annex B5 Calculations Area Stability



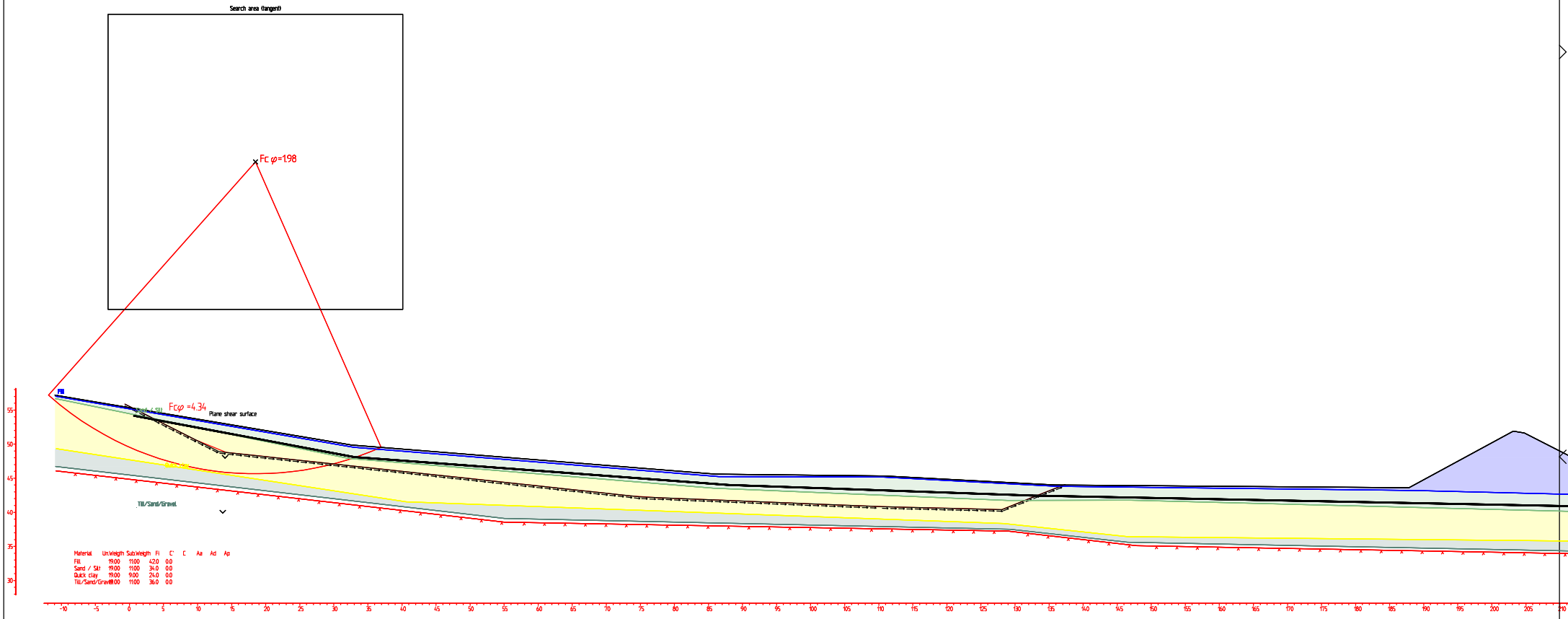
Material	Un.Weigth	Sub.Weigth	Fi	C'	C	Aa	Ad	Ap
Fill	19.00	11.00	42.0	0.0				
Sand / Silt	19.00	11.00	34.0	0.0				
Quick clay	19.00	9.00			C-prof	1.49	1.00	0.58
Till/Sand/Gravel	18.00	11.00	36.0	0.0				

I:\19756 e18 langangen - rugtvedt\02 arbeidskatalog\12 fag\rig\geoteknikk\091 grasulte gamle boringer\stabilgrafer\snitt b-b ucr.dwg

Effage
E18 Langangen Rugtvedt
Snitt B-B Area Stability. Undrained analyse
A4 Scale 1:800

2021-06-16
BG

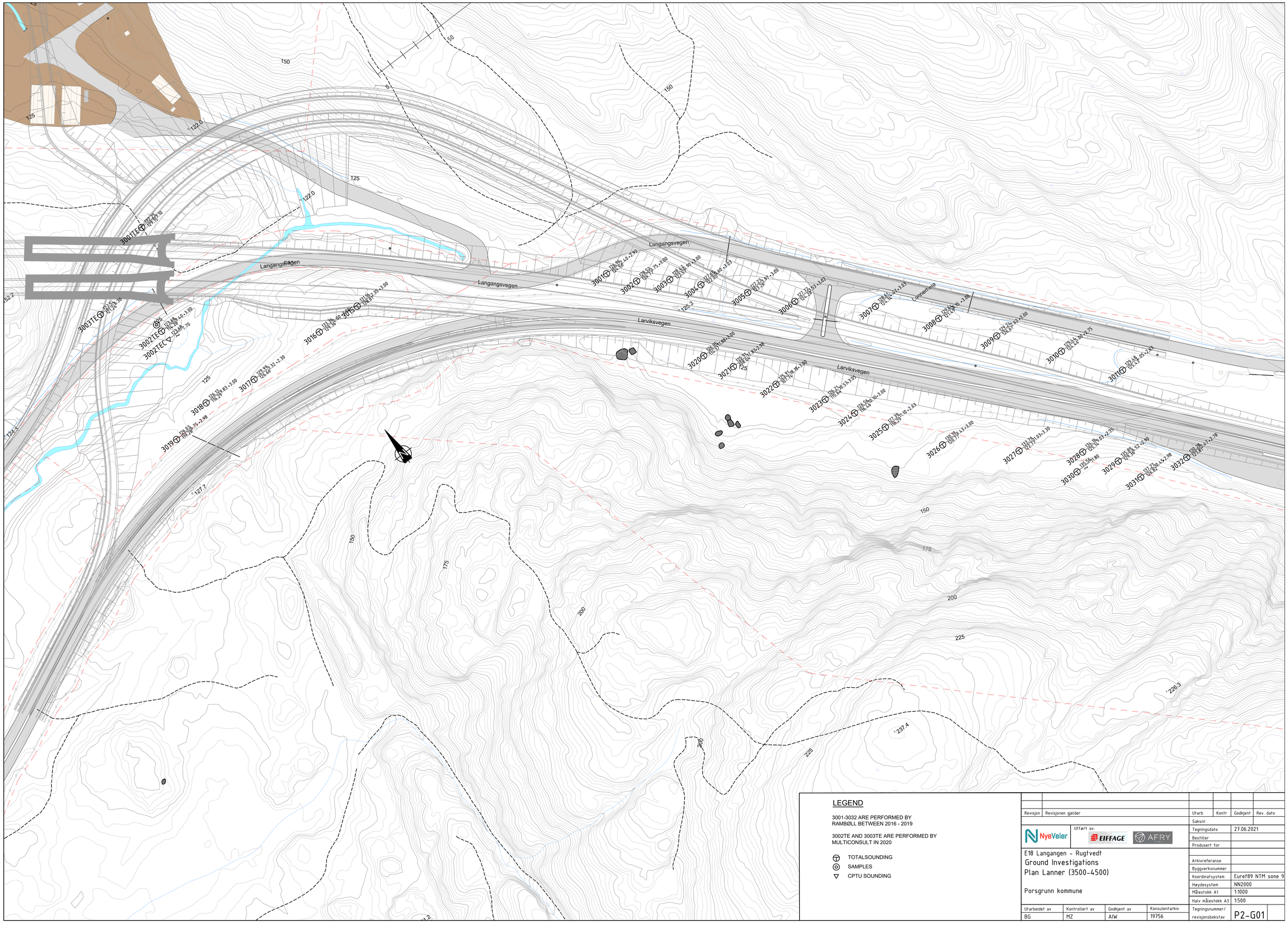
Annex B6 Calculations Area Stability



Effage
E18 Langangen Rugtvedt
Snitt B-B Area Stability, Drained analyse
A4 Scale 1:800

2021-06-16
BG

I:\19756 e18 langangen - rugtvedt\02 arbeidskatalog\12 fag\rig\geoteknikk\09 geosuite gamle boringer\stabgraf\rit\snitt b-b dr.dwg



LEGEND

3001-3032 ARE PERFORMED BY
RAMBØLL BETWEEN 2016 - 2019

3002TE AND 3003TE ARE PERFORMED BY
MULTICONSULT IN 2020

- TOTALSOUNDING
- SAMPLES
- CPTU SOUNDING

Revisjon	Revisjonen gjelder	Utarb	Kontr	Godkjent	Rev. dato

Saksnr.

NyeVeier — Utført av: EIFFAGE, AFRY

Tegningsdato	27.06.2021
Bestiller	
Produsert for	
Arkivreferanse	
Byggverksnummer	
Koordinatsystem	Euref89 NTM sone 9
Høydesystem	NN2000
Målestokk A1	1:1000
Halv målestokk A3	1:500
Tegningsnummer/ revisjonsbokstav	P2-G01

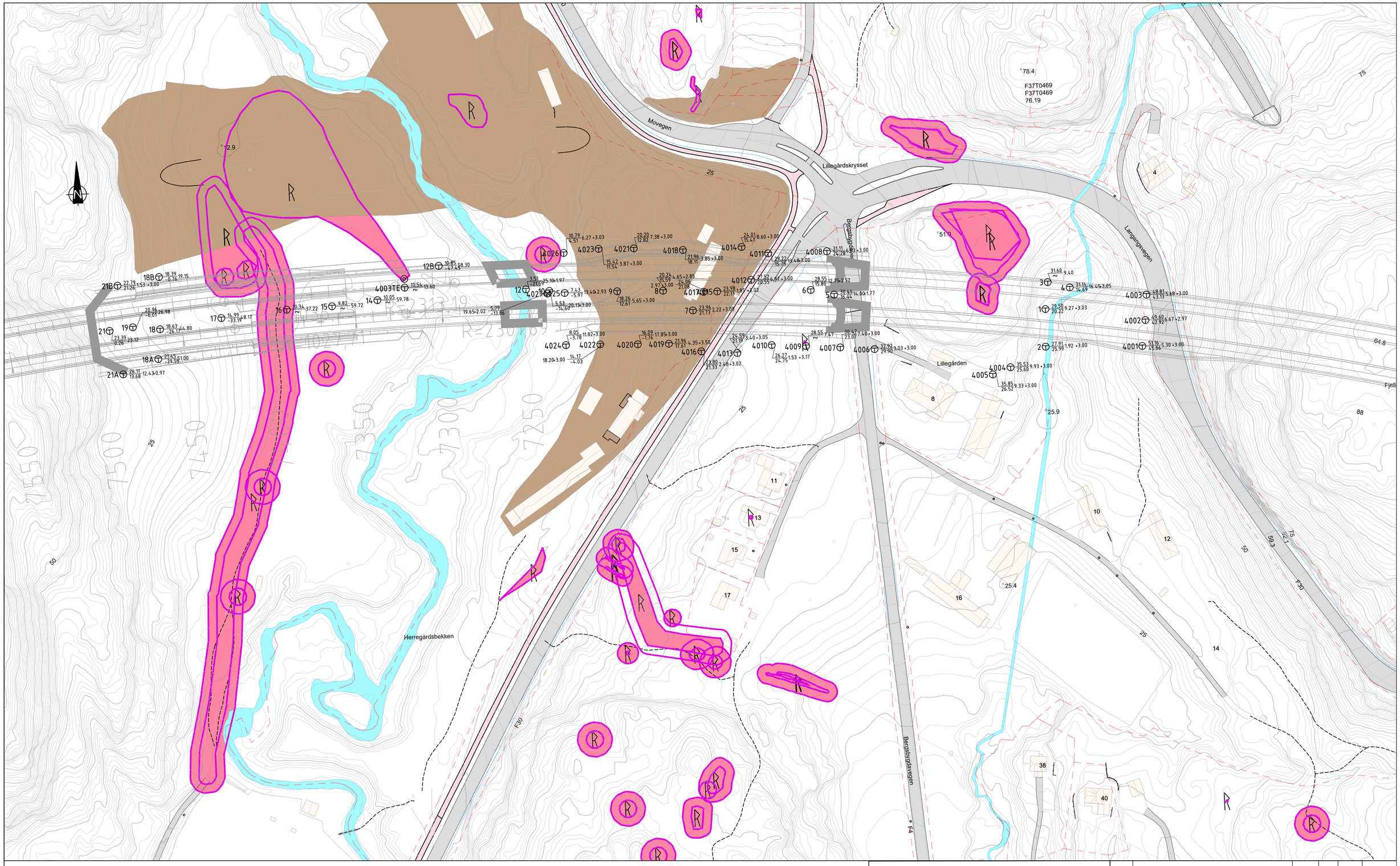
E18 Langangen - Rugtvedt
Ground Investigations
Plan Lanner (3500-4500)

Porsgrunn kommune

Utarbeidet av	Kontrollert av	Godkjent av	Konsulentarkiv
BG	MZ	AIW	19756

G01-G04 p2 regplan.dwg

27.06.2021



G01–G04 p2 regplan.dwg

27.06.2021

LEGEND

4001-4026 AND 1-25 ARE PERFORMED BY RAMBØLL BETWEEN 2016 - 2019

4003TE IS PERFORMED BY MULTICONSULT IN 2020

- TOTALSOUNDING
- SAMPLES
- CPTU SOUNDING

Revisjon	Revisjonen gjelder	Utarb	Kontr	Godkjent	Rev. dato

Saksnr.

NyeVeier

Utført av: EIFFAGE AFRY

Tegningsdato	27.06.2021
Bestiller	
Produsert for	

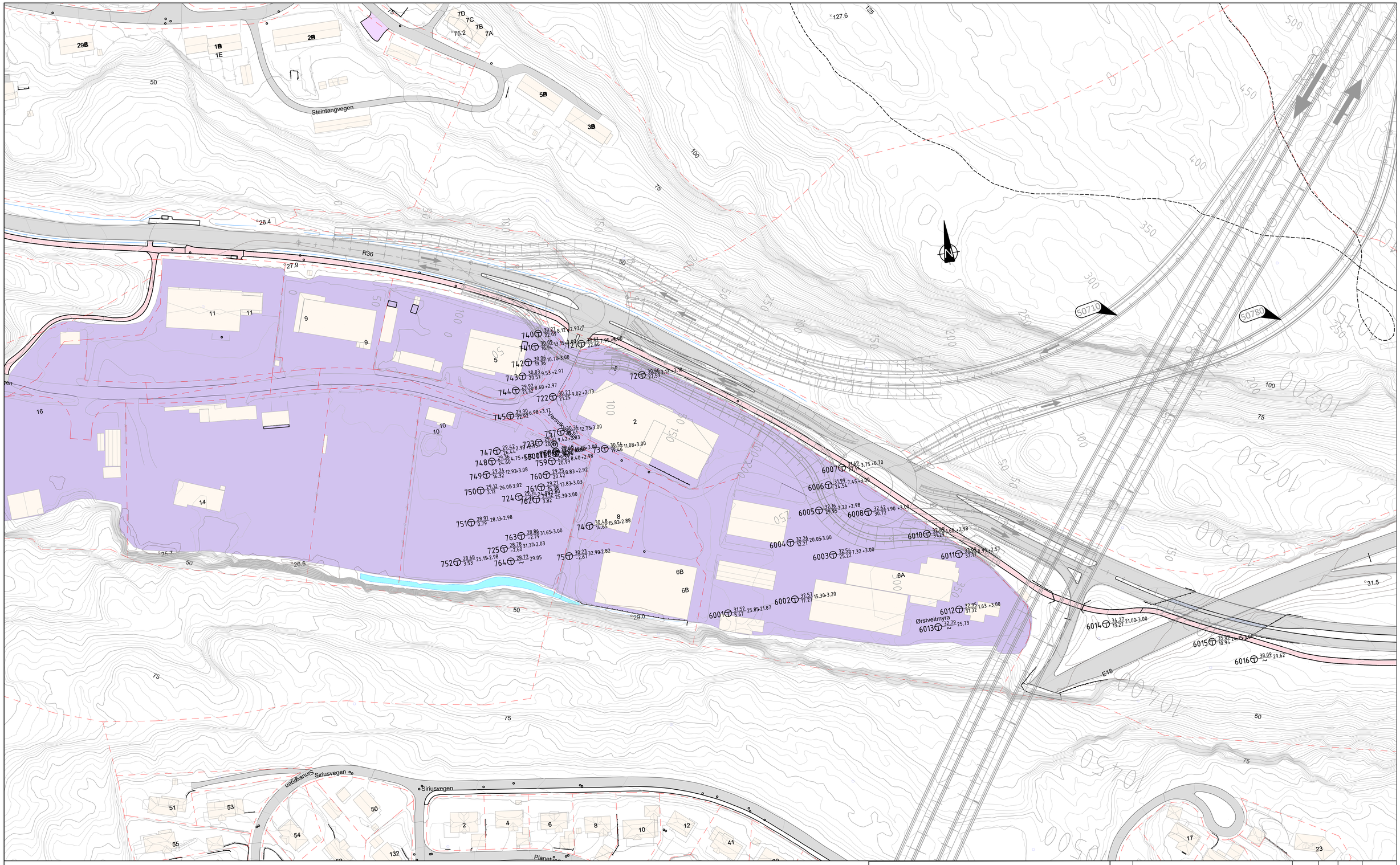
E18 Langangen - Rugtvedt
Ground Investigations
Plan Herregårdsbekken (7000-7400)

Porsgrunn kommune

Arkivreferanse	
Byggverksnummer	
Koordinatsystem	Euref89 NTM sone 9
Høydesystem	NN2000
Målestokk A1	1:1000
Halv målestokk A3	1:500

Utarbeidet av	Kontrollert av	Godkjent av	Konsulentarkiv
BG	MZ	AIW	19756

Tegningsnummer/revisjonsbokstav: P2-G02



LEGEND

72-75, 740-764 AND 6001-6016 ARE PERFORMED BY RAMBØLL BETWEEN 2016 - 2019

5001TE IS PERFORMED BY MULTICONSULT IN 2020

- TOTALSOUNDING
- SAMPLES
- CPTU SOUNDING

Revisjon	Revisjonen gjelder	Utarb	Kontr	Godkjent	Rev. dato

Saksnr.

NyeVeier — Utført av: EIFFAGE, AFRY

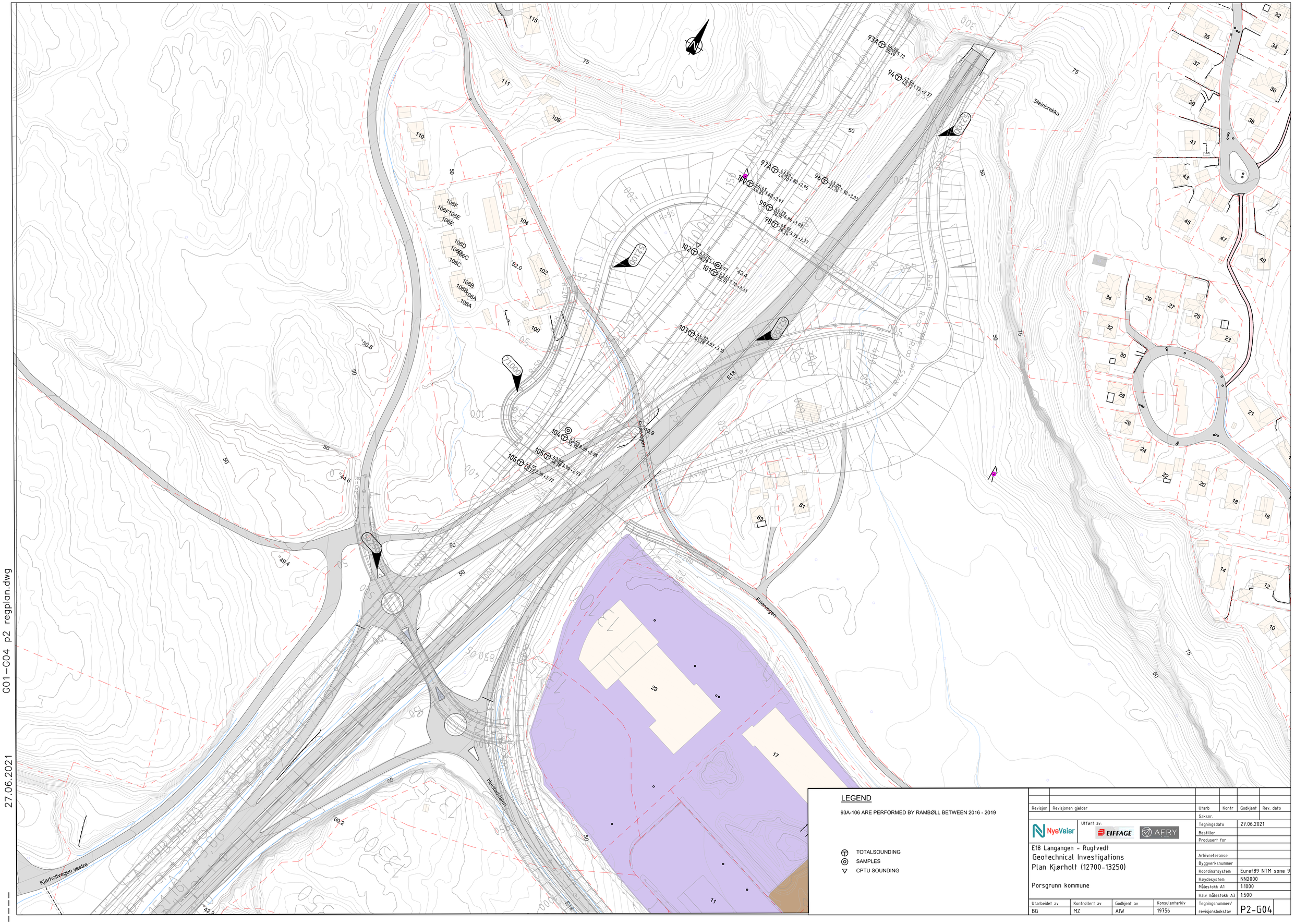
E18 Langangen - Rugtvedt
Geotechnical Investigations
Plan Skjelviksdalen (10350-10550)

Porsgrunn kommune

Tegningsdato	27.06.2021
Bestiller	
Produsert for	
Arkivreferanse	
Byggverksnummer	
Koordinatsystem	Euref89 NTM sone 9
Høydesystem	NN2000
Målestokk A1	1:1000
Halv målestokk A3	1:500
Tegningsnummer/ revisjonsbokstav	P2-G03

Utarbeidet av	Kontrollert av	Godkjent av	Konsulentarkiv
BG	MZ	AIW	19756

27.06.2021 G01-G04 p2 regplan.dwg



LEGEND

93A-106 ARE PERFORMED BY RAMBØLL BETWEEN 2016 - 2019

- TOTALSOUNDING
- SAMPLES
- CPTU SOUNDING

Revisjon	Revisjonen gjelder	Utarb	Kontr	Godkjent	Rev. dato
		Saksnr.			

NyeVeier

Utført av: EIFFAGE AFRY

Tegningsdato	27.06.2021
Bestiller	
Produsert for	
Arkivreferanse	
Byggverksnummer	
Koordinatsystem	Euref89 NTM sone 9
Høydesystem	NN2000
Målestokk A1	1:1000
Halv målestokk A3	1:500
Tegningsnummer/ revisjonsbokstav	P2-G04

E18 Langangen – Rugtvedt
Geotechnical Investigations
Plan Kjørholt (12700-13250)

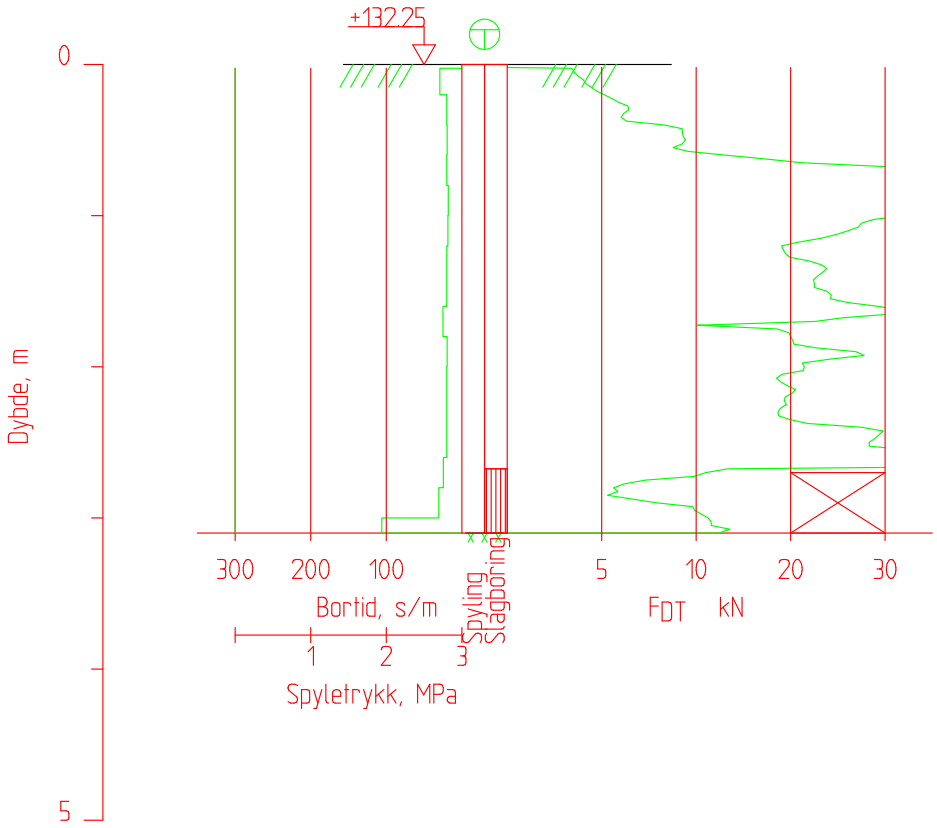
Porsgrunn kommune

Utarbeidet av	Kontrollert av	Godkjent av	Konsulentarkiv
BG	MZ	AIW	19756

G01–G04 p2 regplan.dwg

27.06.2021

3001TE



Posisjon: X 1123341.16 Y 114884.08

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3001TE

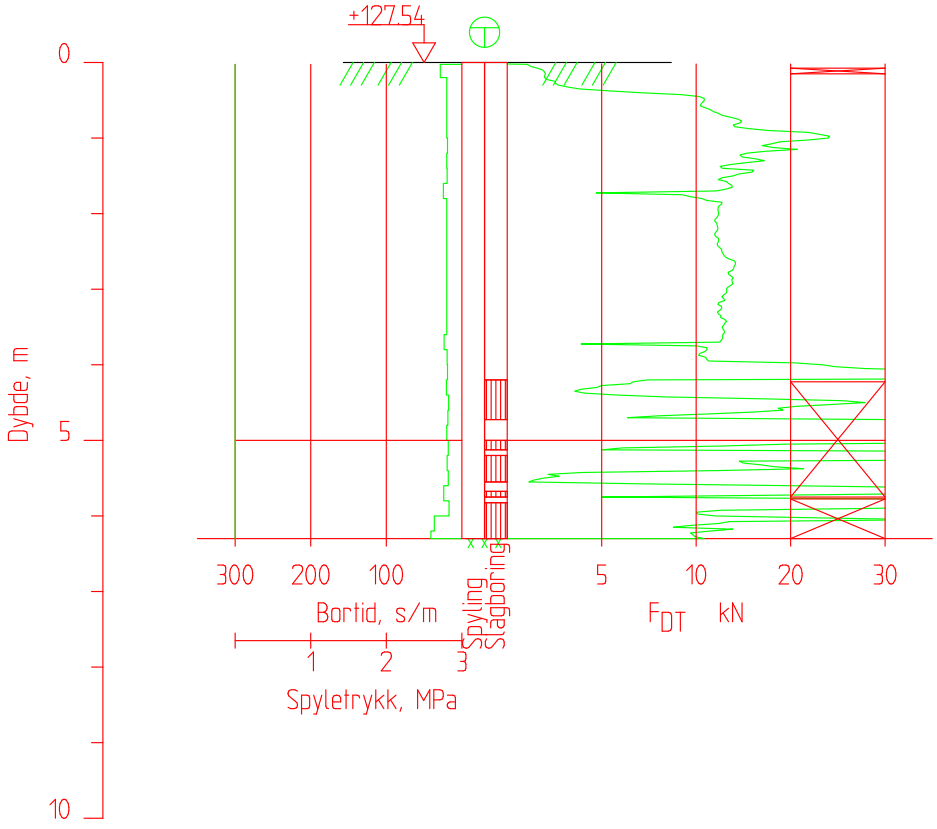
M = 1 : 50

Dato boret :22.06.2020

BG

19756

3003TE



Posisjon: X 1123313.63 Y 114830.45

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

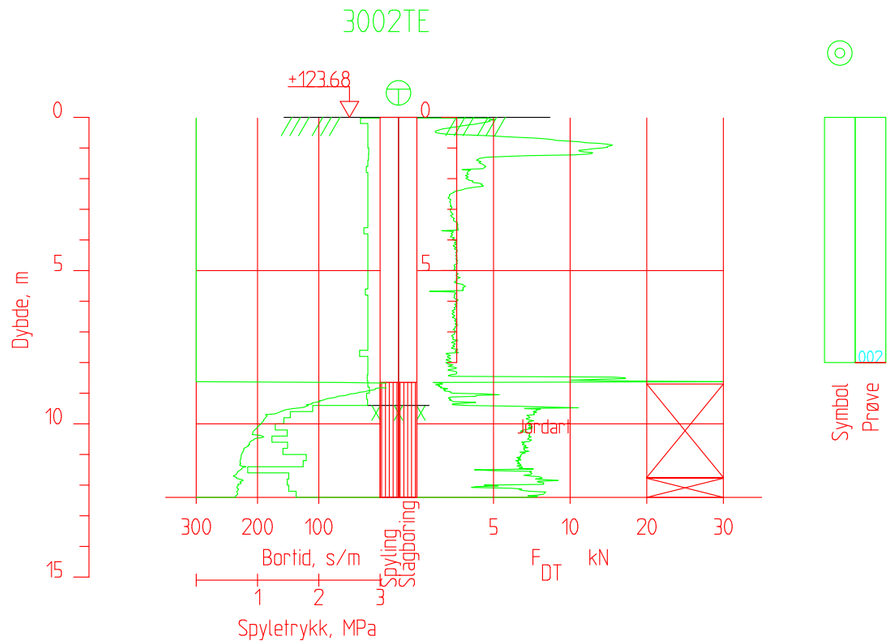
Borhull 3003TE

M = 1 : 100

Dato boret :22.06.2020

BG

19756



Posisjon: X 1123282.10 Y 114854.40

Totalsondering Borprofil

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3002TE

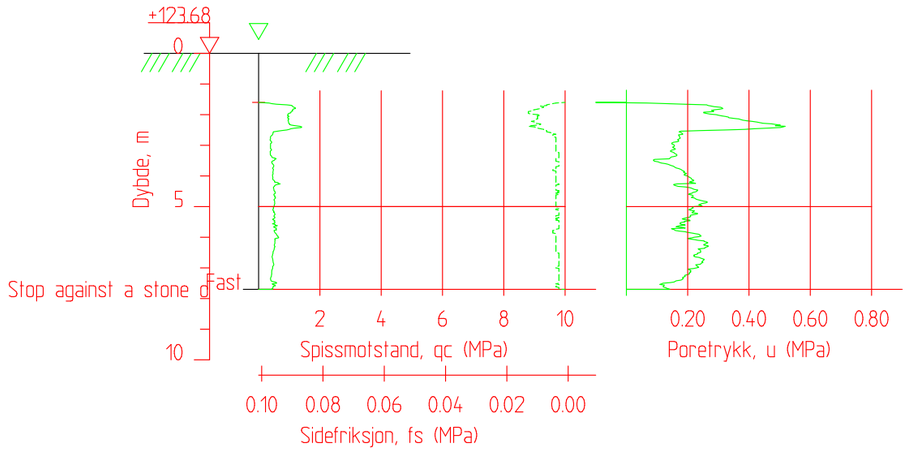
M = 1 : 200

Dato boret :22.06.2020

BG

19756

3002TEC



Posisjon: X 1123282.10 Y 114854.40

CPT-sondering

EIFFAGE

E18 Langangen Rugtvedt

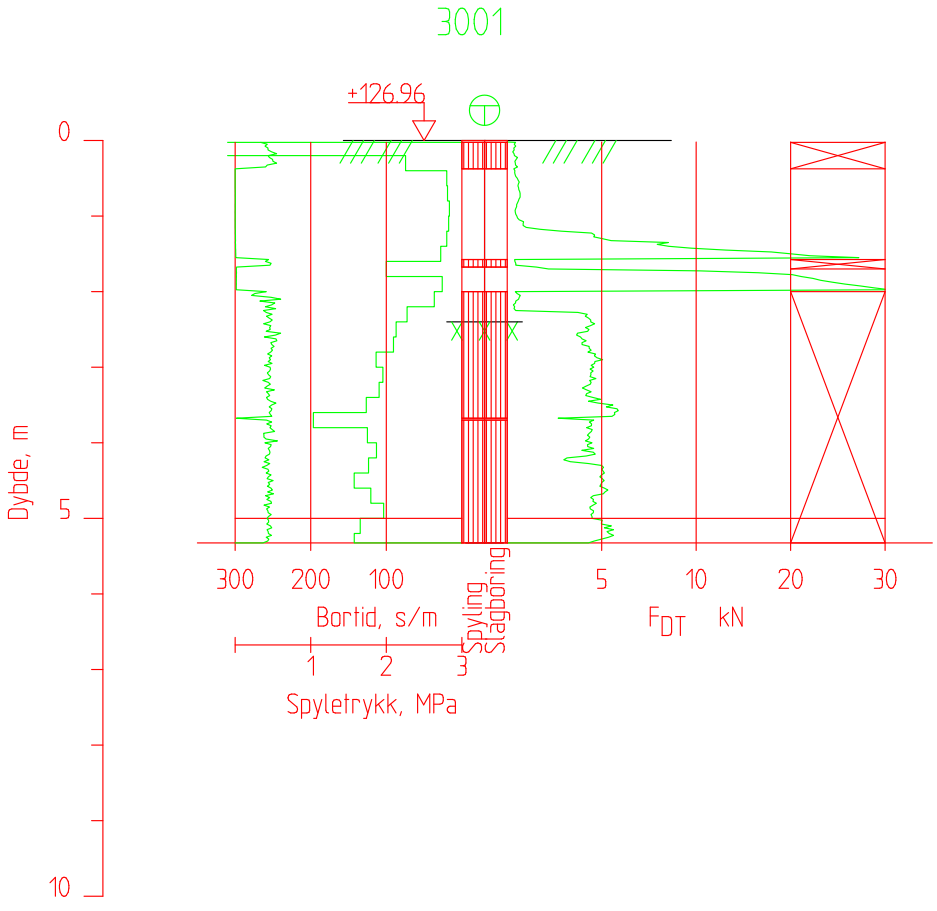
Borhull 3002TEC

M = 1 : 200

Dato boret :23.06.2020

BG

19756



Posisjon: X 1123141.17 Y 115097.31

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

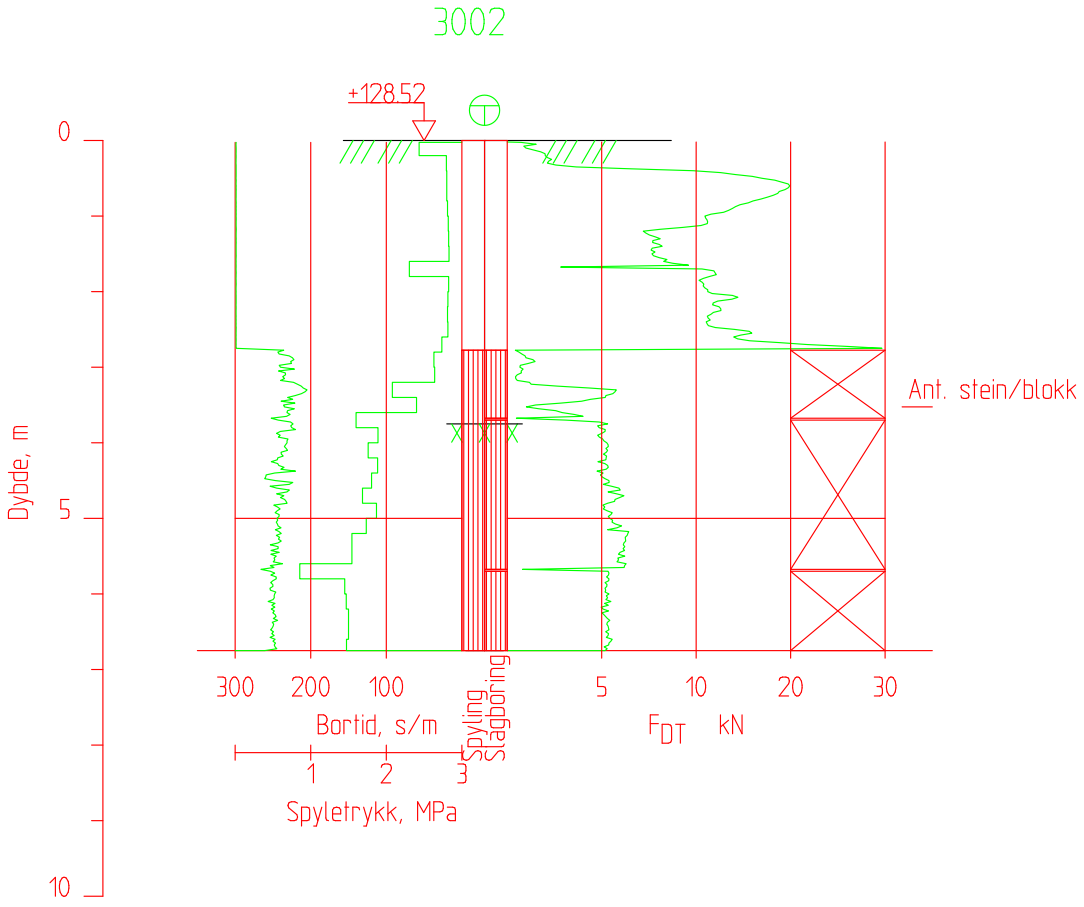
Borhull 3001

M = 1 : 100

Dato boret :27.06.2017

BG

19756



Posisjon: X 1123126.07 Y 115109.42

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

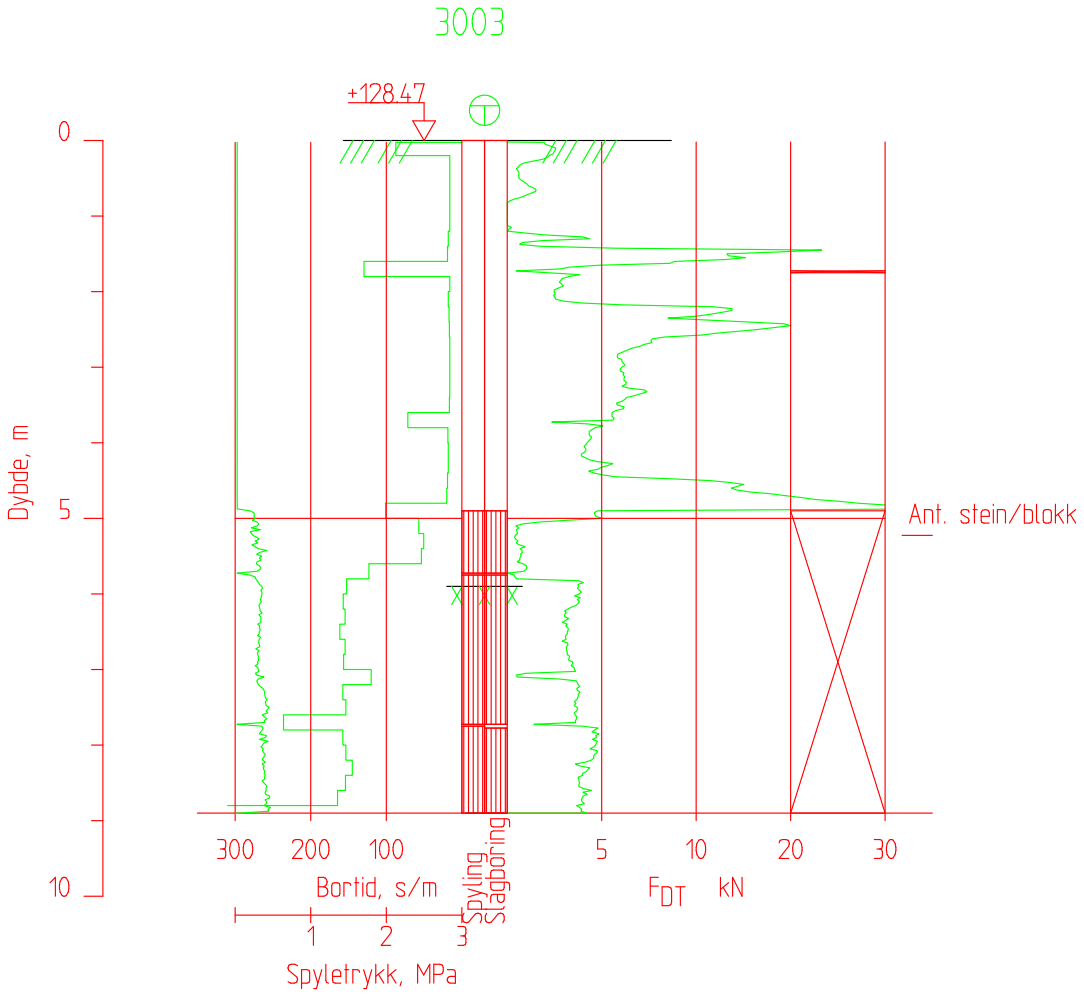
Borhull 3002

M = 1 : 100

Dato boret :27.06.2017

BG

19756



Posisjon: X 1123114.19 Y 115126.46

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3003

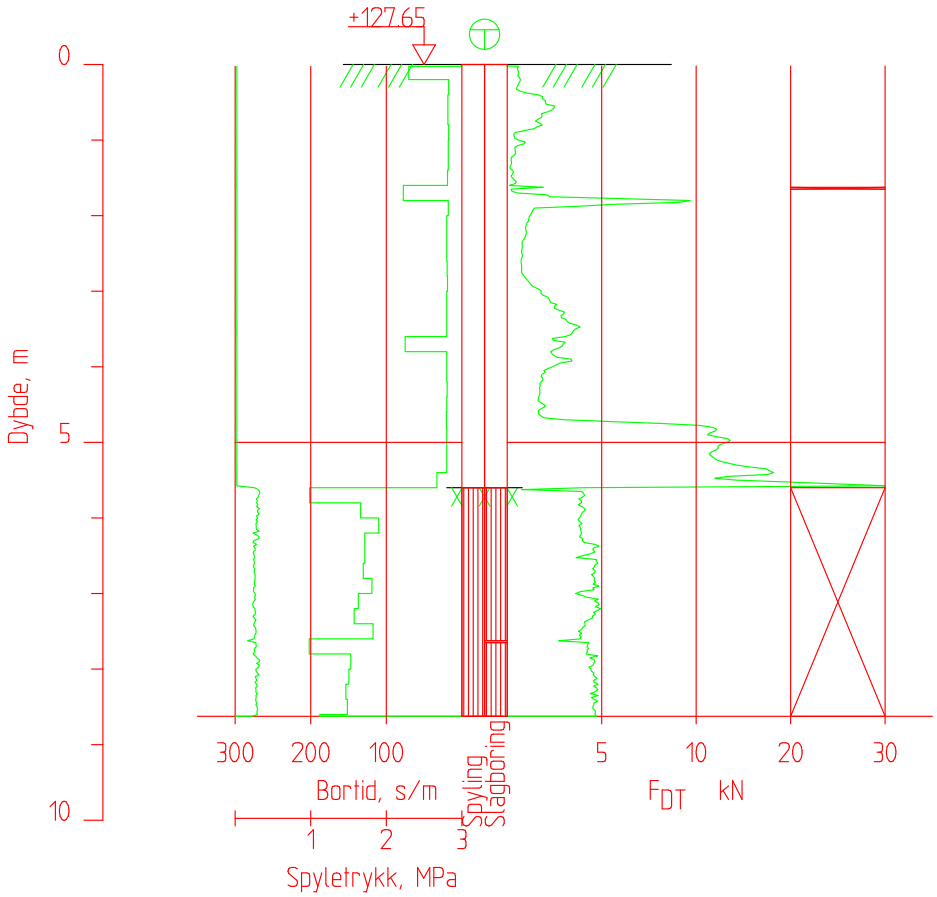
M = 1 : 100

Dato boret :27.06.2017

BG

19756

3004



Posisjon: X 1123099.81 Y 115139.97

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

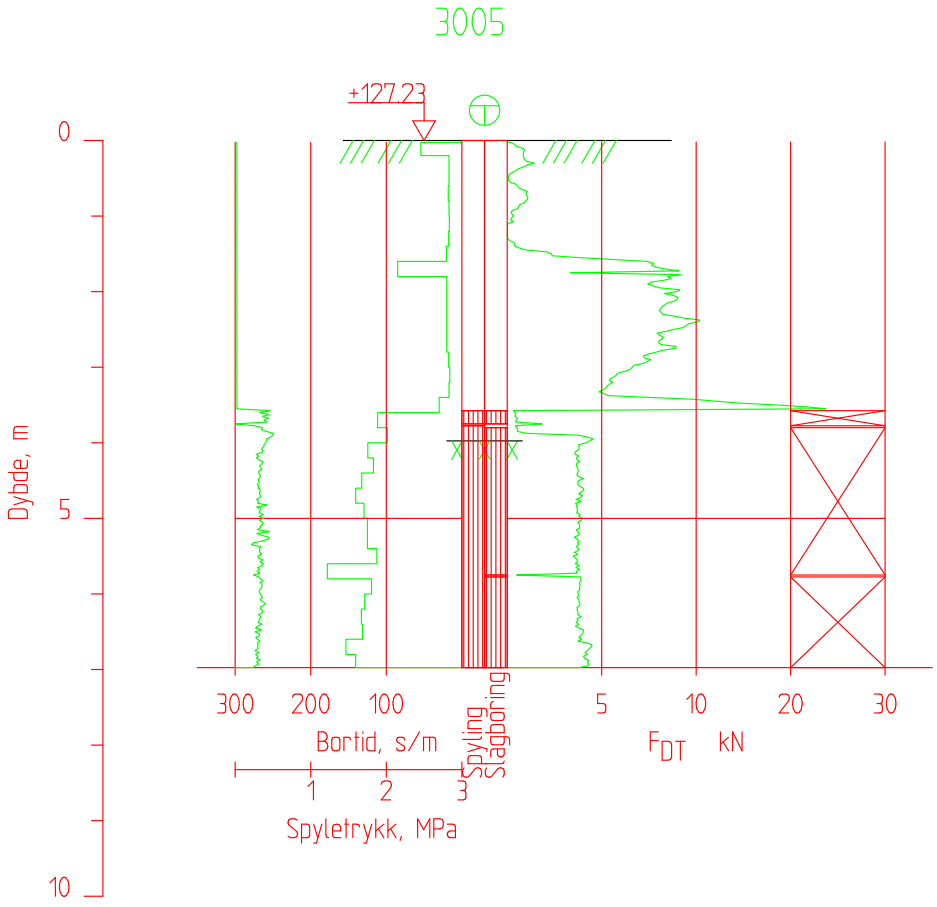
Borhull 3004

M = 1 : 100

Dato boret :26.06.2017

BG

19756



Posisjon: X 1123078.07 Y 115160.24

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3005

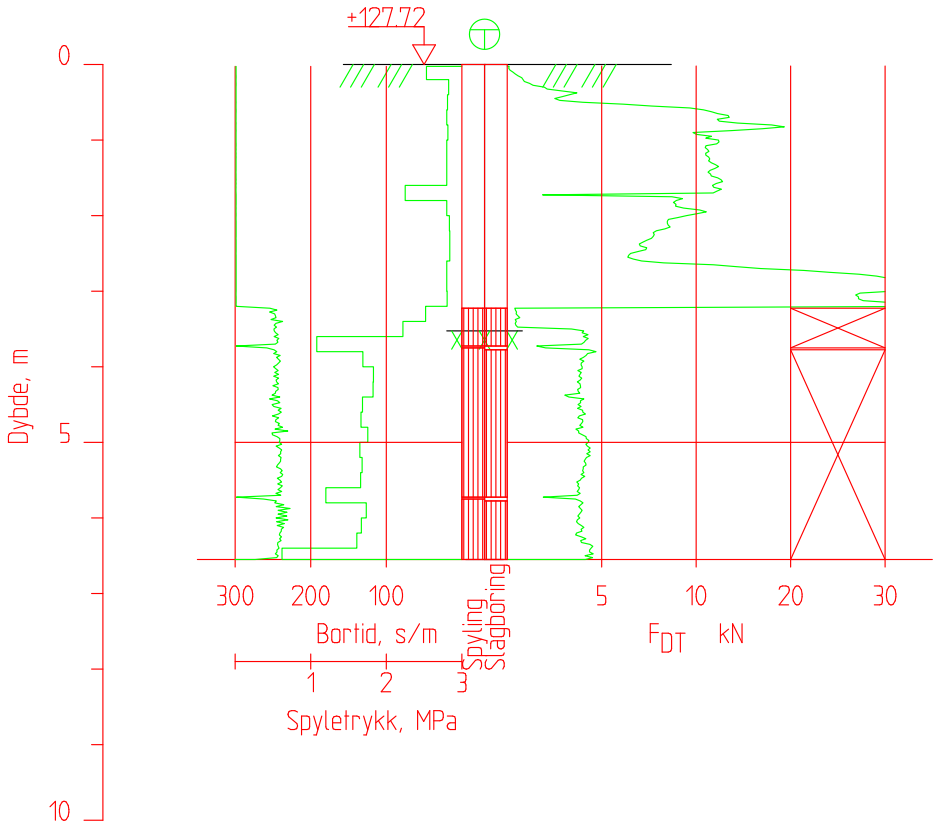
M = 1 : 100

Dato boret :26.06.2017

BG

19756

3006



Posisjon: X 1123055.72 Y 115180.26

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

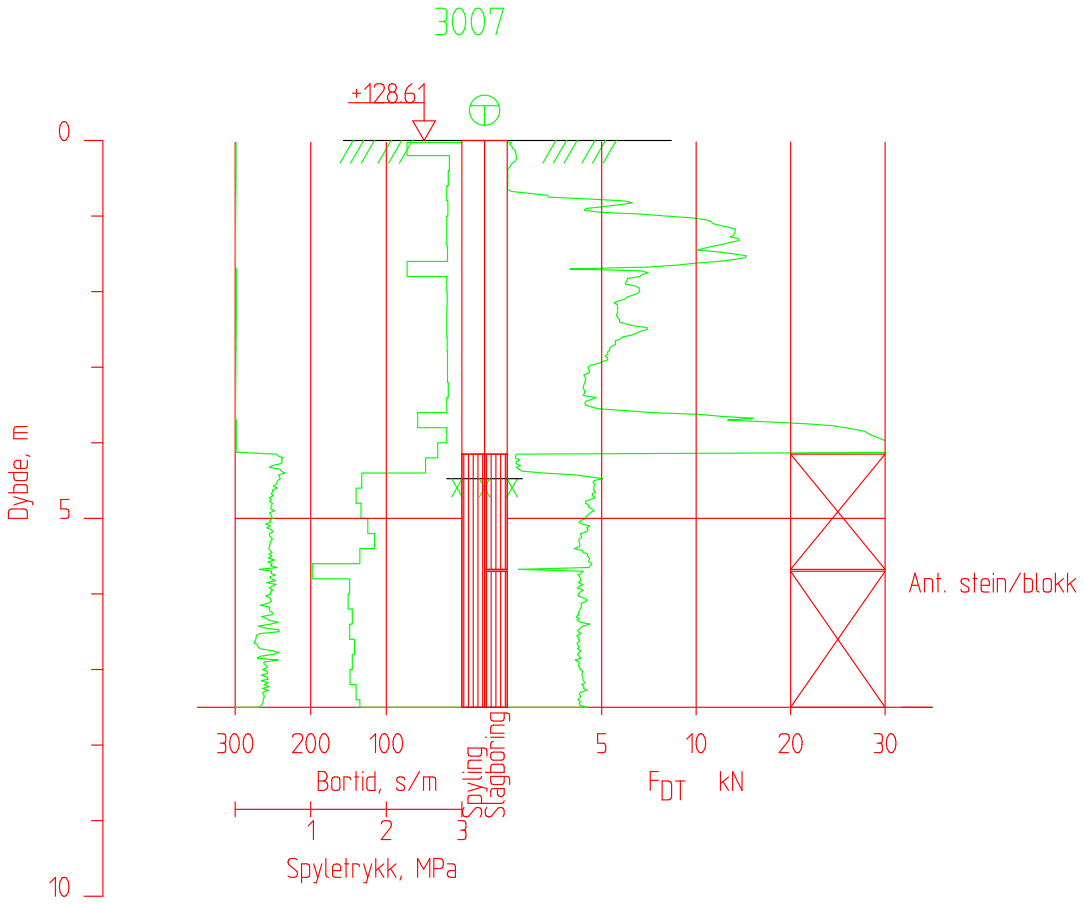
Borhull 3006

M = 1 : 100

Dato boret :26.06.2017

BG

19756



Posisjon: X 112302.62 Y 115218.38

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

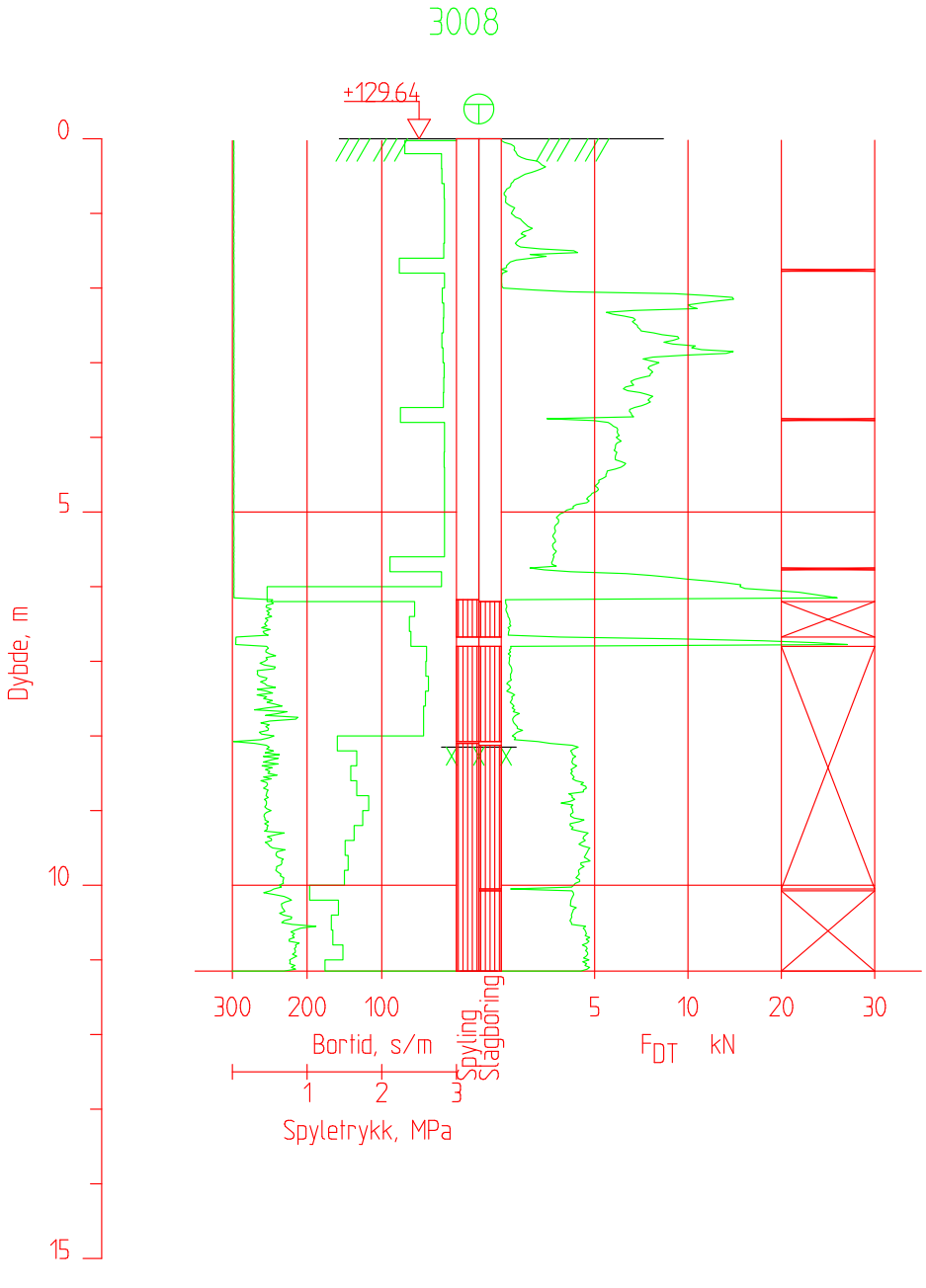
Borhull 3007

M = 1 : 100

Dato boret :26.06.2017

BG

19756



Posisjon: X 1122992.47 Y 115245.13

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3008

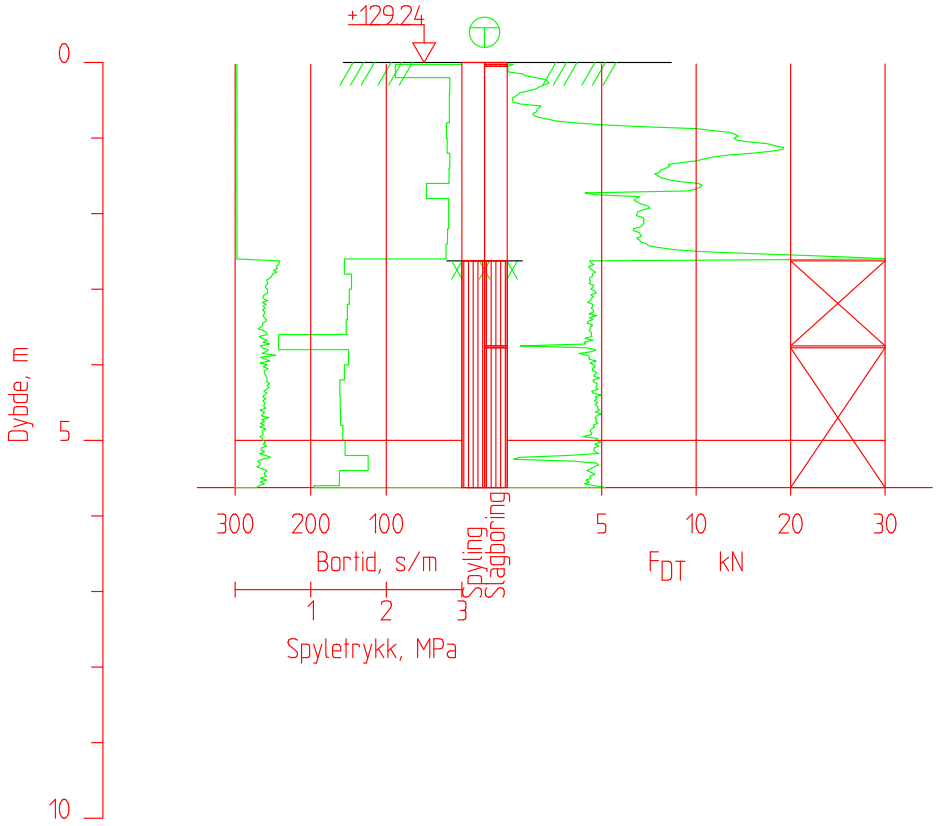
M = 1 : 100

Dato boret :26.06.2017

BG

19756

3009



Posisjon: X 1122961.71 Y 115267.37

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

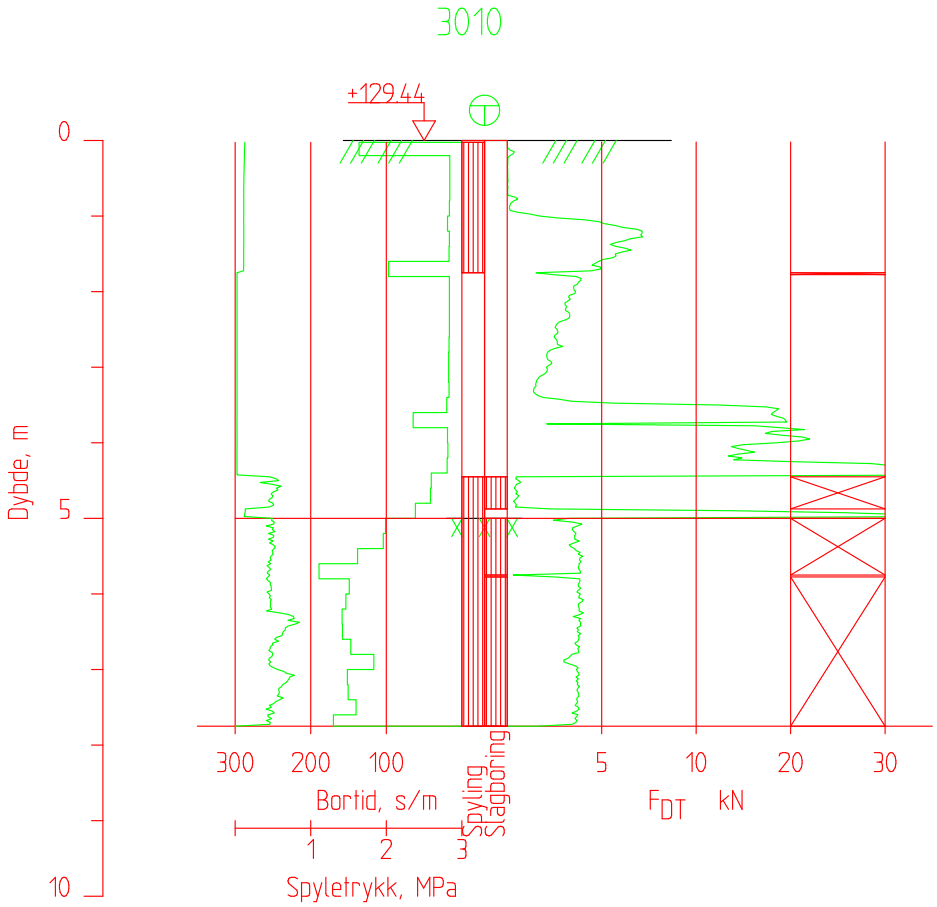
Borhull 3009

M = 1 : 100

Dato boret :26.06.2017

BG

19756



Posisjon: X 1122929.53 Y 115293.64

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

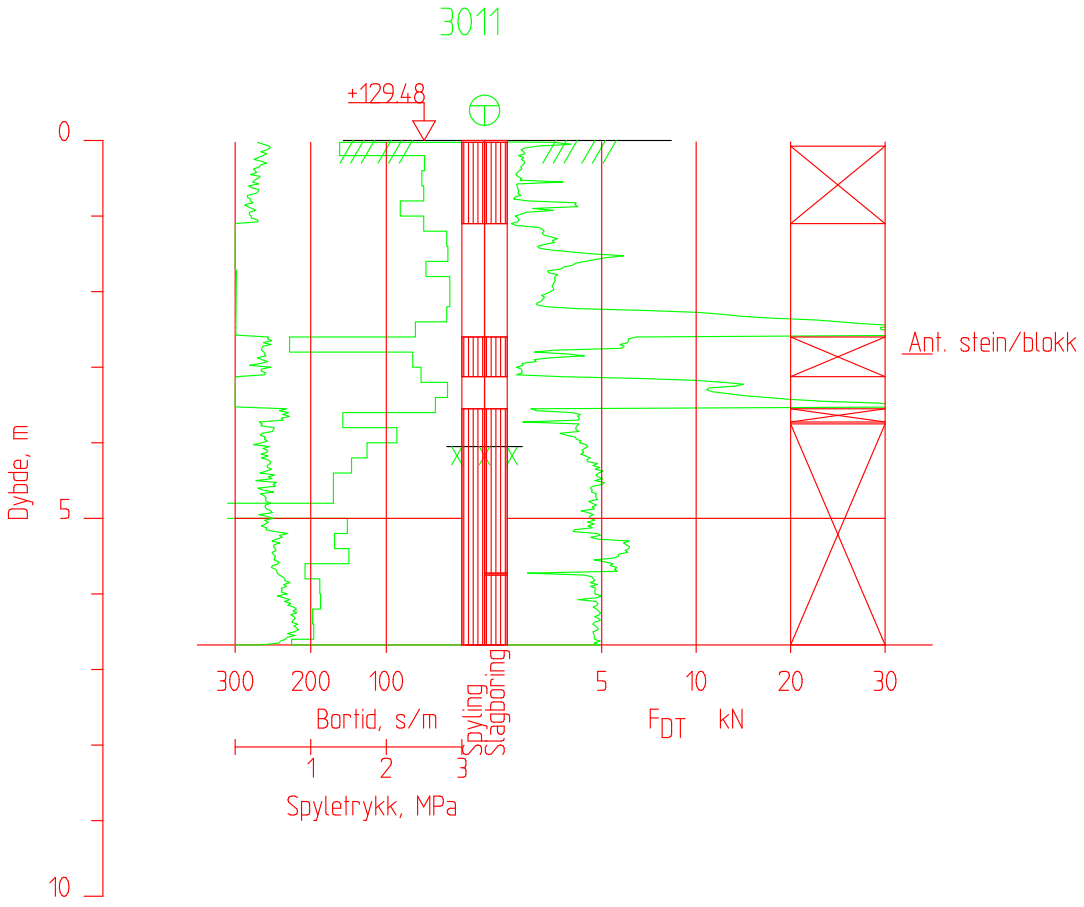
Borhull 3010

M = 1 : 100

Dato boret :26.06.2017

BG

19756



Posisjon: X 1122896.86 Y 115316.81

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3011

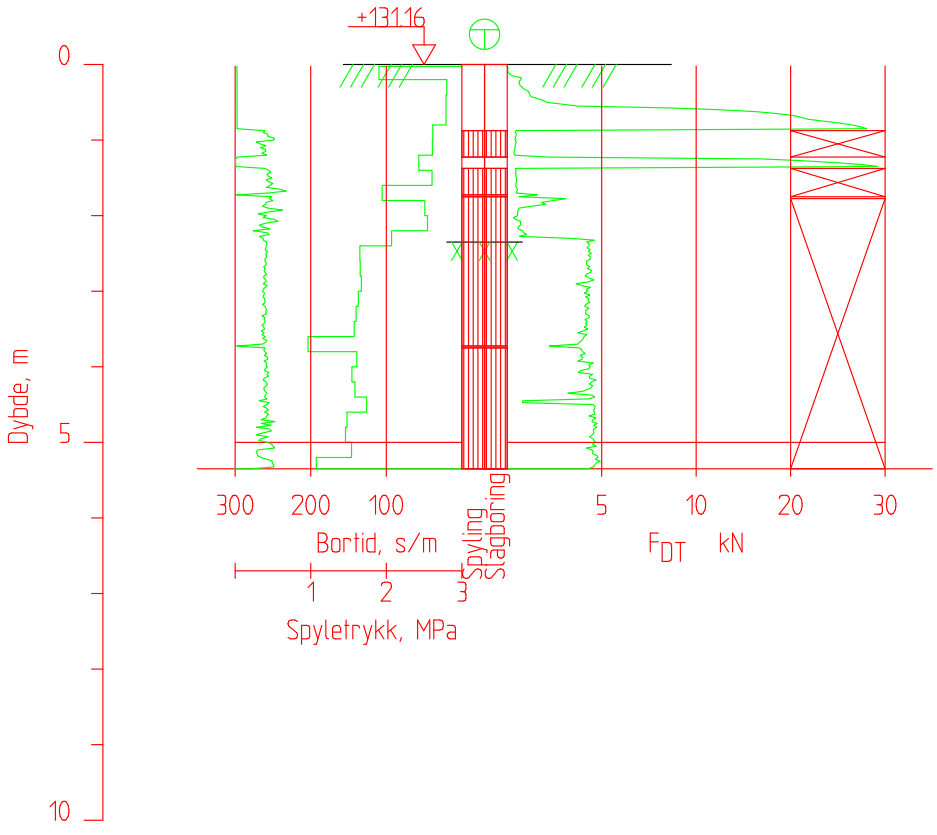
M = 1 : 100

Dato boret :22.06.2017

BG

19756

3015



Posisjon: X 1123220.05 Y 114961.10

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3015

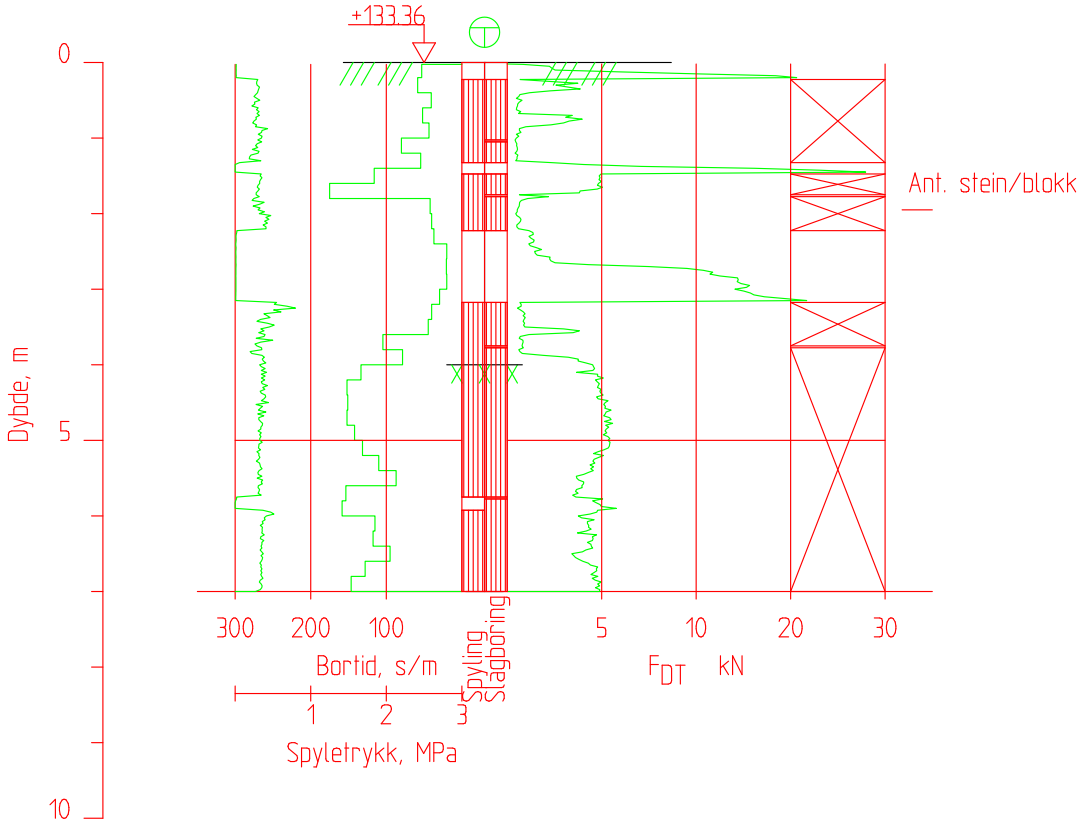
M = 1 : 100

Dato boret :27.06.2017

BG

19756

3016



Posisjon: X 1123221.62 Y 114932.44

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3016

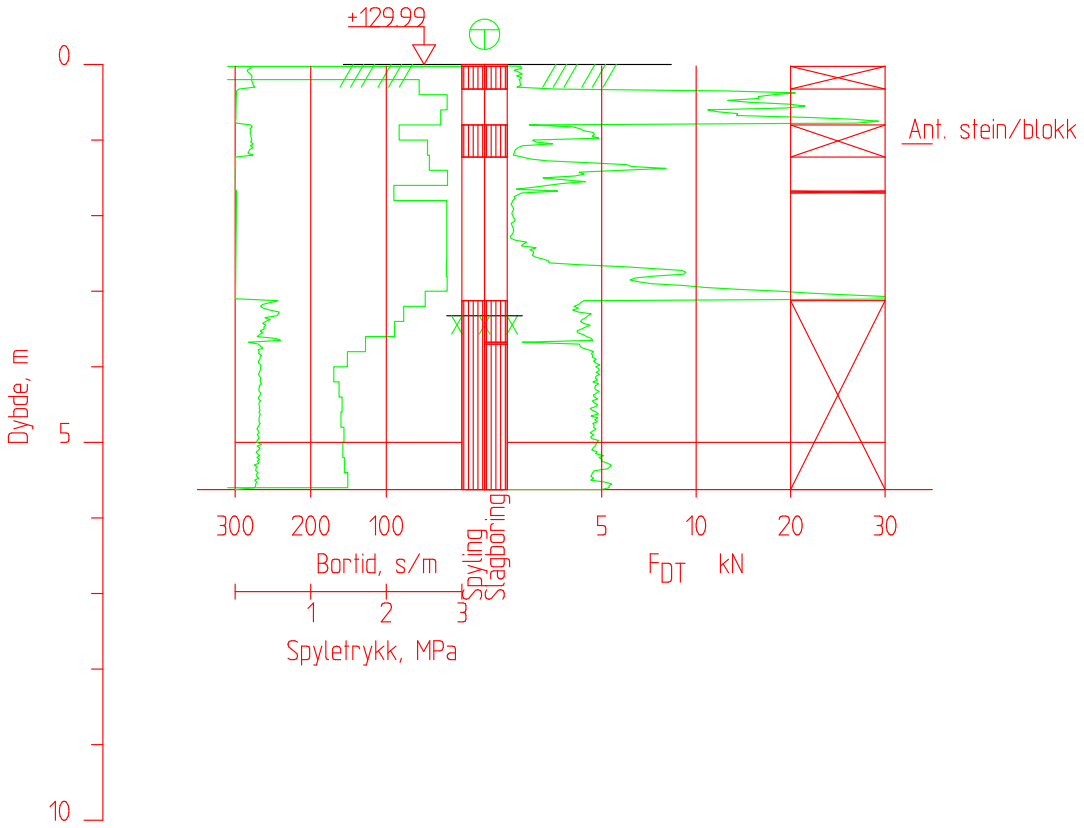
M = 1 : 100

Dato boret :27.06.2017

BG

19756

3017



Posisjon: X 1123222.93 Y 114882.04

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3017

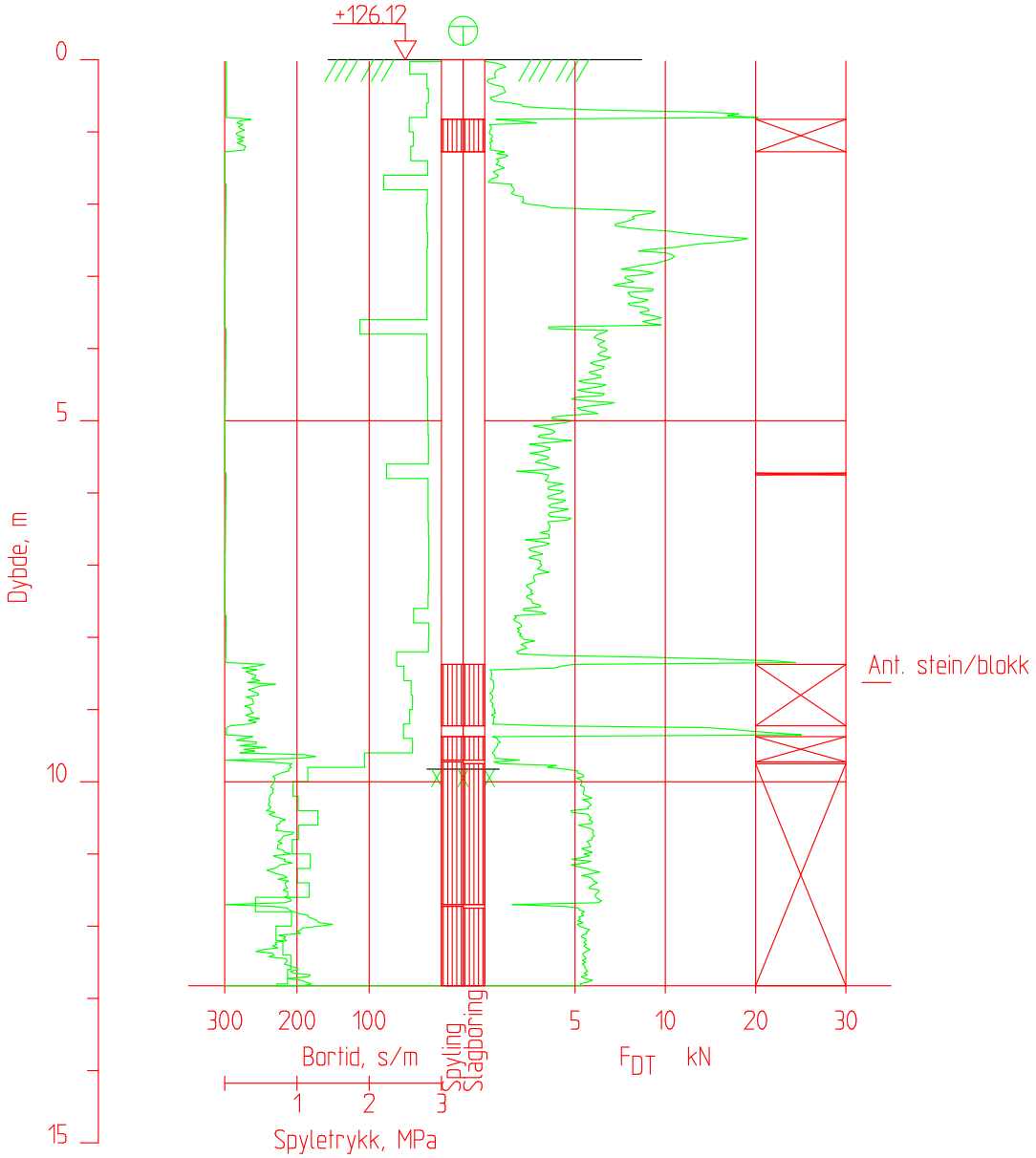
M = 1 : 100

Dato boret :27.06.2017

BG

19756

3018



Posisjon: X 1123229.52 Y 114849.31

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3018

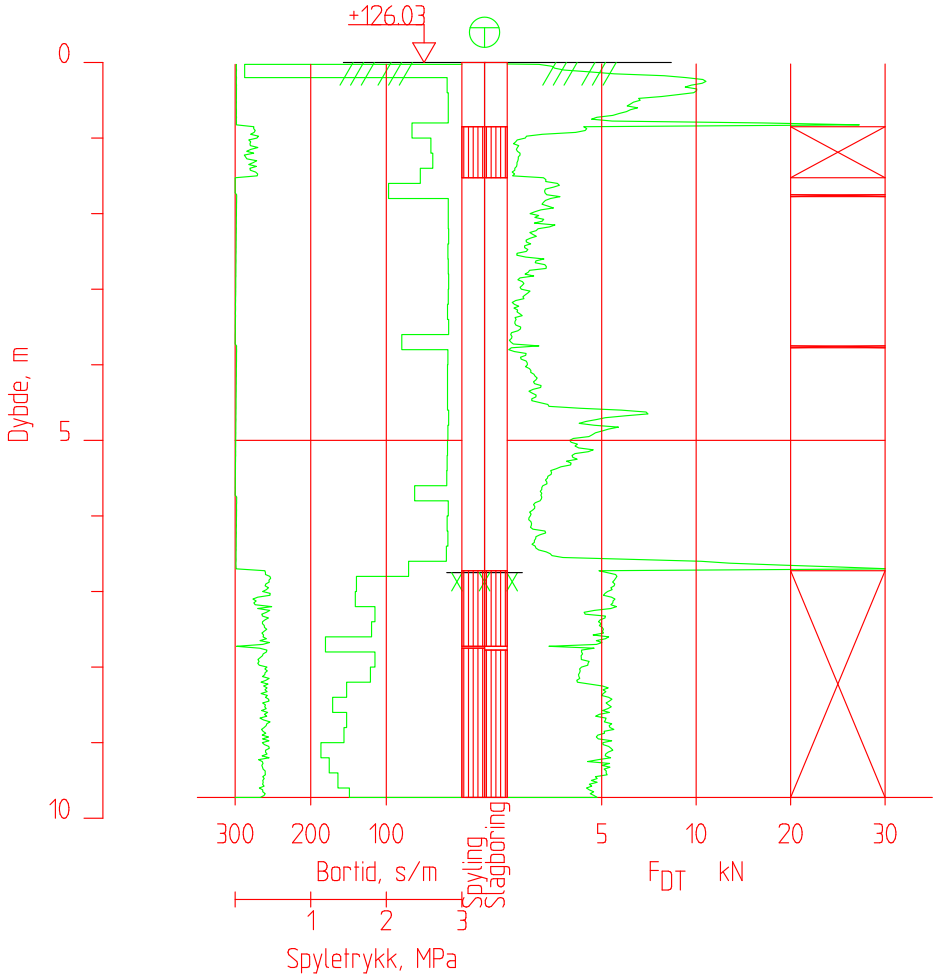
M = 1 : 100

Dato boret :27.06.2017

BG

19756

3019



Posisjon: X 1123222.63 Y 114820.72

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

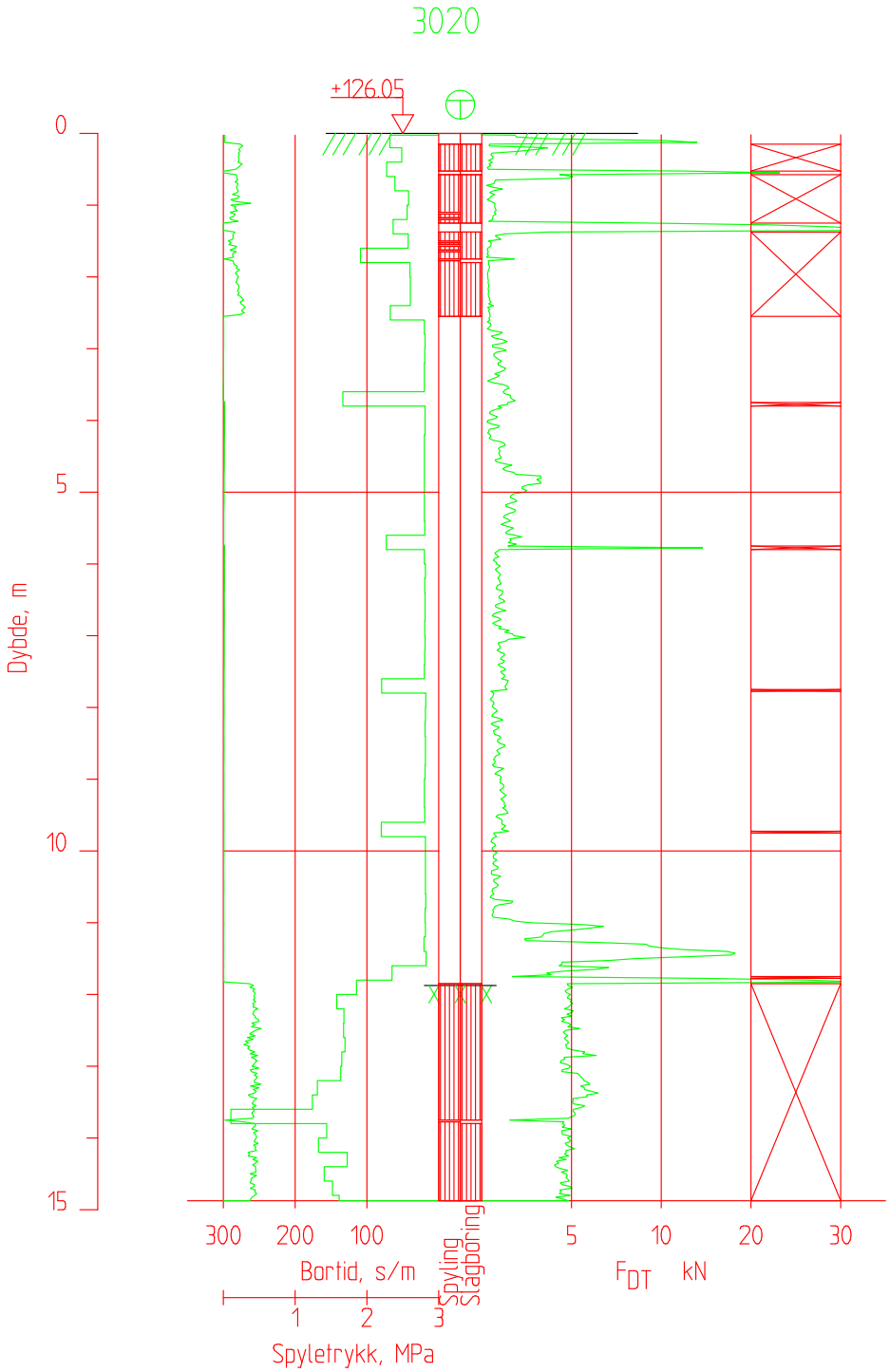
Borhull 3019

M = 1 : 100

Dato boret :27.06.2017

BG

19756



Posisjon: X 1123063.43 Y 115114.29

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3020

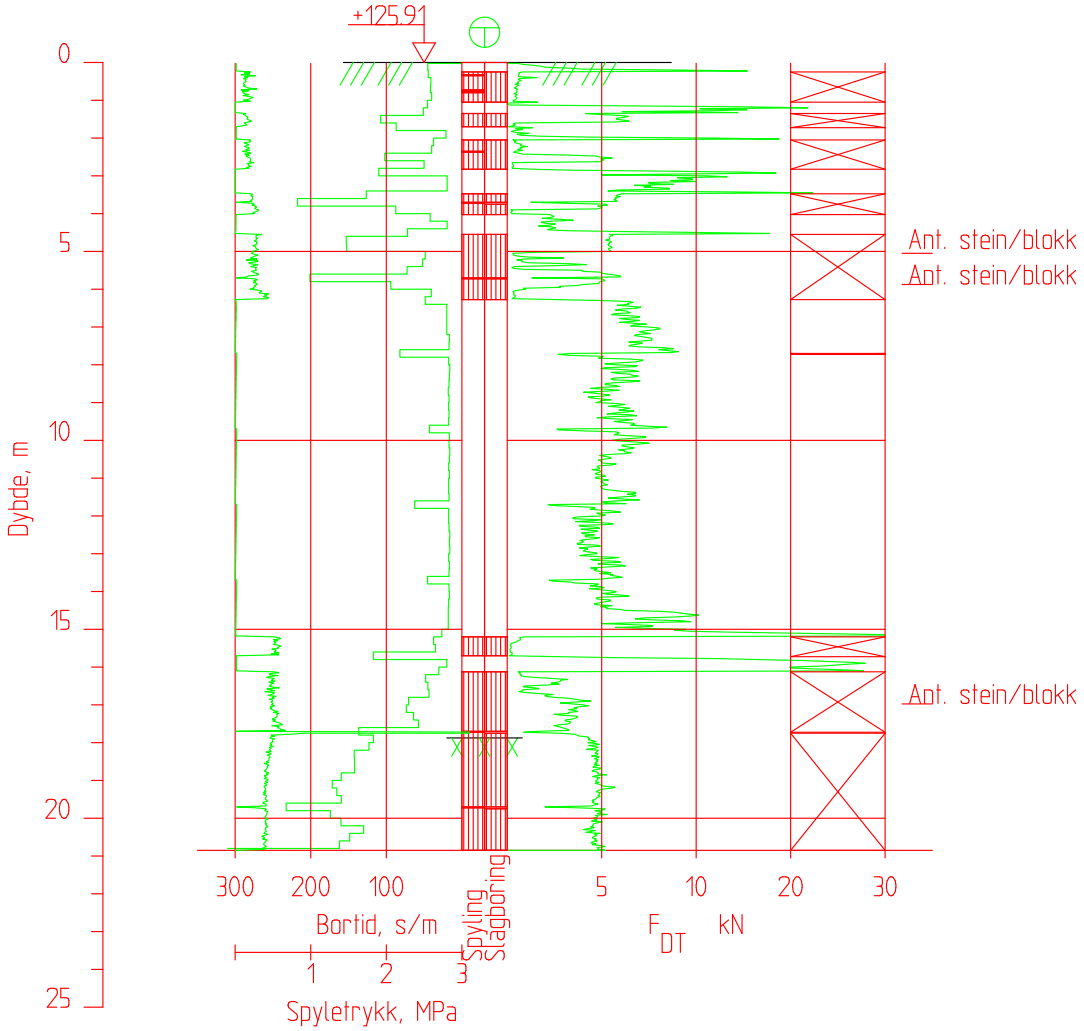
M = 1 : 100

Dato boret :27.06.2017

BG

19756

3021



Posisjon: X 1123046.82 Y 115124.92

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3021

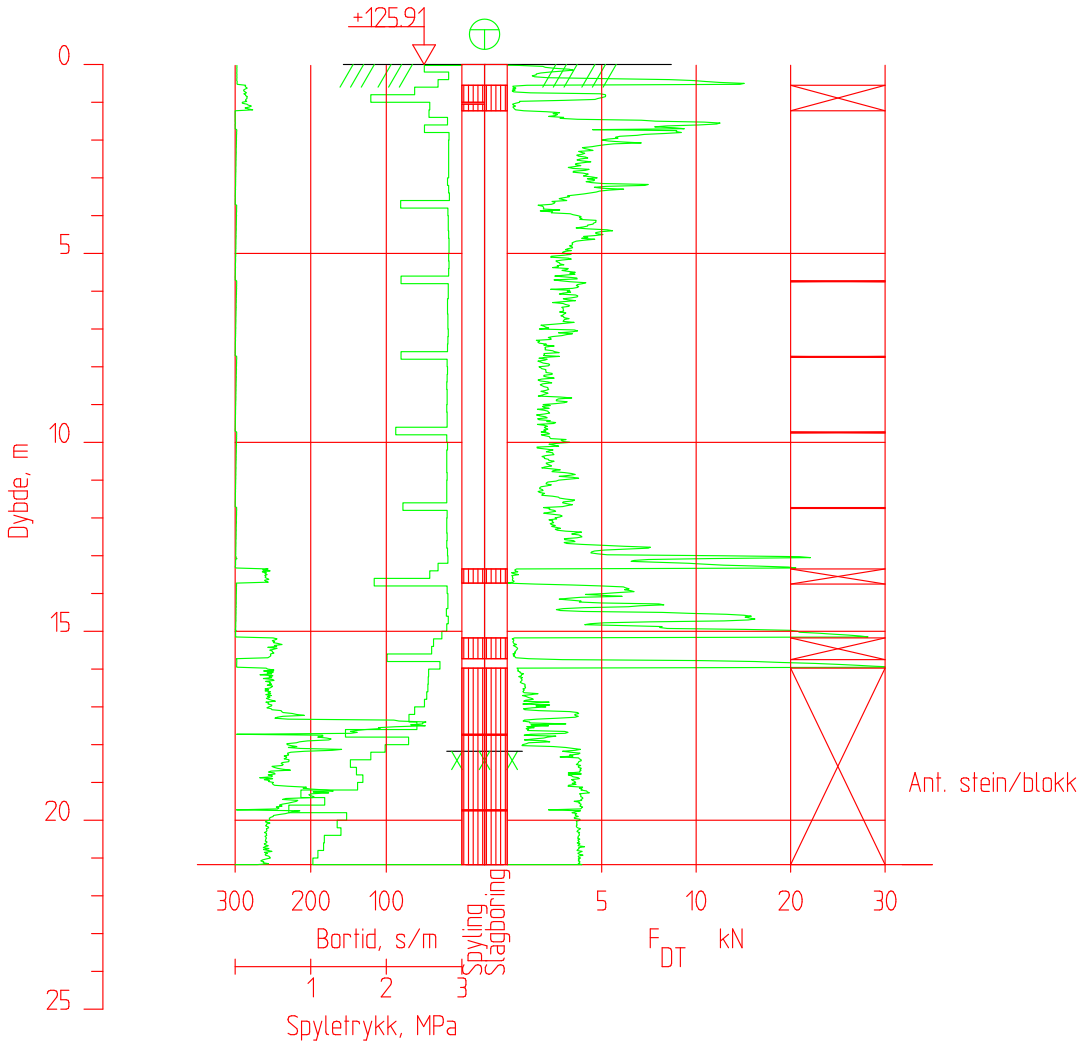
M = 1 : 200

Dato boret :27.06.2017

BG

19756

3022



Posisjon: X 1123021.77 Y 115139.37

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

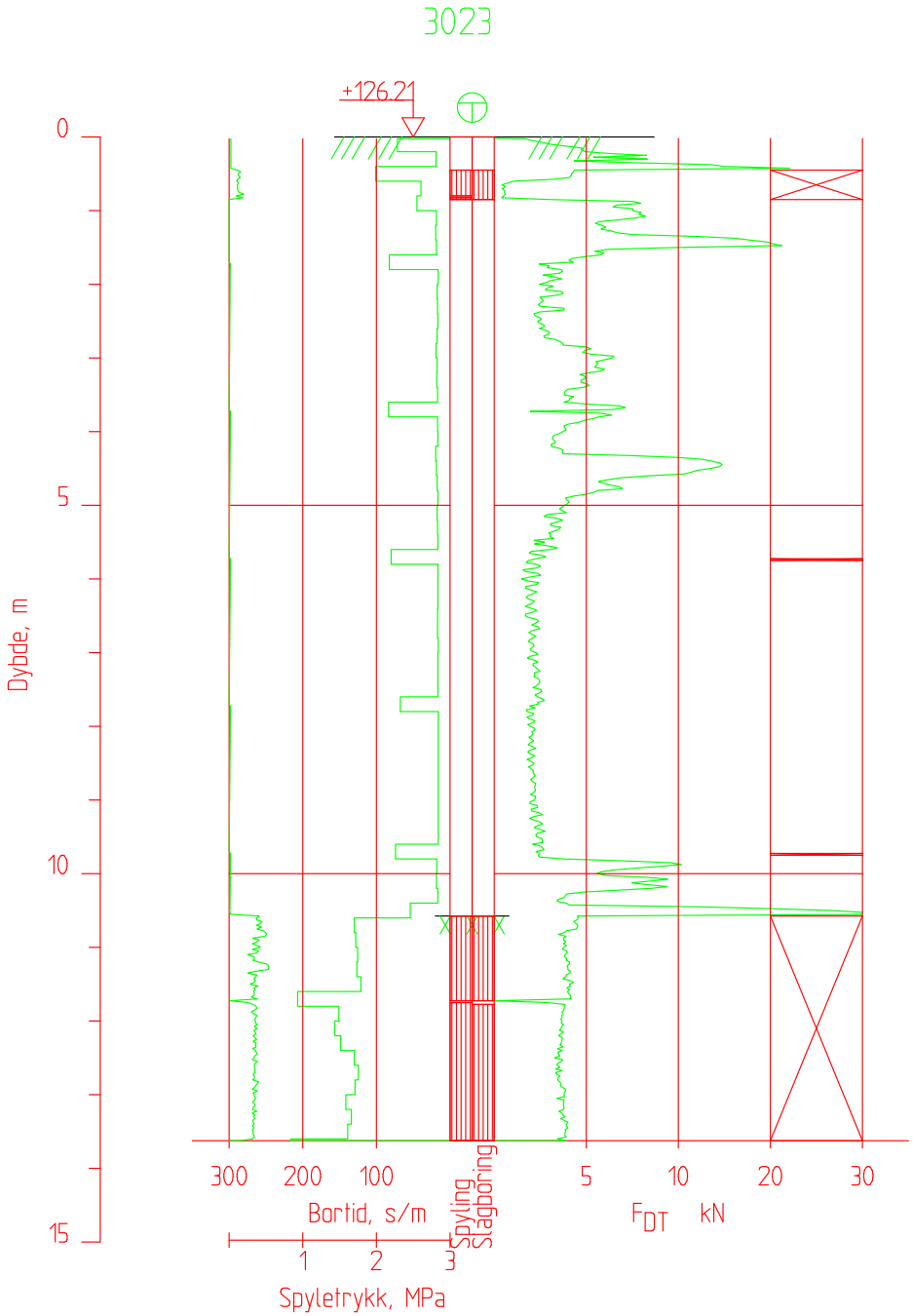
Borhull 3022

M = 1 : 200

Dato boret :28.06.2017

BG

19756



Posisjon: X 1122995.55 Y 115157.98

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3023

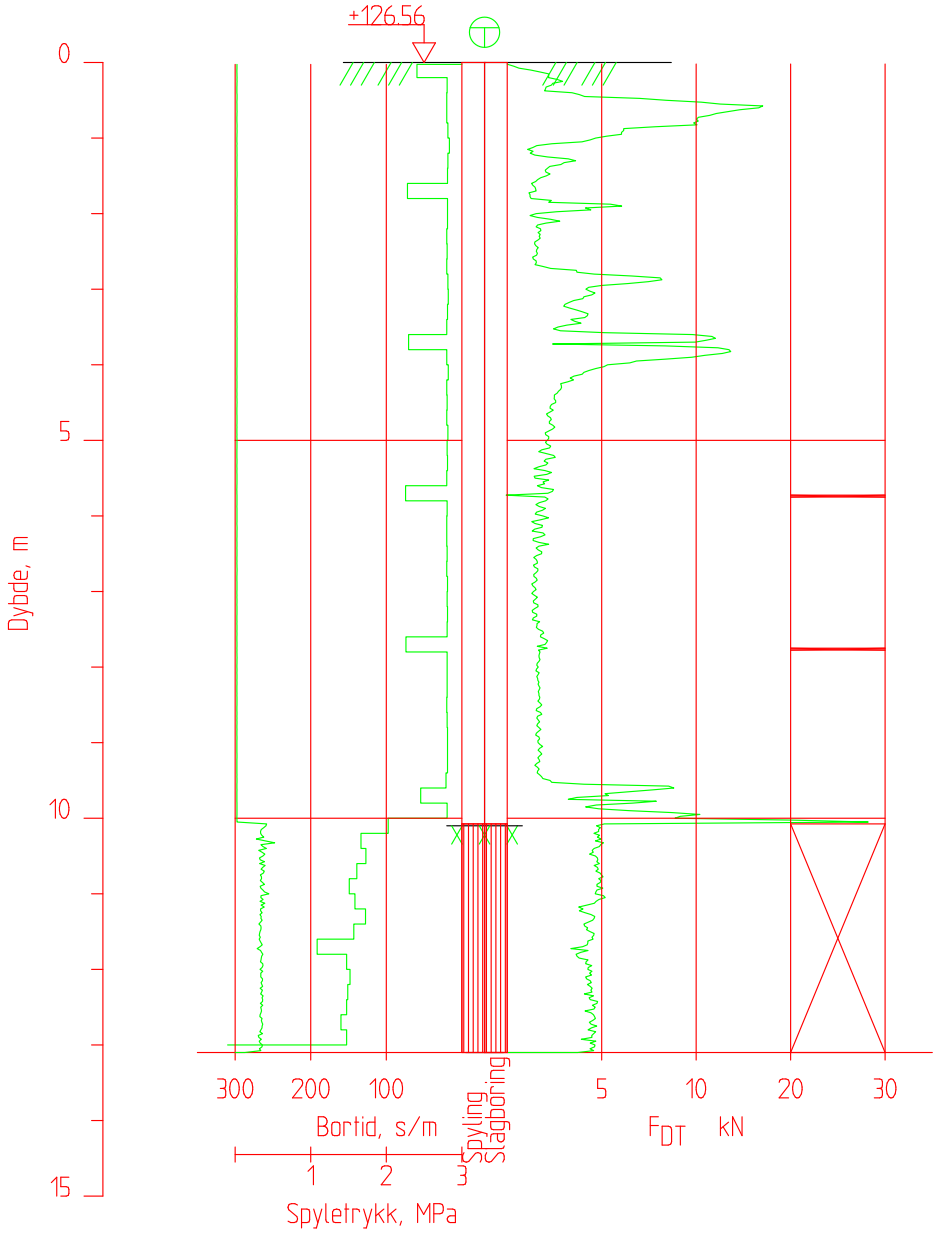
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3024



Posisjon: X 1122977.61 Y 115167.42

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3024

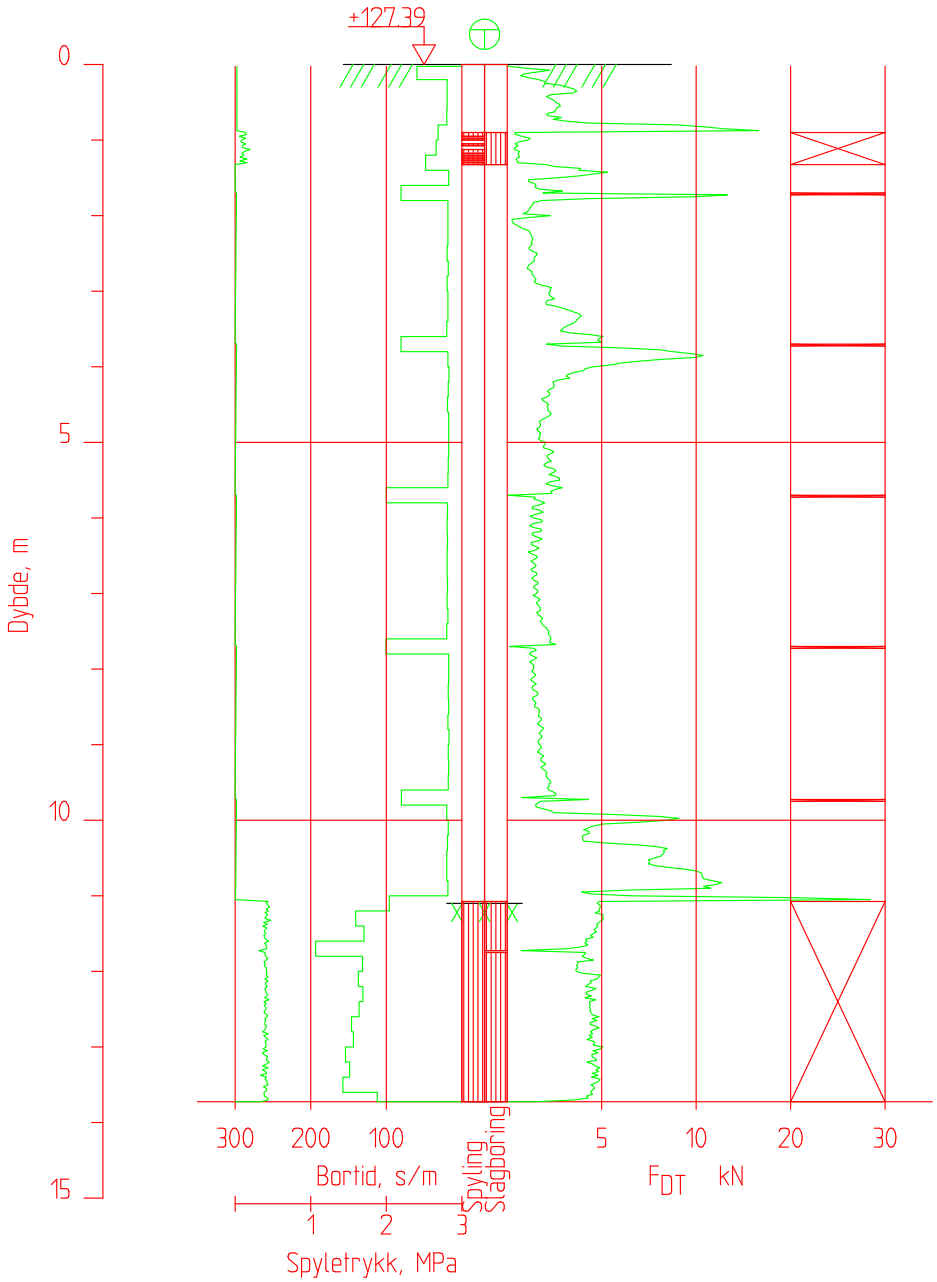
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3025



Posisjon: X 1122958.89 Y 115177.28

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3025

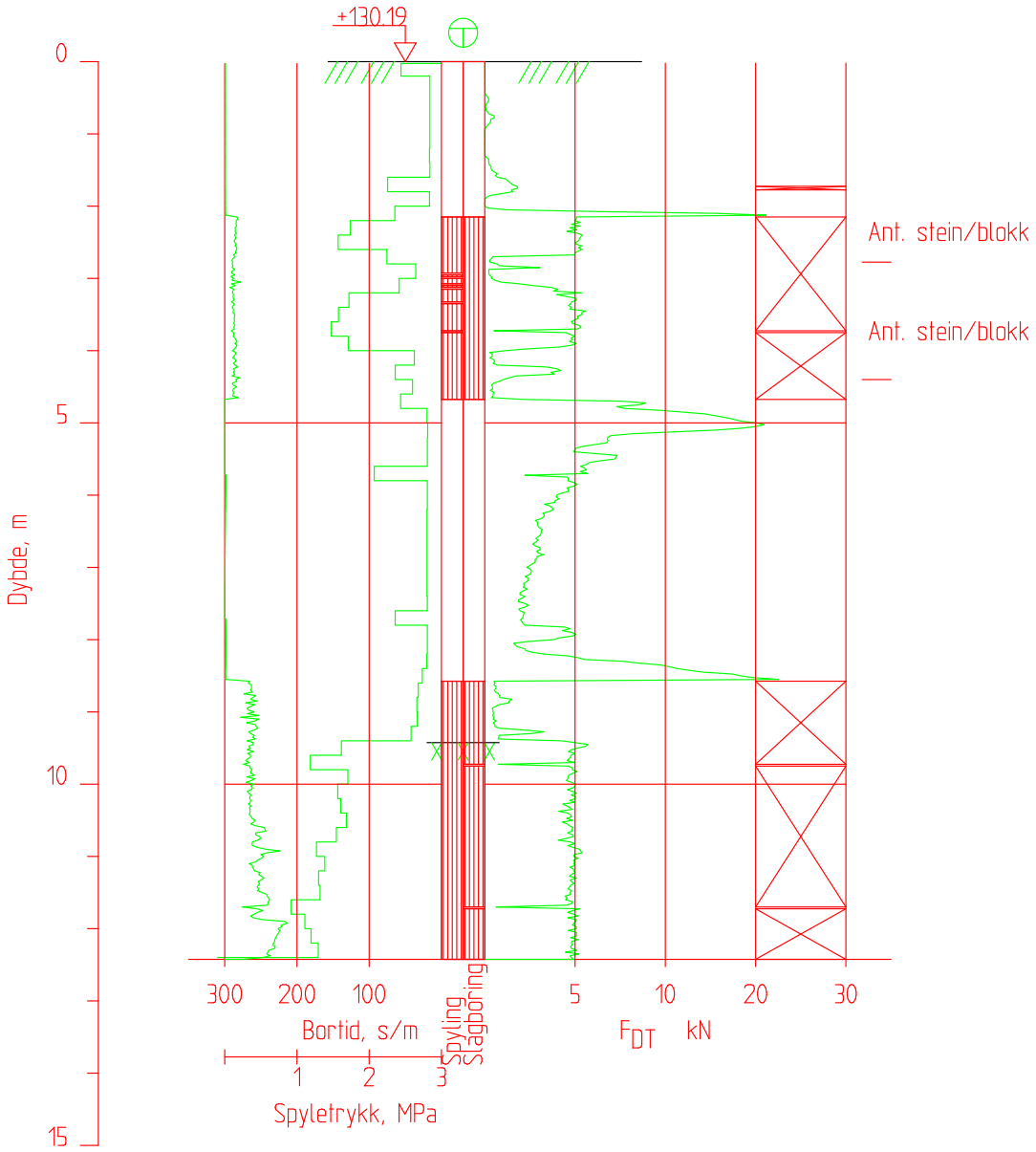
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3026



Posisjon: X 1122928.25 Y 115199.01

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3026

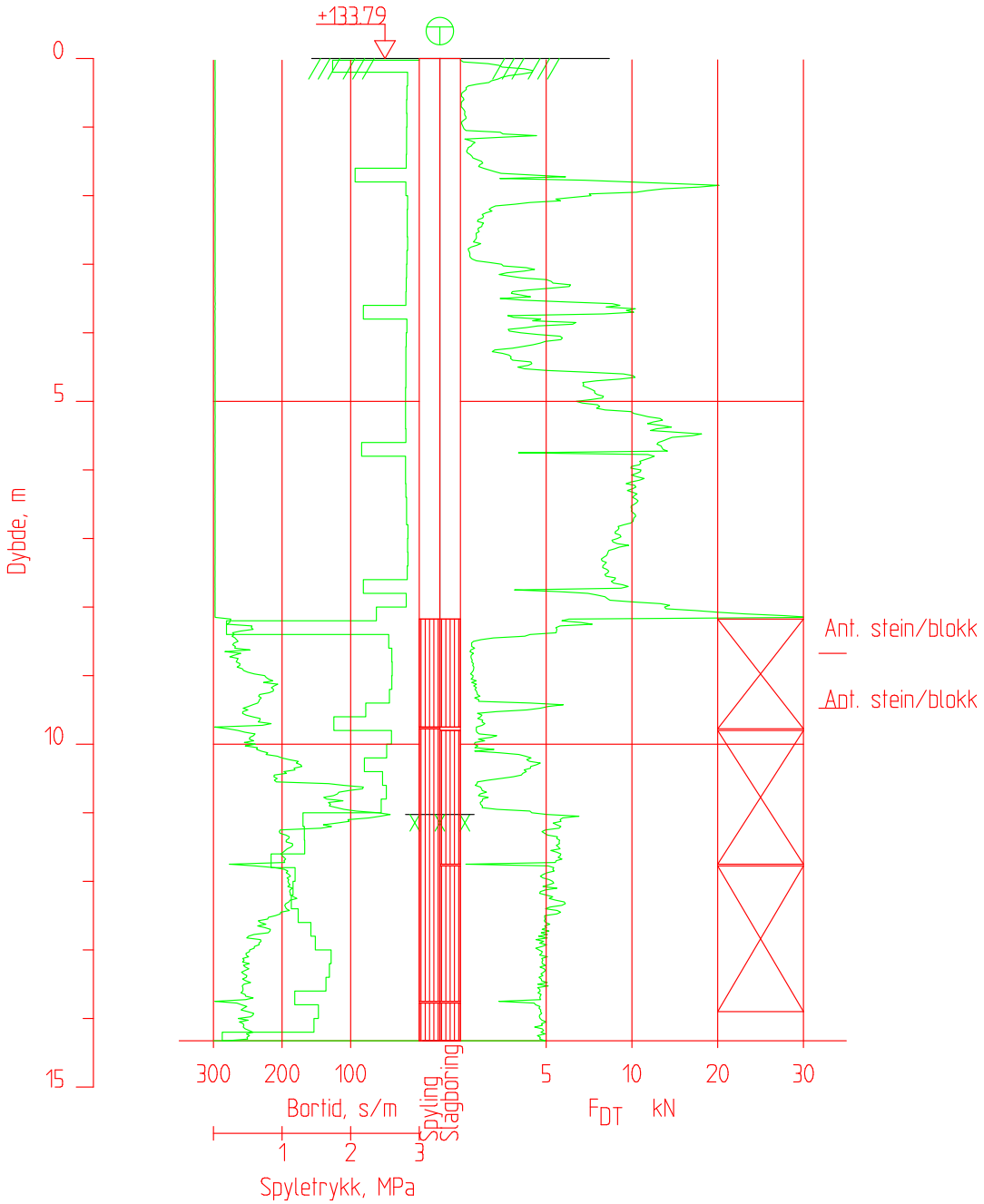
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3027



Posisjon: X 1122896.20 Y 115234.71

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3027

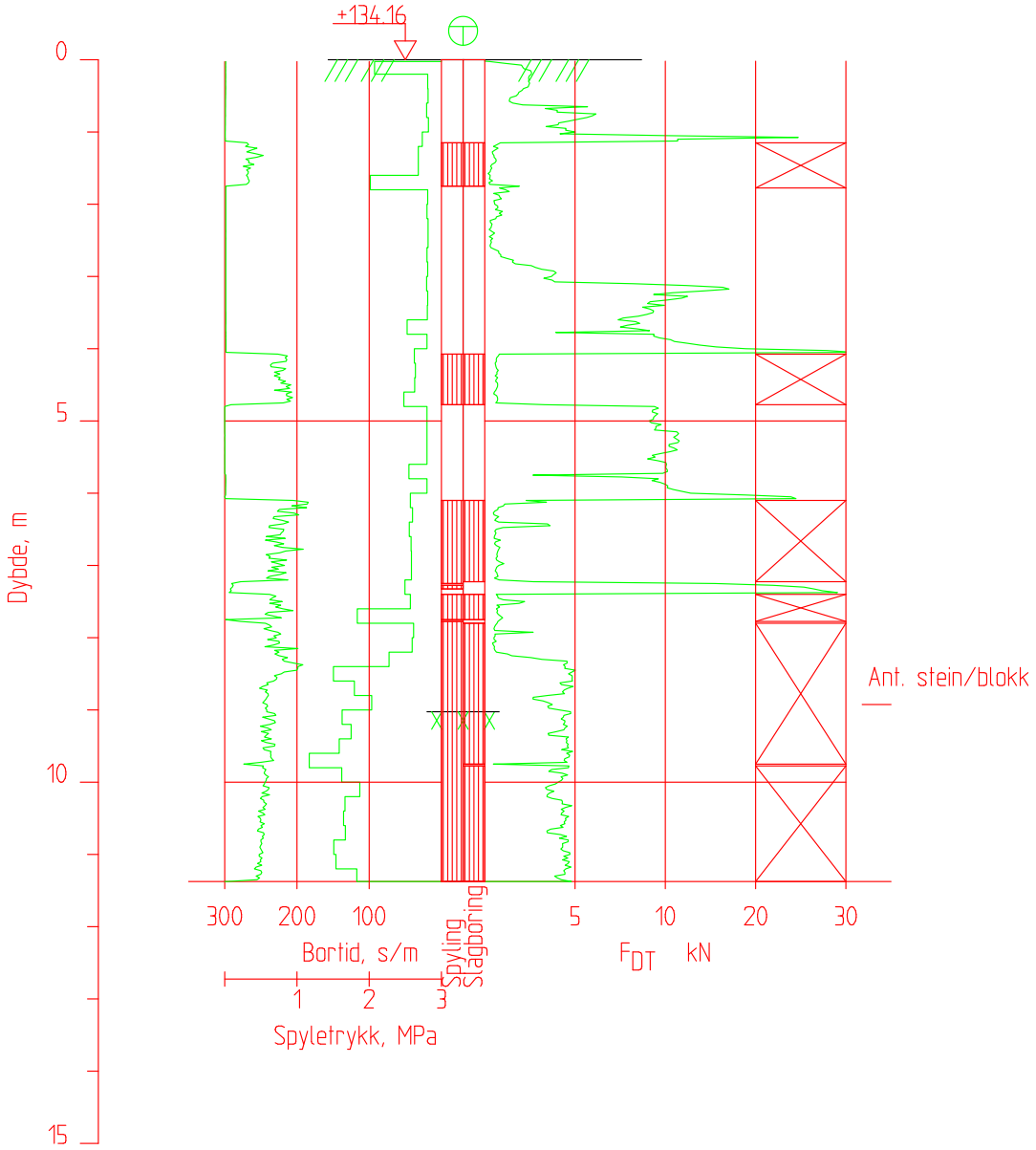
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3028



Posisjon: X 1122871.39 Y 115265.85

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3028

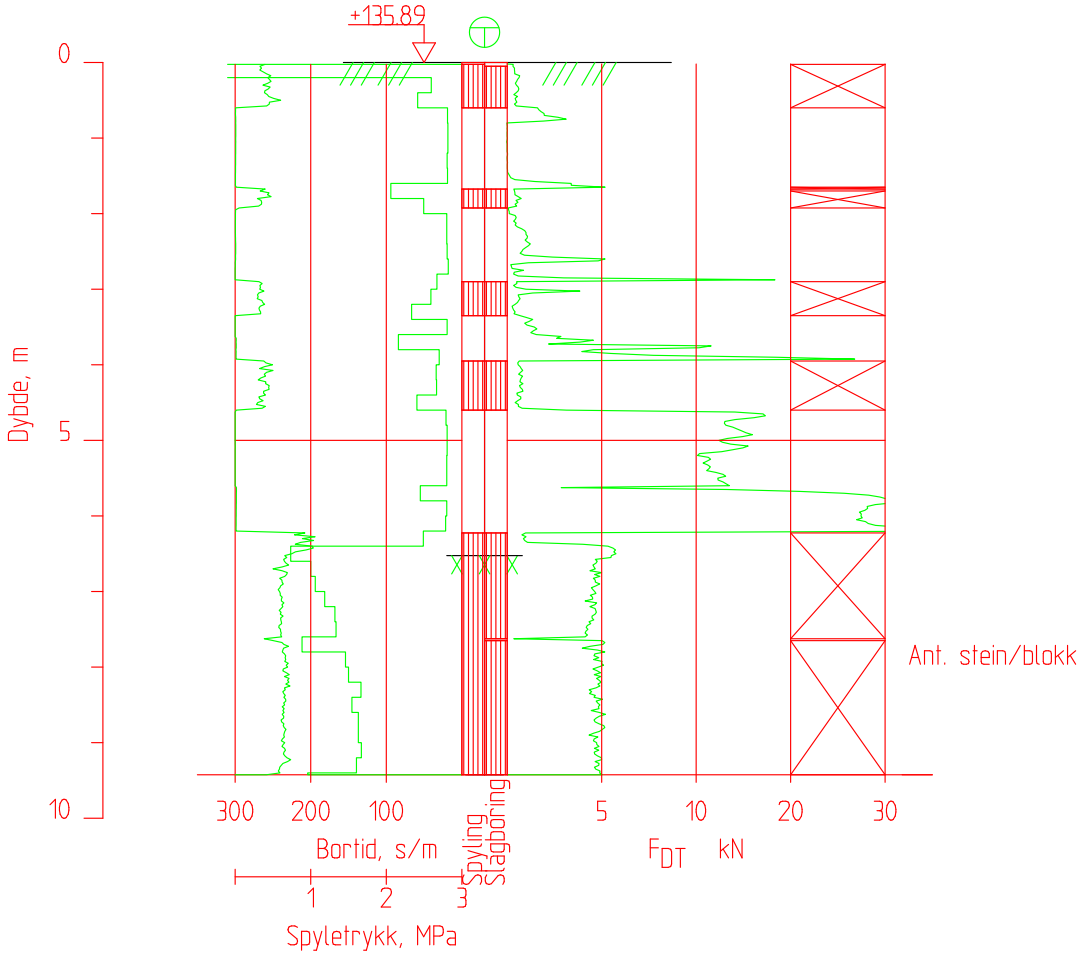
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3029



Posisjon: X 1122853.33 Y 115280.07

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3029

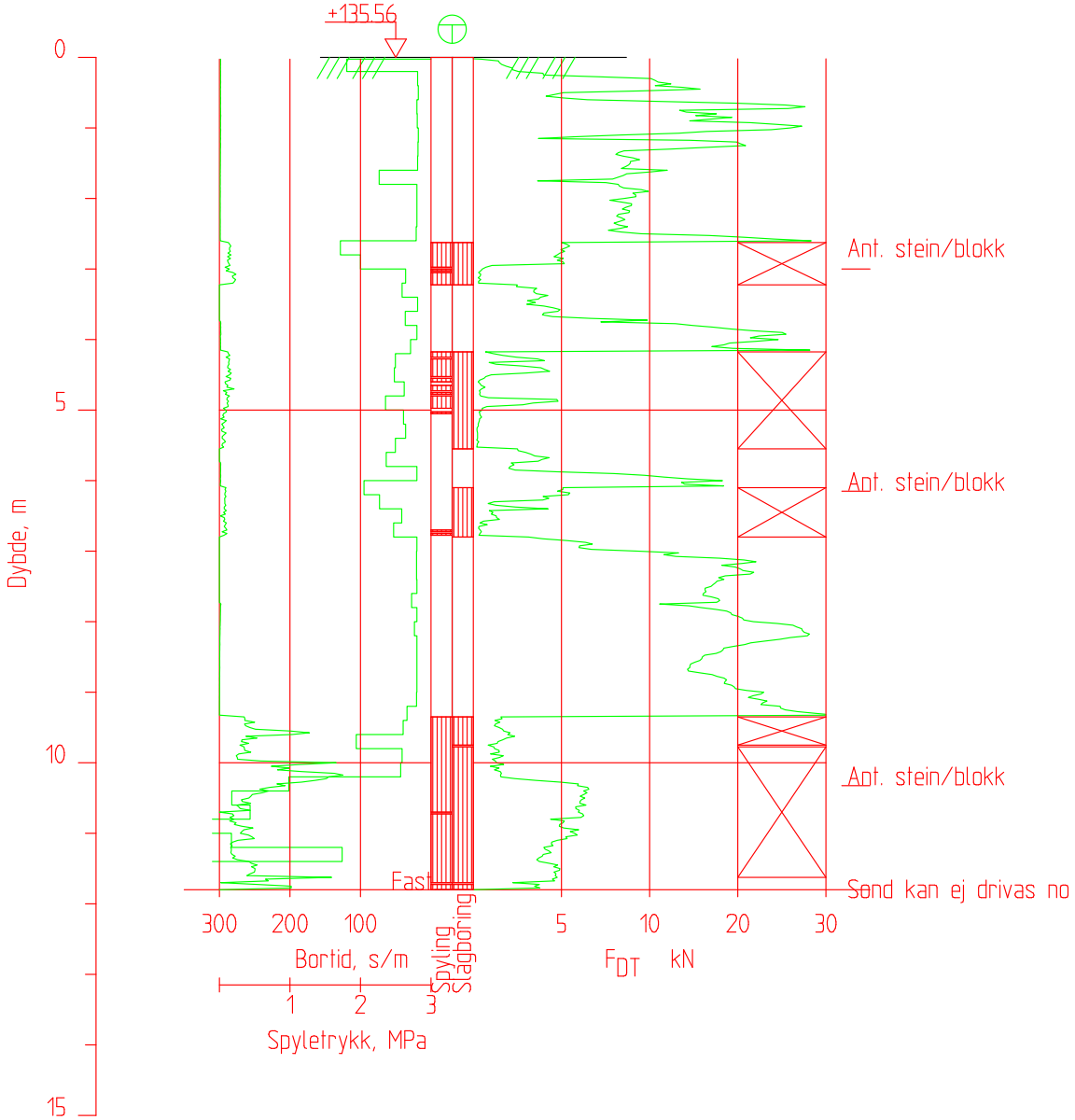
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3030



Posisjon: X 1122863.73 Y 115255.52

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3030

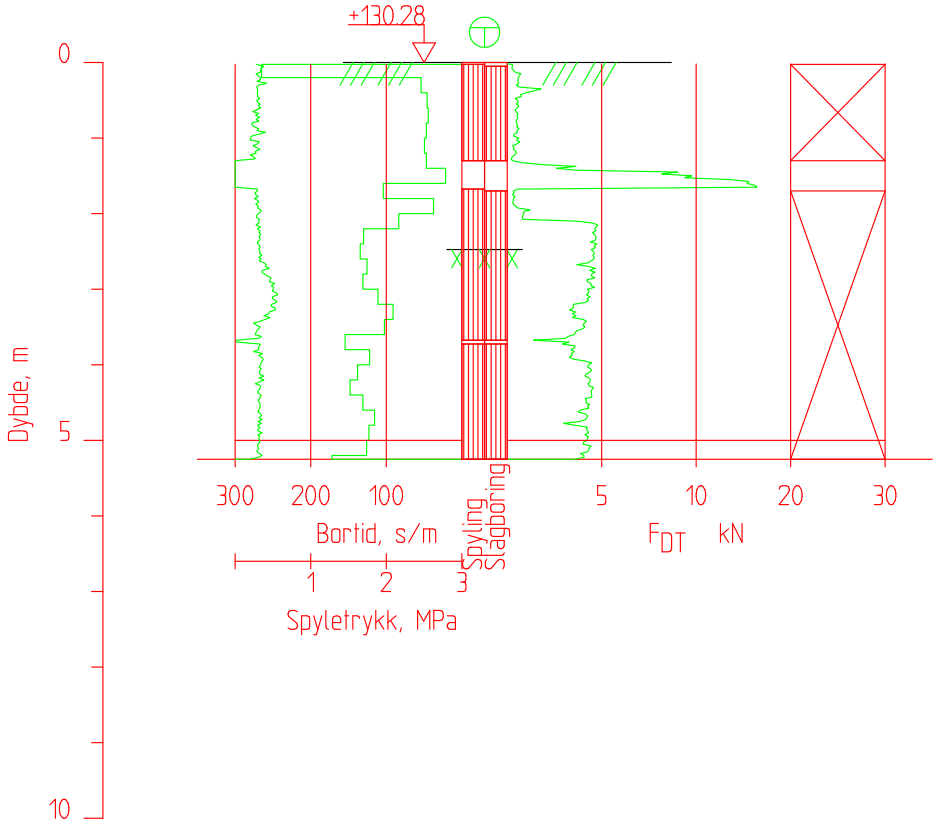
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3032



Posisjon: X 1122829.11 Y 115315.45

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 3032

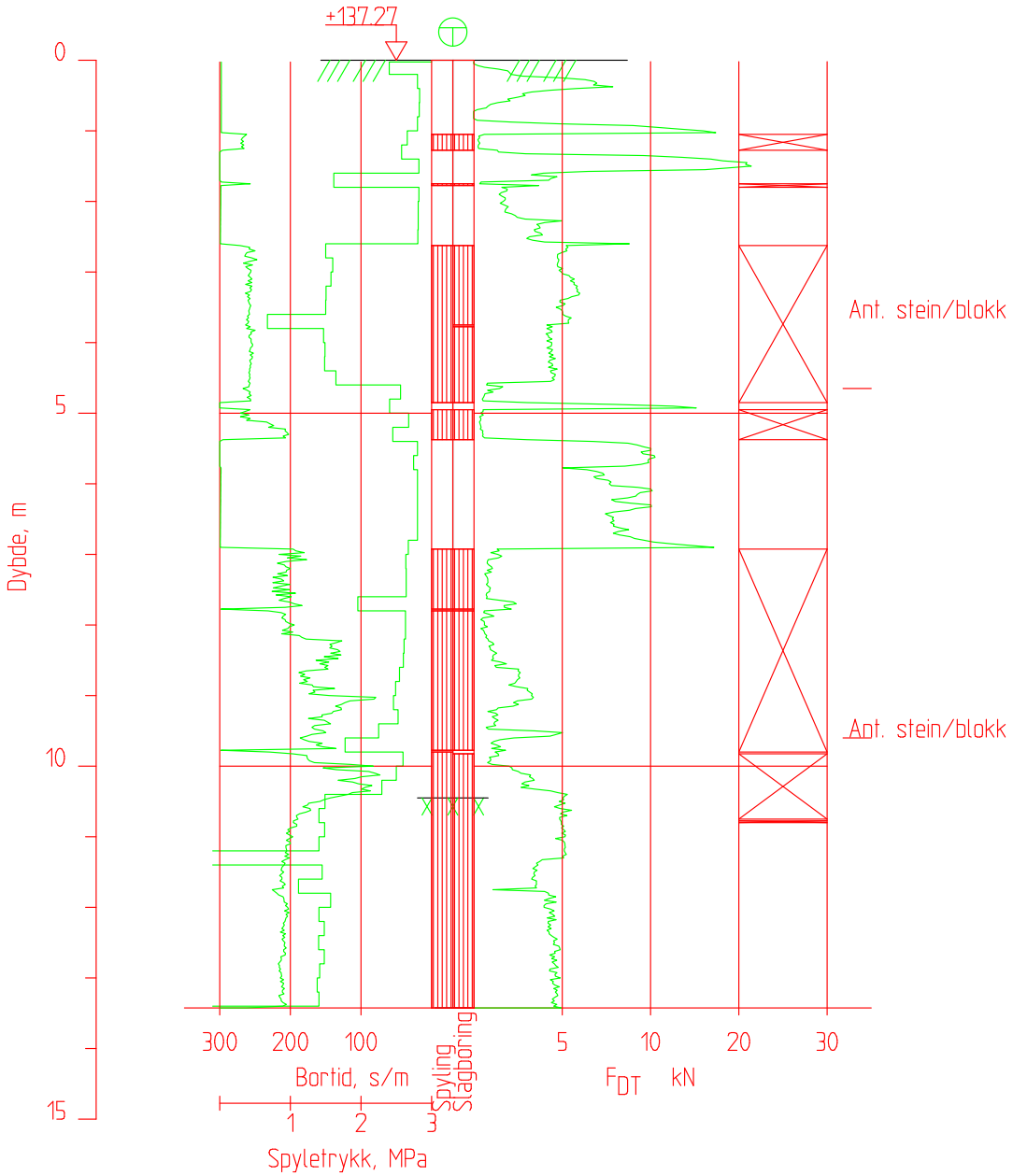
M = 1 : 100

Dato boret :28.06.2017

BG

19756

3031



Posisjon: X 1122836.82 Y 115285.13

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

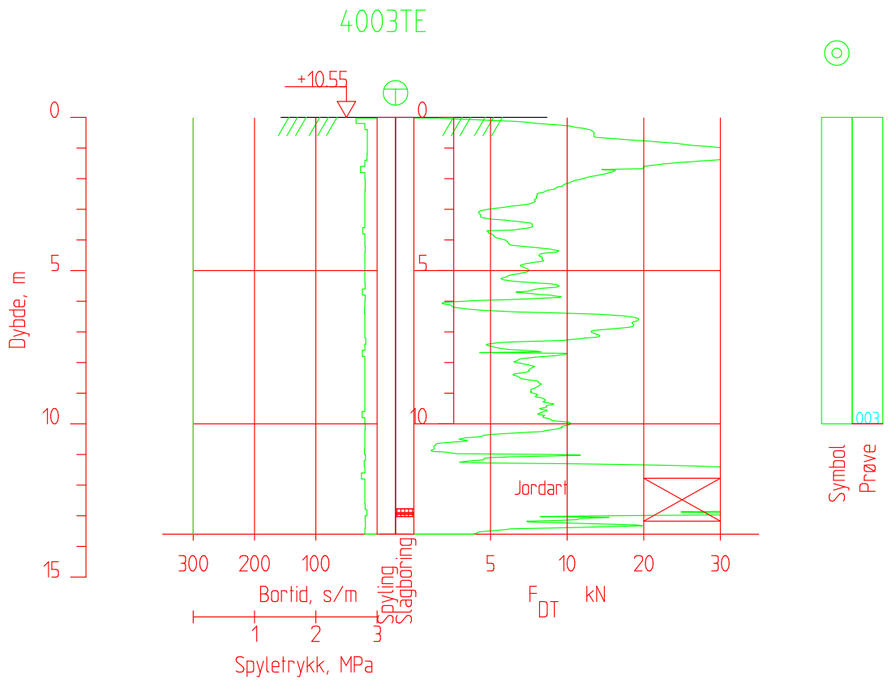
Borhull 3031

M = 1 : 100

Dato boret :28.06.2017

BG

19756



Posisjon: X 1124426.46 Y 1122261.90

Totalsondering Borprofil

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4003TE

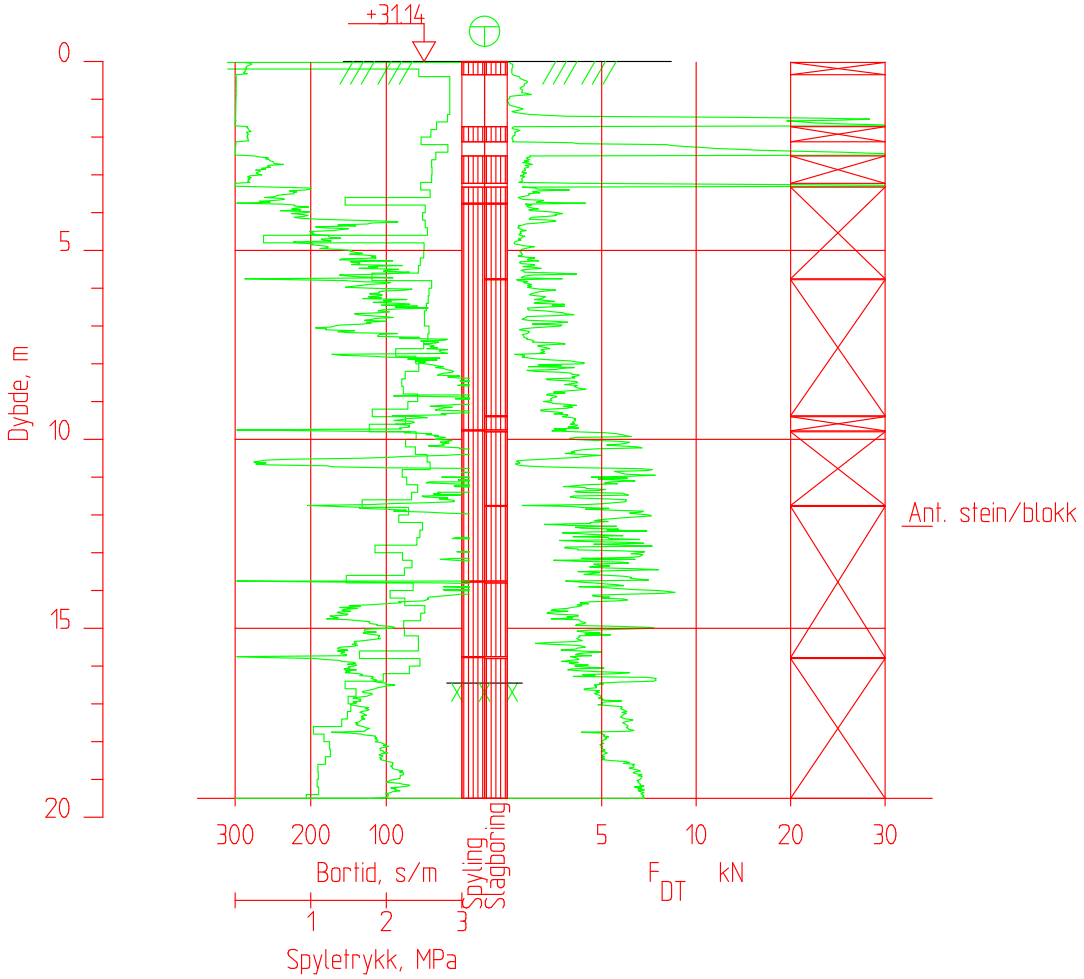
M = 1 : 200

Dato boret :01.07.2020

BG

19756

4



Posisjon: X 1124410.91 Y 112644.46

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

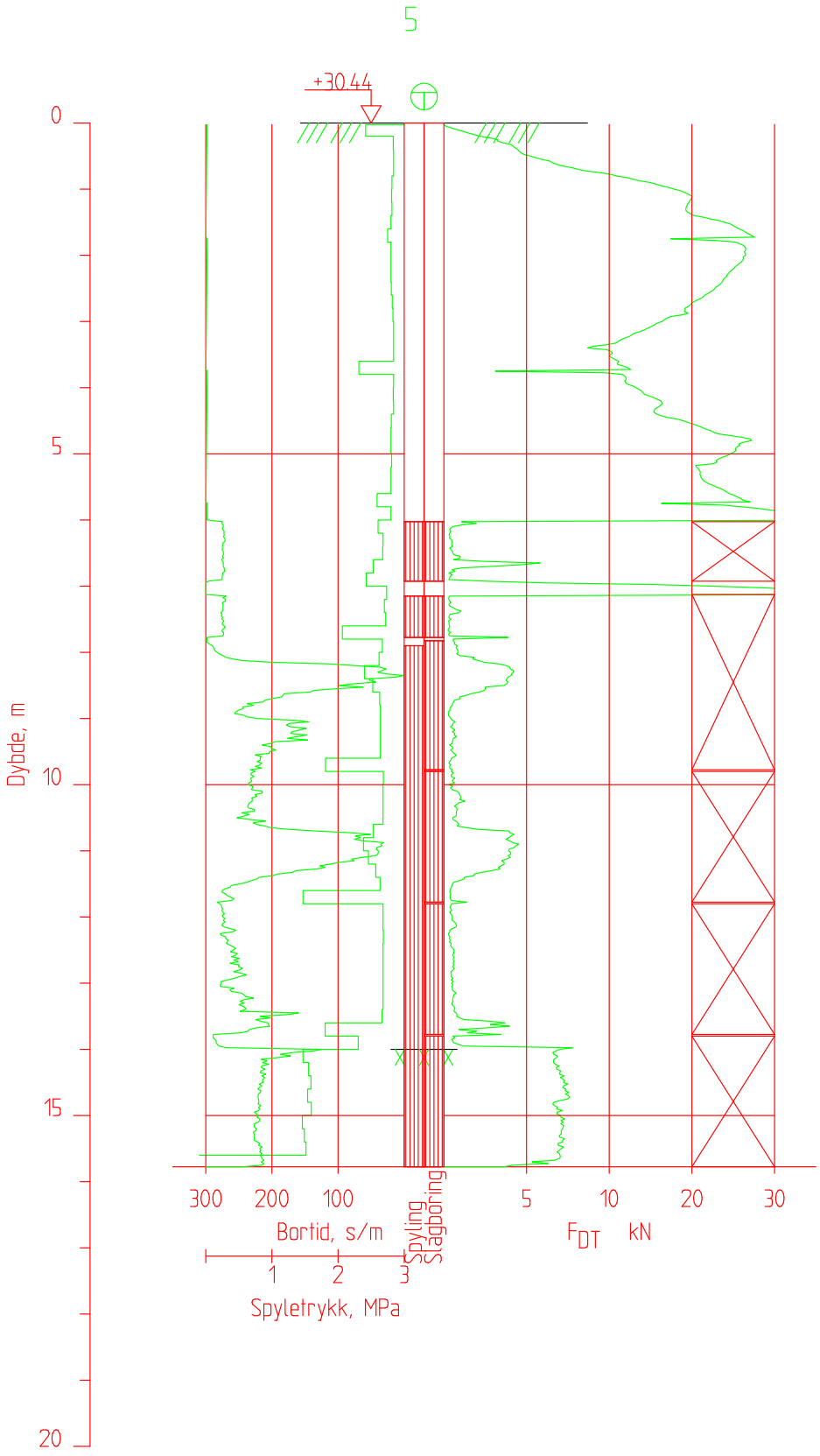
Borhull 4

M = 1 : 200

Dato boret :03.11.2016

BG

19756



Posisjon: X 1124412.34 Y 112508.77

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 5

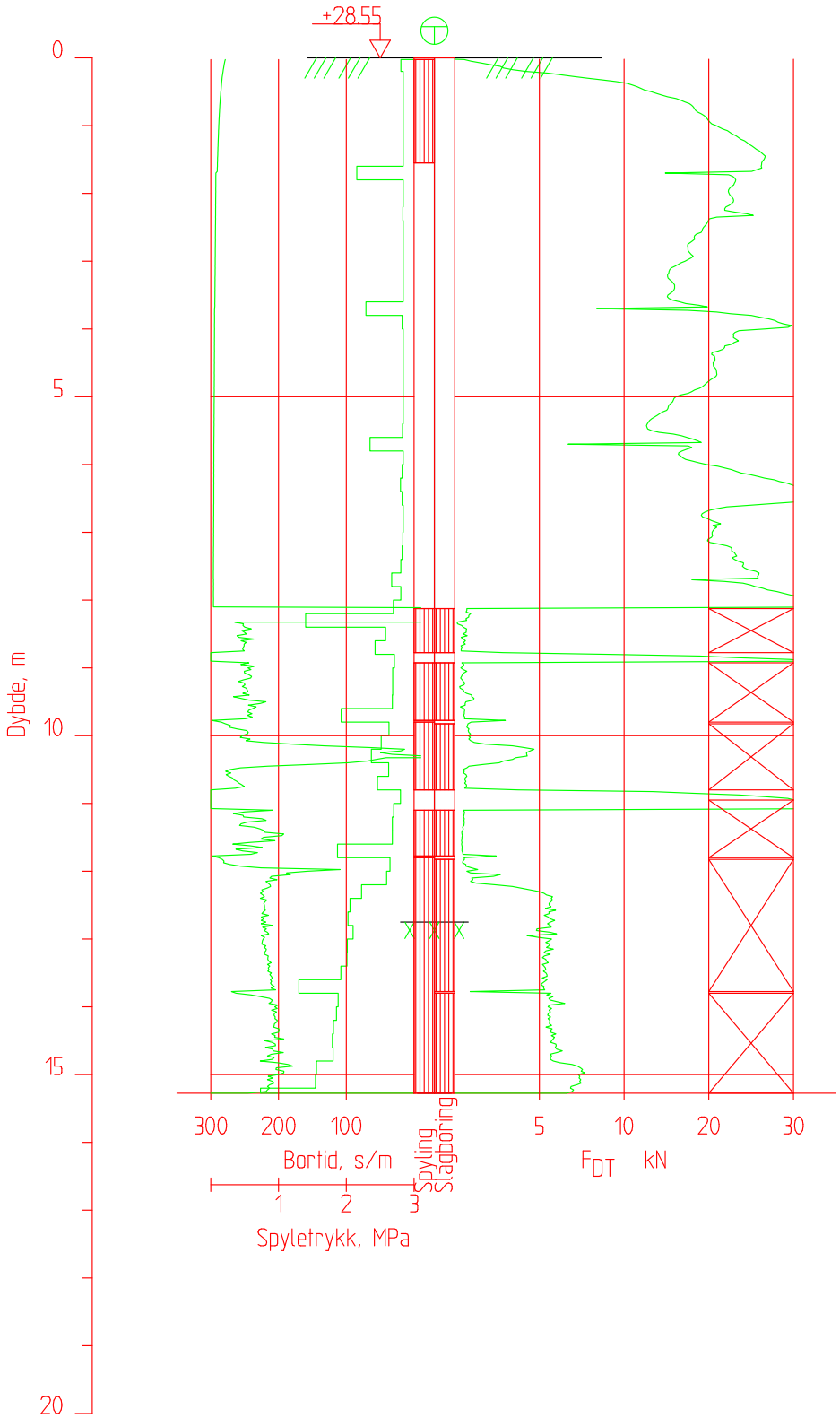
M = 1 : 100

Dato boret :03.11.2016

BG

19756

6



Posisjon: X 1124415.56 Y 112495.43

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6

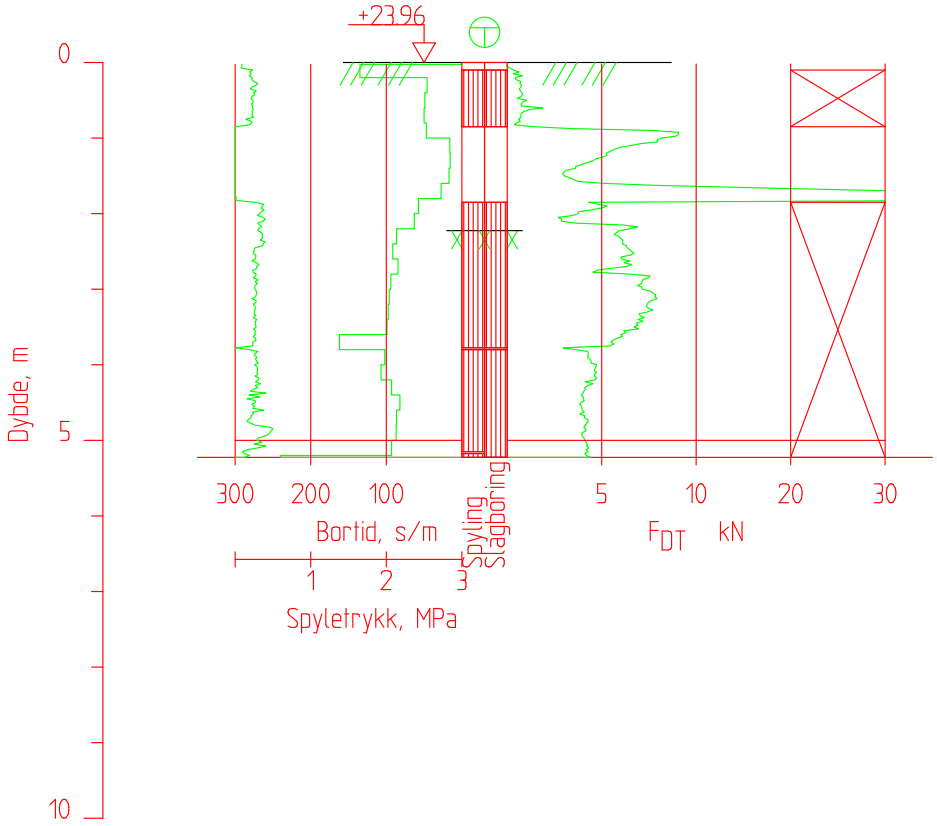
M = 1 : 100

Dato boret :03.11.2016

BG

19756

7



Posisjon: X 1124406.54 Y 112427.19

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 7

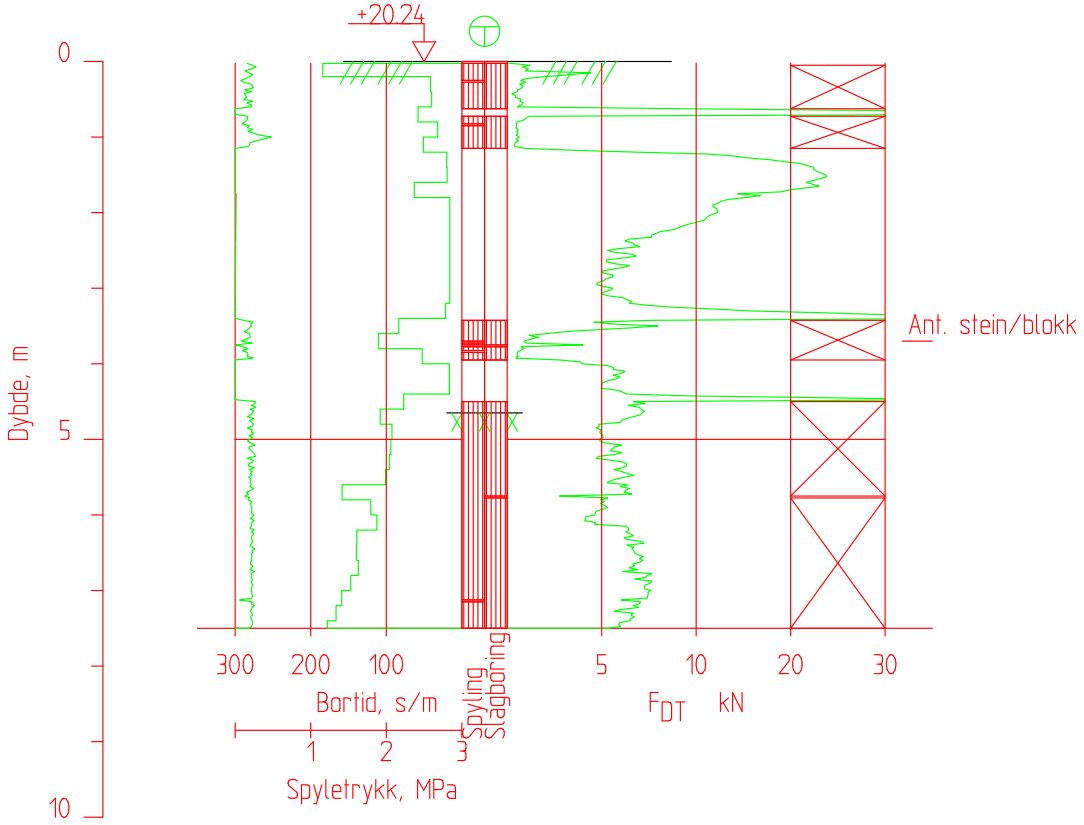
M = 1 : 100

Dato boret :02.11.2016

BG

19756

8



Posisjon: X 1124418.58 Y 112410.49

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 8

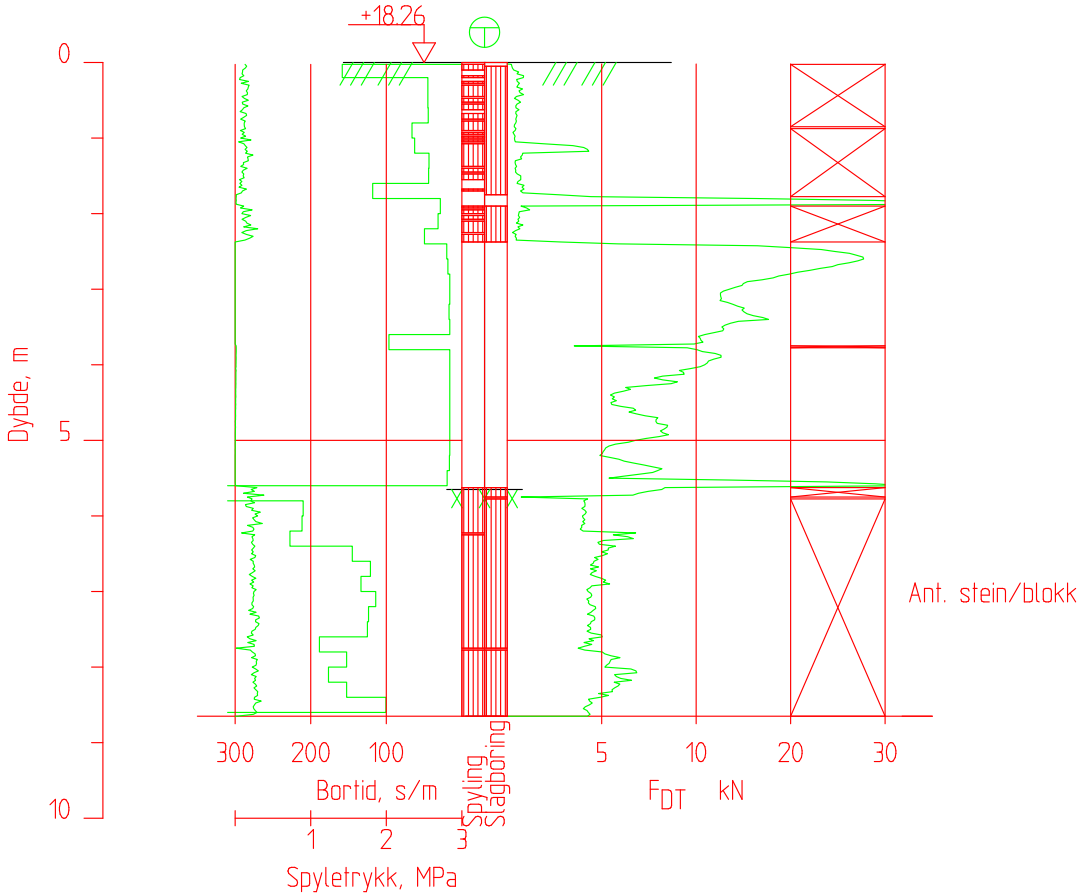
M = 1 : 100

Dato boret :02.11.2016

BG

19756

9



Posisjon: X 1124419.35 Y 112384.05

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

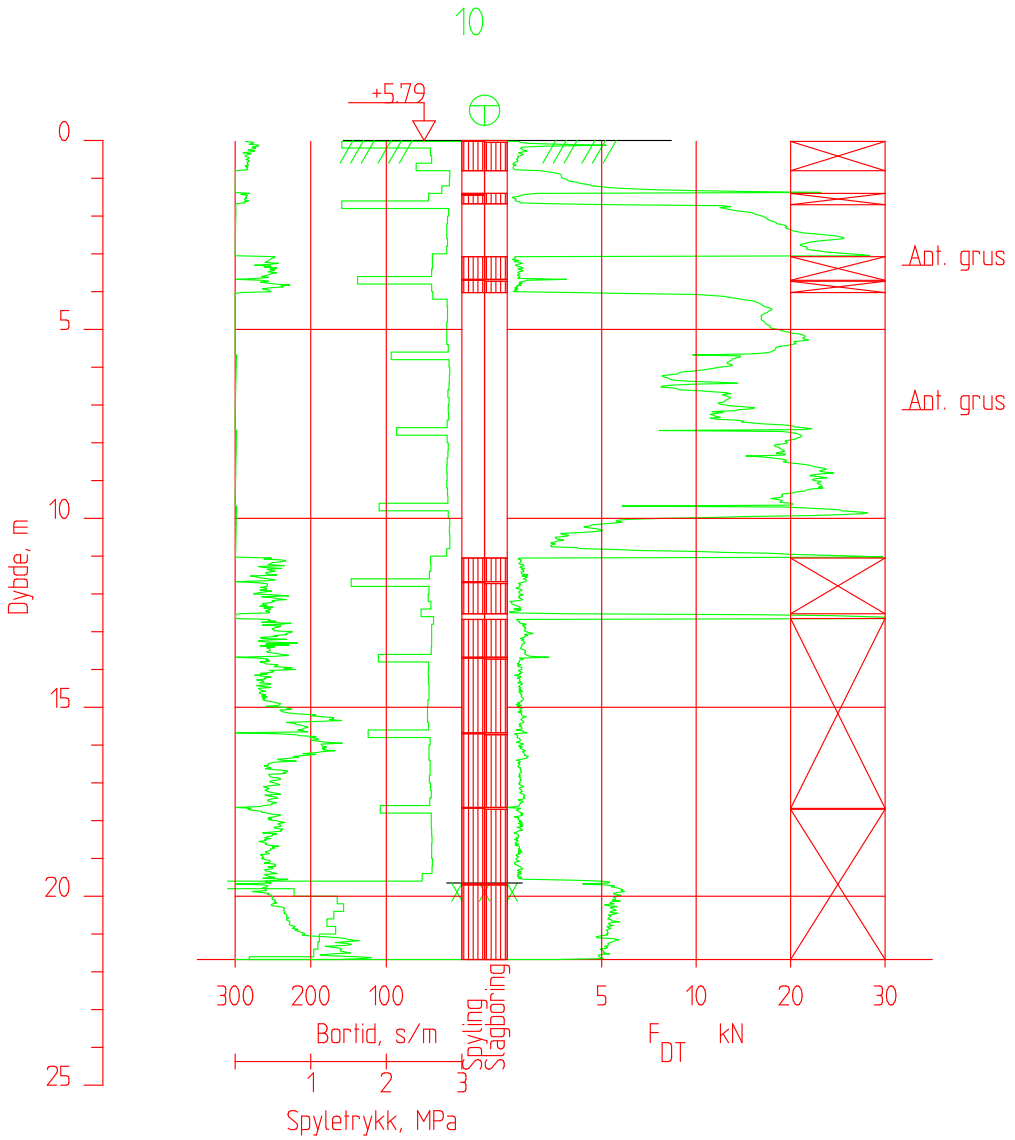
Borhull 9

M = 1 : 100

Dato boret :02.11.2016

BG

19756



Posisjon: X 1124421.16 Y 112345.05

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 10

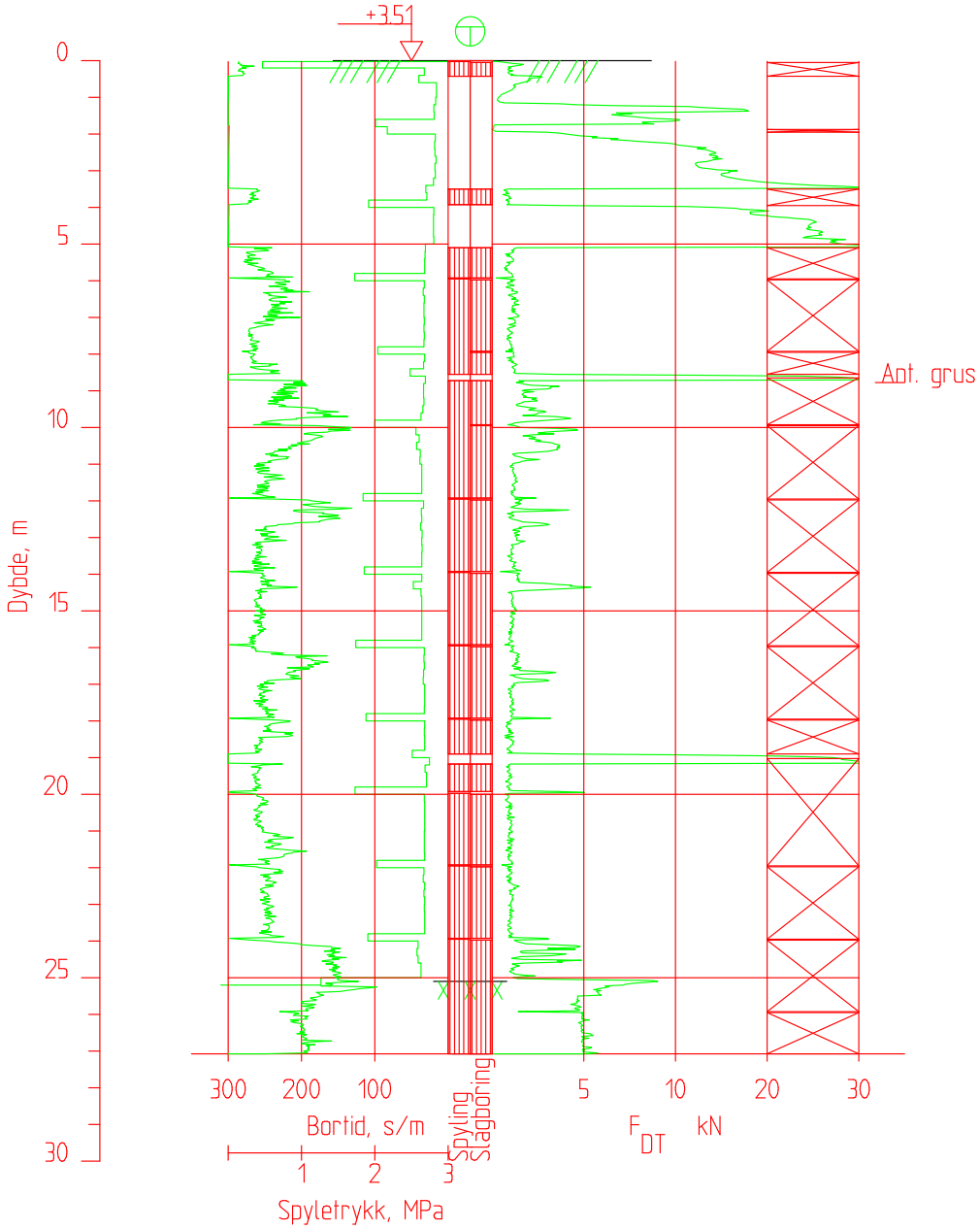
M = 1 : 200

Dato boret :25.01.2017

BG

19756

12



Posisjon: X 1124422.60 Y 112331.63

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

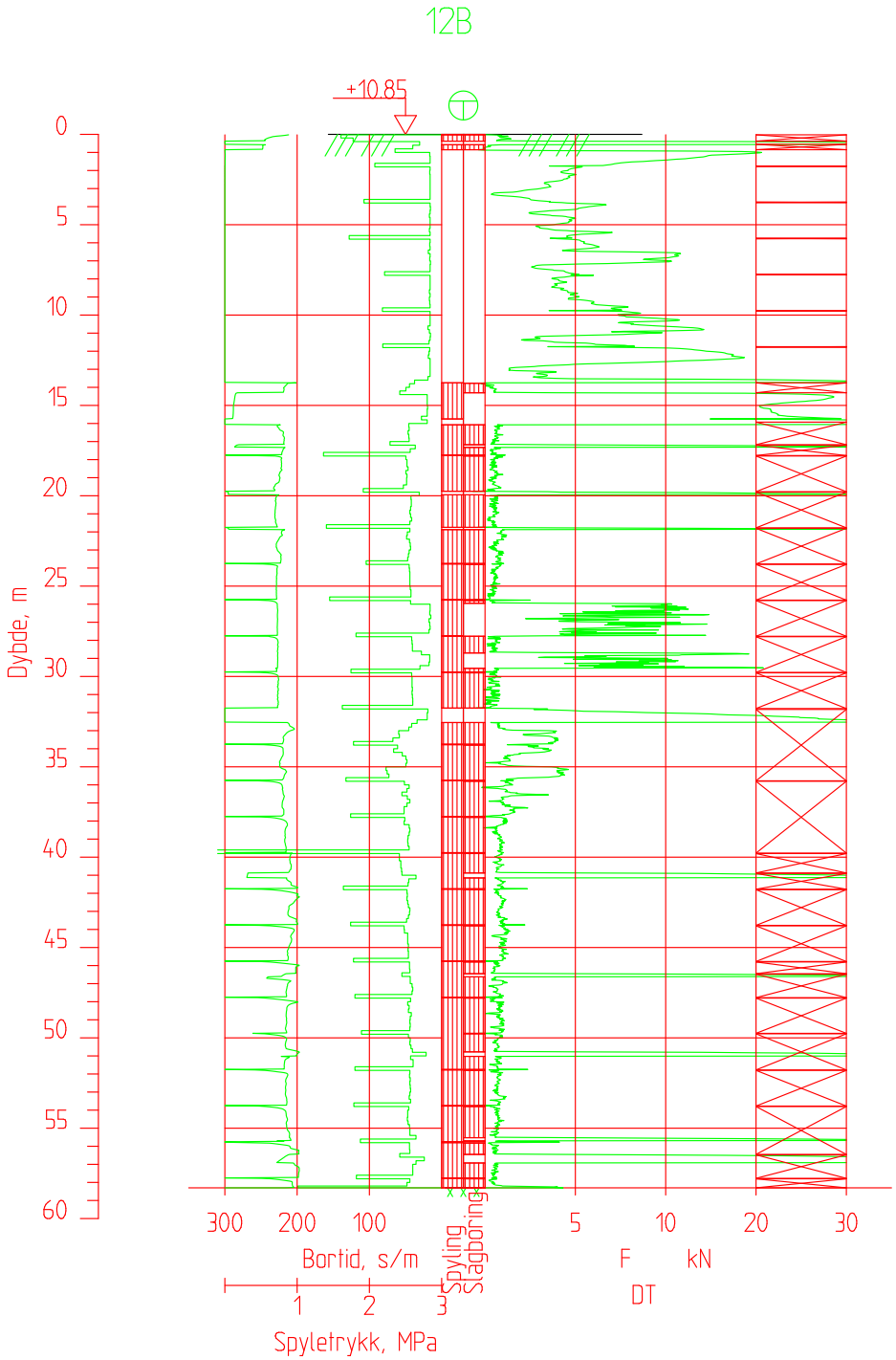
Borhull 12

M = 1 : 200

Dato boret :25.01.2017

BG

19756



Posisjon: X 1124438.15 Y 112282.00

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 12B

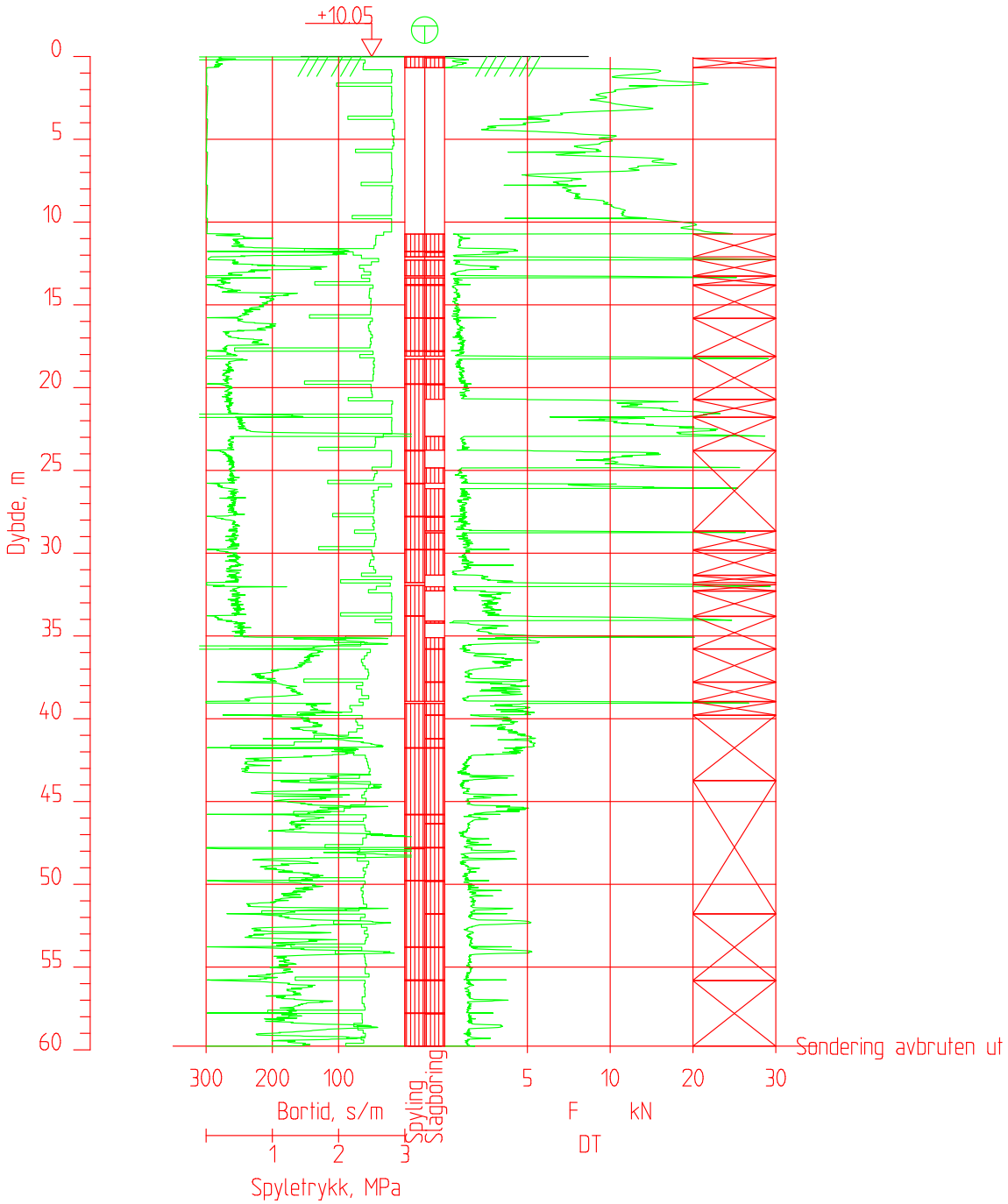
M = 1 : 400

Dato boret :23.01.2017

BG

19756

14



Posisjon: X 1124419.89 Y 112245.94

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 14

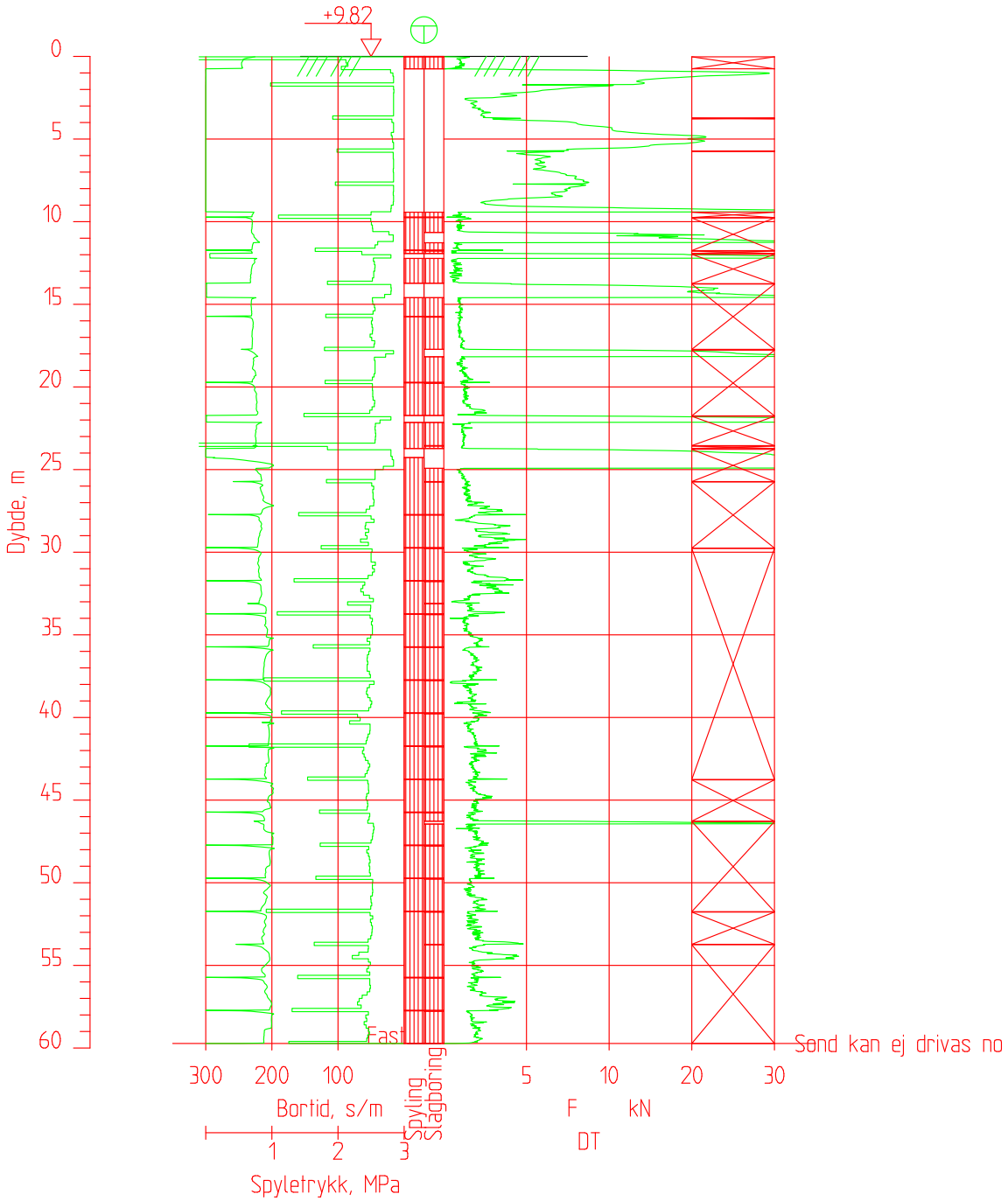
M = 1 : 400

Dato boret :24.01.2017

BG

19756

15



Posisjon: X 1124417.45 Y 112219.69

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 15

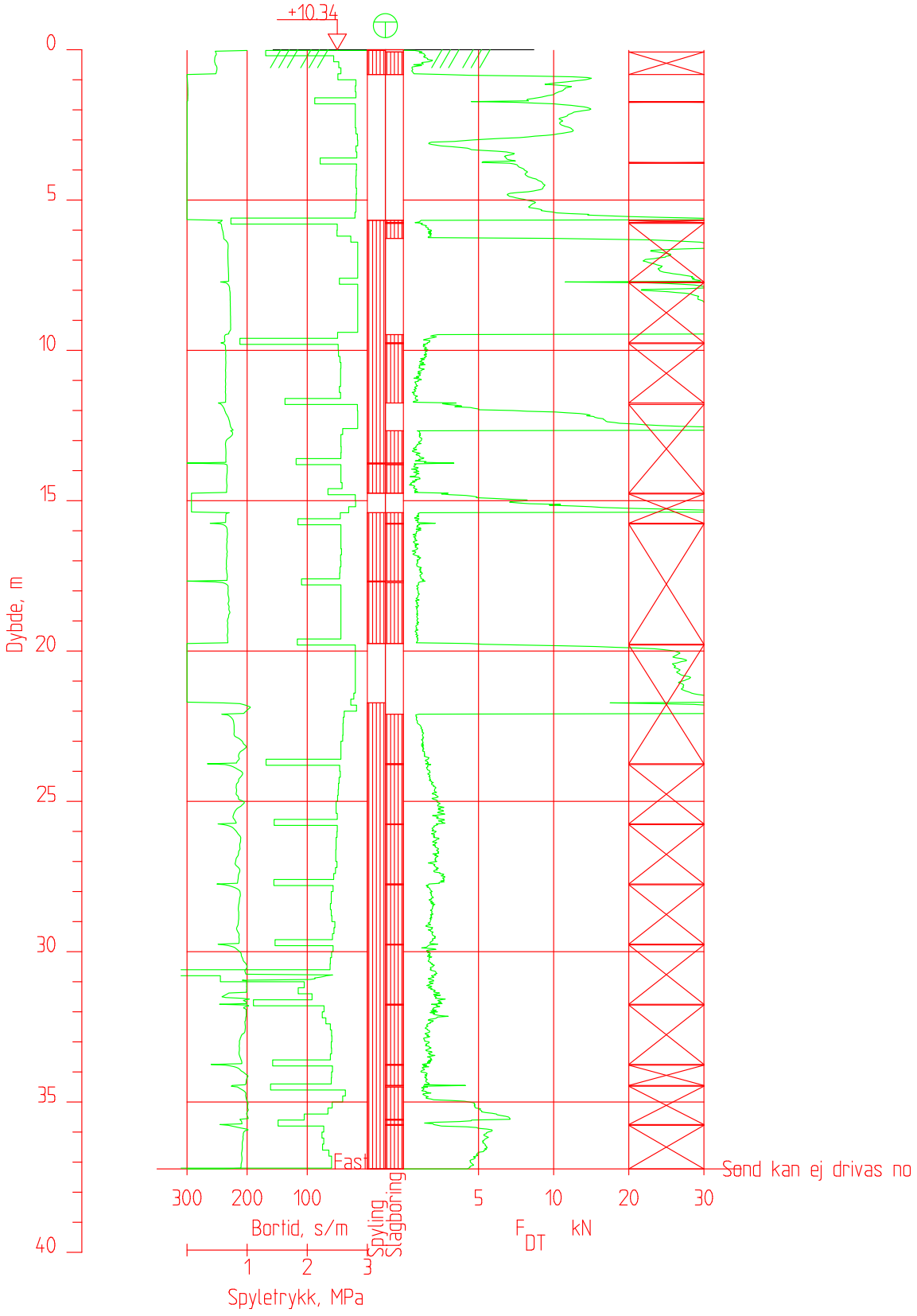
M = 1 : 400

Dato boret :24.01.2017

BG

19756

16



Posisjon: X 1124416.58 Y 112193.55

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

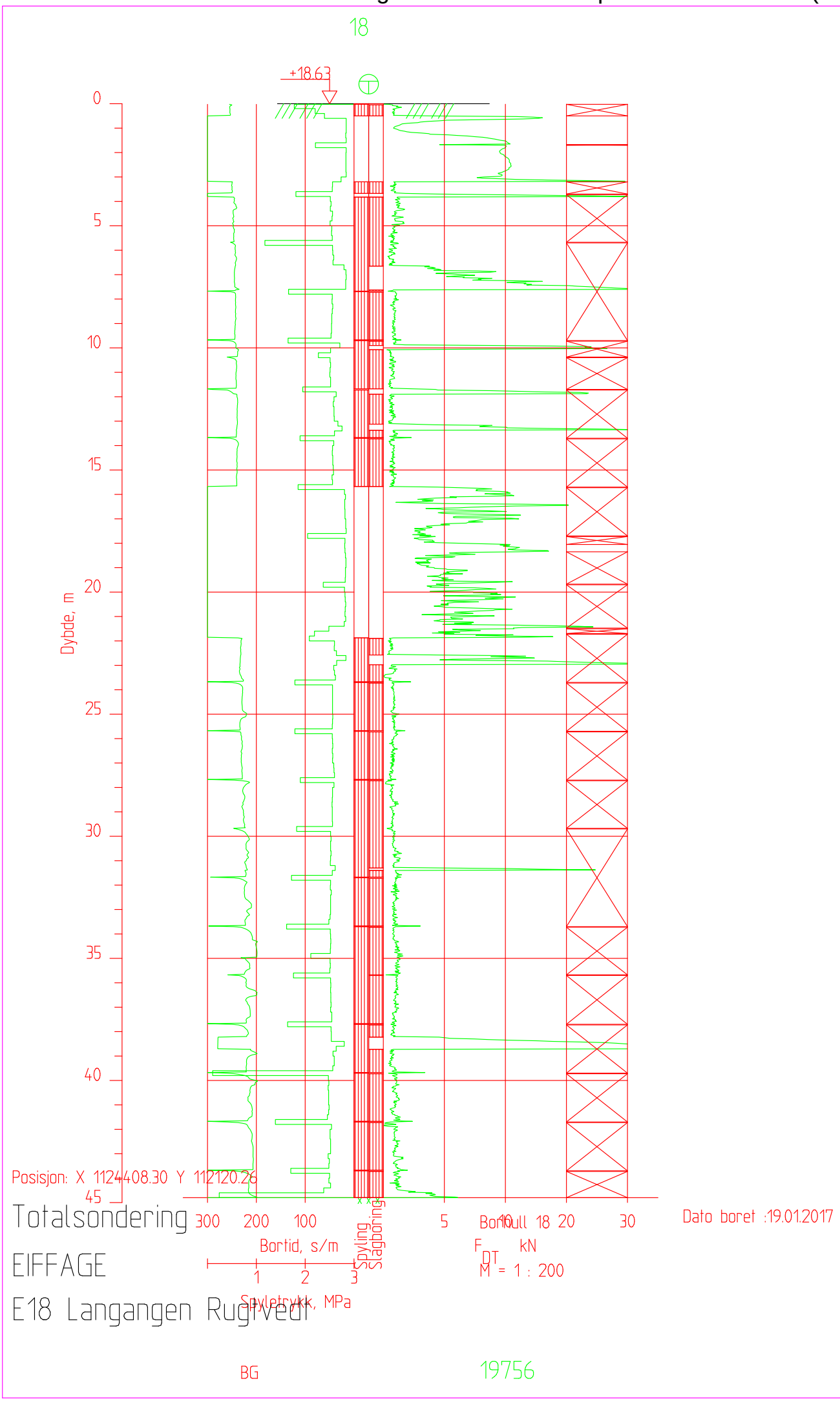
Borhull 16

M = 1 : 200

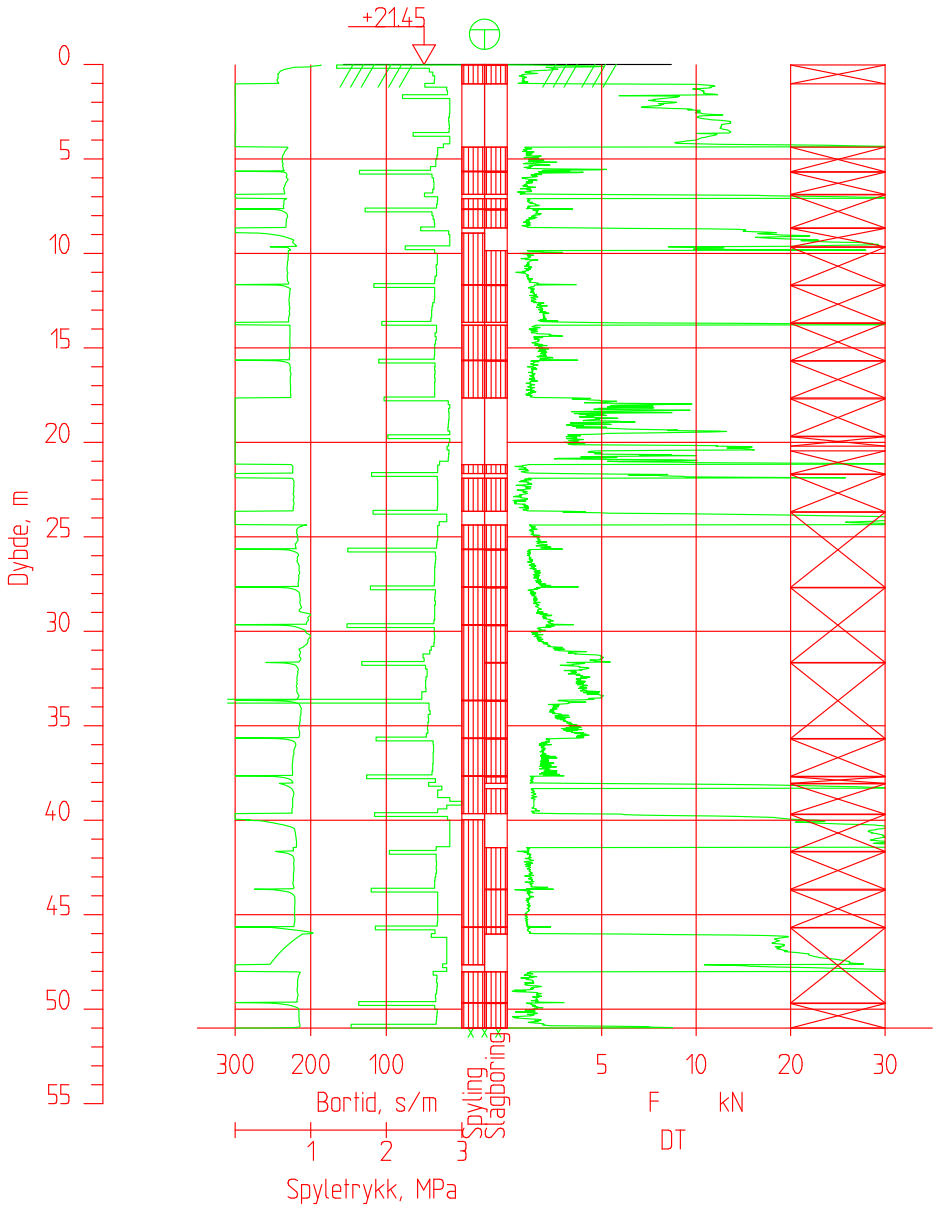
Dato boret :24.01.2017

BG

19756


18
+18.63
0
5
10
15
20
25
30
35
40
45
Dybde, m
Posisjon: X 1124408.30 Y 1121120.28
Totalsondering
EIFFAGE
E18 Langangen Rugtveit
300
200
100
Bortid, s/m
1
2
3
Spyletrykk, MPa
Spyling
Slagboring
5
10
15
20
30
Bortrull
F DT kN
M = 1 : 200
Dato boret :19.01.2017
BG
19756

18A



Posisjon: X 1124391.16 Y 112118.51

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

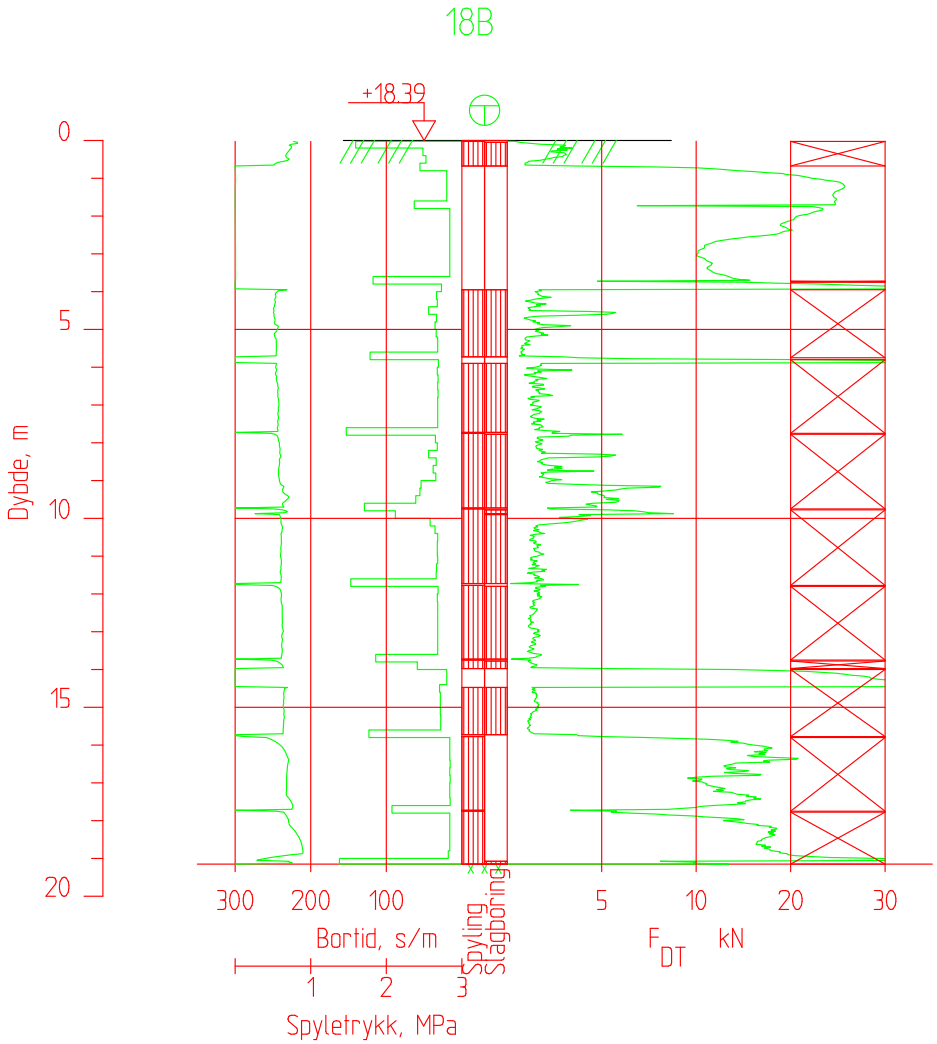
Borhull 18A

M = 1 : 400

Dato boret :25.01.2017

BG

19756



Posisjon: X 1124438.39 Y 112120.85

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 18B

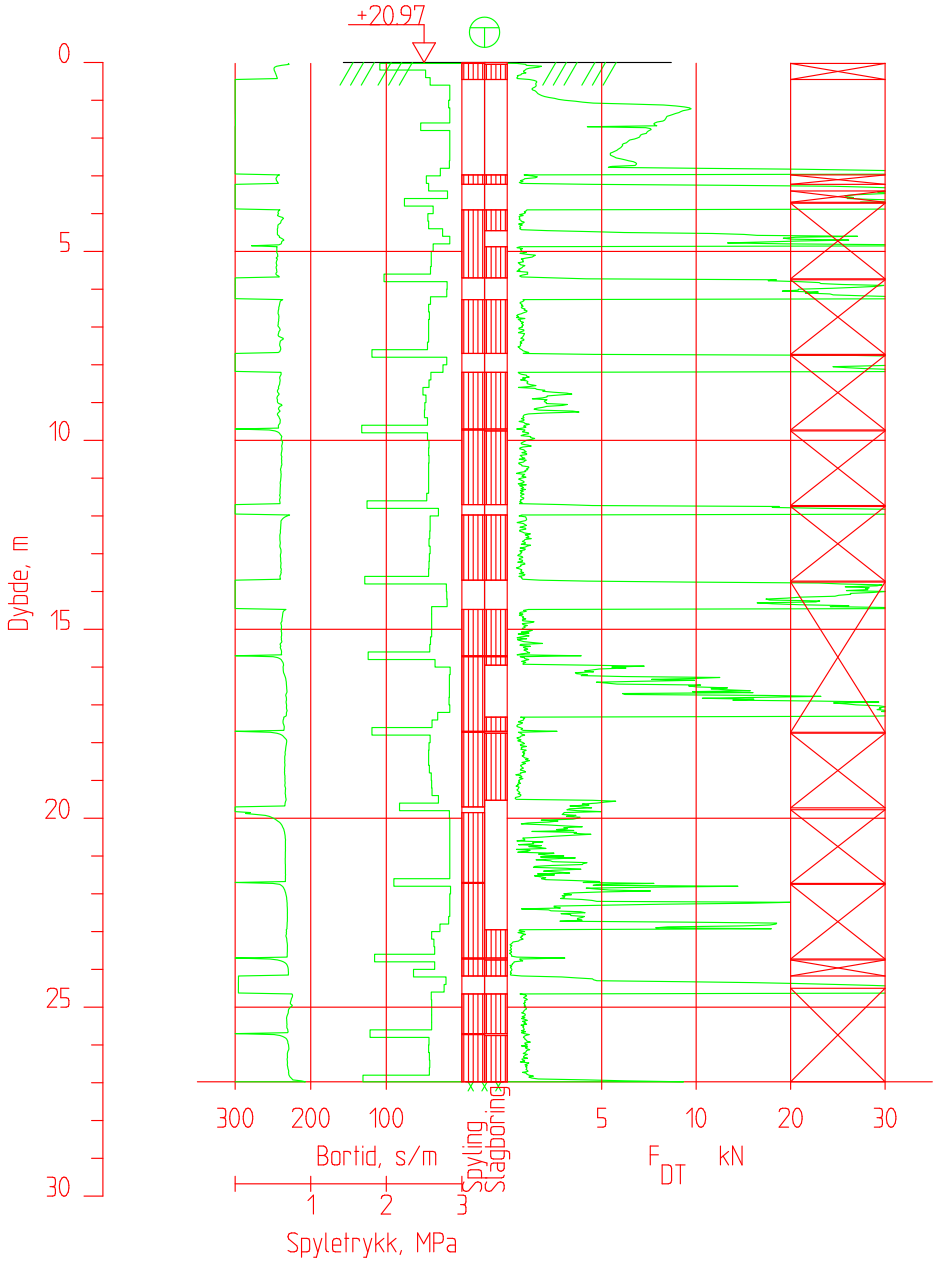
M = 1 : 200

Dato boret :25.01.2017

BG

19756

19



Posisjon: X 1124410.06 Y 112104.64

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 19

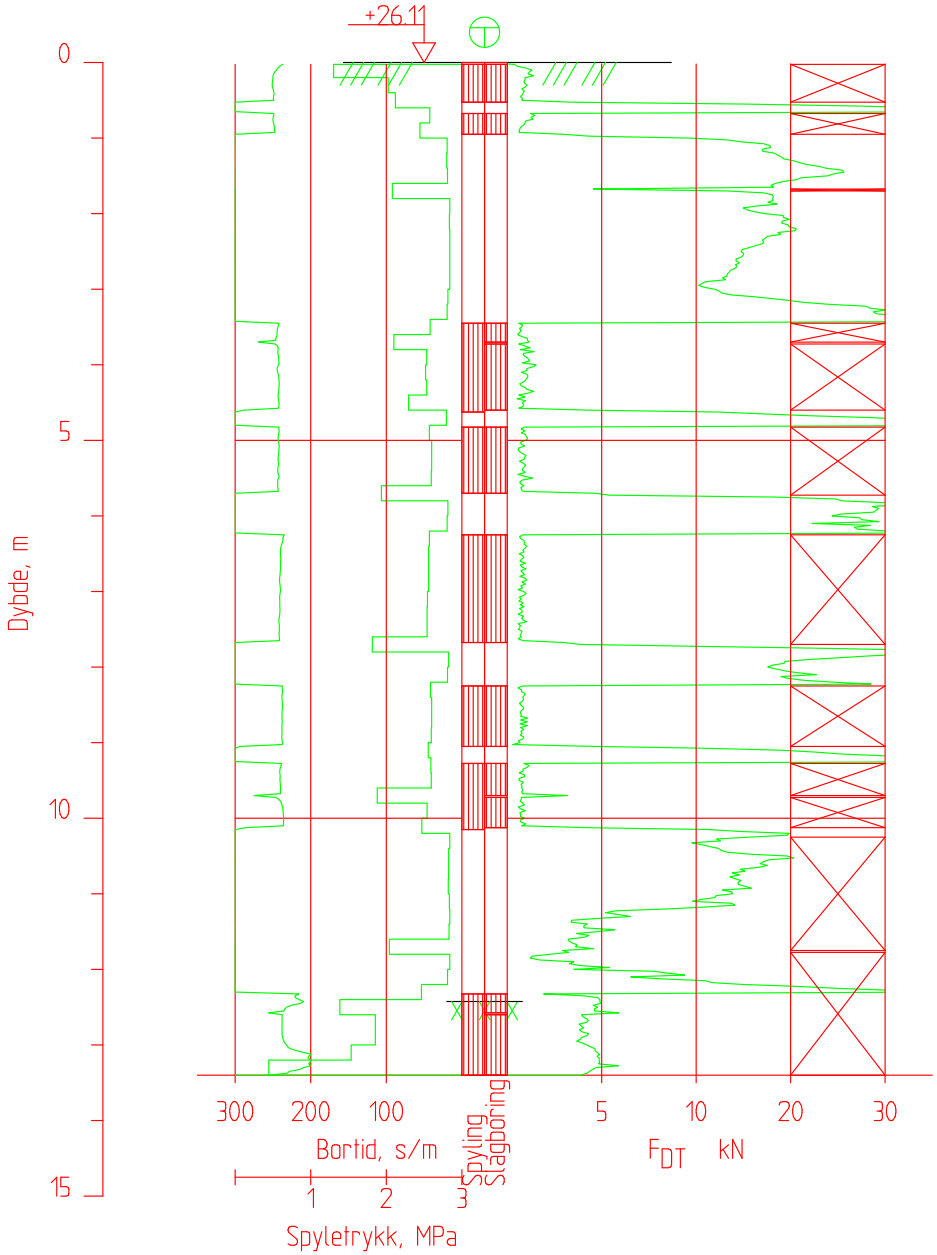
M = 1 : 200

Dato boret :19.01.2017

BG

19756

21A



Posisjon: X 1124383.25 Y 112098.01

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 21A

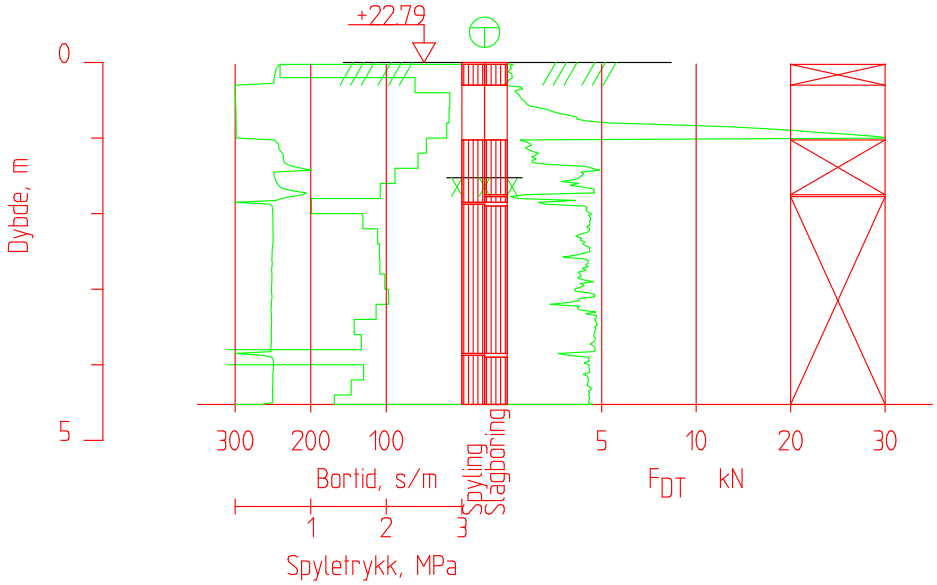
M = 1 : 100

Dato boret :19.01.2017

BG

19756

21B



Posisjon: X 1124434.36 Y 112096.78

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 21B

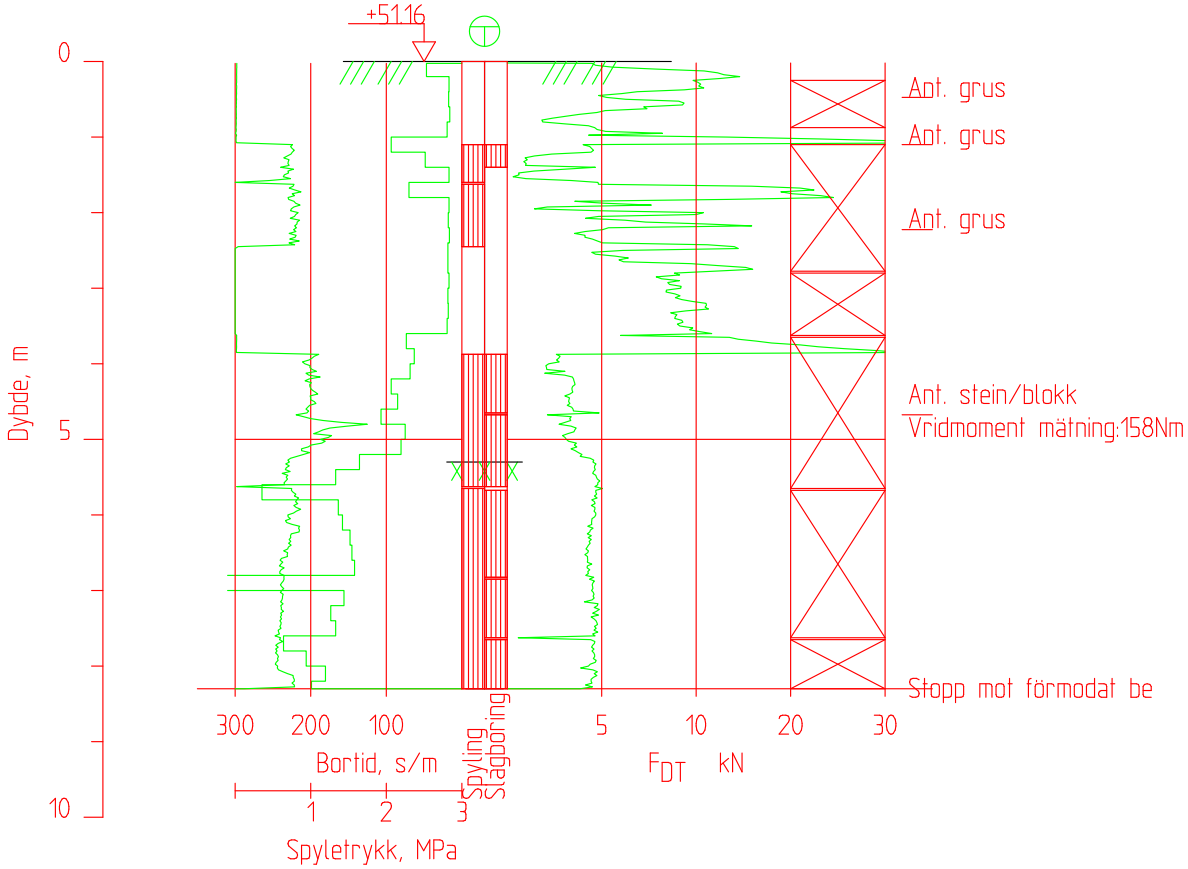
M = 1 : 100

Dato boret :19.01.2017

BG

19756

4001



Posisjon: X 1124375.51 Y 112684.84

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

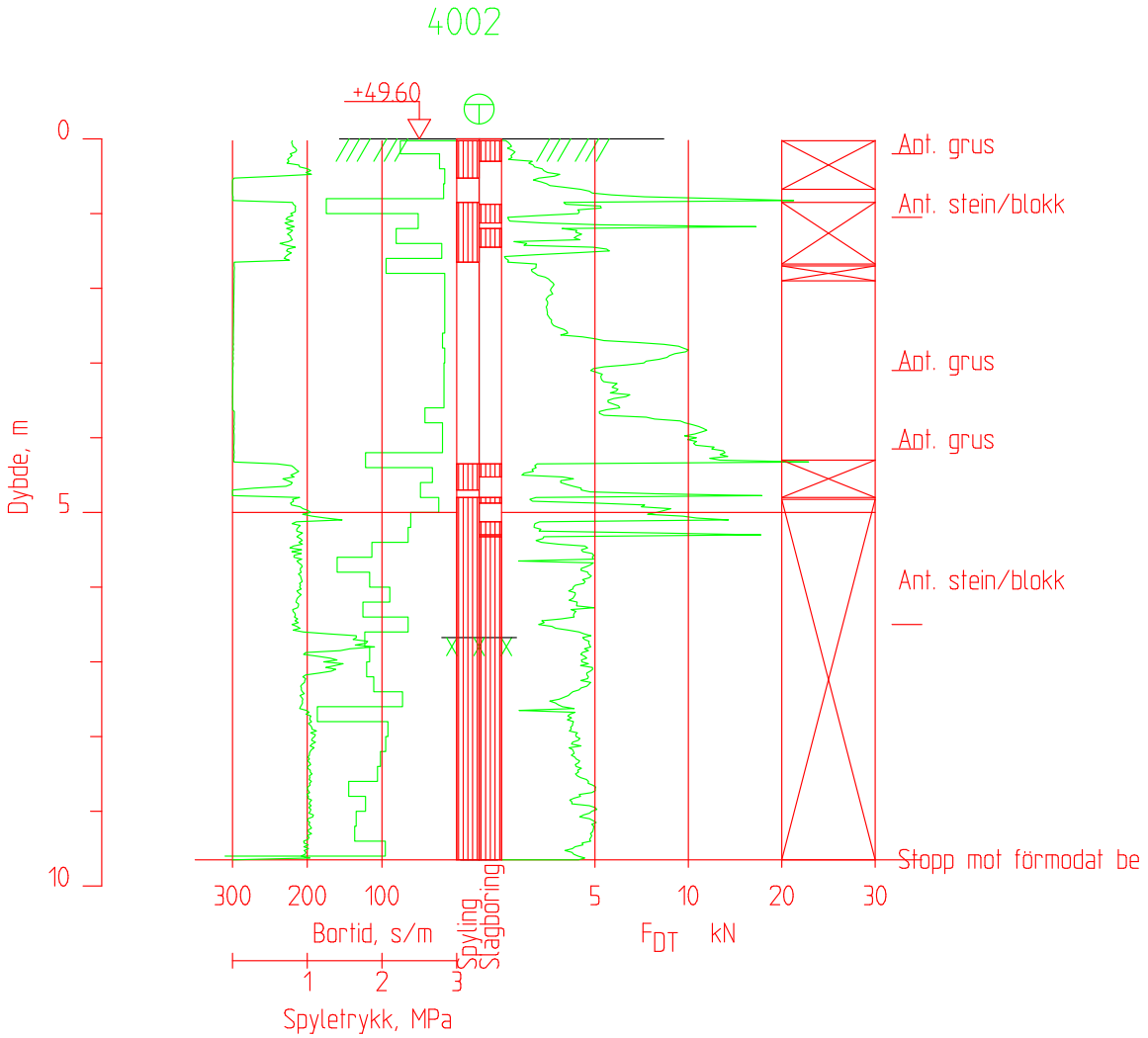
Borhull 4001

M = 1 : 100

Dato boret :22.11.2018

BG

19756



Posisjon: X 1124390.31 Y 112687.23

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

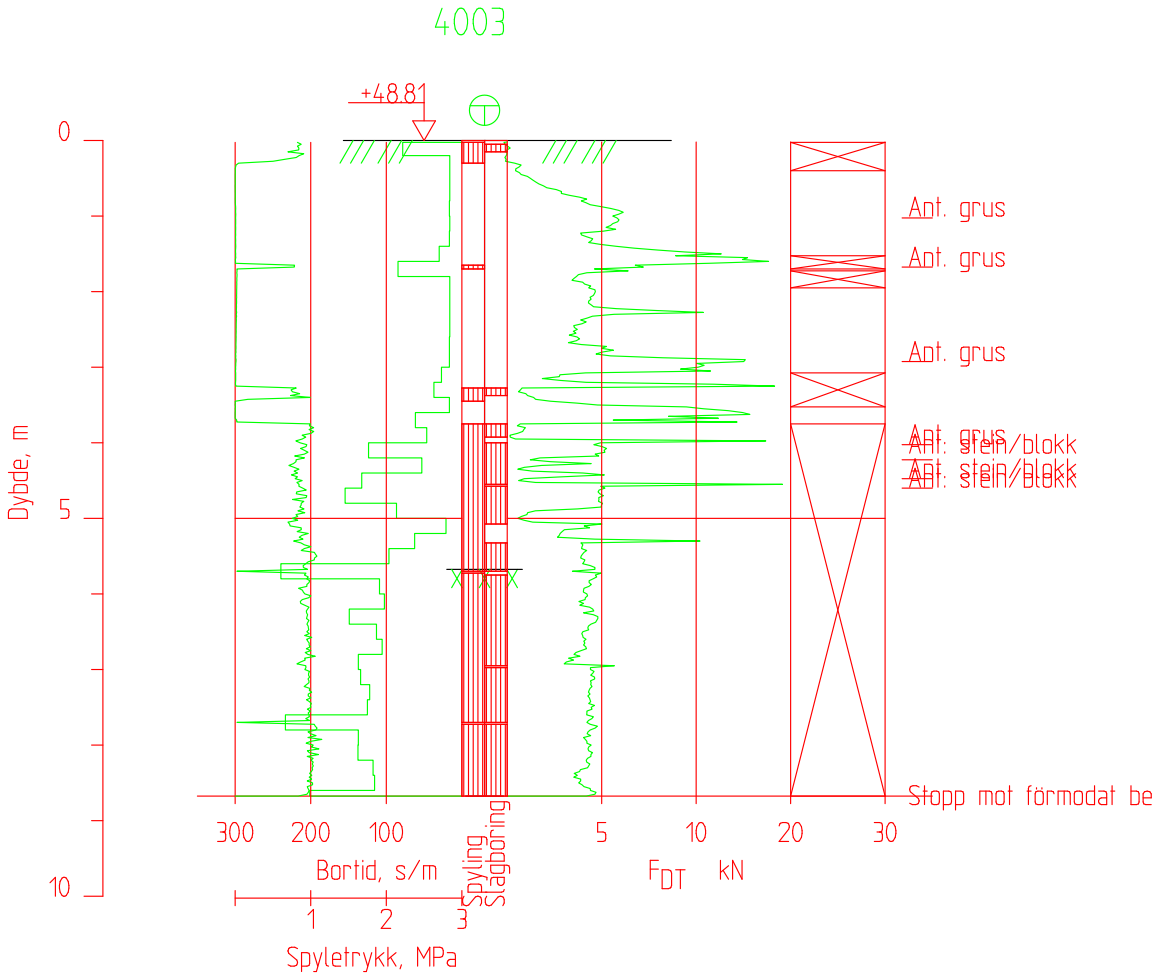
Borhull 4002

M = 1 : 100

Dato boret :22.11.2018

BG

19756



Posisjon: X 1124404.95 Y 112688.43

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4003

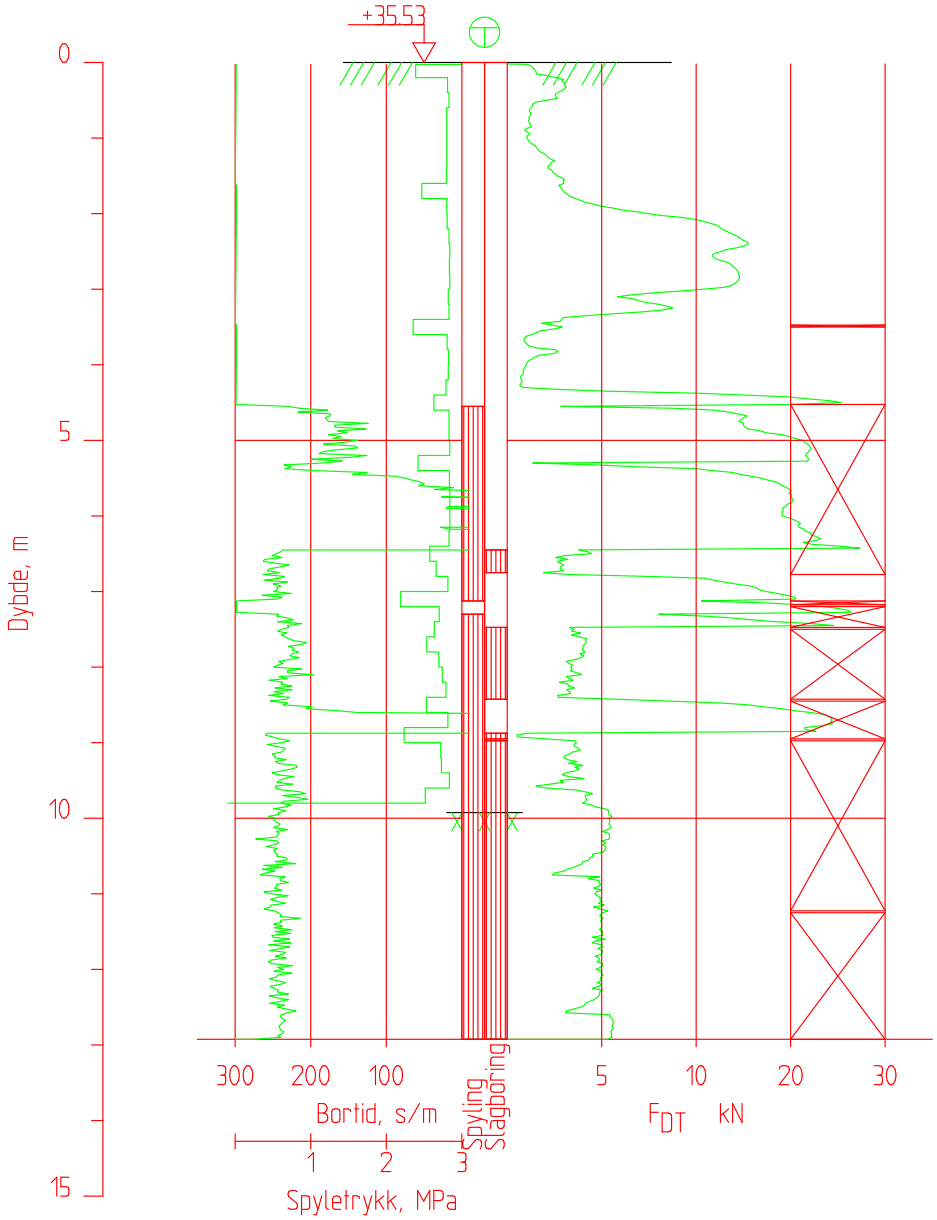
M = 1 : 100

Dato boret :22.11.2018

BG

19756

4004



Posisjon: X 1124366.37 Y 112608.55

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4004

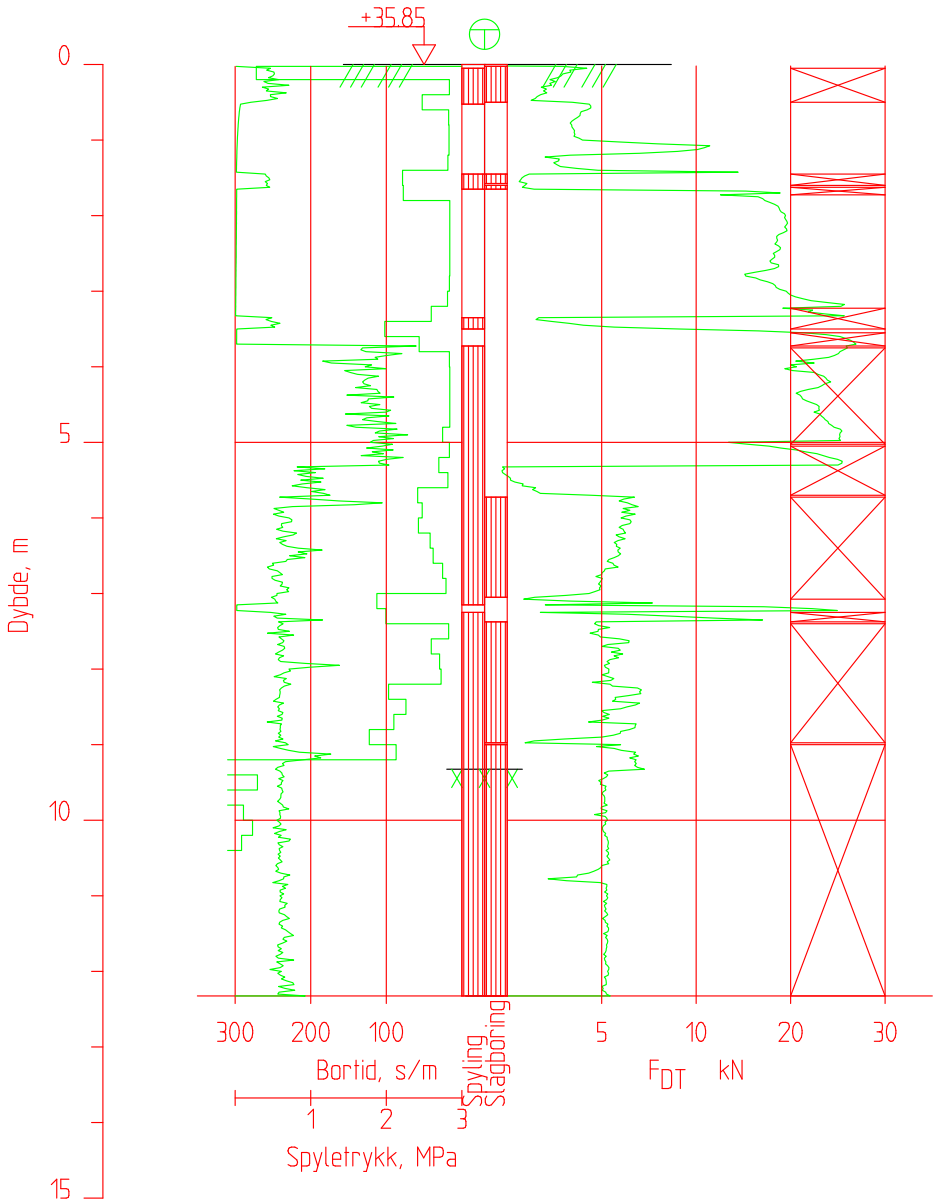
M = 1 : 100

Dato boret :29.10.2018

BG

19756

4005



Posisjon: X 112436.64 Y 112598.17

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4005

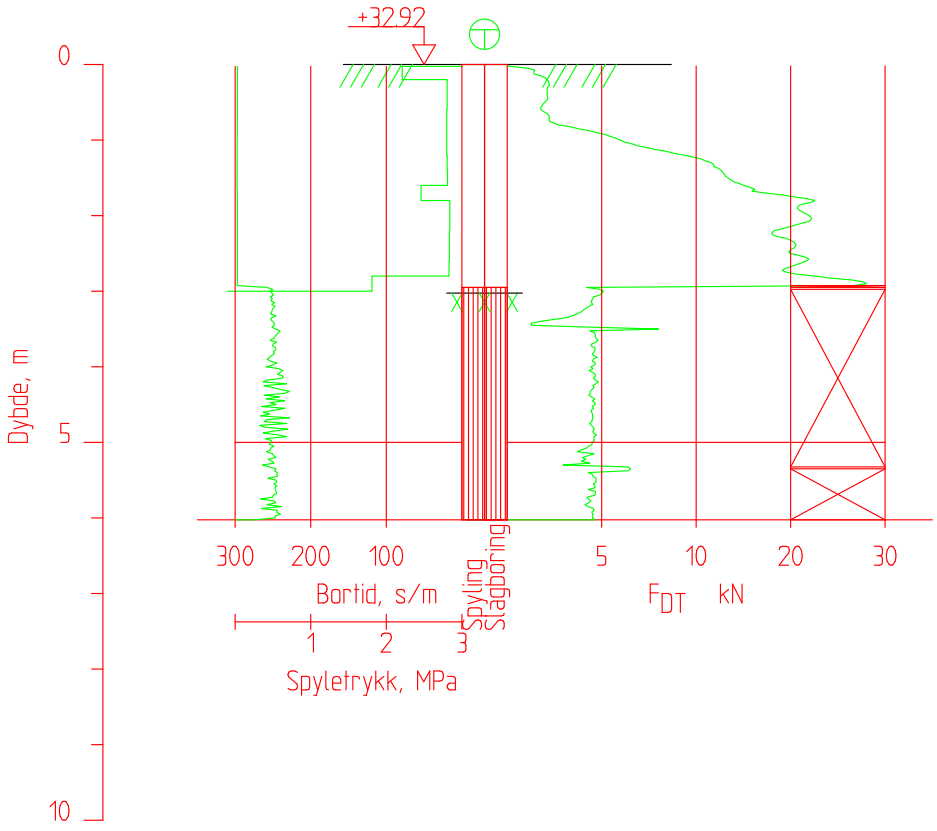
M = 1 : 100

Dato boret :29.10.2018

BG

19756

4006



Posisjon: X 1124380.03 Y 112530.72

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4006

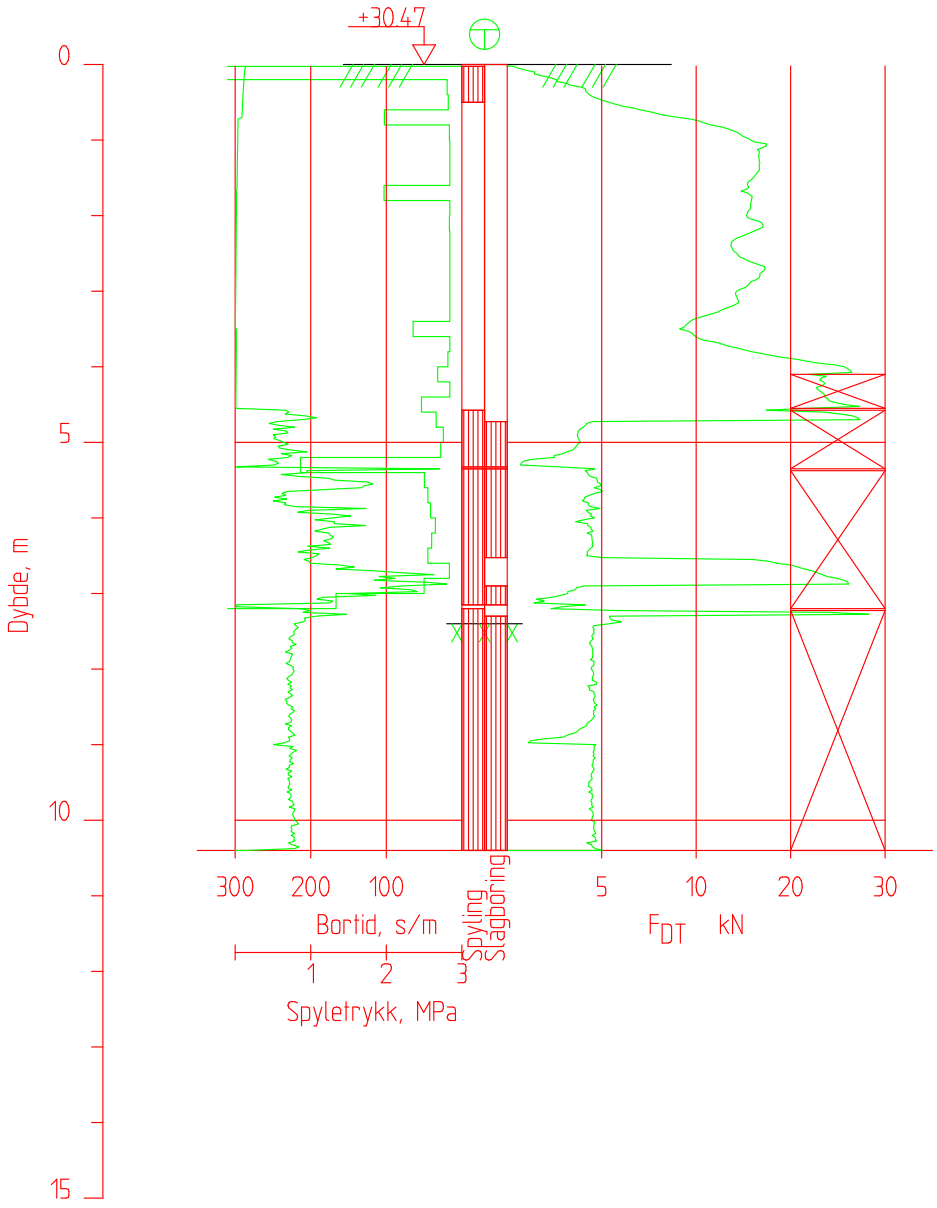
M = 1 : 100

Dato boret :29.10.2018

BG

19756

4007



Posisjon: X 1124381.78 Y 112511.06

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4007

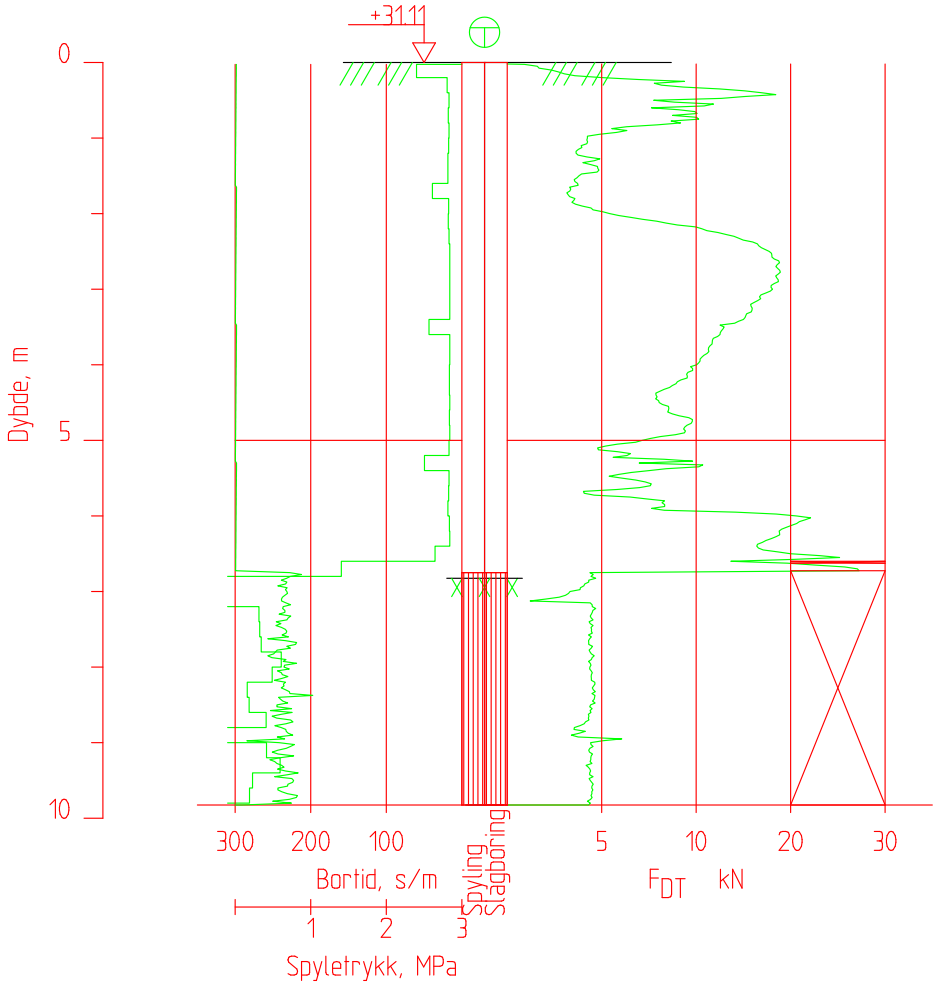
M = 1 : 100

Dato boret :29.10.2018

BG

19756

4008



Posisjon: X 1124437.41 Y 112505.62

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4008

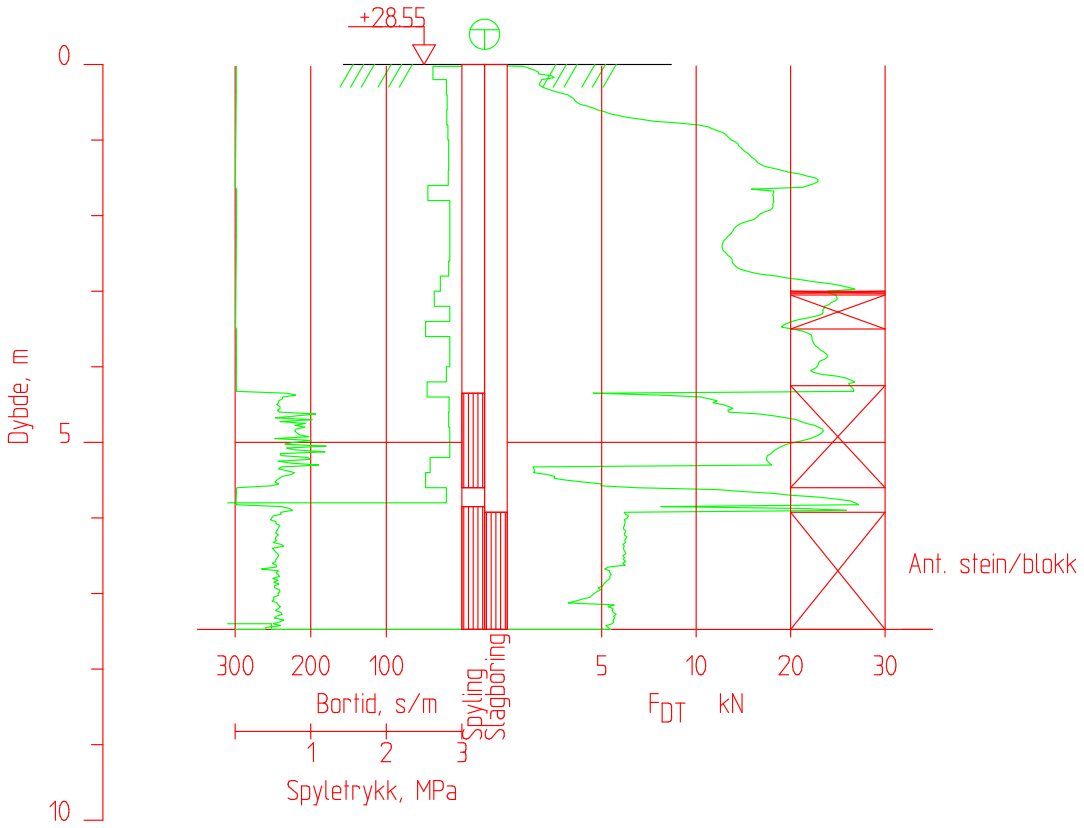
M = 1 : 100

Dato boret :29.10.2018

BG

19756

4009



Posisjon: X 1124383.35 Y 112491.38

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

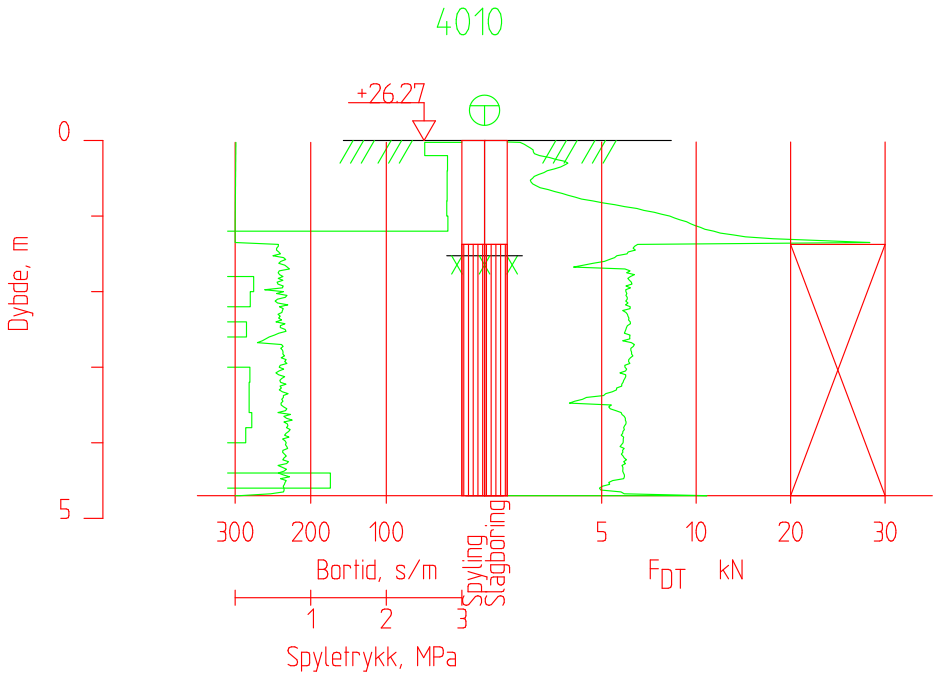
Borhull 4009

M = 1 : 100

Dato boret :25.10.2018

BG

19756



Posisjon: X 1124384.76 Y 11247169

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4010

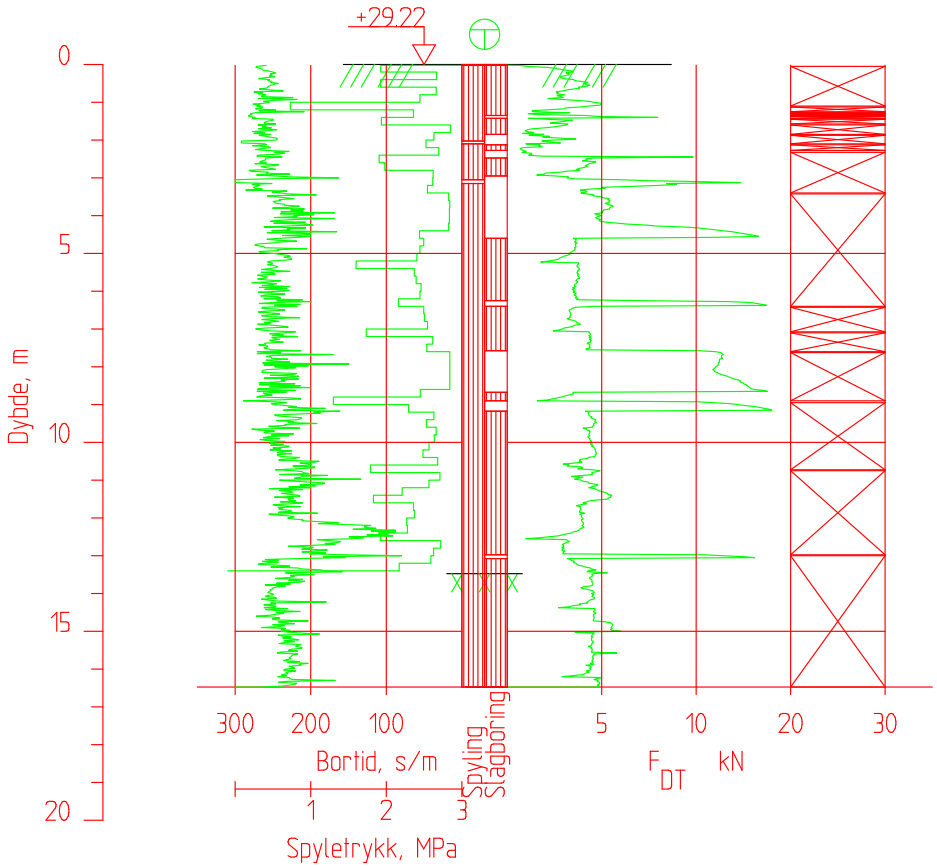
M = 1 : 100

Dato boret :25.10.2018

BG

19756

4011



Posisjon: X 1124437.59 Y 112471.80

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4011

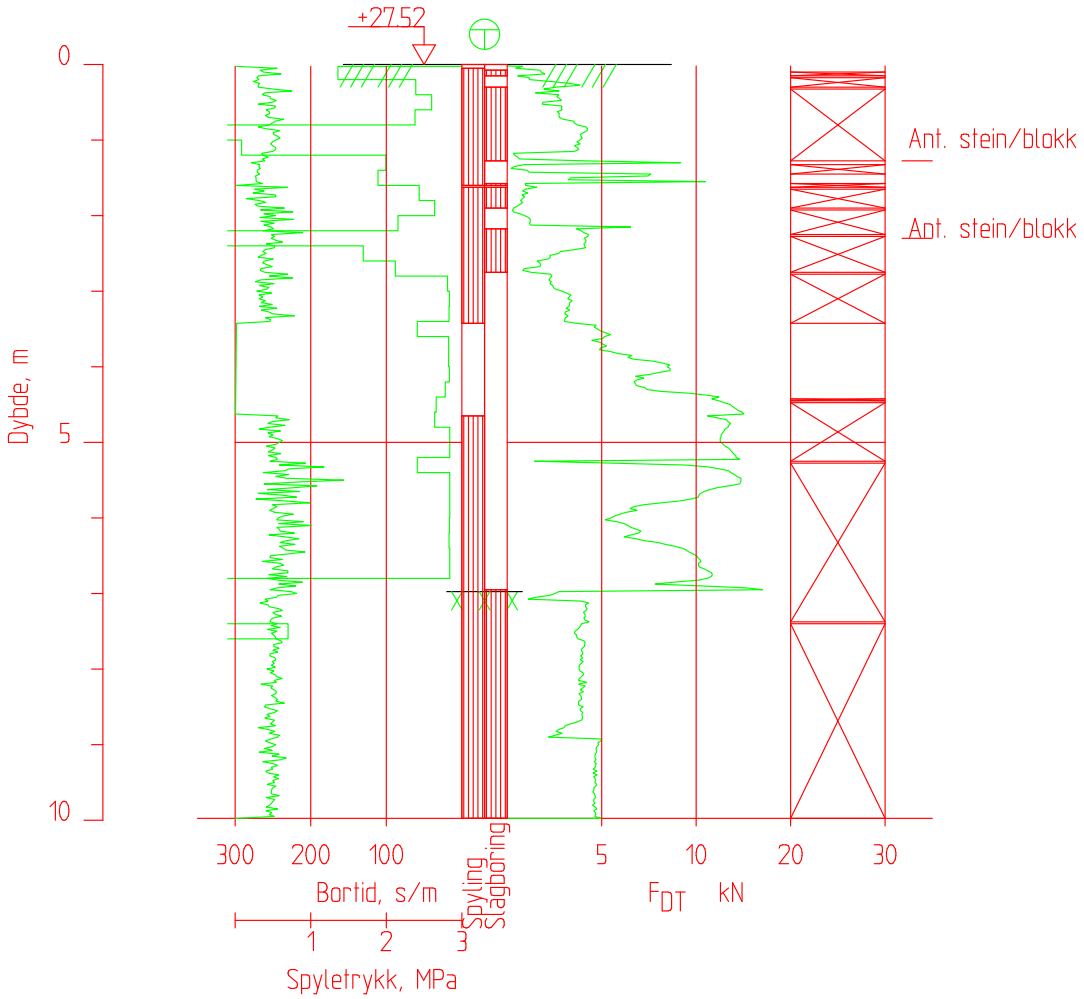
M = 1 : 200

Dato boret :07.11.2018

BG

19756

4012



Posisjon: X 1124422.78 Y 11246143

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4012

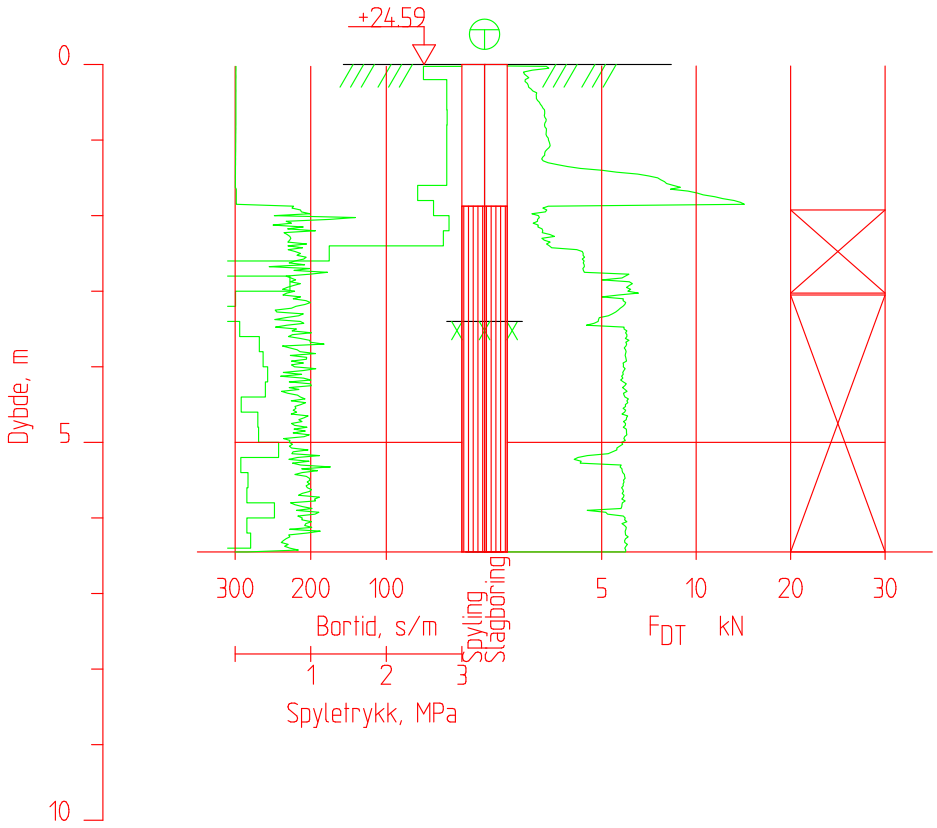
M = 1 : 100

Dato boret :07.11.2018

BG

19756

4013



Posisjon: X 1124381.01 Y 112451.70

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

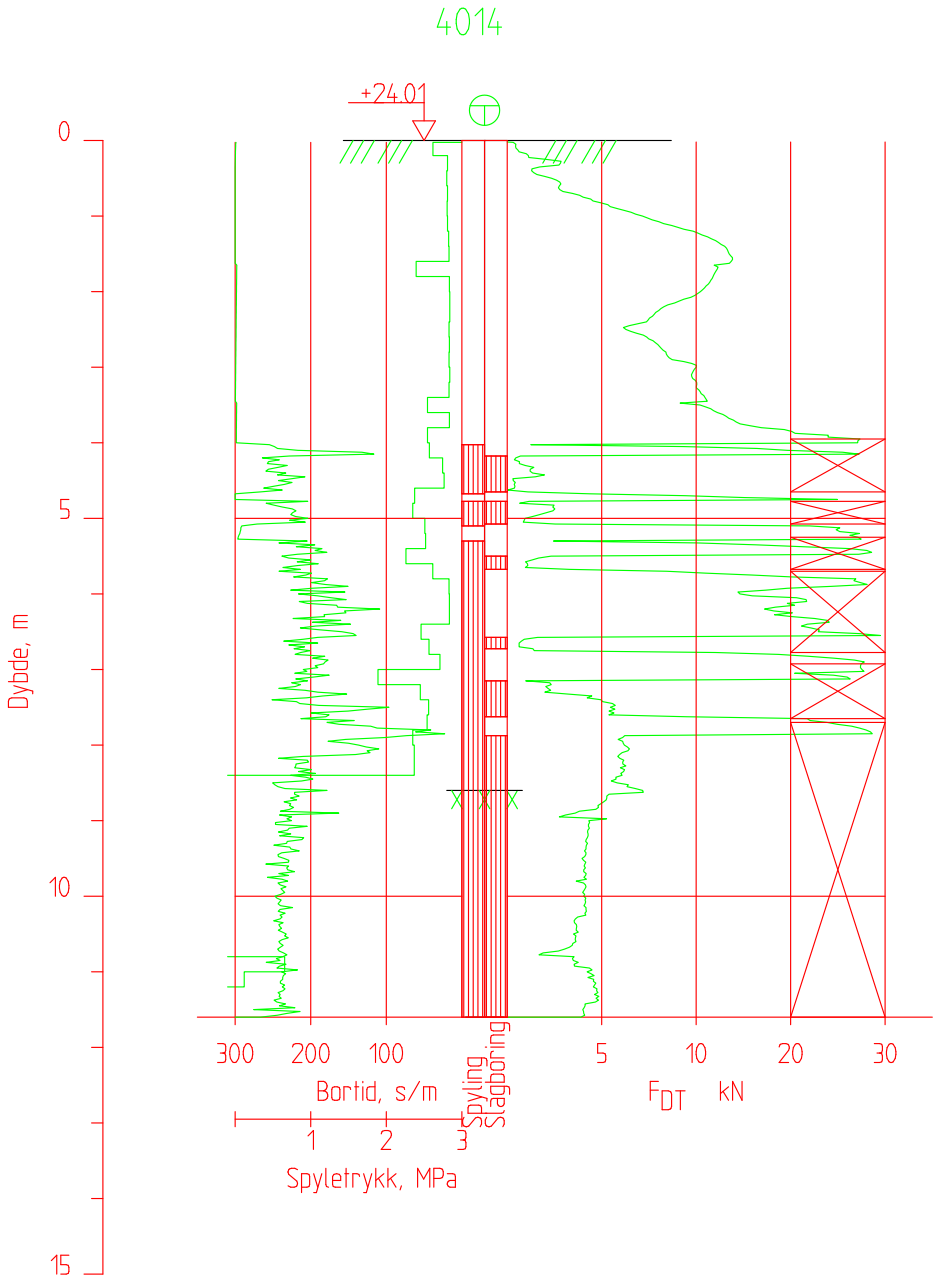
Borhull 4013

M = 1 : 100

Dato boret :25.10.2018

BG

19756



Posisjon: X 112444.92 Y 112456.67

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4014

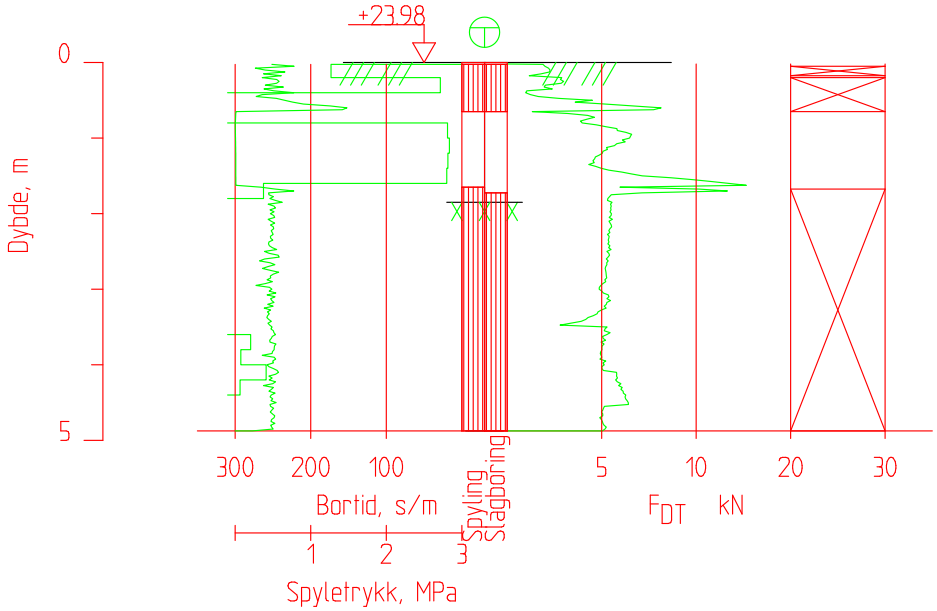
M = 1 : 100

Dato boret :06.11.2018

BG

19756

4015



Posisjon: X 1124416.90 Y 112441.62

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4015

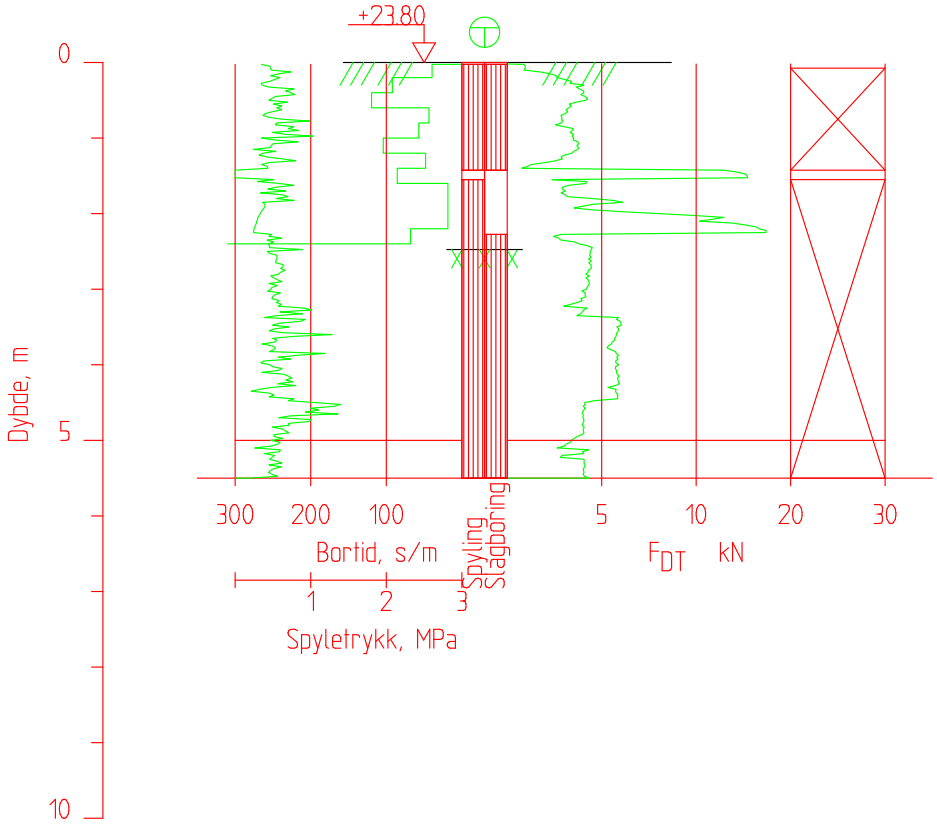
M = 1 : 100

Dato boret :06.11.2018

BG

19756

4016



Posisjon: X 1124382.81 Y 112431.03

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4016

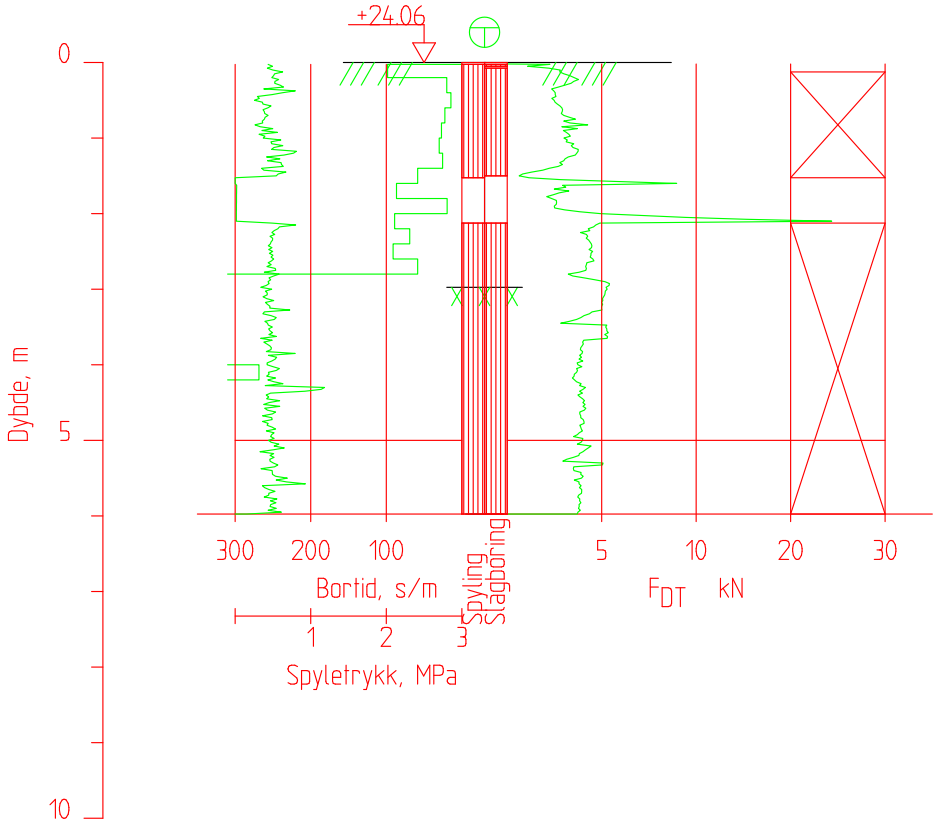
M = 1 : 100

Dato boret :07.11.2018

BG

19756

4017



Posisjon: X 1124417.02 Y 112433.77

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

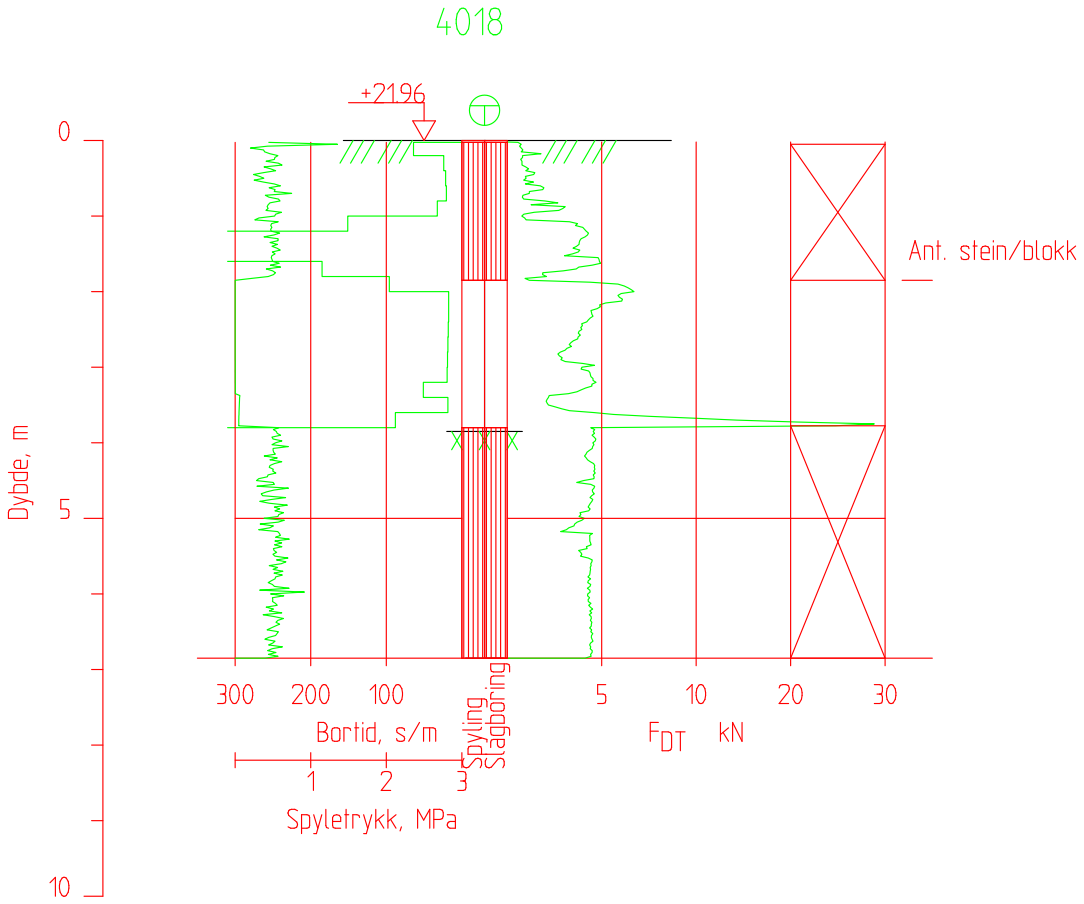
Borhull 4017

M = 1 : 100

Dato boret :06.11.2018

BG

19756



Posisjon: X 112444.56 Y 112422.83

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4018

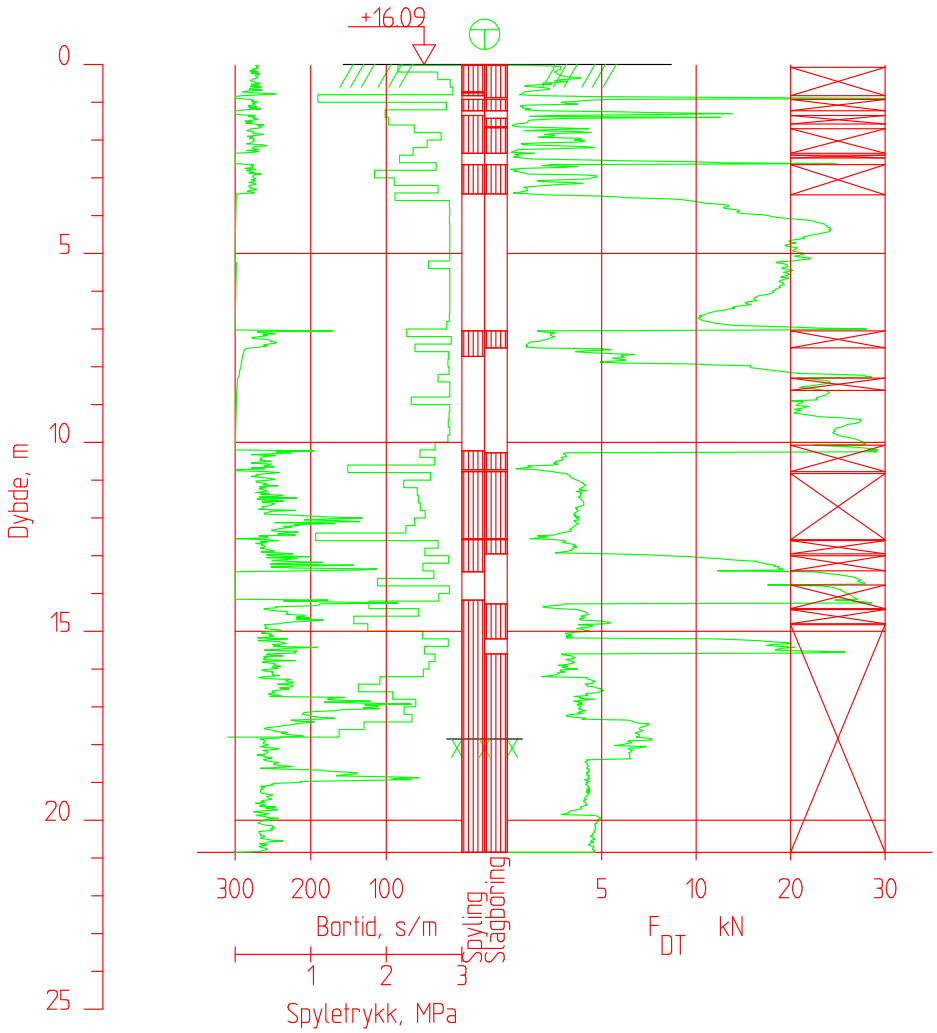
M = 1 : 100

Dato boret :07.11.2018

BG

19756

4020



Posisjon: X 1124388.35 Y 112394.68

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4020

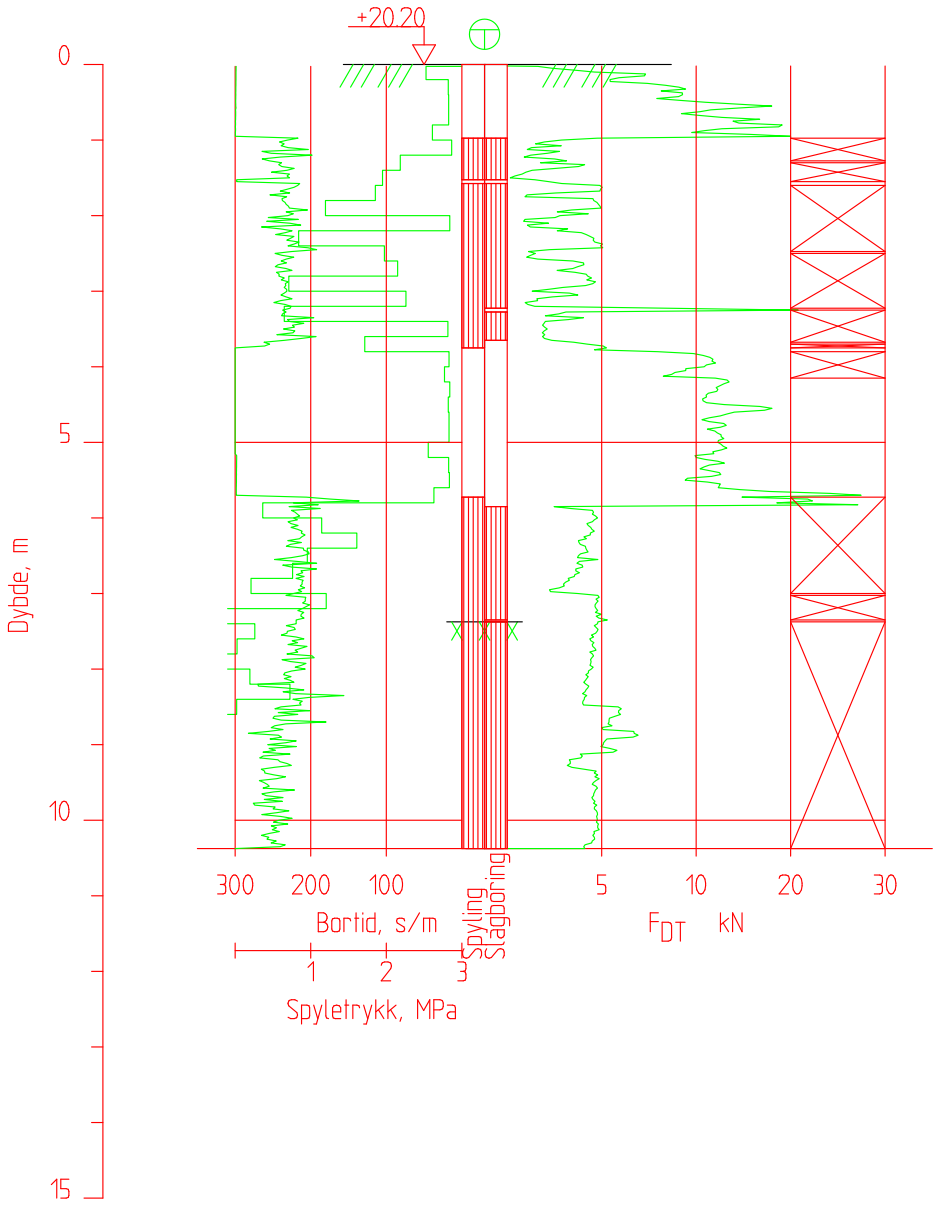
M = 1 : 200

Dato boret :25.10.2018

BG

19756

4021



Posisjon: X 112444.3.64 Y 112394.61

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4021

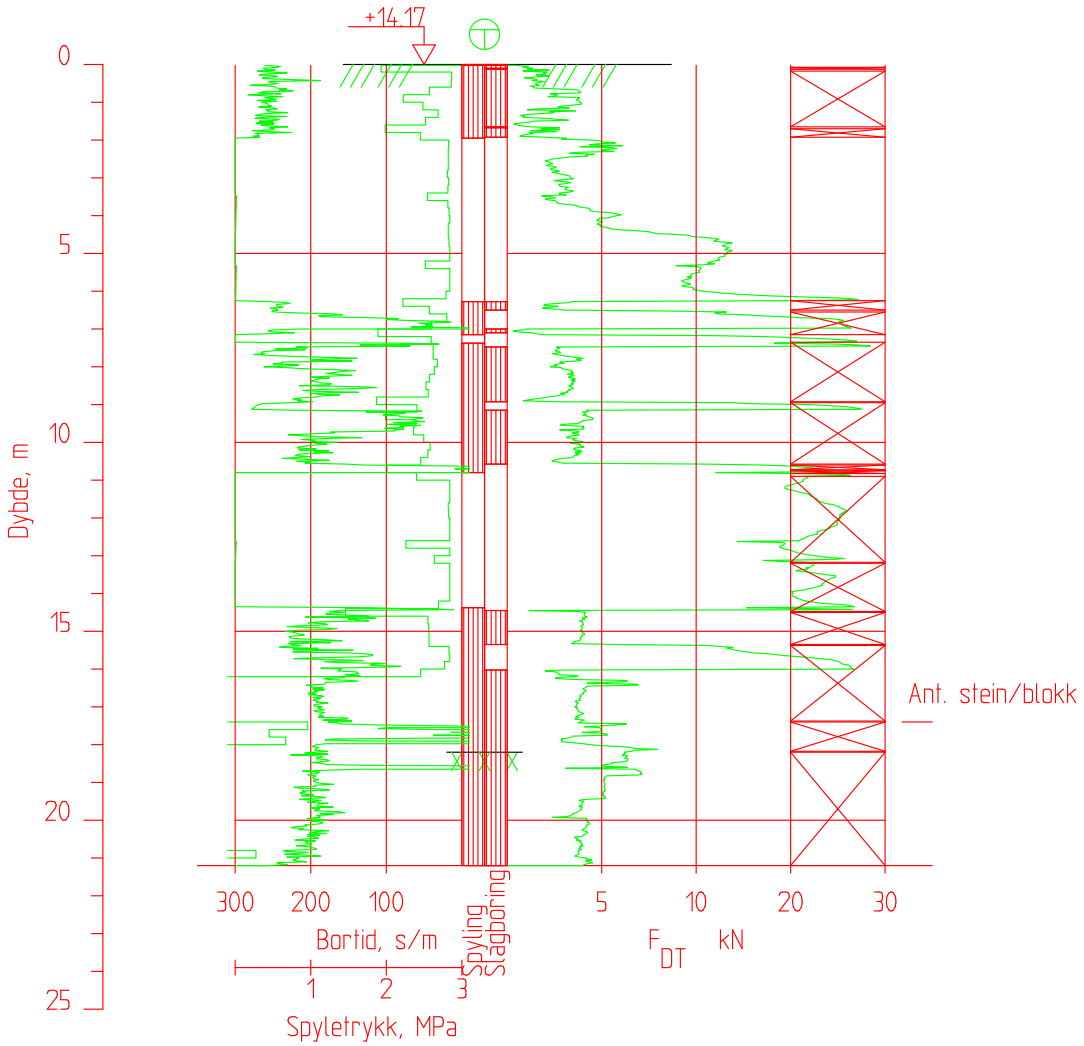
M = 1 : 100

Dato boret :24.10.2018

BG

19756

4022



Posisjon: X 1124389.22 Y 112373.11

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4022

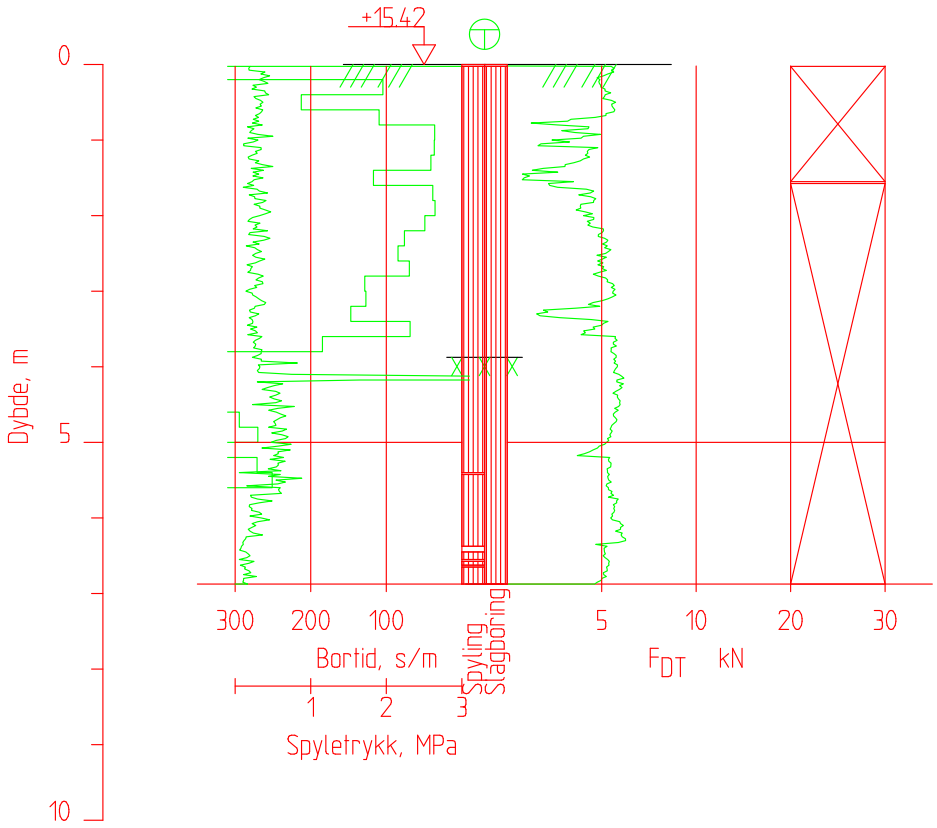
M = 1 : 200

Dato boret :25.10.2018

BG

19756

4023



Posisjon: X 1124444.21 Y 112374.40

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4023

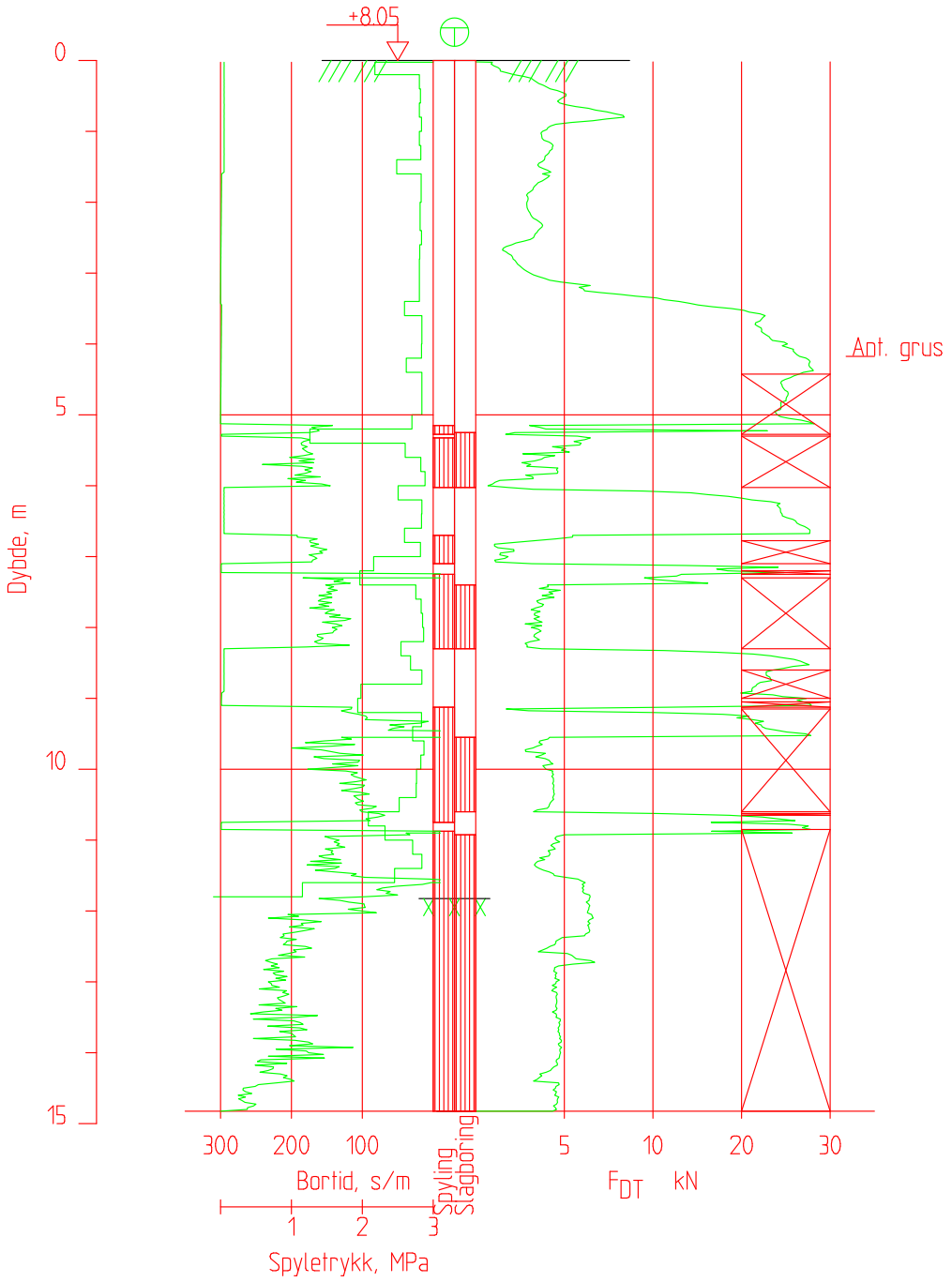
M = 1 : 100

Dato boret :24.10.2018

BG

19756

4024



Posisjon: X 1124389.60 Y 112353.37

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4024

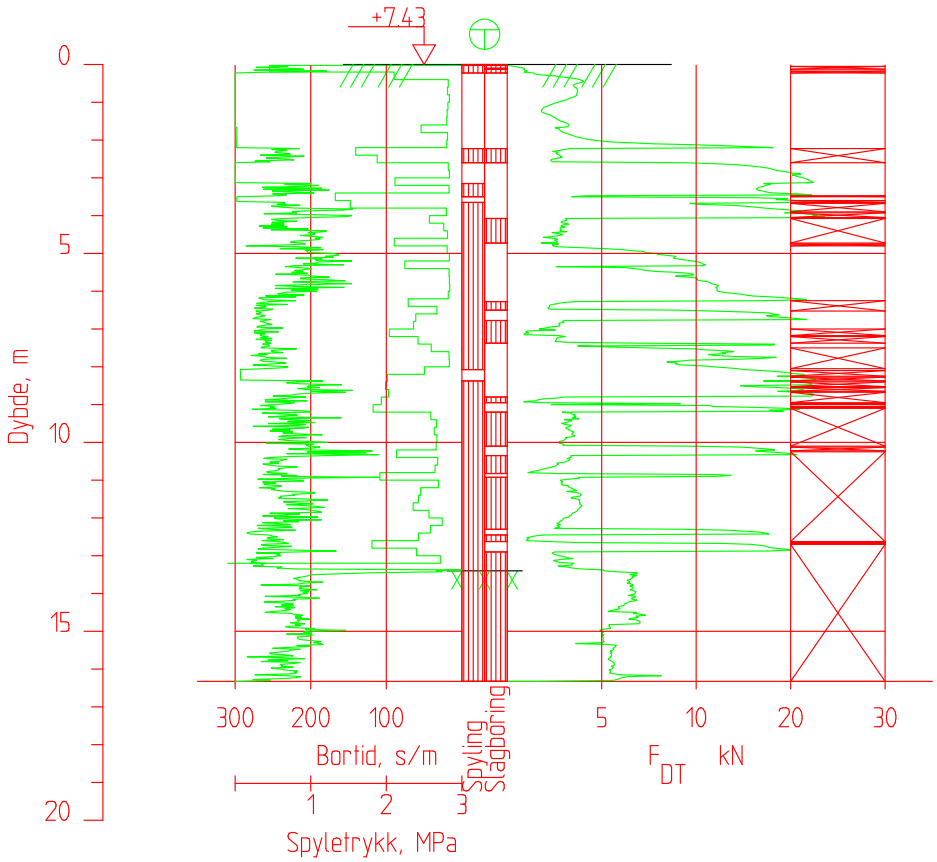
M = 1 : 100

Dato boret :24.10.2018

BG

19756

4025



Posisjon: X 1124419.60 Y 112353.82

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4025

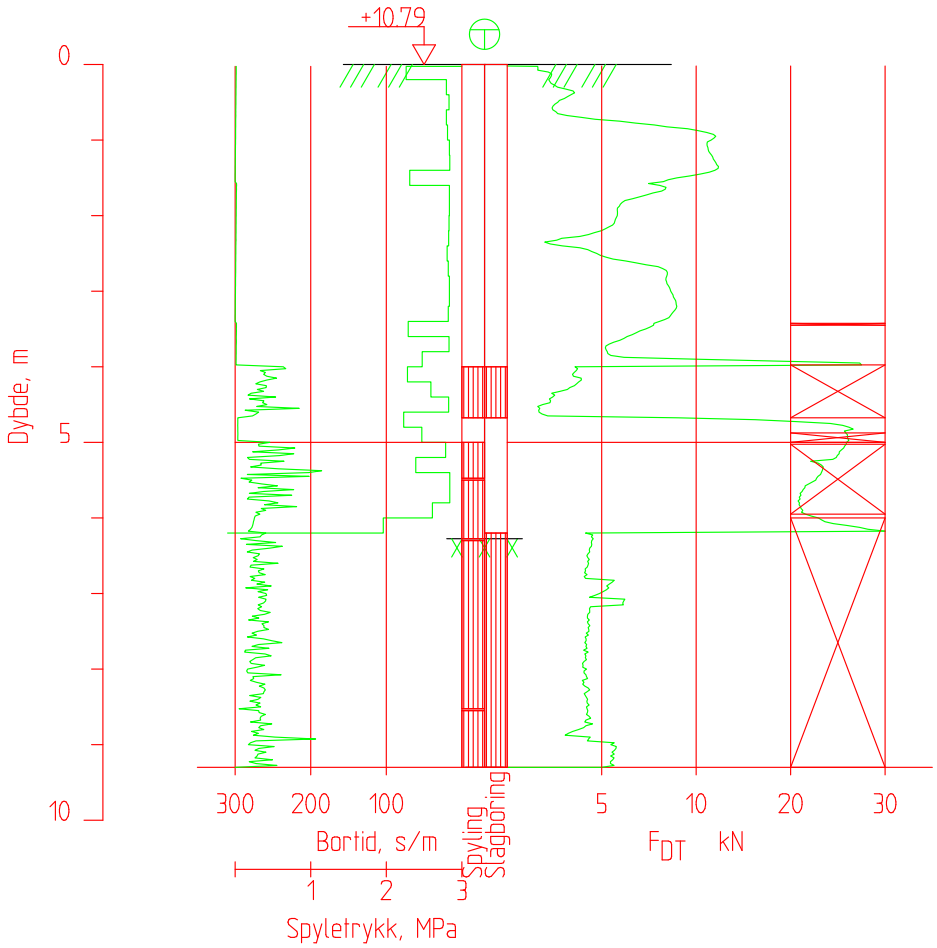
M = 1 : 200

Dato boret :23.10.2018

BG

19756

4026



Posisjon: X 1124442.67 Y 112354.18

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 4026

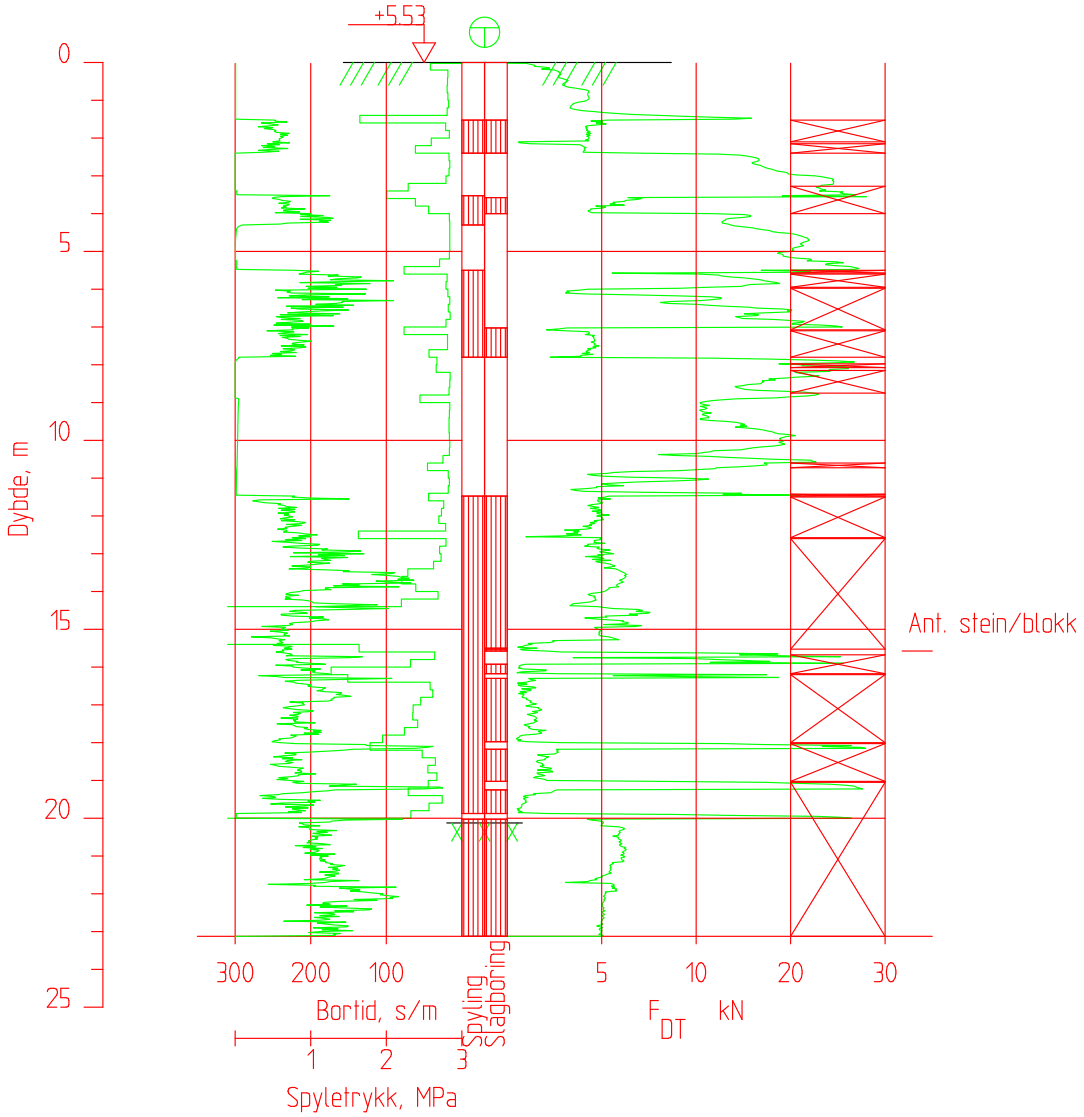
M = 1 : 100

Dato boret :24.10.2018

BG

19756

4027



Posisjon: X 1124419.72 Y 112343.82

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

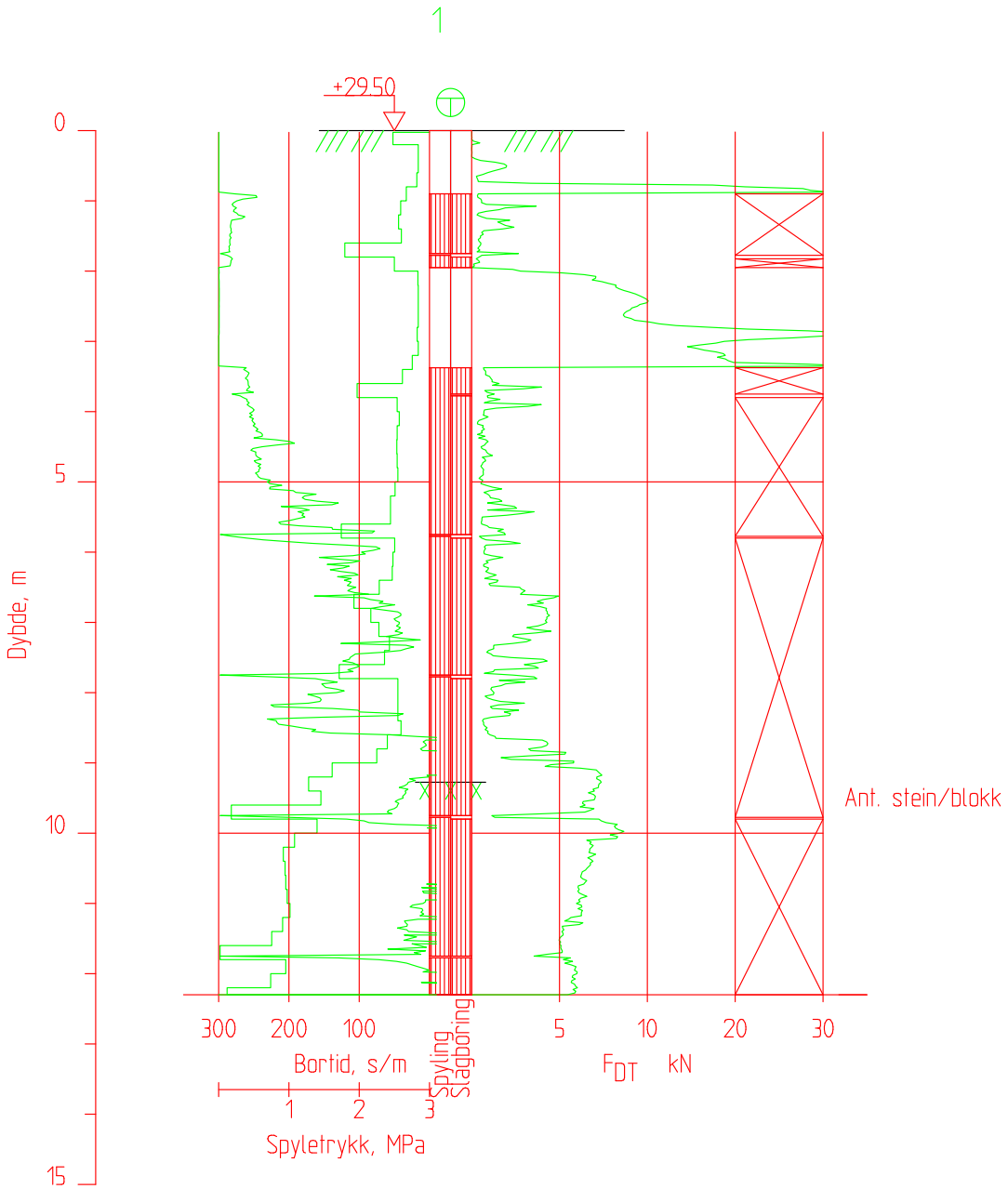
Borhull 4027

M = 1 : 200

Dato boret :23.10.2018

BG

19756



Posisjon: X 1124399.02 Y 112629.97

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 1

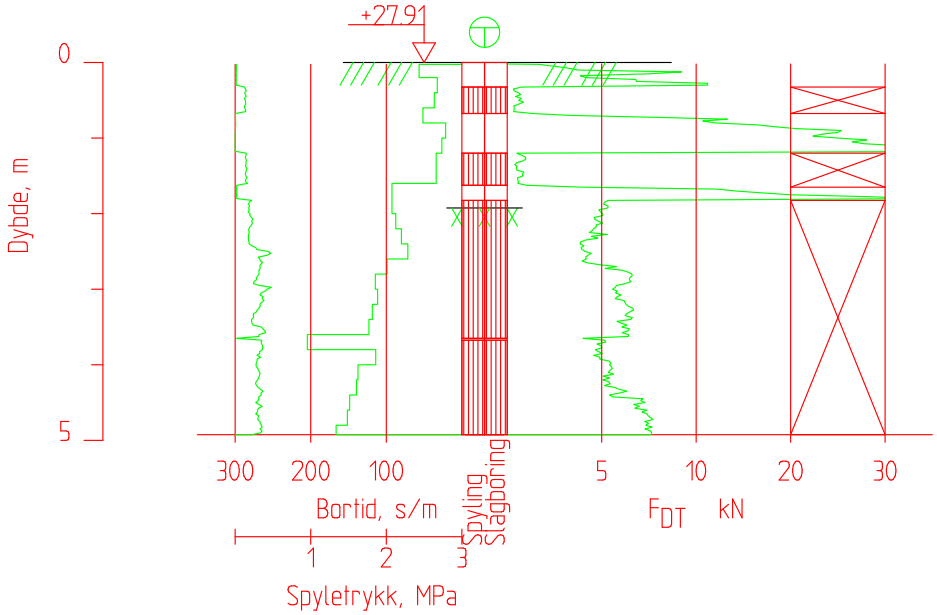
M = 1 : 100

Dato boret :07.11.2016

BG

19756

2



Posisjon: X 1124377.36 Y 112629.23

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

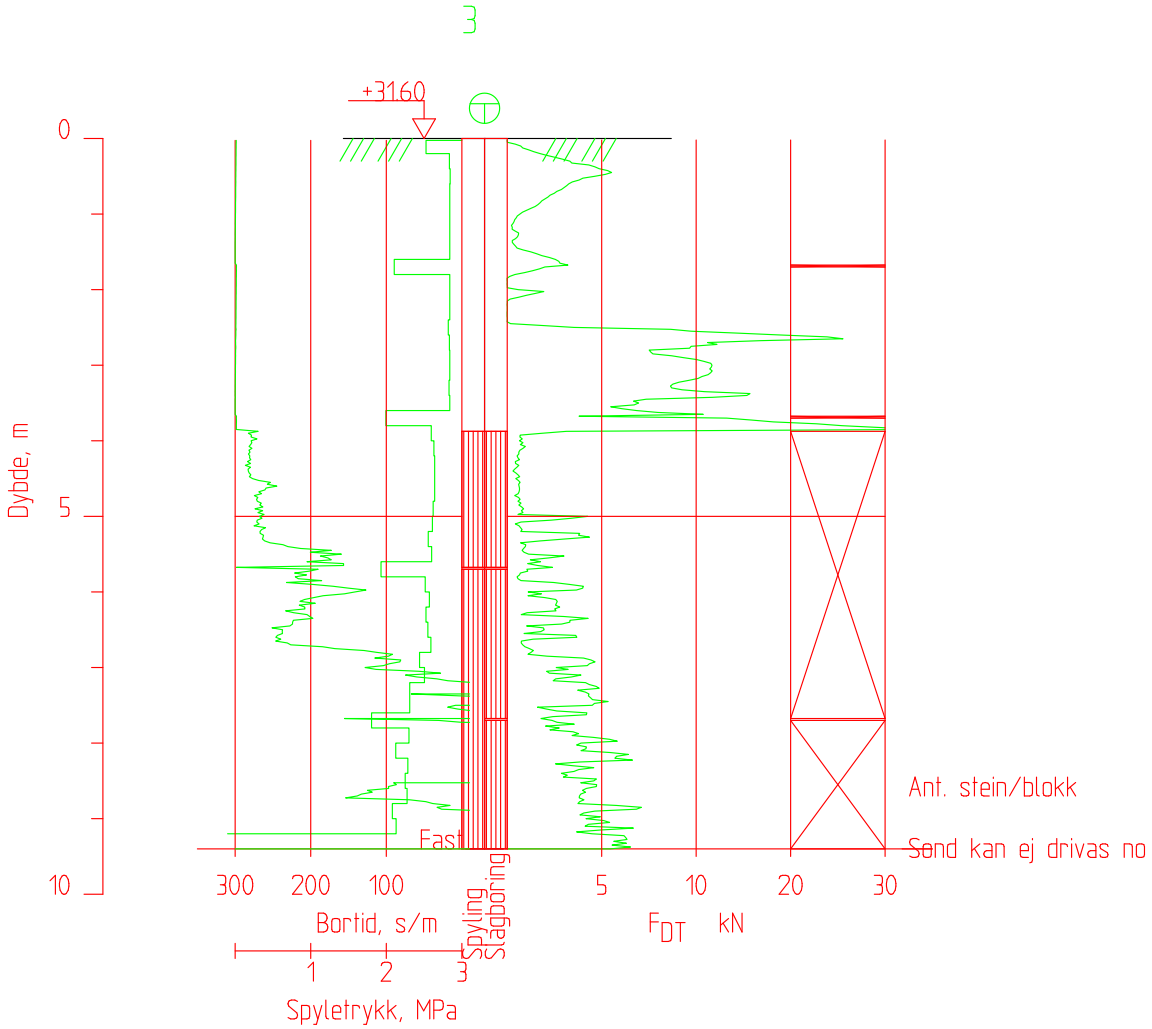
Borhull 2

M = 1 : 100

Dato boret :07.11.2016

BG

19756



Posisjon: X 1124414.50 Y 112631.93

Totalsondering

Borhull 3

Dato boret :03.11.2016

EIFFAGE

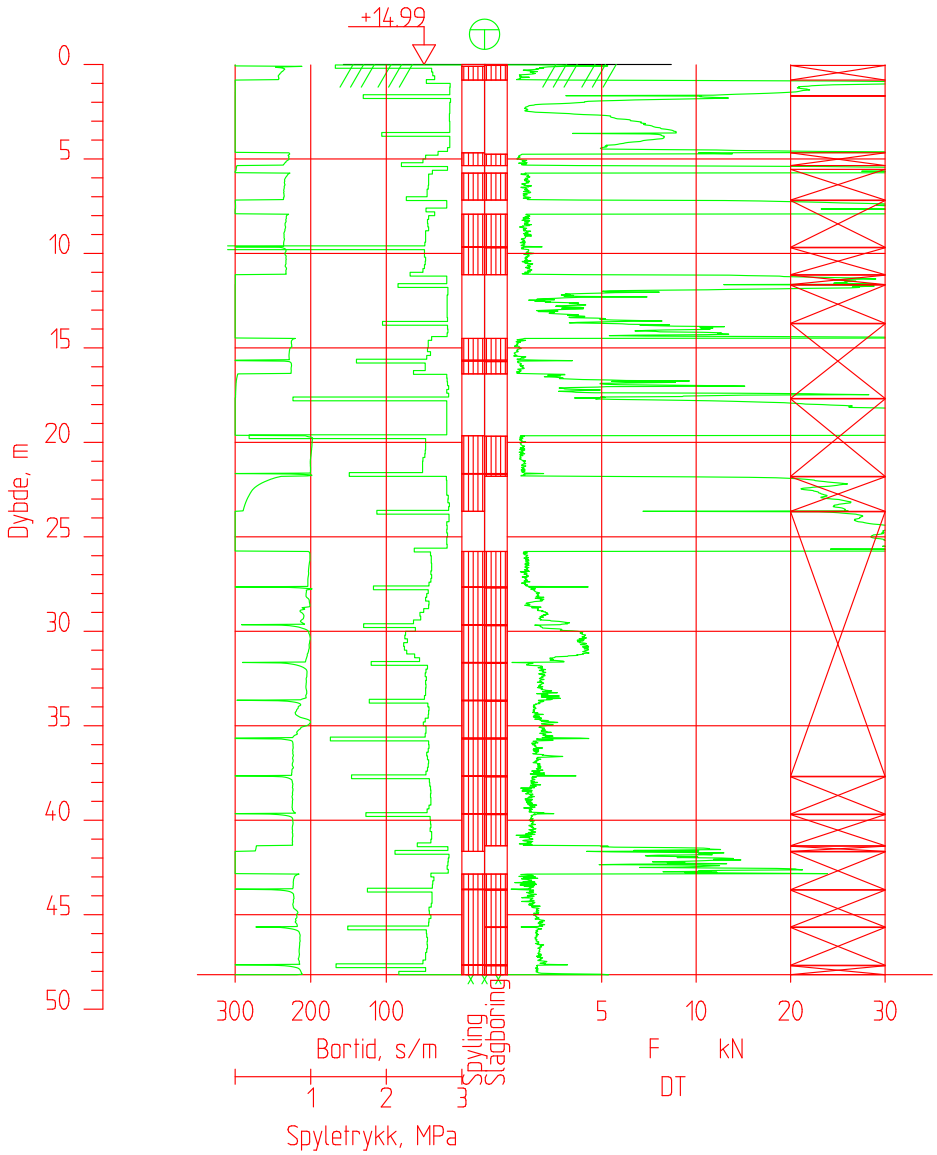
M = 1 : 100

E18 Langangen Rugtvedt

BG

19756

17



Posisjon: X 1124413.27 Y 112155.75

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 17

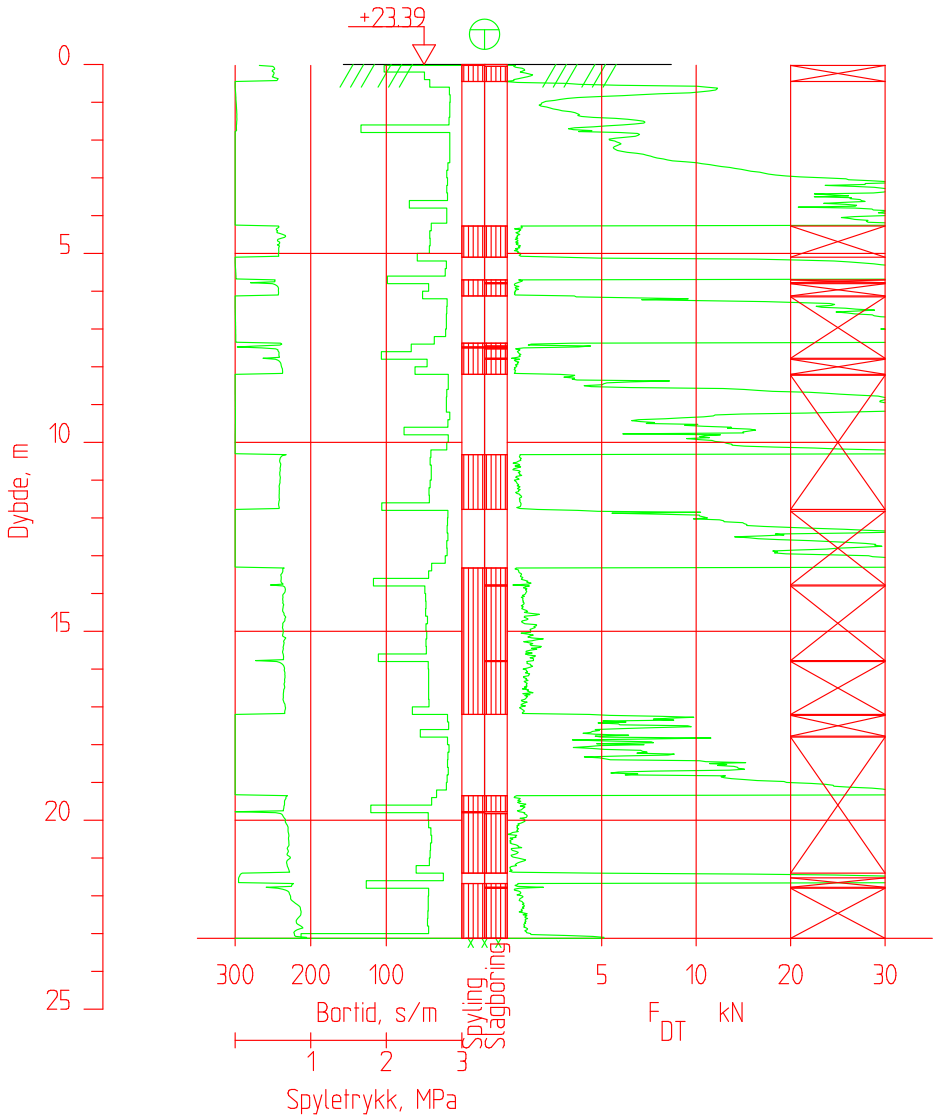
M = 1 : 400

Dato boret :23.01.2017

BG

19756

21



Posisjon: X 1124408.54 Y 112091.17

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 21

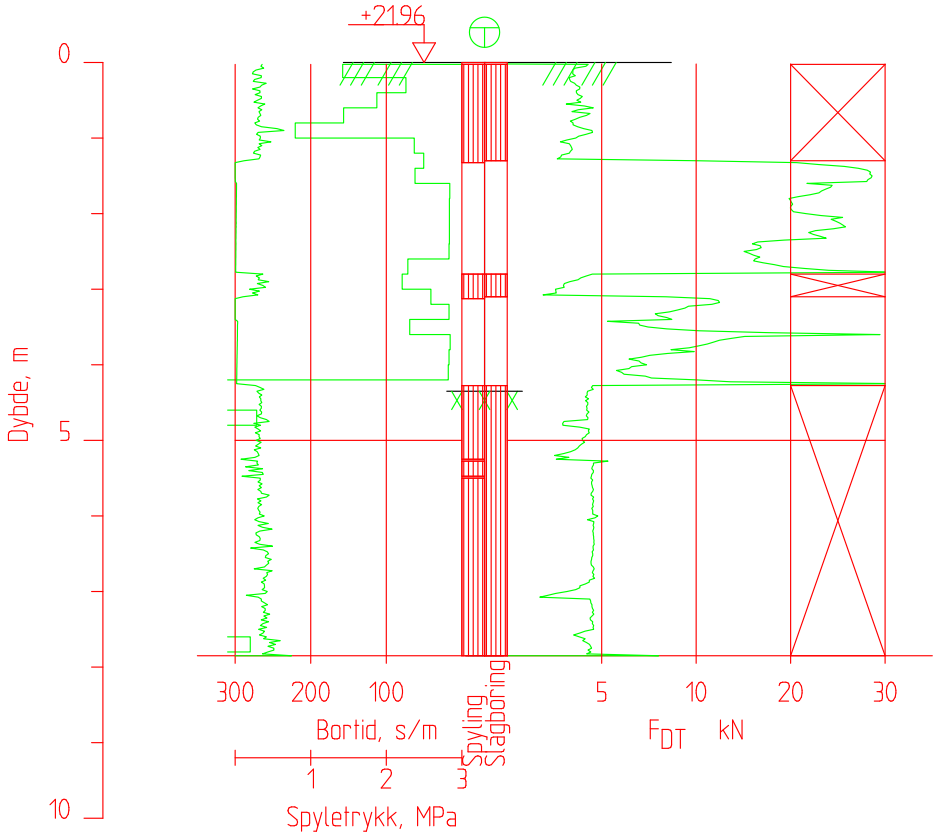
M = 1 : 200

Dato boret :19.01.2017

BG

19756

4019



Posisjon: X 1124387.95 Y 112412.57

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

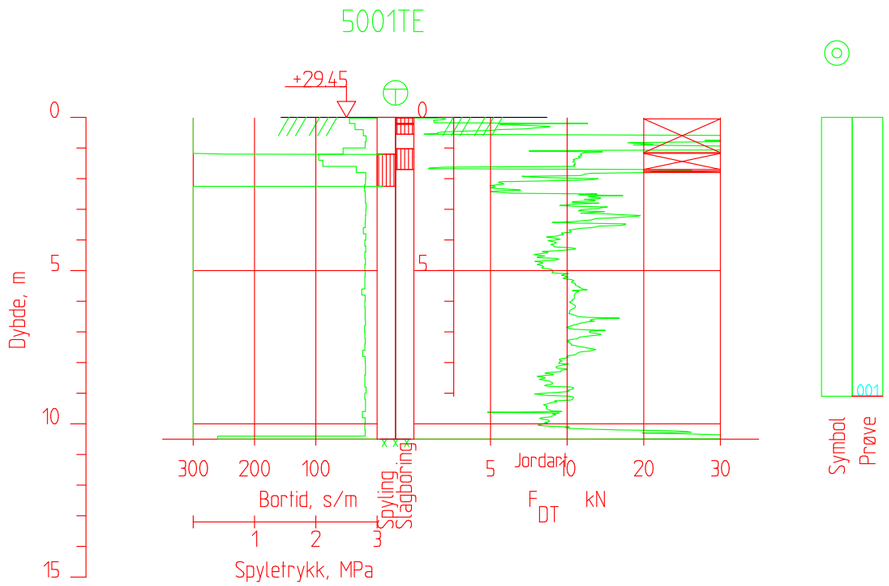
Borhull 4019

M = 1 : 100

Dato boret :07.11.2018

BG

19756



Posisjon: X 1122686.87 Y 109742.64

Totalsondering Borprofil

EIFFAGE

E18 Langangen Rugtvedt

Borhull 5001TE

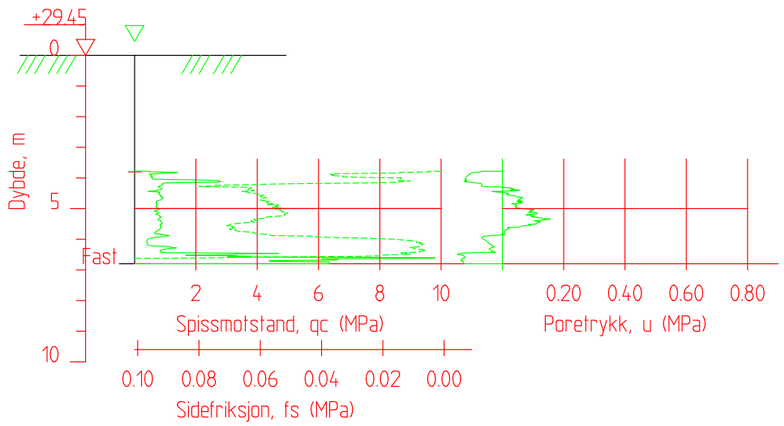
M = 1 : 200

Dato boret :30.06.2020

BG

19756

5001TEC



Posisjon: X 1122686.87 Y 10974264

CPT-sondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 5001TEC

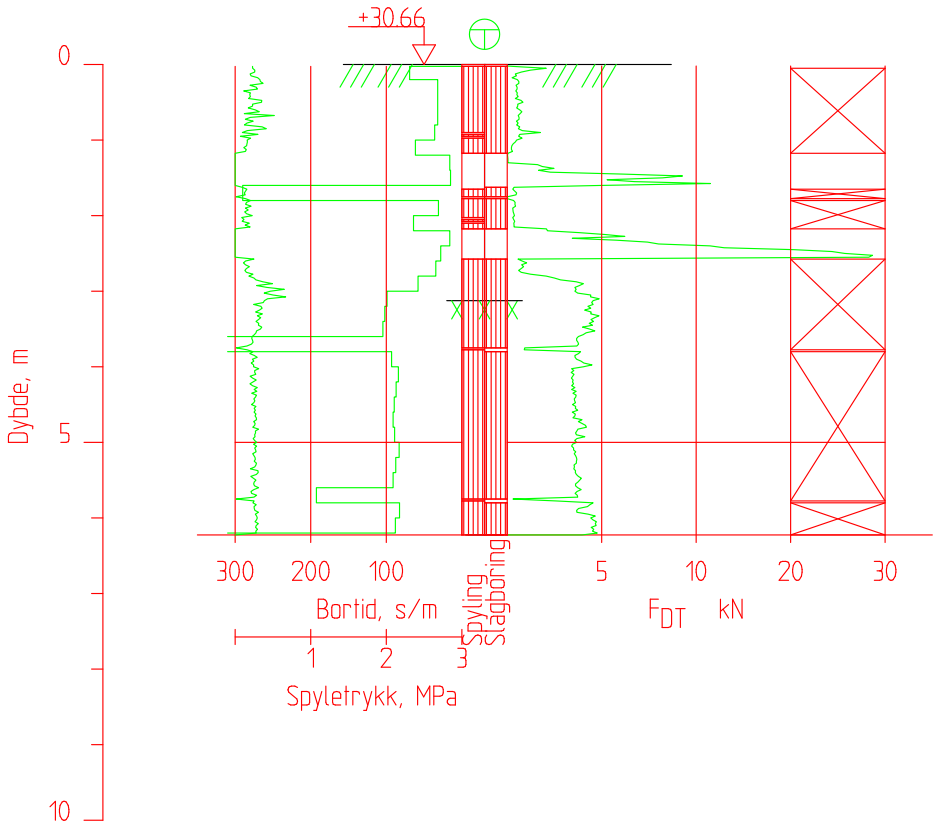
M = 1 : 200

Dato boret :02.07.2020

BG

19756

72



Posisjon: X 1122724.57 Y 109798.17

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 72

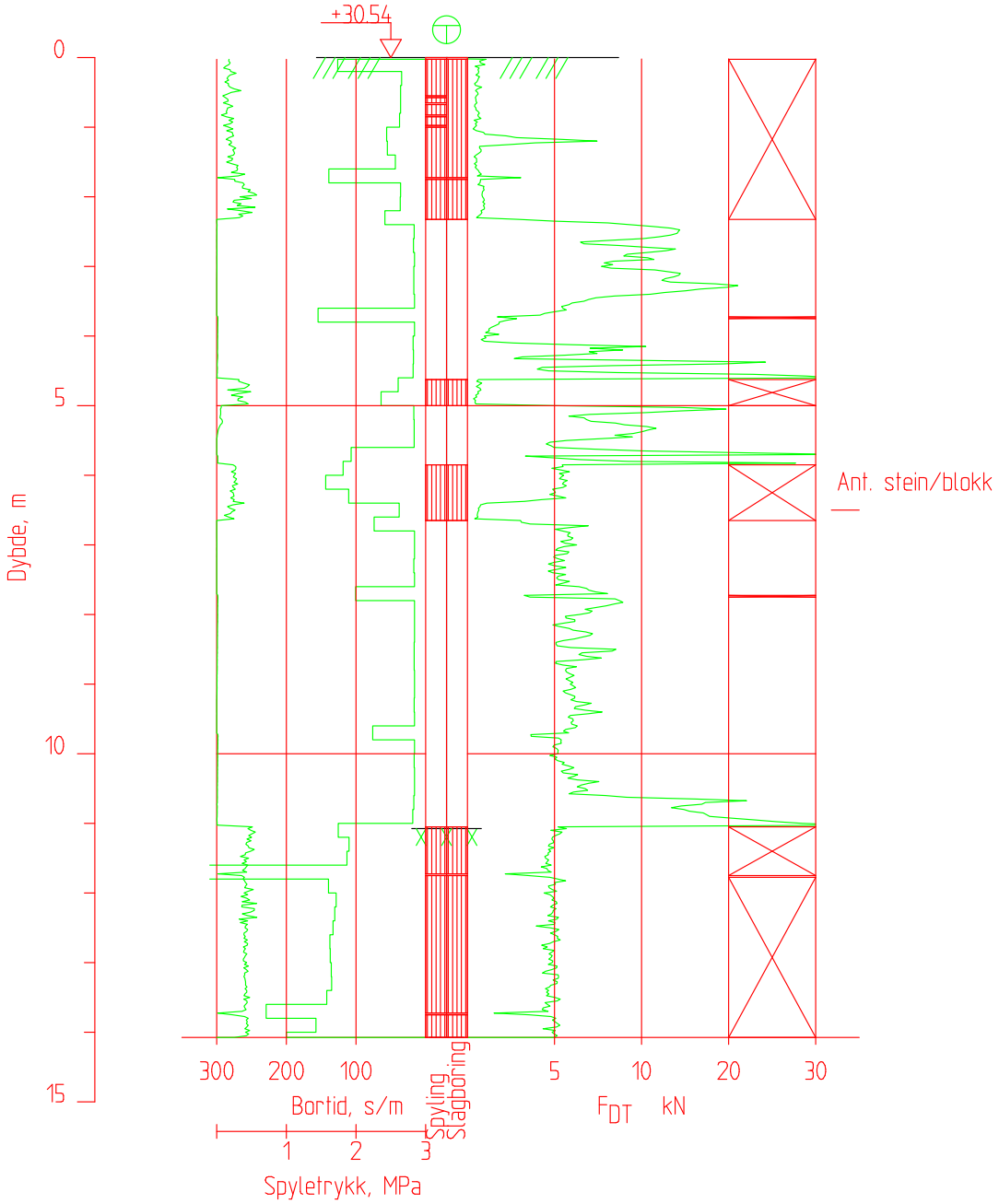
M = 1 : 100

Dato boret :16.11.2016

BG

19756

73



Posisjon: X 1122685.44 Y 109771.07

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 73

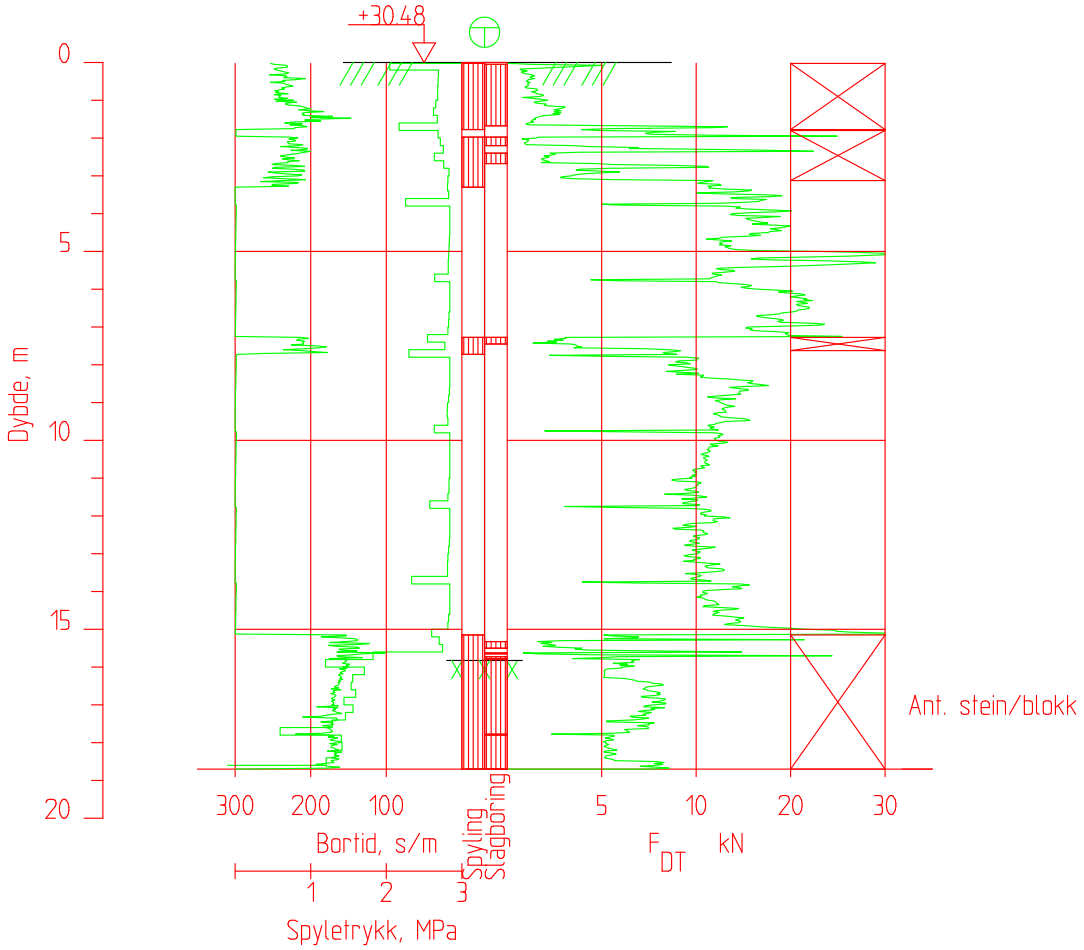
M = 1 : 100

Dato boret :16.11.2016

BG

19756

74



Posisjon: X 1122642.65 Y 109756.24

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 74

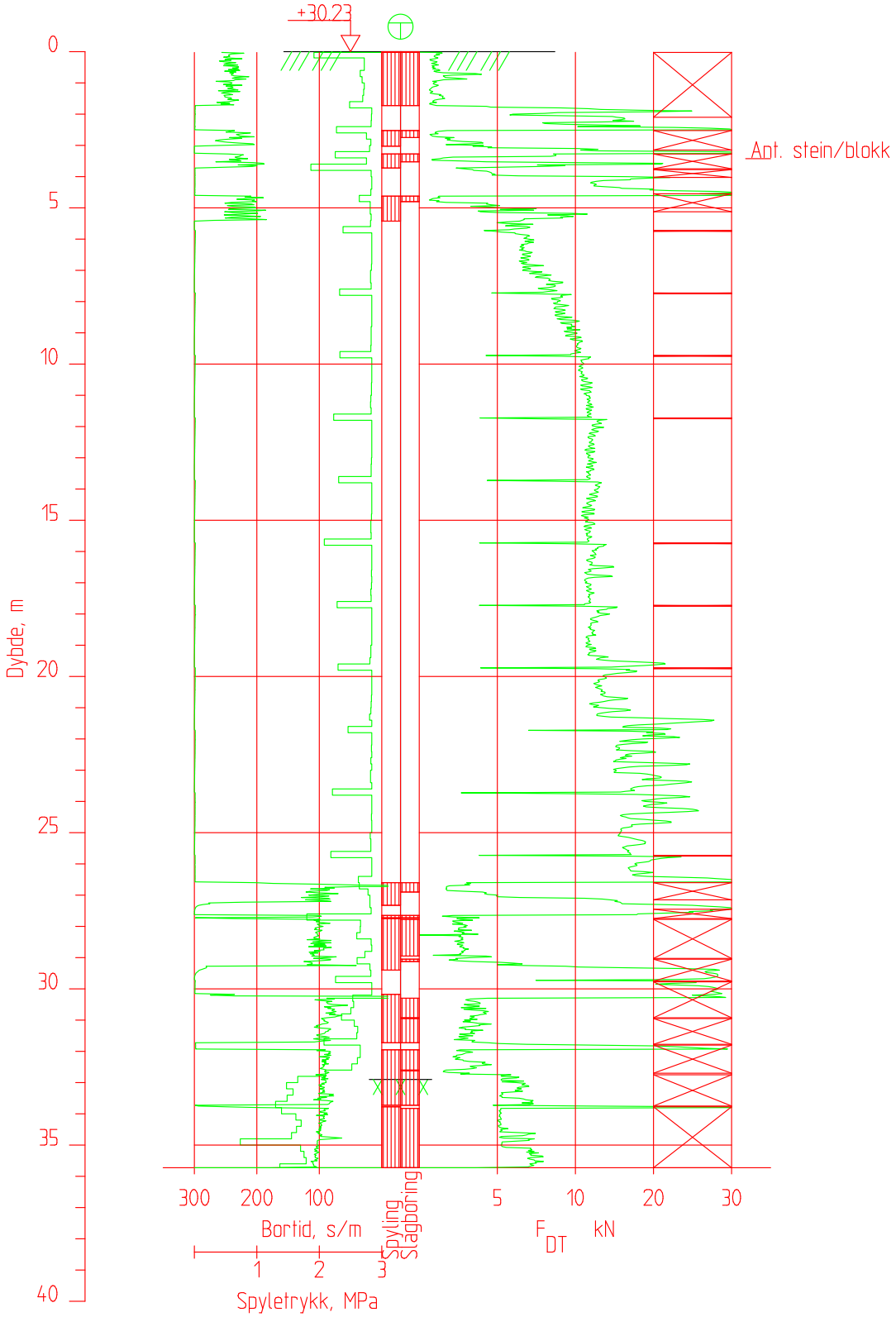
M = 1 : 200

Dato boret :16.11.2016

BG

19756

75



Posisjon: X 1122627.10 Y 109742.25

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 75

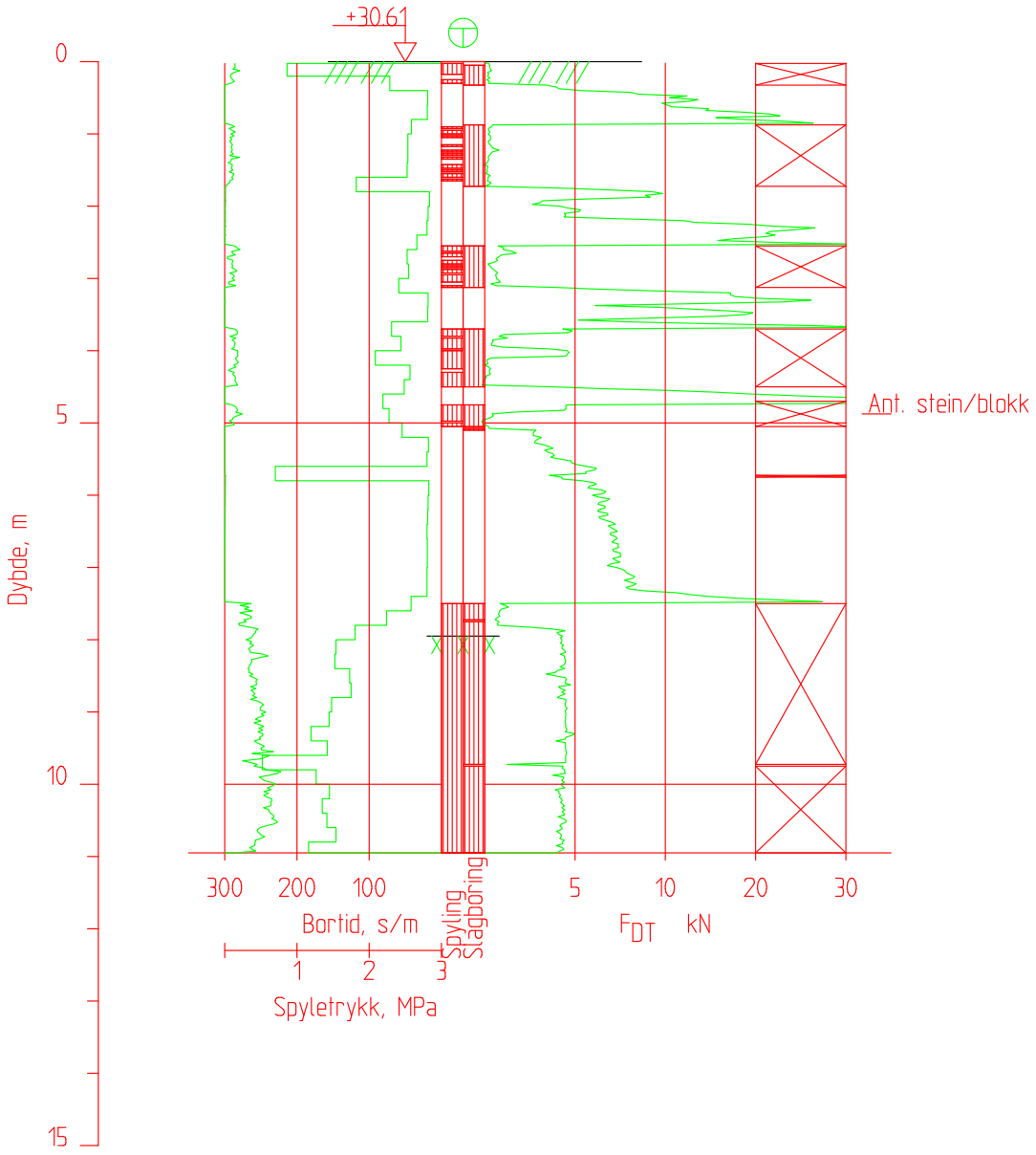
M = 1 : 200

Dato boret :16.11.2016

BG

19756

721



Posisjon: X 1122747.19 Y 109766.10

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 721

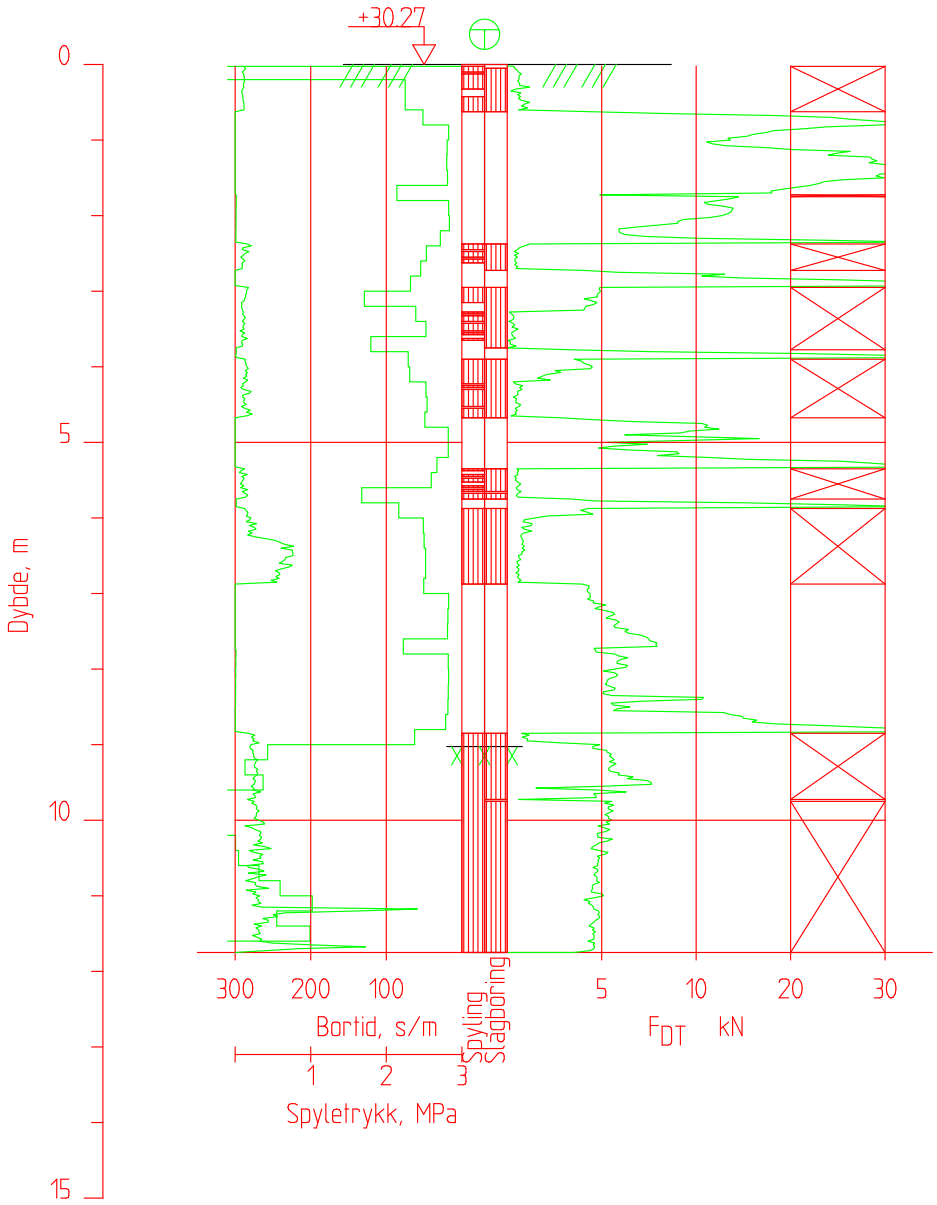
M = 1 : 100

Dato boret :11.01.2017

BG

19756

722



Posisjon: X 1122719.18 Y 109745.63

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 722

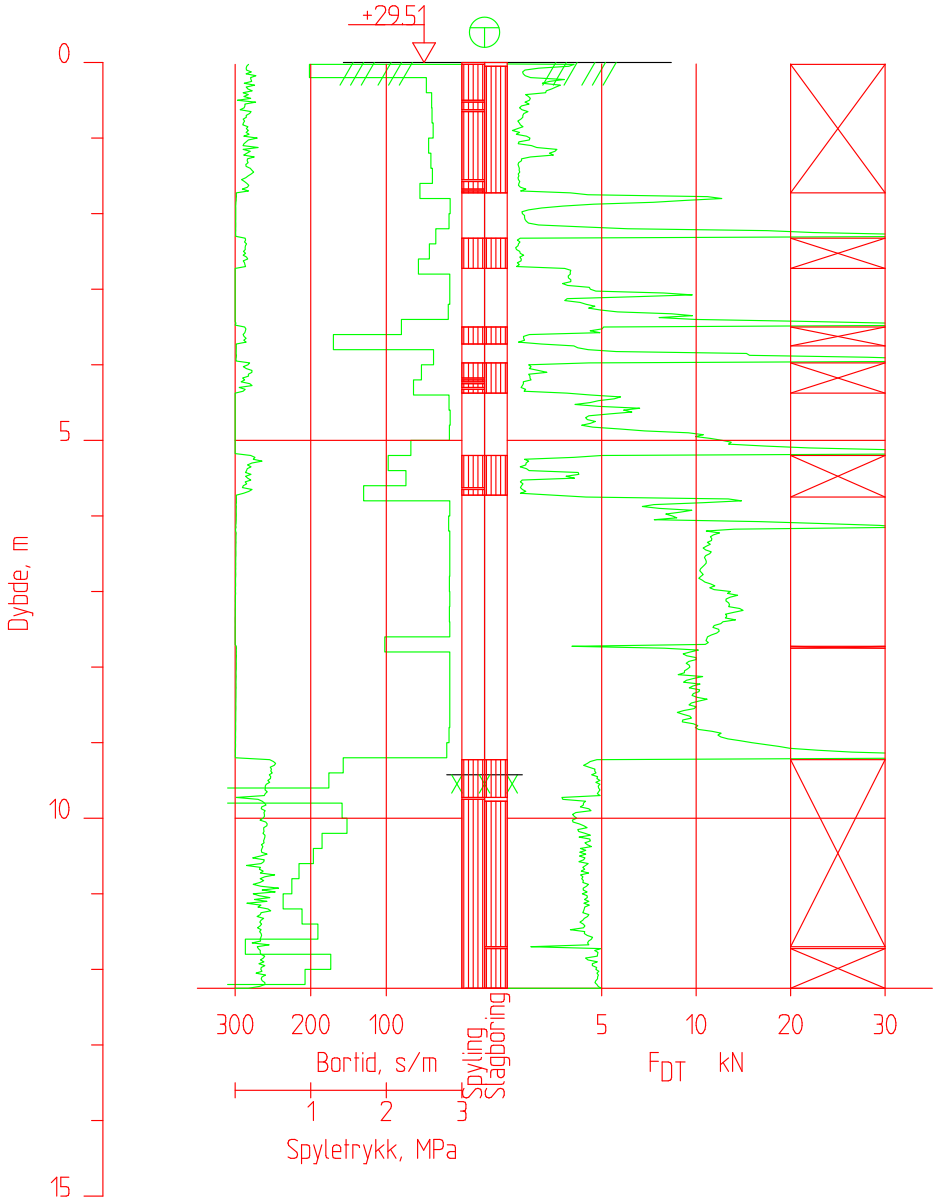
M = 1 : 100

Dato boret :11.01.2017

BG

19756

723



Posisjon: X 1122694.22 Y 109733.96

Totalsondering

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E18 Langangen Rugtvedt

Borhull 723

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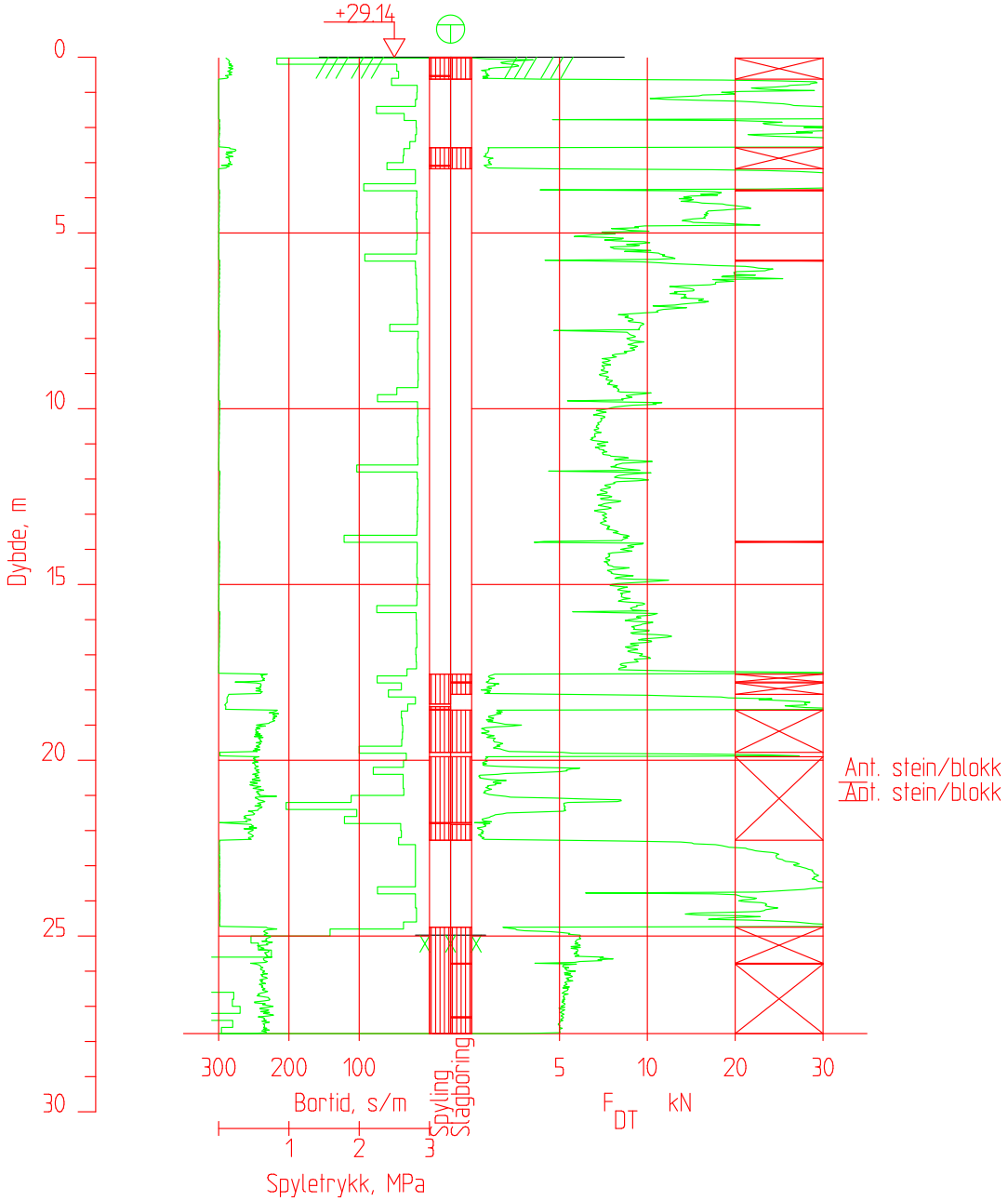
Dato boret :11.01.2017

BG

19756

724



Posisjon: X 1122664.86 Y 109718.22

Totalsondering

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E18 Langangen Rugtvedt

Borhull 724

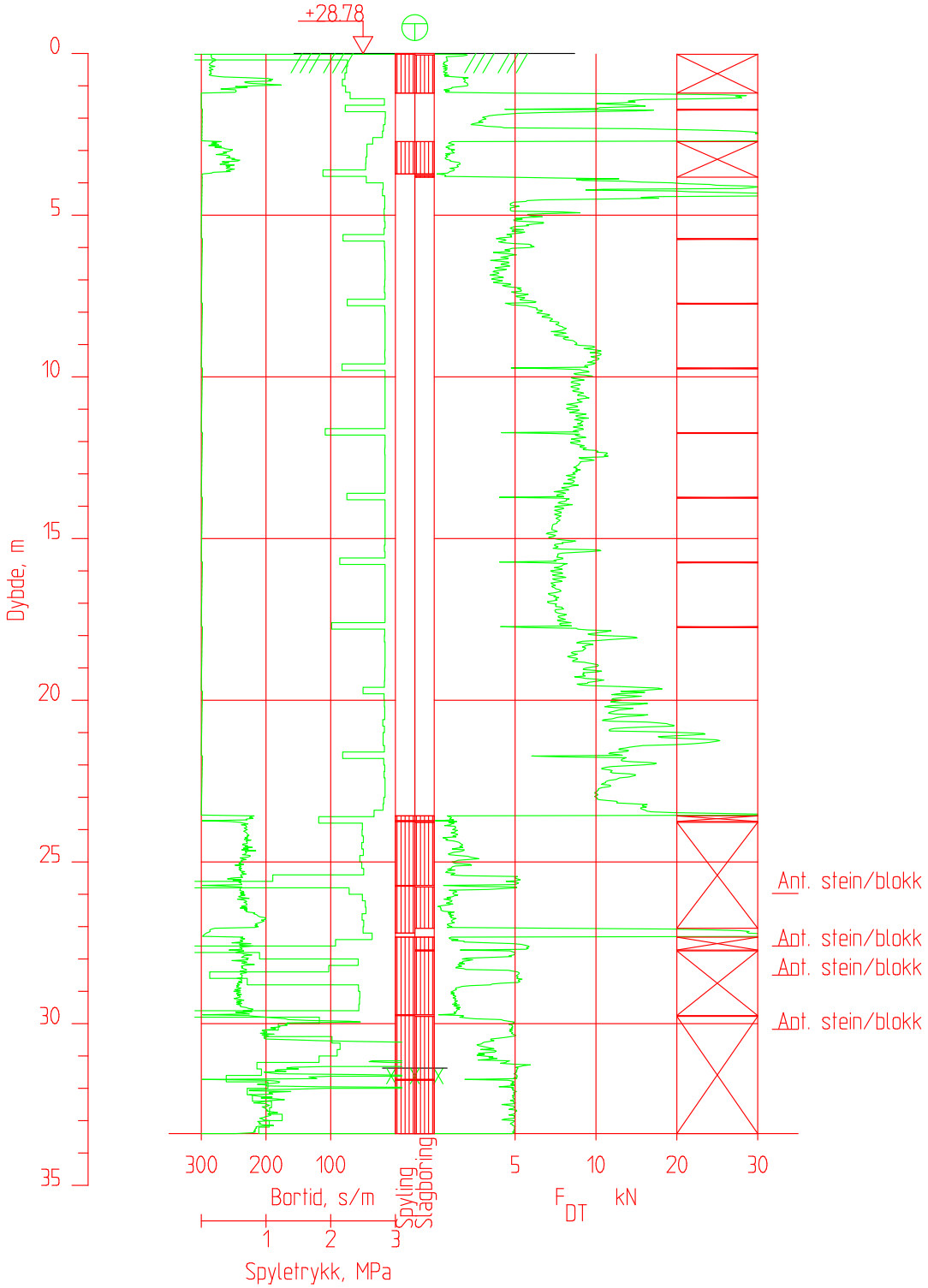
M = 1 : 200

Dato boret :10.01.2017

BG

19756

725



Posisjon: X 1122636.46 Y 109705.64

Totalsondering

Borhull 725

Dato boret :10.01.2017

EIFFAGE

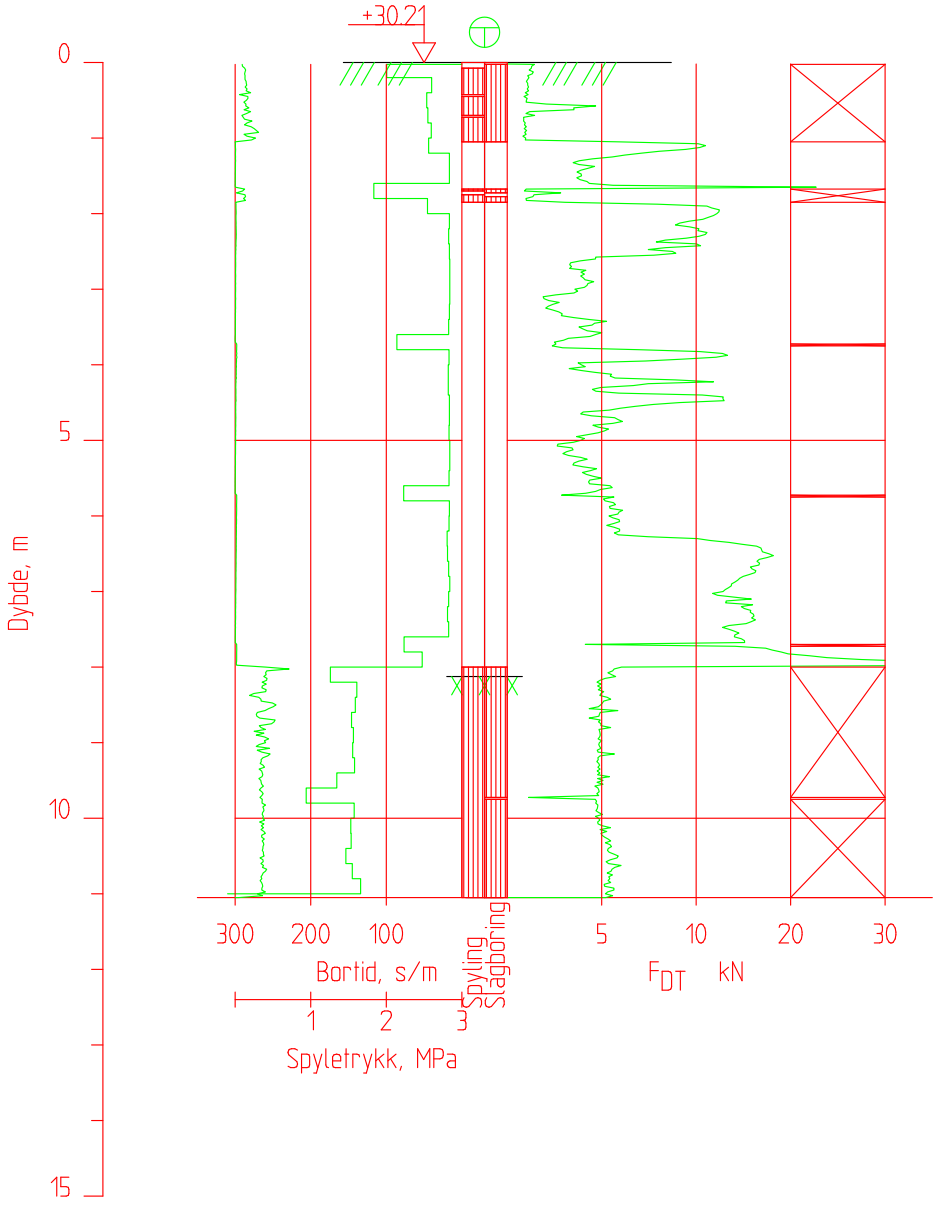
M = 1 : 200

E18 Langangen Rugtvedt

BG

19756

740



Posisjon: X 1122756.44 Y 109742.31

Totalsondering

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E18 Langangen Rugtvedt

Borhull 740

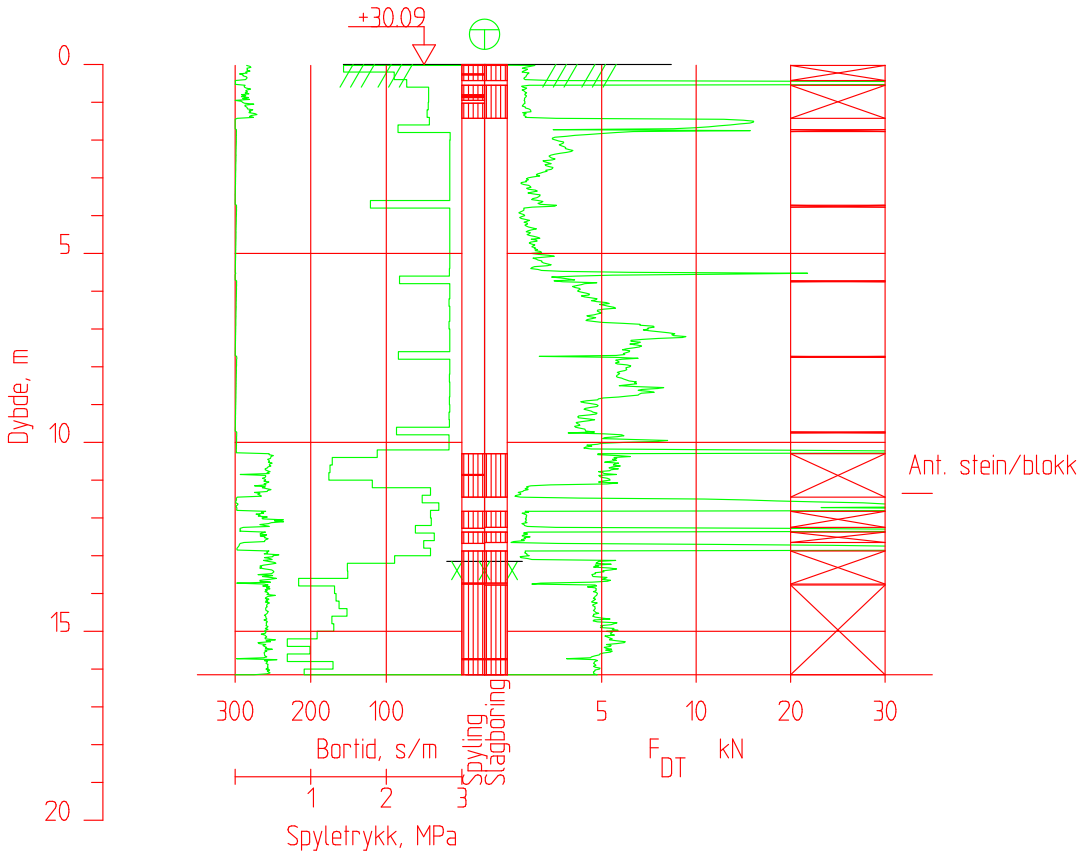
M = 1 : 100

Dato boret :28.03.2017

BG

19756

741



Posisjon: X 1122749.16 Y 109739.41

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 741

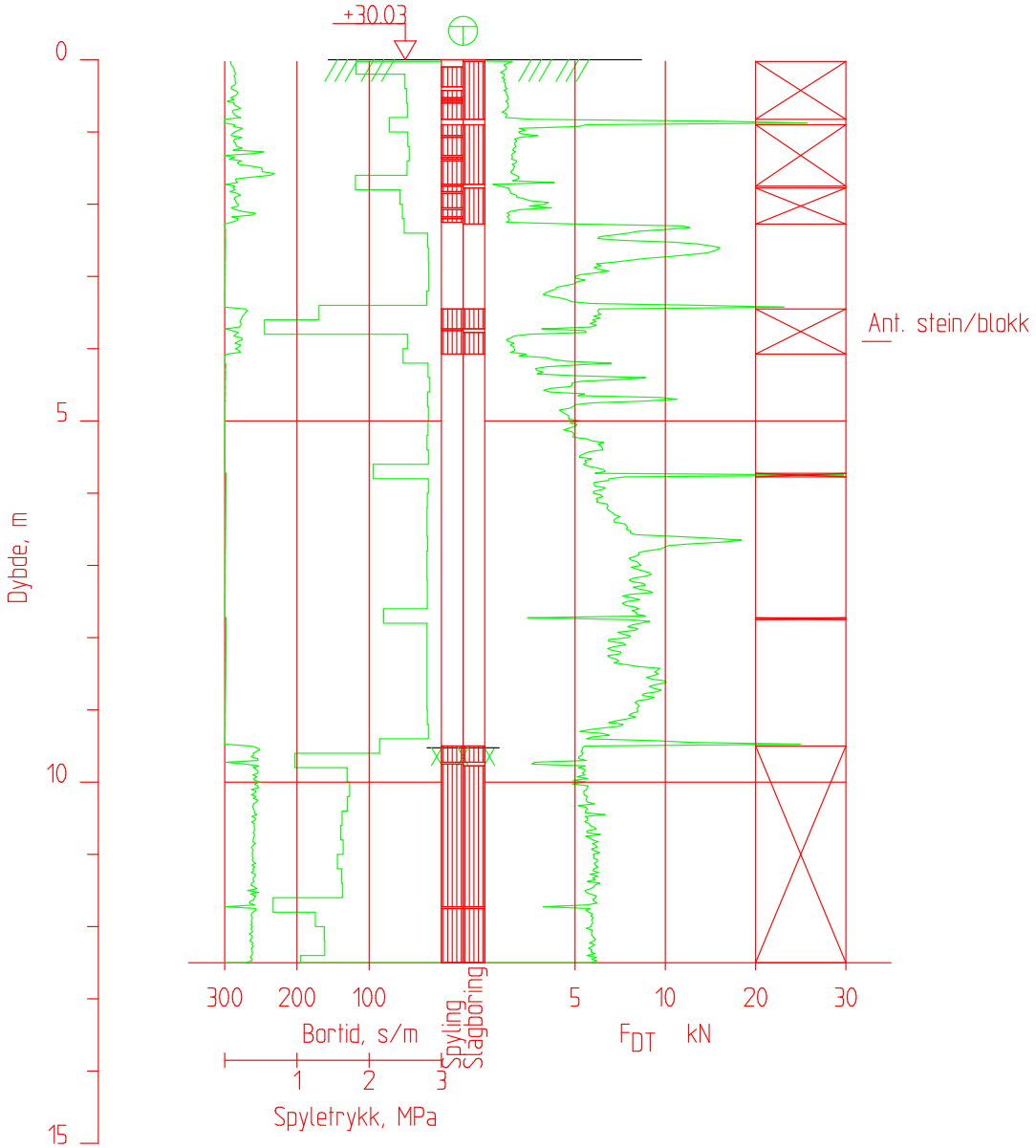
M = 1 : 200

Dato boret :28.03.2017

BG

19756

743



Posisjon: X 1122733.29 Y 109729.93

Totalsondering

Borhull 743

Dato boret :28.03.2017

EIFFAGE

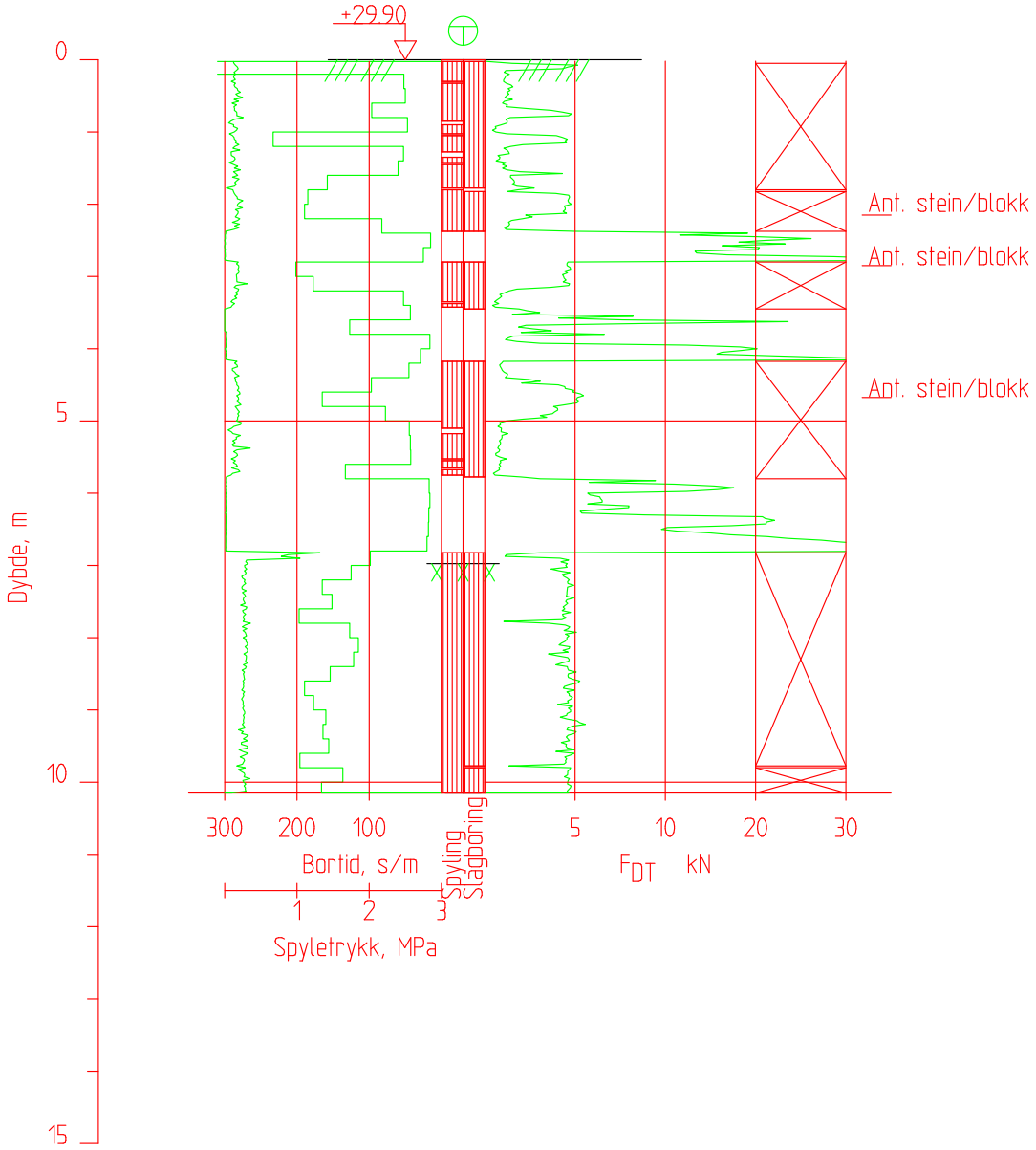
M = 1 : 100

E18 Langangen Rugtvedt

BG

19756

745



Posisjon: X 1122711.86 Y 109719.82

Totalsondering

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E18 Langangen Rugtvedt

Borhull 745

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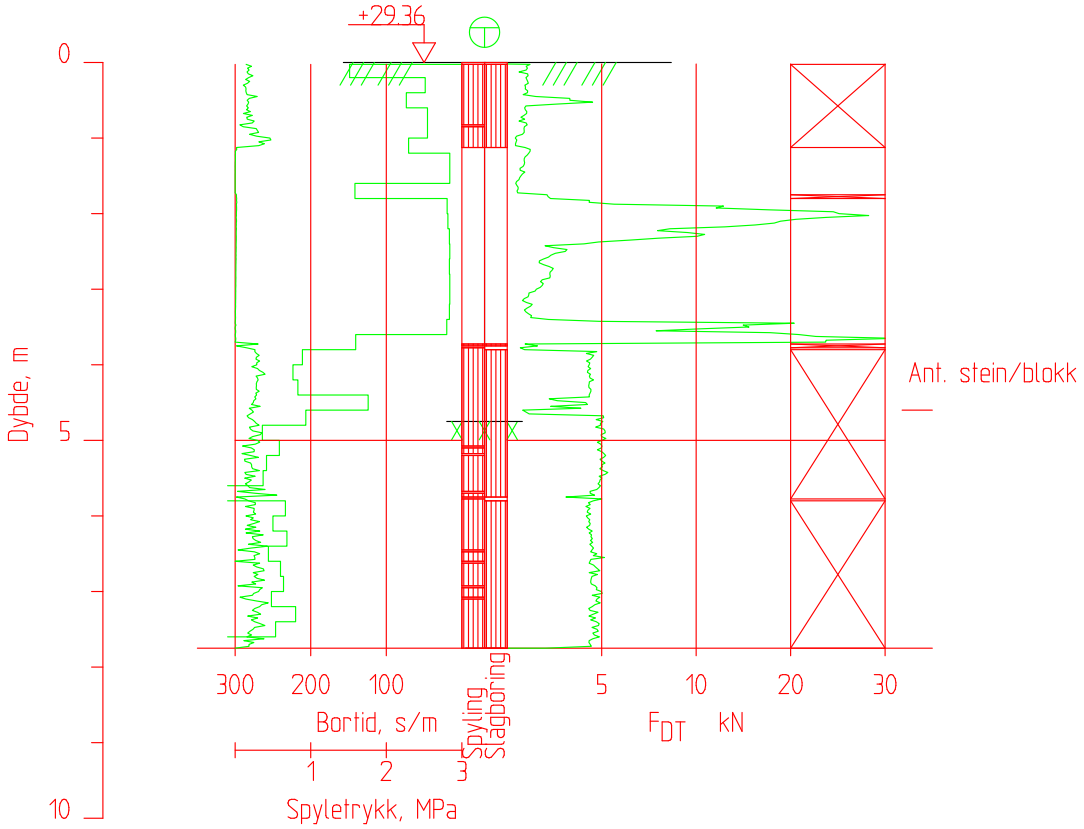
Dato boret :28.03.2017

BG

19756

748



Posisjon: X 1122687.18 Y 109705.74

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 748

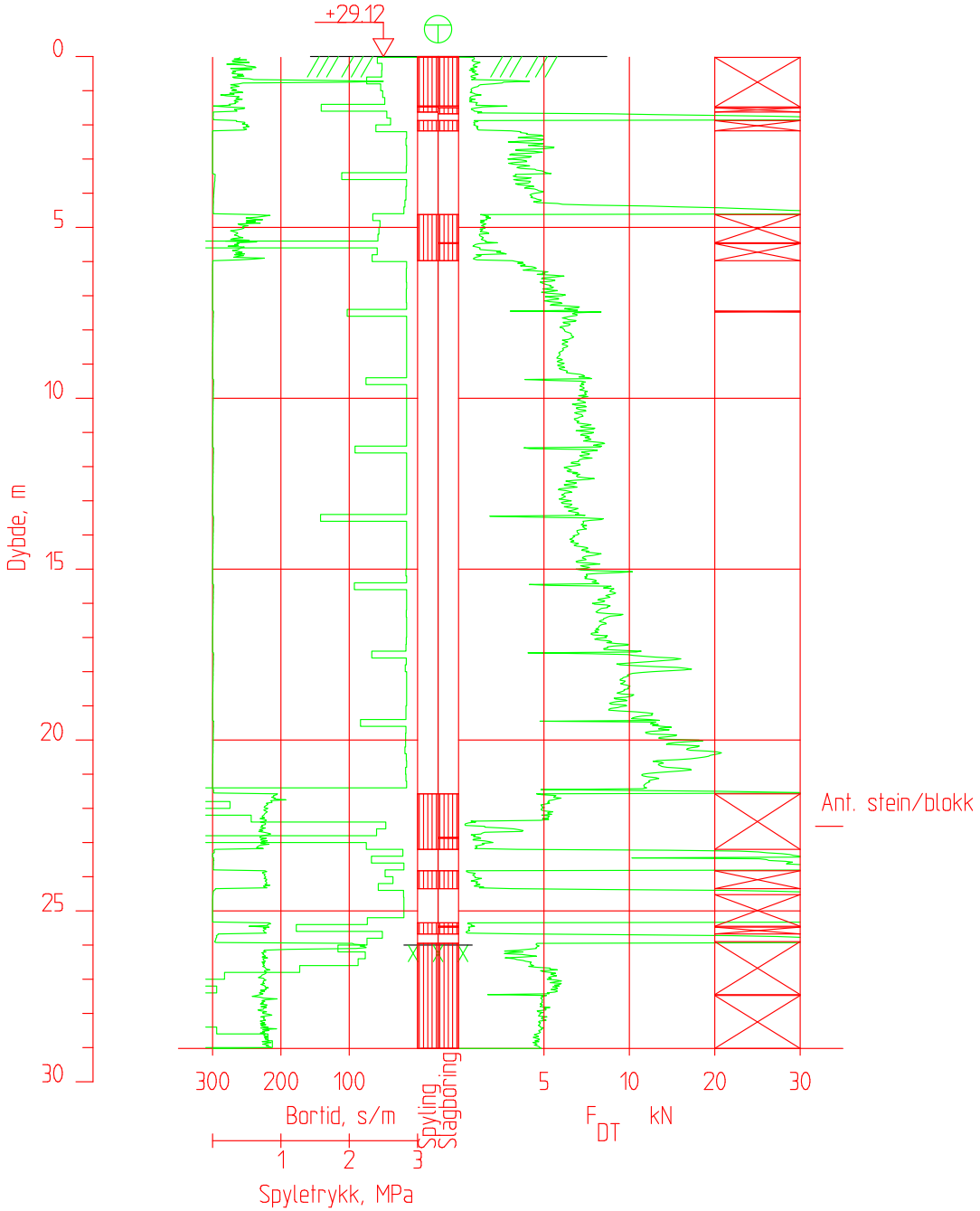
M = 1 : 100

Dato boret :28.03.2017

BG

19756

750



Posisjon: X 112267154 Y 109697.00

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 750

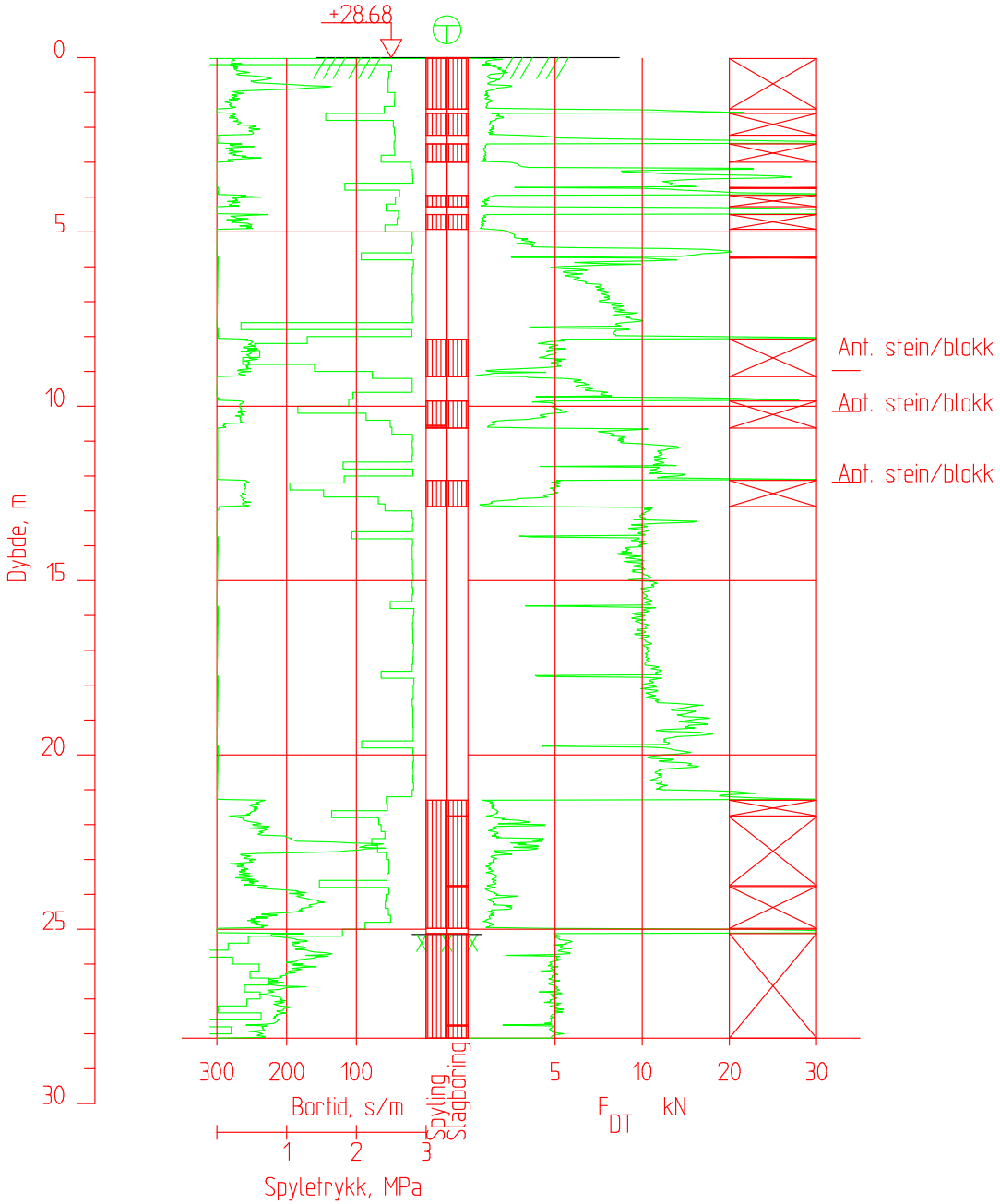
M = 1 : 200

Dato boret :21.03.2017

BG

19756

752



Posisjon: X 112632.62 Y 109677.92

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 752

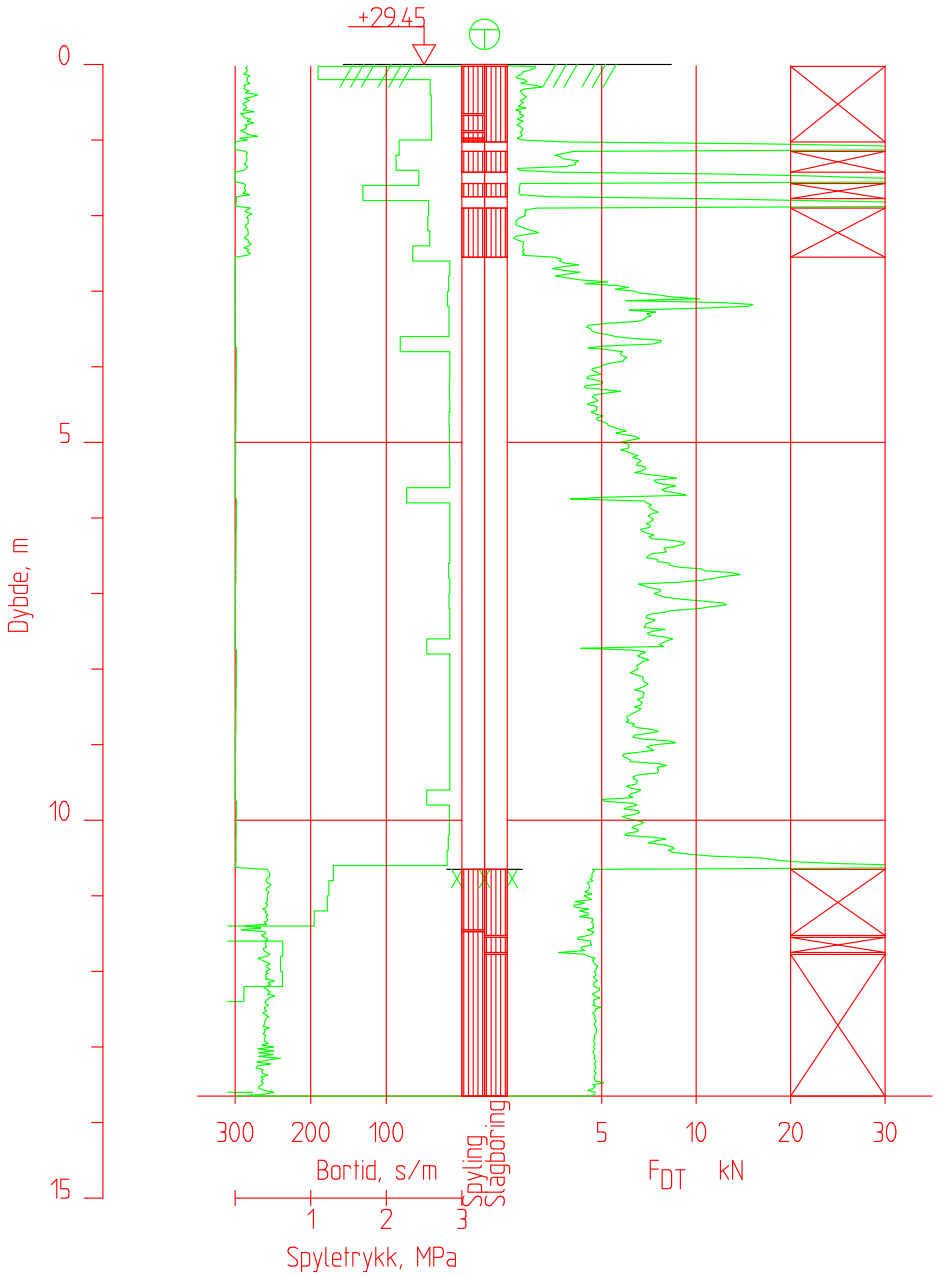
M = 1 : 200

Dato boret :28.03.2017

BG

19756

758



Posisjon: X 1122687.65 Y 109743.03

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 758

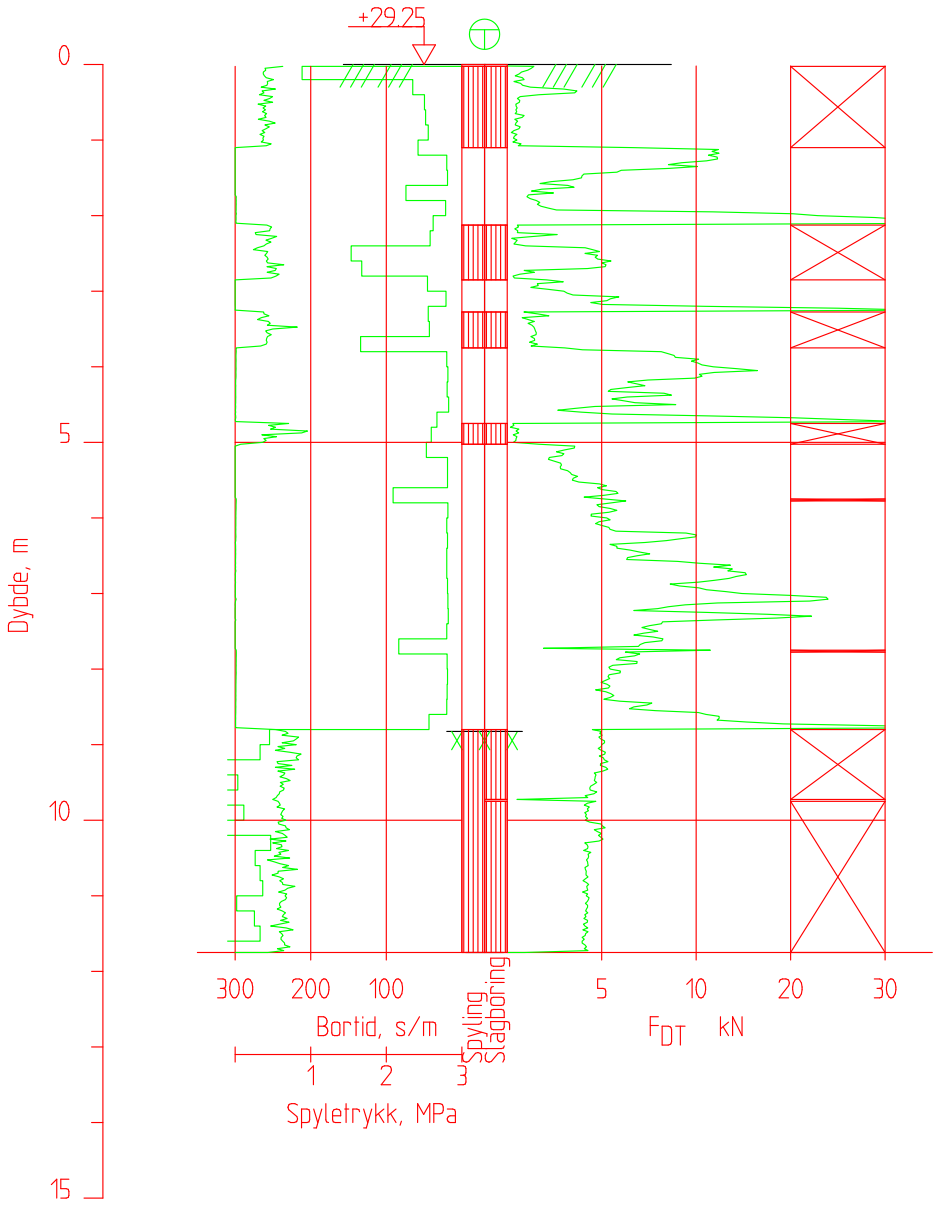
M = 1 : 100

Dato boret :21.03.2017

BG

19756

760



Posisjon: X 1122675.11 Y 109735.77

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 760

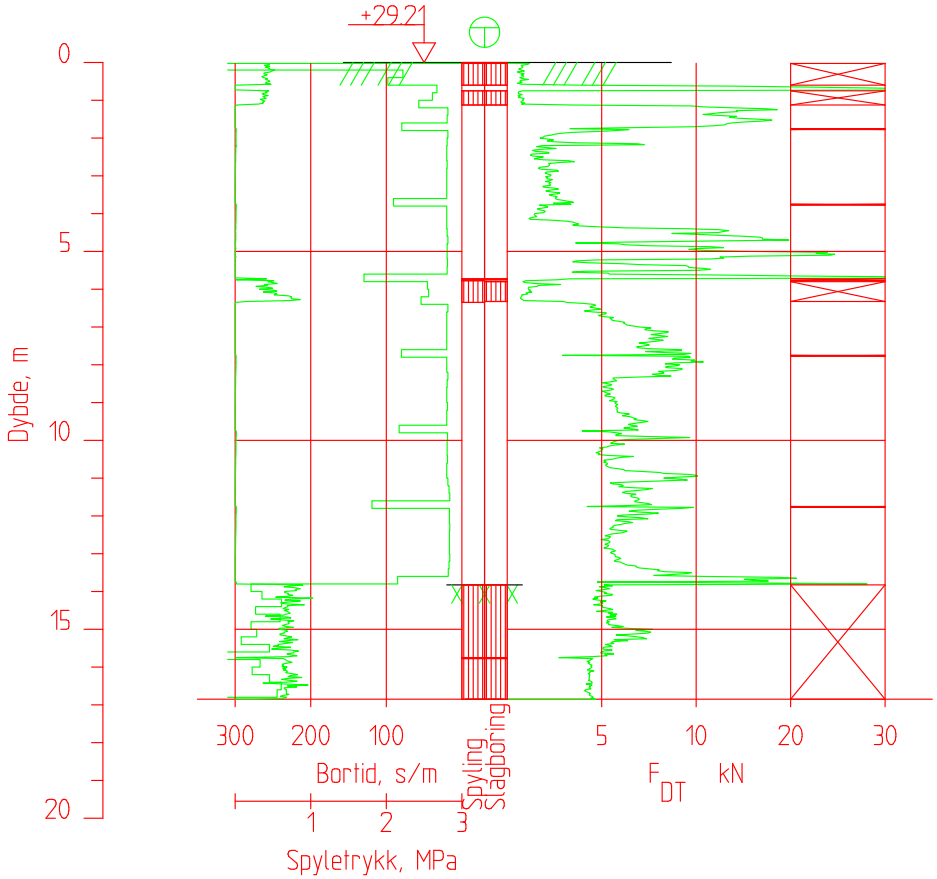
M = 1 : 100

Dato boret :21.03.2017

BG

19756

761



Posisjon: X 1122668.54 Y 109731.77

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 761

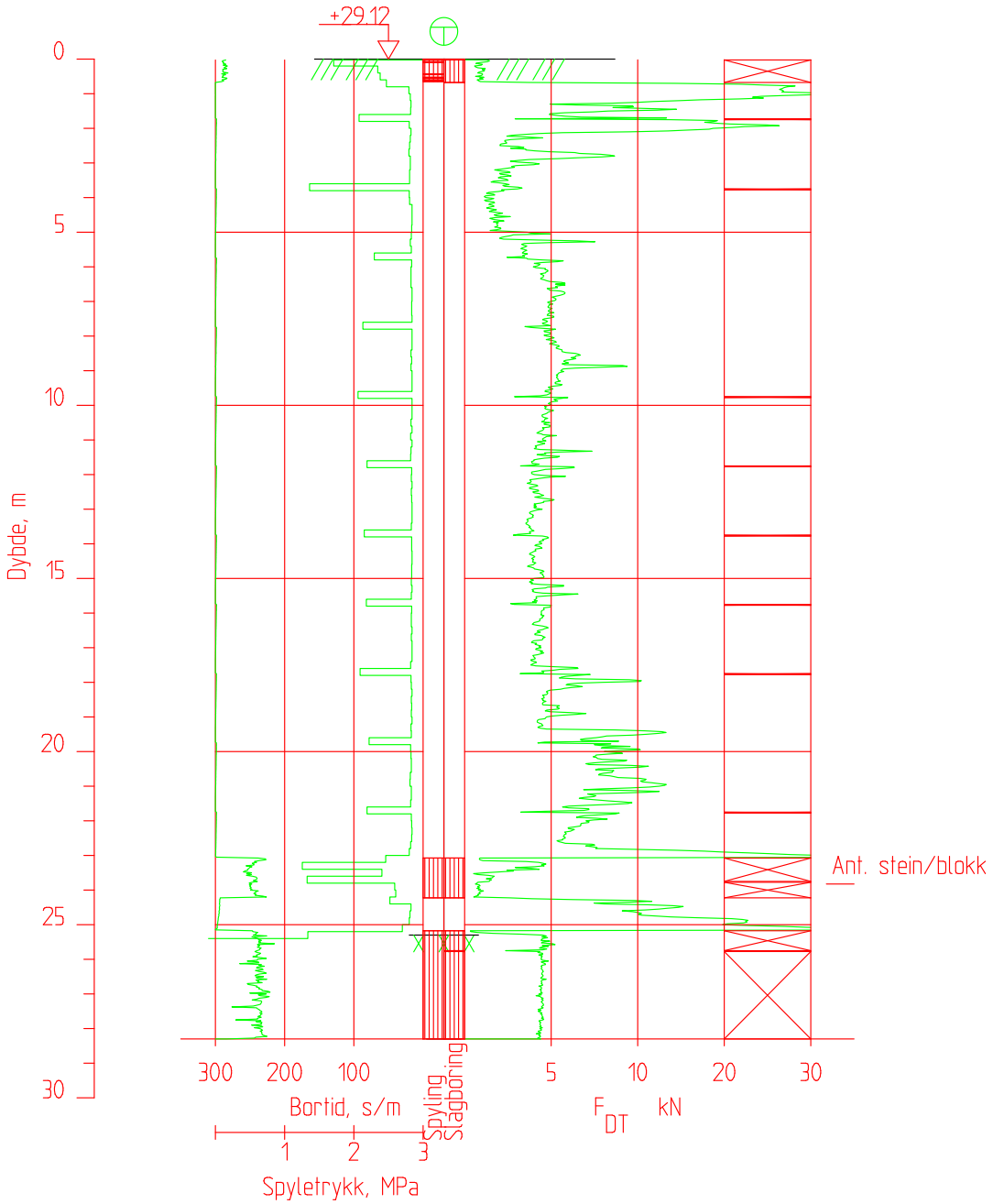
M = 1 : 200

Dato boret :21.03.2017

BG

19756

762



Posisjon: X 112266196 Y 109727.98

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 762

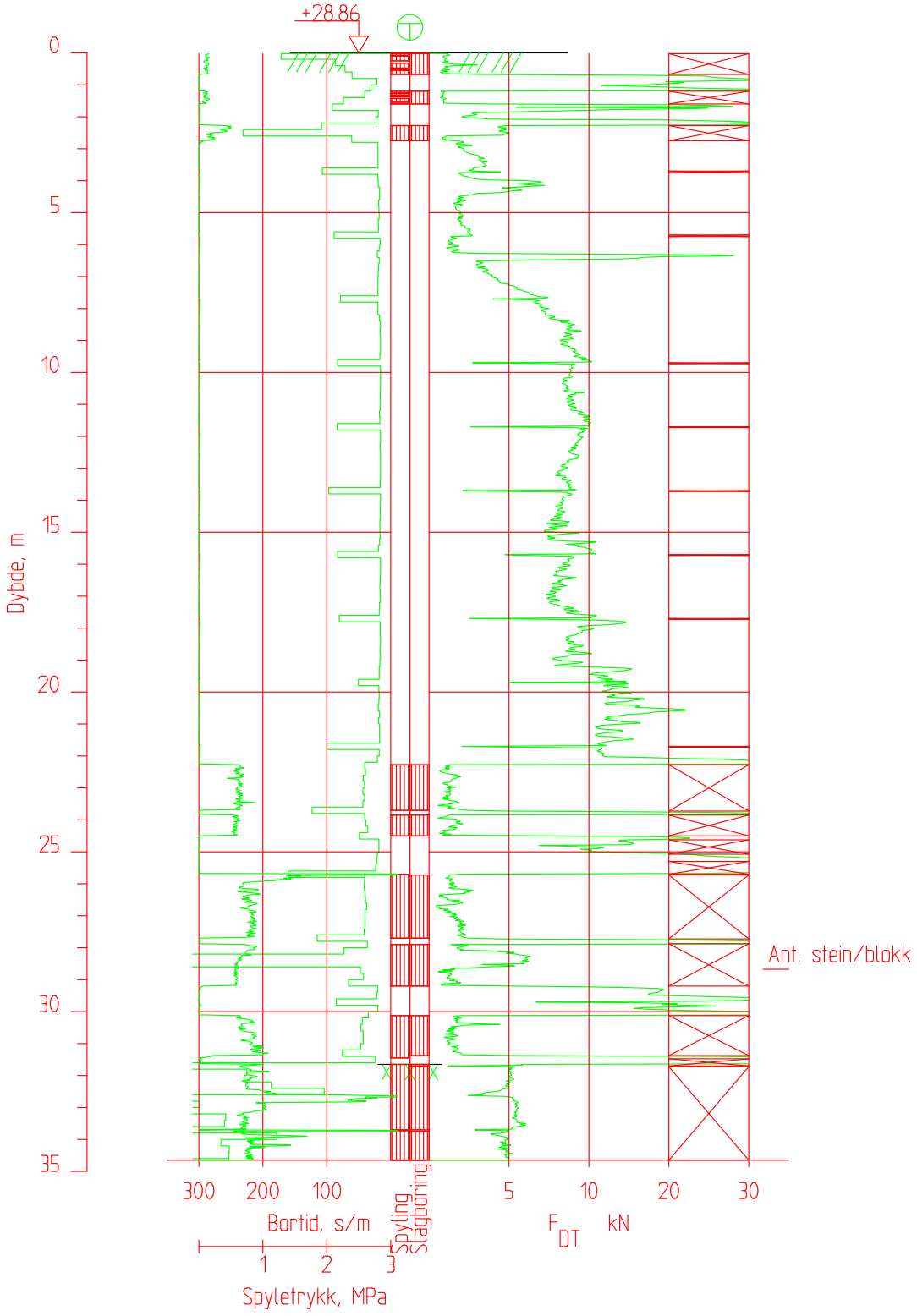
M = 1 : 200

Dato boret :20.03.2017

BG

19756

763



Posisjon: X 112642.40 Y 109716.52

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 763

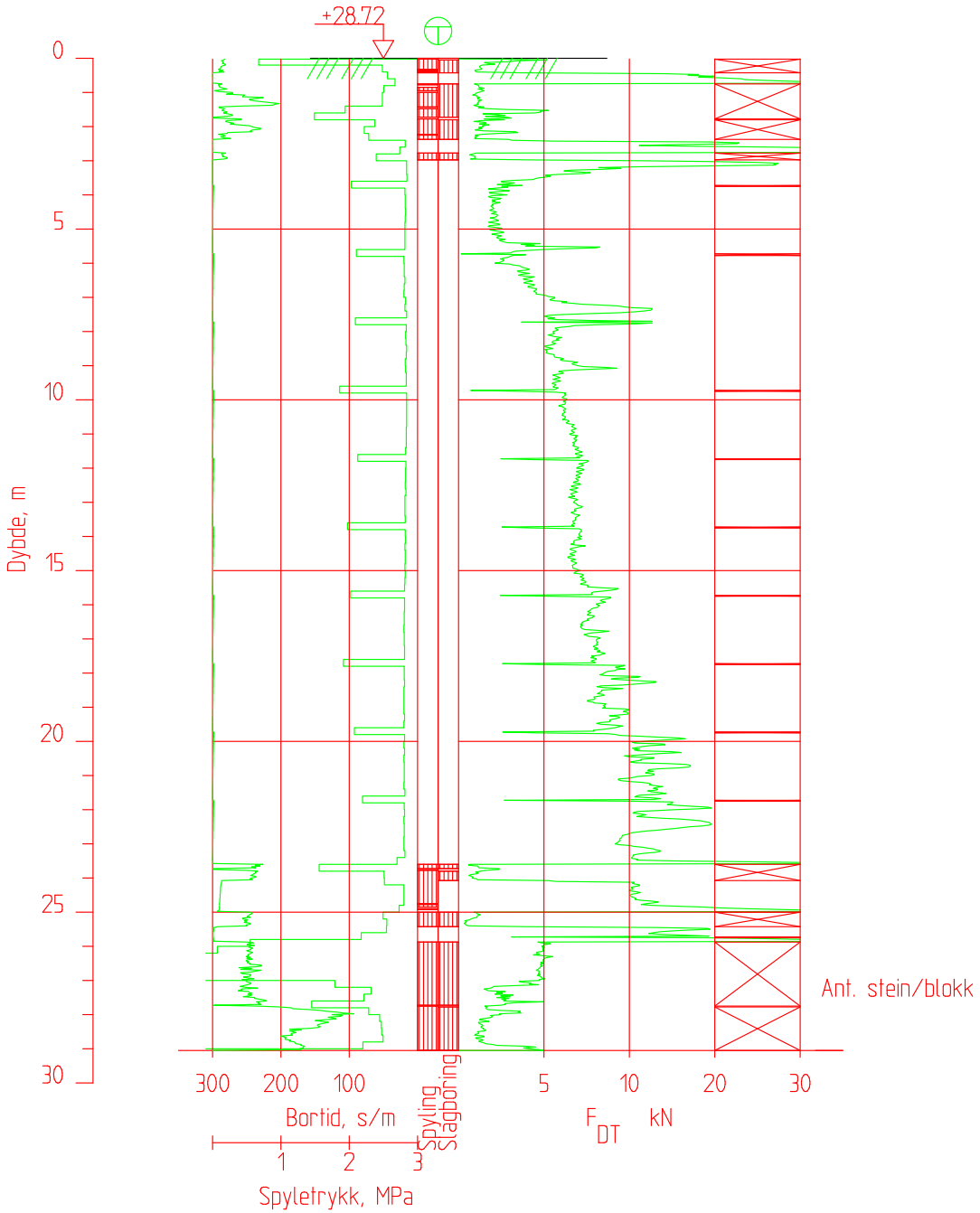
M = 1 : 200

Dato boret :20.03.2017

BG

19756

764



Posisjon: X 1122628.73 Y 109708.58

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 764

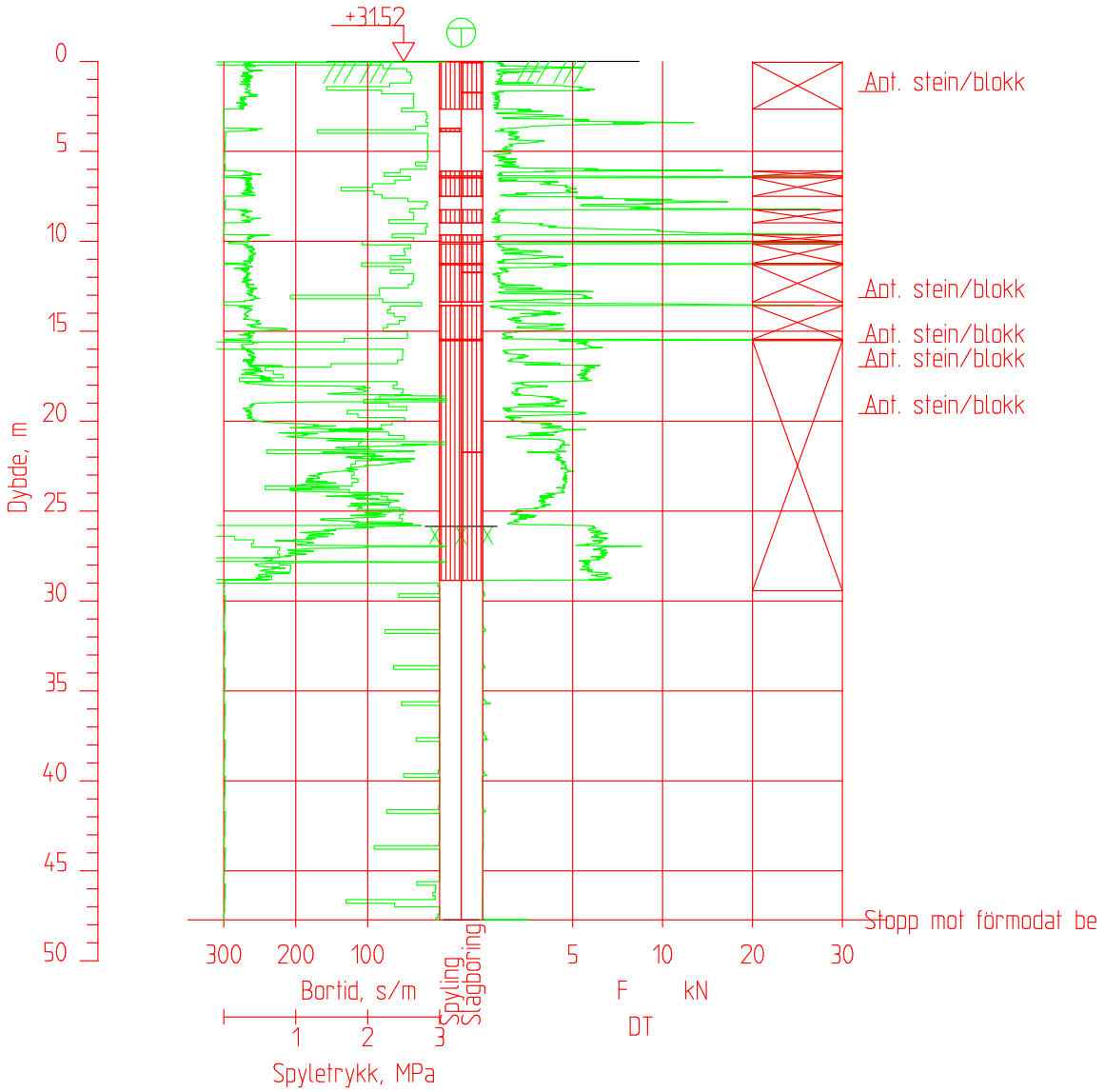
M = 1 : 200

Dato boret :20.03.2017

BG

19756

6001



Posisjon: X 1122581.86 Y 109828.29

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

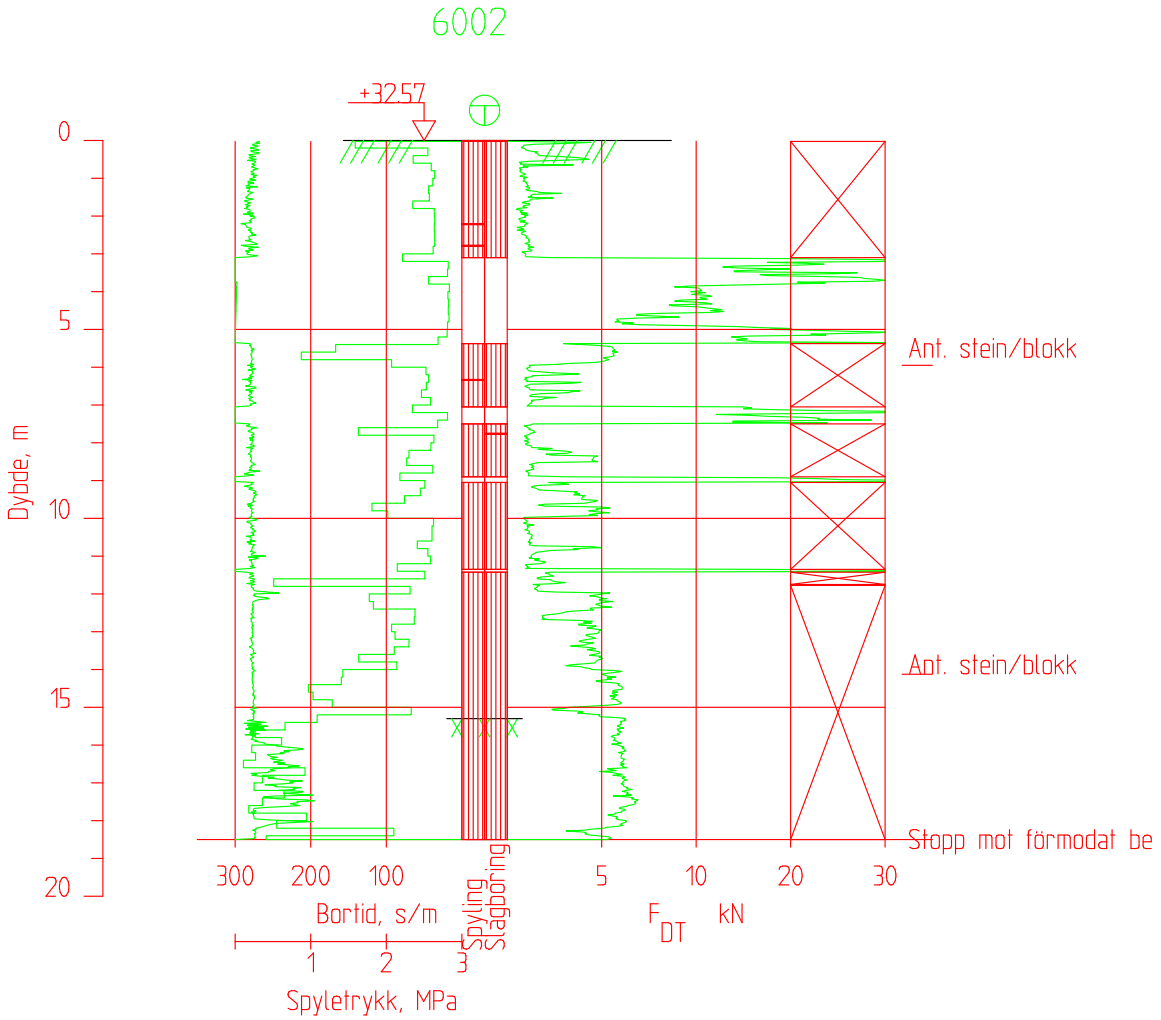
Borhull 6001

M = 1 : 400

Dato boret :10.04.2019

BG

19756



Posisjon: X 1122584.47 Y 109867.49

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

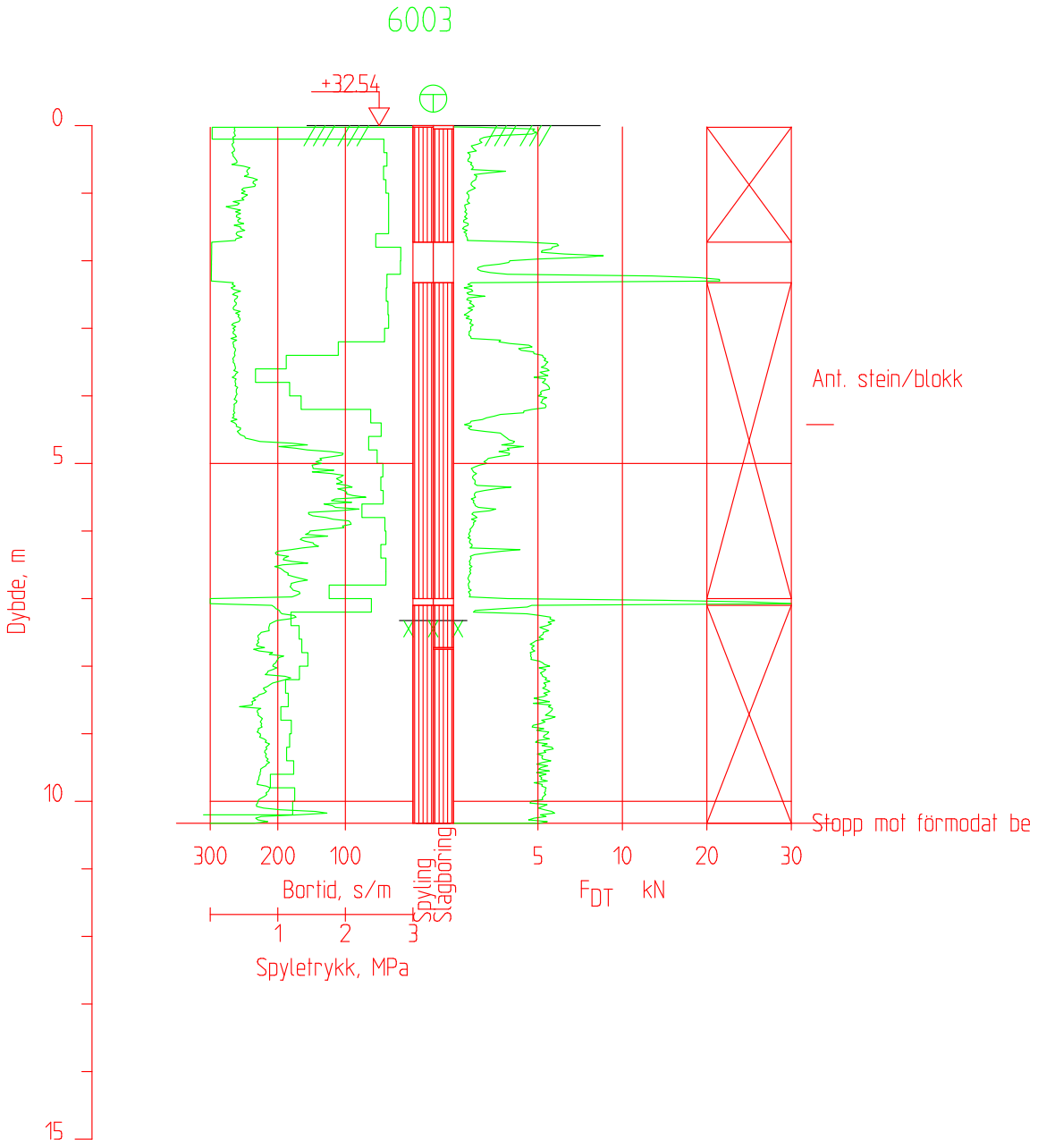
Borhull 6002

M = 1 : 200

Dato boret :09.04.2019

BG

19756



Posisjon: X 1122606.74 Y 109892.81

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6003

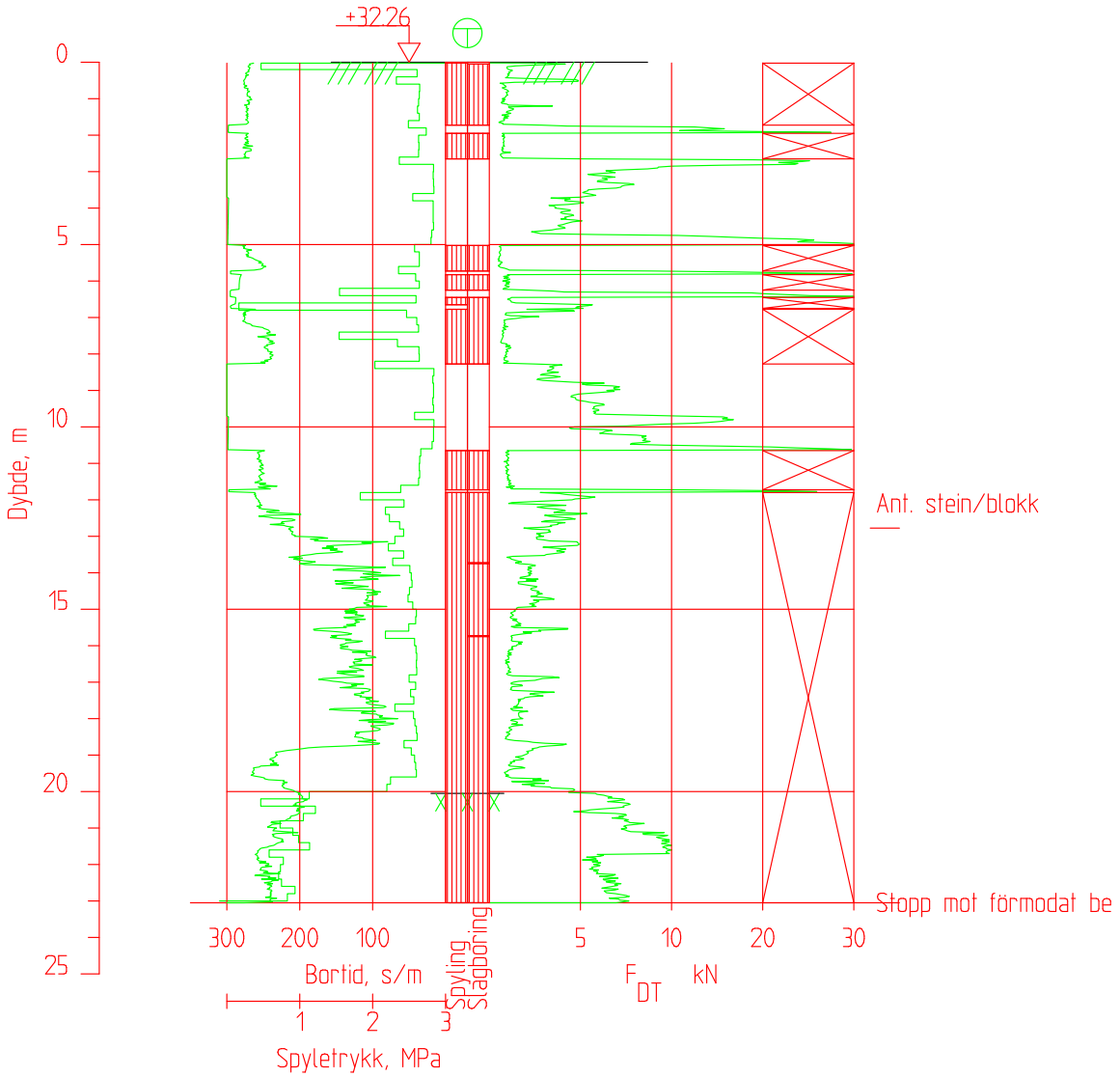
M = 1 : 100

Dato boret :08.04.2019

BG

19756

6004



Posisjon: X 1122617.06 Y 109869.46

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6004

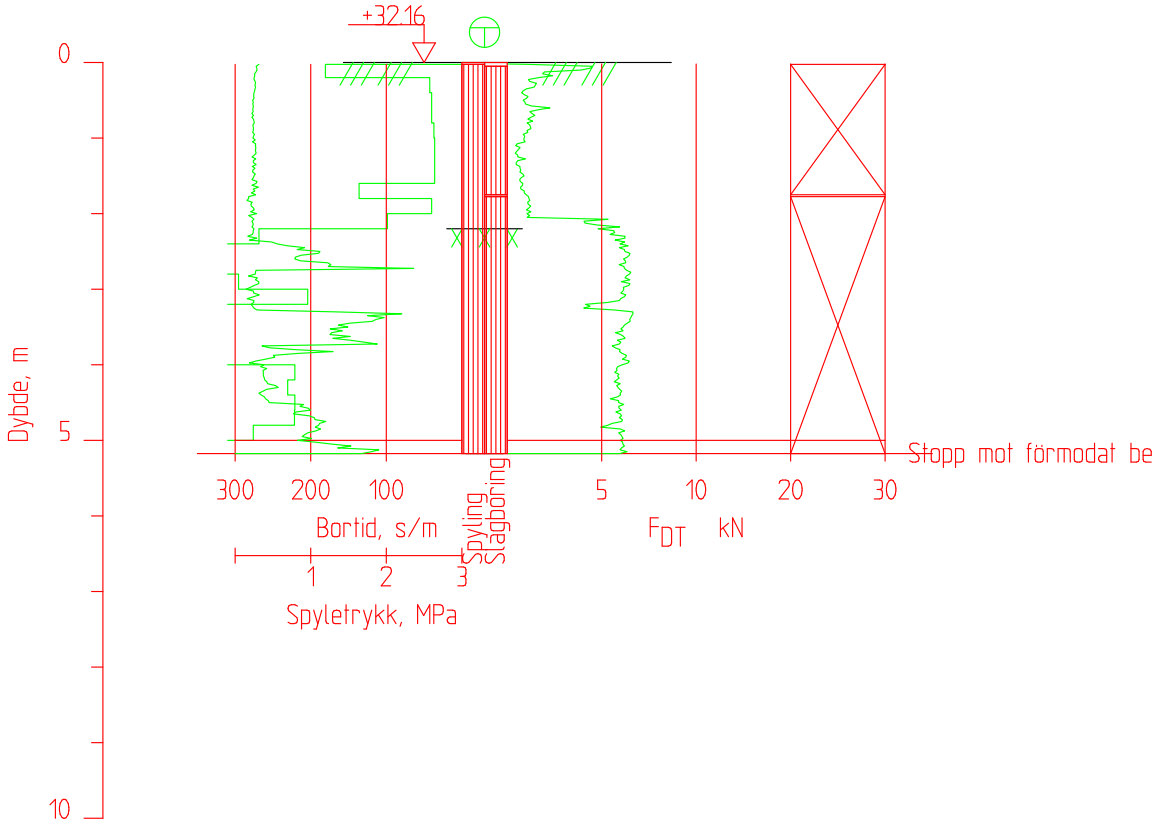
M = 1 : 200

Dato boret :08.04.2019

BG

19756

6005



Posisjon: X 1122633.21 Y 109888.32

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6005

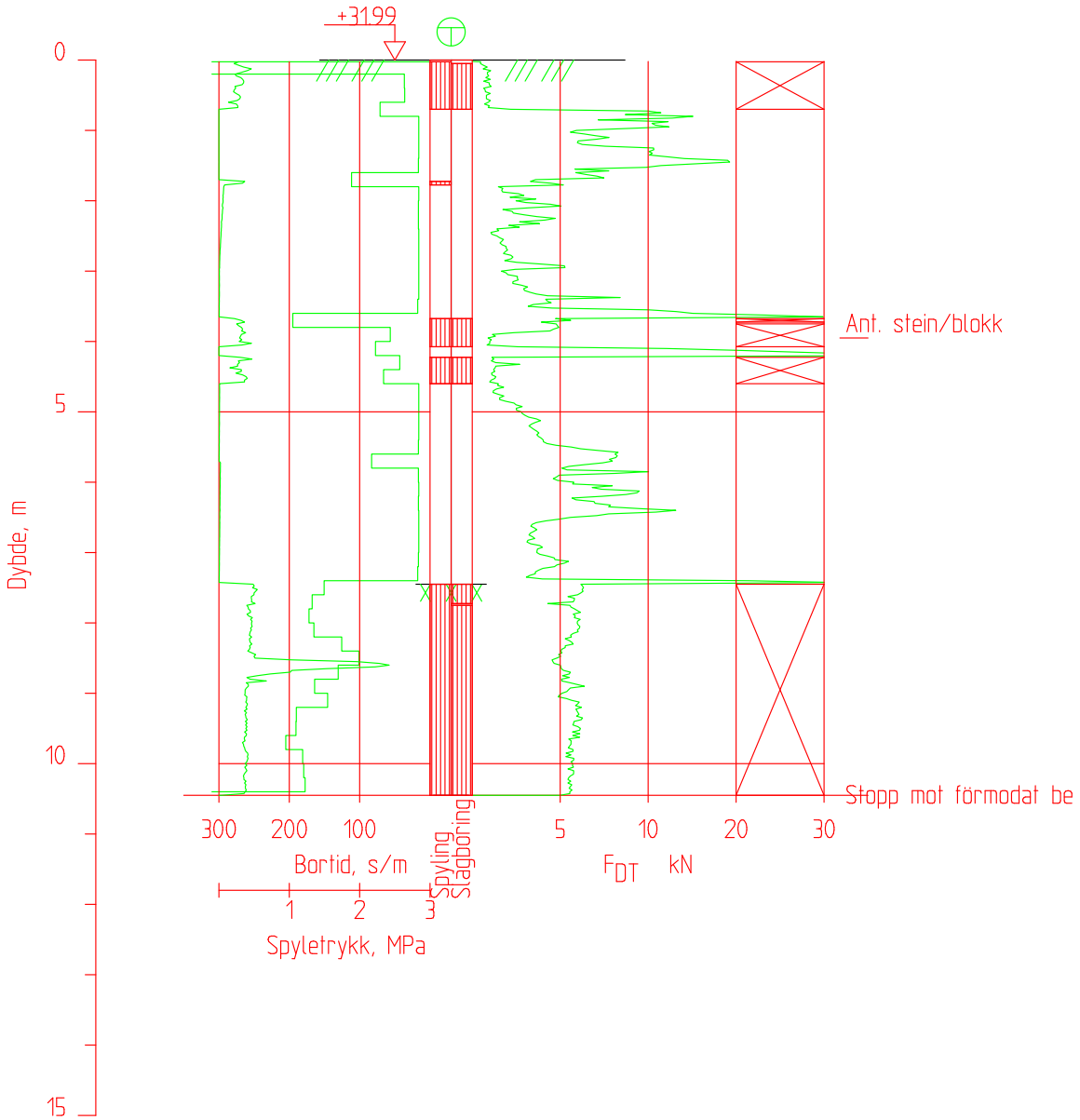
M = 1 : 100

Dato boret :08.04.2019

BG

19756

6006



Posisjon: X 1122646.86 Y 109895.78

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6006

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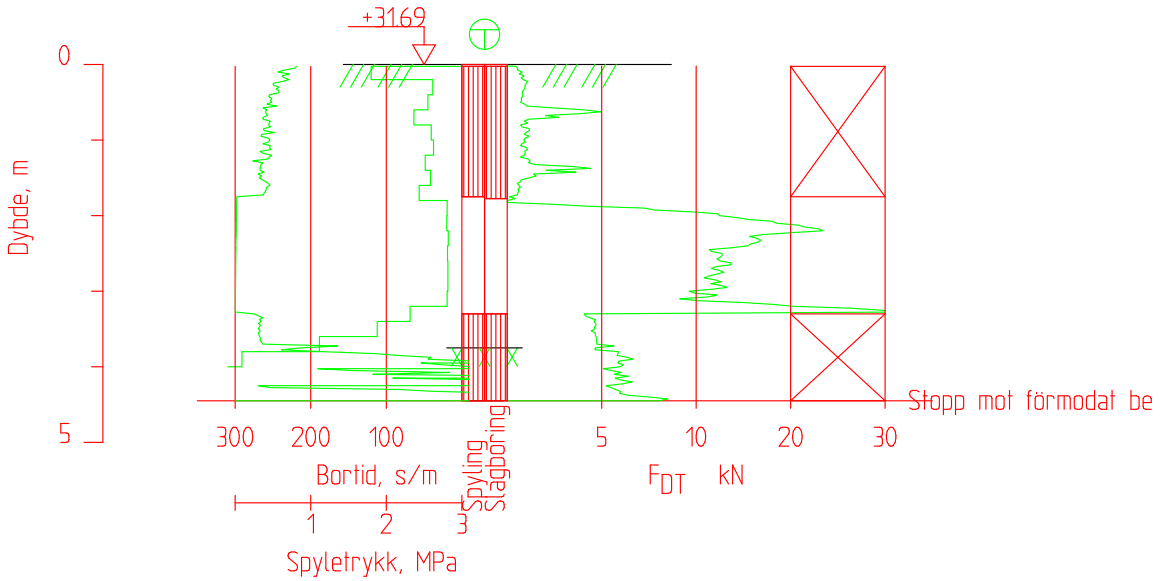
Dato boret :08.04.2019

BG

19756

6007



Posisjon: X 1122655.73 Y 109904.85

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

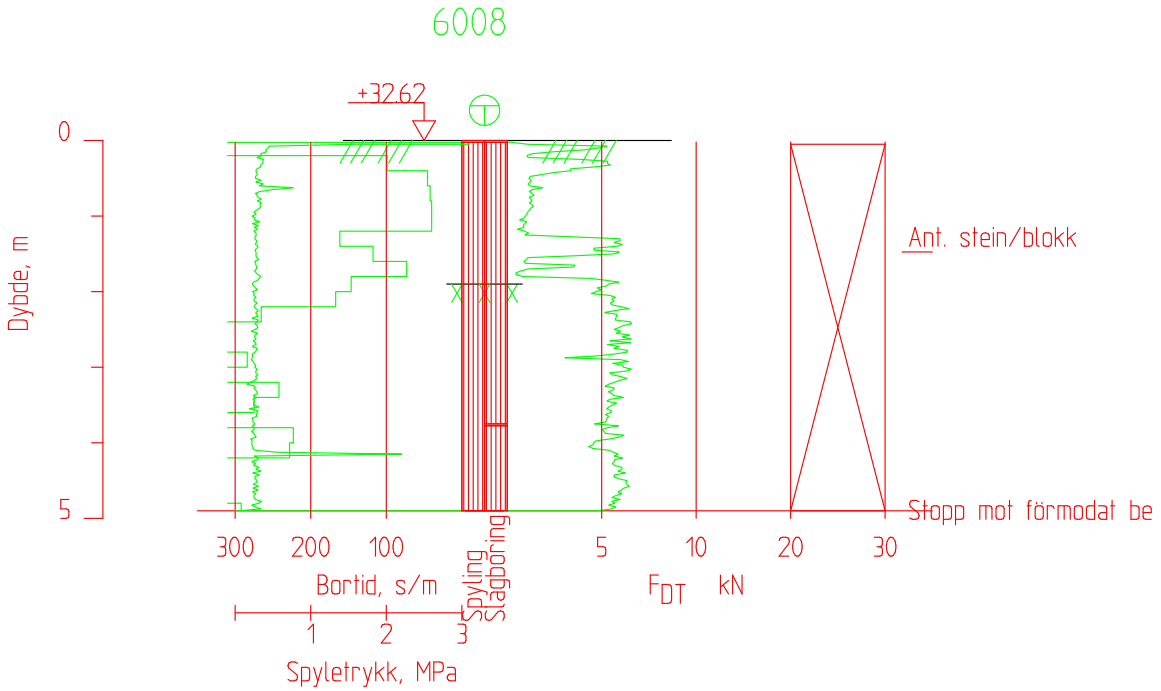
Borhull 6007

M = 1 : 100

Dato boret :09.04.2019

BG

19756



Posisjon: X 1122628.36 Y 109916.18

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6008

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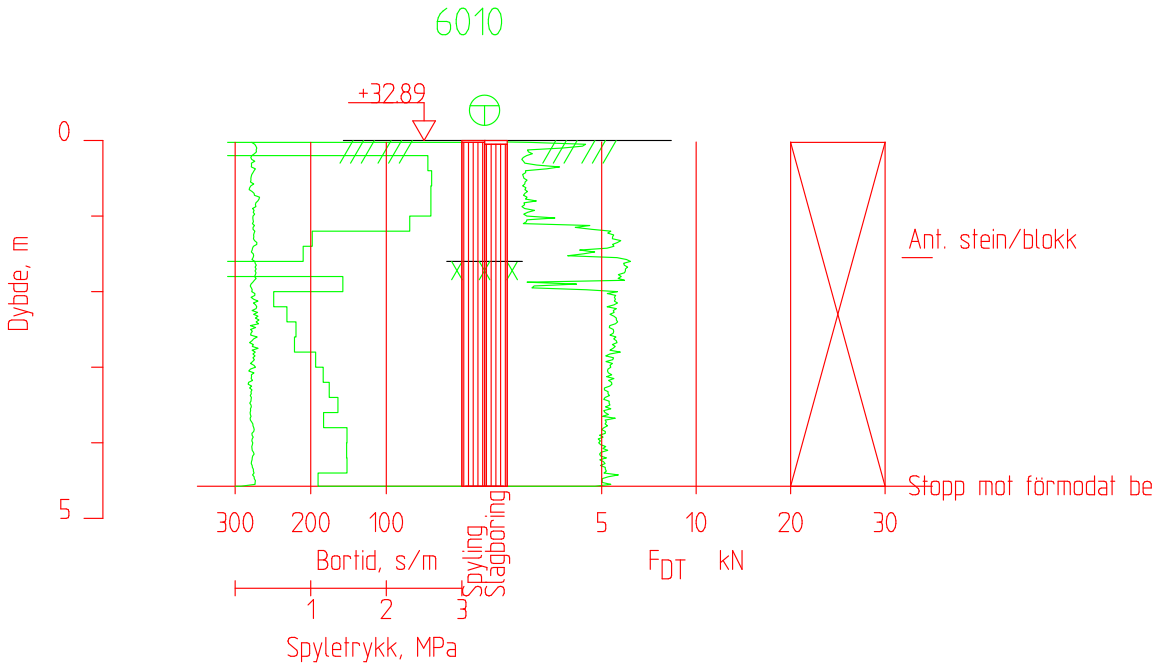
Dato boret :09.04.2019

BG

19756



Posisjon: X 1122611.23 Y 109947.95

Totalsondering

Borhull 6010

Dato boret :09.04.2019

EIFFAGE

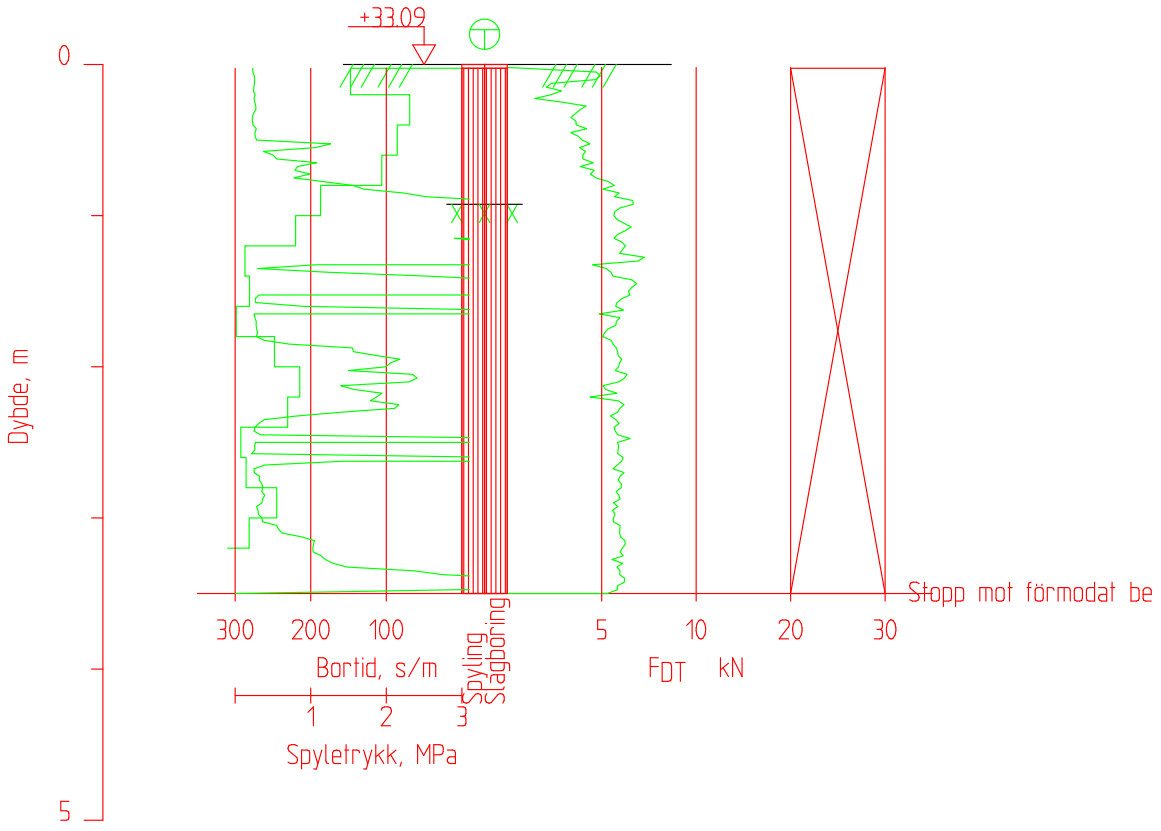
M = 1 : 100

E18 Langangen Rugtvedt

BG

19756

6011



Posisjon: X 1122597.18 Y 109964.58

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6011

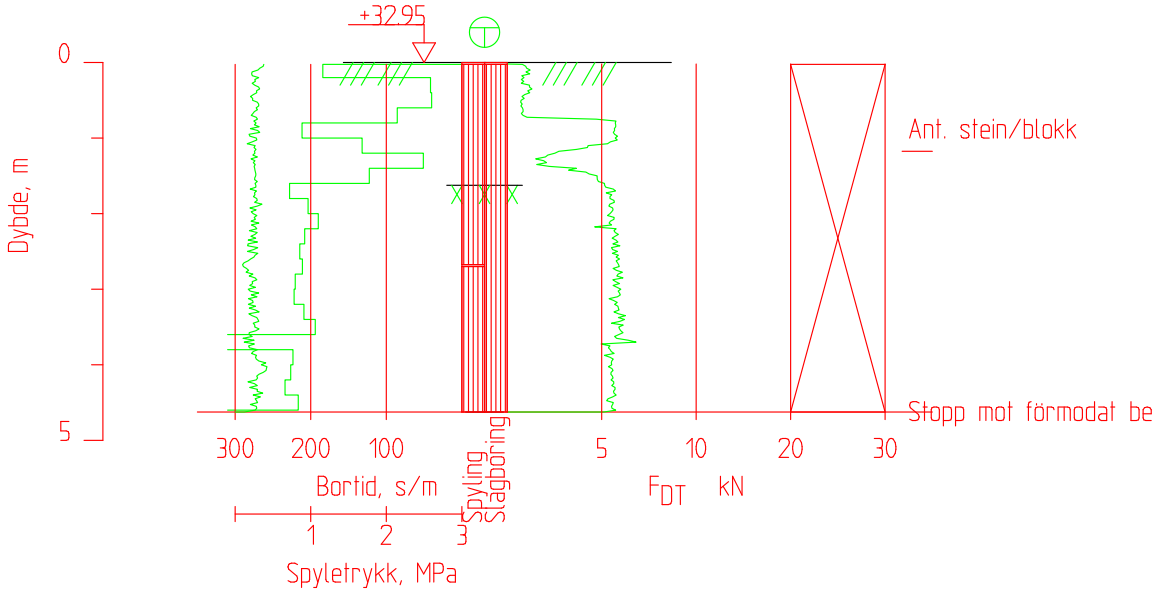
M = 1 : 50

Dato boret :09.04.2019

BG

19756

6012



Posisjon: X 1122565.60 Y 109960.37

Totalsondering

Borhull 6012

Dato boret :09.04.2019

EIFFAGE

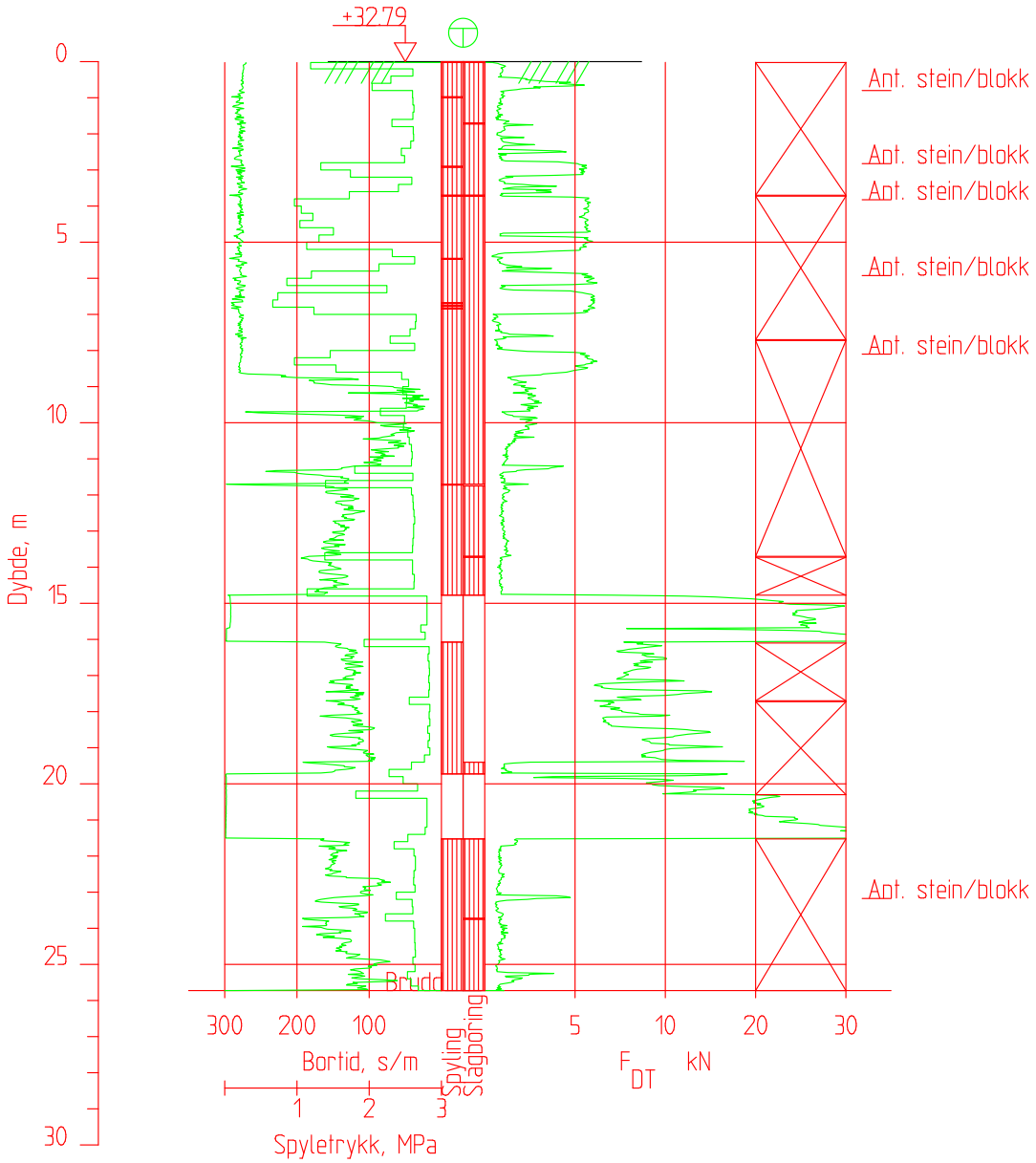
M = 1 : 100

E18 Langangen Rugtvedt

BG

19756

6013



Posisjon: X 1122557.22 Y 109947.02

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6013

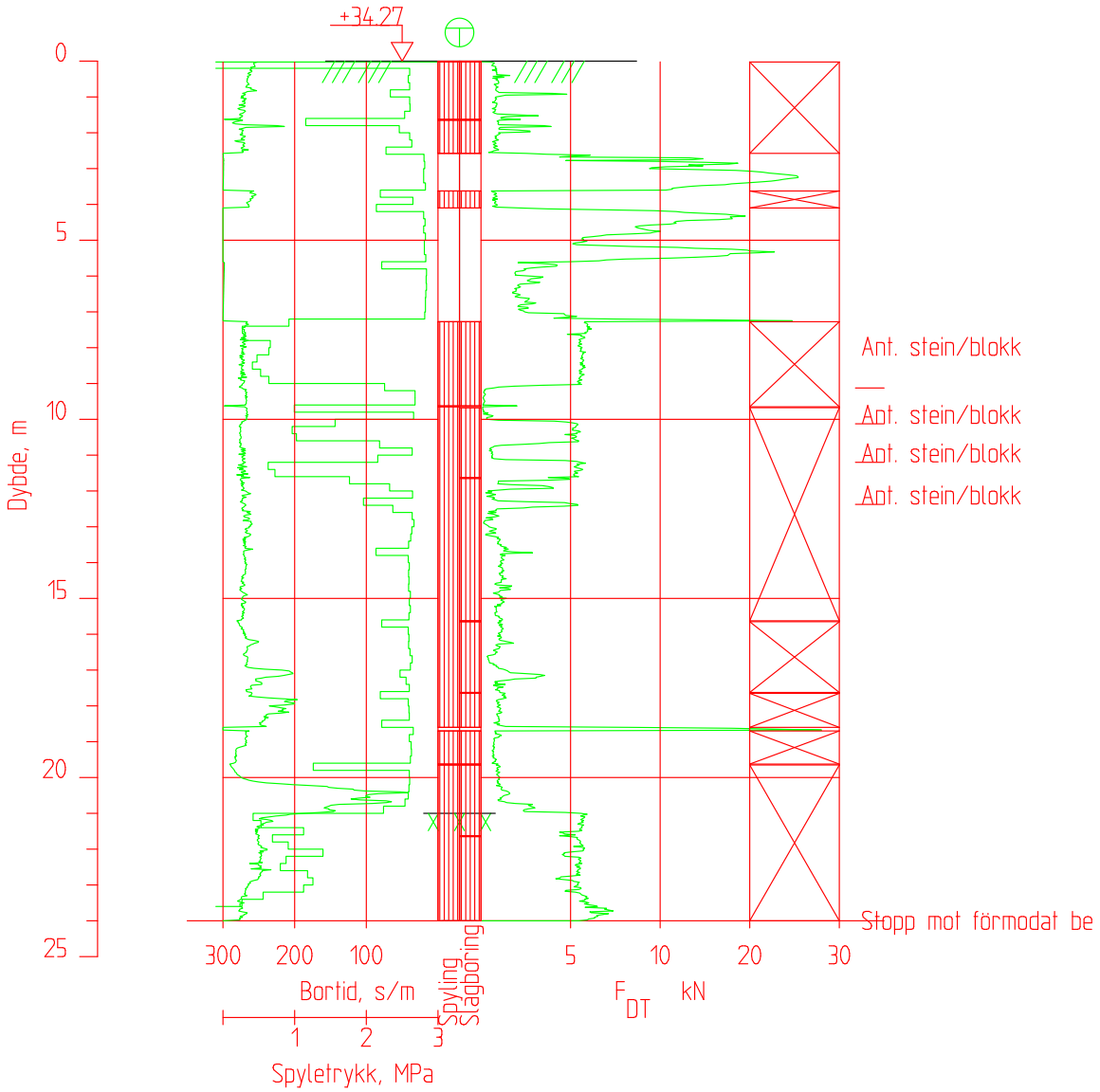
M = 1 : 200

Dato boret :09.04.2019

BG

19756

6014



Posisjon: X 1122545.55 Y 11004297

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6014

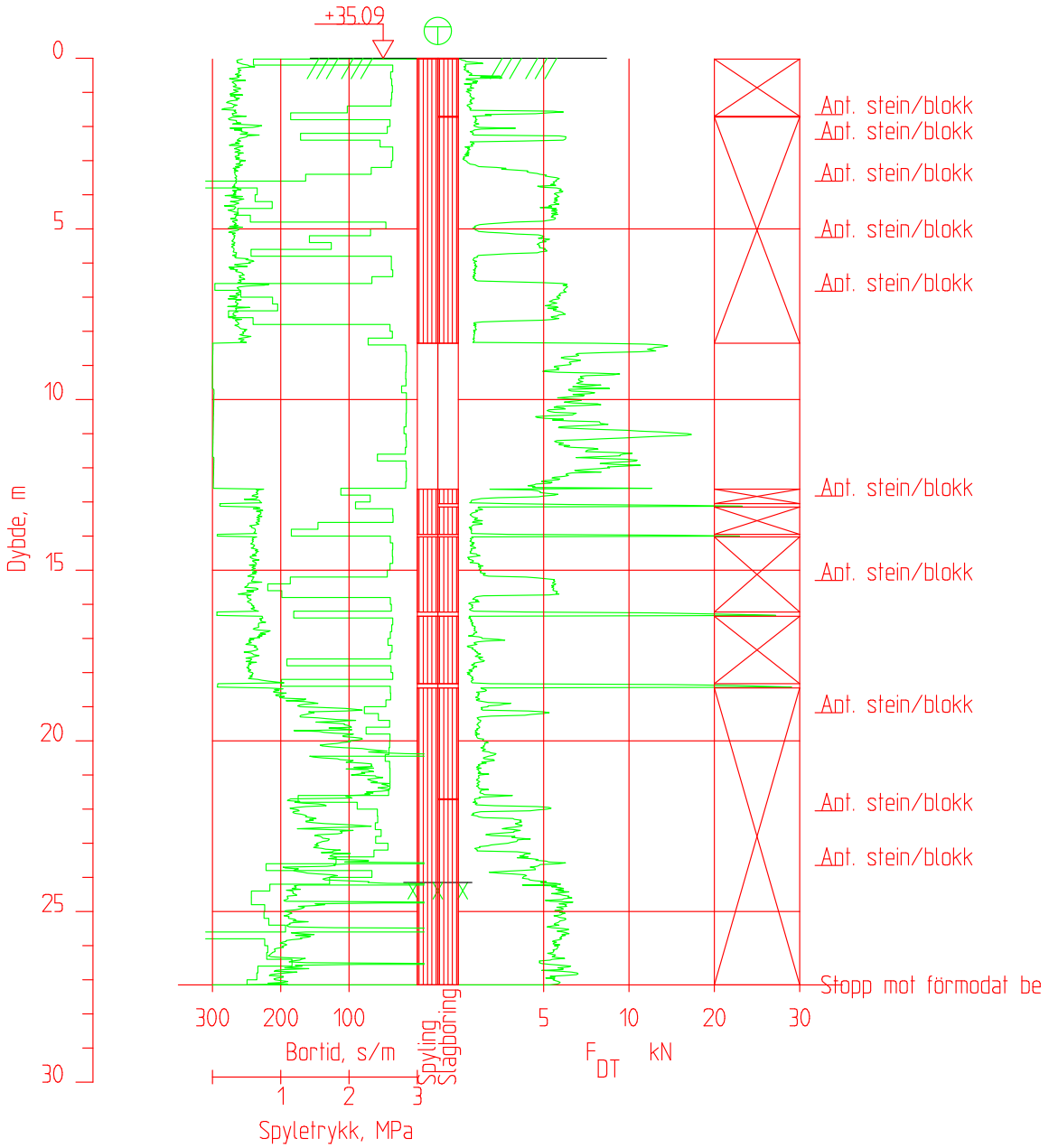
M = 1 : 200

Dato boret :09.04.2019

BG

19756

6015



Posisjon: X 1122526.99 Y 110102.07

Totalsondering

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E18 Langangen Rugtvedt

Borhull 6015

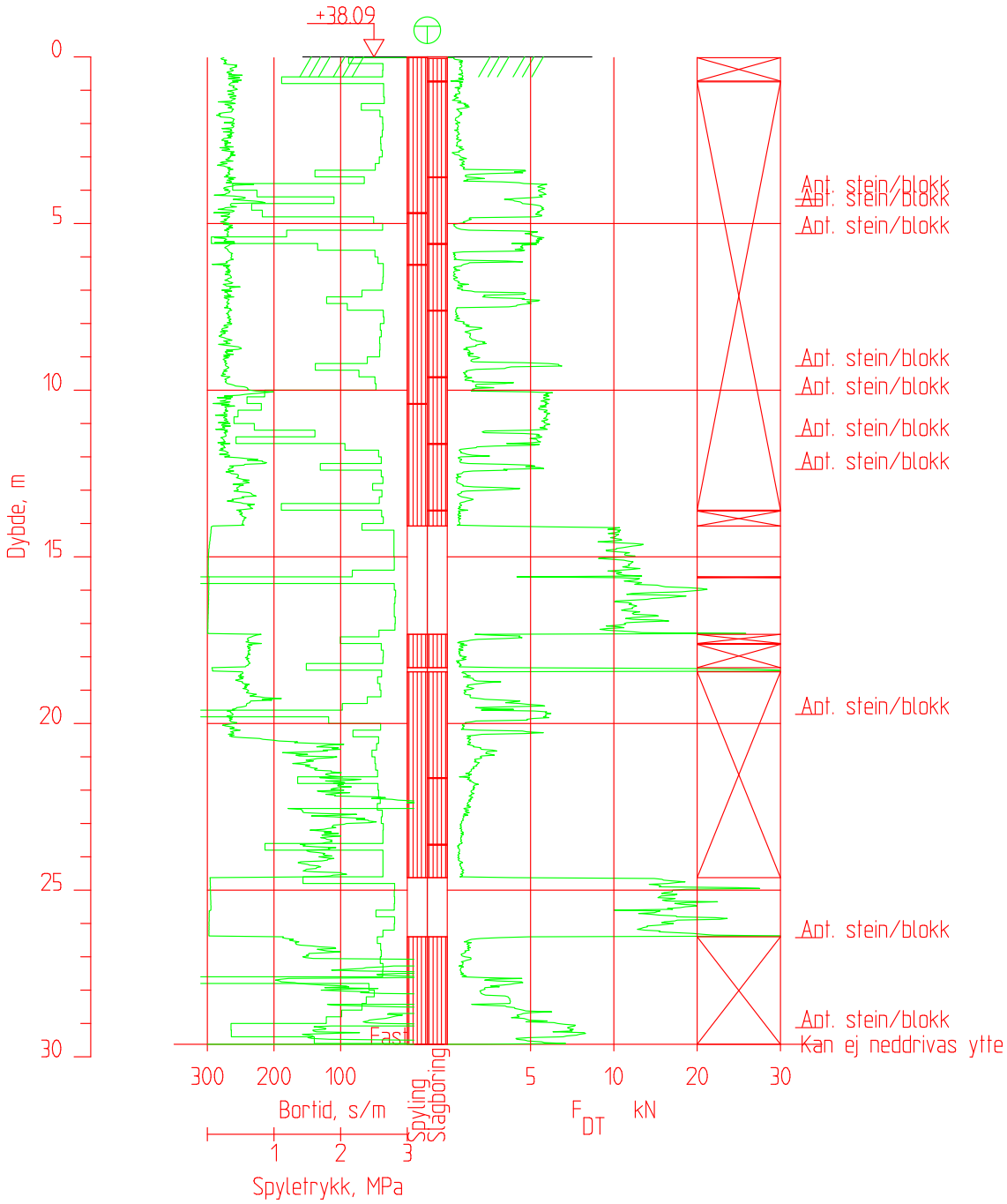
M = 1 : 200

Dato boret :10.04.2019

BG

19756

6016



Posisjon: X 1122513.70 Y 110124.51

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 6016

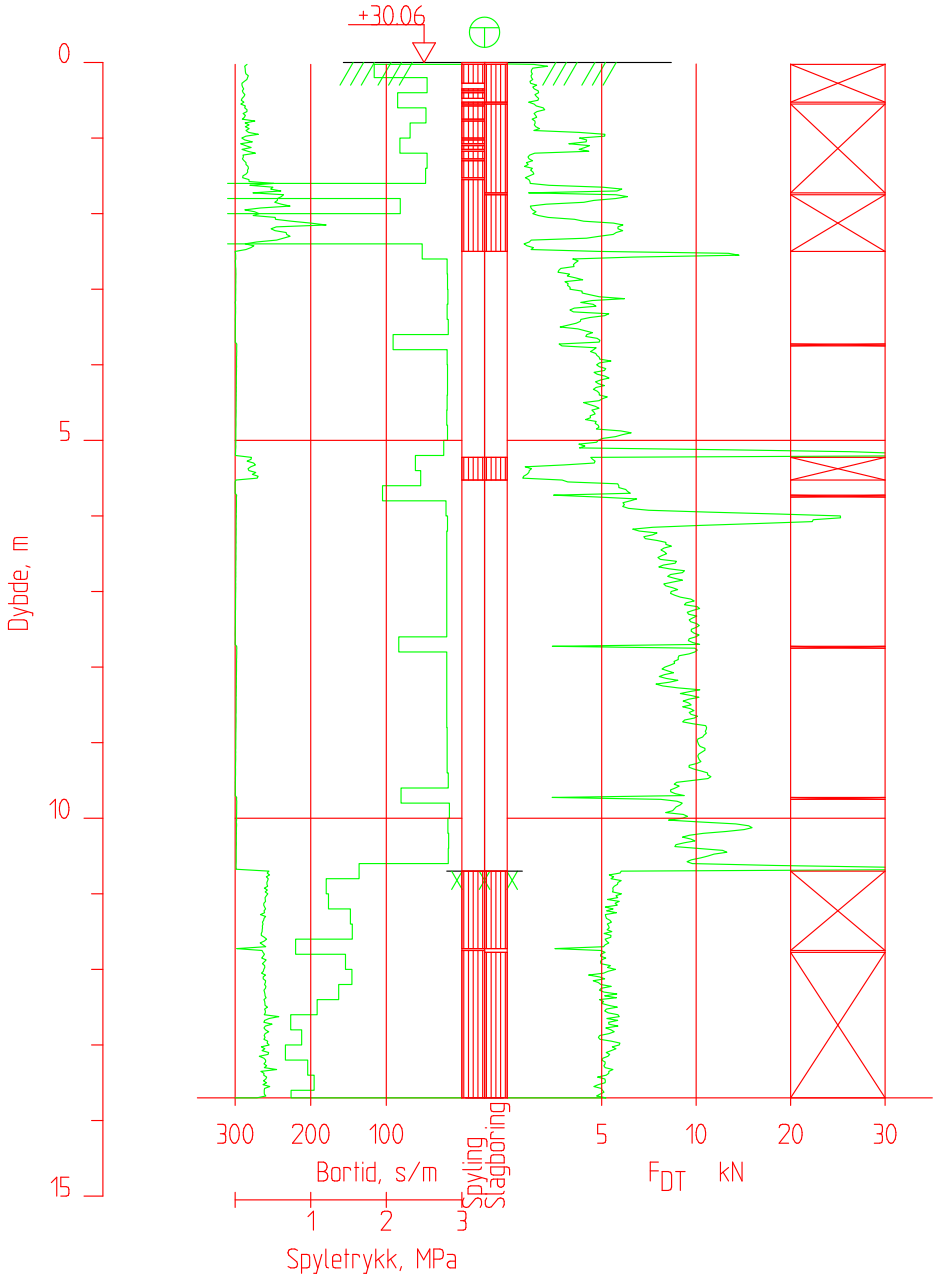
M = 1 : 200

Dato boret :10.04.2019

BG

19756

742



Posisjon: X 1122740.78 Y 109734.35

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 742

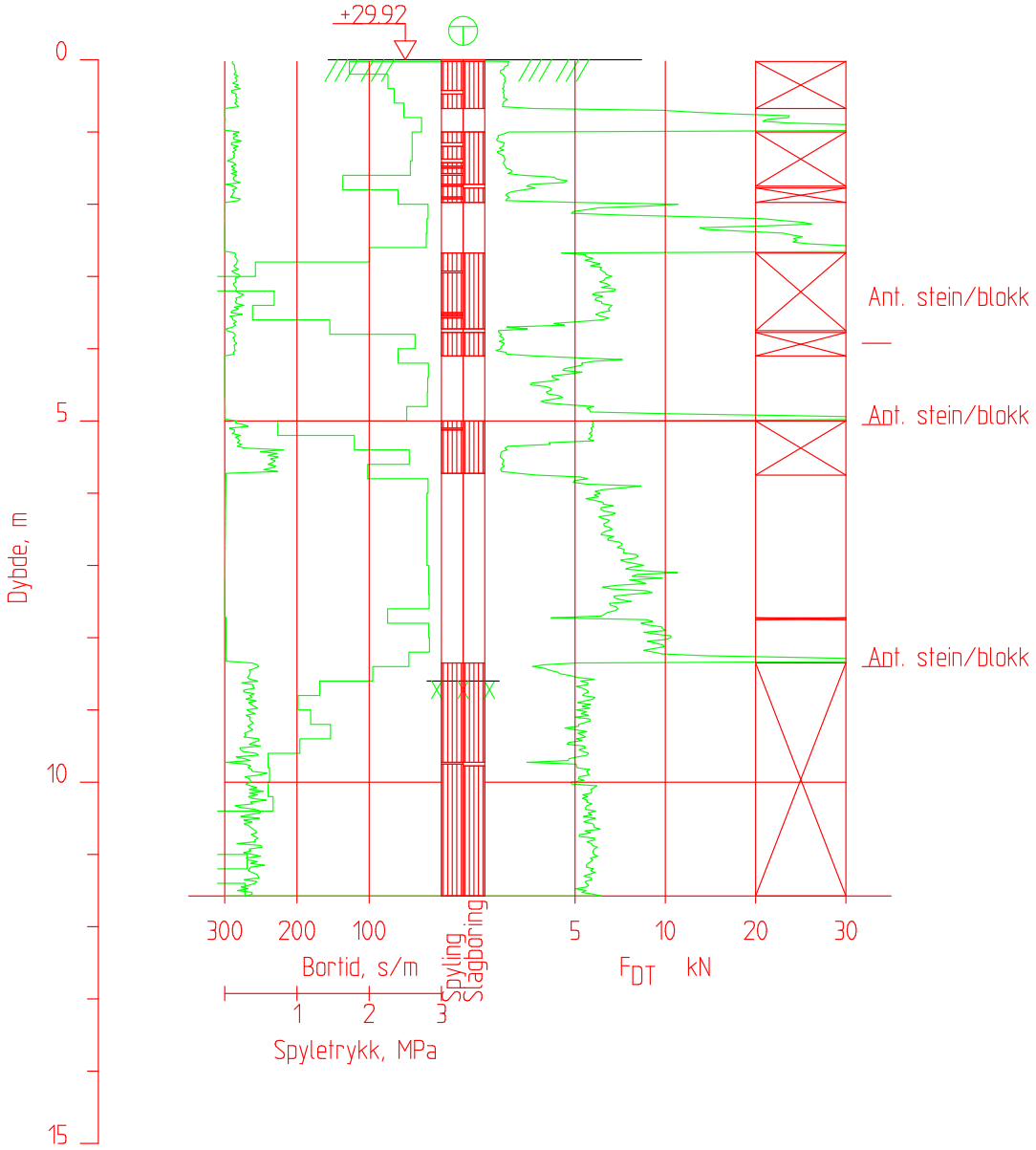
M = 1 : 100

Dato boret :28.03.2017

BG

19756

744



Posisjon: X 1122725.74 Y 109725.00

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 744

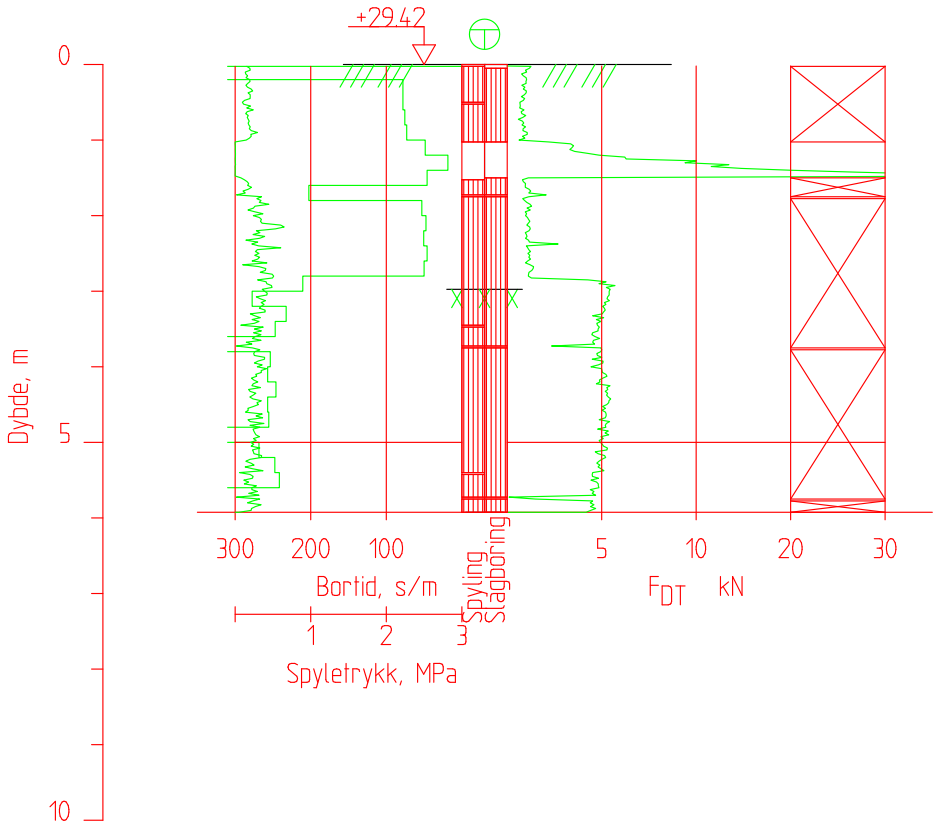
M = 1 : 100

Dato boret :28.03.2017

BG

19756

747



Posisjon: X 1122692.72 Y 109709.35

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 747

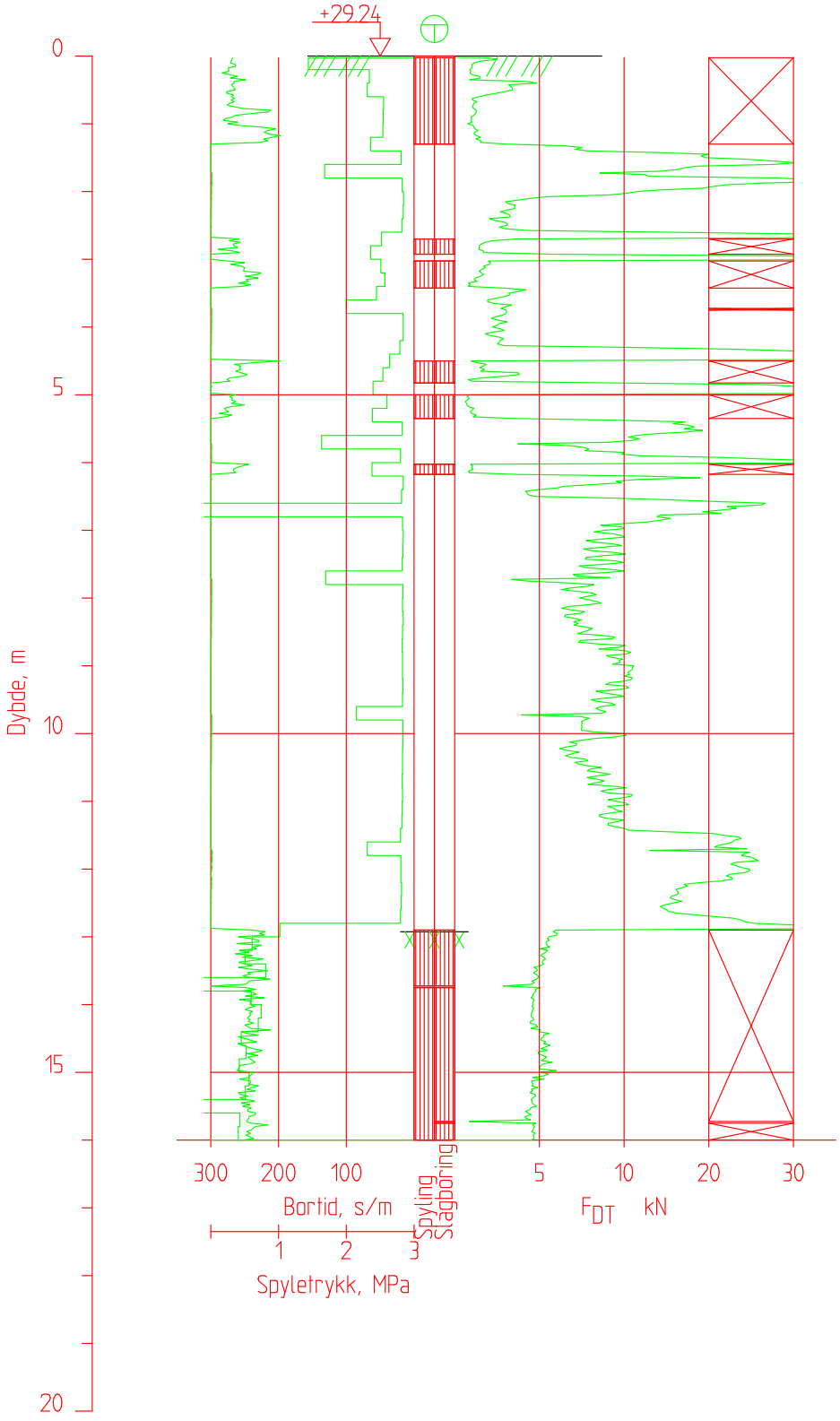
M = 1 : 100

Dato boret :28.03.2017

BG

19756

749



Posisjon: X 1122679.95 Y 10970160

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 749

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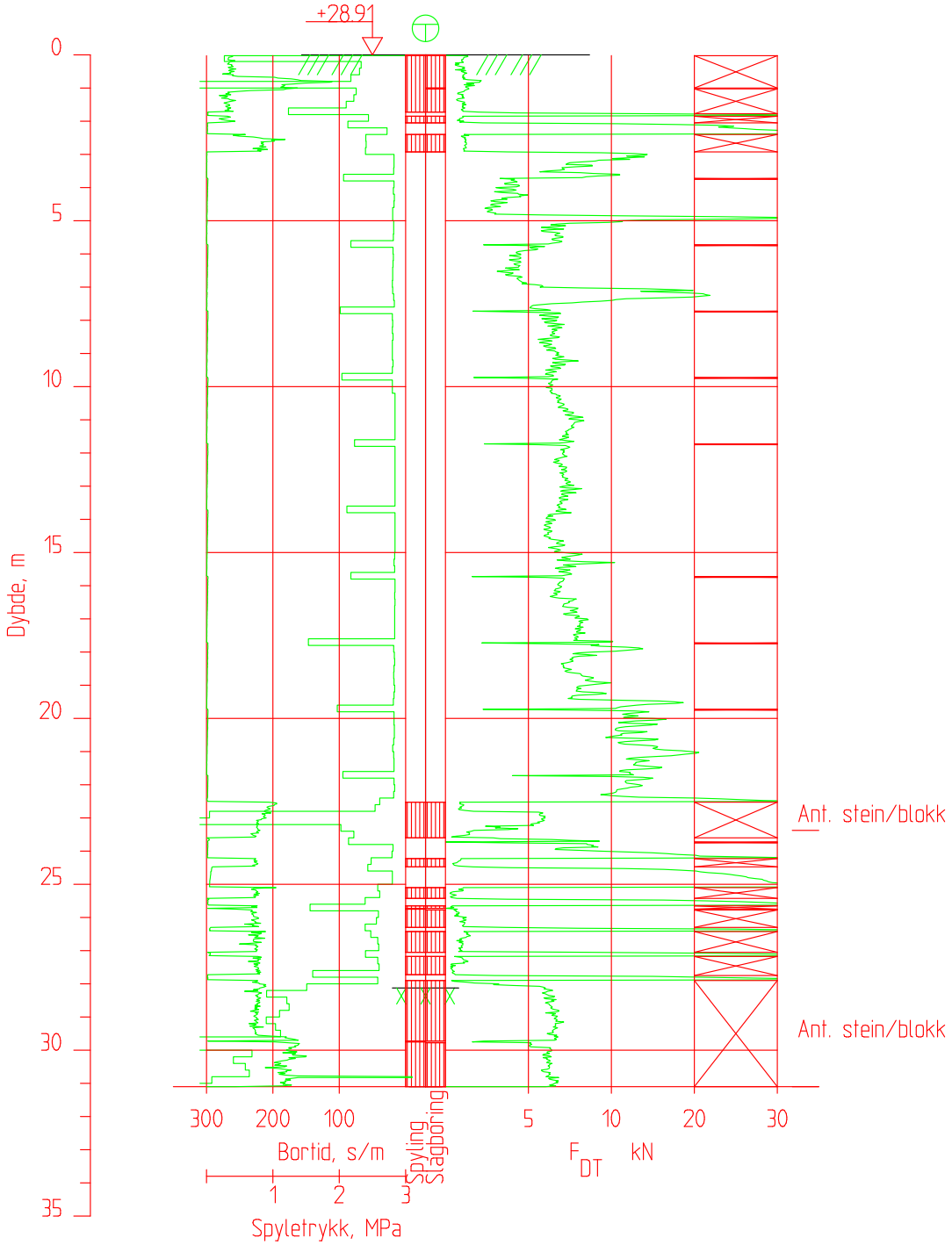
Dato boret :21.03.2017

BG

19756

751



Posisjon: X 1122653.98 Y 109689.04

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 751

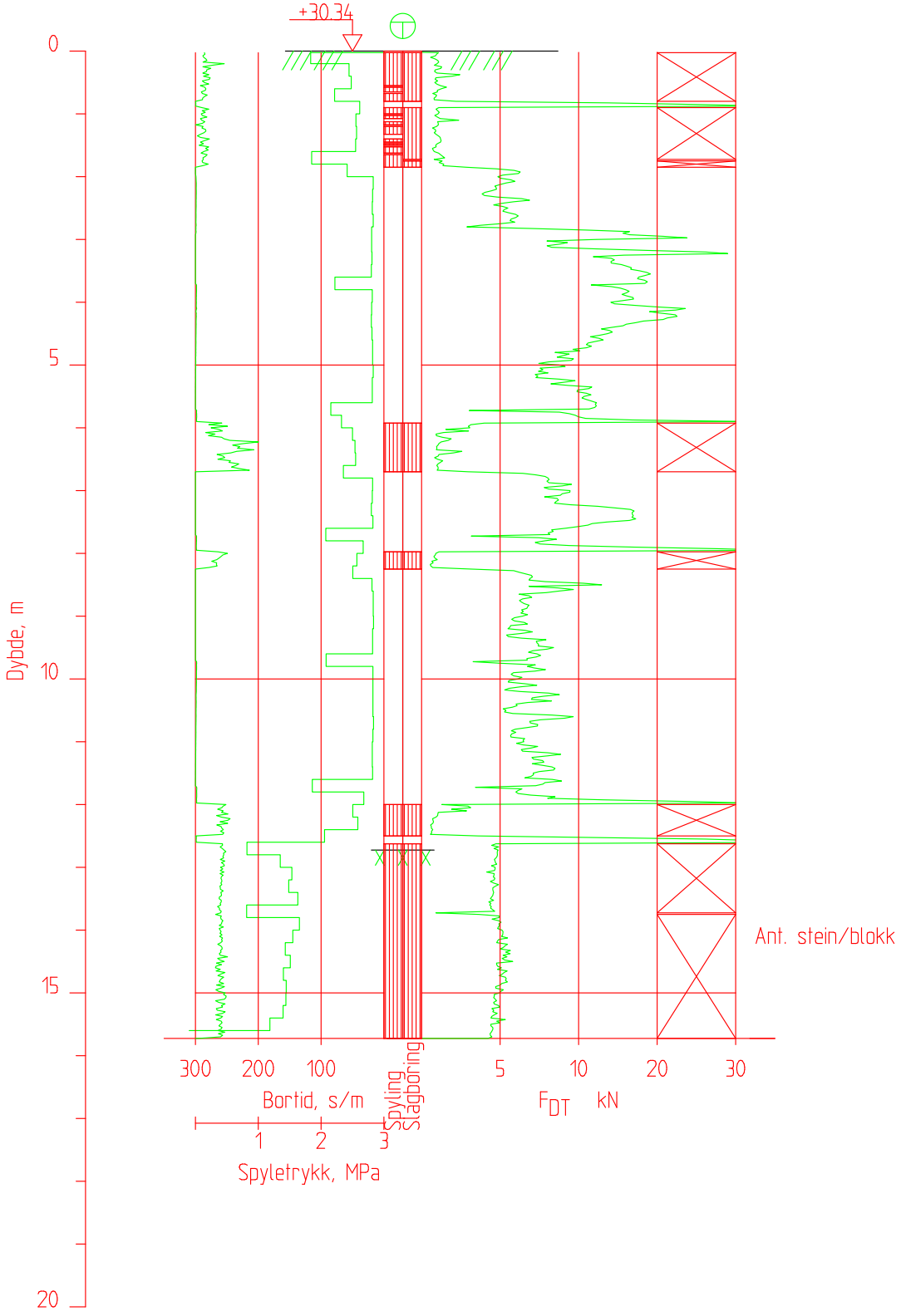
M = 1 : 200

Dato boret :28.03.2017

BG

19756

757



Posisjon: X 1122698.57 Y 109747.33

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 757

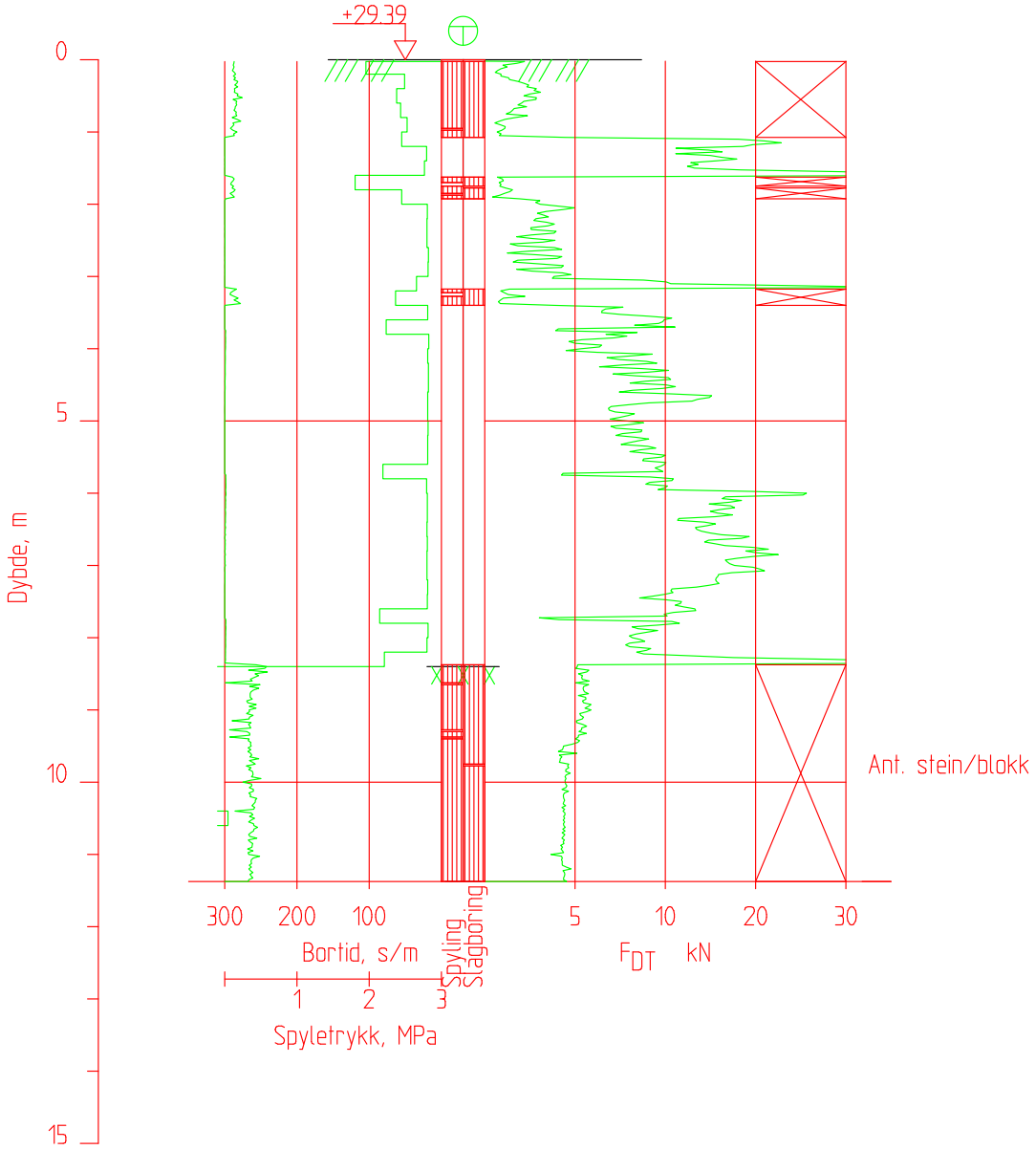
M = 1 : 100

Dato boret :28.03.2017

BG

19756

759



Posisjon: X 112682.52 Y 109739.94

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

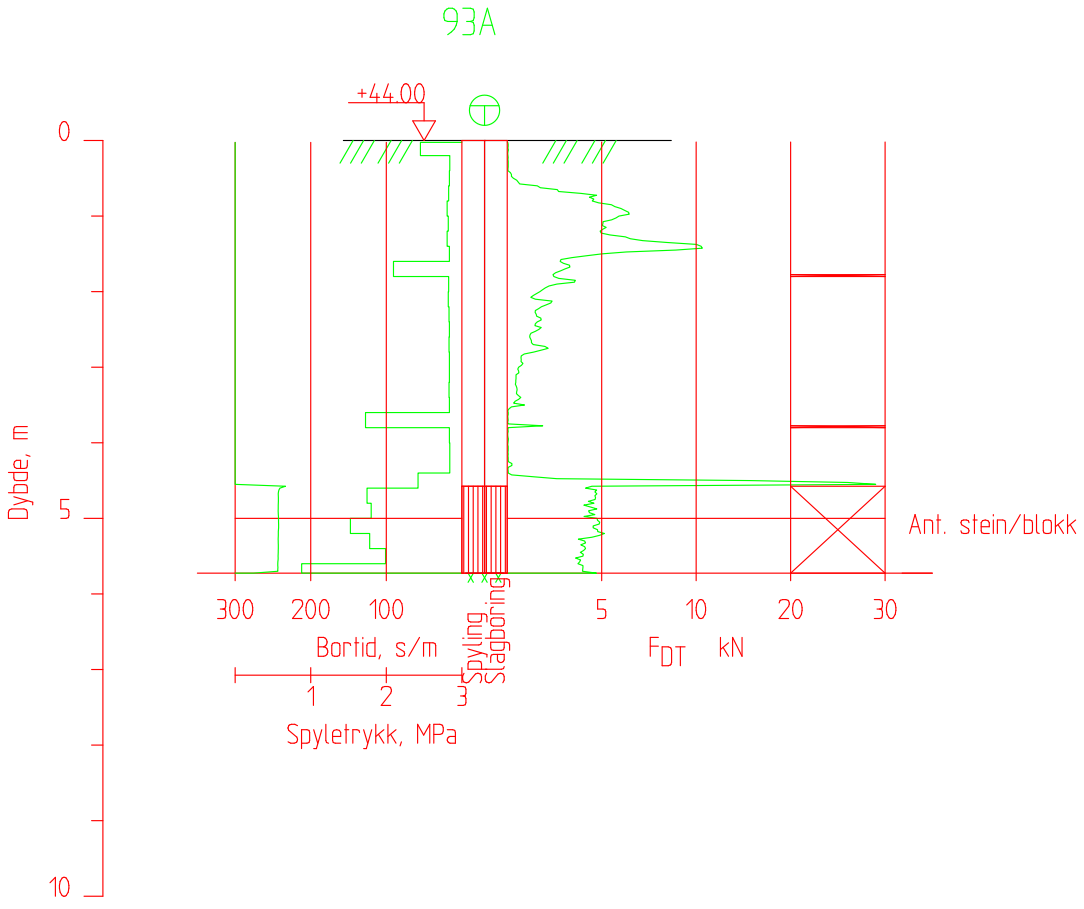
Borhull 759

M = 1 : 100

Dato boret :21.03.2017

BG

19756



Posisjon: X 1120342.04 Y 109420.66

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 93A

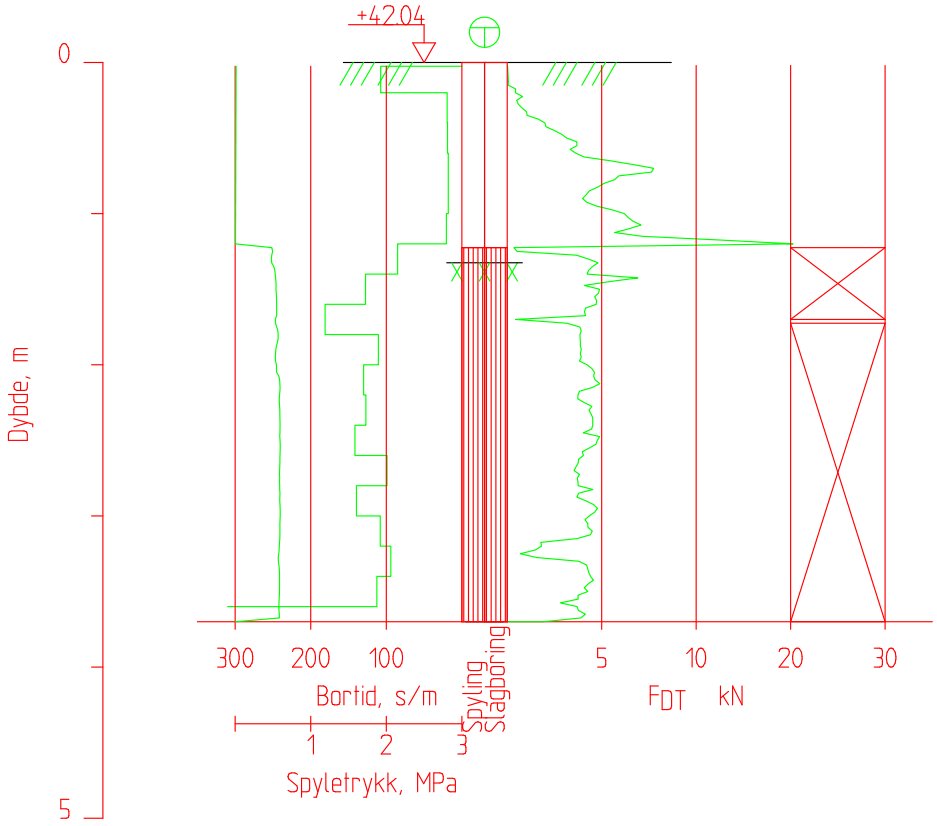
M = 1 : 100

Dato boret :22.11.2016

BG

19756

94



Posisjon: X 1120329.33 Y 109439.87

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 94

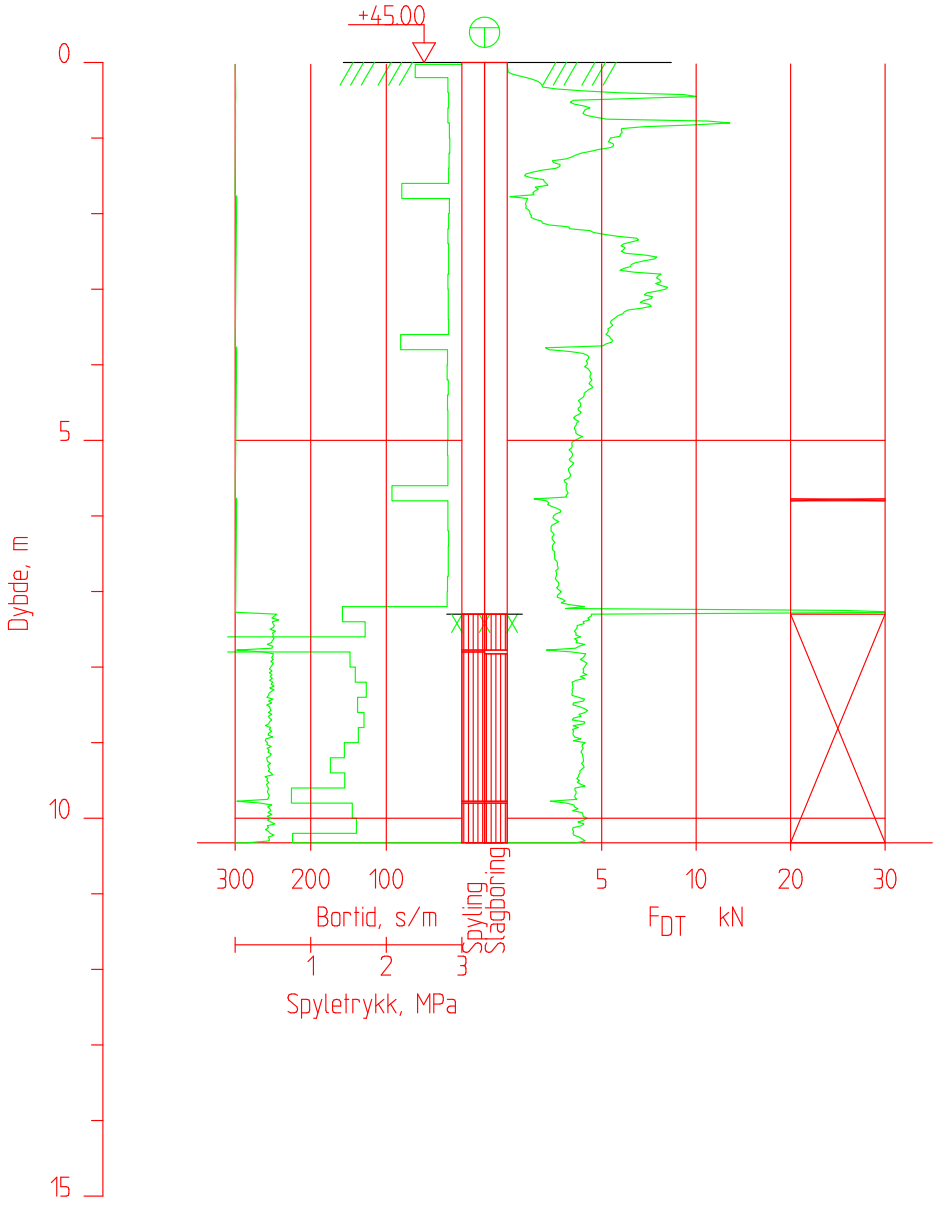
M = 1 : 50

Dato boret :22.11.2016

BG

19756

96



Posisjon: X 1120249.73 Y 10943190

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 96

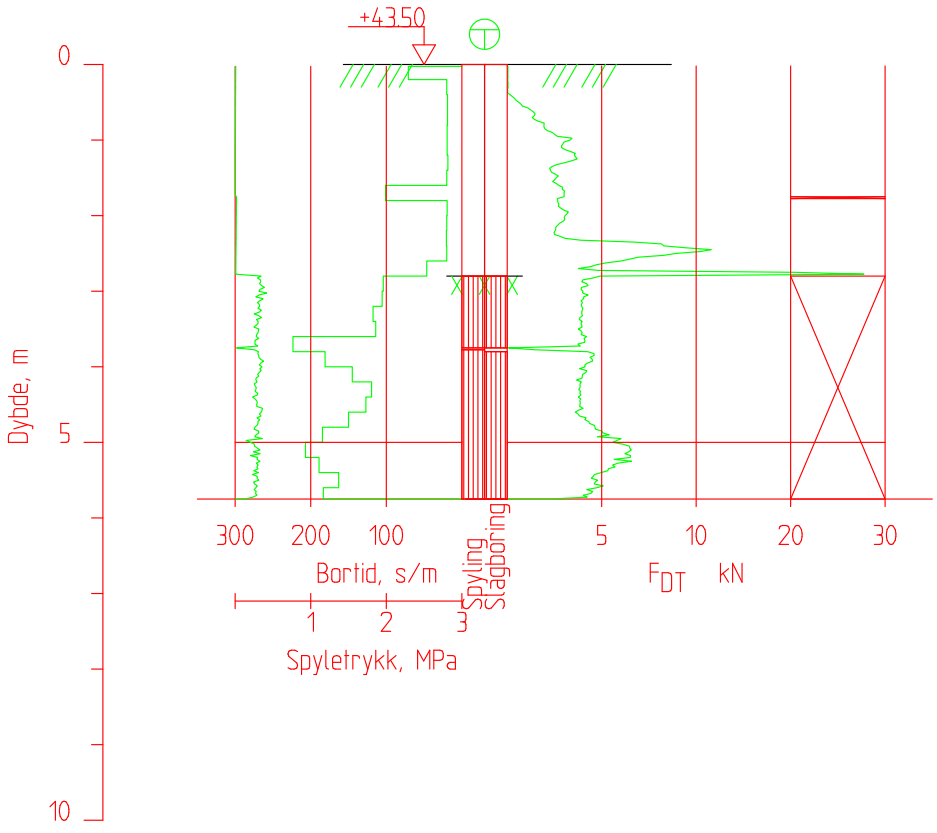
M = 1 : 100

Dato boret :22.11.2016

BG

19756

97A



Posisjon: X 1120240.23 Y 109401.17

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 97A

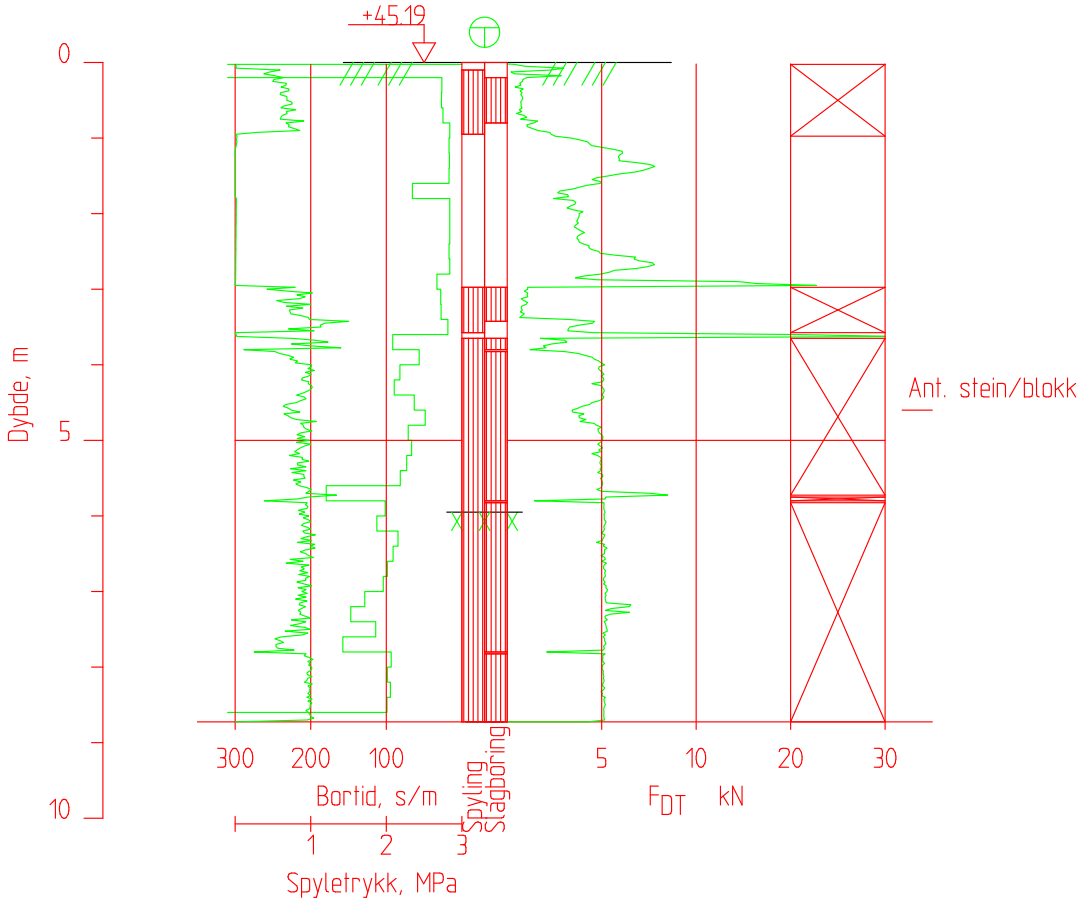
M = 1 : 100

Dato boret :22.11.2016

BG

19756

98



Posisjon: X 1120210.51 Y 109418.12

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 98

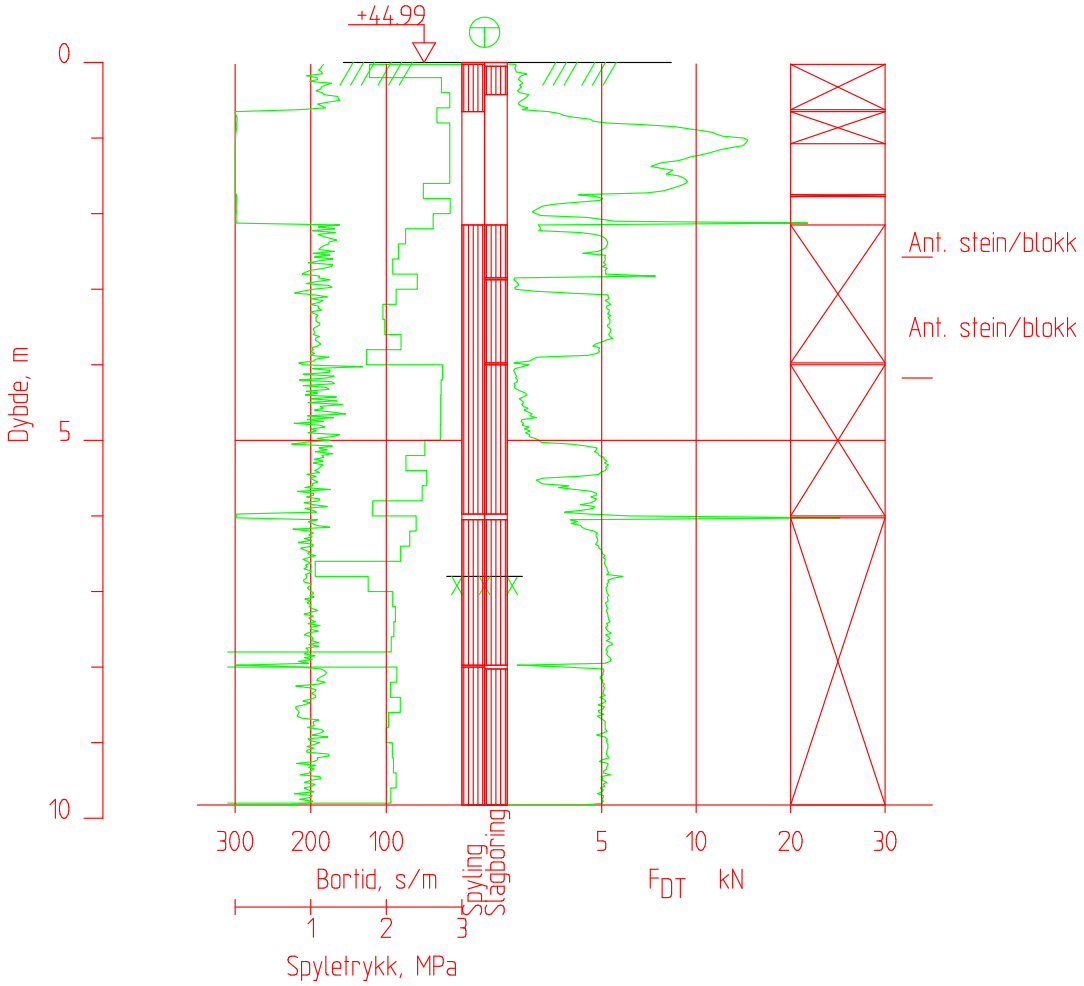
M = 1 : 100

Dato boret :16.11.2016

BG

19756

99



Posisjon: X 1120217.80 Y 109409.91

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

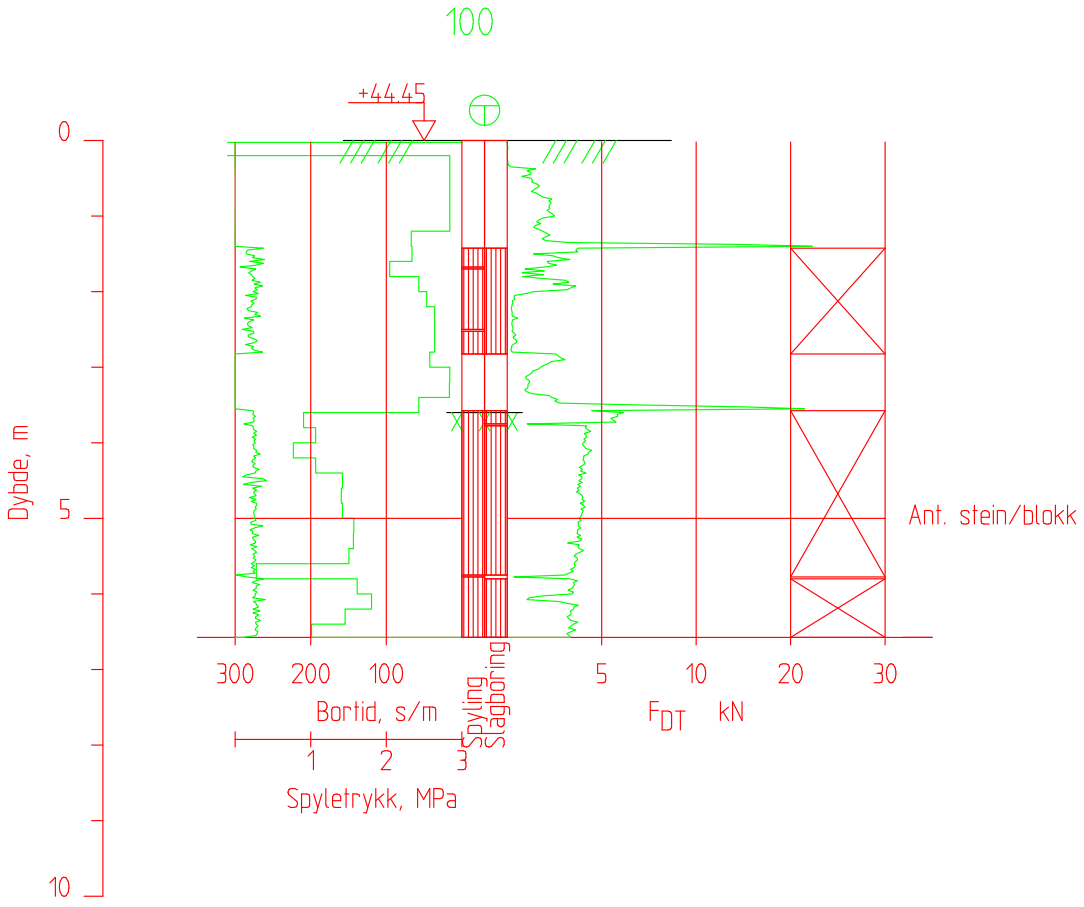
Borhull 99

M = 1 : 100

Dato boret :16.11.2016

BG

19756



Posisjon: X 1120224.93 Y 10939183

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

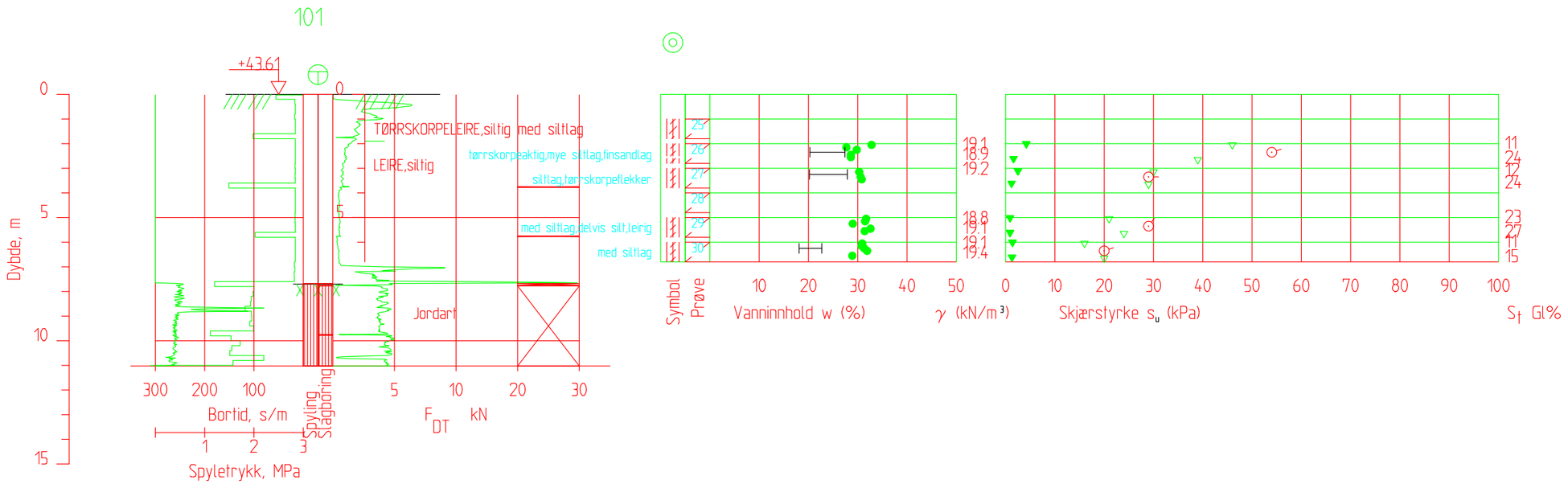
Borhull 100

M = 1 : 100

Dato boret :17.11.2016

BG

19756



Posisjon: X 1120165.09 Y 109399.88

Totalsondering Borprofil

EIFFAGE

E18 Langangen Rugtvedt

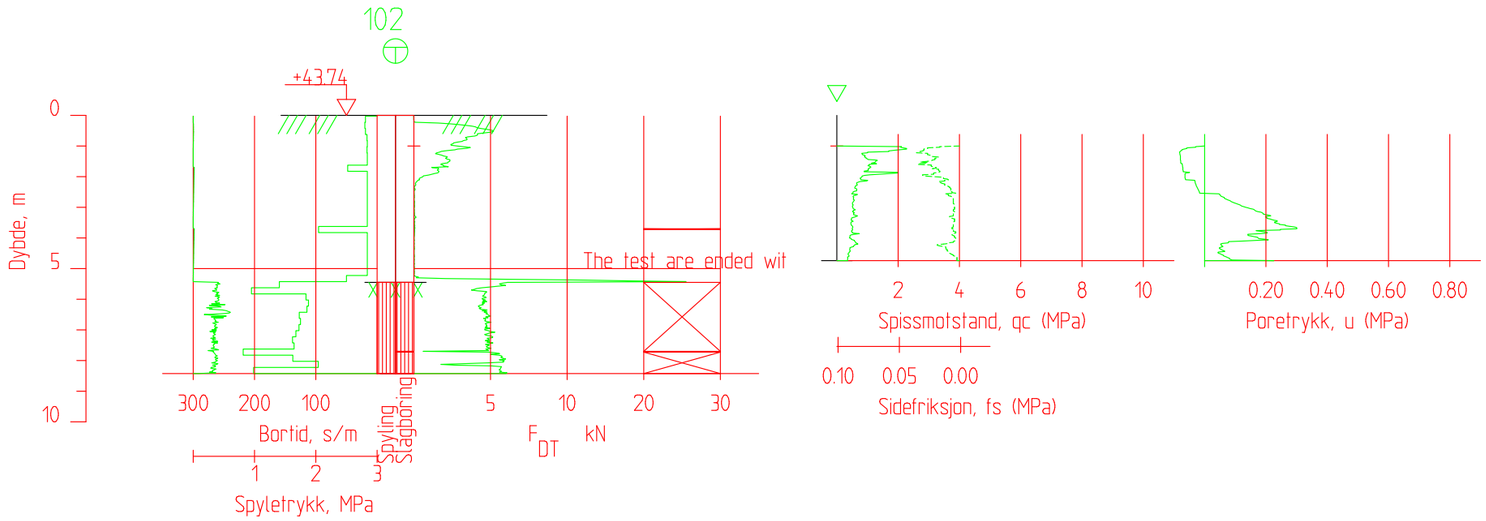
Borhull 101

M = 1 : 200

Dato boret :17.11.2016

BG

19756



Posisjon: X 1120170.25 Y 10938264

Totalsondering CPT-sondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 102

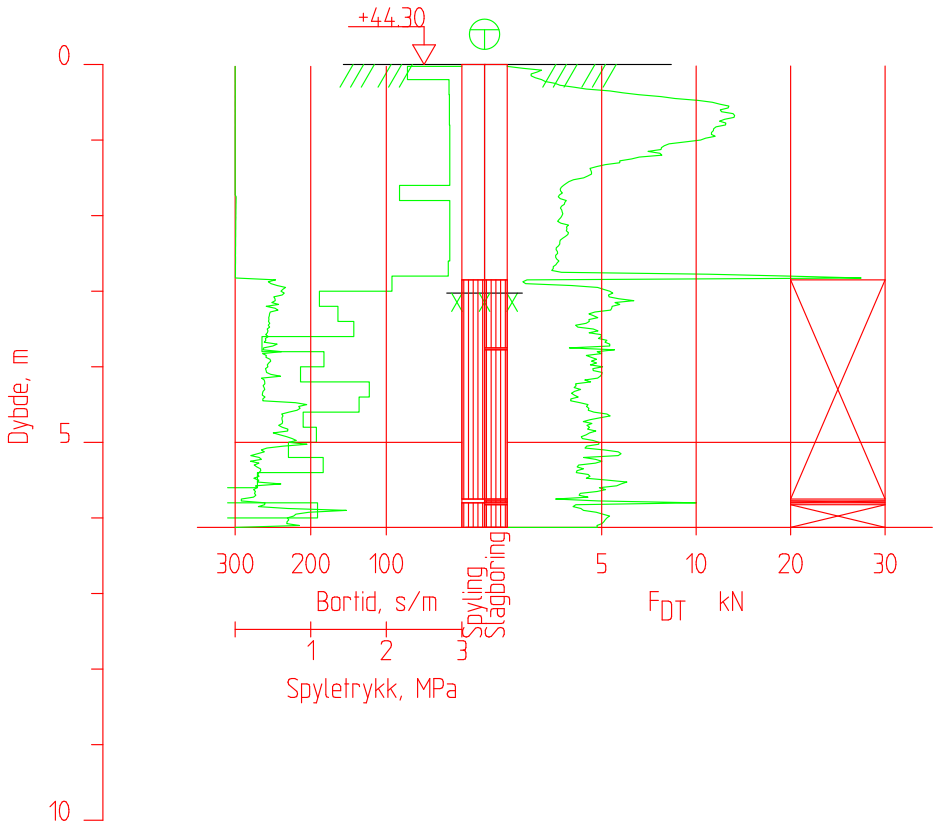
M = 1 : 200

Dato boret :14.02.2017

BG

19756

103



Posisjon: X 1120124.86 Y 109406.39

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

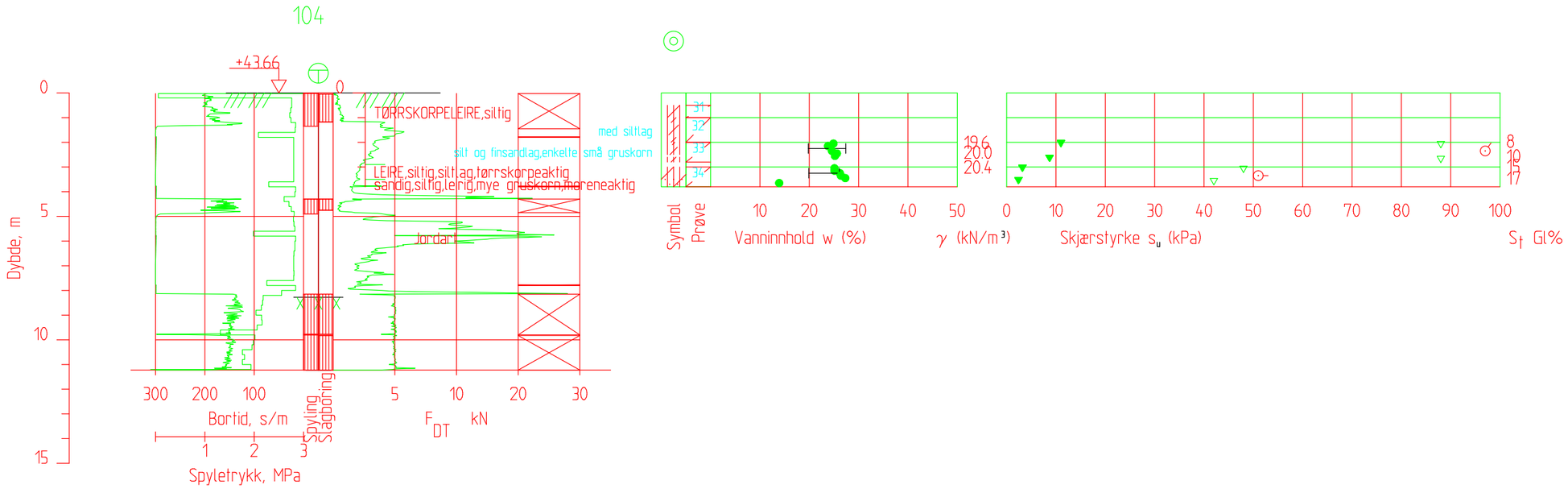
Borhull 103

M = 1 : 100

Dato boret :17.11.2016

BG

19756



Posisjon: X 1120028.33 Y 109369.38

Totalsondering Borprofil

EIFFAGE

E18 Langangen Rugtvedt

Borhull 104

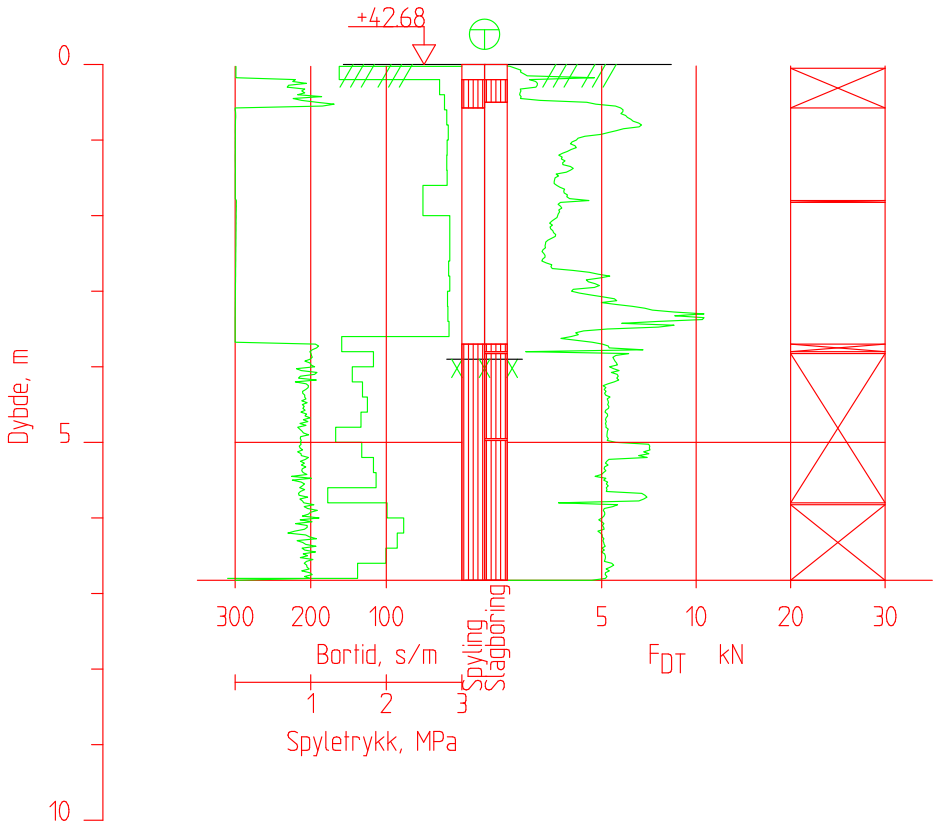
M = 1 : 200

Dato boret :16.11.2016

BG

19756

105



Posisjon: X 1120012.81 Y 109365.87

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

Borhull 105

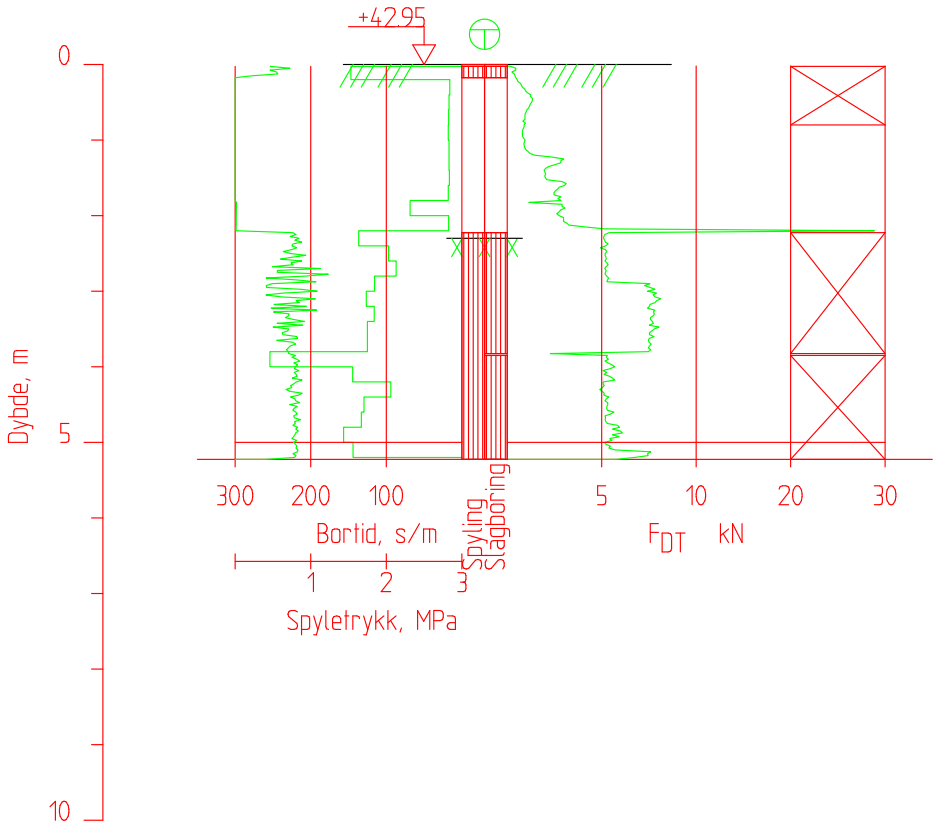
M = 1 : 100

Dato boret :16.11.2016

BG

19756

106



Posisjon: X 1120001.03 Y 109353.12

Totalsondering

EIFFAGE

E18 Langangen Rugtvedt

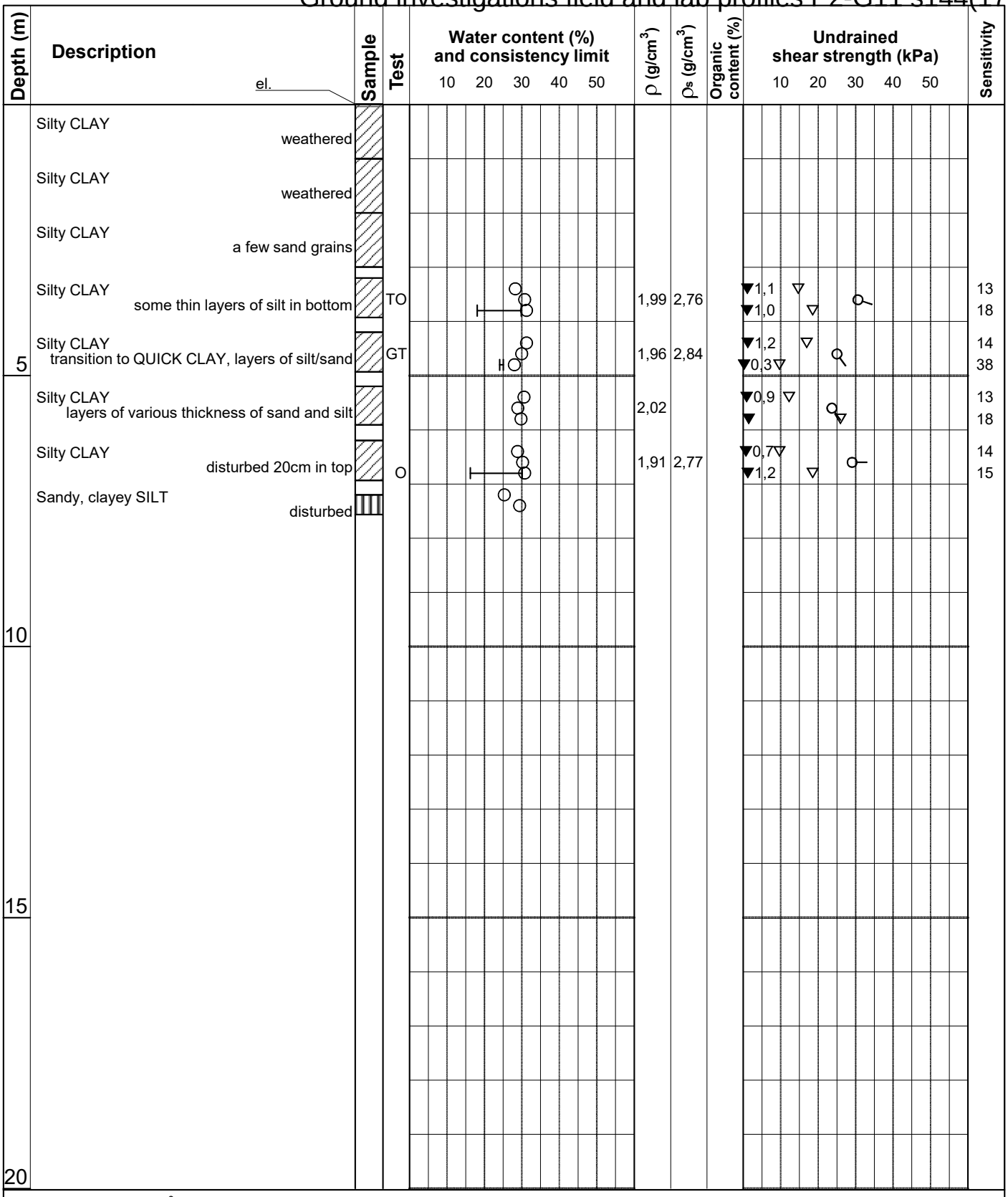
Borhull 106

M = 1 : 100

Dato boret :16.11.2016

BG

19756



Symbols:

0 / 15 / 5 / 10 — Unconfined compression test (line specifies strain (%) at failure)

Water content
Plasticity Index (PI)

ISO 17892-6: 2017
▼ Disturbed fall cone
▽ Undisturbed fall cone

ρ = Density
ρs = Grain density

T = Triaxial test
O = Oedometer test
G = Grain size distribution

Ground water level: 2,0 m
Bore book: Digital

Soil Sampling

Borehole: 3002

Nye Veier

Date: 2020-07-07

E18 Langangen-Rugtvedt, supplementary ground investigations

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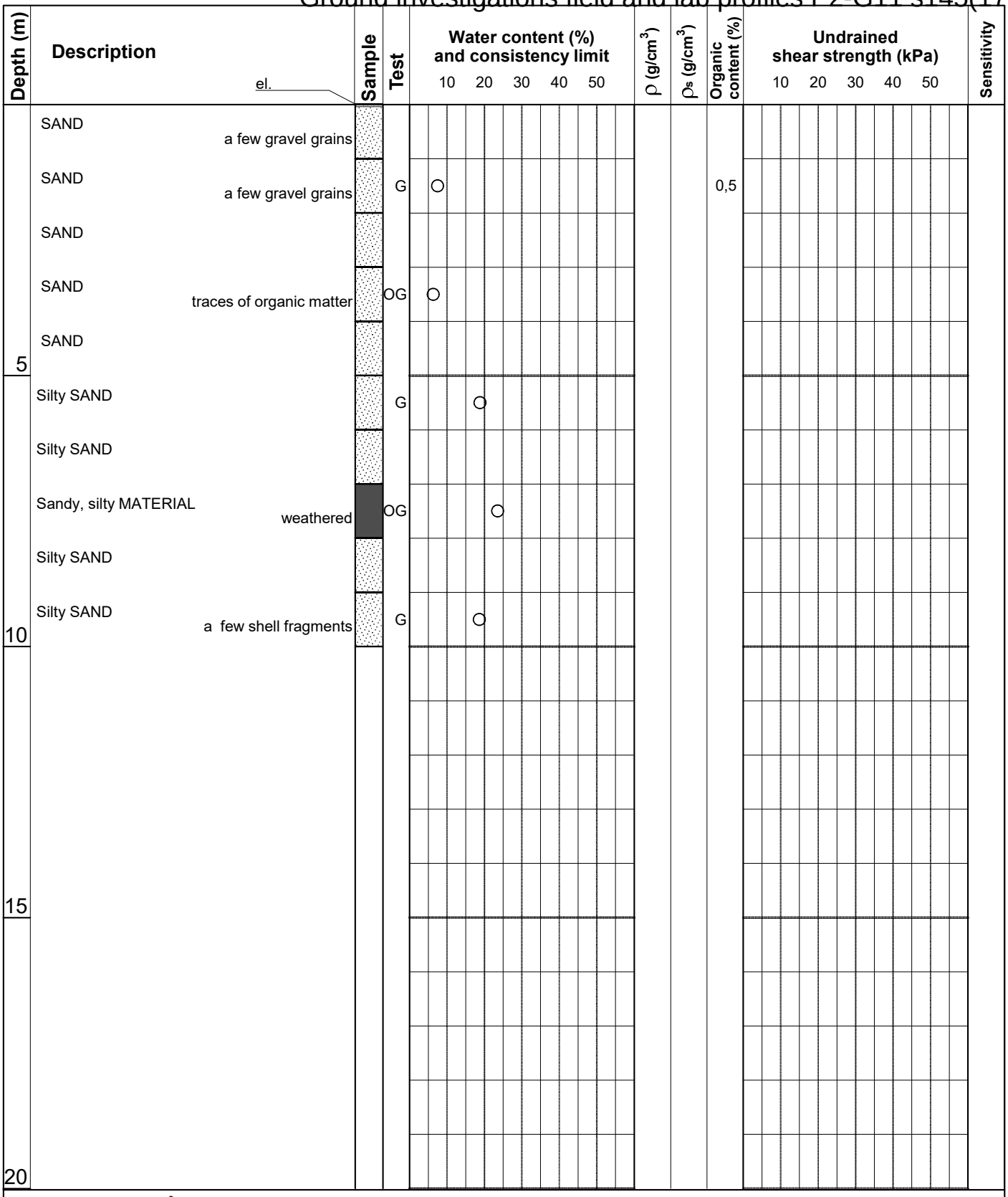
Drawn by:	Reviewed by:	Approved by:
GEO	ANNM	STEG
Project number:	**Drawing number:**	**Revision number:**
10217934-02	RIG-TEG-201	00



Symbols:

15 0 5 10 Unconfined compression test (line specifies strain (%) at failure)

Water content
Plasticity Index (PI)

ISO 17892-6: 2017
▼ Disturbed fall cone
▽ Undisturbed fall cone

ρ = Density
ρs = Grain density

T = Triaxial test
O = Oedometer test
G = Grain size distribution

Ground water level: m
Bore book: Digital

Soil Sampling

Borehole: 4003

Nye Veier

Date: 2020-07-09

E18 Langangen-Rugtvedt, supplementary ground investigations

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Drawn by:	Reviewed by:	Approved by:
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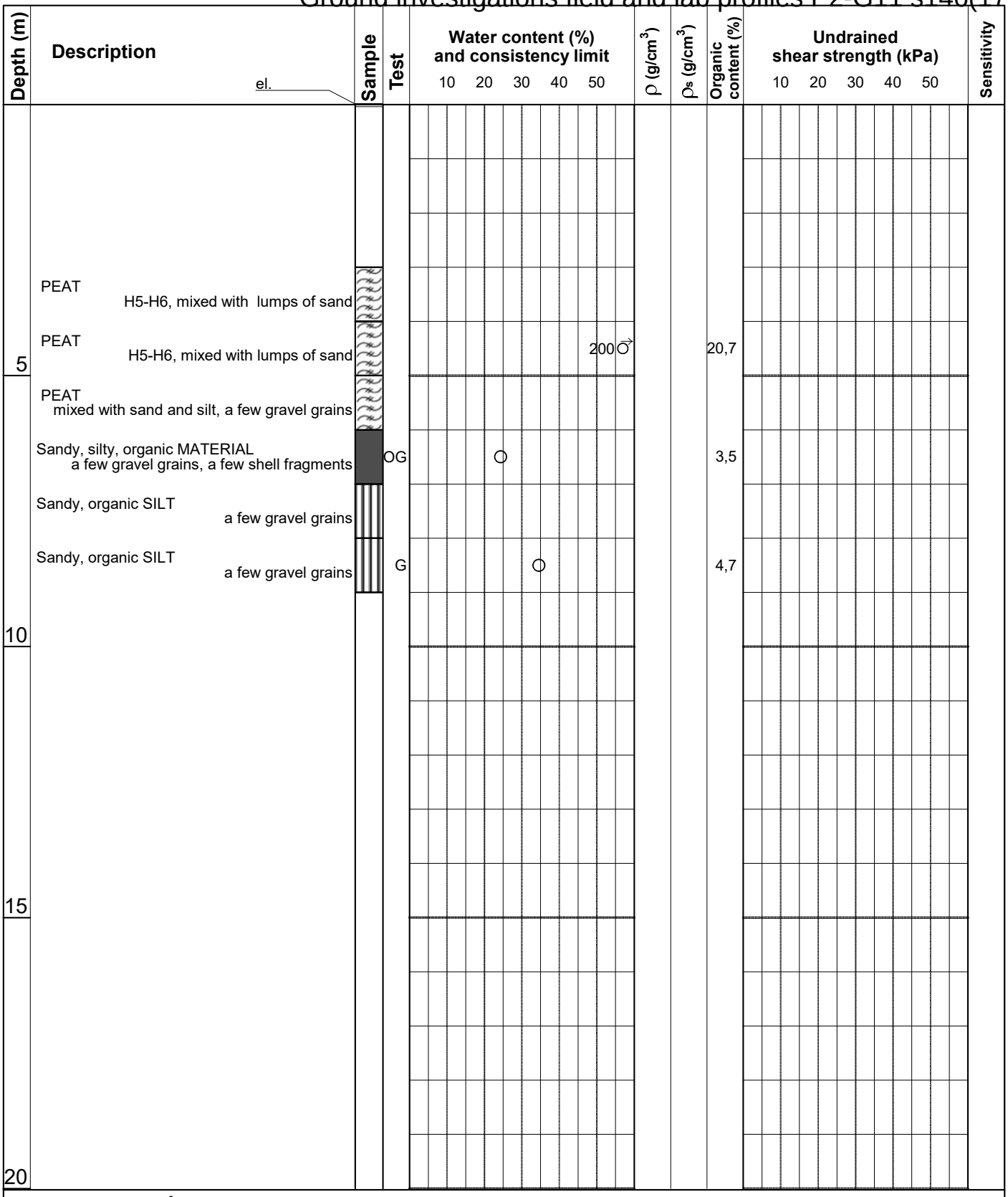
Project number:	**Drawing number:**	**Revision number:**
10217934-02	RIG-TEG-202	00



Symbols:

0 / 15 / 5 / 10 — Unconfined compression test (line specifies strain (%) at failure)

Water content
Plasticity Index (PI)

ISO 17892-6: 2017
Disturbed fall cone
Undisturbed fall cone

ρ = Density
ρs = Grain density

T = Triaxial test
O = Oedometer test
G = Grain size distribution

Ground water level: m
Bore book: Digital

Soil Sampling

Borehole: 5001

Nye Veier

Date: 2020-07-09

E18 Langangen-Rugtvedt, supplementary ground investigations

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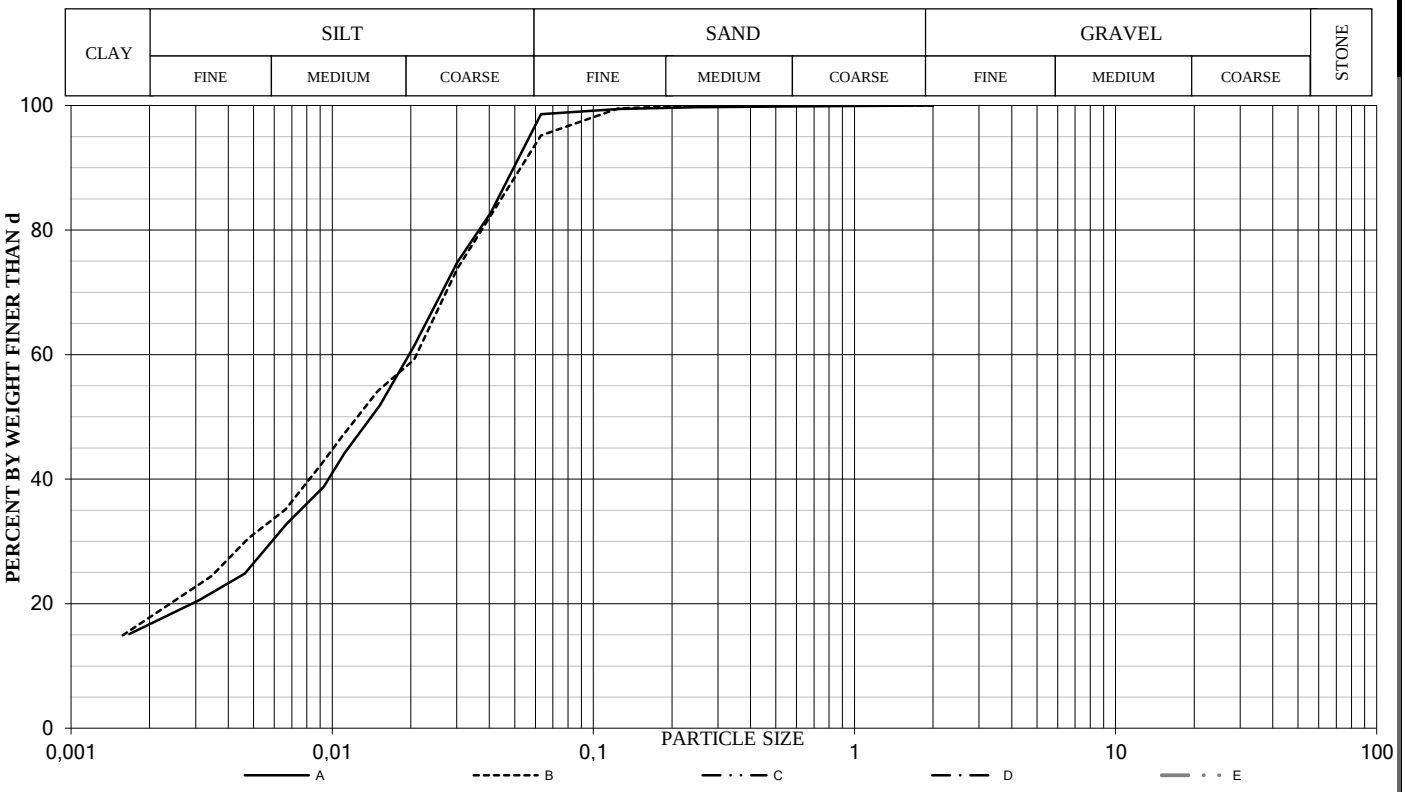
Drawn by:	Reviewed by:	Approved by:
GEO	ANNM	STEG

Project number:	Drawing number:	Revision number:
10217934-02	RIG-TEG-203	00

SERIES	BOREHOLE ID	DEPTH (m)	SOIL CLASSIFICATION	REMARKS	METHOD		
					DS	WS	HYD
A	2007	4,2-5,0	Silty CLAY			X	X
B	3002	4,2-5,0	Silty CLAY			X	X
C							
D							
E							



ABBREVIATIONS:

MC = Moisture content

FS = Frost susceptibility

$$C_z = \frac{D^2{}_{30}}{(D_{60})(D_{10})} \qquad C_u = \frac{D_{60}}{D_{10}}$$

METHOD

DS = Dry Sieving

WS = Wet Sieving

HYD = Hydrometer

SERIES	FS Group	MC %	C_u kN/m^2	C_{ur} kN/m^2	Plastic limit %	Plasticity index %	Organic Content %	< 0,02 mm %	Bulk density (g/m^3)	D_{10} mm	D_{30} mm	D_{50} mm	D_{60} mm
A											0,0060	0,0143	0,0198
B											0,0047	0,0127	0,0211
C													
D													
E													

GRAIN SIZE DISTRIBUTION

Nye Veier

E18 Langangen-Rugtvedt, supplementary ground investigations

Prepared by:	Reviewed by:
GEO	ANNM
Approved by:	Date:
STEG	**07.07.20**

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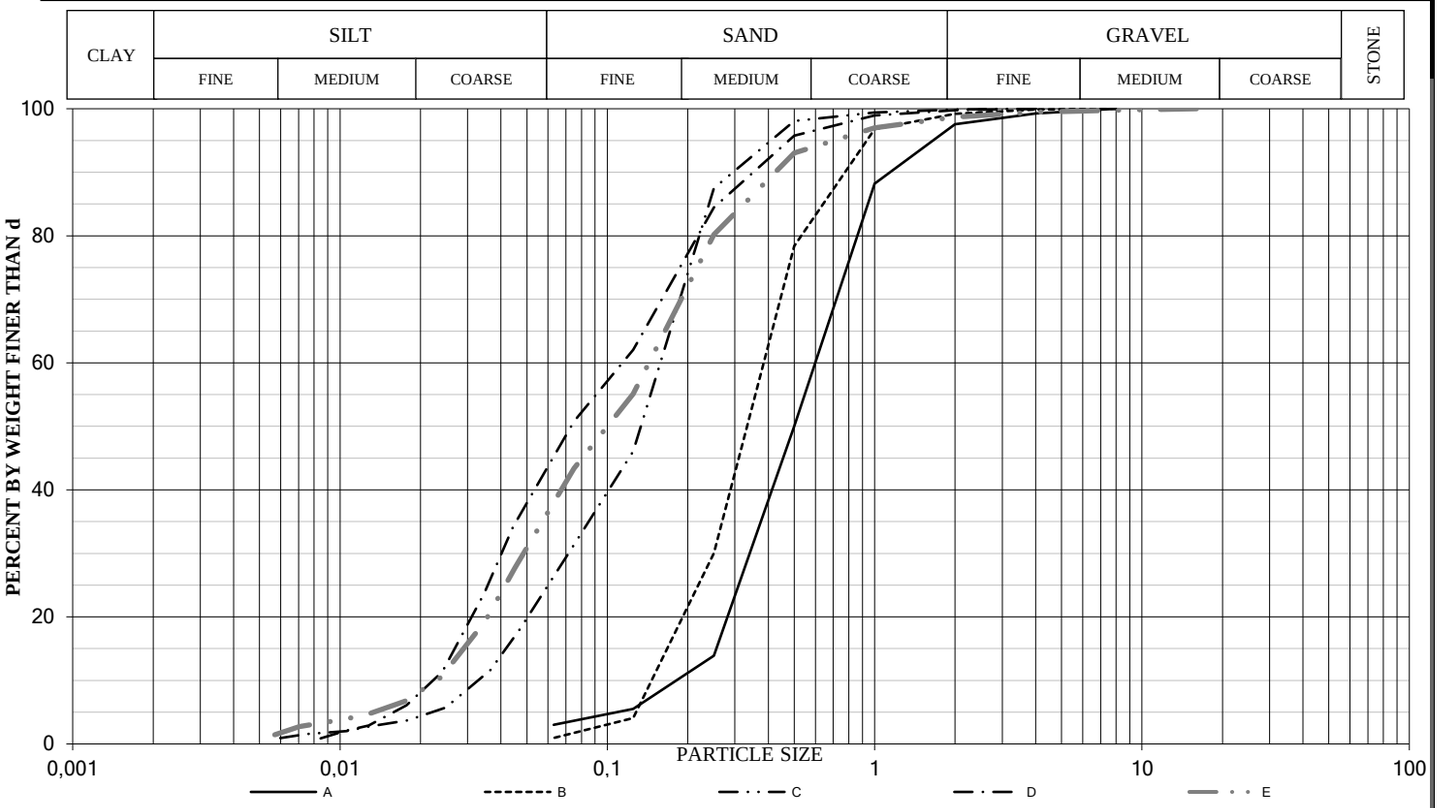
Project ID:	Drawing ID:	Rev.
10217934-02	RIG-TEG-300	00

SERIES	BOREHOLE ID	DEPTH (m)	SOIL CLASSIFICATION	REMARKS	METHOD		
					DS	WS	HYD
A	4003	1,0-2,0	SAND		X		
B	4003	3,0-4,0	SAND		X		
C	4003	5,0-6,0	Silty SAND			X	X
D	4003	7,0-8,0	Sandy, silty MATERIAL			X	X
E	4003	9,0-10,0	Silty SAND			X	X



ABBREVIATIONS:

MC = Moisture content

FS = Frost susceptibility

$$C_z = \frac{D^2{}_{30}}{(D_{60})(D_{10})} \qquad C_u = \frac{D_{60}}{D_{10}}$$

METHOD

DS = Dry Sieving

WS = Wet Sieving

HYD = Hydrometer

SERIES	FS Group	MC %	C_u kN/m^2	C_{ur} kN/m^2	Plastic limit %	Plasticity index %	Organic Content %	< 0,02 mm %	Bulk density (g/m^3)	D_{10} mm	D_{30} mm	D_{50} mm	D_{60} mm
A										0,1921	0,3616	0,5000	0,6308
B										0,1535	0,2498	0,3532	0,4049
C										0,0333	0,0721	0,1368	0,1670
D										0,0225	0,0405	0,0735	0,1158
E										0,0231	0,0494	0,1032	0,1493

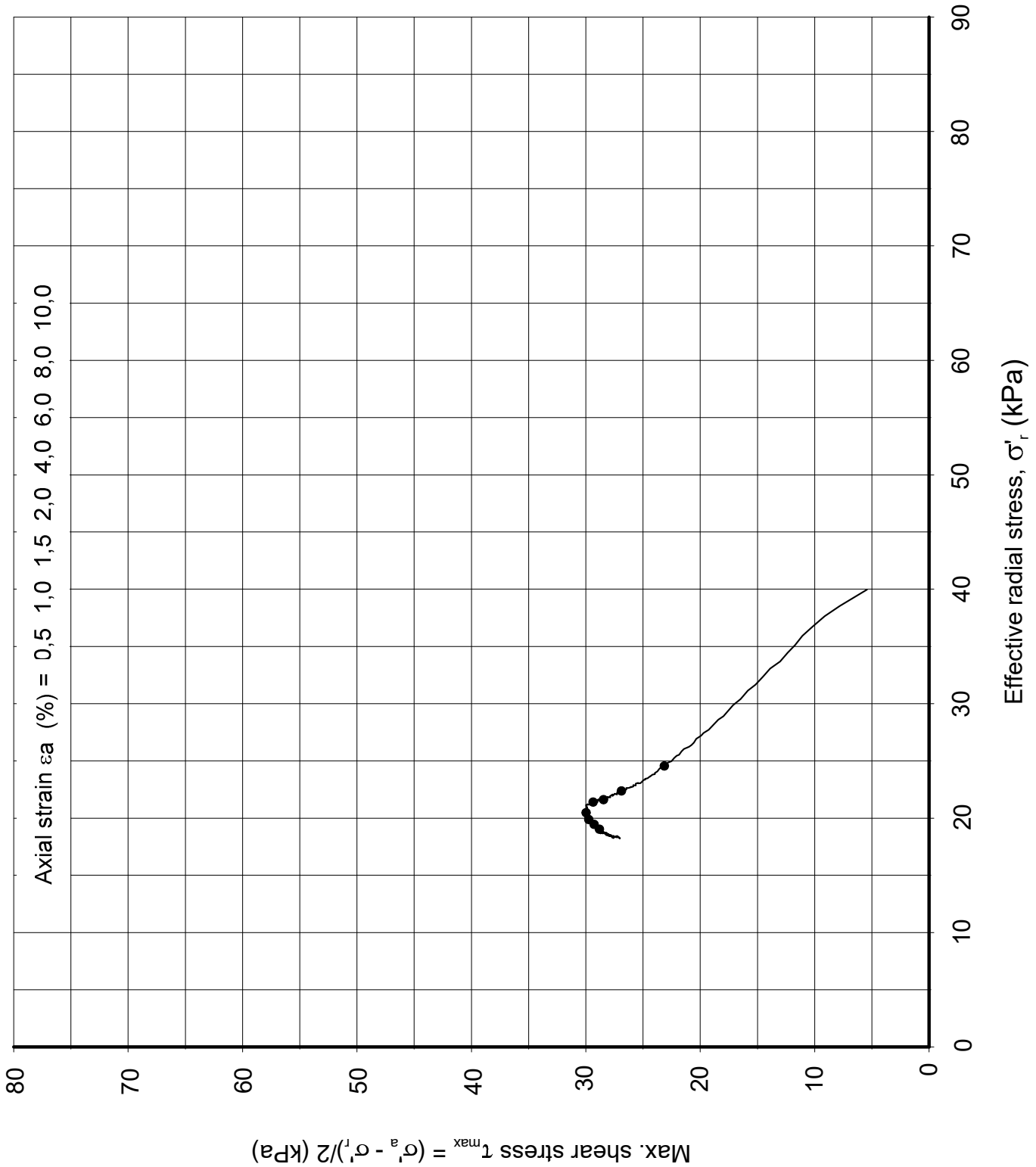
GRAIN SIZE DISTRIBUTION

Nye Veier

E18 Langangen-Rugtvedt, supplementary ground investigations

Prepared by:	Reviewed by:
GEO	ANNM
Approved by:	Date:
STEG	**10.07.20**

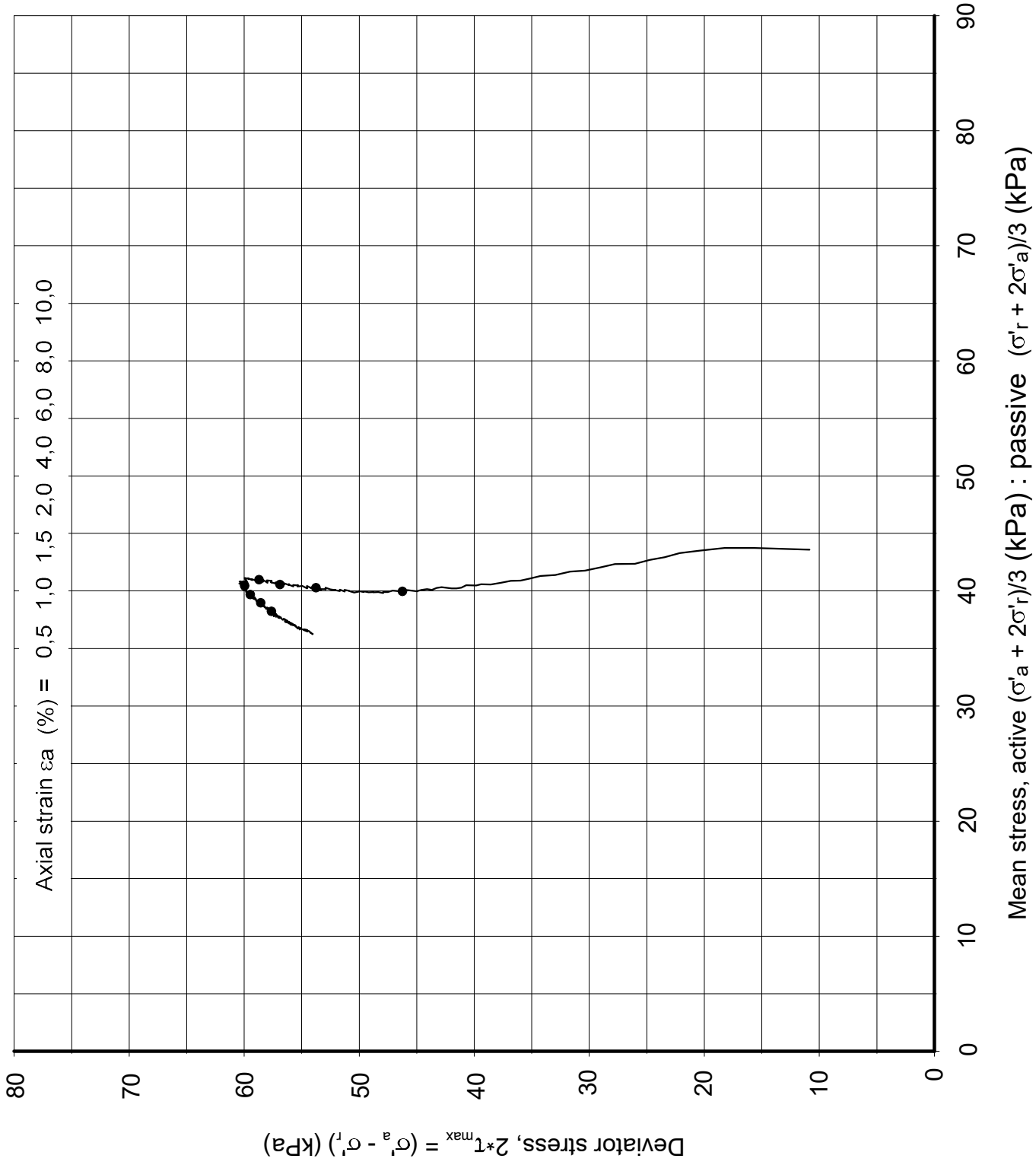
Multiconsult www.multiconsult.no	Project ID:	Drawing ID:	Rev.
	10217934-02	RIG-TEG-301	00



Test data

Depth. 3,50 m
GWT = 2 m
γ_i = 19,4 kN/m^3
$\varepsilon_{vol} = \Delta V/V$ = 2,54 %
w_i = 27,8 %
w_f = - %
w_p = - %
$\tau \tan \phi_f$ = -
Attraction = - kPa
σ'_{vo} = 53,4 kPa
σ'_{ac} = 53,5 kPa
σ'_{rc} = 42,7 kPa

Triaxial test CAUa Deviator stress path - NTNU-plot	Boring no. 3002	
Nye Veier E18 Langangen-Rugtvedt, supplementary ground investigations		Date 03.07.2020
Multiconsult www.multiconsult.no	Drawn. RHS / Checked. ANNM / Approved STEG	
	Job no. 10217934-02 / Dwg. no. RIG-TEG-452.1 / Rev 00	



Test data

	γ_i = 19,4 kN/m³	w_i = 27,8 %		σ'_{vo} = 53,4 kPa
Depth. 3,50 m	ε_{vol} = 2,54 %	w_f = - %	$\tau an.\ \phi_f$ = -	σ'_{ac} = 53,5 kPa
GWT = 2,0 m	$\Delta e/e_0$(-) = 0,058	w_p = - %	Attraction = - kPa	σ'_{rc} = 42,7 kPa

Triaxial test CAUa

Bore hole: 3002

Nye Veier

Date. 03.07.2020

E18 Langangen-Rugtvedt, supplementary ground investigations

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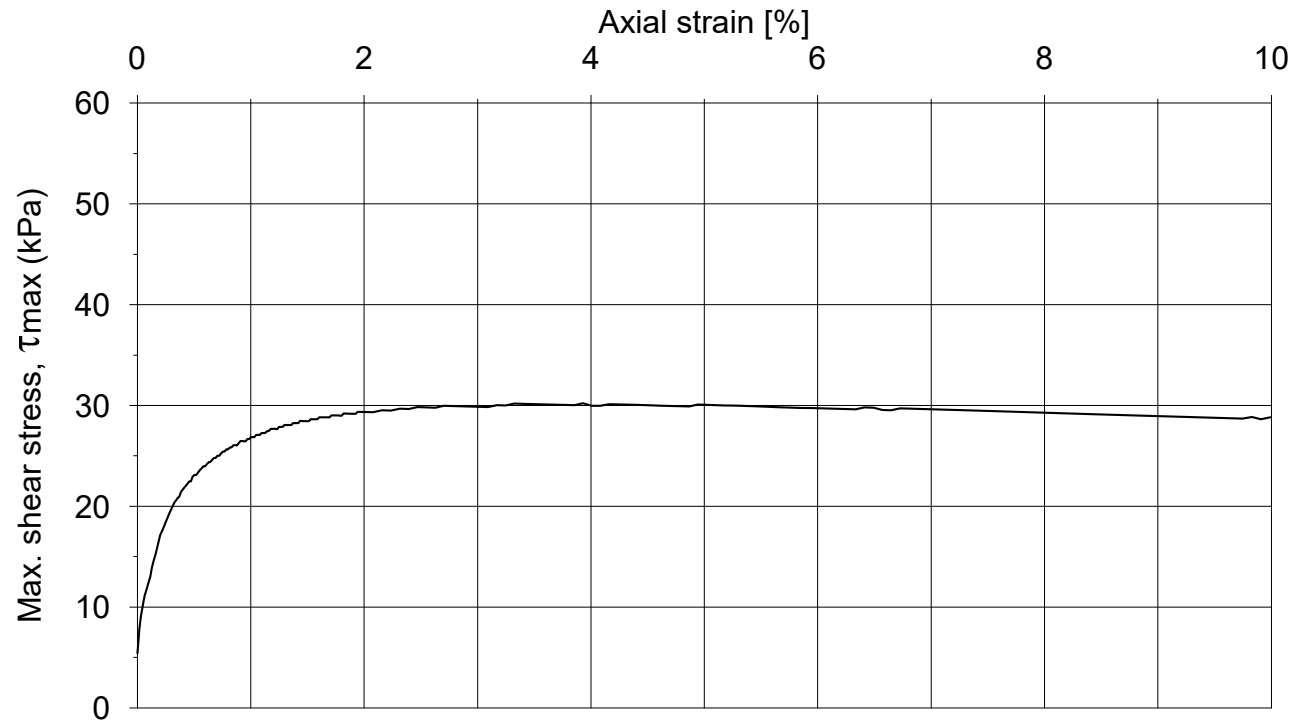
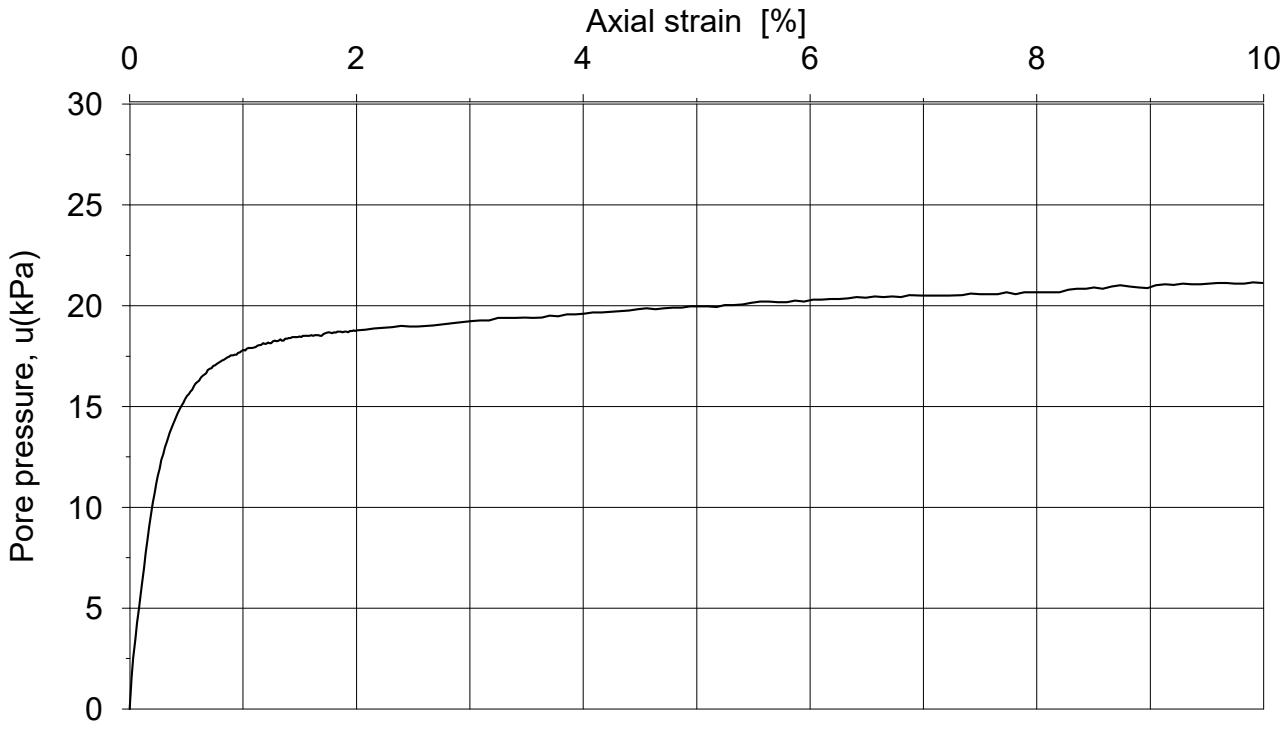
Drawn by:	Checked by:	Approved by:
RHS	ANNM	STEG
Job no.: 10217934-02	DWG.no.: RIG-TEG-452.2	Rev.no.: 00





Test data

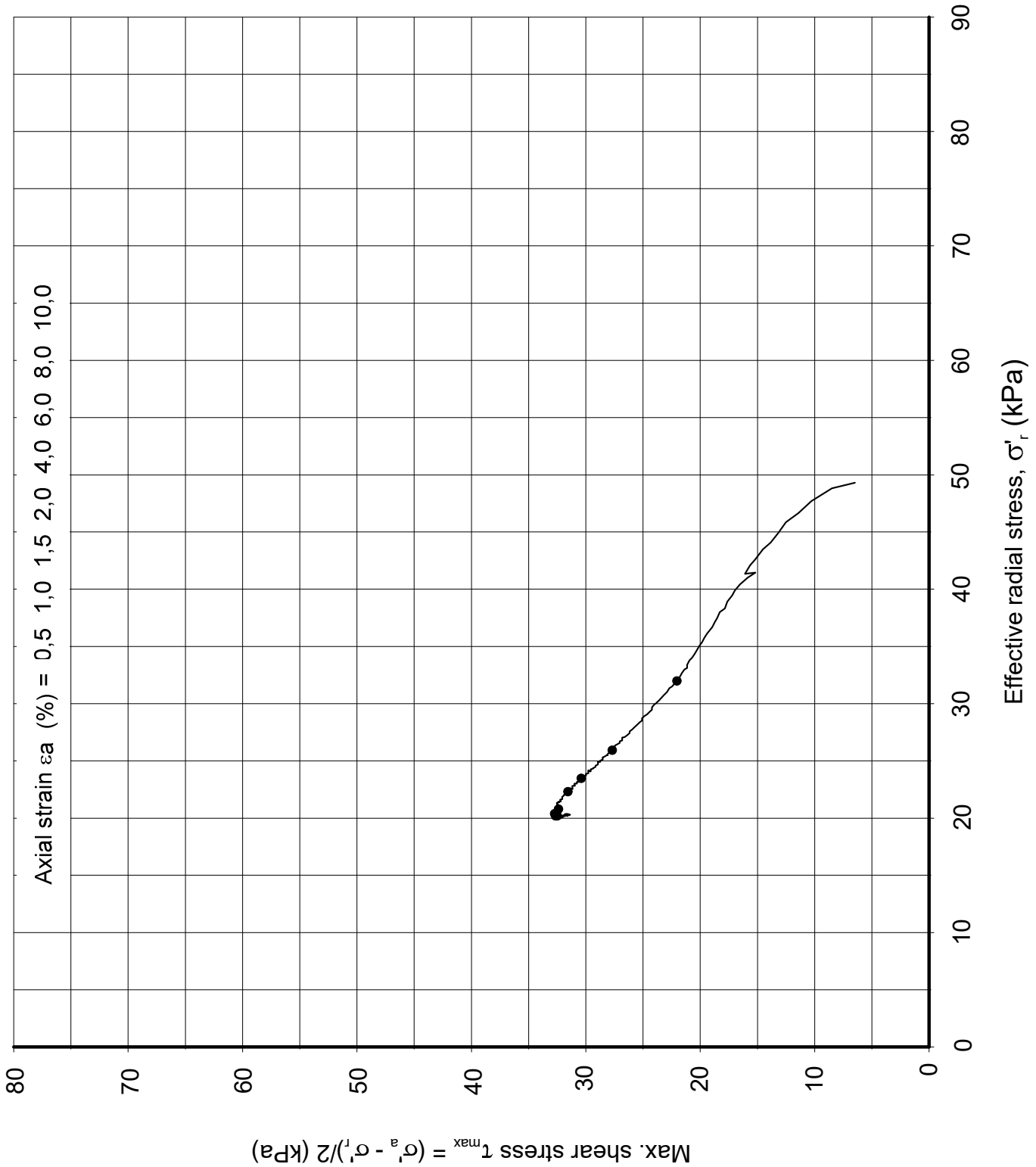
Depth 3,50 m
GWT= 2 m

γ_i = 19,4 kN/m^3
$\varepsilon_{vol} = \Delta V/V$ = 2,54 %
$\Delta e/e_0$ (-) = 0,058

w_i = 27,8 %
w_f = - %
w_p = - %

σ'_{vo} = 53,4 kPa
σ'_{ac} = 53,5 kPa
σ'_{rc} = 42,7 kPa

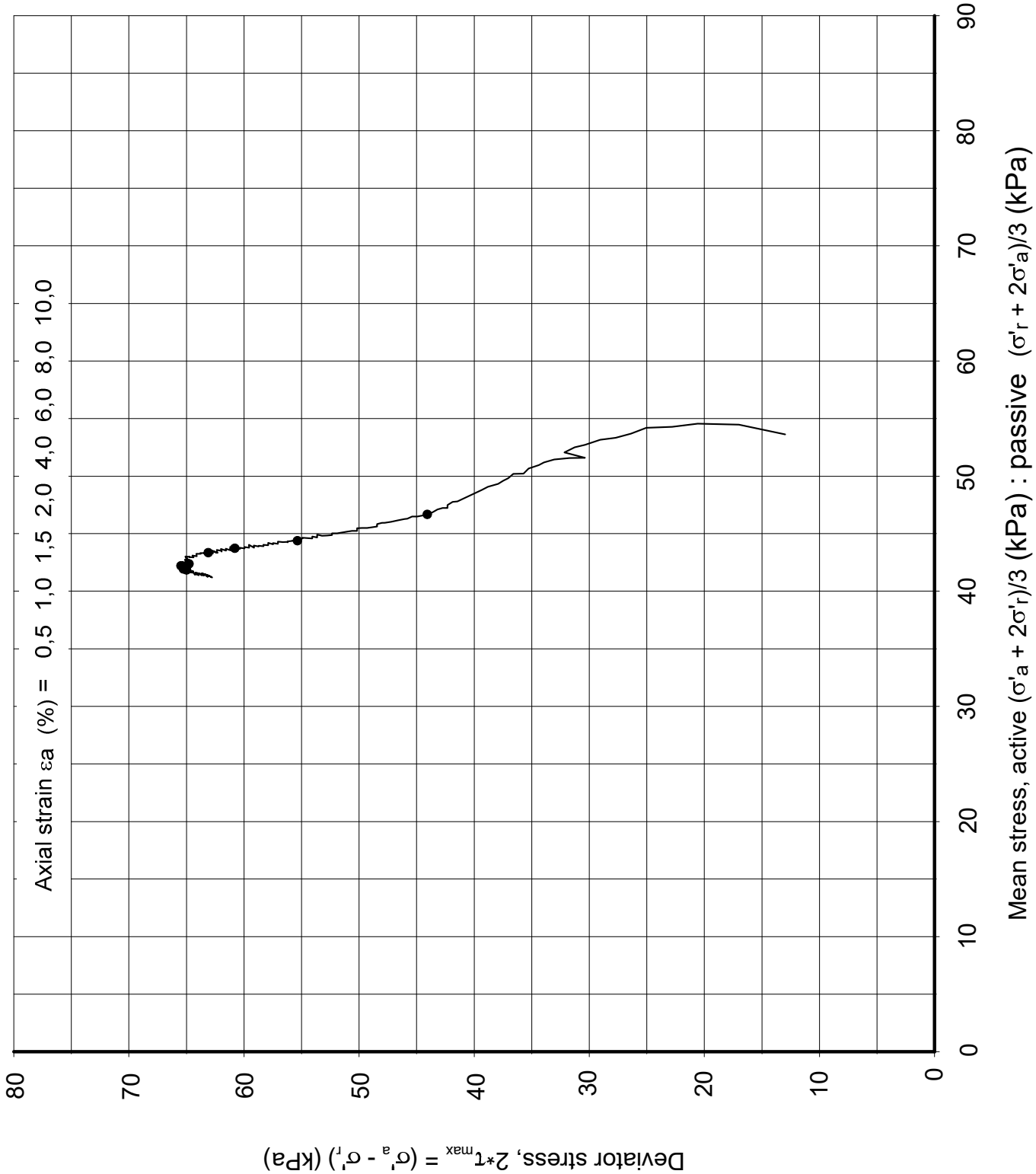
Triaxial test CAUa Pore- and max.shear stress	Boring no. 3002	
Nye Veier		Date 03.07.2020
E18 Langangen-Rugtvedt, supplementary ground investigations		
Multiconsult www.multiconsult.no	Drawn RHS / Checked ANNM / Approved STEG	
	Job no. 10217934-02 / Dwg.no. RIG-TEG-452.3	Rev. 00



Test data

Depth.	4,70 m	γ_i =	19,8 kN/m^3	w_i =	27,6 %	σ'_{vo} =	66,2 kPa
GWT =	2 m	$\varepsilon_{vol} = \Delta V/V$ =	3,67 %	w_f =	- %	σ'_{ac} =	64,9 kPa
				w_p =	- %	σ'_{rc} =	51,9 kPa
				τan ϕ_f =	-		
				Attraction =	- kPa		

Triaxial test CAUa Deviator stress path - NTNU-plot	Boring no. 3002	
Nye Veier		Date 03.07.2020
E18 Langangen-Rugtvedt, supplementary ground investigations		
Multiconsult www.multiconsult.no	Drawn. RHS / Checked. ANNM / Approved STEG	
	Job no. 10217934-02 / Dwg. no. RIG-TEG-453.1 / Rev 00	



Test data

	γ_i = 19,8 kN/m^3	w_i = 27,6 %		σ'_{vo} = 66,2 kPa
Depth. 4,70 m	ε_{vol} = 3,67 %	w_f = - %	τan. ϕ_f = -	σ'_{ac} = 64,9 kPa
GWT = 2 m	$\Delta e/e_0$ (-) = 0,083	w_p = - %	Attraction = - kPa	σ'_{rc} = 51,9 kPa

Triaxial test CAUa

Bore hole: 3002

Nye Veier

Date. 03.07.2020

E18 Langangen-Rugtvedt, supplementary ground investigations

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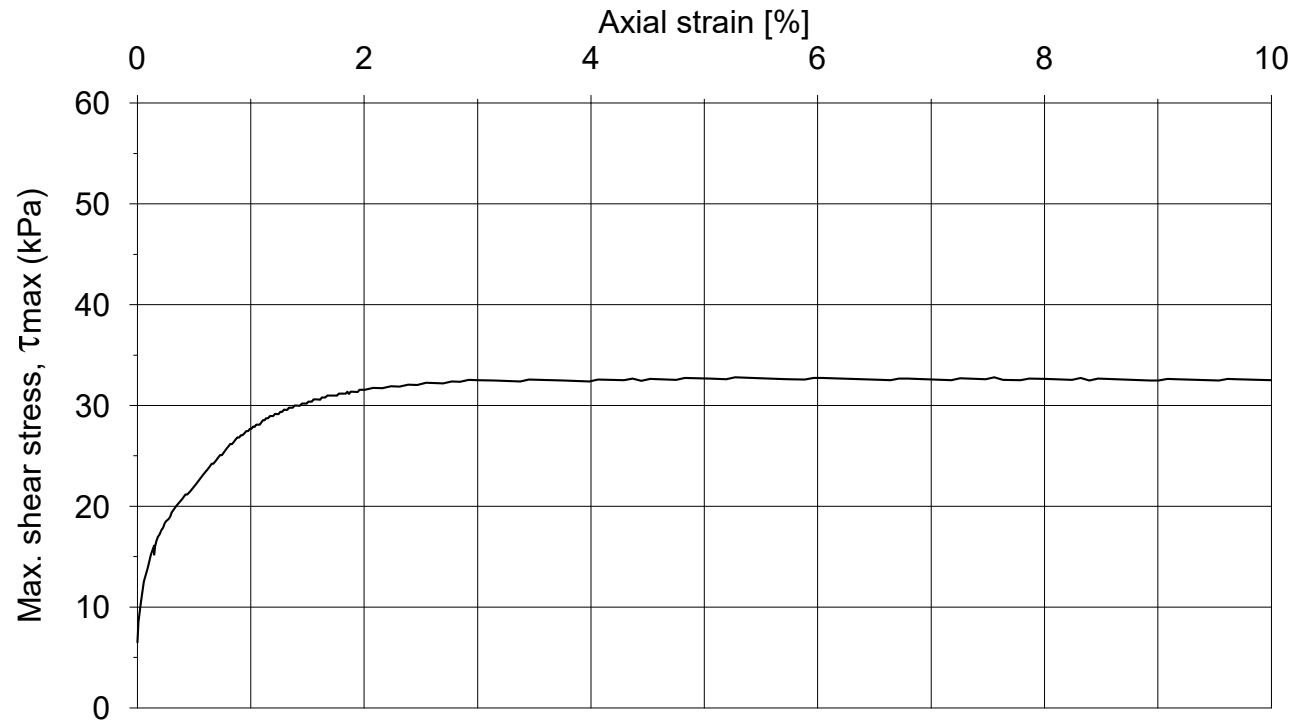
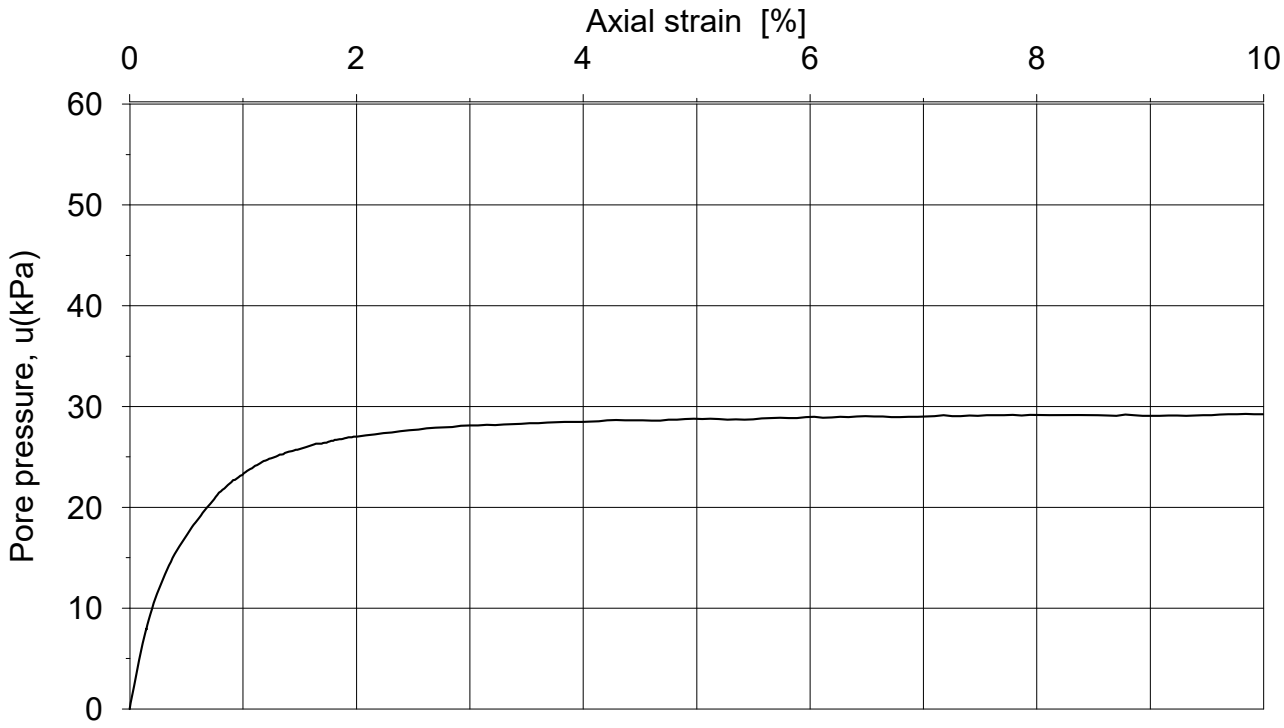
Drawn by:	Checked by:	Approved by:
RHS	ANNM	STEG
Job no.:	DWG.no.:	Rev.no.:
10217934-02	RIG-TEG-453.2	00





Test data

Depth	4,70 m	γ_i = 19,8 kN/m^3	w_i = 27,6 %	σ'_{vo} =	66,2 kPa
GWT=	2 m	$\varepsilon_{vol} = \Delta V/V$ = 3,67 %	w_f = - %	σ'_{ac} =	64,9 kPa
		$\Delta e/e_0$ (-) = 0,083	w_p = - %	σ'_{rc} =	51,9 kPa

Triaxial test CAUa Pore- and max.shear stress	Boring no. 3002	
Nye Veier		Date 03.07.2020
E18 Langangen-Rugtvedt, supplementary ground investigations		
Multiconsult www.multiconsult.no	Drawn RHS / Checked ANNM / Approved STEG	
	Job no. 10217934-02 / Dwg.no. RIG-TEG-453.3	Rev. 00

Sonde og utførelse

Sondenummer	4704	Boreleder	Sigmund
Type sonde	Nova	Temperaturendring (°C)	15
Kalibreringsdato	24-01-2020	Maks helning (°)	3,0
Dato sondering	20-06-22	Maks avstand målinger (m)	0,02
Filtertype			

Kalibreringsdata

	Spissmotstand	Sidefriksjon	Poretrykk
Maksimal last (MPa)	50	0,5	2
Måleområde (MPa)	50	0,5	2
Skaleringsfaktor	1289	3702	3559
Oppløsning 2^{12} bit (kPa)	-	-	-
Oppløsning 2^{18} bit (kPa)	0,5919	0,0103	0,0214
Arealforhold	0,8480	0,0020	
Maks ubelastet temp. effekt (kPa)	18,929	0,453	0,857
Temperaturområde (°C)	40		

Nullpunktskontroll

	NA	NA	NA
Registrert før sondering (kPa)	7210,3	128,3	260,1
Registrert etter sondering (kPa)	0,0	-0,8	-4,1
Avvik under sondering(kPa)	0,0	0,8	4,1
Maksimal temperatureffekt (kPa)	7,1	0,2	0,3
Maksverdi under sondering (kPa)	1408,5	12,4	619,1

Vurdering av anvendelsesklasse ihht. ISO 22476-1:2012

	Spissmotstand		Sidefriksjon		Poretrykk	
	(kPa)	(%)	(kPa)	(%)	(kPa)	(%)
Samlet nøyaktighet (kPa)	**7,7**	**0,5**	**1,0**	**7,9**	**4,4**	**0,7**
Tillatt nøyaktighet klasse 1	35	5	5	10	10	2
Tillatt nøyaktighet klasse 2	100	5	15	15	25	3
Tillatt nøyaktighet klasse 3	200	5	25	15	50	5
Tillatt nøyaktighet klasse 4	500	5	50	20		
Anvendelsesklasse	1	1	1	1	1	1
Anvendelsesklasse måleintervall	1					
Anvendelsesklasse	**1**					

Måleverdier under kapasitet/krav

Spissmotstand	Sidefriksjon	Poretrykk	Helning	Temperatur
OK	OK	OK	OK	OK

Kommentarer:

Prosjekt: **E18 Langangen-Rugtvedt**

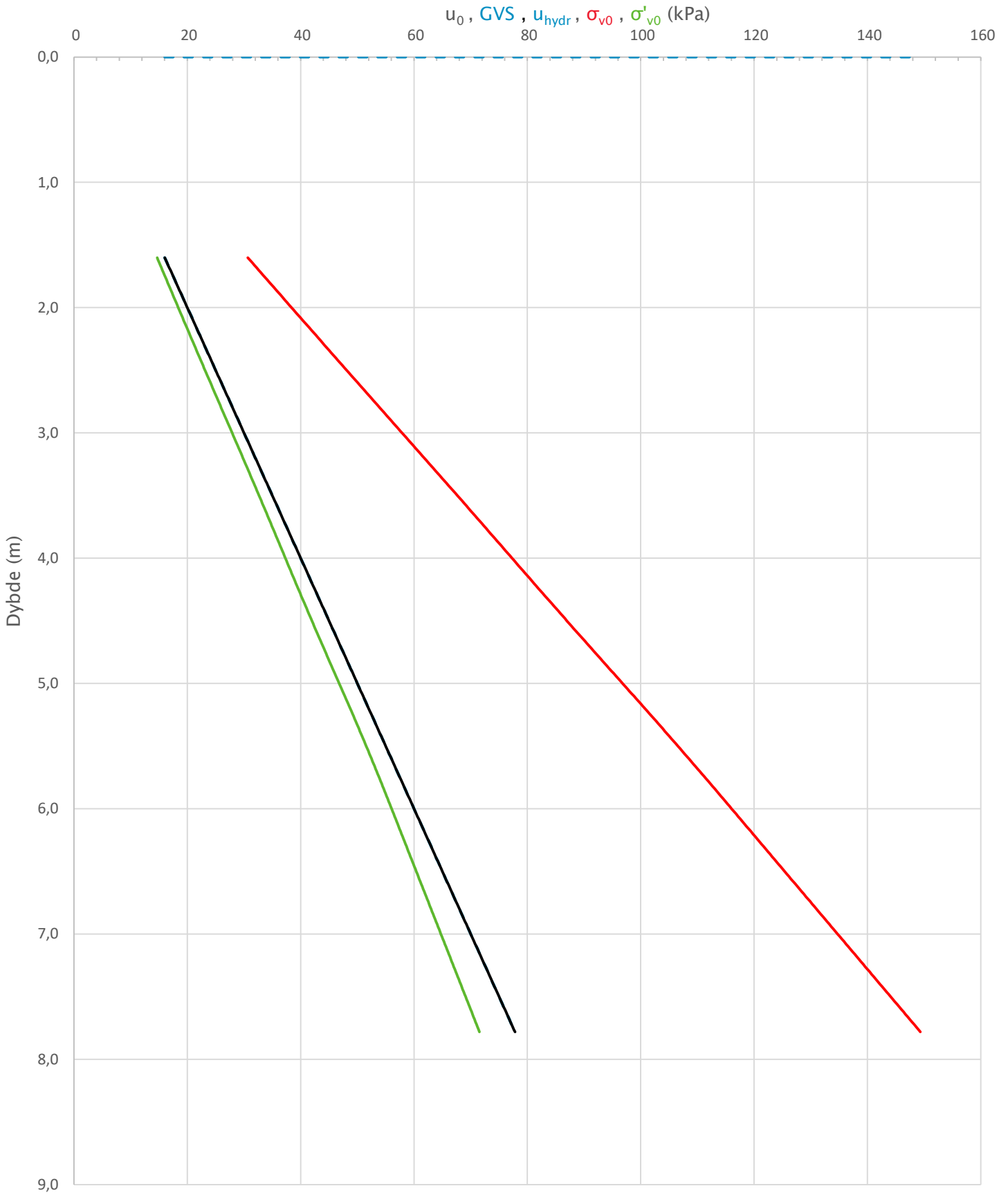
Prosjektnummer: 10217934 Rapportnummer: -1

Borhull: **3002**

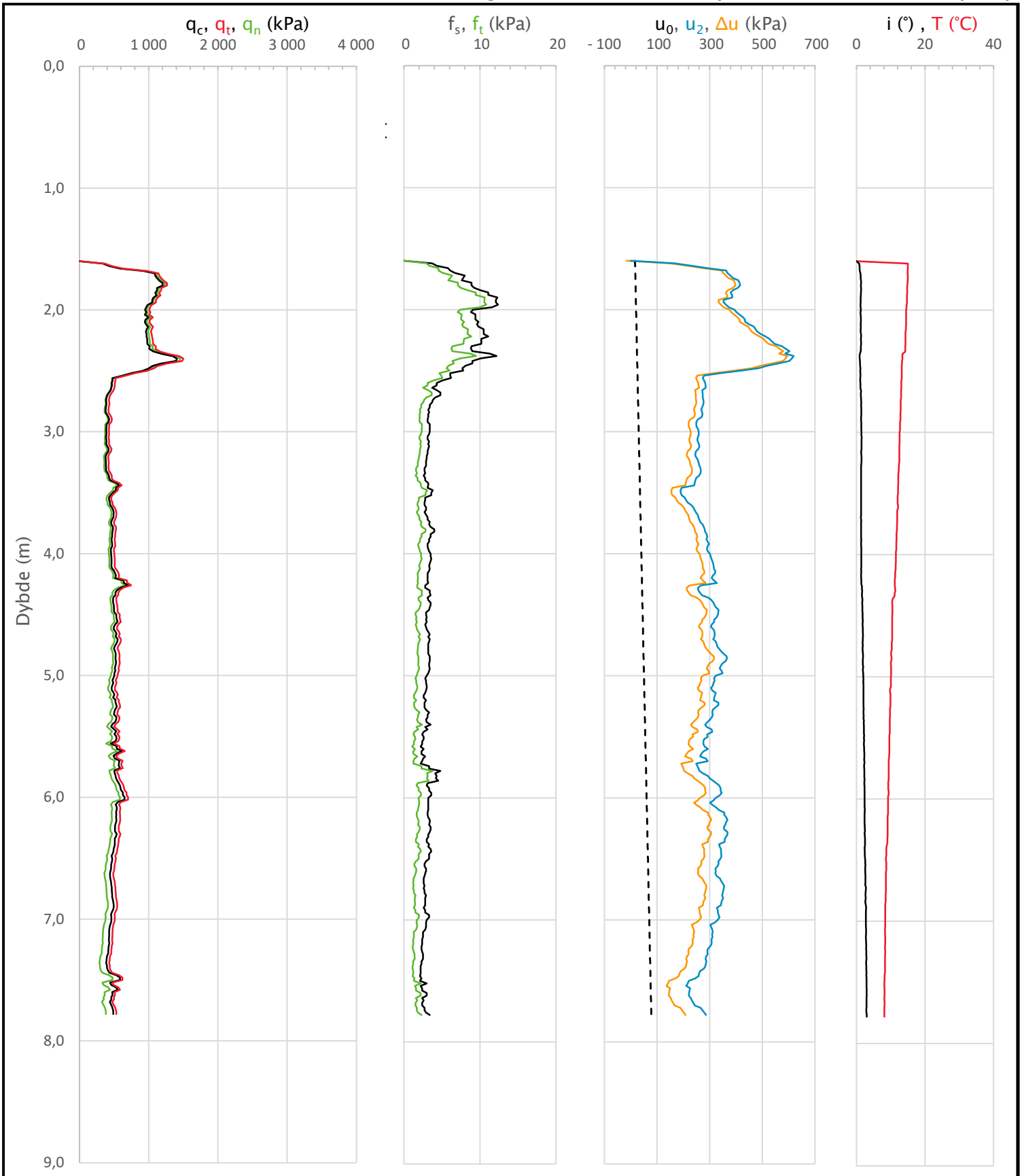
Innhold: Dokumentasjon av utstyr og målenøyaktighet

Sondenummer: **4704**

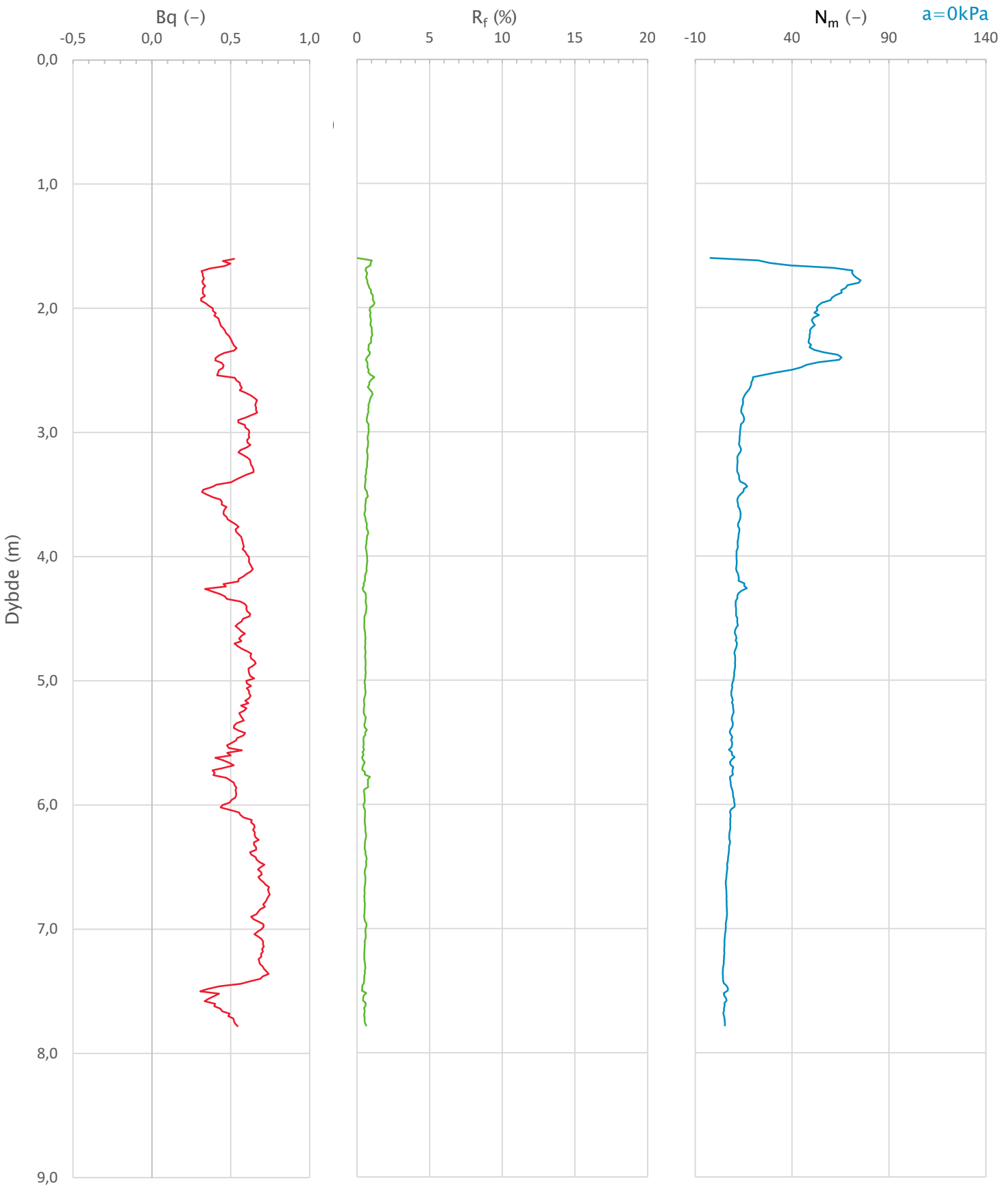
Multiconsult	Tegnet: HalE	Kontrollert: MRL	Godkjent: SteG	Anvend.klasse: 1
	Utførende: Multiconsult	Dato sondering: 20-06-22	Revisjon: 0 Rev. dato: 20.07.2020	RIG-TEG: 501.1



Prosjekt **E18 Langangen-Rugtvedt** Prosjektnummer: 10217934 Rapportnummer: -1				Borhull **3002**
Innhold In-situ poretrykk, total- og effektiv vertikalspenning i beregninger				Sondenummer **4704**
Multiconsult	Tegnet HalE	Kontrollert MRL	Godkjent SteG	Anvend.klasse 1
	Utførende Multiconsult	Dato sondering 20-06-22	Revisjon 0 Rev. dato 20.07.2020	RIG-TEG 501.2



Prosjekt **E18 Langangen-Rugtvedt**	Prosjektnummer: 10217934 Rapportnummer: -1				Borhull **3002**
Innhold Måledata og korrigerte måleverdier					Sondenummer **4704**
Multiconsult	Tegnet HalE	Kontrollert MRL	Godkjent SteG		Anvend.klasse 1
	Utførende Multiconsult	Dato sondering 20-06-22	Revisjon 0 Rev. dato 20.07.2020		RIG-TEG 501.3



Prosjekt **E18 Langangen-Rugtvedt**	Prosjektnummer: 10217934 Rapportnummer: -1				Borhull **3002**
Innhold Avledede dimensjonsløse forhold					Sondenummer **4704**
Multiconsult	Tegnet HalE	Kontrollert MRL	Godkjent SteG		Anvend.klasse 1
	Utførende Multiconsult	Dato sondering 20-06-22	Revisjon 0 Rev. dato 20.07.2020		RIG-TEG 501.4

Sonde og utførelse

Sondenummer	4704	Boreleder	Sigmund
Type sonde	Nova	Temperaturendring (°C)	9,2
Kalibreringsdato	24-01-2020	Maks helning (°)	4,2
Dato sondering	20-06-30	Maks avstand målinger (m)	0,02
Filtertype			

Kalibreringsdata

	Spissmotstand	Sidefriksjon	Poretrykk
Maksimal last (MPa)	50	0,5	2
Måleområde (MPa)	50	0,5	2
Skaleringsfaktor	1289	3702	3559
Oppløsning 2^{12} bit (kPa)	-	-	-
Oppløsning 2^{18} bit (kPa)	0,5919	0,0103	0,0214
Arealforhold	0,8480	0,0020	
Maks ubelastet temp. effekt (kPa)	18,929	0,453	0,857
Temperaturområde (°C)	40		

Nullpunktskontroll

	NA	NA	NA
Registrert før sondering (kPa)	7177,8	129,7	257,9
Registrert etter sondering (kPa)	-0,6	-2,1	-14,7
Avvik under sondering(kPa)	0,6	2,1	14,7
Maksimal temperatureffekt (kPa)	4,4	0,1	0,2
Maksverdi under sondering (kPa)	9792,4	215,0	258,4

Vurdering av anvendelsesklasse ihht. ISO 22476-1:2012

	Spissmotstand		Sidefriksjon		Poretrykk	
	(kPa)	(%)	(kPa)	(%)	(kPa)	(%)
Samlet nøyaktighet (kPa)	**5,5**	**0,1**	**2,2**	**1,0**	**14,9**	**5,8**
Tillatt nøyaktighet klasse 1	35	5	5	10	10	2
Tillatt nøyaktighet klasse 2	100	5	15	15	25	3
Tillatt nøyaktighet klasse 3	200	5	25	15	50	5
Tillatt nøyaktighet klasse 4	500	5	50	20		
Anvendelsesklasse	1	1	1	1	2	OBS
Anvendelsesklasse måleintervall	1					
Anvendelsesklasse	**2**					

Måleverdier under kapasitet/krav

Spissmotstand	Sidefriksjon	Poretrykk	Helning	Temperatur
OK	OK	OK	OK	OK

Kommentarer:

Prosjekt — Prosjektnummer: 10217934 Rapportnummer: -1

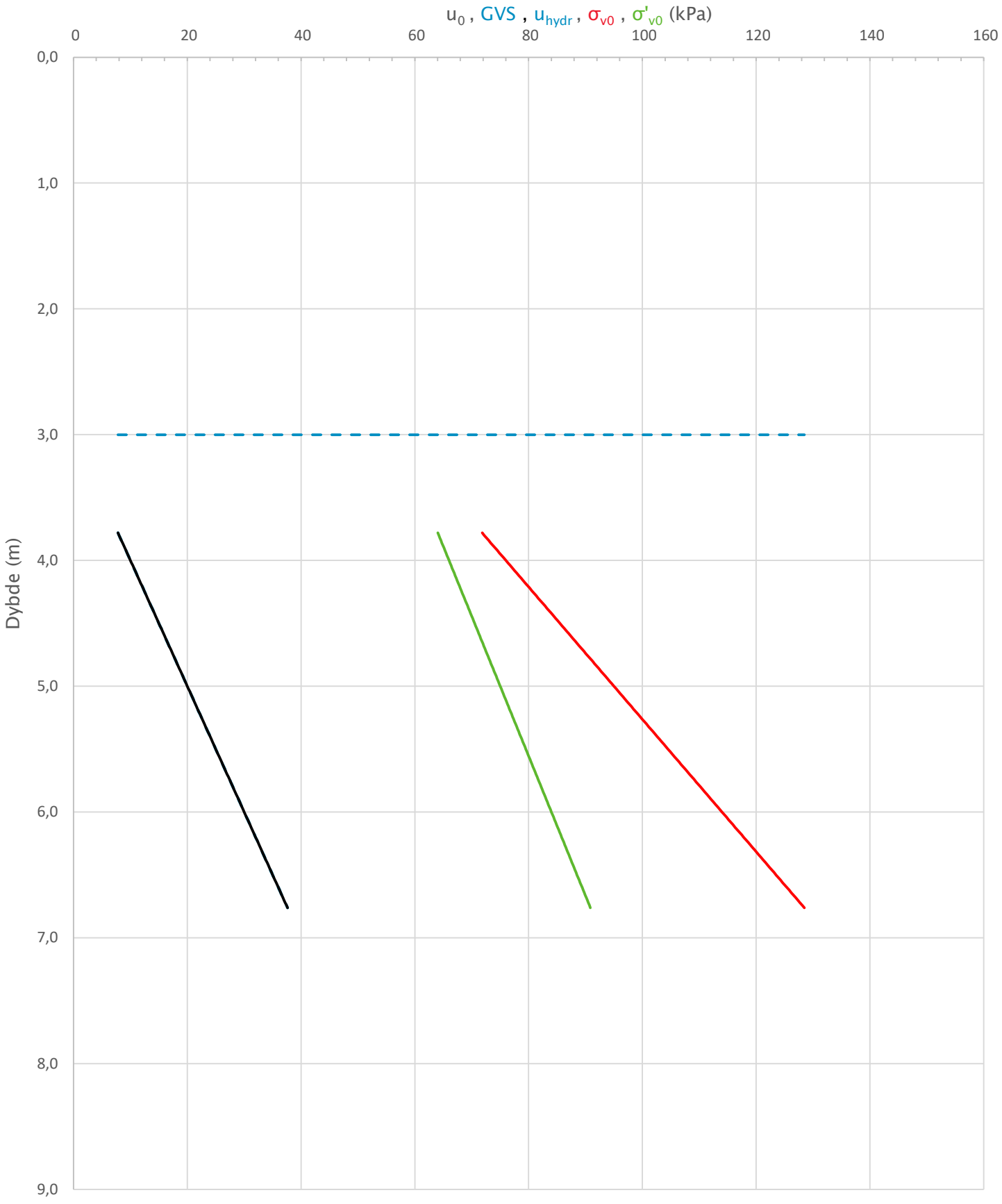
E18 Langangen-Rugtvedt

Borhull: **5001**

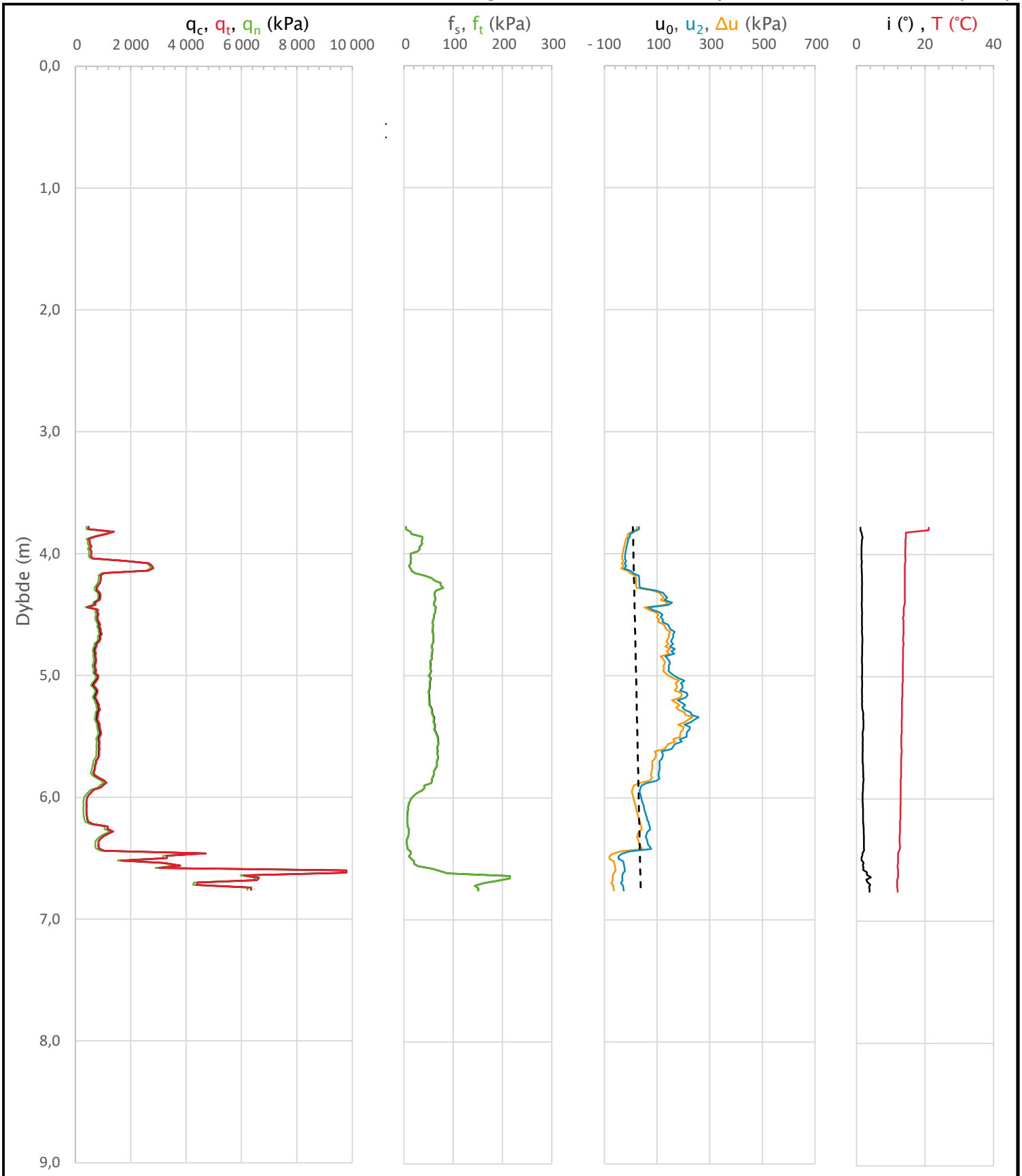
Innhold: Dokumentasjon av utstyr og målenøyaktighet

Sondenummer: **4704**

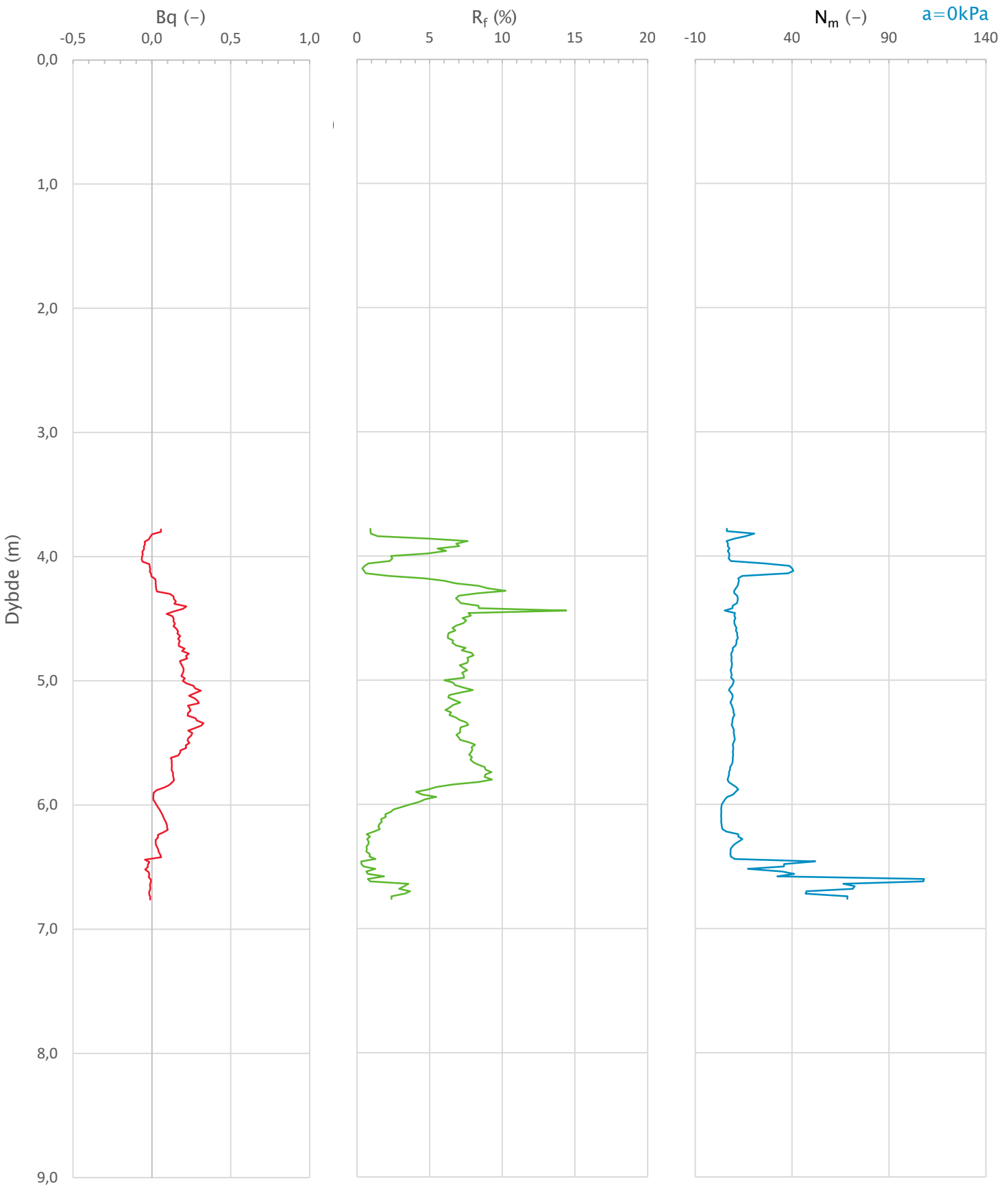
Multiconsult	Tegnet: HalE	Kontrollert: MRL	Godkjent: SteG	Anvend.klasse: 2
	Utførende: Multiconsult	Dato sondering: 20-06-30	Revisjon: 0 / Rev. dato: 20.07.2020	RIG-TEG: 502.1



Prosjekt **E18 Langangen-Rugtvedt** Prosjektnummer: 10217934 Rapportnummer: -1				Borhull **5001**
Innhold In-situ poretrykk, total- og effektiv vertikalspenning i beregninger				Sondenummer **4704**
Multiconsult	Tegnet HalE	Kontrollert MRL	Godkjent SteG	Anvend.klasse **2**
	Utførende Multiconsult	Dato sondering 20-06-30	Revisjon 0 Rev. dato 20.07.2020	RIG-TEG **502.2**



Prosjekt **E18 Langangen-Rugtvedt**	Prosjektnummer: 10217934 Rapportnummer: -1				Borhull **5001**
Innhold Måledata og korrigerte måleverdier					Sondenummer **4704**
Multiconsult	Tegnet HalE	Kontrollert MRL	Godkjent SteG		Anvend.klasse **2**
	Utførende Multiconsult	Dato sondering 20-06-30	Revisjon 0 Rev. dato 20.07.2020		RIG-TEG **502.3**



Prosjekt **E18 Langangen-Rugtvedt**		Prosjektnummer: 10217934 Rapportnummer: -1			Borhull **5001**
Innhold Avledede dimensjonsløse forhold					Sondenummer **4704**
Multiconsult	Tegnet HalE	Kontrollert MRL	Godkjent SteG		Anvend.klasse **2**
	Utførende Multiconsult	Dato sondering 20-06-30	Revisjon 0	Rev. dato 20.07.2020	RIG-TEG **502.4**

Göteborg:2020-01-24

CALIBRATION CERTIFICATE FOR CPT PROBE 4704

Probe No	4704
Date of Calibration	2020-01-24
Calibrated by	Mikael Engdahl.....
Run No	1276
Test Class:	ISO 1

Point Resistance — Tip Area 10cm²

Maximum Load	50	MPa
Range	50	MPa
Scaling Factor	**1289**	
Resolution	0,5919	kPa
Area factor (a)	0,848	

ERRORS

Max. Temperature effect when not loaded 18,929 kPa
Temperature range 5 –40 deg. Celsius.

Local Friction — Sleeve Area 150cm²

Maximum Load	0,5	MPa
Range	0,5	MPa
Scaling Factor	**3702**	
Resolution	0,0103	kPa
Area factor (b)	0,002	

ERRORS

Max. Temperature effect when not loaded 0,453 kPa
Temperature range 5 –40 deg. Celsius.

Pore Pressure

Maximum Load	2	MPa
Range	2	MPa
Scaling Factor	**3559**	
Resolution	0,0214	kPa

ERRORS

Max. Temperature effect when not loaded 0,857 kPa
Temperature range 5 –40 deg. Celsius.

Tilt Angle. — Scaling Factor: 0,92

Range	0 - 40	Deg.

Backup memory
Temperature sensor

Cptlog Cone data base information

Göteborg: 2020-01-24

Cone name
4704

Serial number
4704

Date of purchase
User.

Ranges

Point resistance
50 (Mpa)

Local friction
0,5 (Mpa)

Pore pressure
2 (Mpa)

Tilt sensor
40 (Deg)

temperature
©

Elect. Conductivity
(mS/m)

Geometric parameters

Area factor a
0,848

Area factor b
0,002

Tip area
10 (cm^2)

Sleeve area
150 (cm^2)

Scaling factors

Point resistance
1289

Local friction
3702

Pore pressure
3559

Tilt sensor
0,92

temperature
1

Elect. Conductivity A

Elect. Conductivity B

Type
NOVA cone

Memory option
With memory

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Geotechnical enclosures
Field investigations

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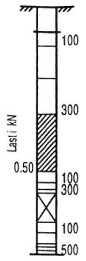
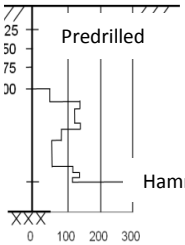
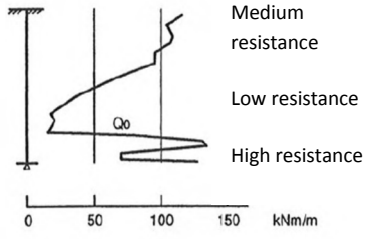
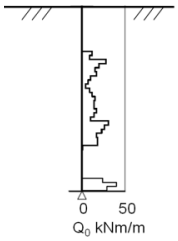
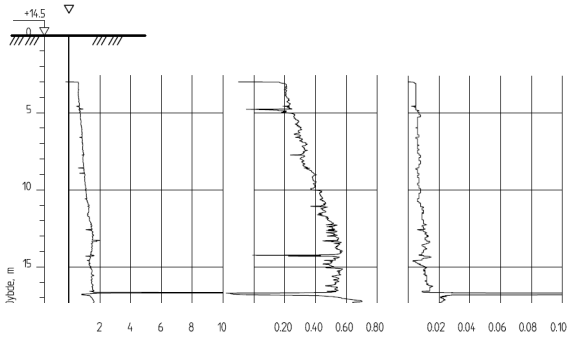
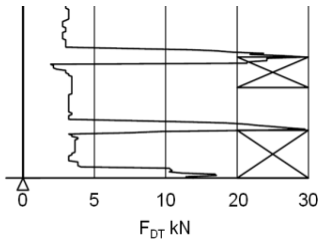
 Stop against stone, block or firm layers  Stop against assumed bedrock		Soundings are carried out to obtain an indication of the relative stiffness of the penetrated soils. From that, the stratification and depth to the bedrock surface or firm layers may be estimated. Reference is made to «Geotechnical enclosure – test standards and guidelines».
 Predrilled Medium resistance Very low resistance Very high resistance Terminated without reaching firm layers or bedrock  Predrilled Hammered Number of half-turns pr. m sink	●	ROTARY WEIGHT SOUNDING Performed with jointed ⌀22 mm drillrods with a 200 mm twisted point. The drillrods are rotated manually or by a drilling machine into the soil with maximum 1 kN (100 kg) vertical load on the rods. If the rod assembly does not sink from this weight, the rods are rotated manually or by machine operation. The number of half-turns per 0.2 m penetration is recorded. The drilling resistance is presented in a diagram with vertical depth-scale and a cross-line for every 100 half-turns. Hatching represents sinking without rotation, with the vertical load during sinking added to the left. A cross indicates that the drillrods are hammered into the ground.
 Medium resistance Low resistance High resistance 	▼	RAM OR HAMMER SOUNDING The drilling is carried out with jointed ϕ32 mm drillrods and a tip with standardized geometry. The drillrods are struck with an energy of 0.38 kNm. The number of blows per 0.2 m penetration is recorded. The drilling resistance is recorded as Q_o per m sink, where Q_o = deadweight * falling height/sink per blow (kNm/m)
 Corr. tip resistance [MPa] Pore press. [MPa] Side friction [MPa]	▽	CONE PENETRATION TEST (CPTU) A cylindrical, instrumented probe with a conical tip is pushed into the ground at a constant penetration rate of 20 mm/sec. During penetration, the forces against the tip and the friction sleeve are recorded, so that the cone resistance qc and the sleeve friction fs can be deduced (CPT). In addition, the penetration pore pressure u is measured just behind the conical tip (CPTU). The recordings are taken continuously every 0.02 m, and the method therefore gives very detailed information of the ground conditions. The results can also be used to determine soil stratification, soil type and mechanical properties of the soils (shear strength, deformation and consolidation parameters).
	▽	ROTARY PRESSURE SOUNDING The test is carried out with smooth, jointed ϕ36 mm drillrods with a standardized tip equipped with a welded hard alloy edge. The drillrods are pushed into the ground with a constant penetration rate of 3 m/min and a constant rotation rate of 25 rpm. The thrust F_{DT} (kN) is recorded automatically under these conditions, and may be used to evaluate the ground conditions. The method is particularly well suited for indication of quick clay. On the other hand it does not verify the depth to bedrock.
 Stone Drillsink in rock cm/min.	✡	Rock control drilling Rock control drilling is carried out using jointed ϕ45 mm drillrods and a hard alloy drillbit with a return valve. A heavy percussion hammer and water flushing at high pressures is used during drilling. Drilling through layers with different properties, for example gravel and clay, can be interpreted, also penetration of blocks and large stones. For verification of the rock surface, an intrusion of 3 m is required, including recording of the sink during drilling.

Geotechnical enclosures
Field investigations

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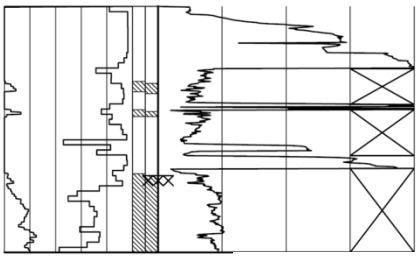


Drilltime, s/m
Flushing pressure, MPa
Thrust F_{DT} (kN)

TOTAL SOUNDING

This method combines rotary pressure sounding and rock control drilling. ϕ45 mm jointed rods and a ϕ57 mm drillbit with impregnated hard metal or diamond fragments are used. During drilling in soft layers, the rotary pressure mode is used, with drillrods given constant penetration and rotation rates. When a dense layer is encountered, the rotation rate is increased. If this is not sufficient to advance the drillrods, water or air flushing and strokes on the drillstring are used. The thrust F_{DT} (kN) is recorded continuously and is shown to the right on the diagram, whereas flushing pressure, number of strokes and drilling time is shown to the left.

Sample marking

SAMPLING

Carried out to obtain samples for determination of the geotechnical properties of the soils in the laboratory.

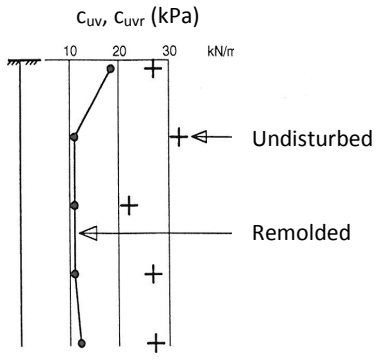
<u>Machine operated auger drilling (disturbed bag samples):</u>

This method is carried out using hollow drillrods, with a metal spiraled plate welded to the drillrod. If a drillrig is used, it may be drilled in the range of 5-20 m depth, depending on the soil, density and the level of the groundwater table. With this method, disturbed bag samples may be taken by collecting the materials gathered between the spirals.

<u>Core/block sampling (undisturbed samples):</u>

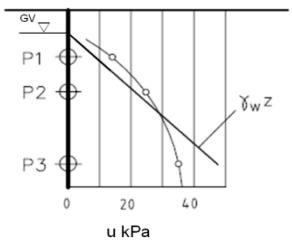
Carried out to obtain samples for determination of the mechanical properties of soils in the laboratory. Usually, piston sampling is used to extract 60-100 cm long core samples. Cylinders made of PVC, steel or similar, and both equipment with or without an inner liner may be used. At the sampling depth, the sample cylinder is pushed down into the soil, while the inner rod with the piston is fixed. By this procedure, a soil sample is sheared and later extracted to the surface. The sample cylinder is then sealed and transported to the laboratory. The diameter of the sample may vary between ϕ54 mm (most common) and ϕ95 mm. It is also possible to use other samplers, such as hammer samplers or block samplers.

The sample quality is classified in Quality classes 1-3, where 1 is the best. Piston sampling usually provides samples in Quality classes 1-2 for clays.



Vane testing

A vane with dimensions b x h = 55x110 mm or 65x130 mm is pushed into the ground to the required test level. A gradually increasing torque is applied to the vane until it reaches failure. The corresponding torque is recorded. The procedure is carried out for both undisturbed and remoulded conditions, where the latter torque value is recorded after 25 repeated rotations of the vane assembly. The undrained shear strengths c_{uv} and c_{ur} are calculated from the torque at first failure and after remoulding, respectively. From this, the sensitivity $S_t = c_{uv}/c_{ur}$ can be determined. The interpreted values must usually be empirically corrected for the effective overburden stress at the test level, and for the plasticity of the soil.



PORE PRESSURE MEASUREMENTS

The measurements are carried out utilizing a standpipe with a filter tip, or by a hydraulic (open)/electric piezometer. The filter or piezometer tip, extended with open piezometer tubes, is pushed into the ground to the required depth. A stabile pore pressure is recorded from the elevated height of the water in the tube, or by readings from an electric pressure transducer in the tip. Choice of equipment is made based on the ground conditions and the purpose of the tests. The ground water table is observed or measured in the hole.

Geotechnical enclosure

Laboratory testing

Multiconsult

Laboratory testing give precise classifications of soil and determines mechanical parameters. The tests are performed on samples retrieved from the field. Relevant standards and guidelines are given in Geotechnical enclosure – Test standards and guidelines.

MINERAL SOILS

The soil is classified and identified after sample extrusion. Mineral soils are usually classified according to their grain size distribution. Identification and grain size for the various fractions are:

Fraction	Clay	Silt	Sand	Gravel	Stone	Block
Grain size (mm)	< 0,002	0,002-0,063	0,063-2	2-63	63-630	> 630

A soil may contain one or more of the fractions above. The soil is identified in accordance with the grading curve, with the principal fraction having the dominating influence on the soil properties. This is identified by a noun, with secondary contributing fractions as adjectives (for example silty sand). The clay content has the largest influence on the identification of the soil. Moraine is a poorly sorted glacial deposit that can contain all fractions from clay to block. The major fraction is given first in the description according to specific identification rules, for example gravelly moraine.

ORGANIC SOILS

Organic soils are classified according to their origin and degree of transition of the soils. The most important types are:

Identification	**Description**
Peat	Marsh plants, more or less transformed.
• *Fibrous peat*	Fibrous with easily reckognizable plant structure. Shows some strength.
• *Pseudo-fibrous peat, medium peat*	Reckognizable plant structure, no strength in the plant debris.
• *Amorphous peat, black peat*	No visible plan structure, spongy consistency.
Gyttja and dy	Transformed structure of organic material, may contain mineral constituents.
Humus	Plant debris, biological organisms with non-organic content.
Mold and topsoil	Strongly transformed organic materials with loose structure, usually comprises the top soil layer.

GRAIN SIZE DISTRIBUTION ANALYSIS

A grain size distribution is carried out by wet or dry sieving of the fractions with diameter d > 0,063 mm. For fractions of particles with smaller diameter, the grain size distribution is determined by a suspension analysis and use of a hydrometer. In the suspension analysis, the material is suspended in water and the density of the suspension is measured by the hydrometer at certain time intervals. The grain size distribution can then be determined from Stokes law on sedimentation of spherically shaped particles in water. It will often be necessary to combine ordinary sieving with a suspension analysis.

WATER CONTENT (w %)

Water content is defined as the ratio of the mass of water to the mass of dry matter in a sample, expressed as a percentage. It is determined by drying a soil sample at 110°C for 24 hours.

ATTERBERG CONSISTENCY LIMITS – LIQUID LIMIT (w_l %) AND PLASTICITY LIMIT (w_p %)

The consistency limits (Atterberg's limits) for a soil express the range of water contents where the material is plastic and possible to form. The liquid limit expresses the water content where the material goes from a plastic to a liquid state. The plastic limit expresses the water content where the material no longer can be formed, but is cracking up during mechanical treatment. The plasticity index $I_p = w_l - w_p$ (%) expresses the plastic range in water content for the soil, and is used to classify the plasticity properties. If the natural water content is higher than the liquid limit, the material liquifies when remoulded (common for quick clays).

HUMUS CONTENT

The humus content is determined by colorimetry and use of NaOH for chemical reaction with the organic contents. The method gives the content of humified organic content in a relative scale. Other methods, such as loss on ignition (LOI) of a soil sample in a muffle furnace or wet-oxidation by hydrogen peroxide, may also be used.

Geotechnical enclosure

Laboratory testing

Multiconsult

DENSITY, UNIT WEIGHT, VOID RATIO AND POROSITY

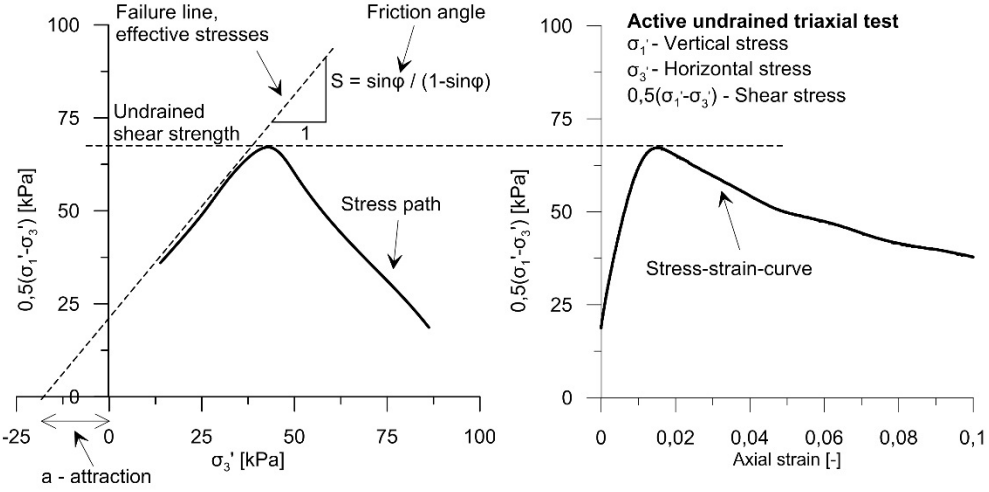
Property	Symbol	Unit	Description
Bulk density	ρ	g/cm^3	Mass of specimen per volume unit. Determined for the whole cylinder and a small sample
Grain density	ρ_s	g/cm^3	Mass of solid matter per volume unit of solid material
Dry density	ρ_d	g/cm^3	Mass of dry matter per volume unit
Unit weight of soil	γ	kN/m^3	Weight of specimen per volume unit ($\gamma = \rho g = \gamma_s(1+w/100)(1-n/100)$, where g = 10 m/s^2)
Unit weight of soilds	γ_s	kN/m^3	Weight of solid matter per volume unit ($\gamma_s = \rho_s g$)
Dry unit weight of soil	γ_d	kN/m^3	Weight of dry material per volume unit ($\gamma_d = \rho_D g = \gamma_s(1-n/100)$)
Void ratio	e	-	Volume of pores divided by volume of solid particles ($e = n/(100-n)$) where n is porosity (%)
Porosity	n	%	Volume of pores as a percentage of total volume of the sample

SHEAR STRENGTH

The shear strength of the soil is used for e.g. slope stability calculations and bearing capacity problems. For short term loading conditions in fine grained materials (clays), the undrained shear strength is used. For longer time spans the material has a drained behaviour and effective stress parameters are used.

The effective stress based parameters a (attraction), tanϕ (friction) and alternatively c = atanϕ (cohesion) are determined by triaxial loading tests on undisturbed (clay) or re-constituted specimens (sand). The shear strength depends on the effective normal stress (total stress less pore pressure) on the critical plane. The test results are presented as stress paths, showing development of stresses and corresponding strains in the sample towards failure. From this and other information, the characteristic values for the shear strength parameters for the actual problem are determined.

The undrained shear strength is defined as the maximum shear stress the soil can experience before failing. This shear strength represents a situation with rapid stress changes, without drainage of pore water or dissipation of pore pressures. In the laboratory, the undrained shear strength is determined by unconfined compression tests (c_{ut}), falling cone tests (undisturbed c_{uk}, remoulded c_{ukr}), undrained triaxial tests (compression/active c_{uA}, extension/passive c_{uP}) and direct shear tests (c_{uD}). The undrained shear strength can also be determined in the field by for example cone penetration tests with pore pressure measurement (CPTU) (c_{ucptu}) or field vane tests (undisturbed c_{uv}, remolded c_{ur}).



SENSITIVITY

The sensitivity $S_t = c_u/c_r$ expresses the ratio between the undisturbed and remoulded undrained shear strengths. This property can be determined from a falling cone test in the laboratory (NS 8015) or by a field vane test in the field. Quick clay for instance has a very low remoulded shear strength c_r (c_r< 0,5 kPa NS8015, c_r<0,33 kPa ISO 17892-6), and therefore normally exhibits very high sensitivity.

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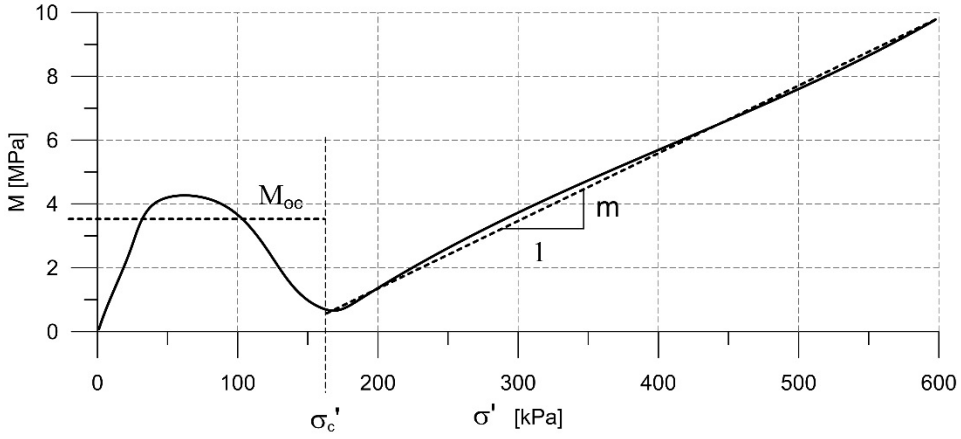
DEFORMATION AND CONSOLIDATION PROPERTIES

The deformation and consolidation properties of a soil are used for calculating settlements and are determined by loading tests in an oedometer. The soil sample is enclosed in a rigid ring that prevents lateral deformation, and is loaded vertically with an incrementally or continously increasing load. Corresponding values of load and deformation (strain ε) are recorded, and the deformation modulus (stiffness) of the soil can be deduced by $M = \Delta\sigma'\Delta\varepsilon$ (Janbu theory). The modulus is presented as a function of the vertical stress σ'_v. A key parameter interpreted from oedometer tests in clay is the preconsolidation stress (σ'_c). This parameter indicates the previous loading history of the soil (i.e. previous overburden).

The deformation modulus differs in the stress range below and over the preconsolidation stress. In clay, the stiffness in the overconsolidated stress range (under σ'_c) can be represented by a constant stiffness modulus (M_{oc}.). For stress levels above σ'_c, the stiffness increases with increasing stress. The slope of this curve is described by the modulus number.



FROST SUSCEPTIBILITY

The frost susceptibility of a soil is determined from the grain size distribution curve or by measuring the capillary rise of the material. The frost susceptibility is classified in the groups T1 (No susceptibility), T2 (Low susceptibility), T3 (Medium susceptibility) and T4 (High susceptibility).

COMPACTION PROPERTIES

By compaction of a soil, a denser and more compact layering of the mineral grains is obtained. The compaction properties of a soil are determined on samples with varying water content that are compacted with a certain compaction energy (usually Standard or Modified Proctor). The results are presented in a diagram showing the dry density ρ_r as a function of the water content w_i. The maximum dry density obtained in the test (ρ_{dmax}) is used in specifications of compaction works. The corresponding water content is denoted the optimum water content (w_{opt}).

PERMEABILITY (k cm/sec or m/year)

The permeability is defined as the amount of water q which under given conditions will flow through a soil volume per unit of time. In general, the permeability is determined from the following relationship: q = kiA, where A is the gross area of the cross-section normal to the direction of flow and i = hydraulic gradient in the direction of flow (= difference in potential per unit length). The permeability can be determined by controlled flow tests in the laboratory using constant or falling head, by pumping or by a flow test in the field.

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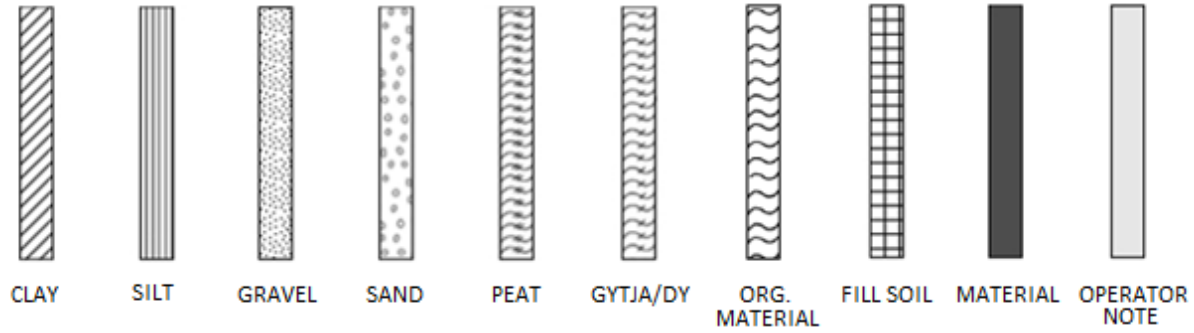
BOREHOLE PROFILE - HATCHING

In the borehole profile each sample is presented with a hatching corresponding to the principle fraction of the material. There is also a separate hatching for notes from the drilling operator. The different hatchings are shown below.



Note: *This is a subjective evaluation based on the visual appearance of the material unless a grain size analysis is performed.*

CLAY: Clay content greater than 15 %
SILT: Silt content greater than 45 % and clay content less than 15 %
SAND: Sand content greater than 60 % and clay content less than 15 %
GRAVEL: Gravel content greater than 60 % and clay content less than 15 %
MATERIAL: Used when none of the above are appropriate. Usually based on a grain size analysis
PEAT: Marsh plants, more or less transformed
GYTJA/DY: Transformed structure of organic material, may contain mineral constituents
ORG. MATERIAL: Highly transformed organic material with open structure
FILL SOIL: Non-natural deposits
Drilling operator note: Notes from the drill rig operator (e.g. empty cylinder, predrilling etc.)

GRAIN SIZE ANALYSIS (K) / TRIAXIAL TESTS (T) / OEDOMETER TESTS (Ø)

For samples where a grain size analysis, triaxial test and/or oedometer test has been performed, the borehole profile is labeled with G, T or O respectively at the relevant depth. The depth is not exact, so the label is only a reference to separate drawings where the specific test is reported.

SYMBOLS – Water content and Atterberg limits

Measurements of water content and Atterberg limits are given on the borehole profile by the following symbols on their respective graphs. If the water content exceeds the limit of the graph axis, the numerical value is given.

Water content ***w***	○	Plastic limit w_p	⊢
		Liquid limit w_f	⊣

SYMBOLS – Undrained shear strength

Measurements for fall cone and unconfined compression tests are given on the borehole profile by the following symbols on their respective graphs. If the measured value exceeds the limit of the graph axis, the numerical value is given.

Fall cone, undisturbed c_{ufc}	▽	Fall cone, remoulded c_{urfc}	▼
Unconfined compression test *The line indicates the axial strain (%) at failure*	0 / 15 / 5 / 10	Fall cone remoulded c_{urfc} ≤2,0kPa	▼ 0,9

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GUIDELINES AND STANDARDS – FIELD INVESTIGATIONS

Field investigations described in geotechnical enclosures, along with terminology and classification used in reporting, are based on the following guidelines and standards:

Document	Topic
NGF Melding 1	SI-units
NGF Melding 2, NS-EN ISO 14688-1 og -2	Symbols and terminology
NGF Melding 3	Rotary weight sounding
NGF Melding 4	Vane test
NGF Melding 5, NS-EN ISO 22476-1	Cone penetration test (CPTU)
NGF Melding 6	Pore pressure and ground water measurements
NGF Melding 7	Rotary pressure sounding
NGF Melding 8	Commentary codes for field investigations
NGF Melding 9	Total sounding
NS-EN ISO 22476-2	Ramsounding
NGF Melding 10	Descriptive texts for ground investigations
NGF Melding 11, NS-EN ISO 22475-1	Soil sampling
Statens vegvesen Håndbok R211	Field investigations
NS 8020-1	Qualification criteria for enterprises performing ground investigations - Part 1: Geotechnical field investigations

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GUIDELINES AND STANDARDS – LABORATORY TESTS

The laboratory tests described in geotechnical enclosures, along with terminology and classification used in reporting, are based on the following guidelines and standards:

Document	Topic
NS8000	Atterberg limits – terminology
NS8001	Percussion liquid limit
NS8002	Fall cone liquid limit
NS8003	Plastic limit
NS8004	Shrinkage limit
NS8005, NS-EN ISO 17892-4	Grain size distribution
NS8010, NS-EN ISO 14688-1 og -2	Soil – constituents and structure. Classification and identification of soils
NS8011, NS-EN ISO 17892-2	Density
NS8012, NS-EN ISO 17892-3	Grain density
NS8013, NS-EN ISO 17892-1	Water content
NS8014	Void ratio, porosity and degree of saturation
ISO 17892-6:2017	Shear strength by fall cone tests
NS8016	Shear strength by unconfined compression test
ISO 17892-5:2017	Oedometer test, incremental loading
NS8018	Oedometer test, continuous loading
NS-EN ISO/TS 17892-8 og -9	Triaxial tests (UU, CU)
The National Public Roads Adm. Statens vegvesen Handbook R210	Laboratory testing