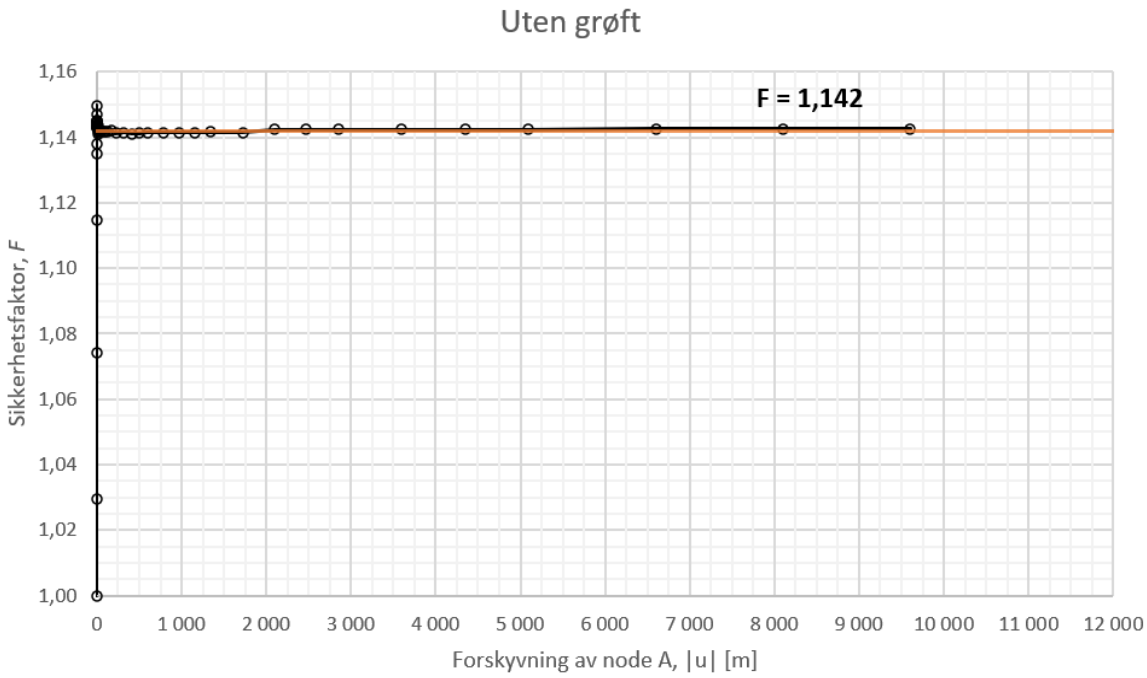
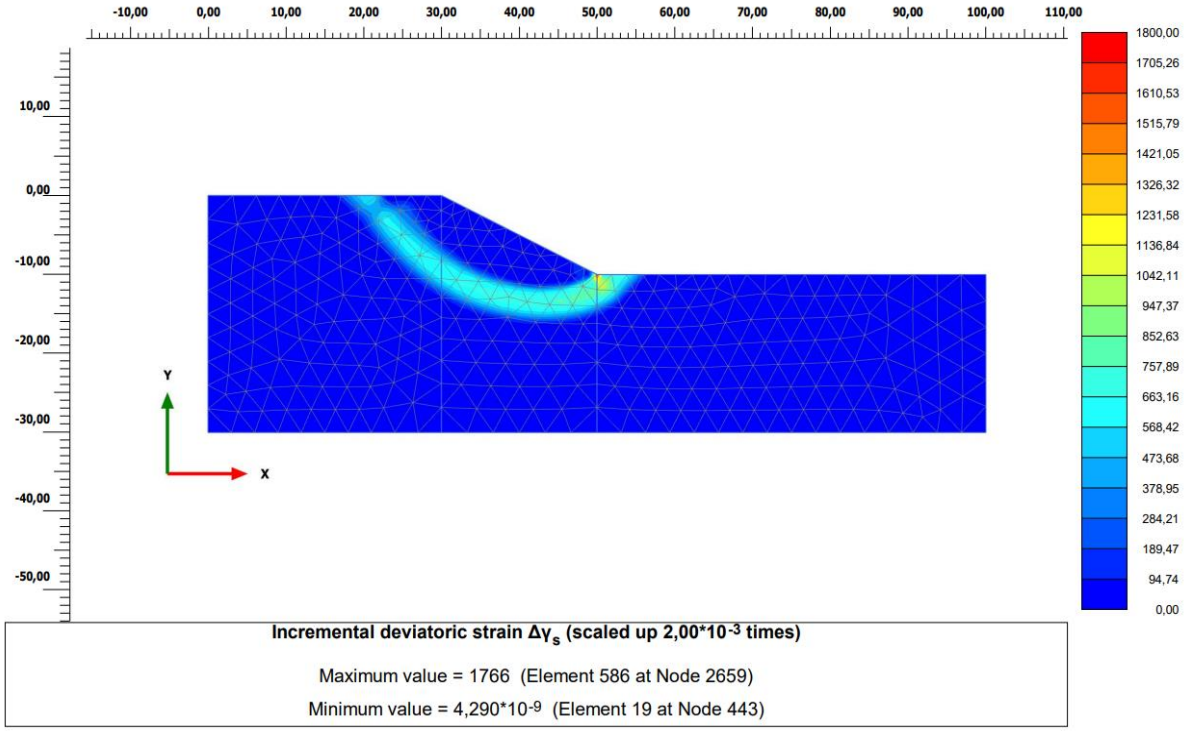
Tillegg A Resultater fra PLAXIS 2D – forstudie

A.1 Stabilitet av opprinnelig skråning

Sikkerhetsanalyse

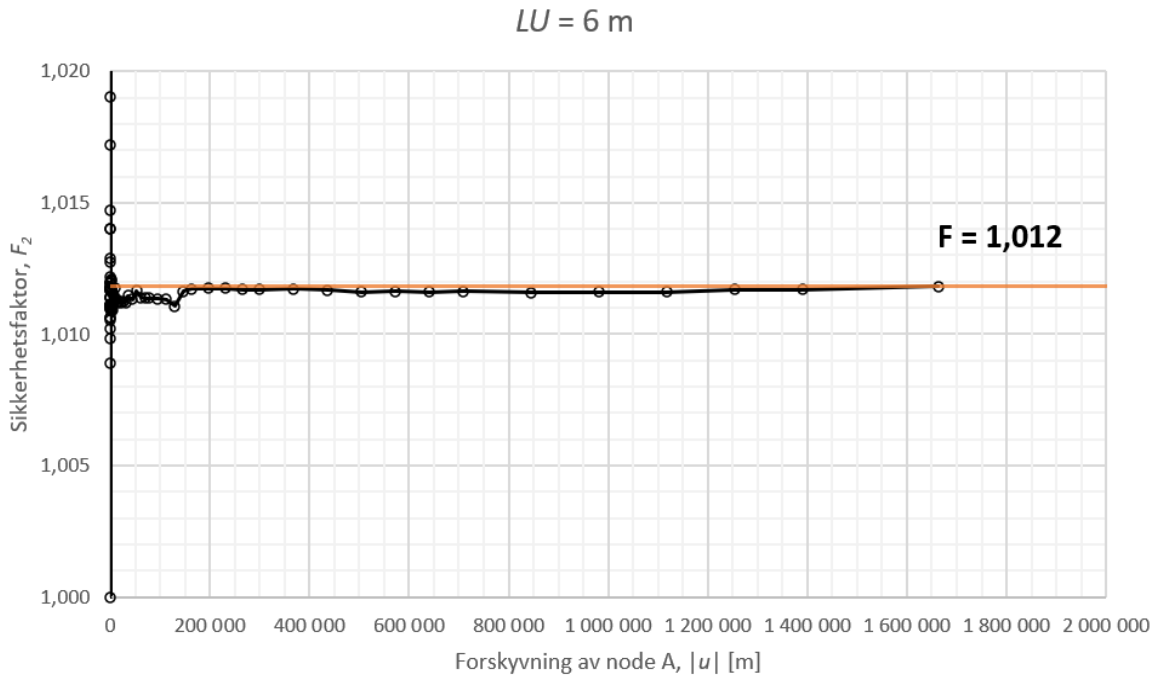


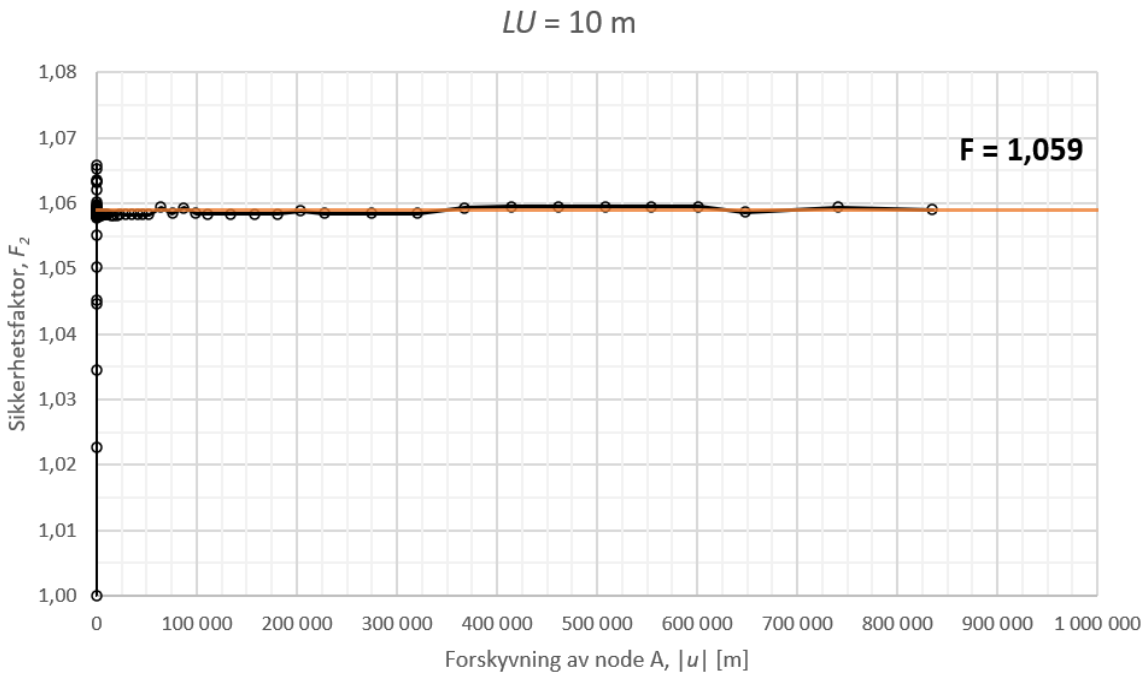
Skjærflate

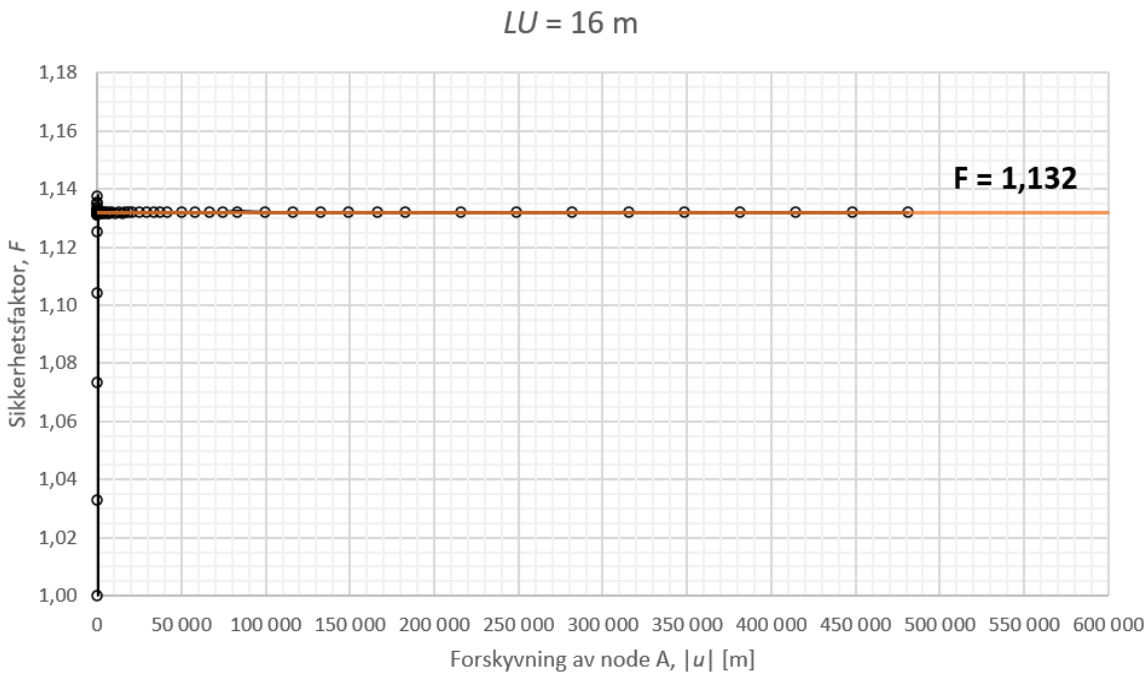


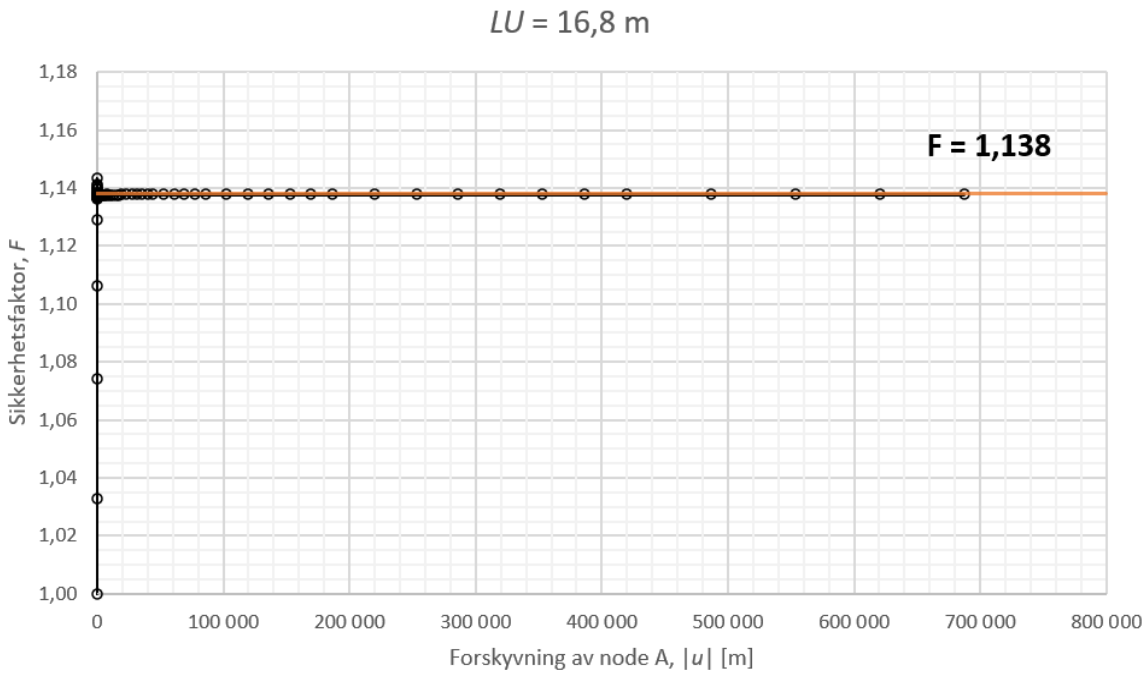
A.2 Stabilitet av skråninger med grøft

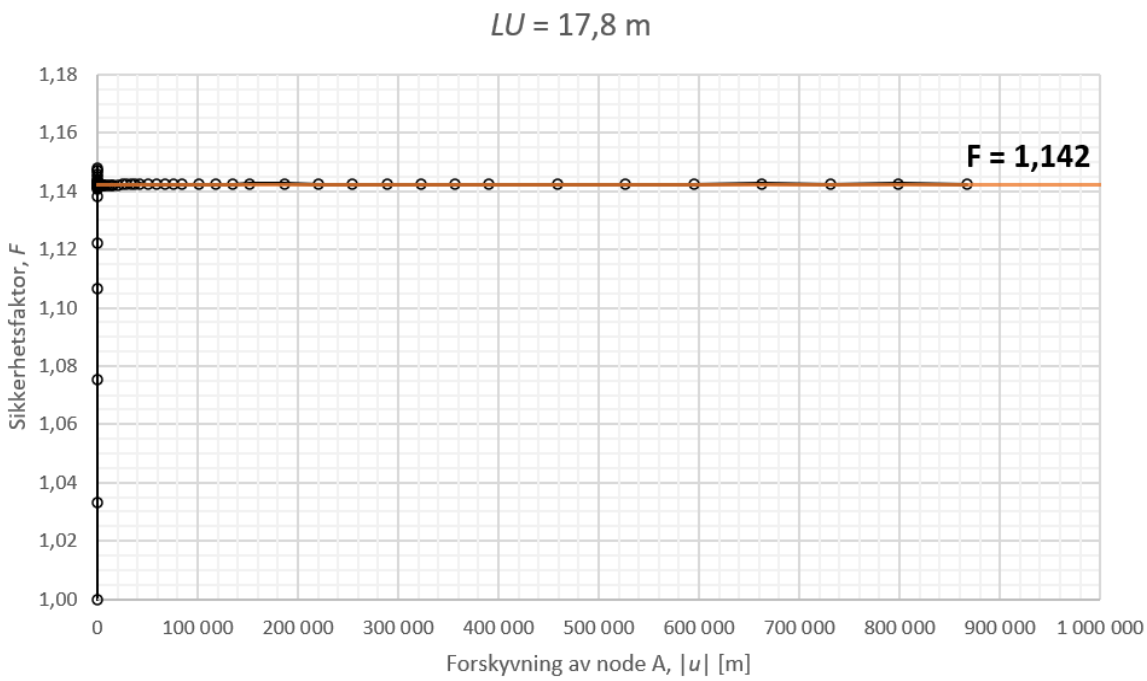
Sikkerhetsanalyser

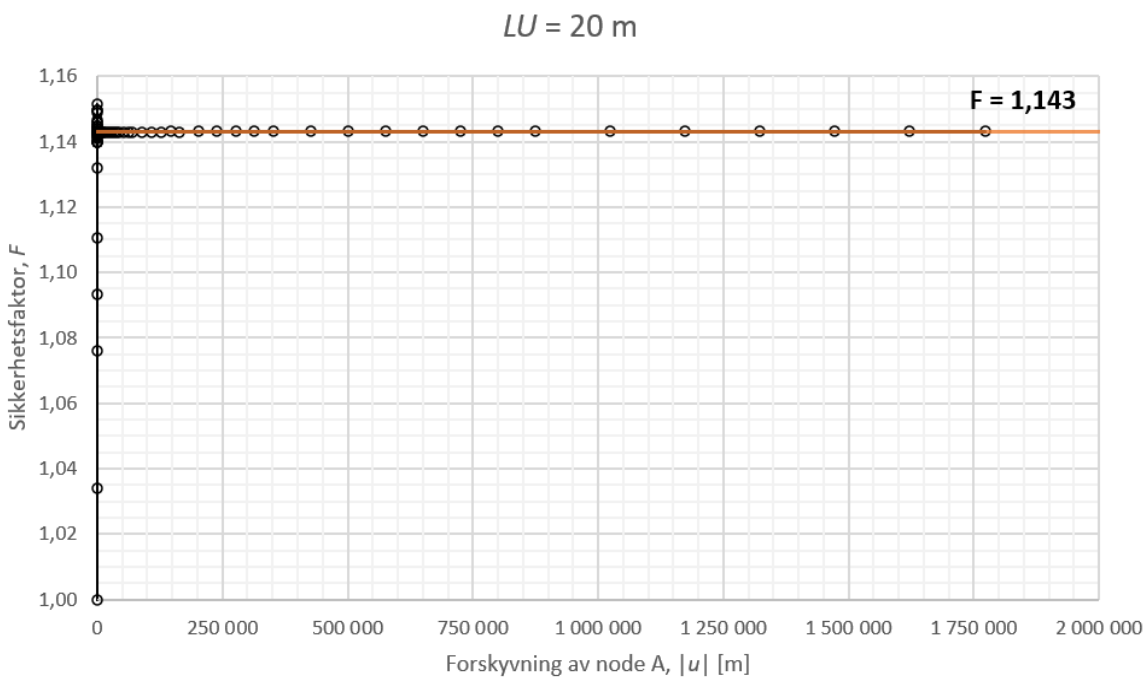



LU = 10 m
F = 1,059
Sikkerhetsfaktor, F2
1,08
1,07
1,06
1,05
1,04
1,03
1,02
1,01
1,00
0
100 000
200 000
300 000
400 000
500 000
600 000
700 000
800 000
900 000
1 000 000
Forskyvning av node A, |u| [m]

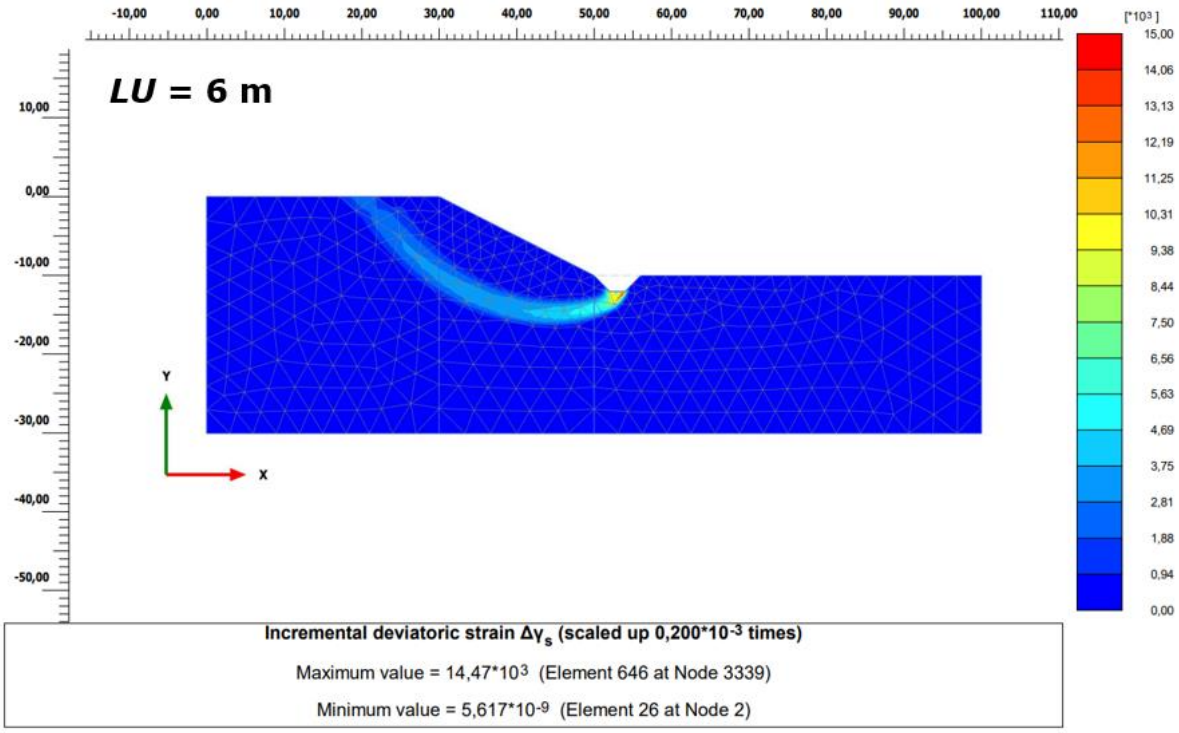

LU = 16 m
F = 1,132
Sikkerhetsfaktor, F
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
50 000
100 000
150 000
200 000
250 000
300 000
350 000
400 000
450 000
500 000
550 000
600 000
Forskyvning av node A, |u| [m]

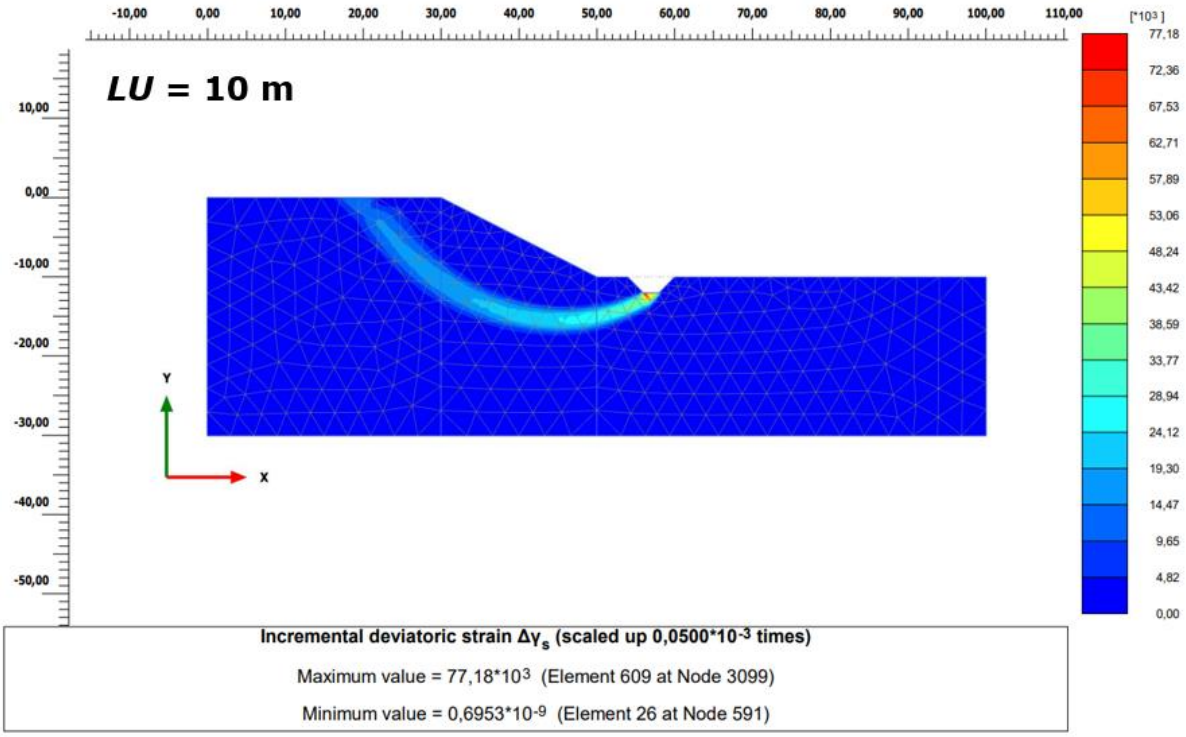

LU = 16,8 m
F = 1,138
Sikkerhetsfaktor, F
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
100 000
200 000
300 000
400 000
500 000
600 000
700 000
800 000
Forskyvning av node A, |u| [m]

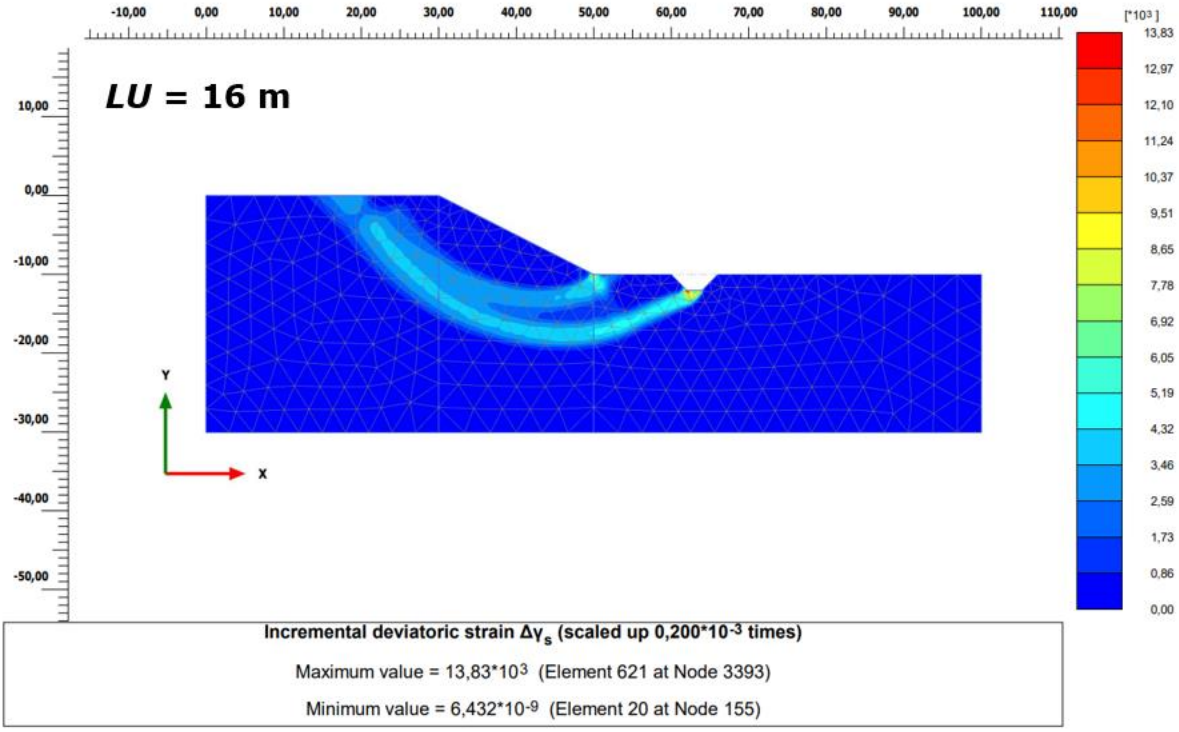

LU = 17,8 m
F = 1,142
Sikkerhetsfaktor, F
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
100 000
200 000
300 000
400 000
500 000
600 000
700 000
800 000
900 000
1 000 000
Forskyvning av node A, |u| [m]

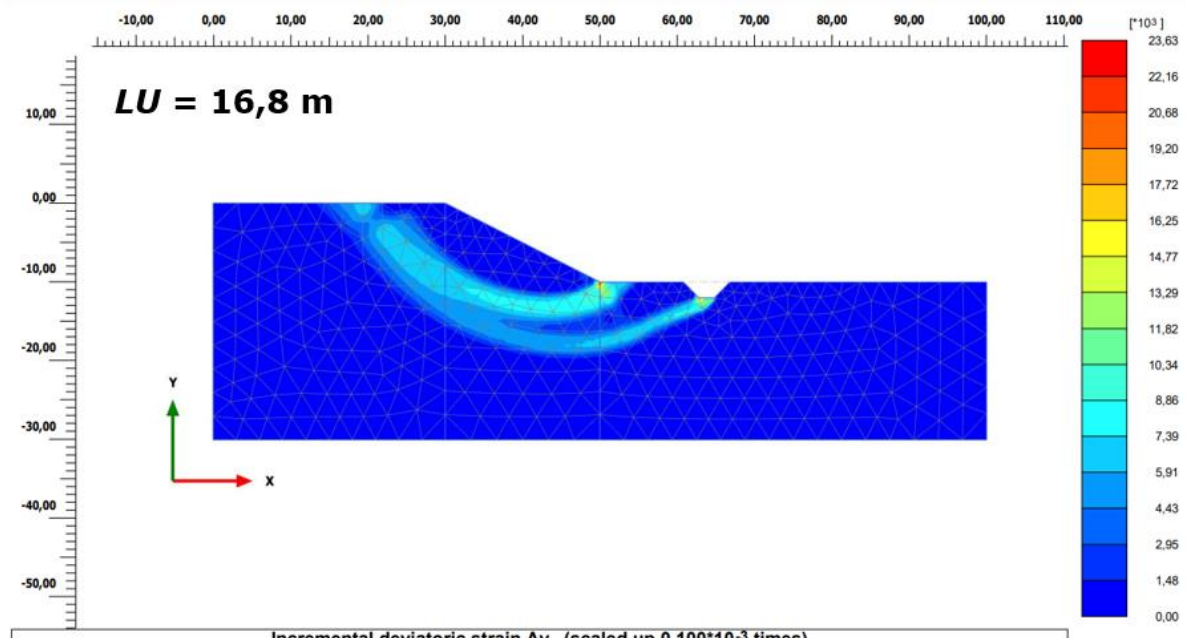


Skjærflater




LU = 10 m
Y
X
[*10³]
77,18
72,36
67,53
62,71
57,89
53,06
48,24
43,42
38,59
33,77
28,94
24,12
19,30
14,47
9,65
4,82
0,00
Incremental deviatoric strain Δγs (scaled up 0,0500*10-3 times)
Maximum value = 77,18*10³ (Element 609 at Node 3099)
Minimum value = 0,6953*10-9 (Element 26 at Node 591)

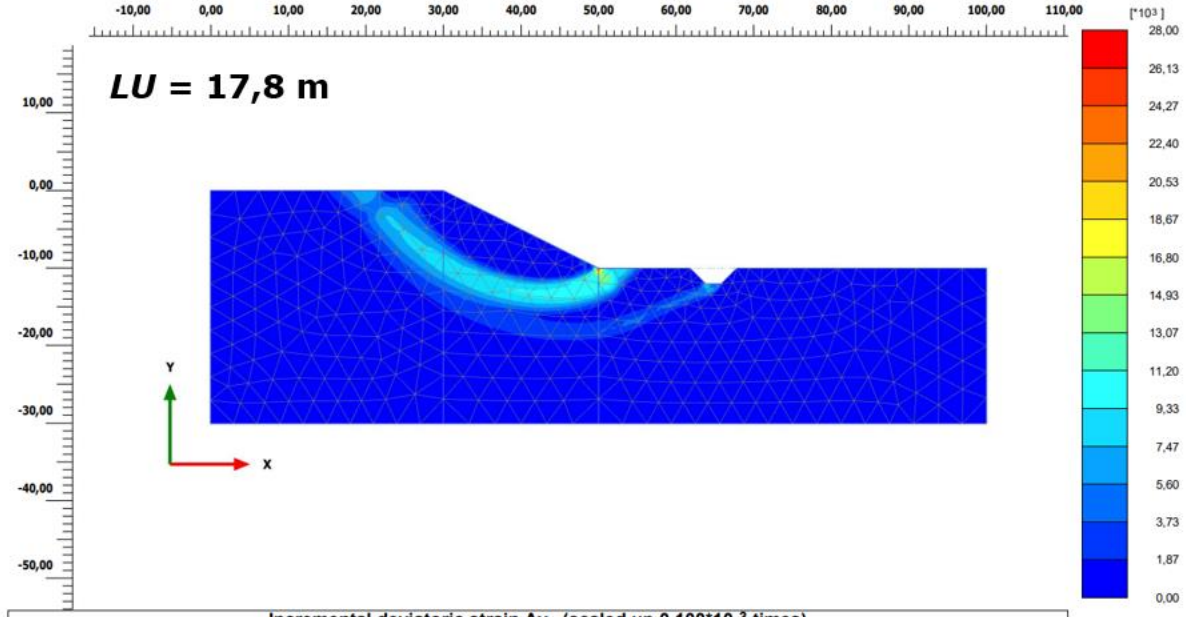

LU = 16 m
Y
X
[*10³]
13,83
12,97
12,10
11,24
10,37
9,51
8,65
7,78
6,92
6,05
5,19
4,32
3,46
2,59
1,73
0,86
0,00
Incremental deviatoric strain Δγs (scaled up 0,200*10-3 times)
Maximum value = 13,83*10³ (Element 621 at Node 3393)
Minimum value = 6,432*10-9 (Element 20 at Node 155)



Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,100*10^{-3} times)

Maximum value = 23,63*10^{3} (Element 601 at Node 2901)

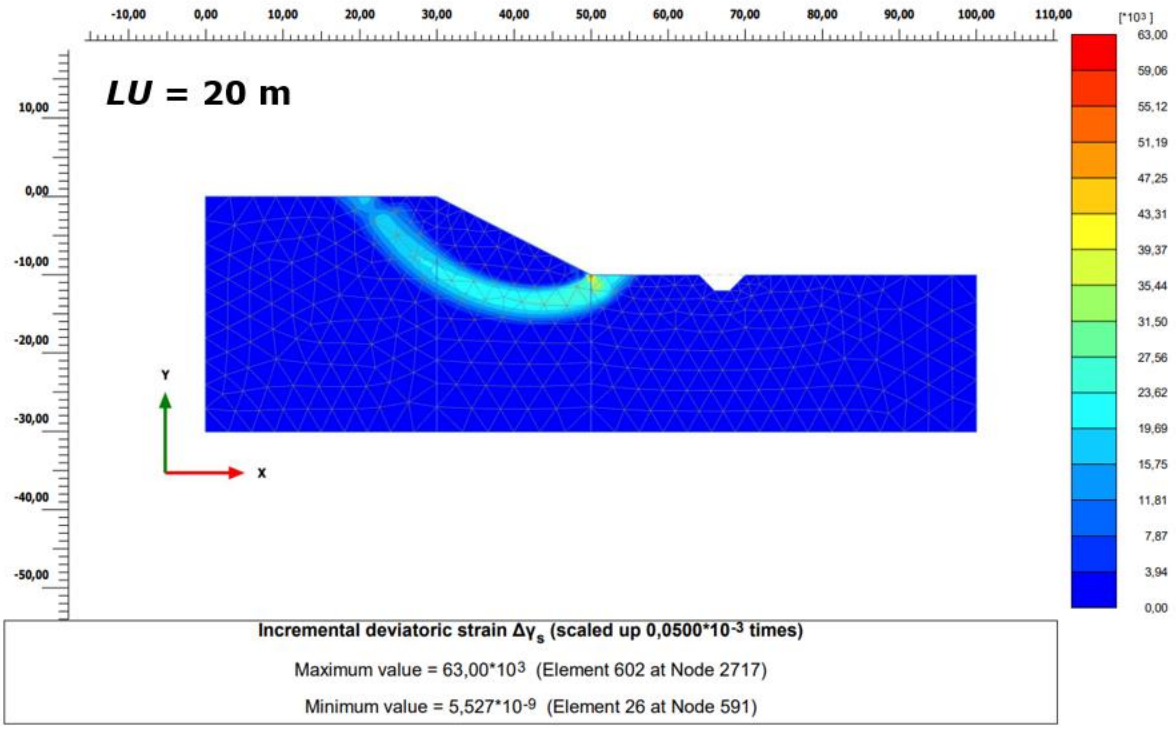
Minimum value = 4,546*10^{-9} (Element 24 at Node 53)



Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,100*10^{-3} times)

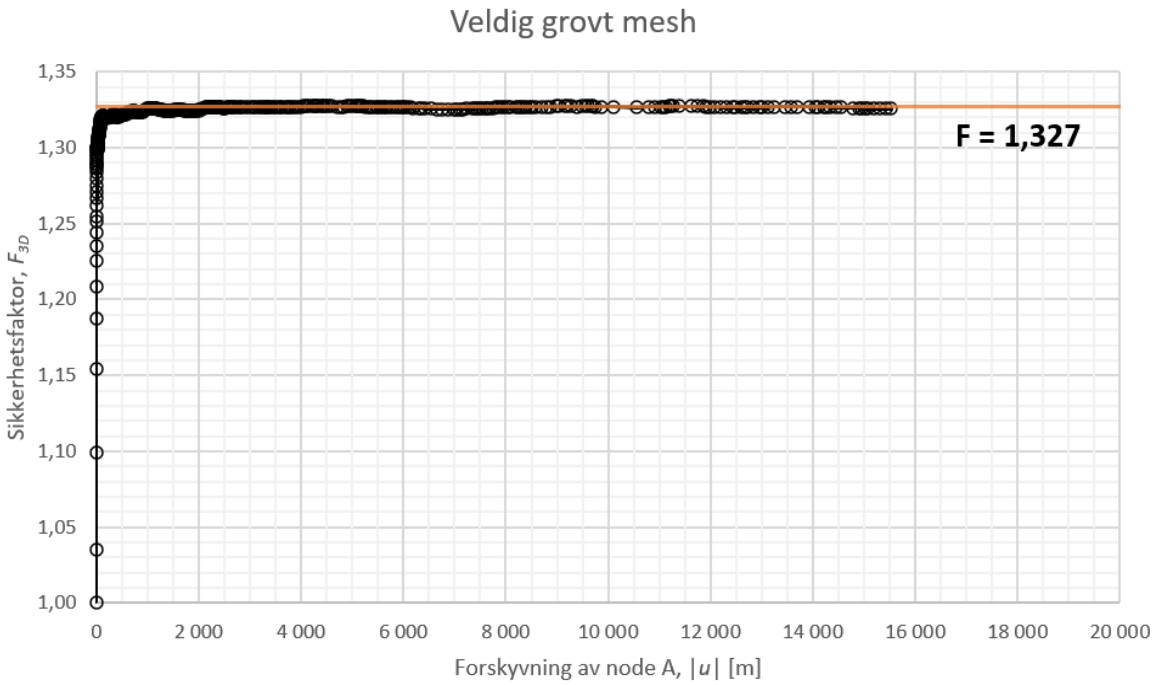
Maximum value = 27,21*10^{3} (Element 602 at Node 2717)

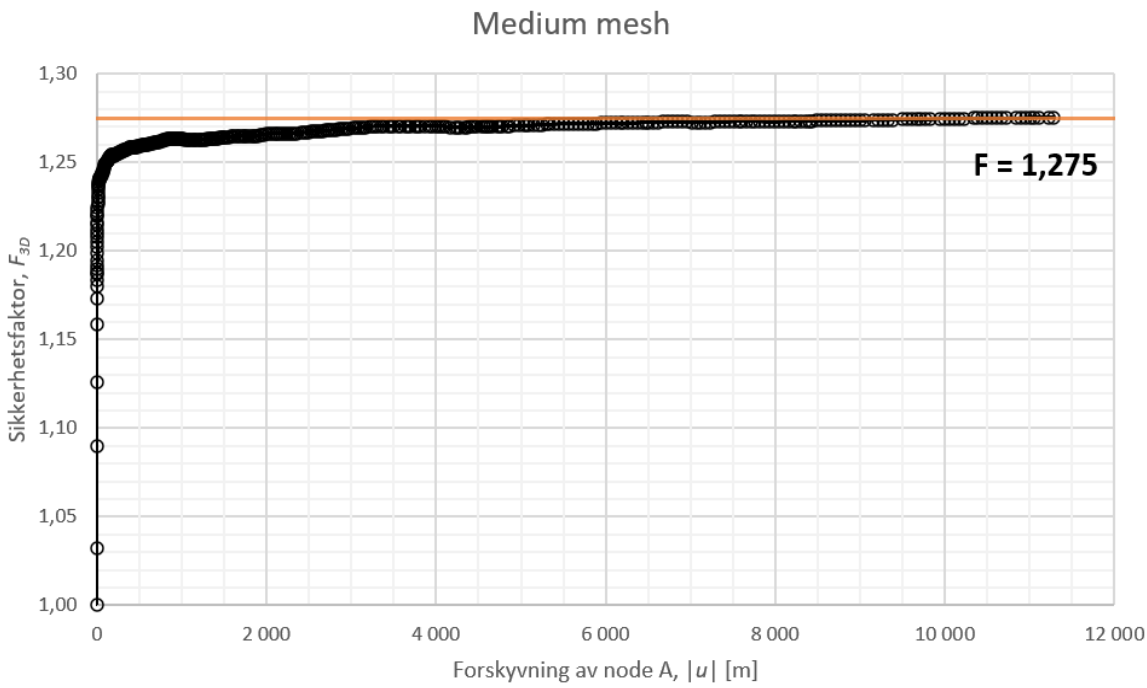
Minimum value = 8,425*10^{-9} (Element 26 at Node 591)

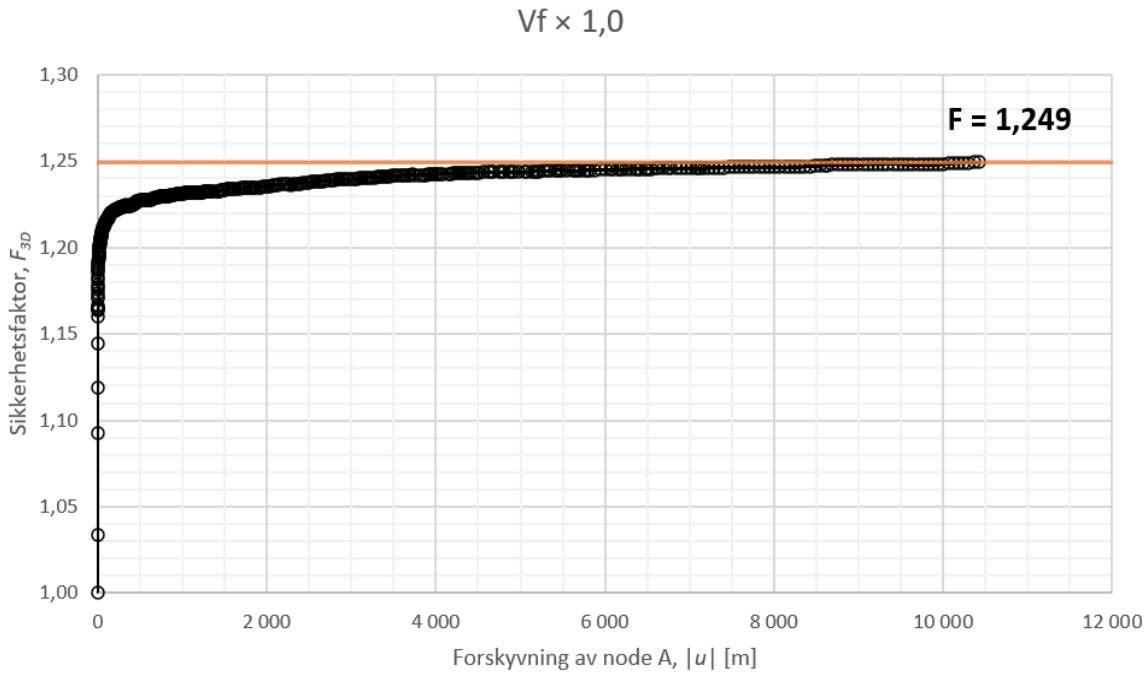

LU = 20 m
-10,00
0,00
10,00
20,00
30,00
40,00
50,00
60,00
70,00
80,00
90,00
100,00
110,00
10,00
0,00
-10,00
-20,00
-30,00
-40,00
-50,00
Y
X
[*10³]
63,00
59,06
55,12
51,19
47,25
43,31
39,37
35,44
31,50
27,56
23,62
19,69
15,75
11,81
7,87
3,94
0,00
Incremental deviatoric strain Δγs (scaled up 0,0500*10-3 times)
Maximum value = 63,00*10³ (Element 602 at Node 2717)
Minimum value = 5,527*10-9 (Element 26 at Node 591)

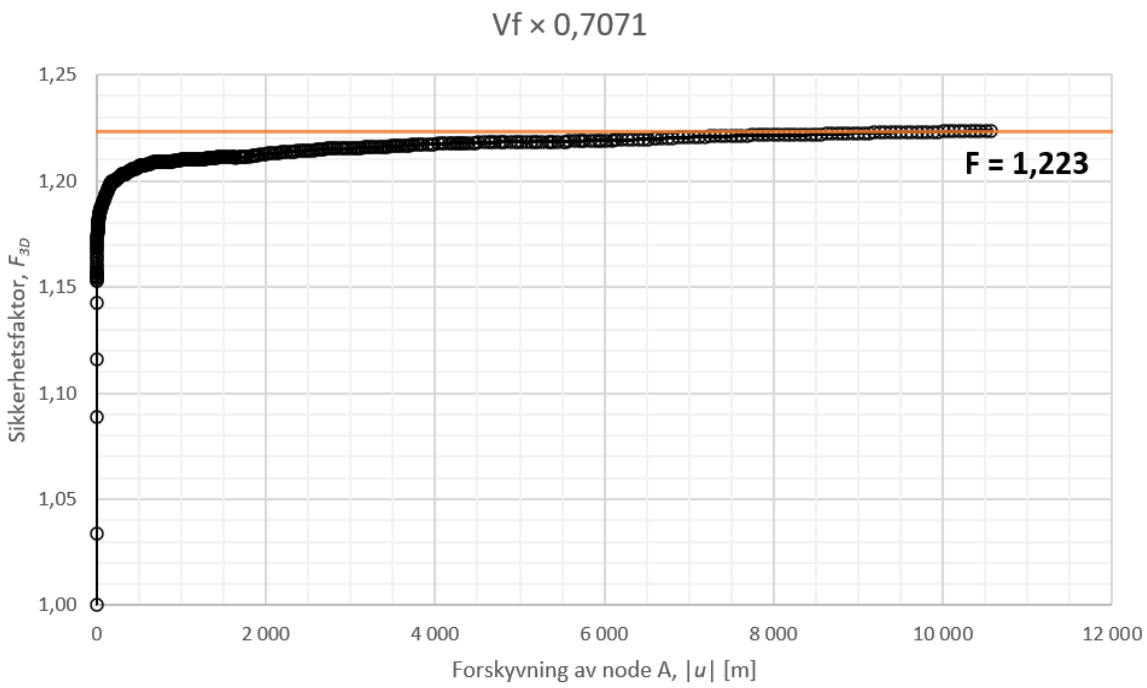
Tillegg B Resultater fra PLAXIS 3D – forstudie

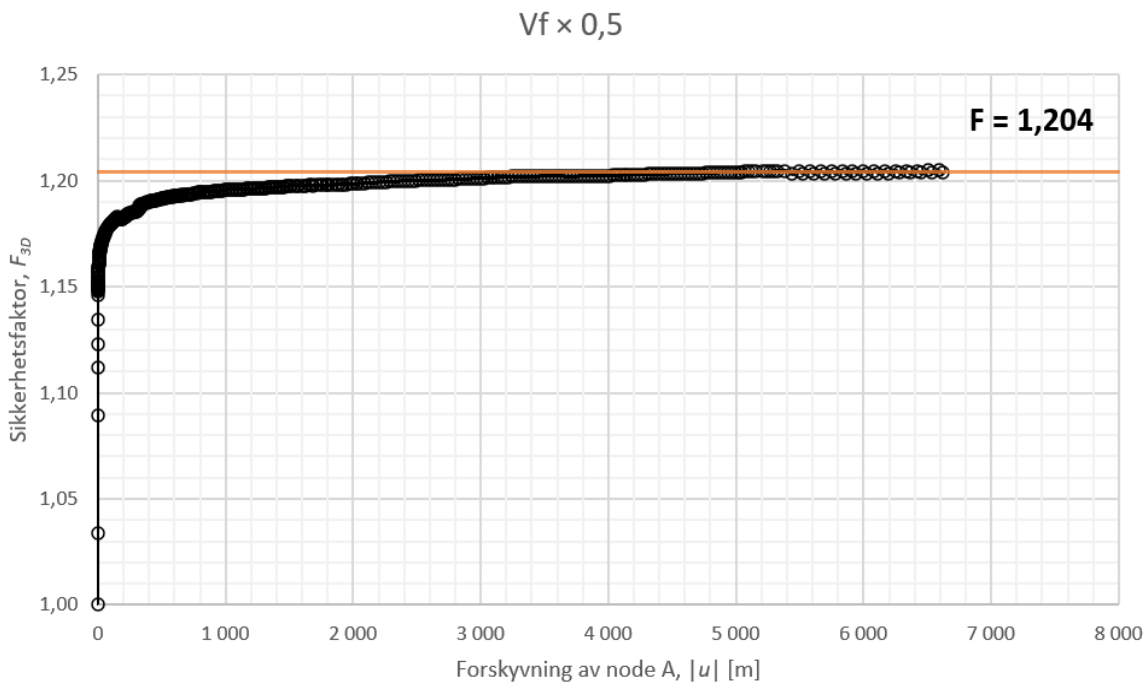
B.1 Mesh-sensitivitetsanalyse PLAXIS 3D

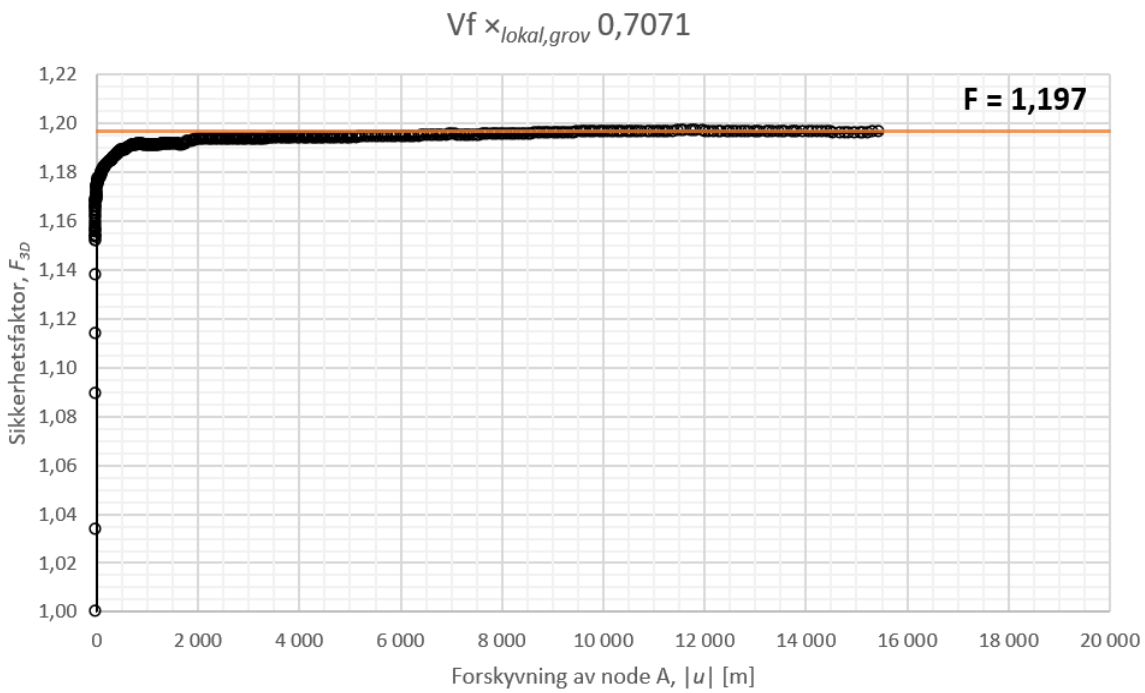


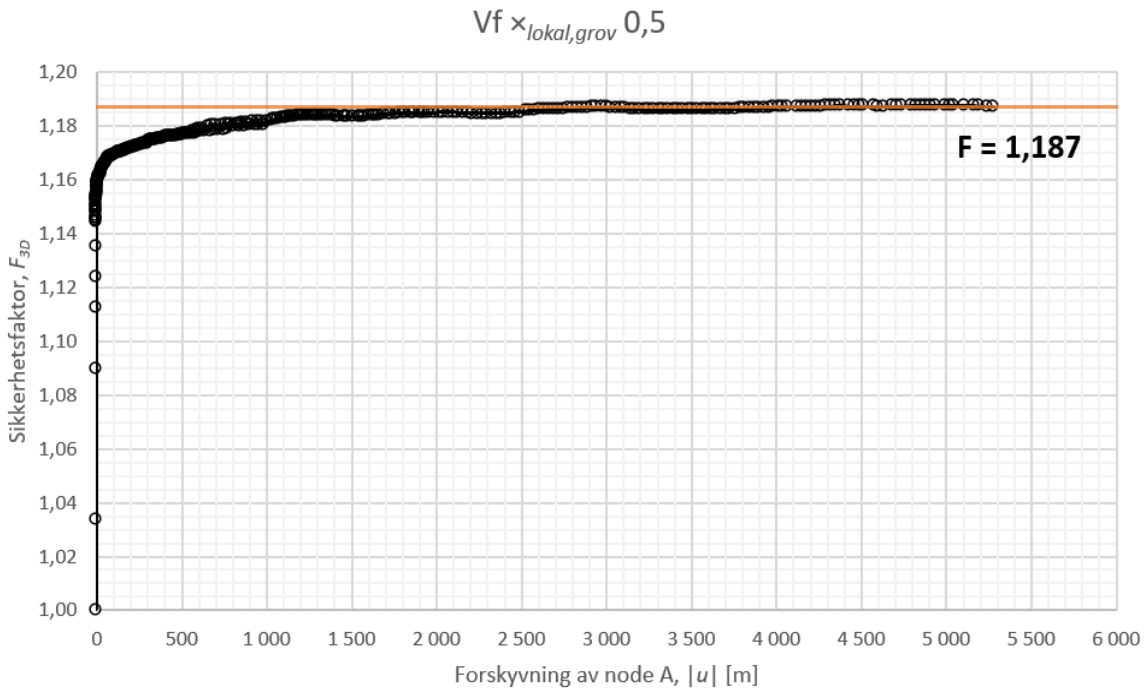

Medium mesh
F = 1,275
Sikkerhetsfaktor, F_{3D}
1,30
1,25
1,20
1,15
1,10
1,05
1,00
0
2 000
4 000
6 000
8 000
10 000
12 000
Forskyvning av node A, |u| [m]

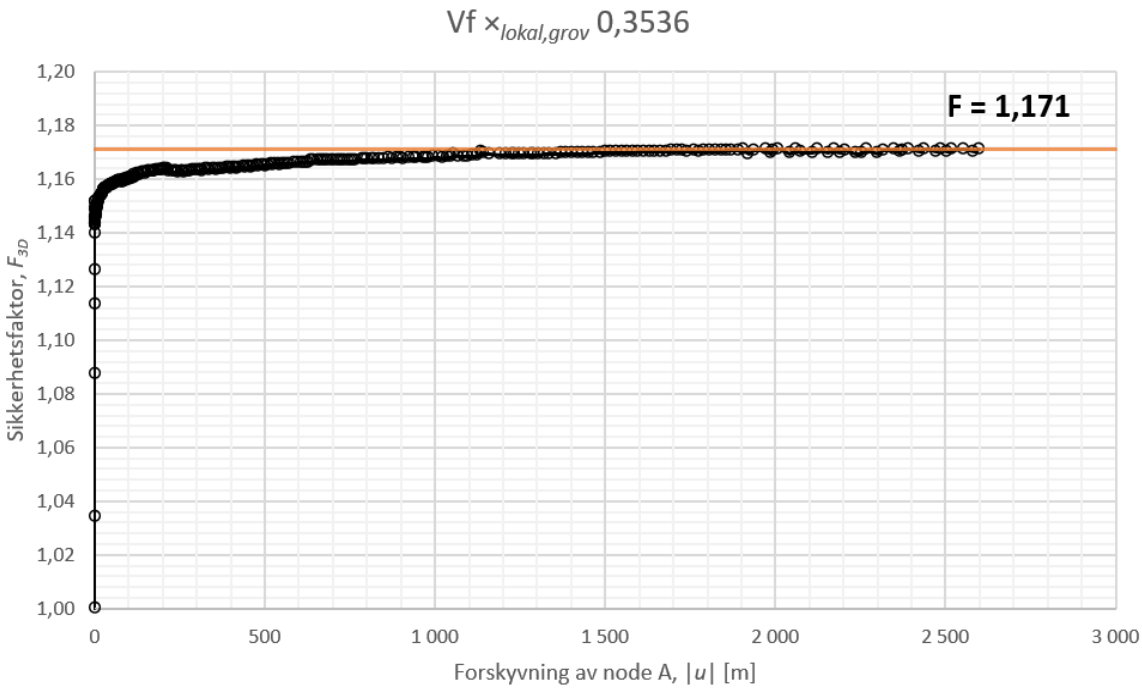

Vf × 1,0
F = 1,249
Sikkerhetsfaktor, F_{3D}
1,30
1,25
1,20
1,15
1,10
1,05
1,00
0
2 000
4 000
6 000
8 000
10 000
12 000
Forskyvning av node A, |u| [m]

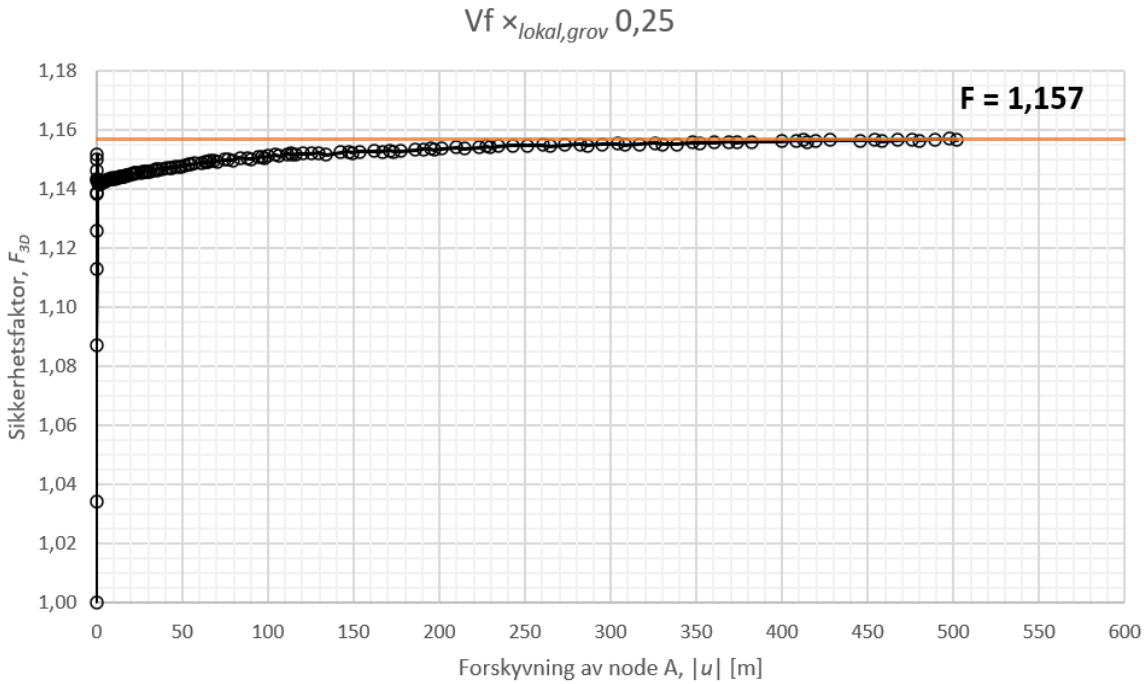

Vf × 0,7071
F = 1,223
Sikkerhetsfaktor, F_{3D}
1,25
1,20
1,15
1,10
1,05
1,00
0
2 000
4 000
6 000
8 000
10 000
12 000
Forskyvning av node A, |u| [m]

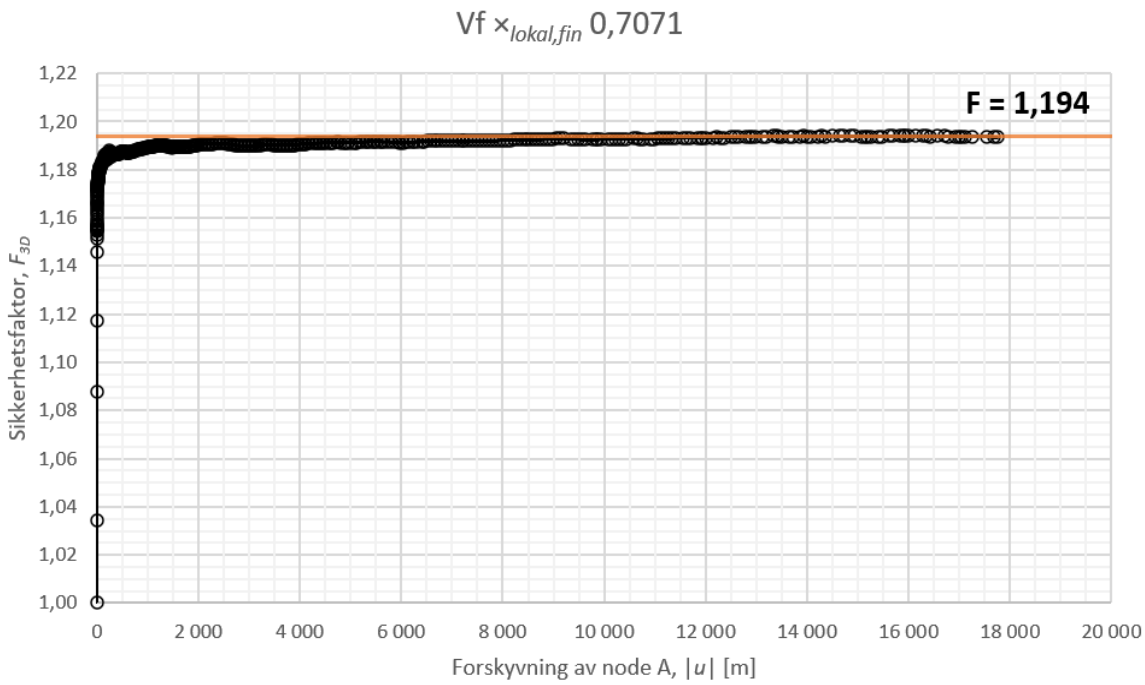

Vf × 0,5
F = 1,204
Sikkerhetsfaktor, F_{3D}
1,25
1,20
1,15
1,10
1,05
1,00
0
1 000
2 000
3 000
4 000
5 000
6 000
7 000
8 000
Forskyvning av node A, |u| [m]

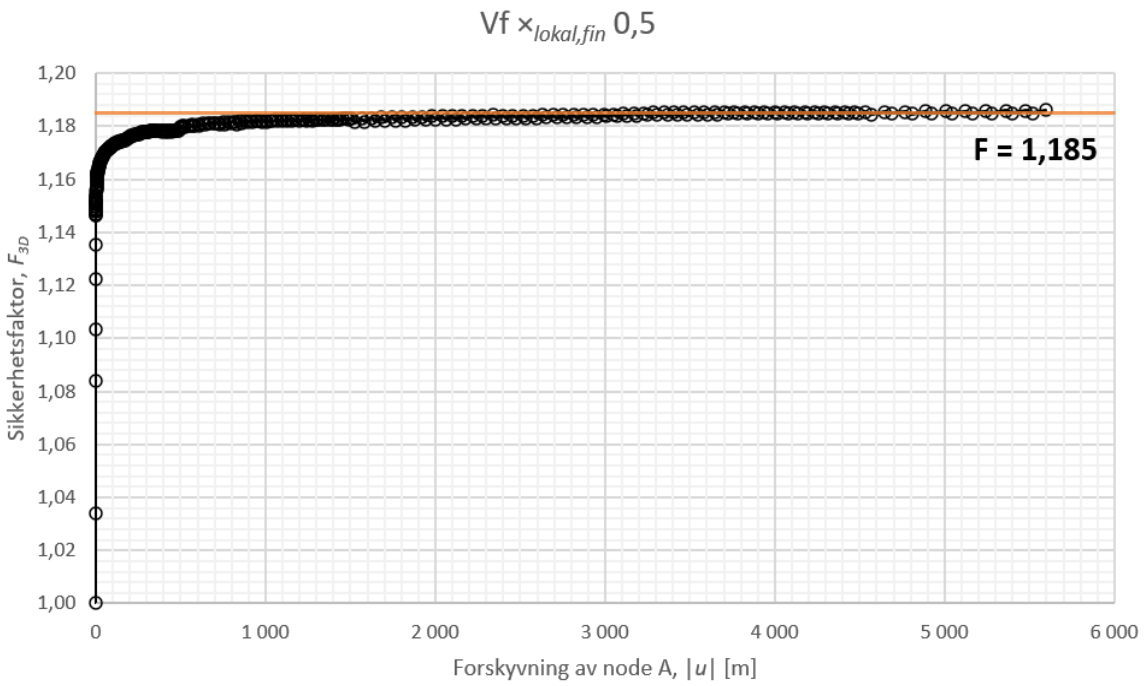

Vf ×lokal,grov 0,7071
F = 1,197
Sikkerhetsfaktor, F3D
1,22
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
2 000
4 000
6 000
8 000
10 000
12 000
14 000
16 000
18 000
20 000
Forskyvning av node A, |u| [m]

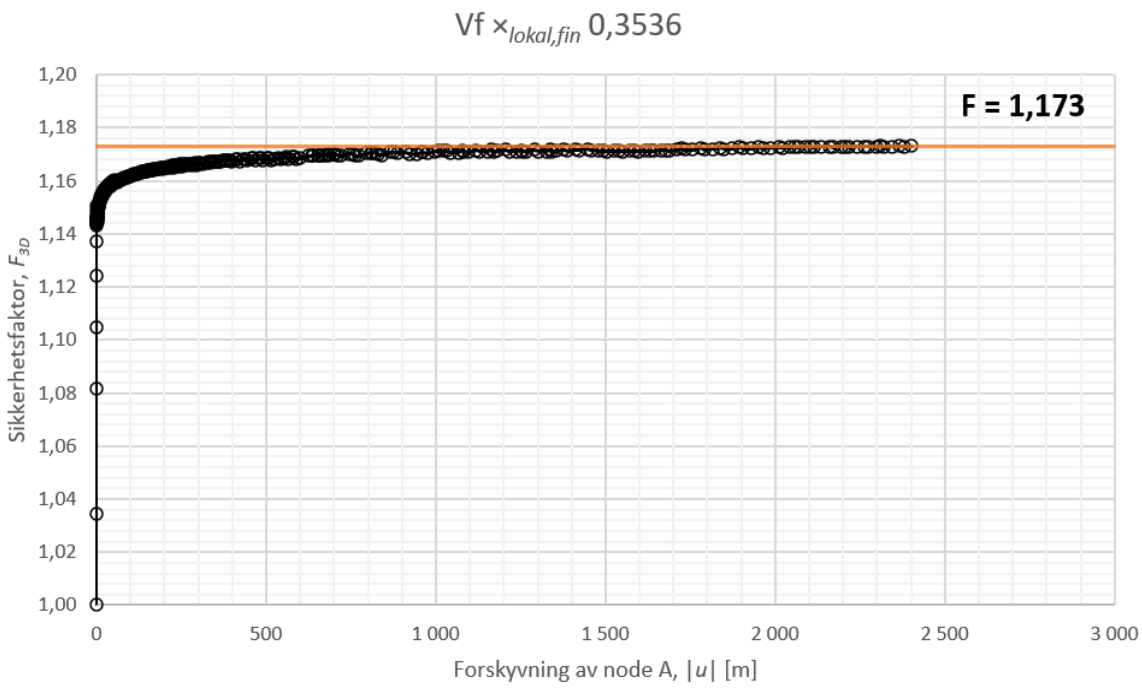

Vf ×lokal,grov 0,5
F = 1,187
Sikkerhetsfaktor, F3D
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
3 500
4 000
4 500
5 000
5 500
6 000
Forskyvning av node A, |u| [m]

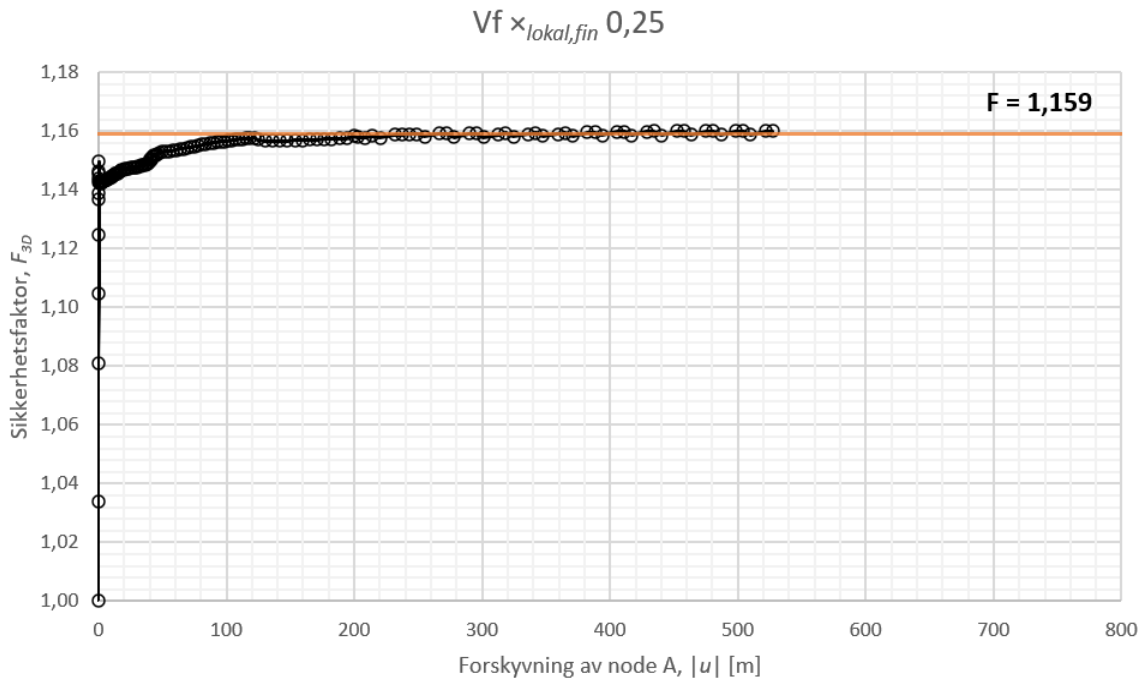

Vf ×lokal,grov 0,3536
F = 1,171
Sikkerhetsfaktor, F3D
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
Forskyvning av node A, |u| [m]


Vf ×lokal,grov 0,25
F = 1,157
Sikkerhetsfaktor, F3D
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
50
100
150
200
250
300
350
400
450
500
550
600
Forskyvning av node A, |u| [m]


Vf ×lokal,fin 0,7071
F = 1,194
Sikkerhetsfaktor, F3D
1,22
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
2 000
4 000
6 000
8 000
10 000
12 000
14 000
16 000
18 000
20 000
Forskyvning av node A, |u| [m]

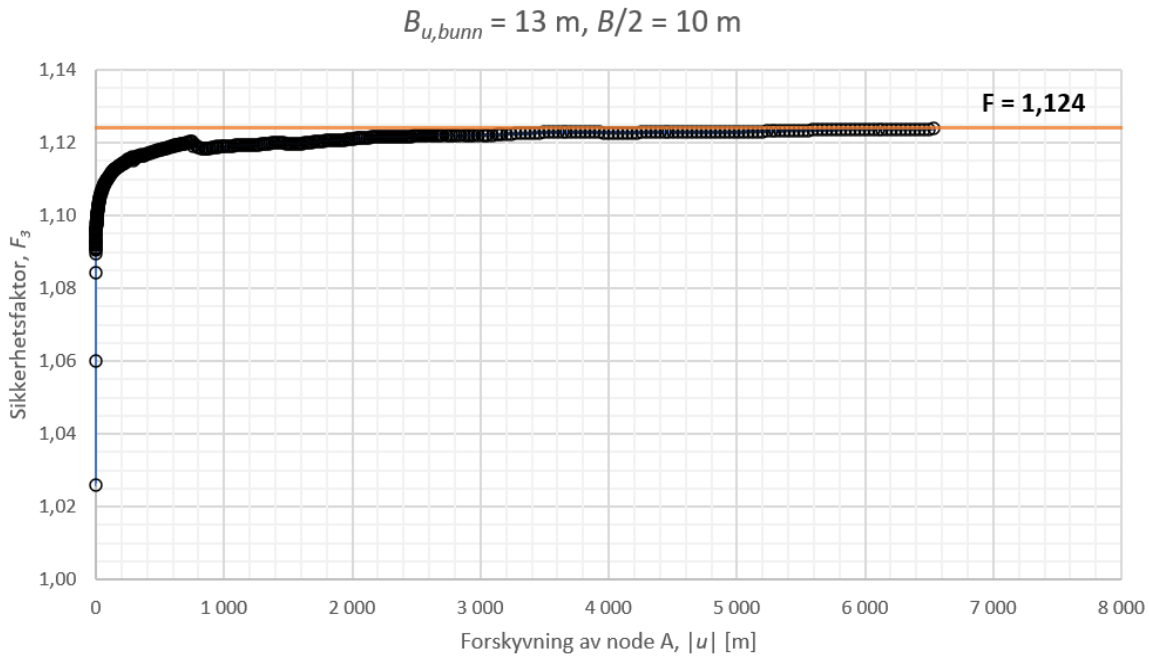

Vf ×lokal,fin 0,5
F = 1,185
Sikkerhetsfaktor, F3D
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
1 000
2 000
3 000
4 000
5 000
6 000
Forskyvning av node A, |u| [m]

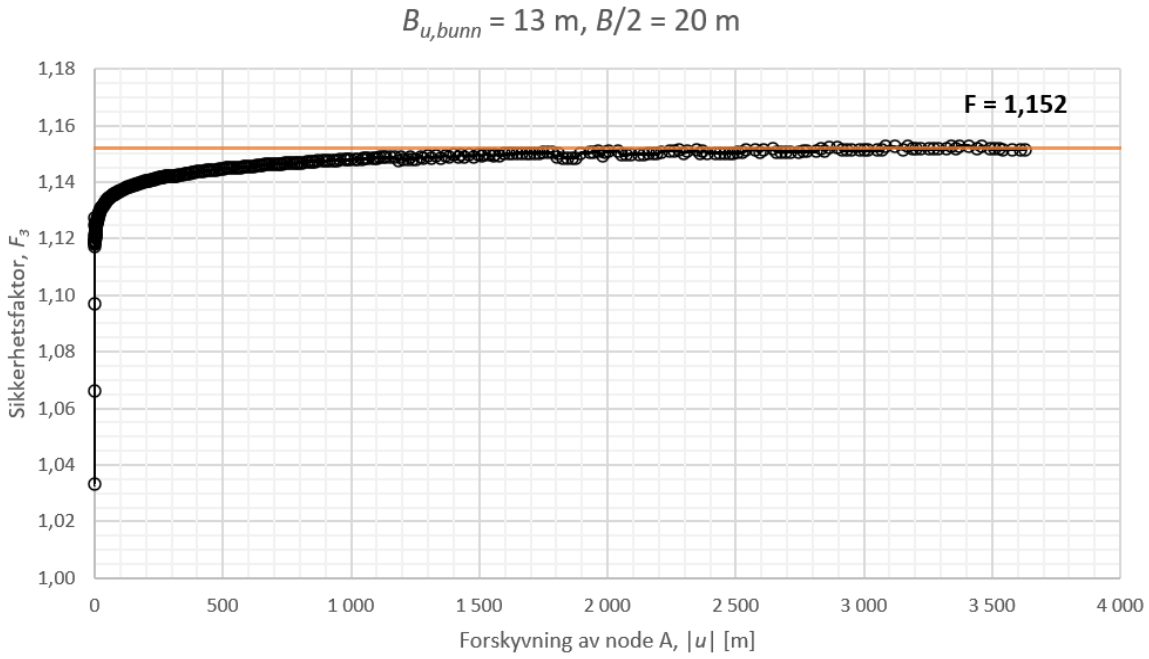

Vf ×lokal,fin 0,3536
F = 1,173
Sikkerhetsfaktor, F3D
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
Forskyvning av node A, |u| [m]

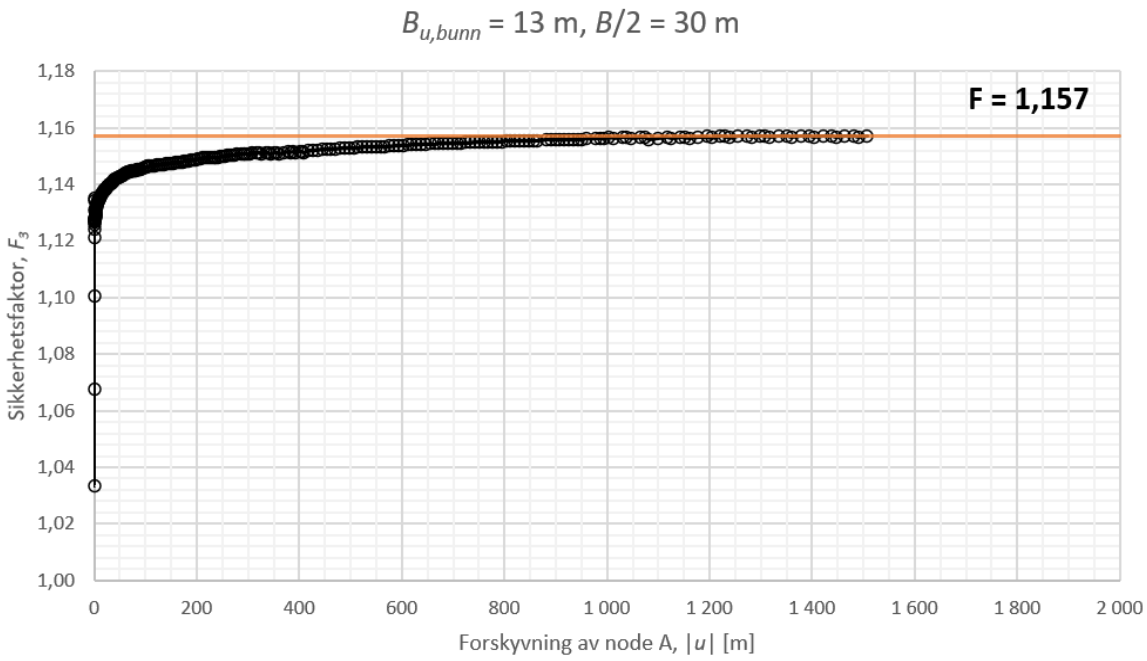

Vf ×lokal,fin 0,25
F = 1,159
Sikkerhetsfaktor, F3D
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
100
200
300
400
500
600
700
800
Forskyvning av node A, |u| [m]

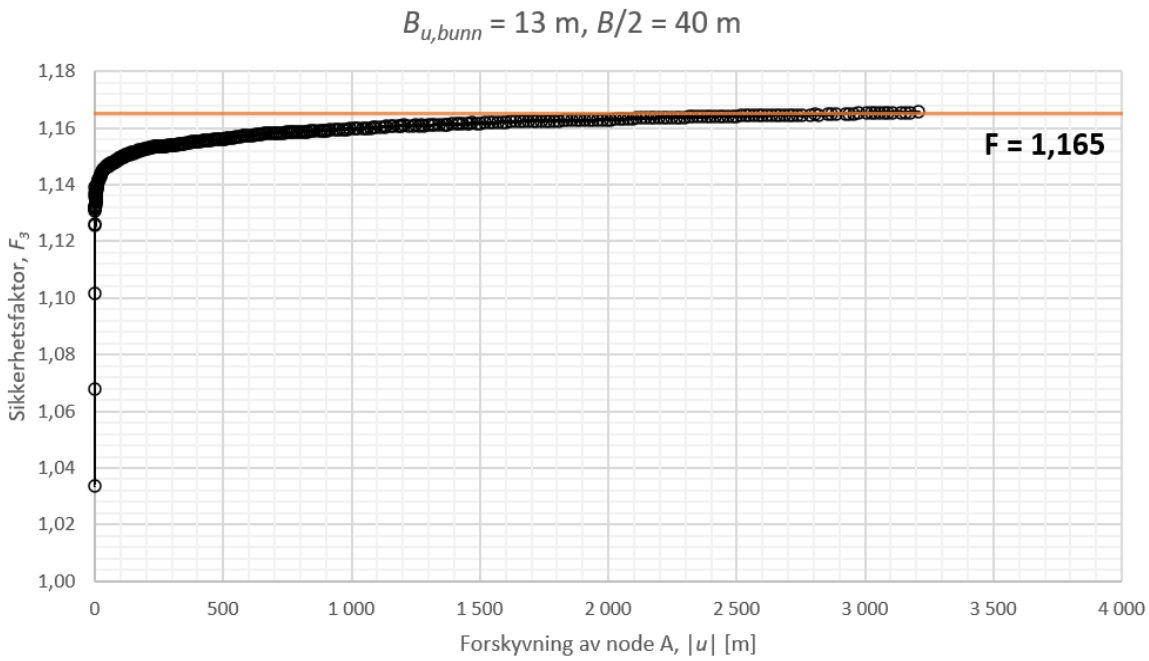
B.2 Sensitivitetsanalyse av forholdet mellom $B_{u,bunn}$ og B

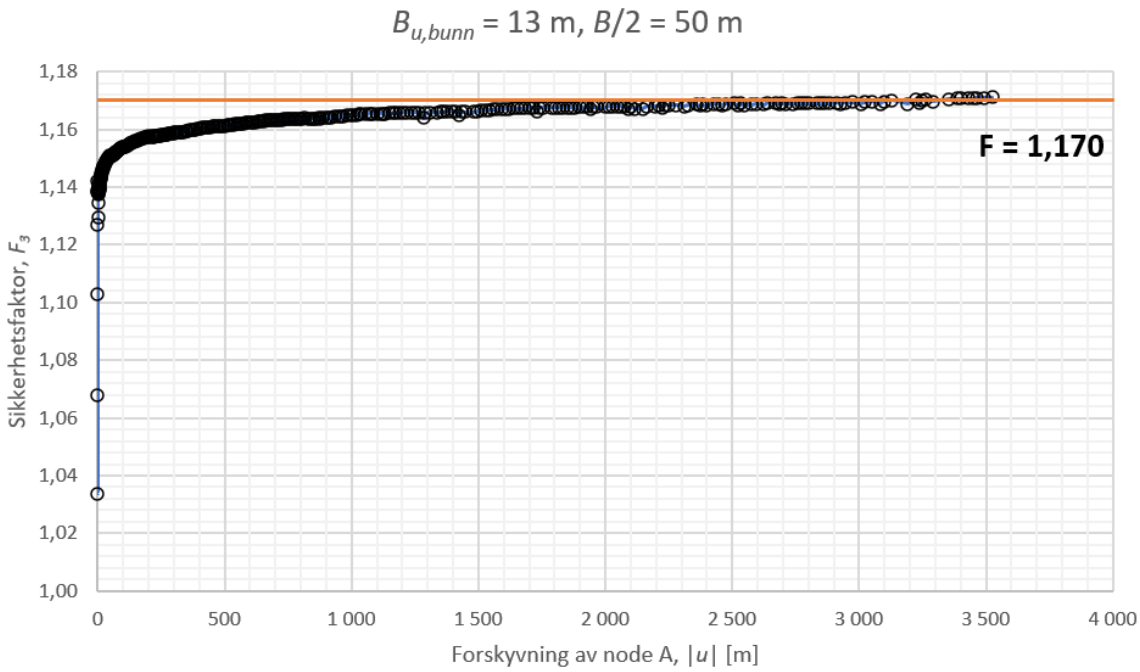
Sikkerhetsanalyser



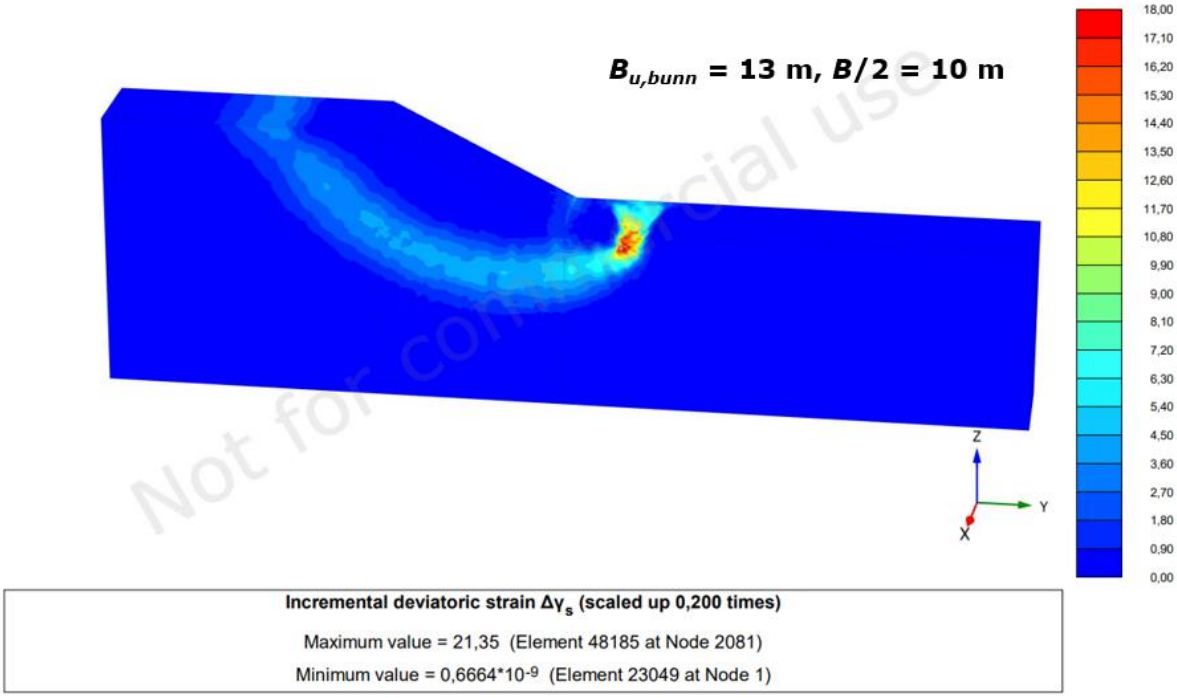


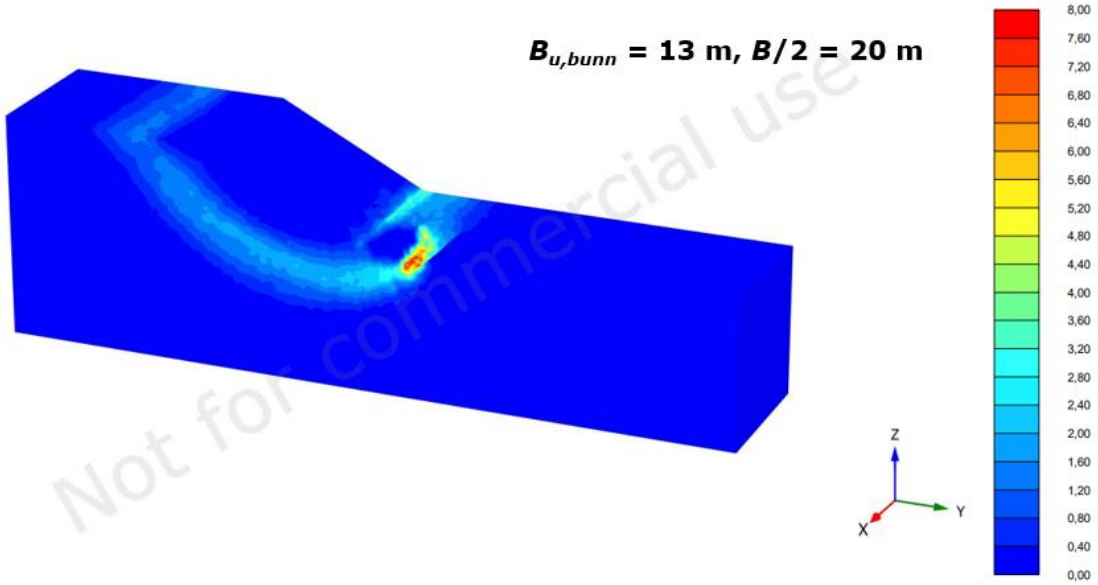

$B_{u,bunn}$ = 13 m, $B/2$ = 30 m
F = 1,157
Sikkerhetsfaktor, F_3
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
200
400
600
800
1 000
1 200
1 400
1 600
1 800
2 000
Forskyvning av node A, |u| [m]


$B_{u,bunn}$ = 13 m, $B/2$ = 40 m
F = 1,165
Sikkerhetsfaktor, F_3
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
3 500
4 000
Forskyvning av node A, |u| [m]



Skjærflater

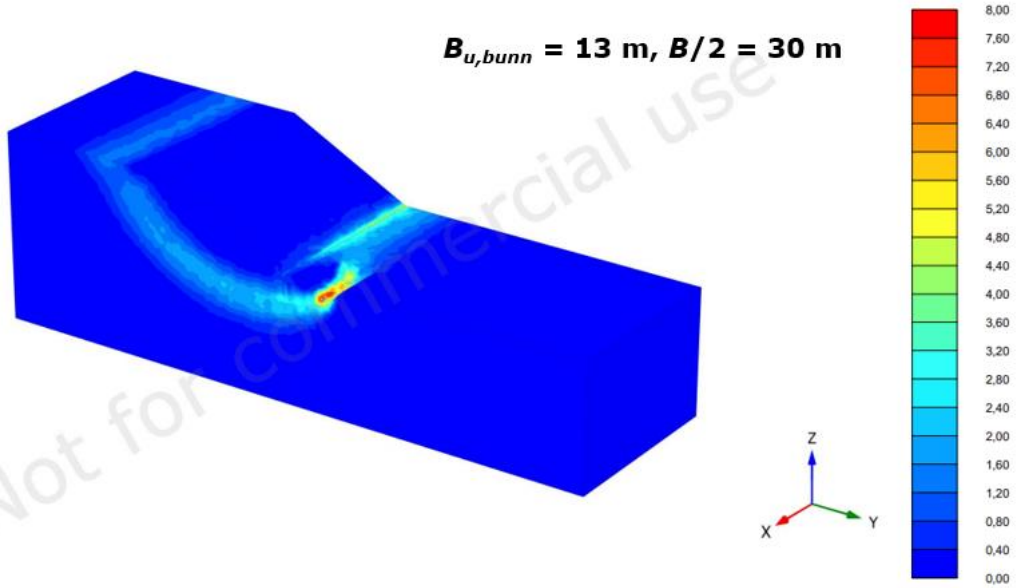




Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 8,886 (Element 99701 at Node 62555)

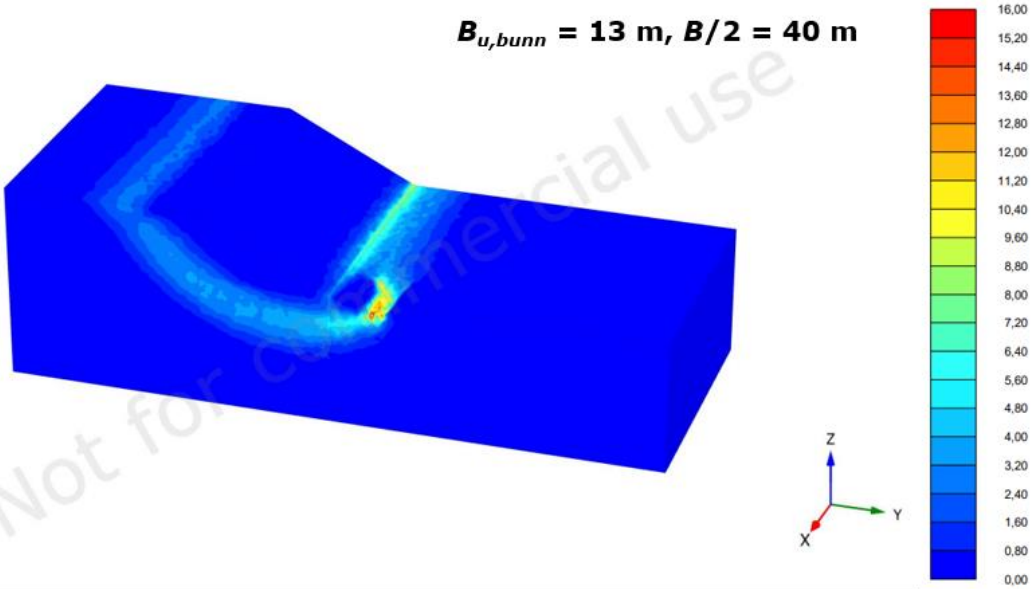
Minimum value = $1{,}438 \cdot 10^{-9}$ (Element 160698 at Node 3463)



Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 9,037 (Element 144124 at Node 4668)

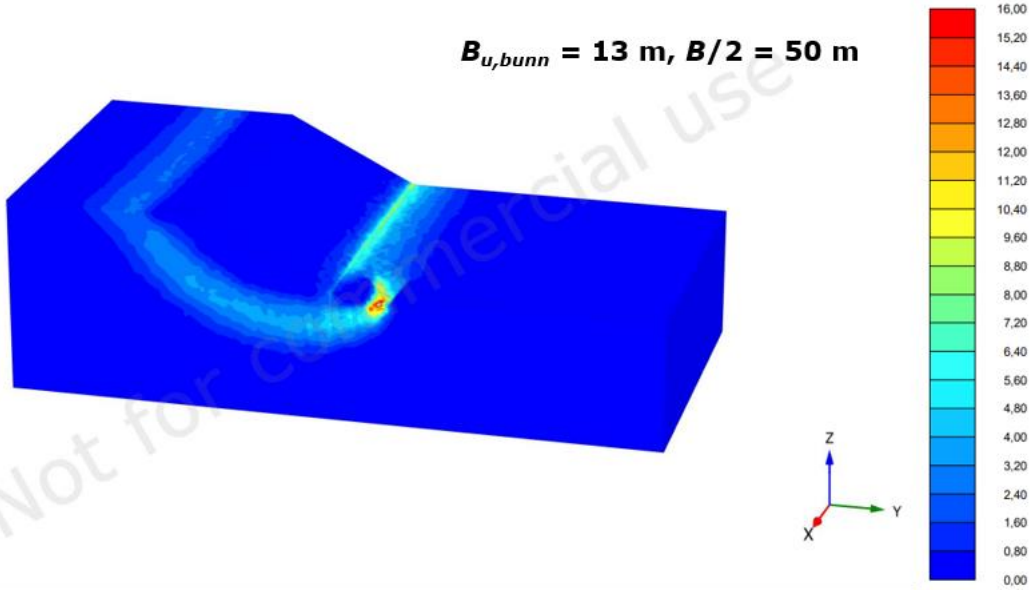
Minimum value = $4{,}495 \cdot 10^{-9}$ (Element 60787 at Node 2221)



Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)

Maximum value = 20,53 (Element 180709 at Node 5882)

Minimum value = $0{,}5682 \cdot 10^{-9}$ (Element 74957 at Node 2218)



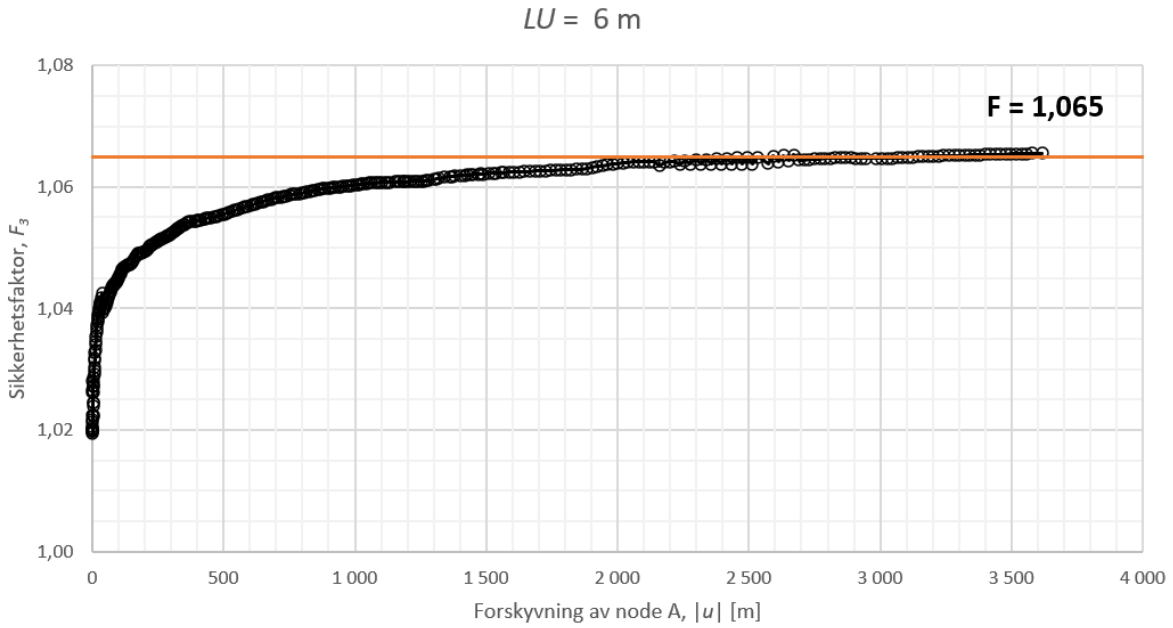
Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)

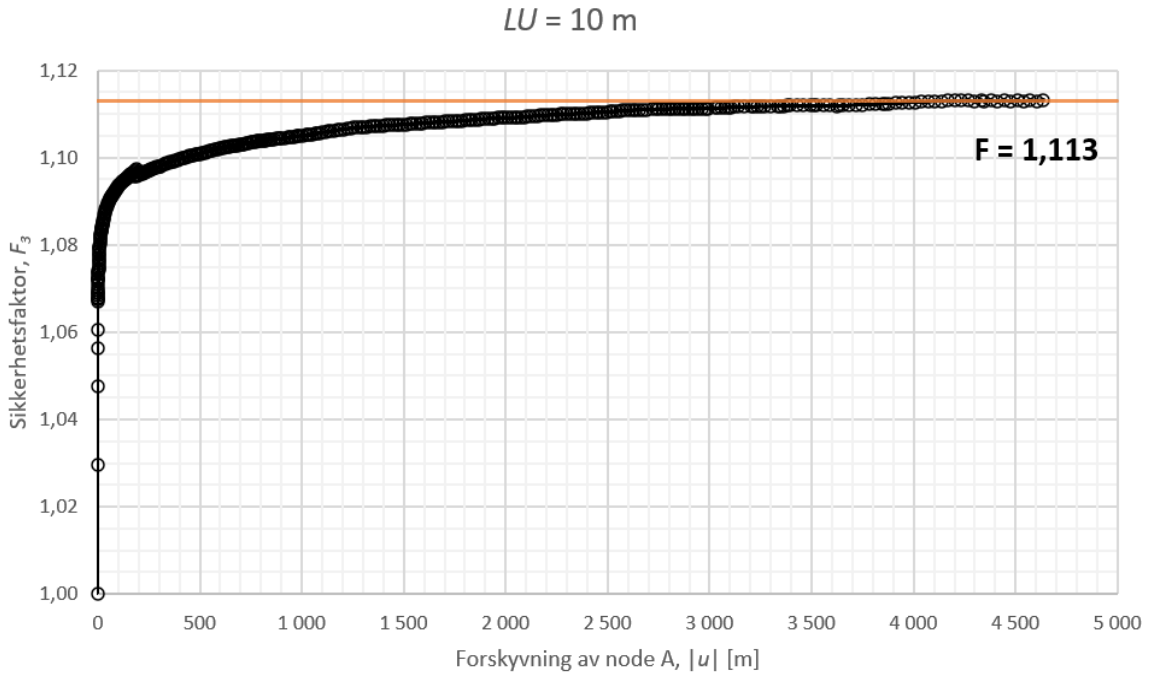
Maximum value = 19,05 (Element 197027 at Node 123769)

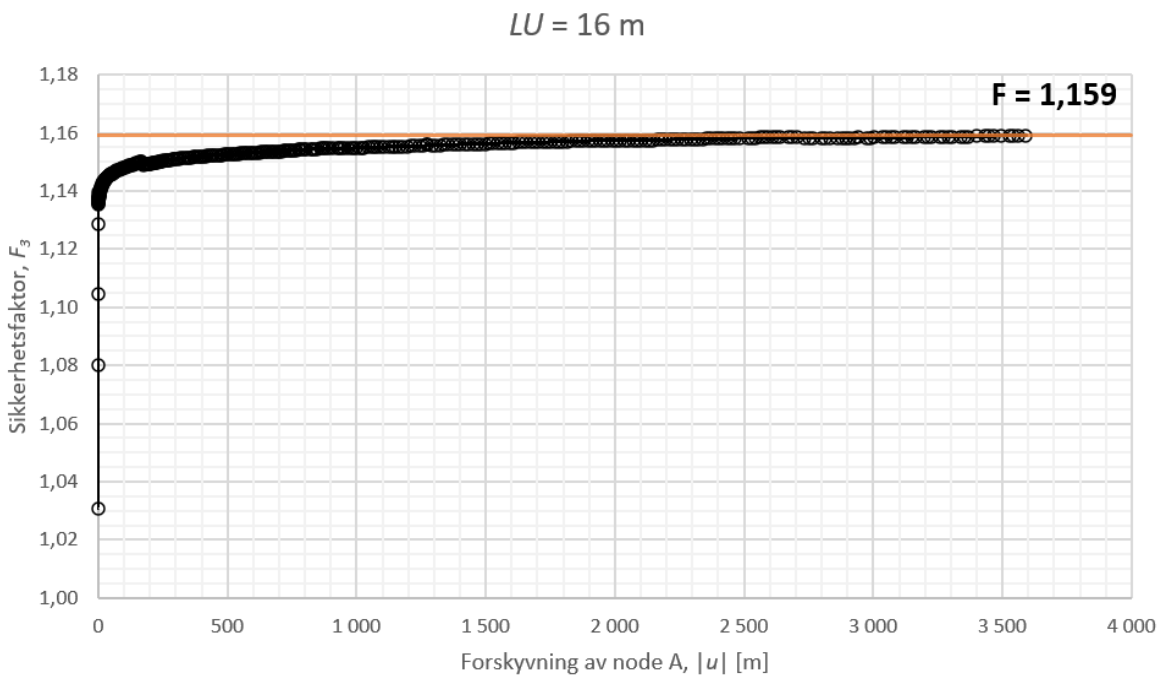
Minimum value = $0{,}01005 \cdot 10^{-6}$ (Element 82251 at Node 2100)

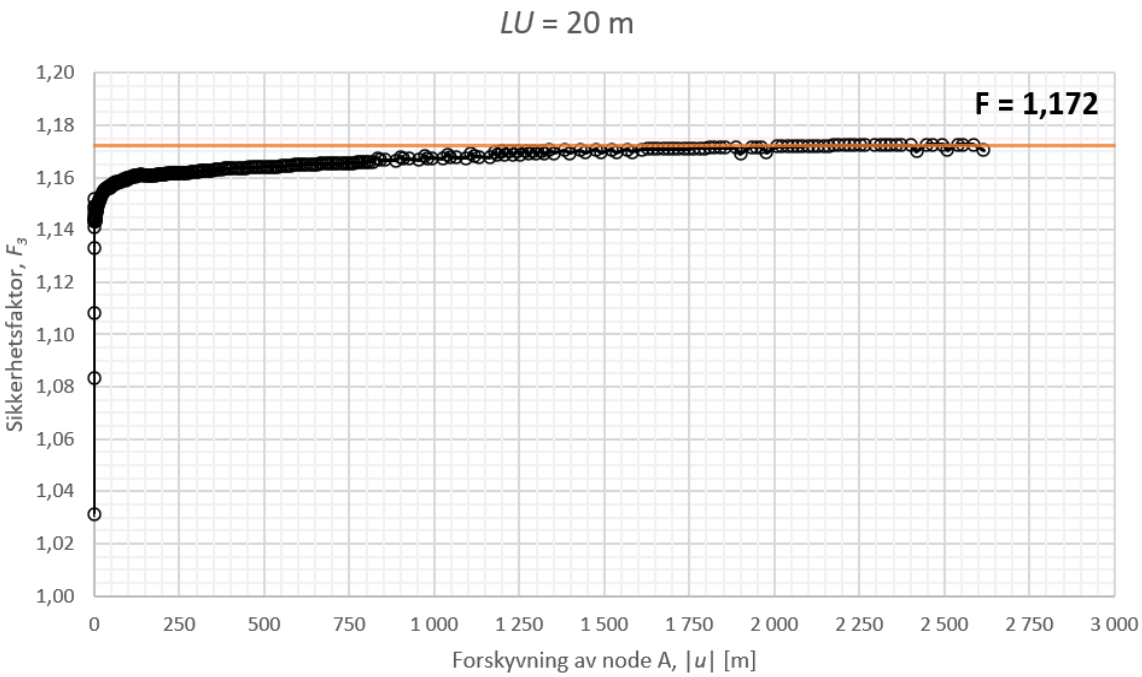
B.3 Plan tøyningsanalyser PLAXIS 3D med grøft

Sikkerhetsanalyser

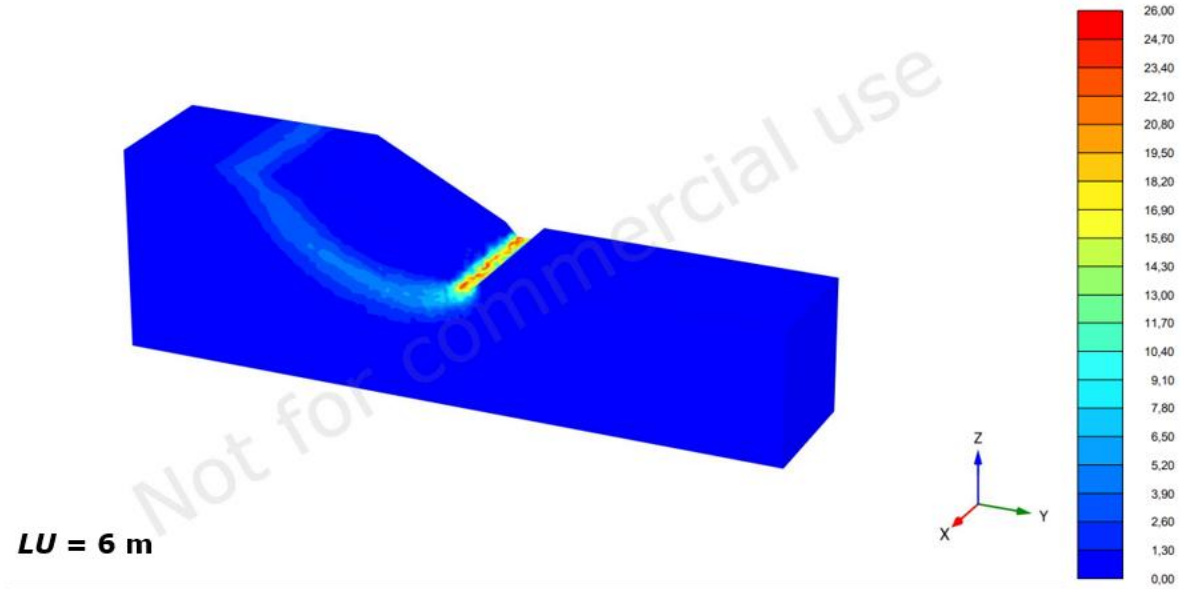





LU = 16 m
F = 1,159
Sikkerhetsfaktor, F_3
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
3 500
4 000
Forskyvning av node A, |u| [m]


LU = 20 m
F = 1,172
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]

Skjærflater

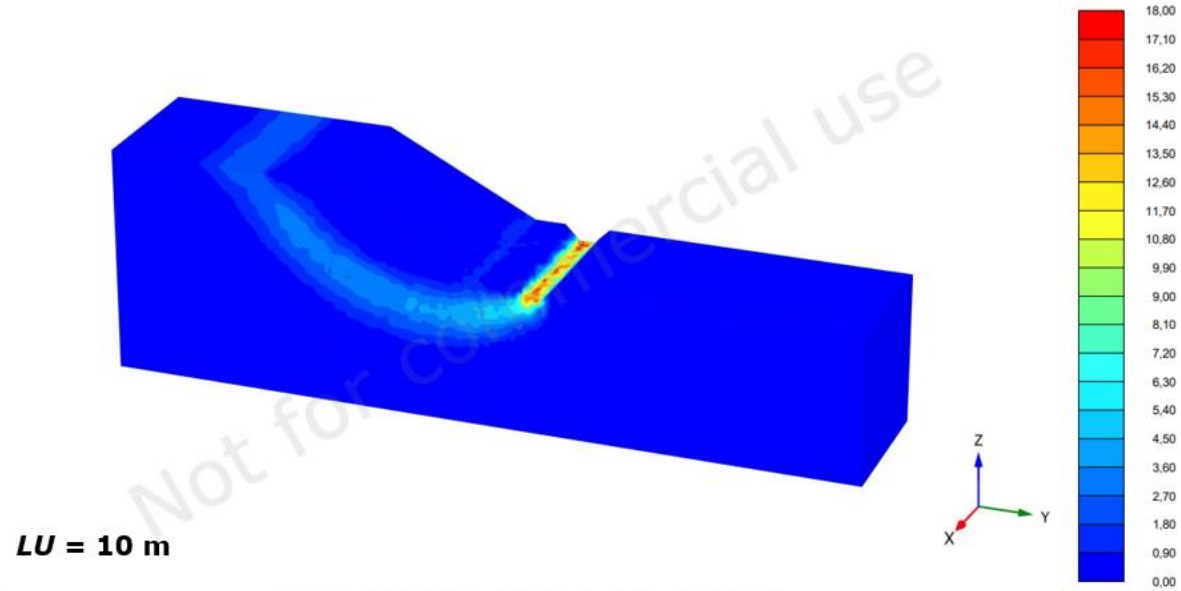


***LU* = 6 m**

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,100 times)

Maximum value = 27,42 (Element 87423 at Node 2032)

Minimum value = $1{,}253 \cdot 10^{-9}$ (Element 45198 at Node 2296)

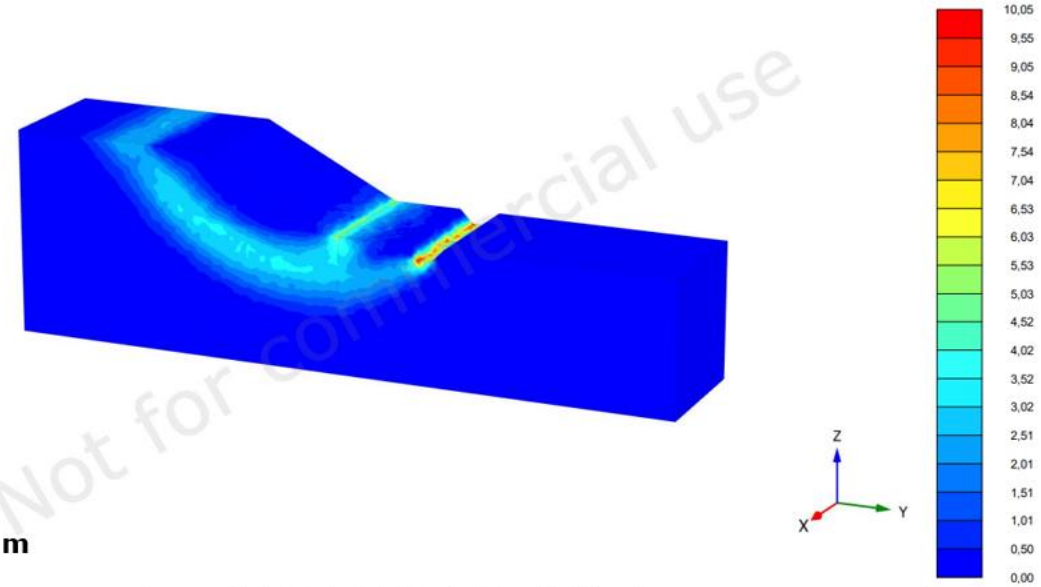


***LU* = 10 m**

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)

Maximum value = 19,83 (Element 86791 at Node 36191)

Minimum value = $5{,}289 \cdot 10^{-9}$ (Element 45169 at Node 61)

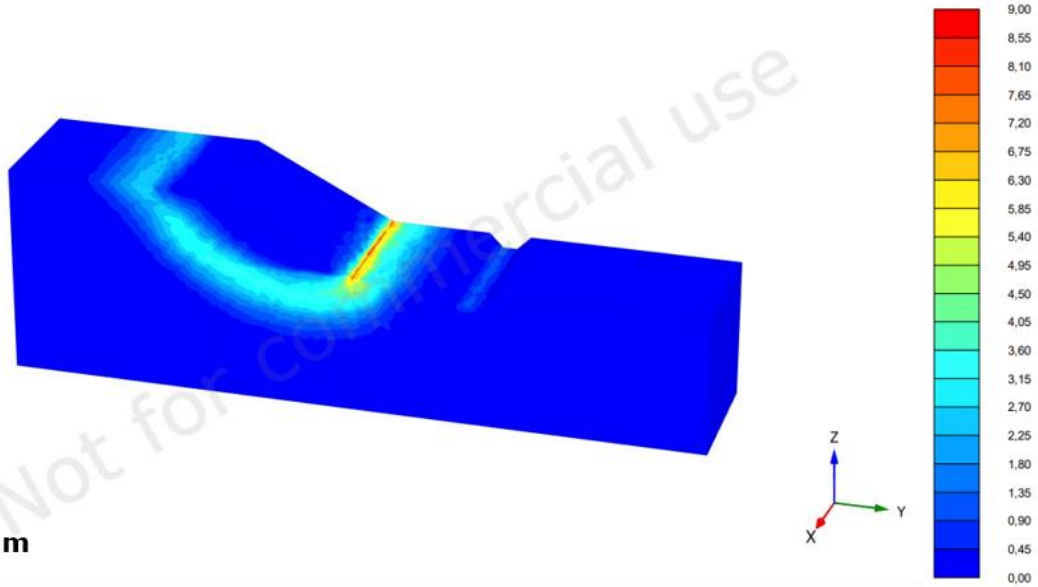


***LU* = 16 m**

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 10,05 (Element 87653 at Node 36275)

Minimum value = $3{,}391 \cdot 10^{-9}$ (Element 45191 at Node 61)



***LU* = 20 m**

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 9,690 (Element 38507 at Node 3111)

Minimum value = $2{,}426 \cdot 10^{-9}$ (Element 161501 at Node 3578)

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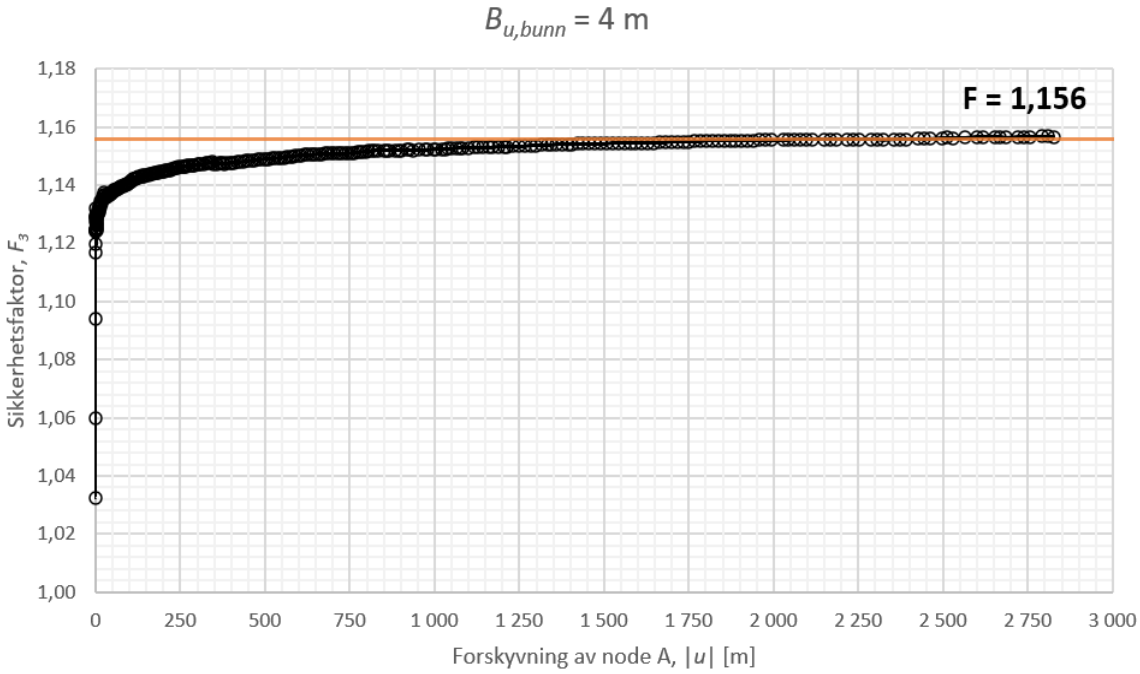
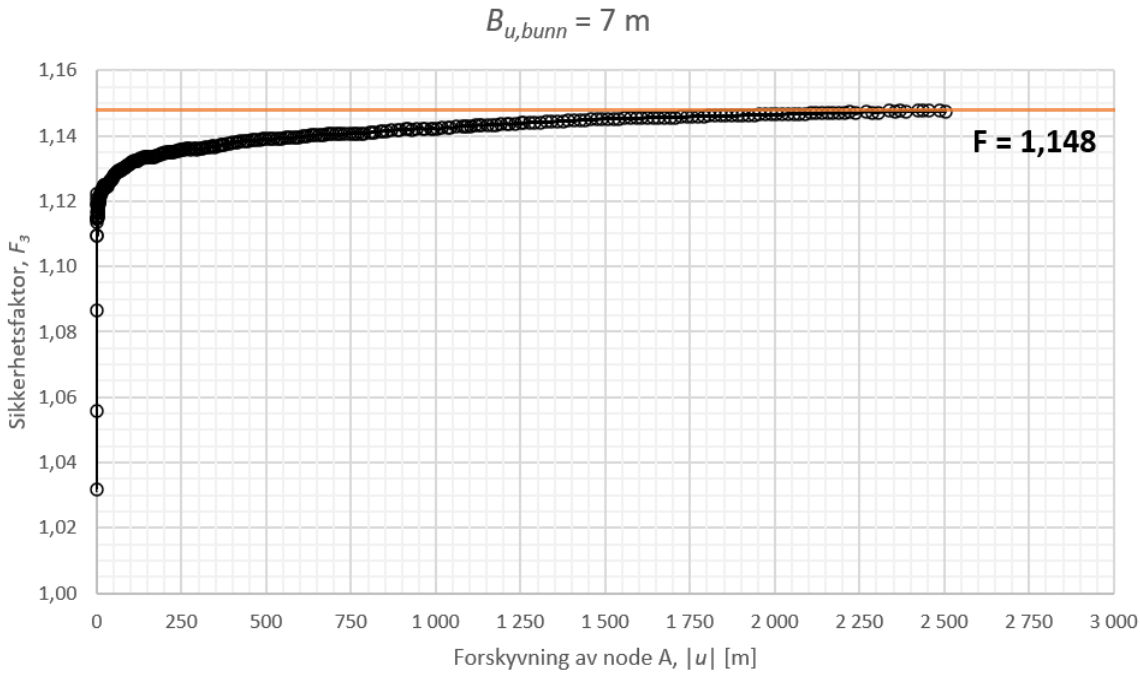
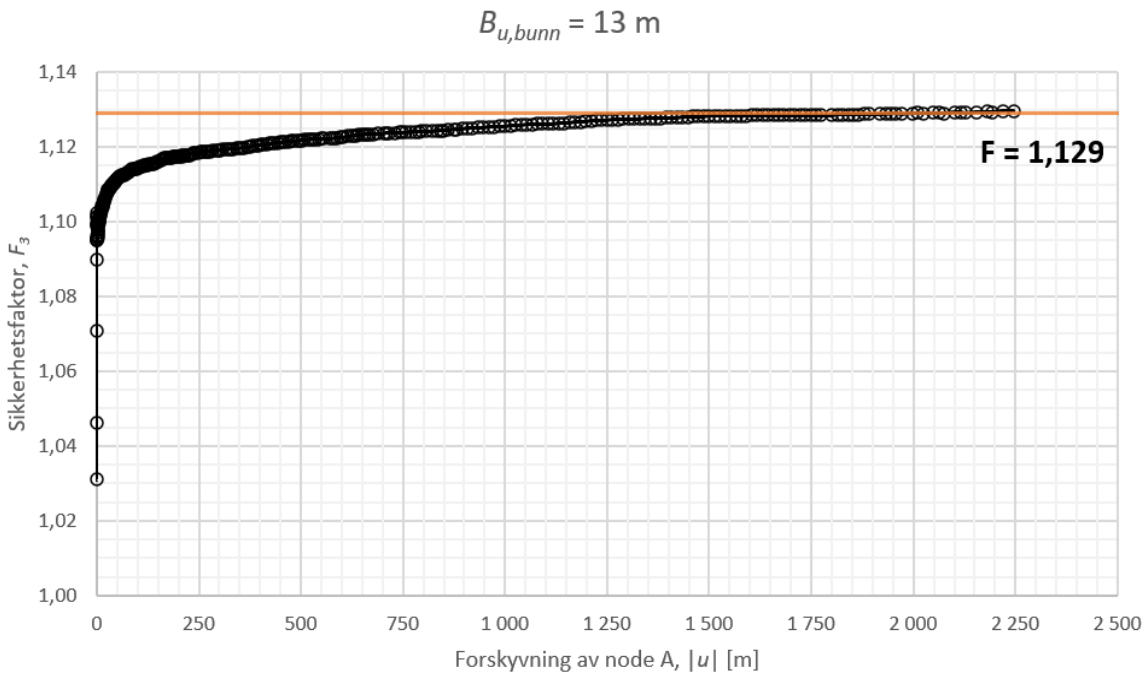
B.4 Sikkerhetsanalyser seksjonsvis utgraving PLAXIS 3D

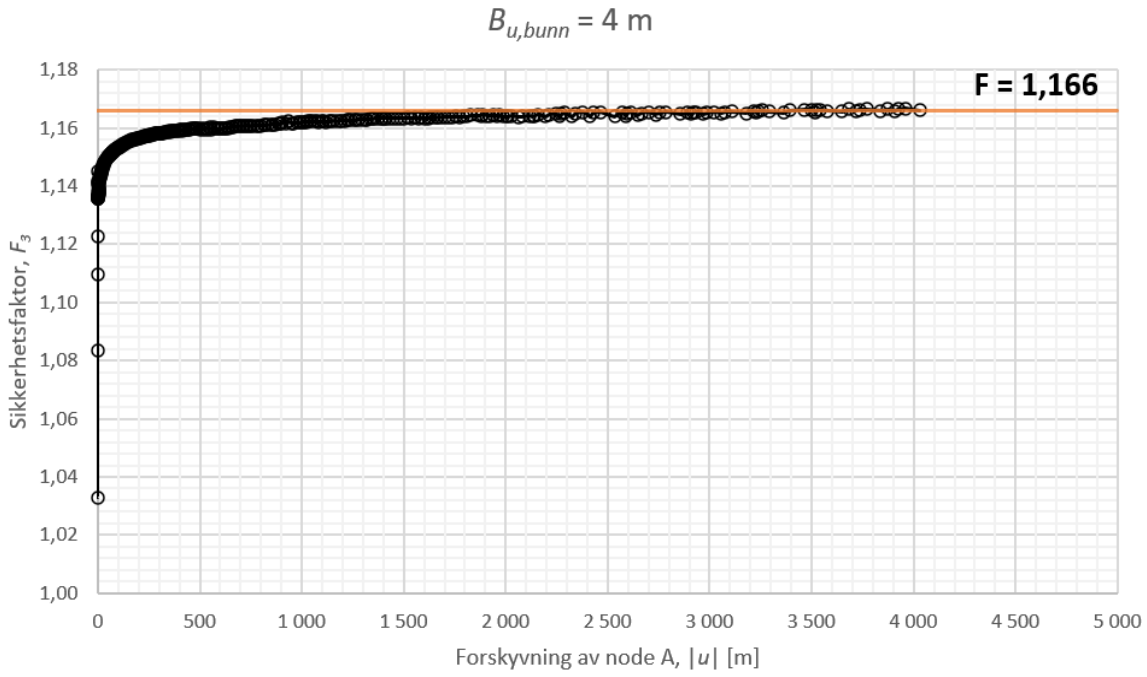
LU = 6 m

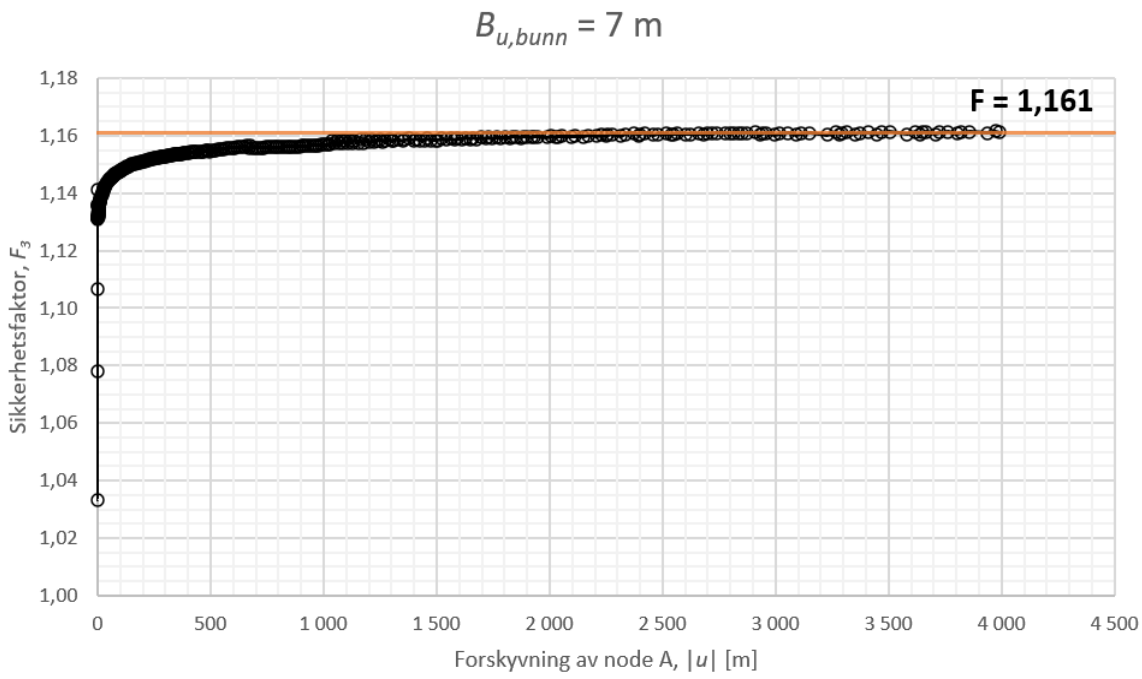


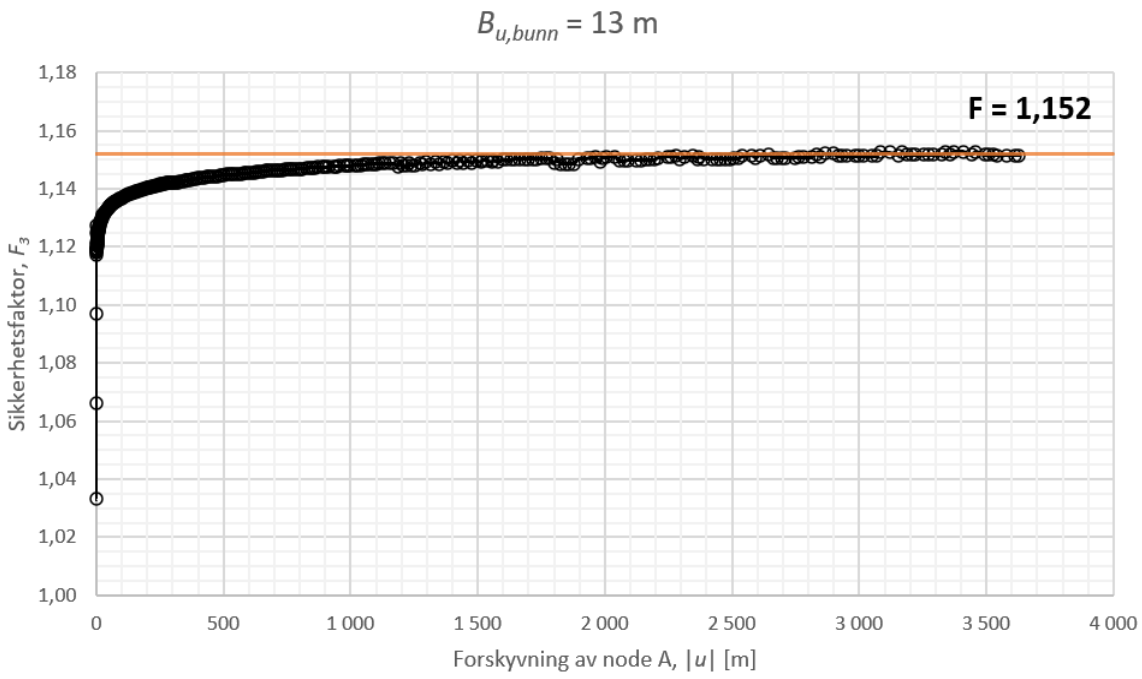



$B_{u,bunn}$ = 13 m
F = 1,129
Sikkerhetsfaktor, F_3
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
Forskyvning av node A, |u| [m]

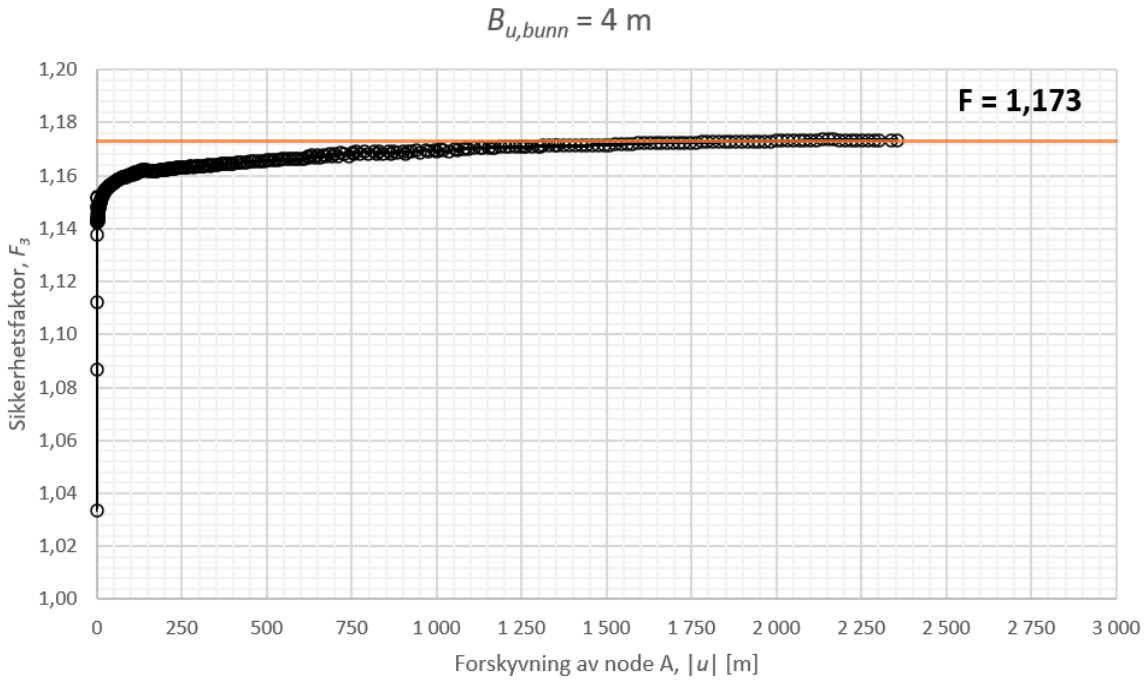
LU = 10 m

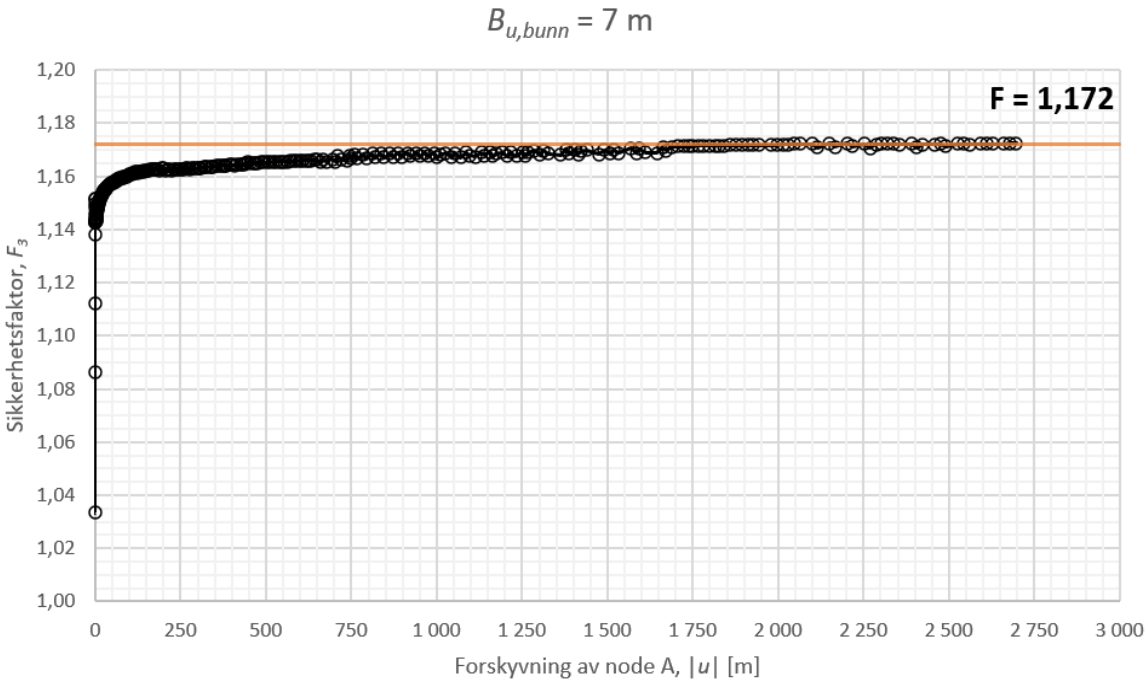

$B_{u,bunn}$ = 4 m
F = 1,166
Sikkerhetsfaktor, F_3
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
3 500
4 000
4 500
5 000
Forskyvning av node A, |u| [m]

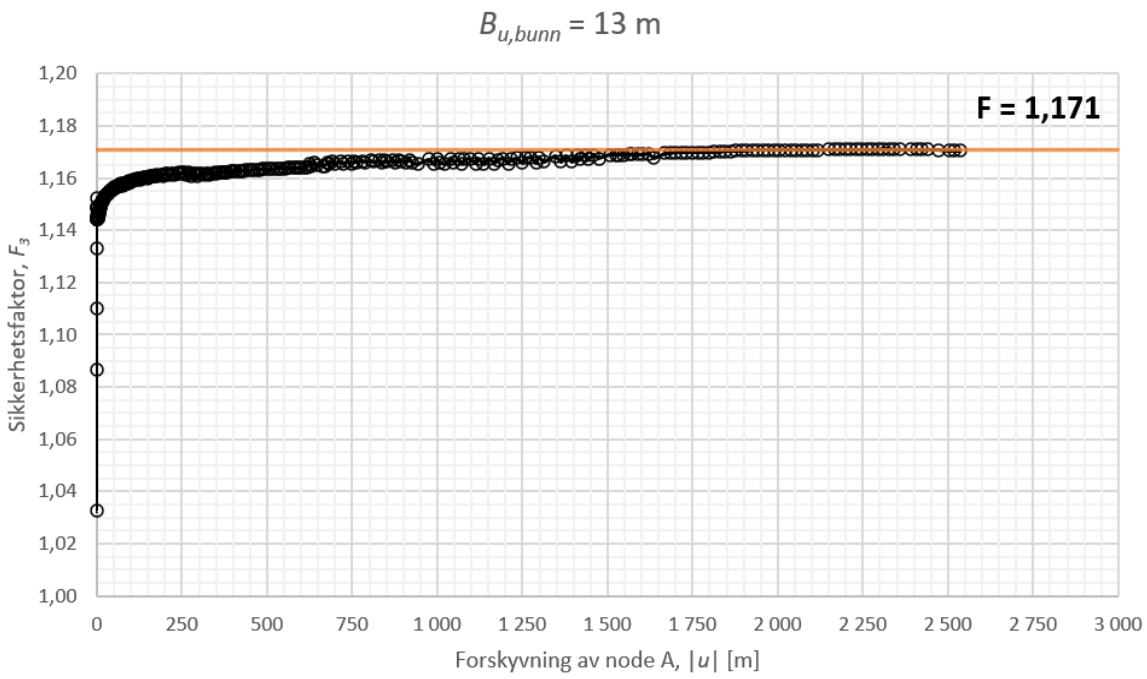

$B_{u,bunn}$ = 7 m
F = 1,161
Sikkerhetsfaktor, F_3
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
3 500
4 000
4 500
Forskyvning av node A, |u| [m]


$B_{u,bunn}$ = 13 m
F = 1,152
Sikkerhetsfaktor, F_3
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
500
1 000
1 500
2 000
2 500
3 000
3 500
4 000
Forskyvning av node A, |u| [m]

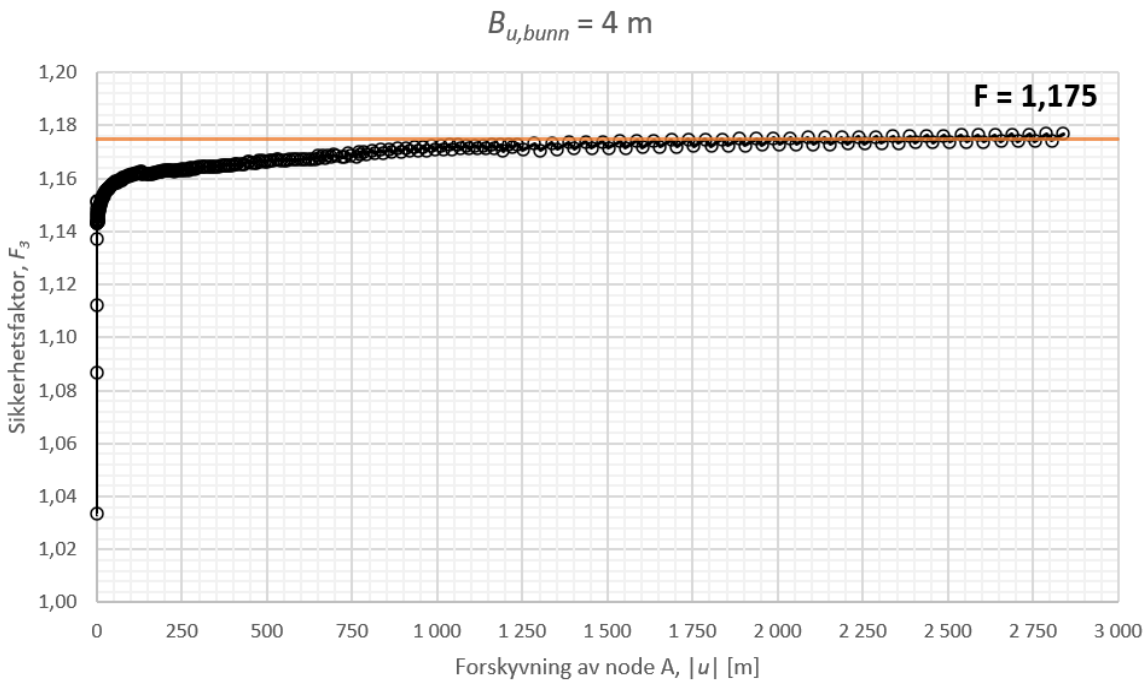
LU = 16 m

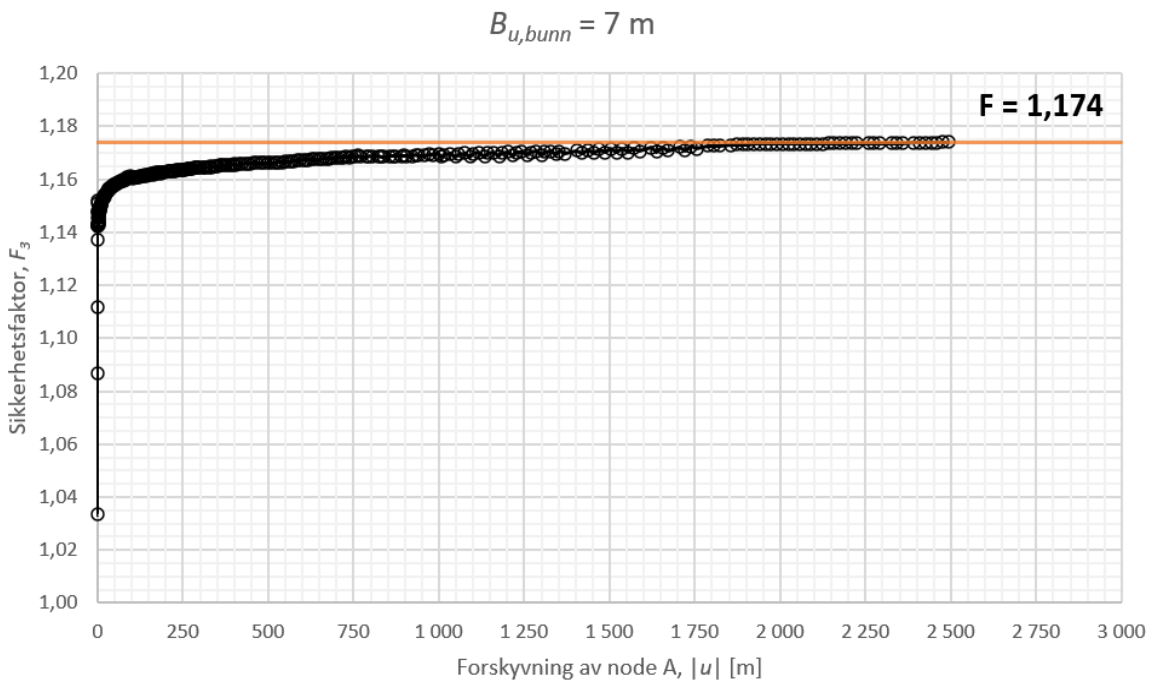

$B_{u,bunn}$ = 4 m
F = 1,173
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]

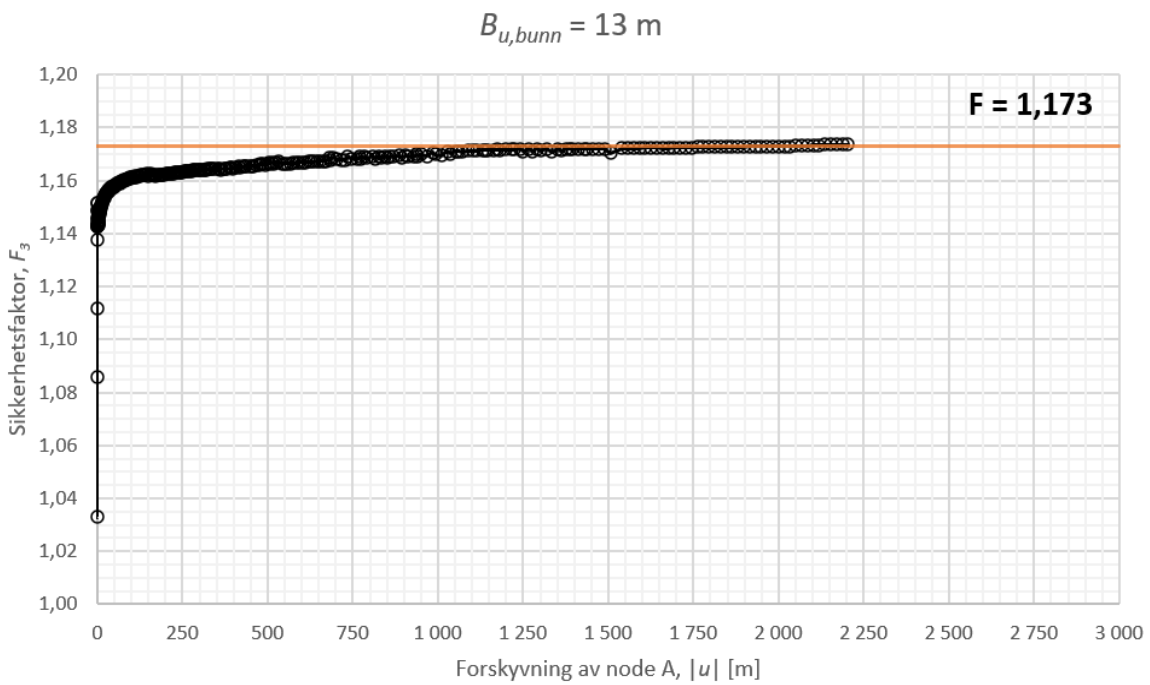

$B_{u,bunn}$ = 7 m
F = 1,172
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]


$B_{u,bunn}$ = 13 m
F = 1,171
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]

LU = 20 m

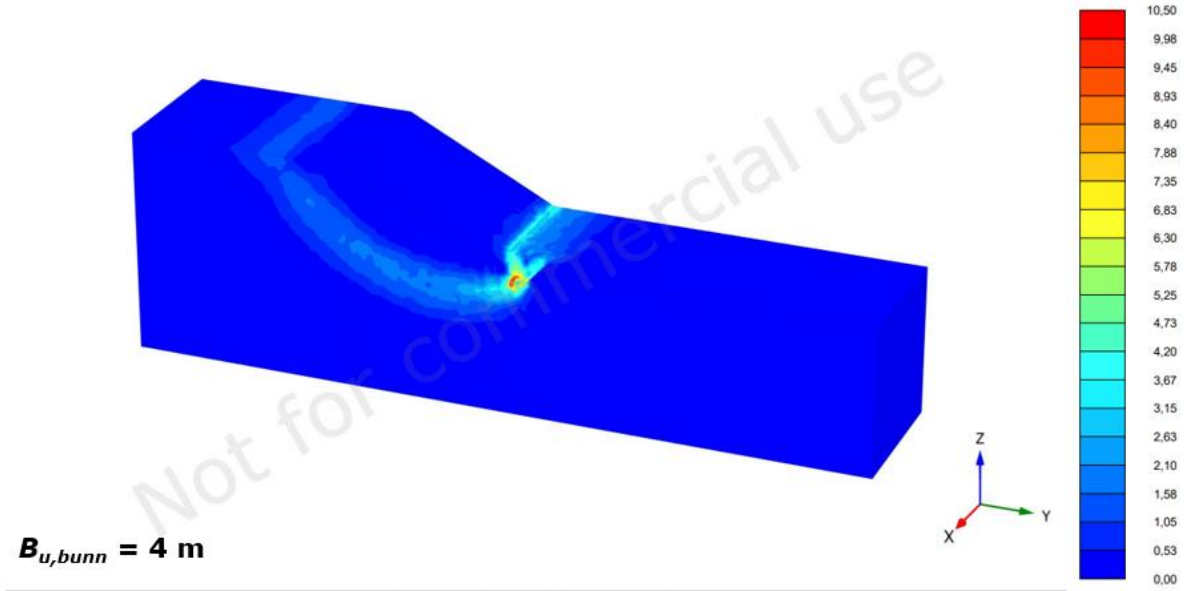

$B_{u,bunn}$ = 4 m
F = 1,175
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]


$B_{u,bunn}$ = 7 m
F = 1,174
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]


$B_{u,bunn}$ = 13 m
F = 1,173
Sikkerhetsfaktor, F_3
1,20
1,18
1,16
1,14
1,12
1,10
1,08
1,06
1,04
1,02
1,00
0
250
500
750
1 000
1 250
1 500
1 750
2 000
2 250
2 500
2 750
3 000
Forskyvning av node A, |u| [m]

B.5 Skjærflater seksjonsvis utgraving PLAXIS 3D

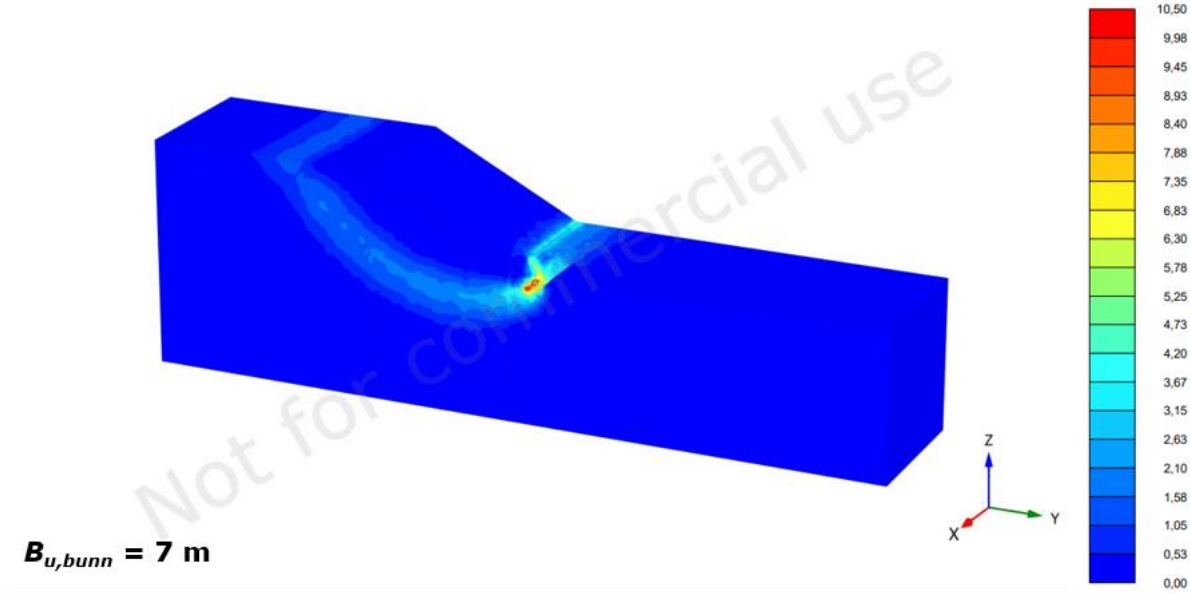
LU = 6 m



Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)

Maximum value = 11,54 (Element 99918 at Node 3393)

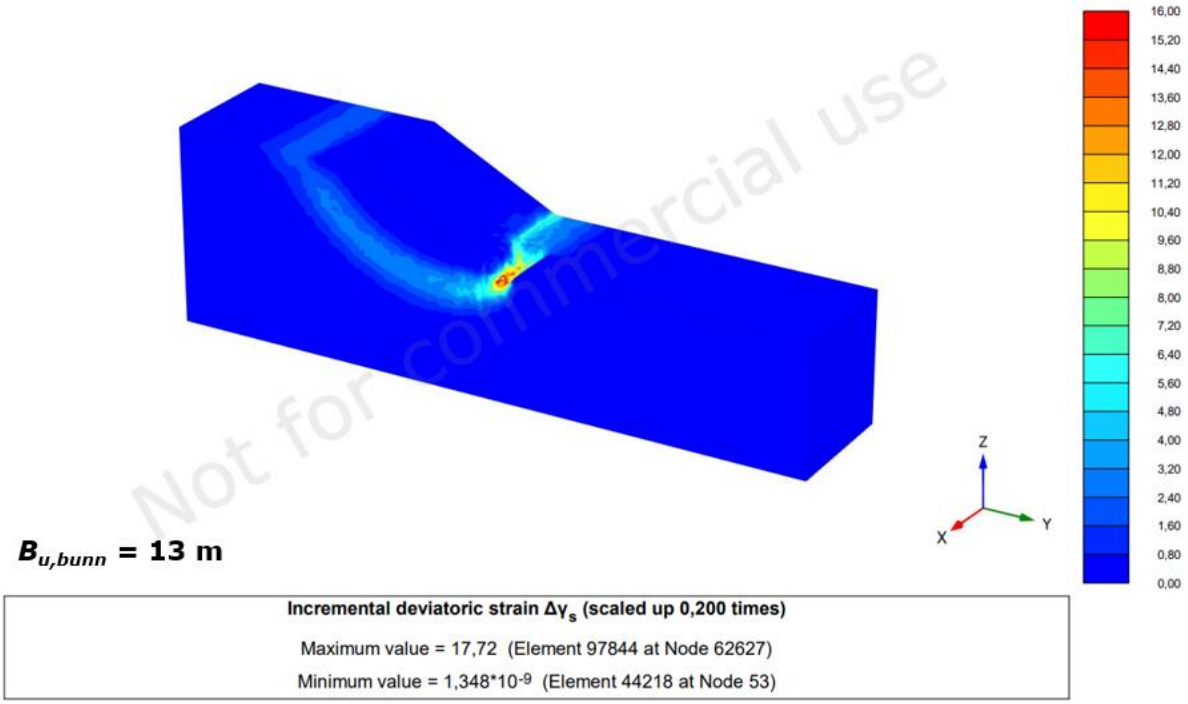
Minimum value = $5{,}324 \cdot 10^{-9}$ (Element 43823 at Node 53)



Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)

Maximum value = 12,30 (Element 96934 at Node 62591)

Minimum value = $1{,}262 \cdot 10^{-9}$ (Element 44124 at Node 53)



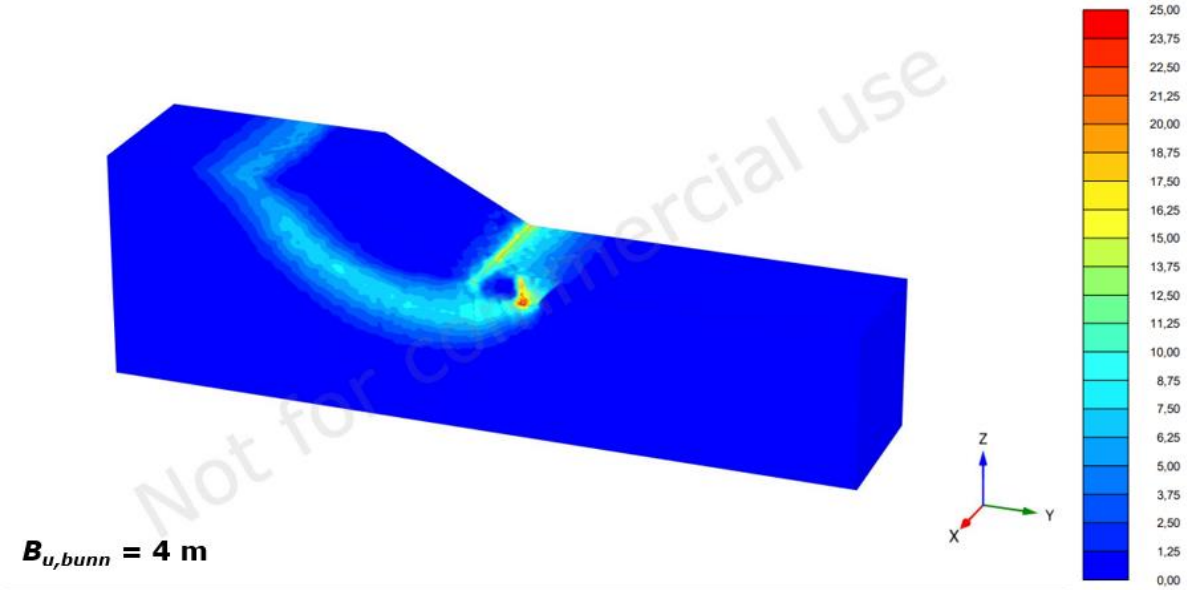
$B_{u,bunn}$ = 13 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)

Maximum value = 17,72 (Element 97844 at Node 62627)

Minimum value = $1{,}348 \cdot 10^{-9}$ (Element 44218 at Node 53)

LU = 10 m

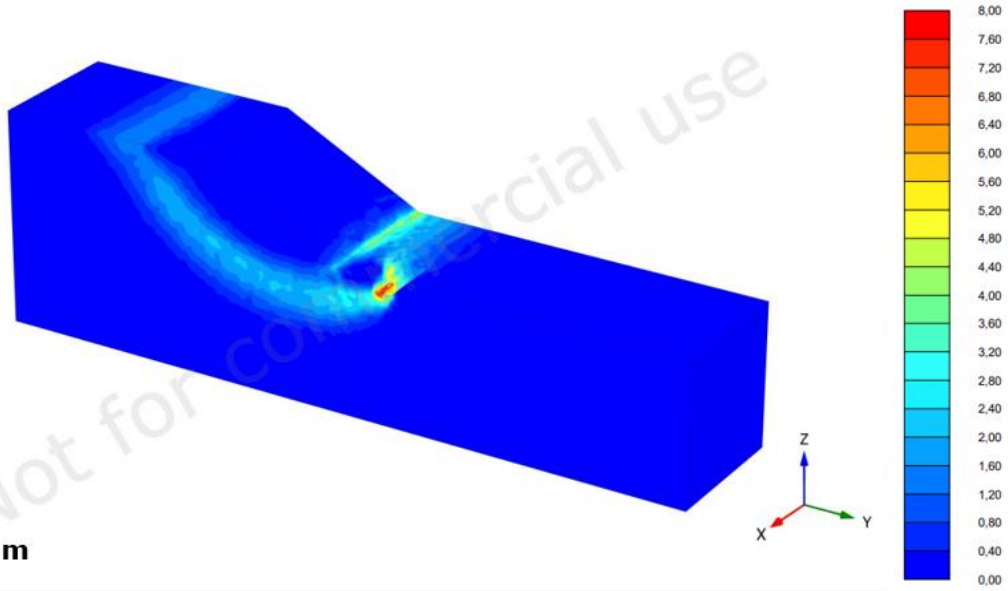


$B_{u,bunn}$ = 4 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,100 times)

Maximum value = 27,84 (Element 90356 at Node 62553)

Minimum value = $1{,}515 \cdot 10^{-9}$ (Element 43959 at Node 53)

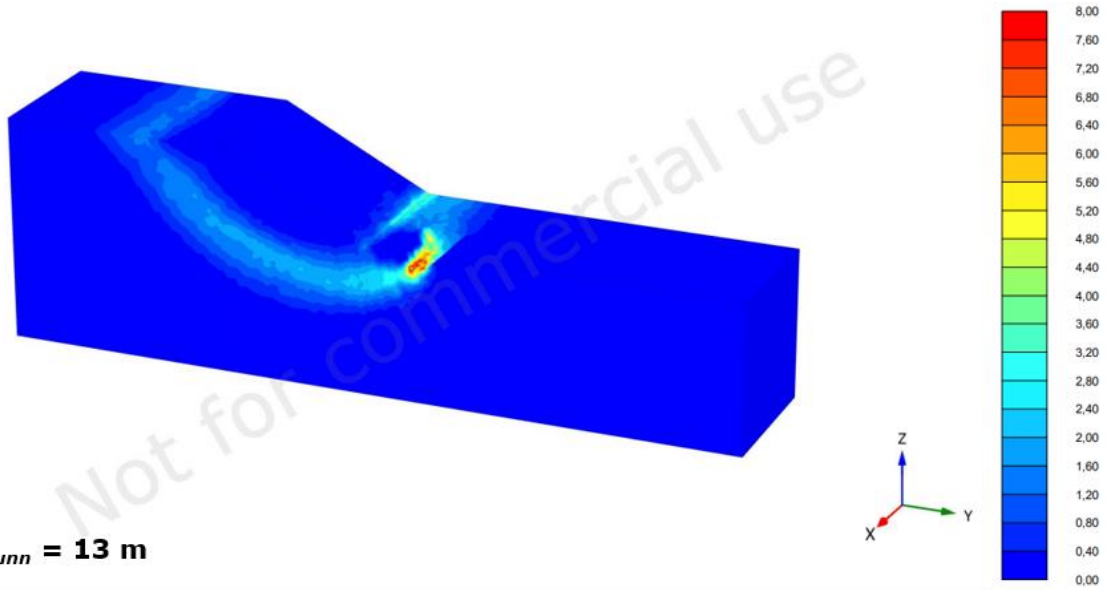


$B_{u,bunn}$ = 7 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 8,768 (Element 93313 at Node 62555)

Minimum value = $2{,}662 \cdot 10^{-9}$ (Element 159137 at Node 2029)



$B_{u,bunn}$ = 13 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 8,886 (Element 99701 at Node 62555)

Minimum value = $1{,}438 \cdot 10^{-9}$ (Element 160698 at Node 3463)

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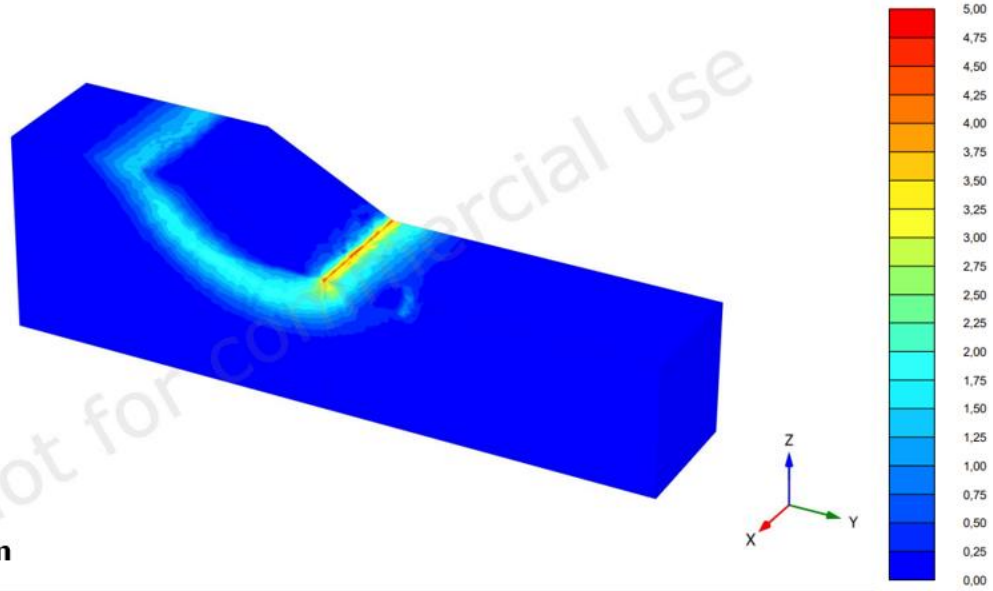
LU = 16 m

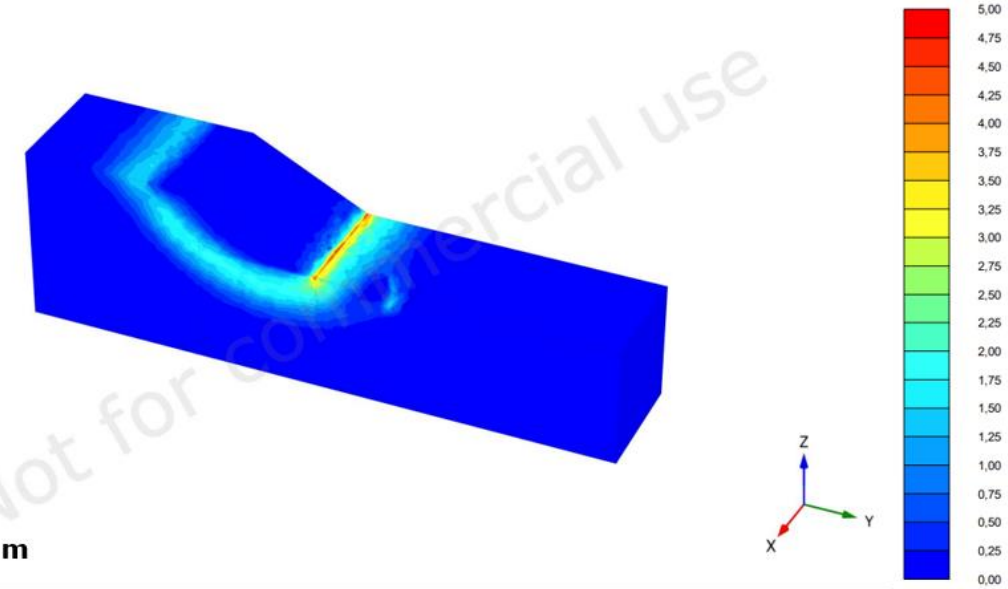


$B_{u,bunn}$ = 4 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 5,005 (Element 32607 at Node 1406)

Minimum value = 0,5544*10^{-9} (Element 43969 at Node 53)

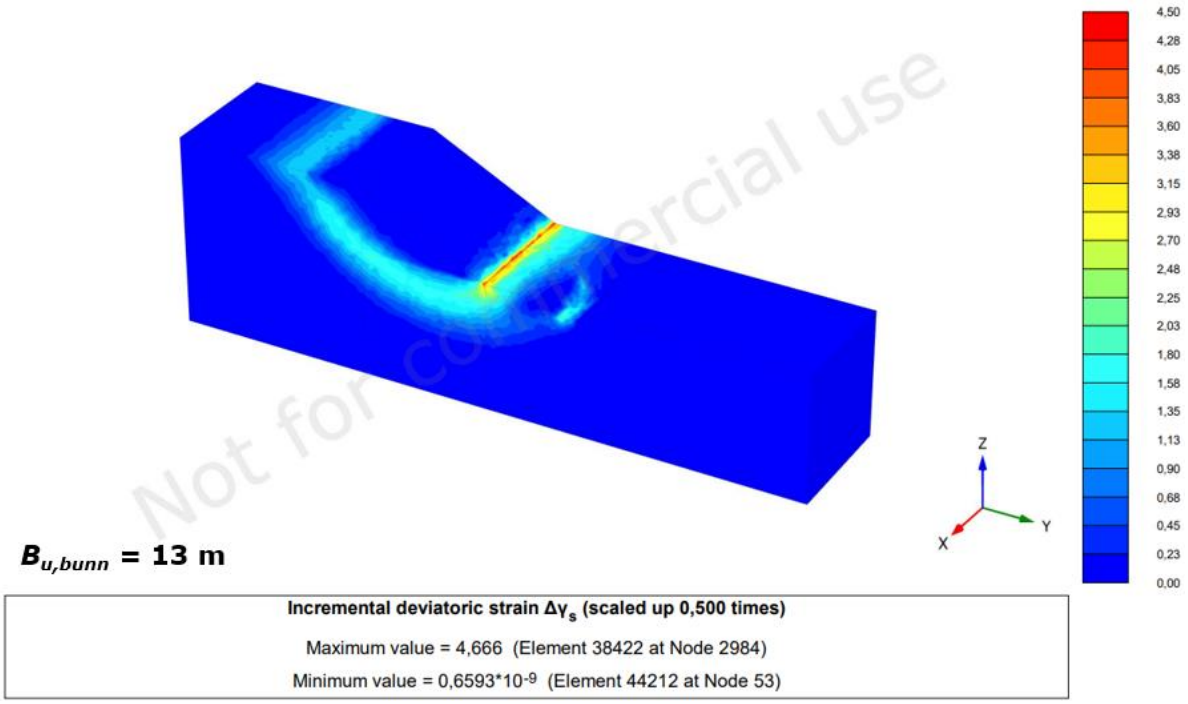


$B_{u,bunn}$ = 7 m

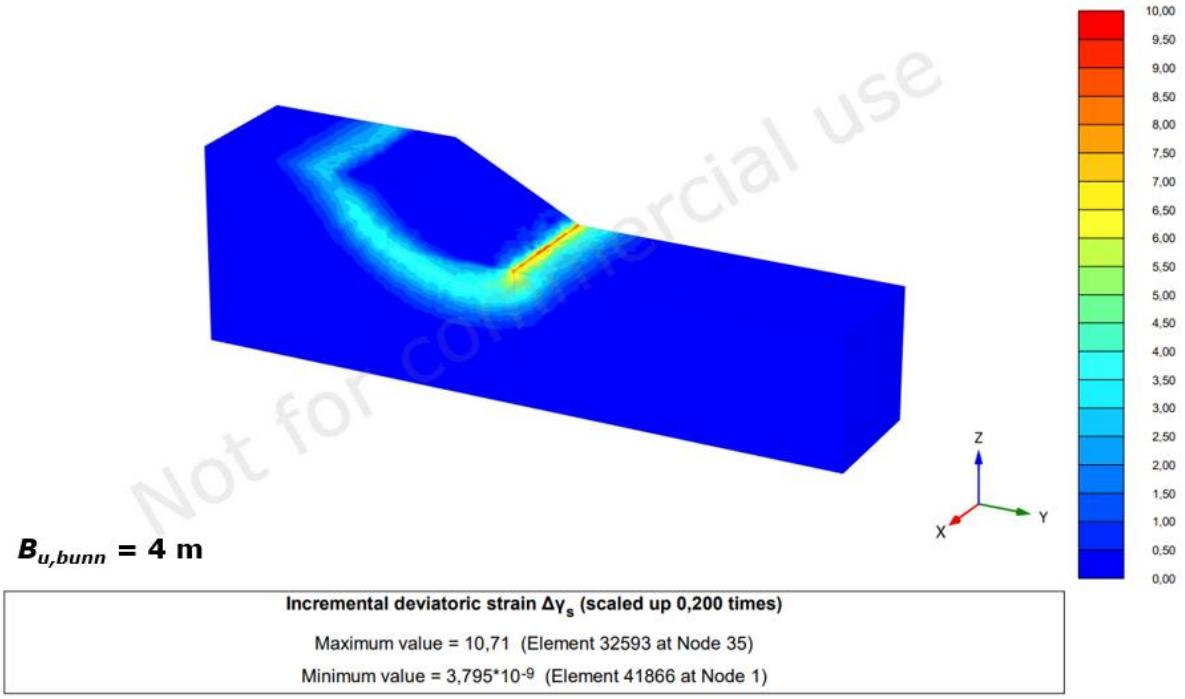
Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

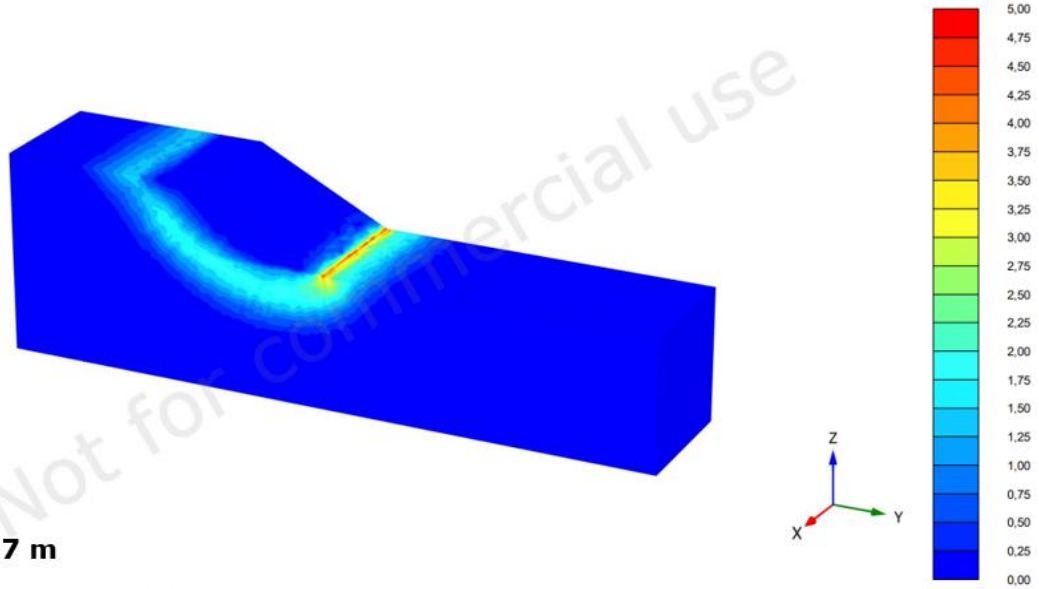
Maximum value = 5,221 (Element 32483 at Node 1396)

Minimum value = 0,6026*10^{-9} (Element 43660 at Node 2198)


4,50
4,28
4,05
3,83
3,60
3,38
3,15
2,93
2,70
2,48
2,25
2,03
1,80
1,58
1,35
1,13
0,90
0,68
0,45
0,23
0,00
Z
Y
X
$B_{u,bunn}$ = 13 m
Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)
Maximum value = 4,666 (Element 38422 at Node 2984)
Minimum value = 0,6593*10^{-9} (Element 44212 at Node 53)

LU = 20 m


10,00
9,50
9,00
8,50
8,00
7,50
7,00
6,50
6,00
5,50
5,00
4,50
4,00
3,50
3,00
2,50
2,00
1,50
1,00
0,50
0,00
Z
Y
X
$B_{u,bunn}$ = 4 m
Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,200 times)
Maximum value = 10,71 (Element 32593 at Node 35)
Minimum value = 3,795*10^{-9} (Element 41866 at Node 1)

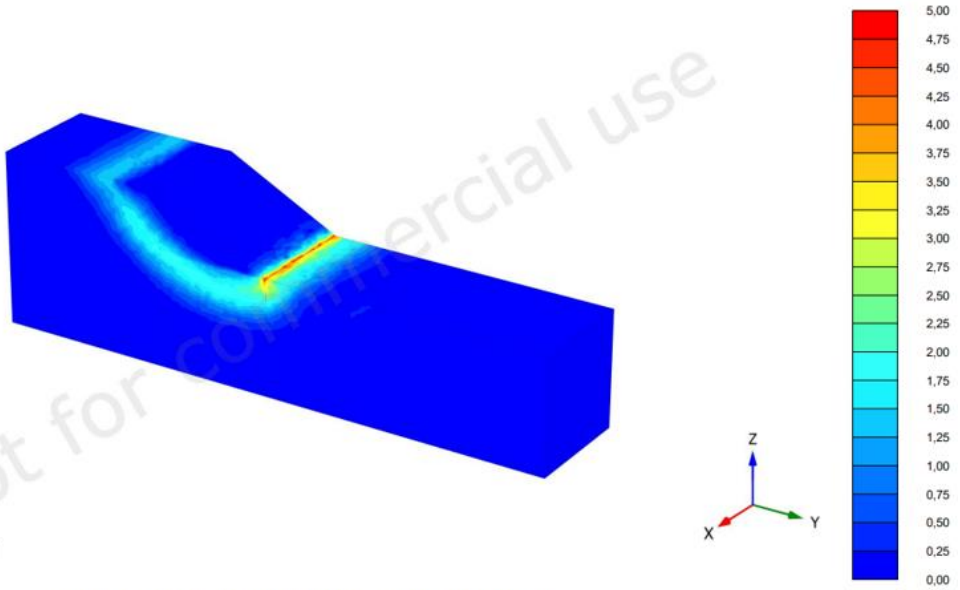


$B_{u,bunn}$ = 7 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

Maximum value = 5,020 (Element 38415 at Node 2984)

Minimum value = $0{,}3760 \cdot 10^{-9}$ (Element 43992 at Node 53)



$B_{u,bunn}$ = 13 m

Incremental deviatoric strain $\Delta\gamma_s$ (scaled up 0,500 times)

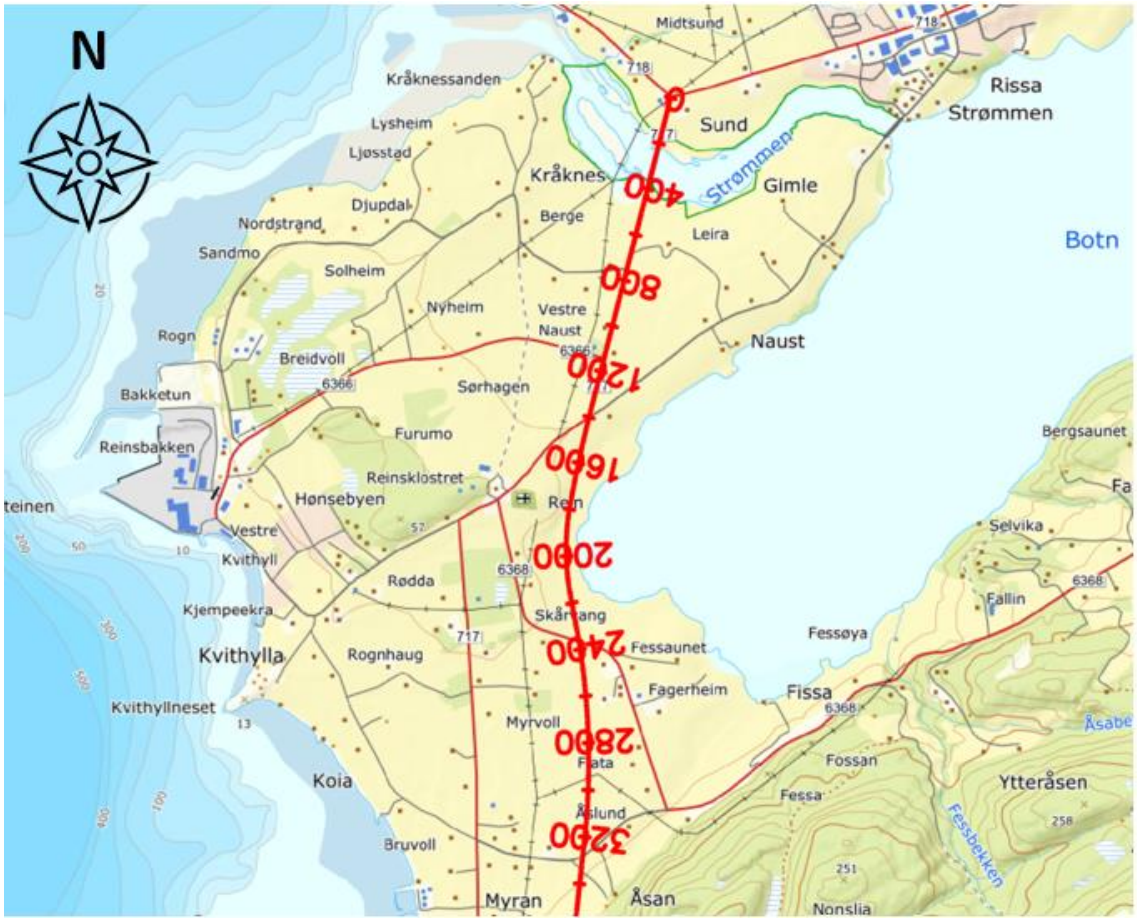
Maximum value = 5,108 (Element 38407 at Node 2987)

Minimum value = $1{,}147 \cdot 10^{-9}$ (Element 44302 at Node 2203)

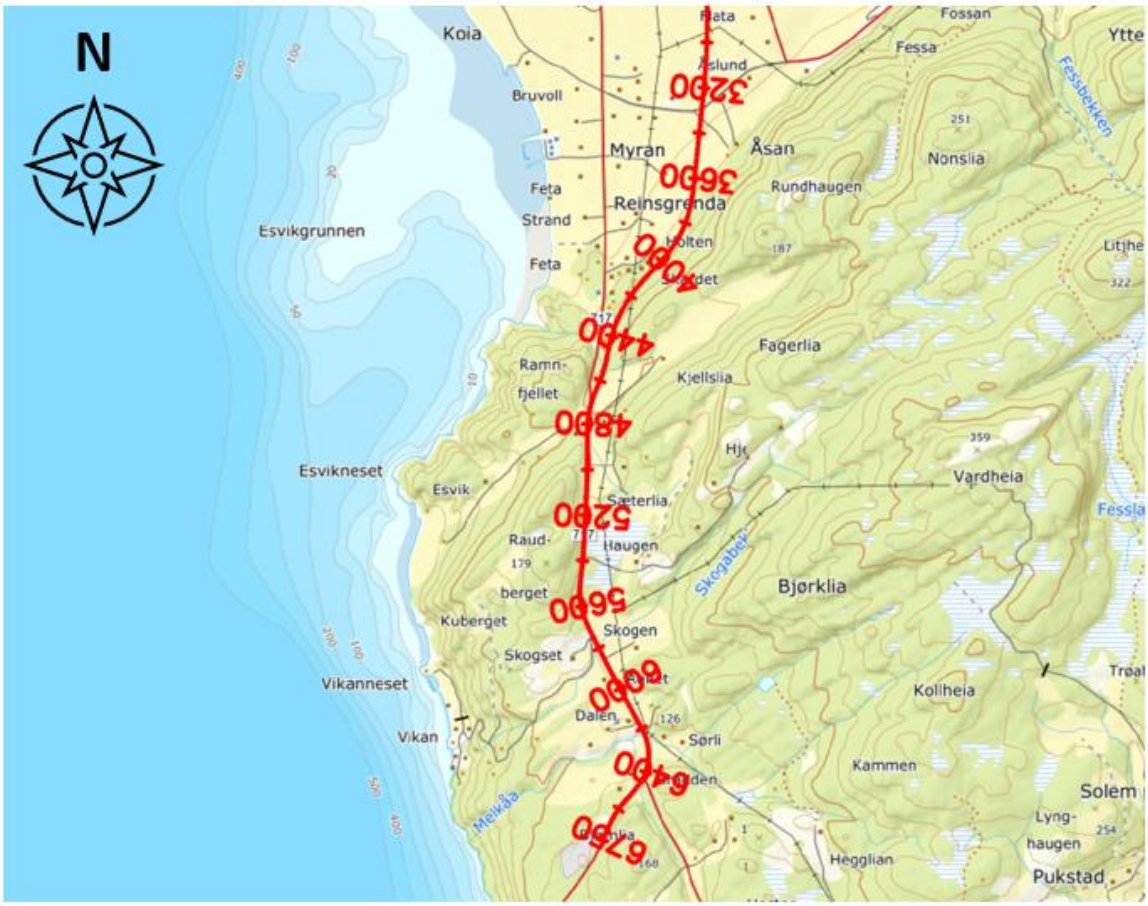
Not for commercial use

Tillegg C Oversiktskart Rissa

C.1 Prosjektert vegtrasé mellom Sund og Bradden

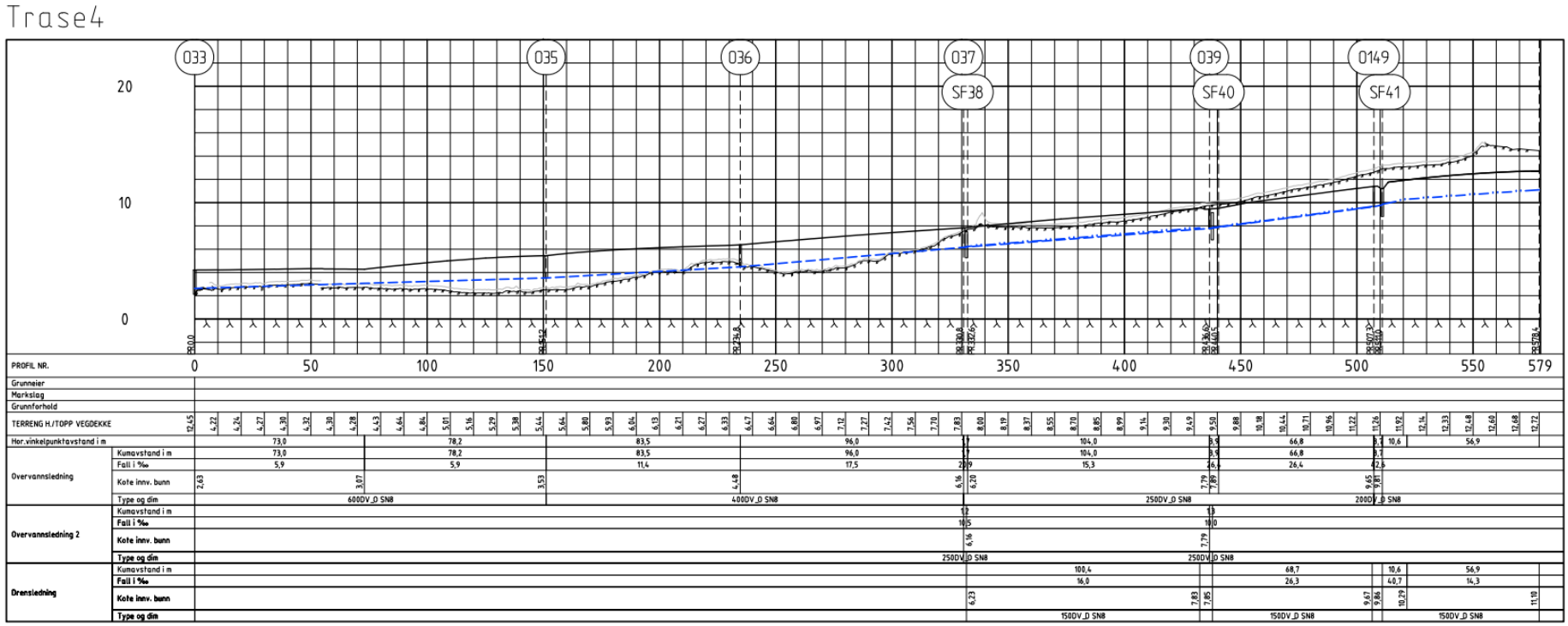


Figur C.1 Prosjektert vegtrasé mellom profil 0 og 3200.

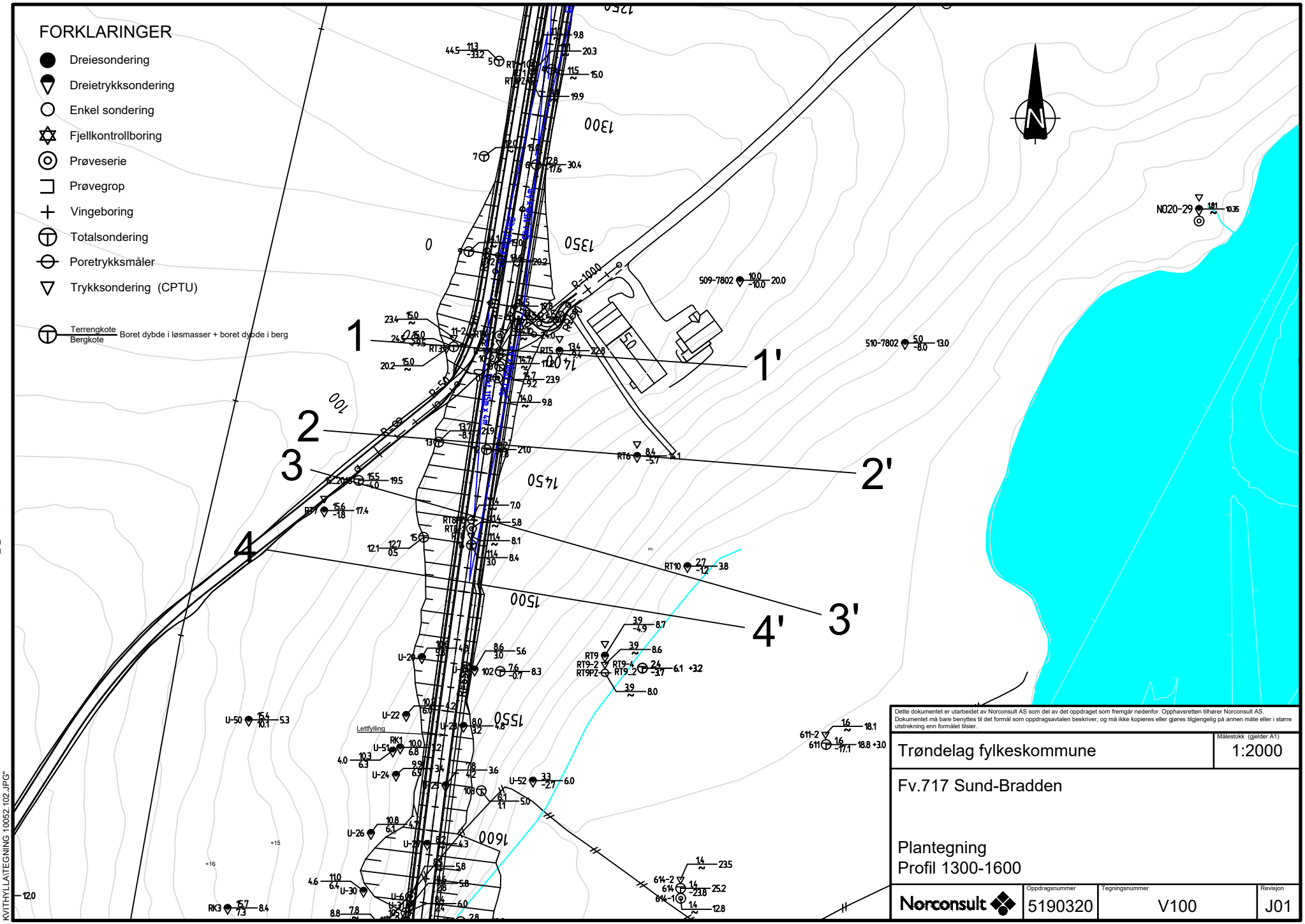


Figur C.2 Prosjektert vegtrasé mellom profil 3200 og 6750.

C.2 Lengdeprofil prosjektert ledningstrasé mellom profil 1450 og 1950 i vegtraseen



C.3 Oversiktskart tidligere grunnundersøkelse



Dette dokumentet er utarbeidet av Norconsult AS som del av det oppdraget som fremgår nedenfor. Opphavsretten tilhører Norconsult AS. Dokumentet må bare benyttes til det formål som oppdragsavtalen beskriver, og må ikke kopieres eller gjøres tilgjengelig på annen måte eller i større utstrekning enn formålet tilsier.

Trøndelag fylkeskommune	Målestokk (gjelder A1) 1:2000

Fv.717 Sund-Bradden

Plantegning
Profil 1300-1600

Norconsult	Oppdragsnummer	Tegningsnummer	Revisjon
	5190320	V100	J01

"X:\nor\oppdrag\Steinkjer\519\03\5190320\BIM\Geoteknikk\Arkfil\Plantegning.dwg - EmiCed - Plottet: 2022-06-05, 14:30:51 - LAYOUT = Layout3 - XREF = Plassering av profiler, Sjøbunnskart, T_NO20SUP, T_sonderinger, Kvithylla, Centerlinje 14000, Plantegning Vertikaldren, T_KART_2D, T_GEOM_VEG, T_BERGBLOTNINGER - RASTER = N:\519\03\5190320\05 ARBEID\DOKUMENTER\52 RIG\RIG-17 DEPONIER KVITHYLLA\Q8876_PLAN.JPG, N:\519\03\5190320\05 ARBEID\DOKUMENTER\52 RIG\DIVERSE VURDERING\DEPONI KVITHYLLA\TEGNING 10052_3_102.JPG, X:\NOR\OPPDRAG\STEINKJER\519\03\5190320\05 ARBEID\DOKUMENTER\52 RIG\DIVERSE VURDERING\DEPONI KVITHYLLA\TEGNING 10052_102.JPG"

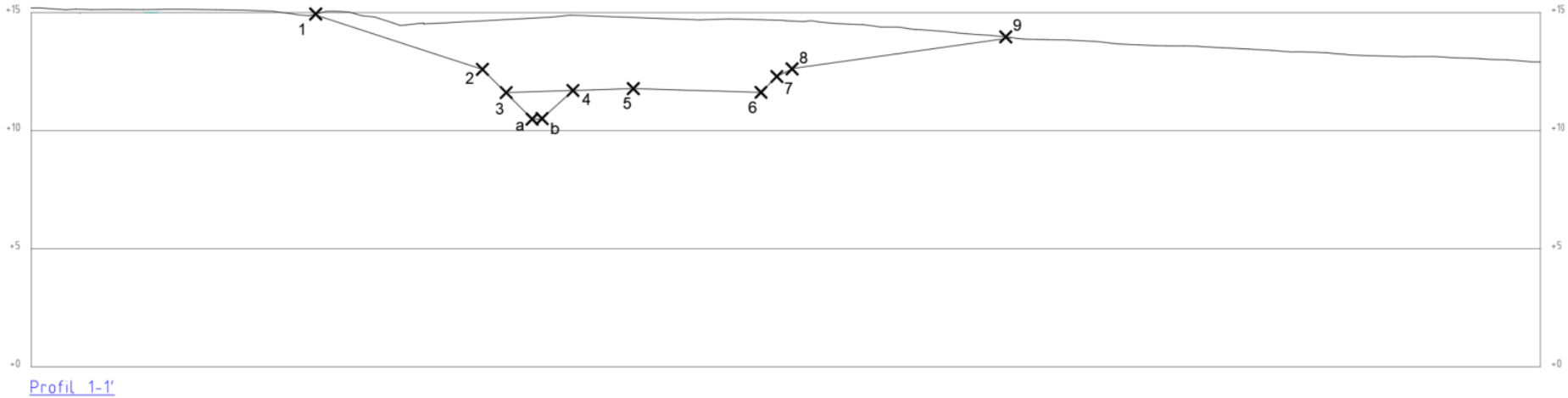
C.4 Opprinnelige koordinater

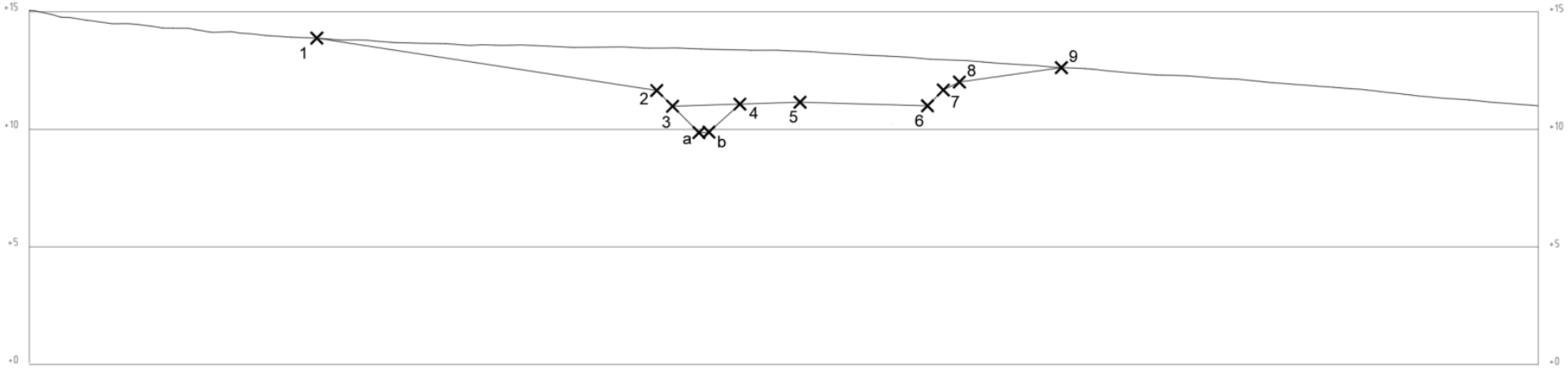
Tabell C.1 Koordinatene til borehullene i koordinatsystem NTM sone 9 og høydesystem NN2000.

Borehull	**Koordinat**		
	x (nord)	y (øst)	z (høyde)
11	1620472,196	121422,19	15
RT5	1620470,246	121466,113	13,408
13	1620432,709	121415,667	13,725
RT6	1620426,322	121497,948	8,437
15_2018	1620417,029	121382,378	15,498
14	1620389,915	121428,902	11,447
RT10	1620380,416	121518,47	2,688
RT9_2	1620338,747	121501,729	2,4
102	1620337,336	121440,438	7,635
U-20	1620343,511	121408,02	10,6

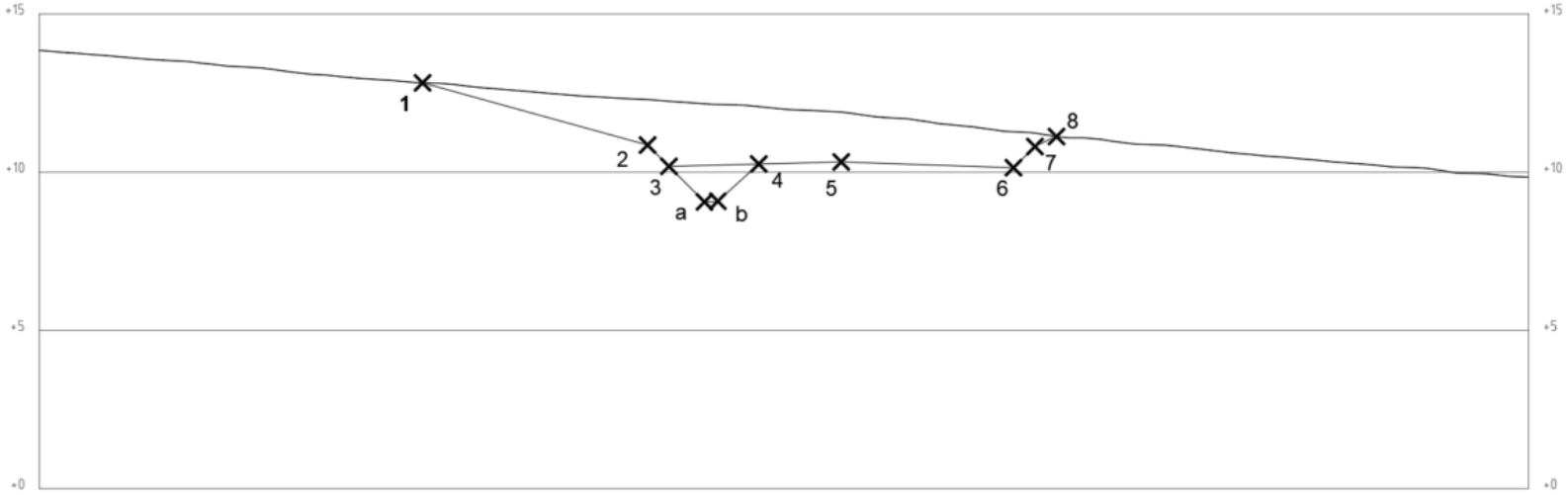
Tillegg D Tiltak Rissa

D.1 Tverrsnitt tiltak 1 og 2

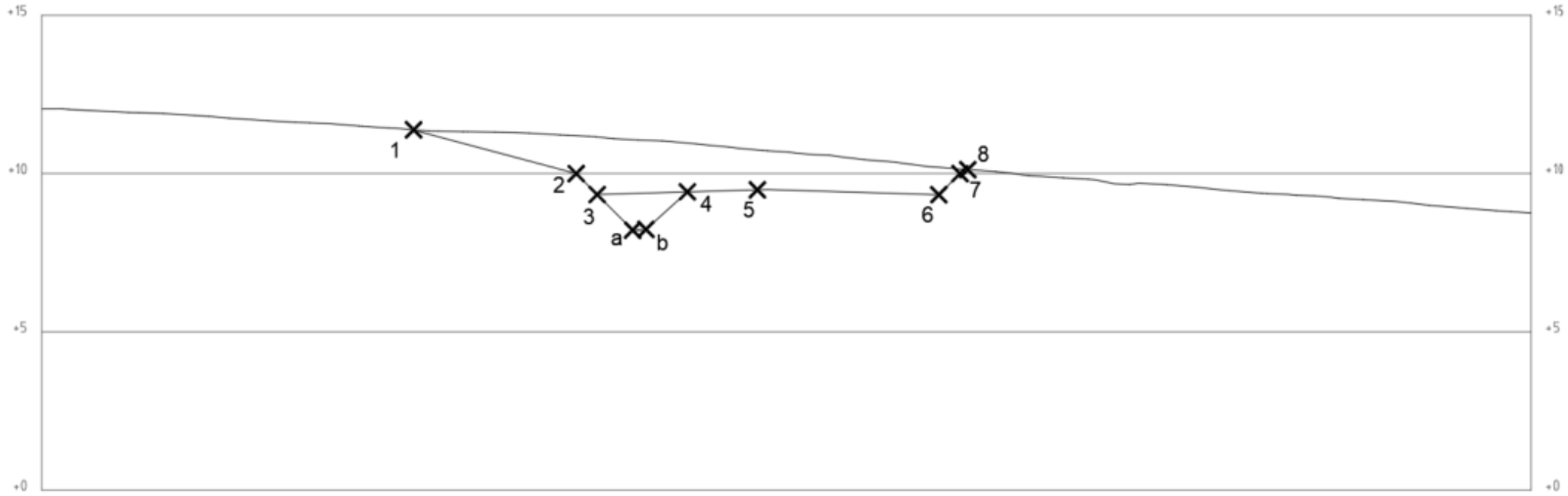




Profil 2-2'



Profil 3-3'



Profil 4-4'

D.2 Koordinater for tiltak 1 og 2

Tabell D.1 Oversikt som viser de relative koordinatene til tiltak 1.

	Punkt								
	1			2			3		
	x	y	z	x	y	z	x	y	z
Profil 1-1'	0,317	6,922	-0,081	0,819	14,057	-2,405	0,888	15,042	-3,388
Profil 2-2'	38,574	-6,108	-1,121	39,727	8,259	-3,348	39,781	8,927	-4,017
Profil 3-3'	66,83	-2,788	-2,177	68,78	4,100	-4,144	68,96	4,749	-4,815
Profil 4-4'	95,930	-5,040	-3,613	96,765	0,098	-5,000	96,870	0,741	-5,662
	4			5			6		
	x	y	z	x	y	z	x	y	z
Profil 1-1'	1,089	17,892	-3,301	1,269	20,448	-3,222	1,649	25,854	-3,380
Profil 2-2'	40,009	11,770	-3,928	40,213	14,310	-3,847	40,645	19,693	-4,001
Profil 3-3'	69,74	7,484	-4,744	70,45	9,991	-4,677	71,94	15,231	-4,860
Profil 4-4'	97,328	3,556	-5,579	97,737	6,072	-5,504	98,604	11,407	-5,669
	7			8			9		
	x	y	z	x	y	z	x	y	z
Profil 1-1'	1,696	26,526	-2,709	1,744	27,206	-2,368	2,395	36,464	-1,067
Profil 2-2'	40,698	20,362	-3,329	40,753	21,039	-2,988	41,098	25,346	-2,377
Profil 3-3'	72,12	15,882	-4,192	72,26	16,360	-3,947	72,30	16,506	-3,873
Profil 4-4'	98,711	12,064	-5,000	98,734	12,202	-4,930	98,751	12,308	-4,876

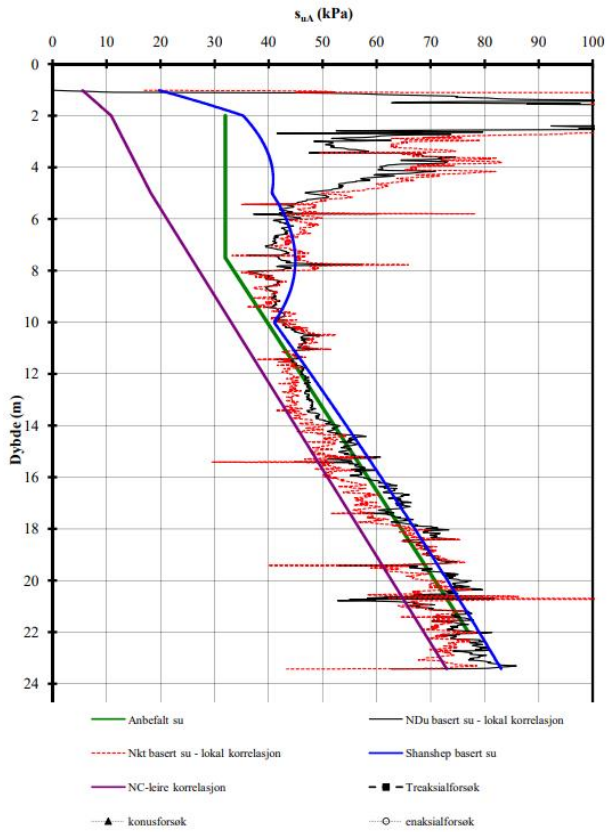
Tabell D.2 Oversikt som viser de relative koordinatene til tiltak 2.

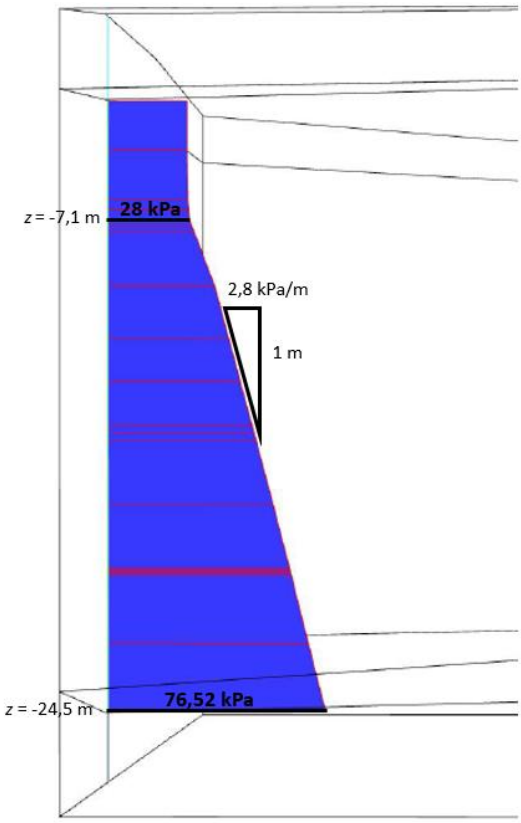
	Punkt					
	3			4		
	x	y	z	x	y	z
Profil 1-1'	0,888	15,042	-3,388	1,089	17,892	-3,301
Profil 2-2'	39,781	8,927	-4,017	40,009	11,770	-3,928
Profil 3-3'	68,96	4,749	-4,815	69,74	7,484	-4,744
Profil 4-4'	96,870	0,741	-5,662	97,328	3,556	-5,579
	a			b		
	x	y	x	y	x	y
Profil 1-1'	0,967	16,163	0,967	16,163	0,967	16,163
Profil 2-2'	39,870	10,044	39,870	10,044	39,870	10,044
Profil 3-3'	69,272	5,831	69,272	5,831	69,272	5,831
Profil 4-4'	97,050	1,850	97,050	1,850	97,050	1,850

Tillegg E Felt- og laboratorieundersøkelser Rissa

E.1 Anbefalt aktiv skjærstyrke basert på CPTU-sonderinger og SHANSEP (Enlid, 2009a)

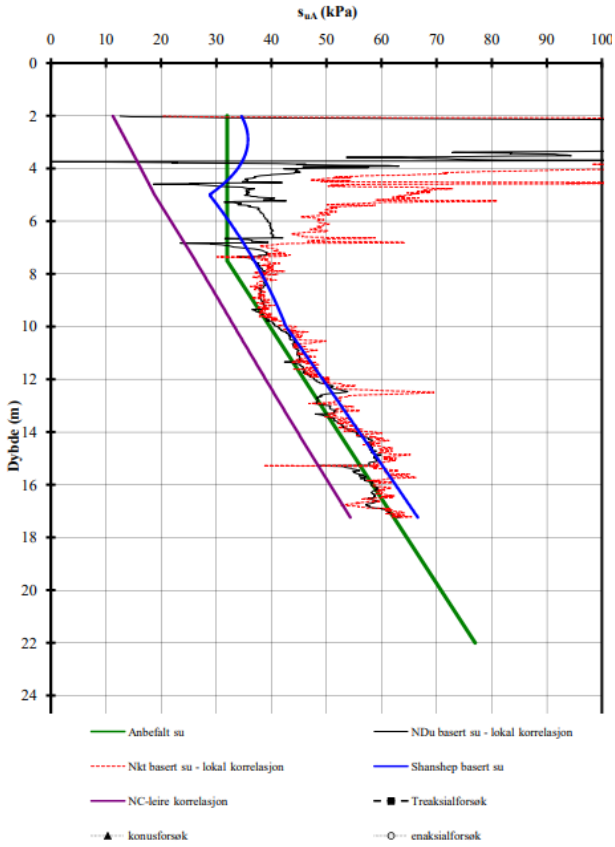
Borehull 11

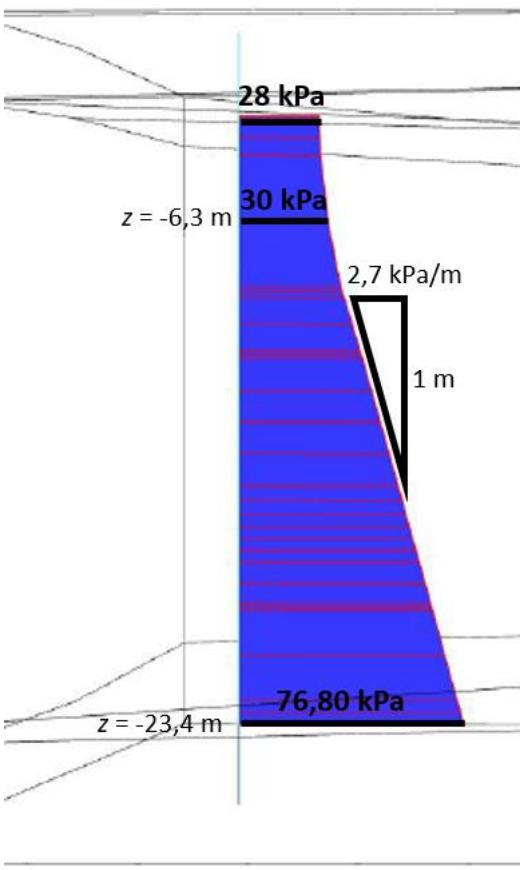




$$s_u(z = -24{,}5\ \mathrm{m}) = 85\ \mathrm{kPa}$$

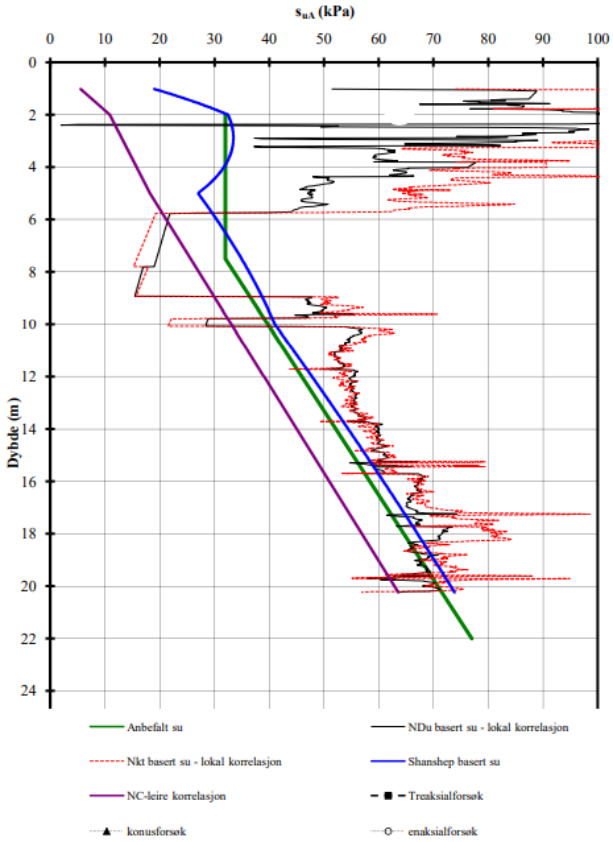
Borehull 10

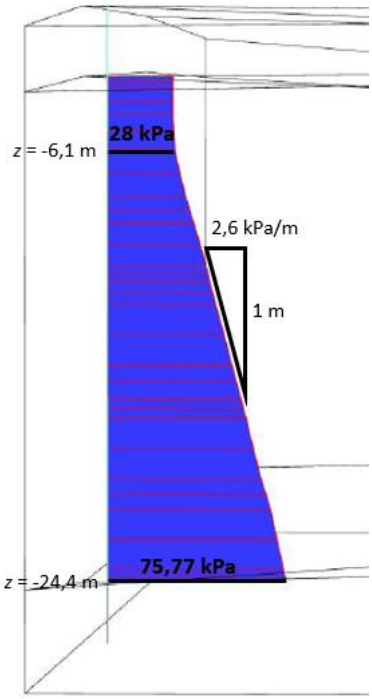




$$s_u(z = -23{,}4\ \mathrm{m}) = 82\ \mathrm{kPa}$$

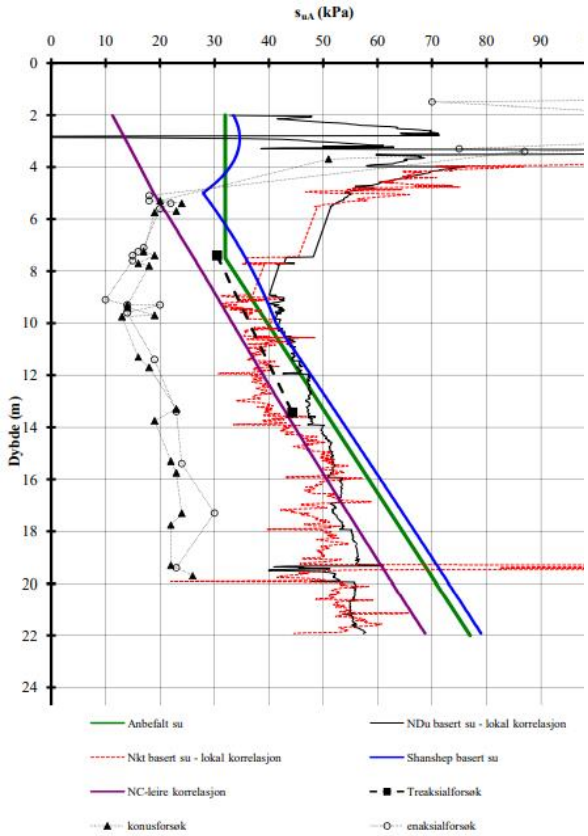
Borehull RT3

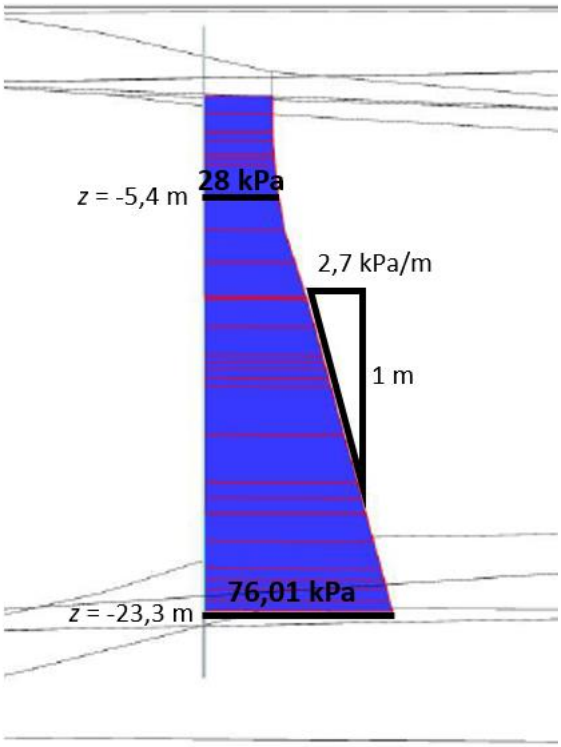




$s_u(z = -24{,}4\ \mathrm{m}) = 85\ \mathrm{kPa}$

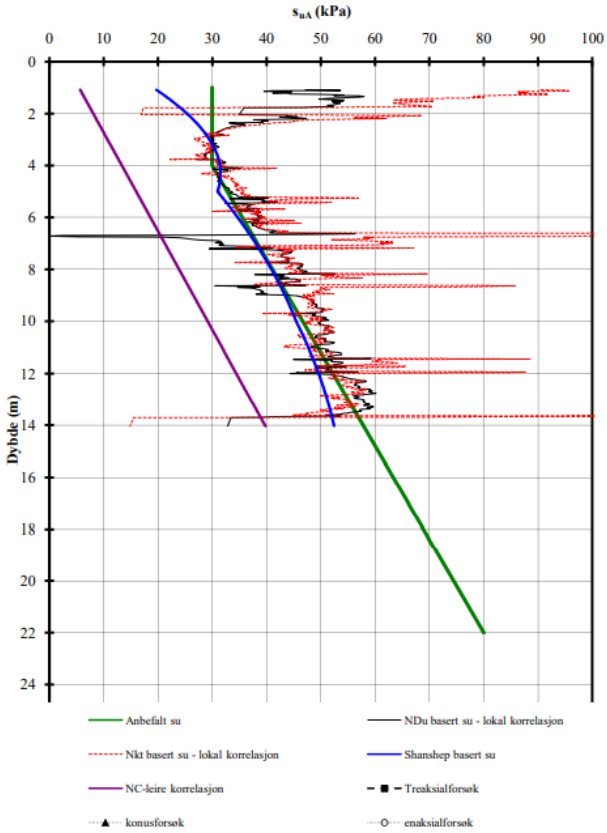
Borehull RT4

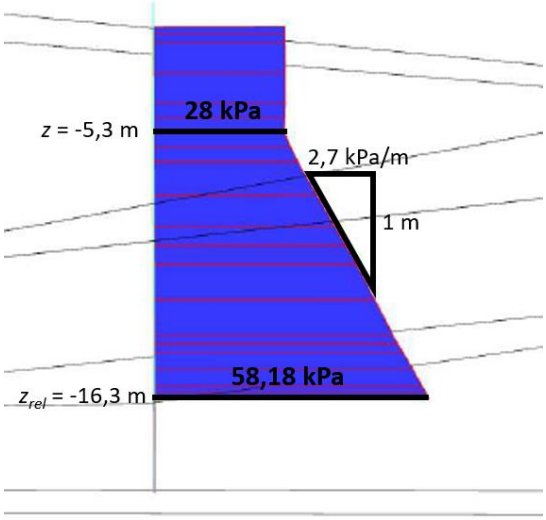




$s_u(z = -23{,}3\ \mathrm{m}) = 82\ \mathrm{kPa}$

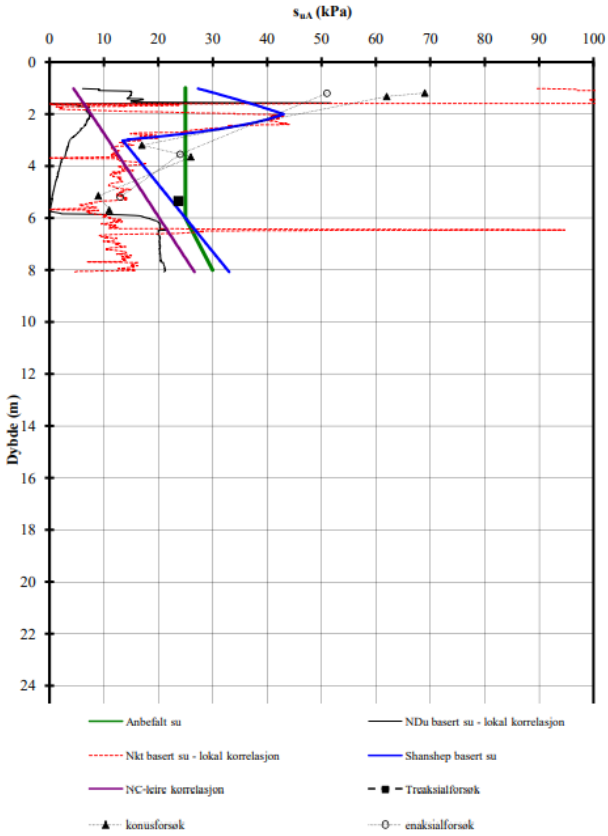
Borehull RT6

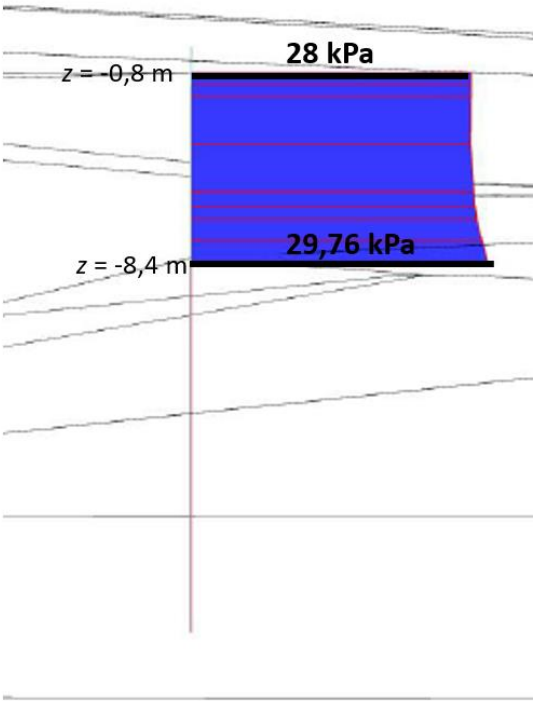




$s_u(z = -16{,}3\ \text{m}) = 65\ \text{kPa}$

Borehull RT8

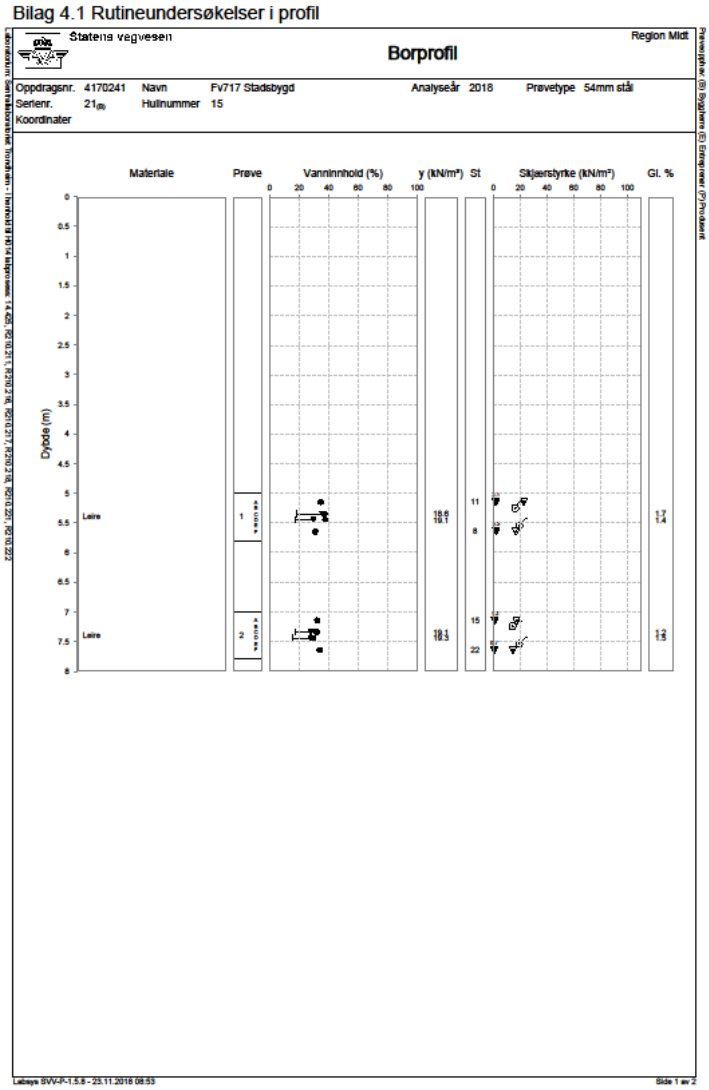




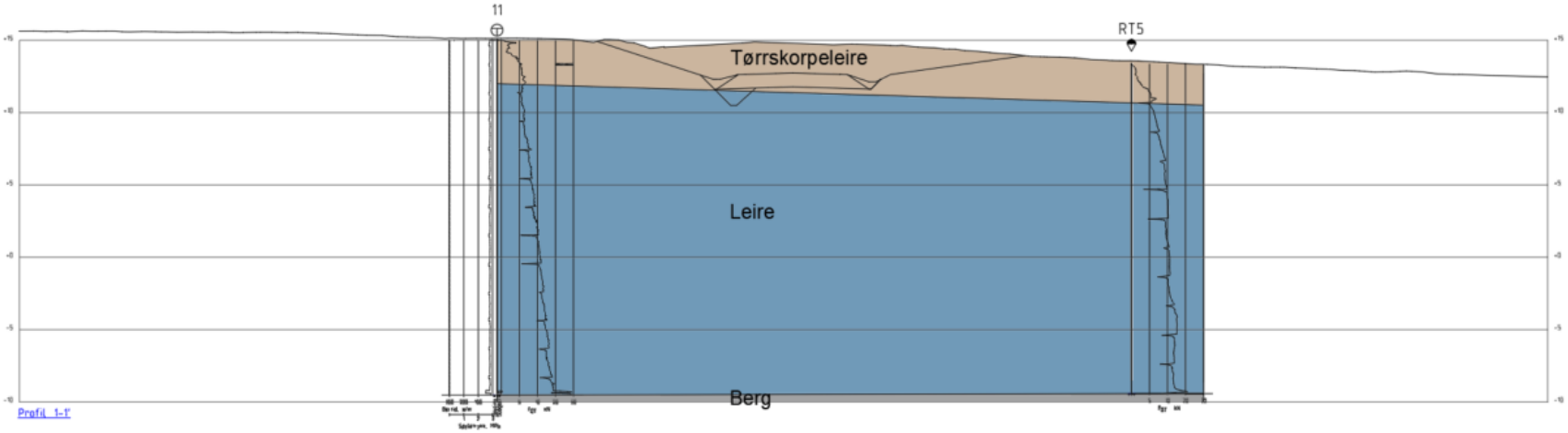
$s_u(z = -8{,}4\ \text{m}) = 31\ \text{kPa}$

E.2 Laboratorieundersøkelser

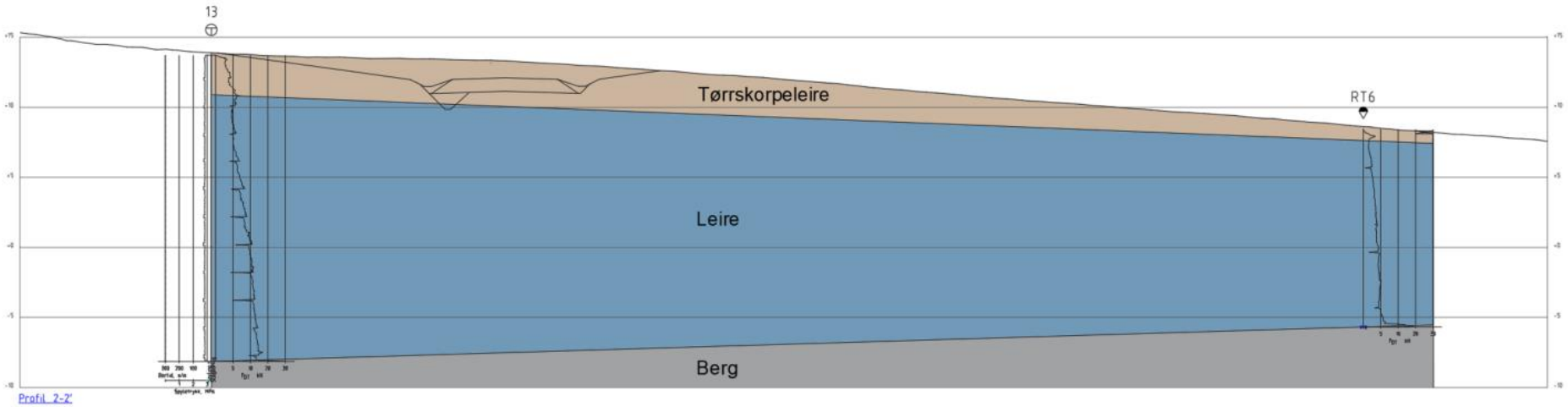
Rutineundersøkelser i borehull 15-1, hentet fra SVVs rapport nr. Ud926A-GEOT-R01 (Cederstöm, 2018).



E.3 Tolket lagdeling



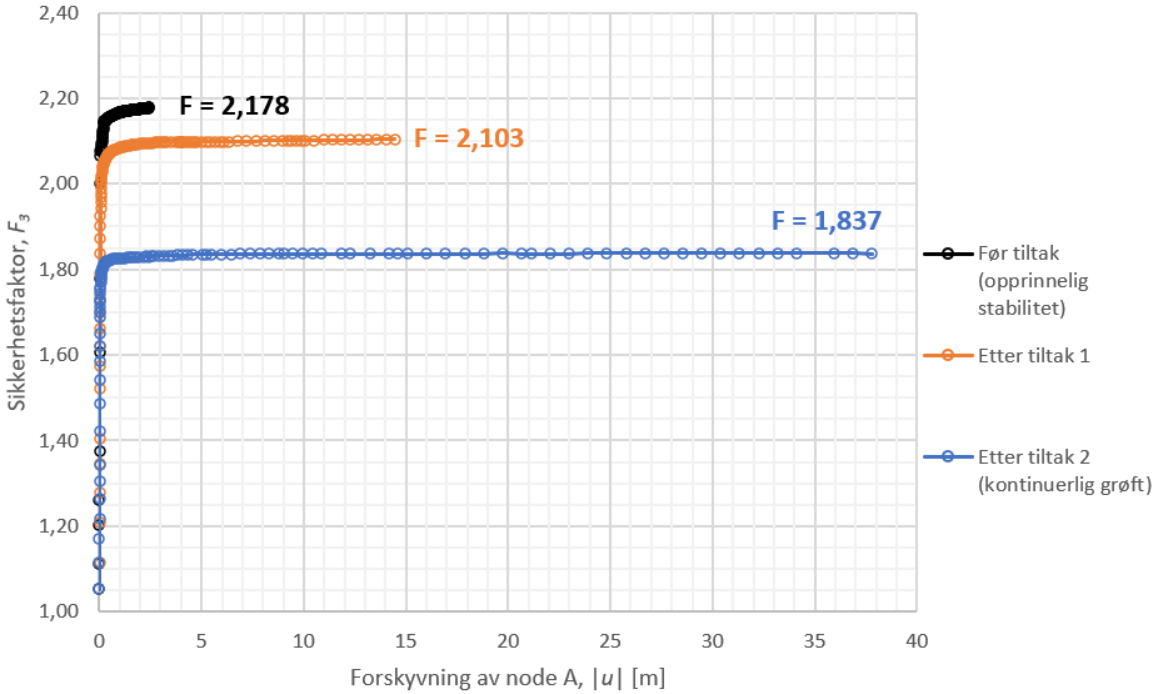
Figur E.1 Tolket lagdeling i profil 1-1' fra total- og dreietrykksonderingen i hhv. borehull 11 og RT5.



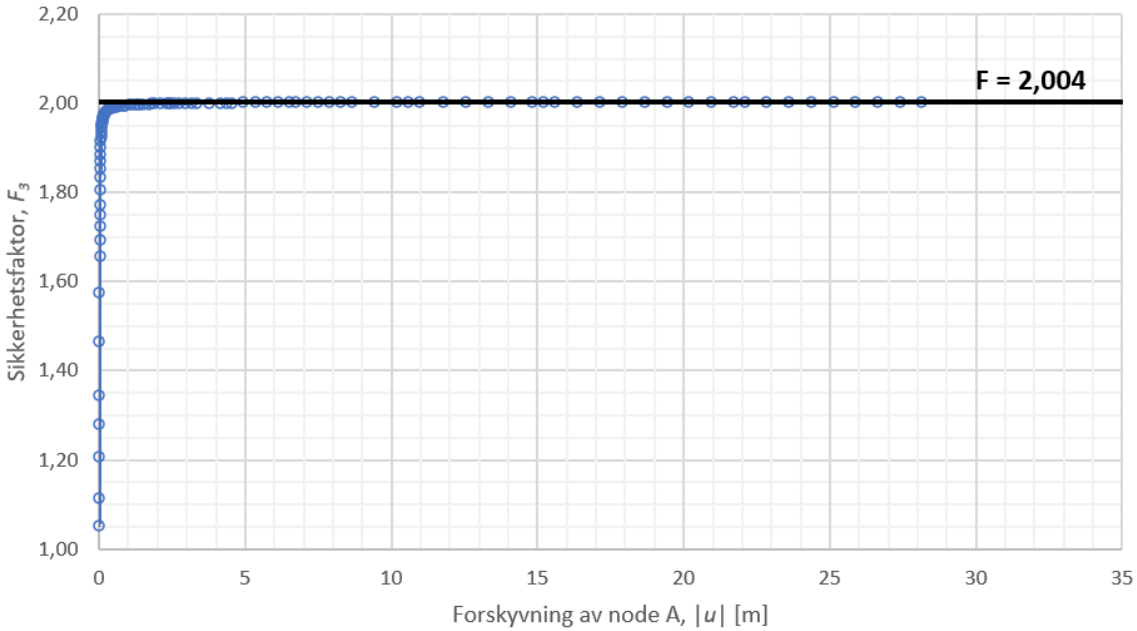
Figur E.2 Tolket lagdeling i profil 2-2' fra total- og dreietrykksonderingen i hhv. borehull 13 og RT6.

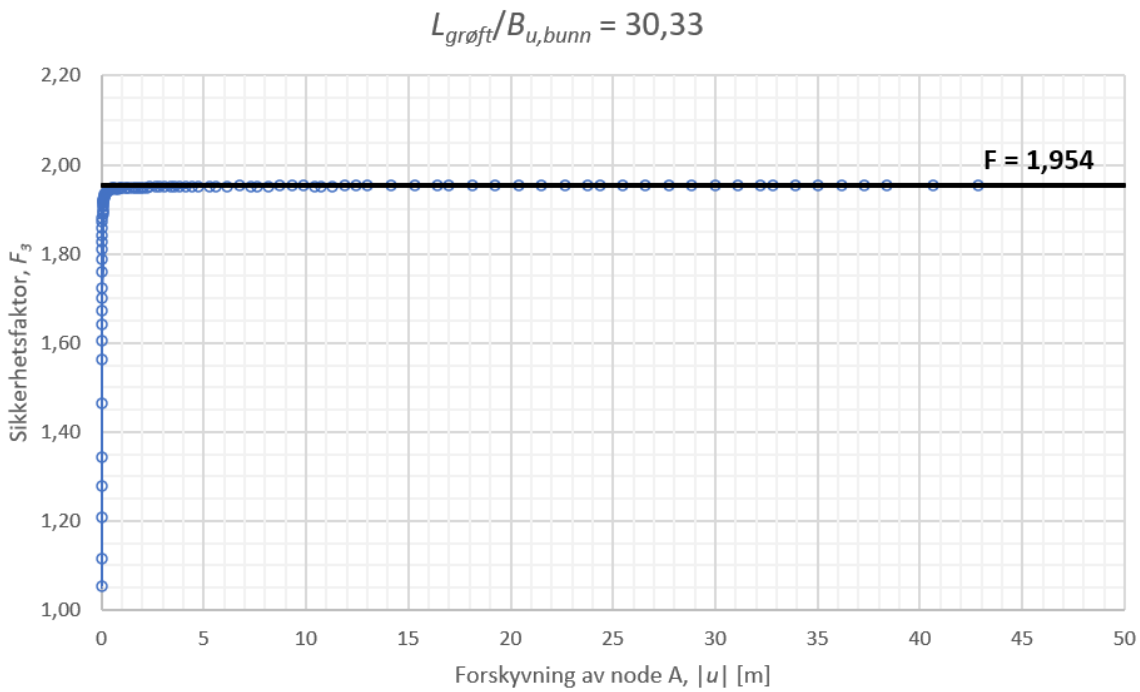
Tillegg F Resultater fra PLAXIS 3D – casestudie

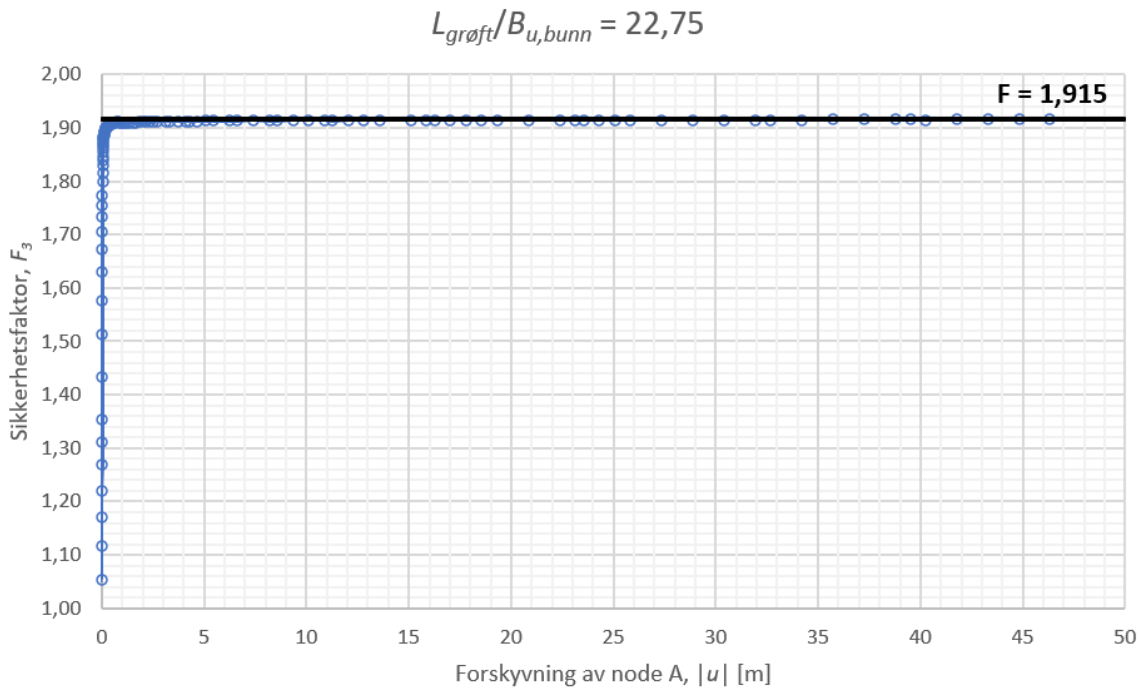
F.1 Sikkerhetsanalyser

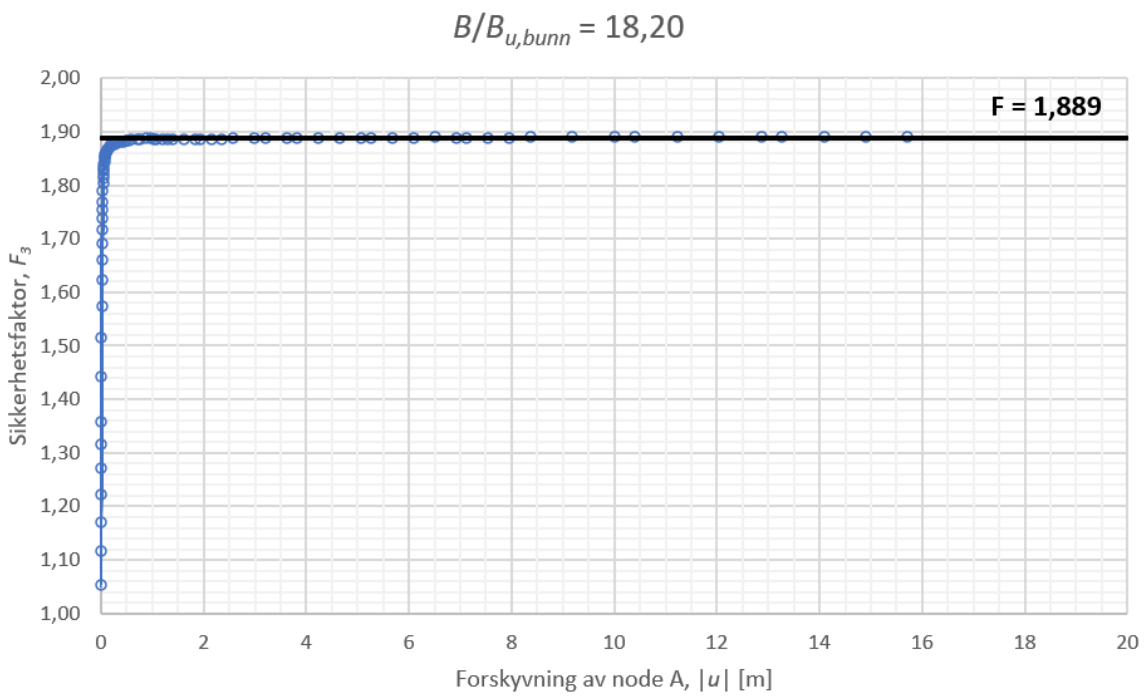


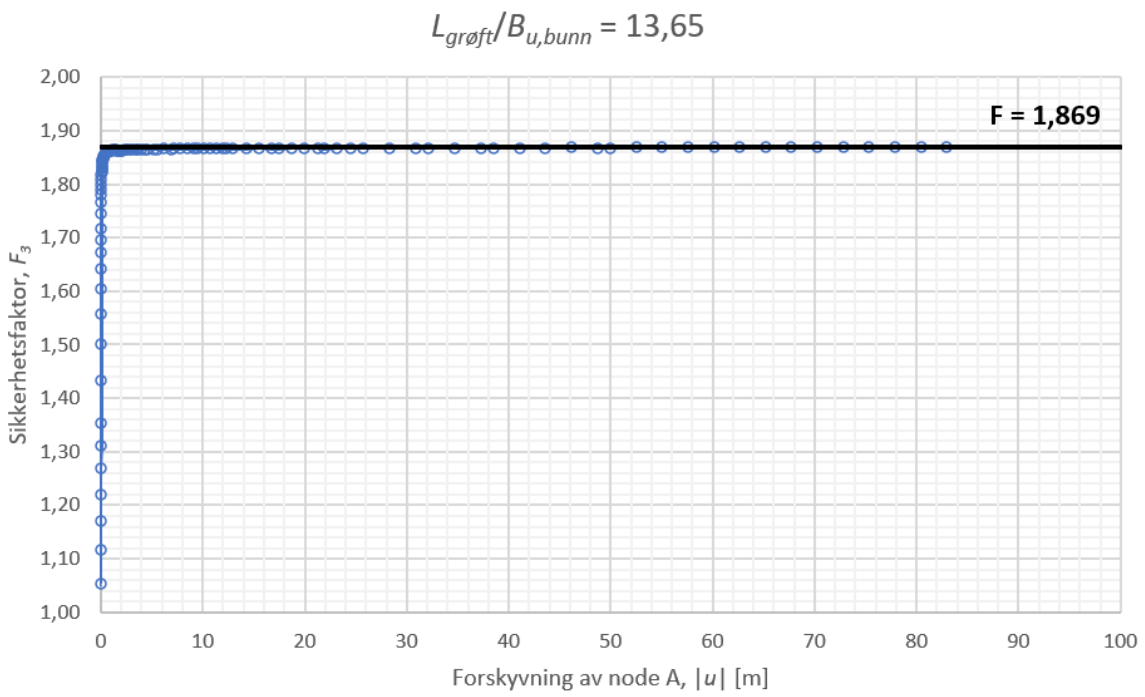
$L_{grøft}/B_{u,bunn}$ = 45,50



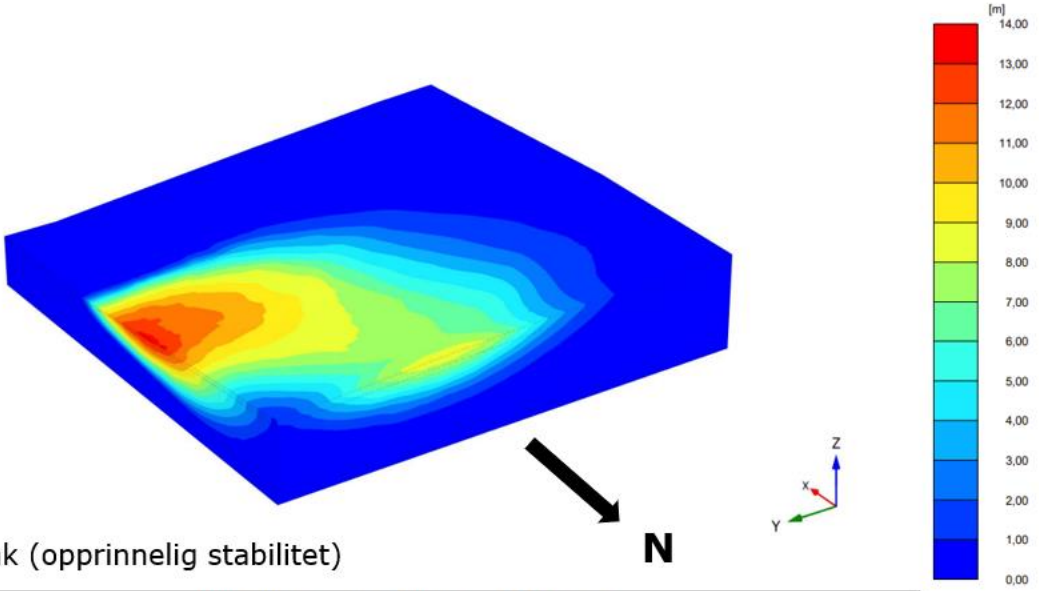

$L_{grøft}/B_{u,bunn}$ = 30,33
F = 1,954
Sikkerhetsfaktor, F_3
2,20
2,00
1,80
1,60
1,40
1,20
1,00
0
5
10
15
20
25
30
35
40
45
50
Forskyvning av node A, |u| [m]


$L_{grøft}/B_{u,bunn}$ = 22,75
F = 1,915
Sikkerhetsfaktor, F_3
2,00
1,90
1,80
1,70
1,60
1,50
1,40
1,30
1,20
1,10
1,00
0
5
10
15
20
25
30
35
40
45
50
Forskyvning av node A, |u| [m]


$B/B_{u,bunn}$ = 18,20
F = 1,889
Sikkerhetsfaktor, F_3
2,00
1,90
1,80
1,70
1,60
1,50
1,40
1,30
1,20
1,10
1,00
0
2
4
6
8
10
12
14
16
18
20
Forskyvning av node A, |u| [m]


$L_{grøft}/B_{u,bunn}$ = 13,65
F = 1,869
Sikkerhetsfaktor, F_3
2,00
1,90
1,80
1,70
1,60
1,50
1,40
1,30
1,20
1,10
1,00
0
10
20
30
40
50
60
70
80
90
100
Forskyvning av node A, |u| [m]

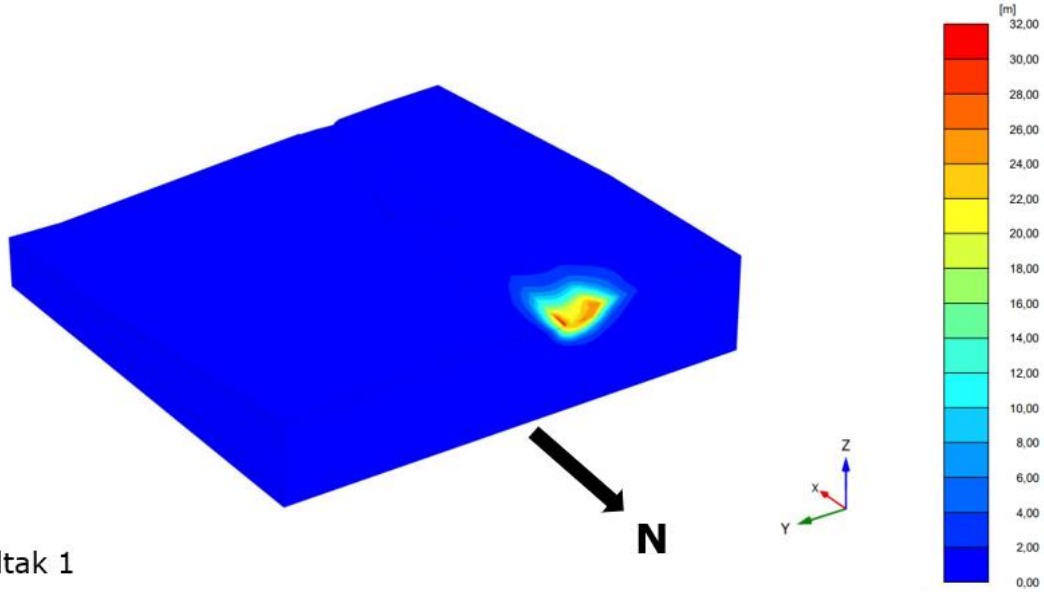
F.2 Skjærflater



Før tiltak (opprinnelig stabilitet)

Total displacements |u| (scaled up 0,500 times)

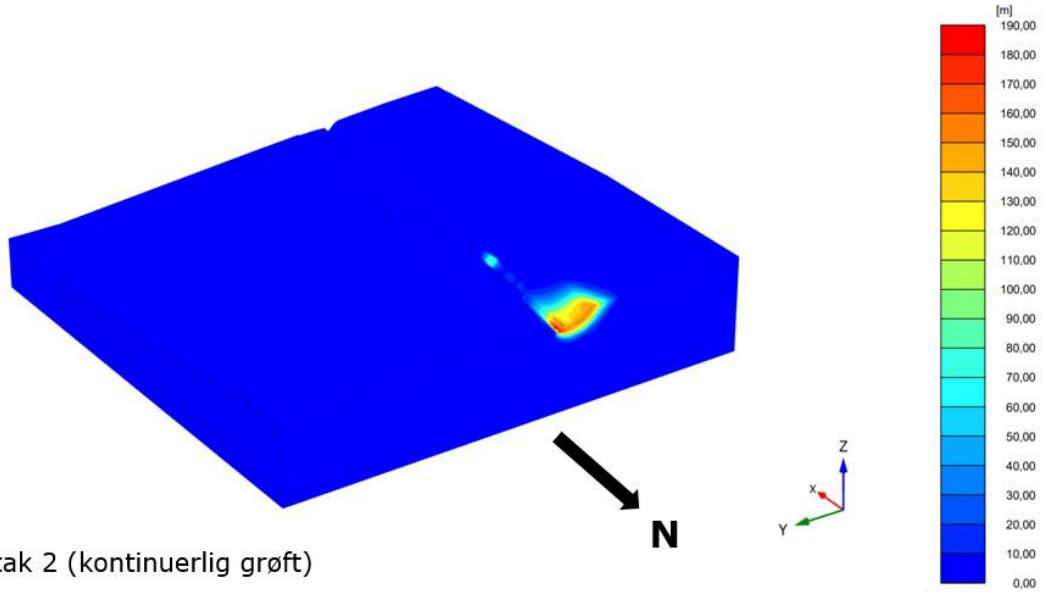
Maximum value = 13,23 m (Element 269475 at Node 10858)



Etter tiltak 1

Total displacements |u| (scaled up 0,200 times)

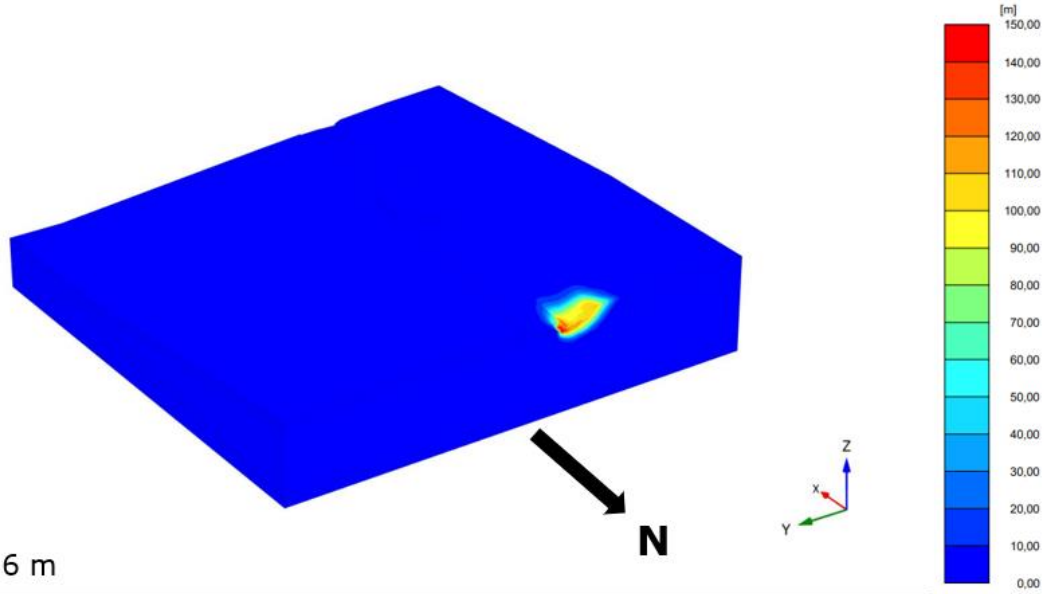
Maximum value = 30,71 m (Element 12218 at Node 71000)



Etter tiltak 2 (kontinuerlig grøft)

Total displacements |u| (scaled up 0,0200 times)

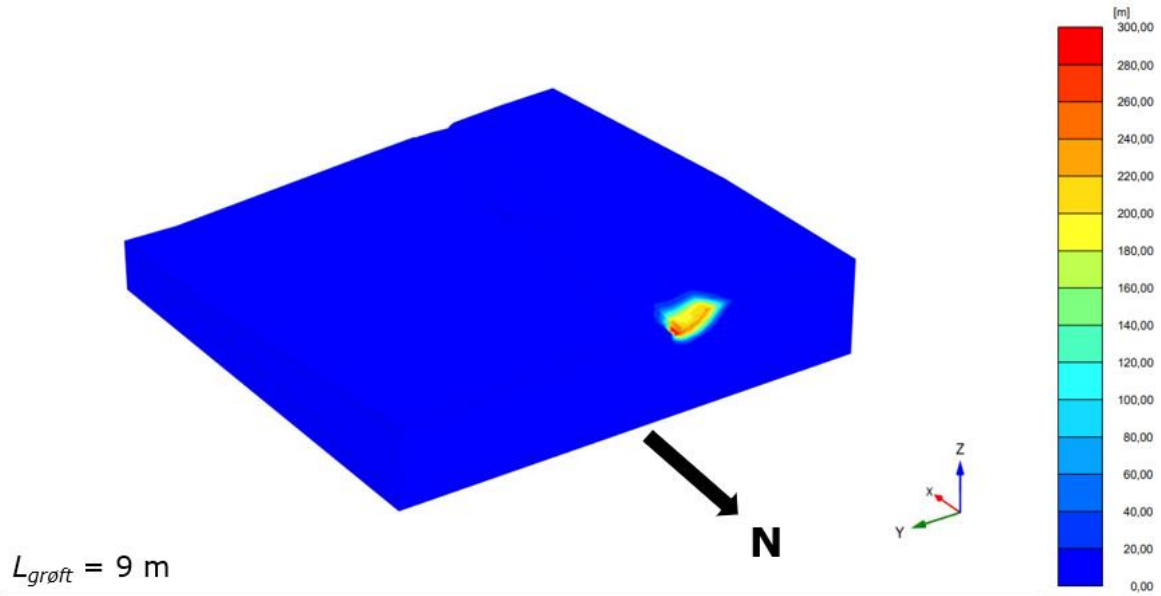
Maximum value = 186,9 m (Element 315034 at Node 23934)



$L_{grøft}$ = 6 m

Total displacements |u| (scaled up 0,0500 times)

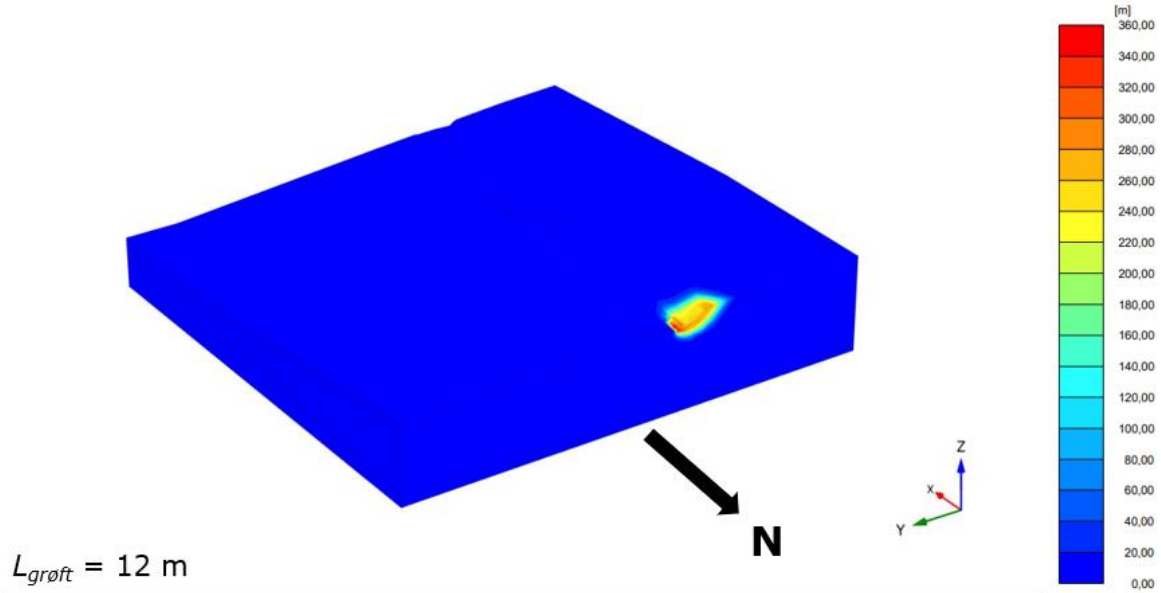
Maximum value = 148,9 m (Element 322926 at Node 612)



$L_{grøft}$ = 9 m

Total displacements |u| (scaled up 0,0200 times)

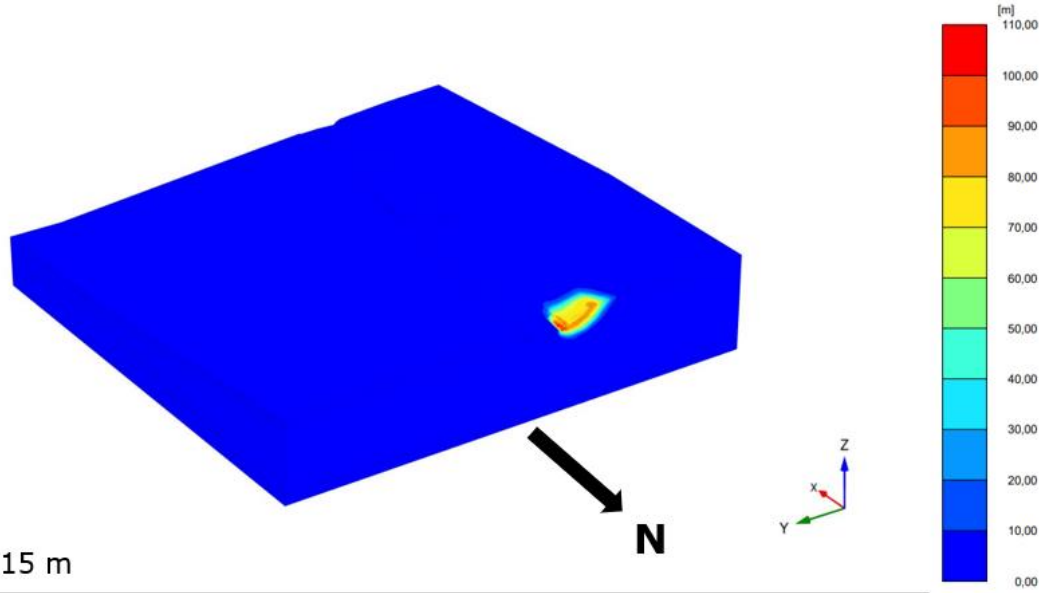
Maximum value = 296,5 m (Element 315034 at Node 23934)



$L_{grøft}$ = 12 m

Total displacements |u| (scaled up 0,0200 times)

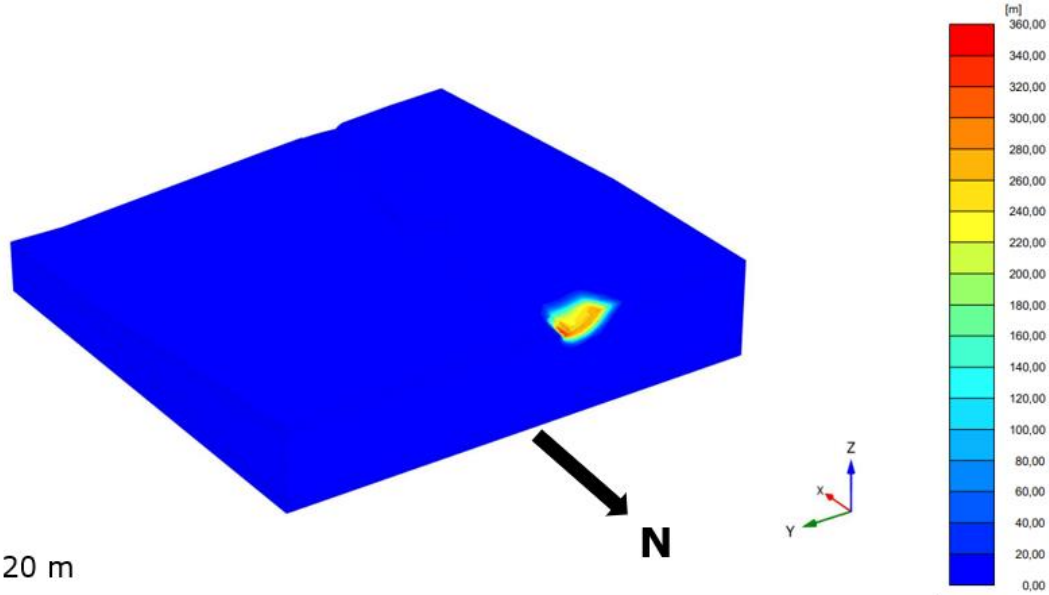
Maximum value = 354,0 m (Element 315034 at Node 23934)



$L_{grøft}$ = 15 m

Total displacements |u| (scaled up 0,0500 times)

Maximum value = 105,3 m (Element 315034 at Node 23934)



$L_{grøft}$ = 20 m

Total displacements |u| (scaled up 0,0200 times)

Maximum value = 343,2 m (Element 315034 at Node 23934)