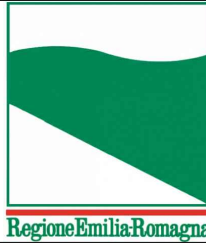




PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile



CONFERENZA DELLE REGIONI E
DELLE PROVINCE AUTONOME

Attuazione dell'articolo 11 della legge 24 giugno 2009, n. 77

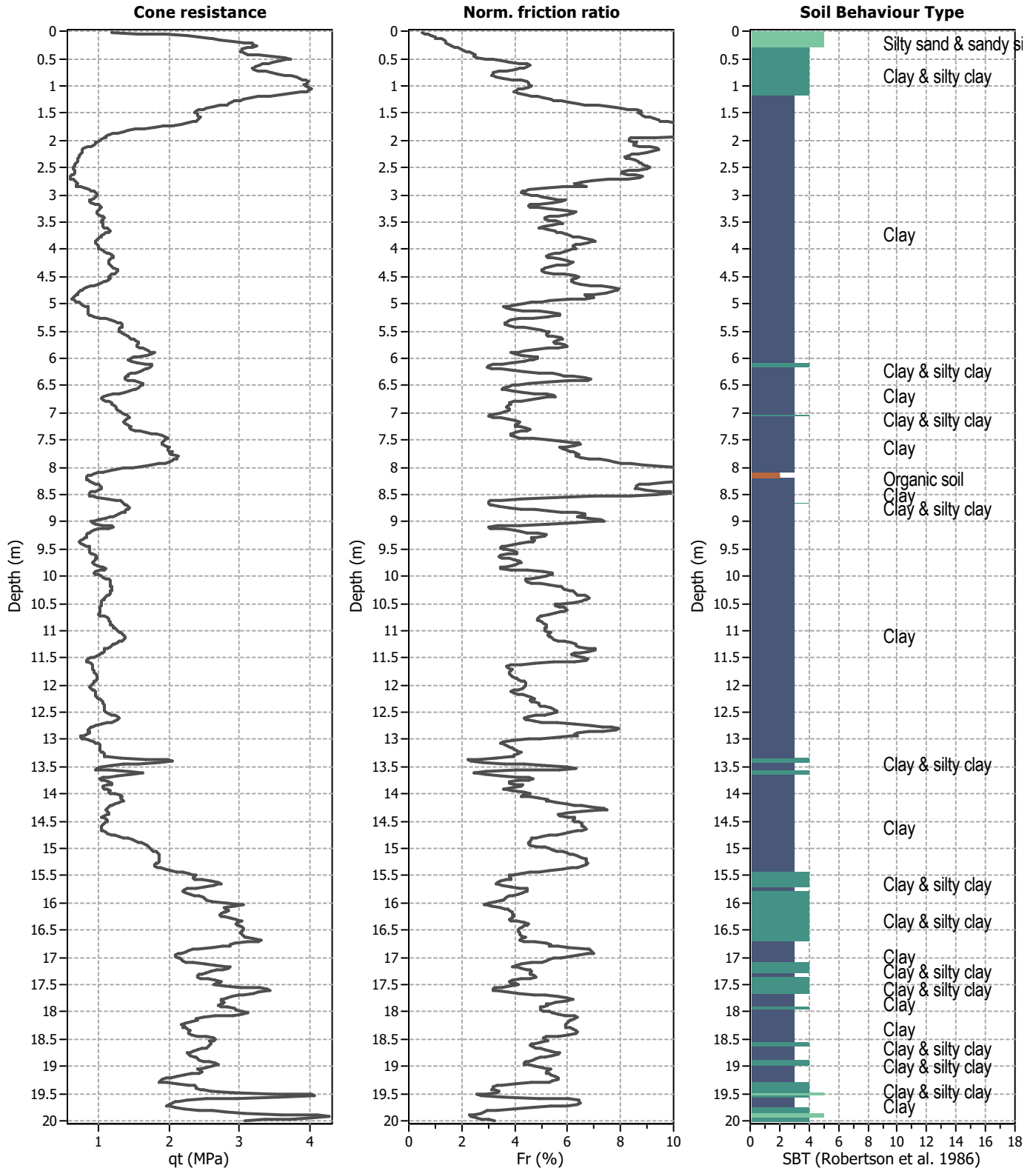
MICROZONAZIONE SISMICA

Verifiche liquefazione

Regione Emilia-Romagna
Comune di Soragna



<p>Regione Emilia-Romagna</p>	<p>Soggetto realizzatore</p>  <p>EN GEO S.r.l. ENGINEERING GEOLOGY www.engeo.it</p> <p><u>Direzione tecnica</u> Dott. Geol. Carlo Caleffi Dott. Geol. Francesco Cerutti</p> <p><u>Collaboratori</u> Dott. Geol. Matteo Baisi Dott.ssa Geol. Melinda Raimondo Dott. Lorenzo Dalle Luche</p>	<p>Data Ottobre 2022</p> <p>MS3</p>
-----------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.18	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based

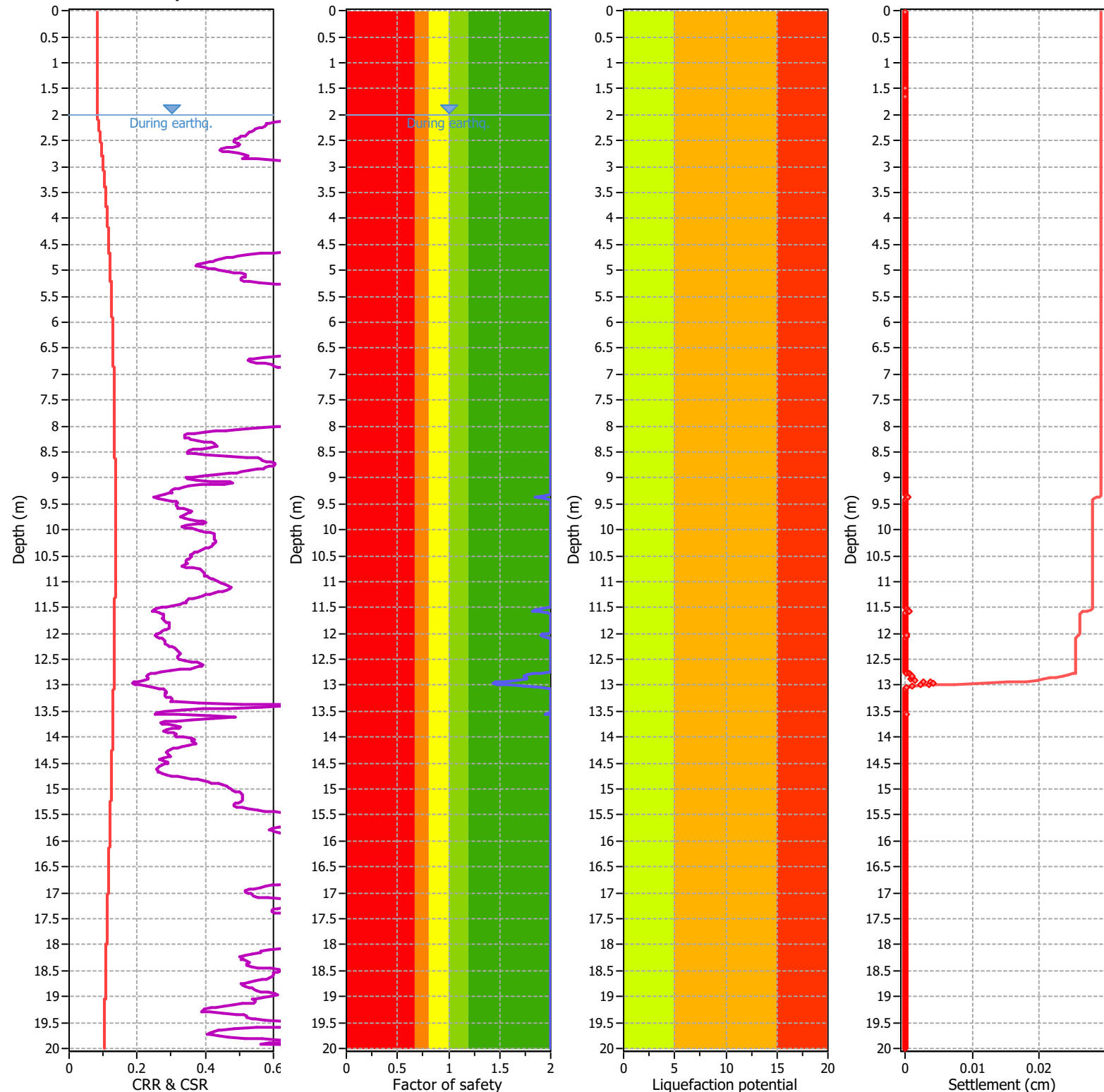


CRR plot

FS Plot

LPI

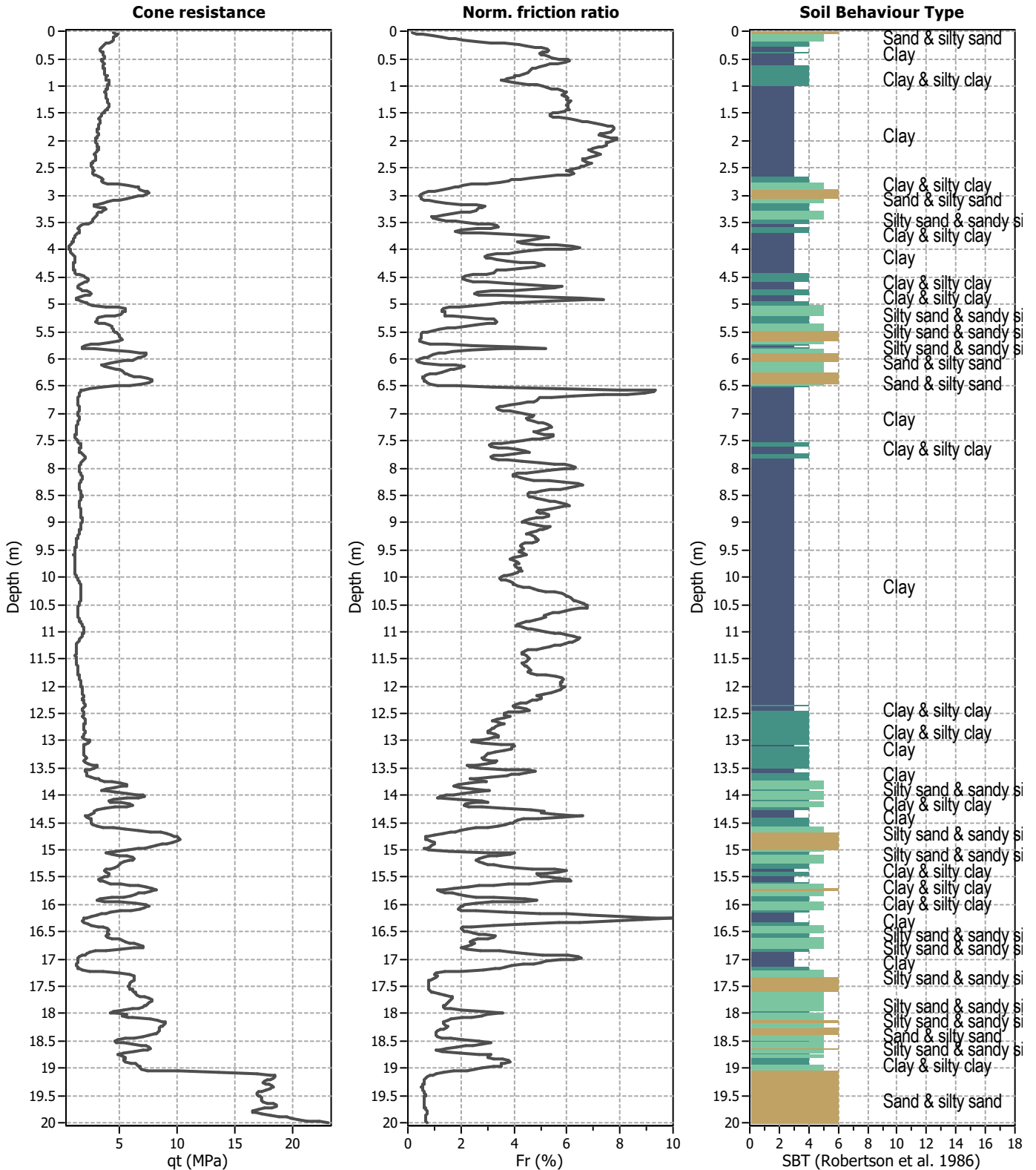
Vertical settlements



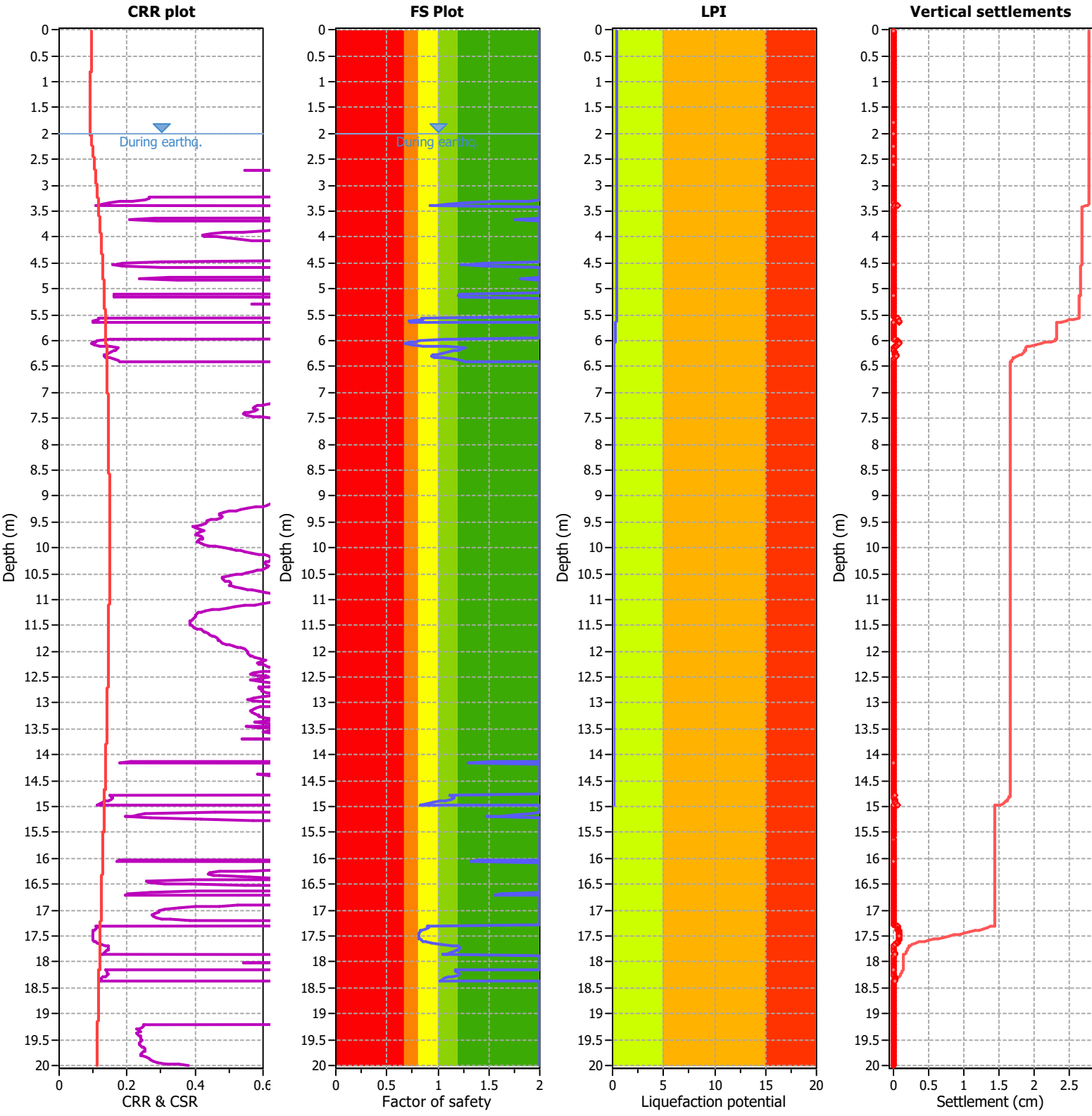
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.18	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

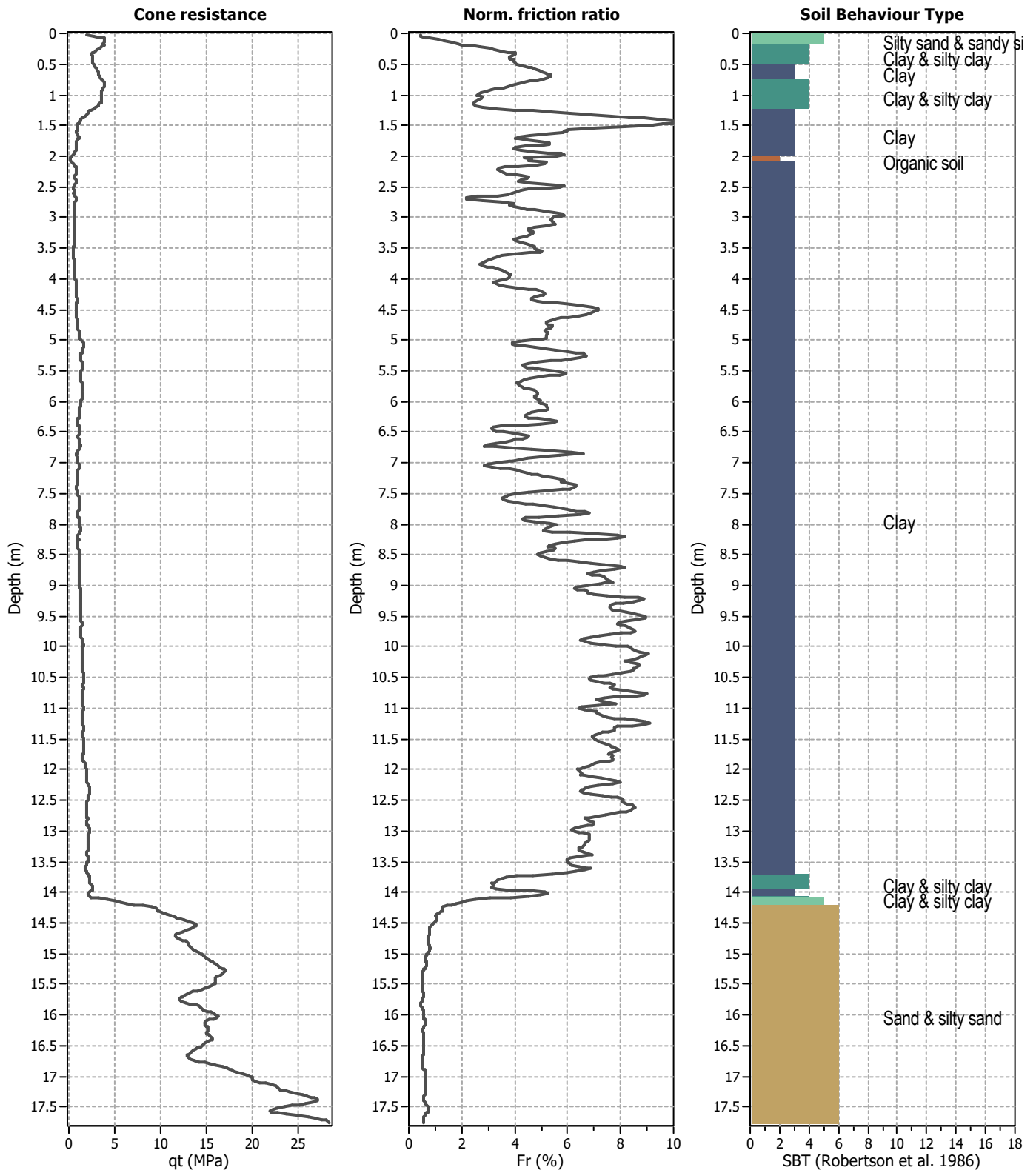
Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT	K_0 applied:	No		



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.16	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based

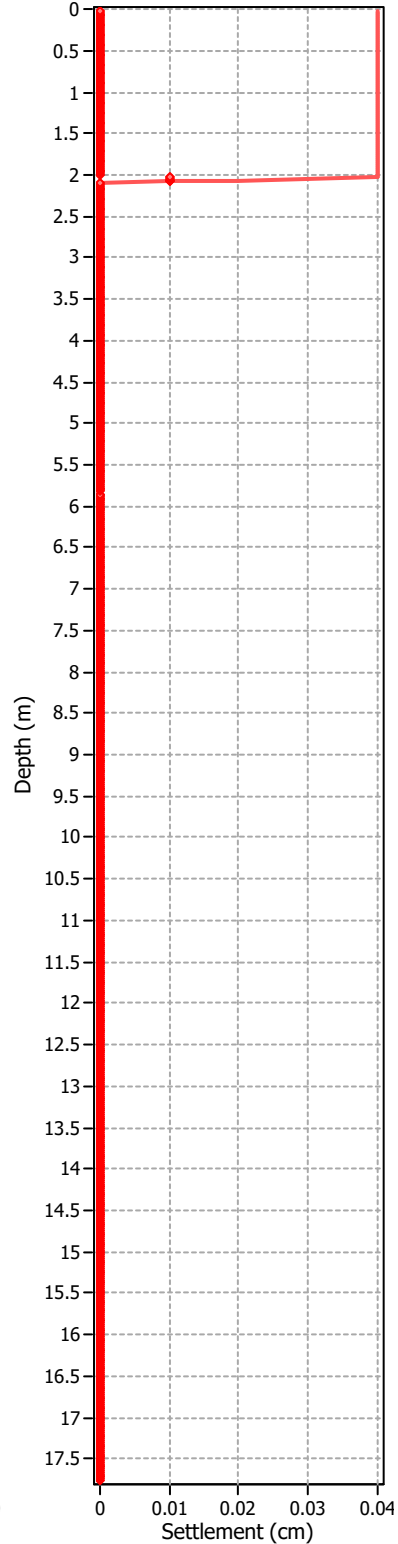
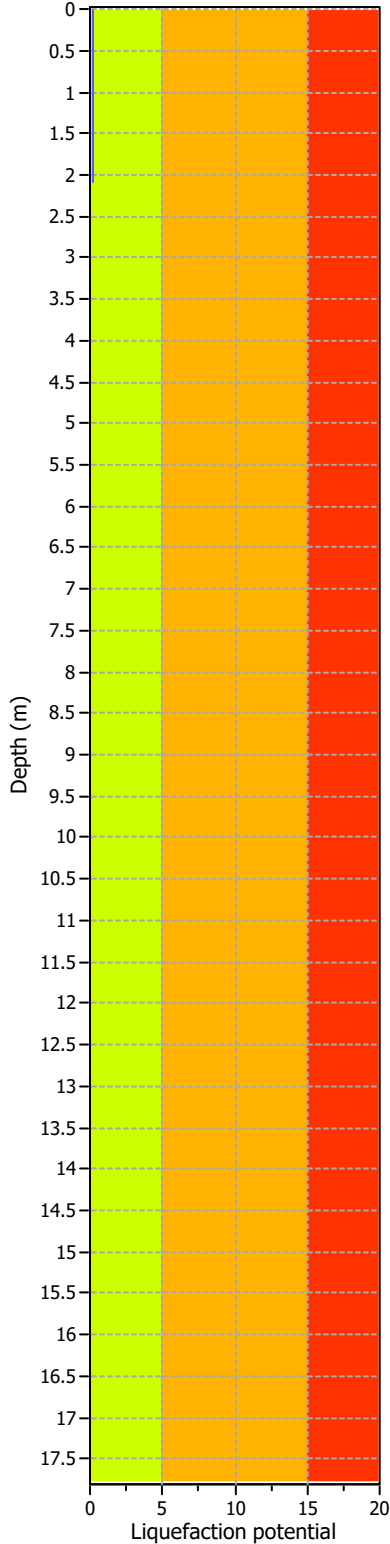
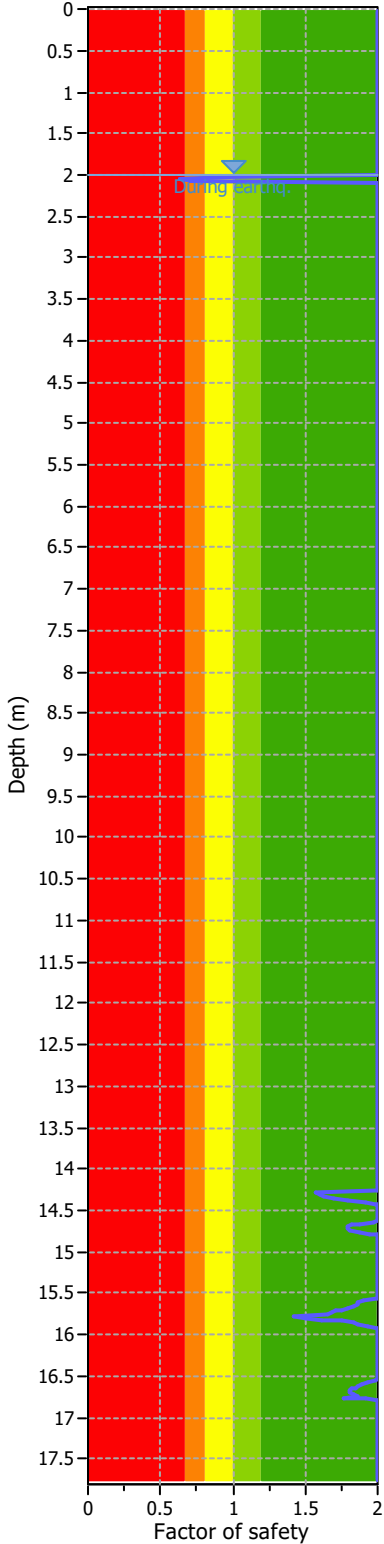
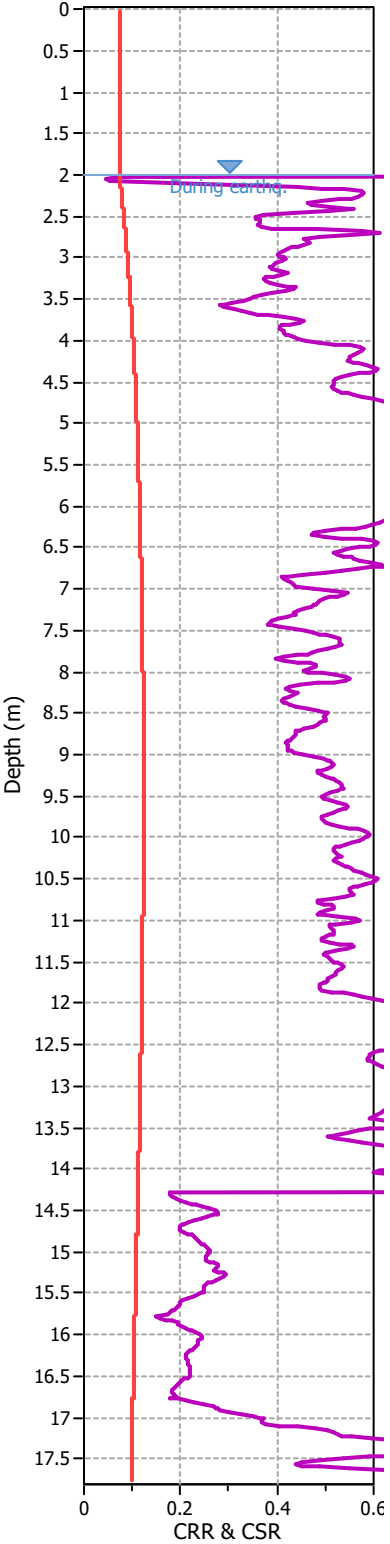


CRR plot

FS Plot

LPI

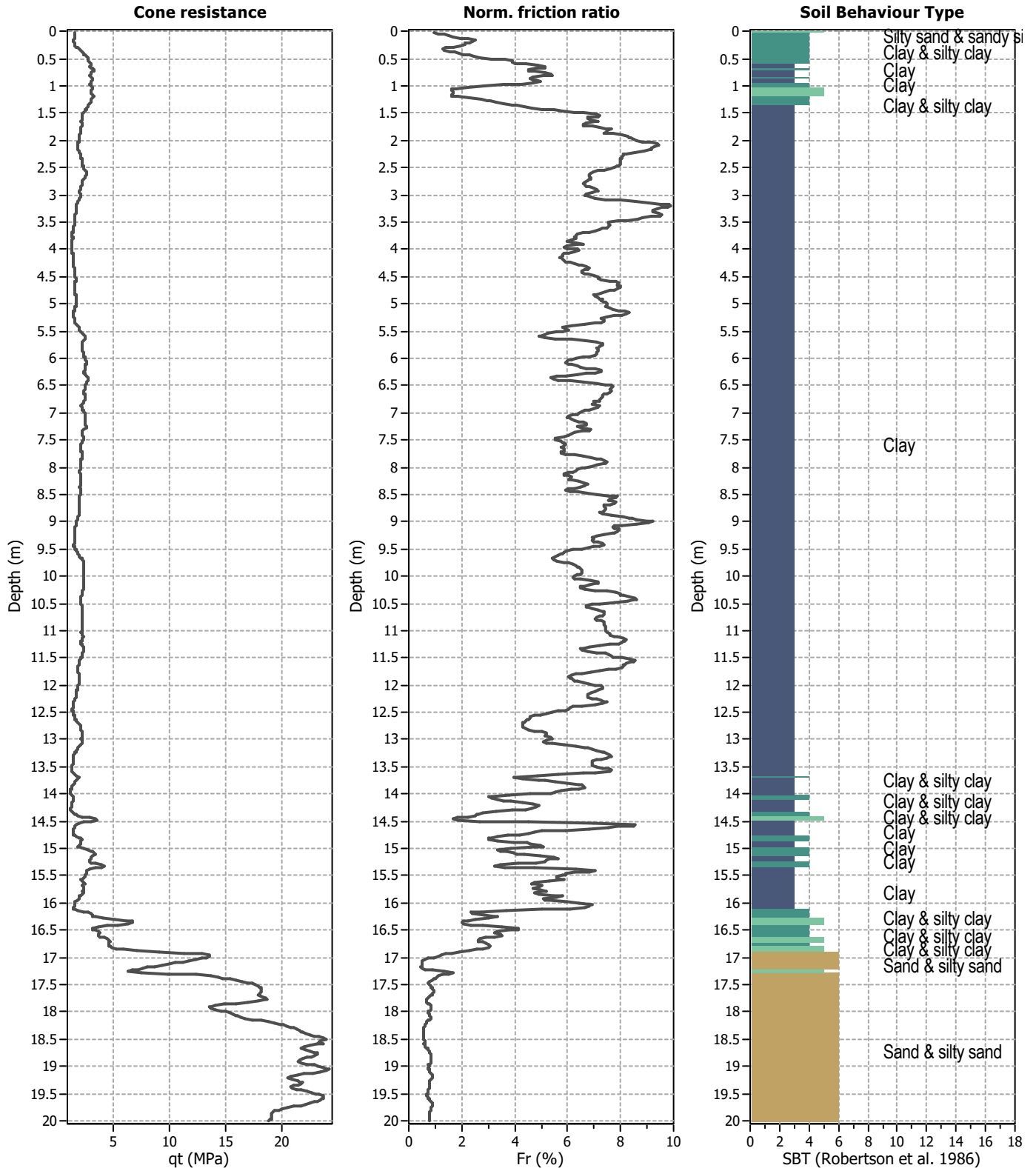
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.16	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based

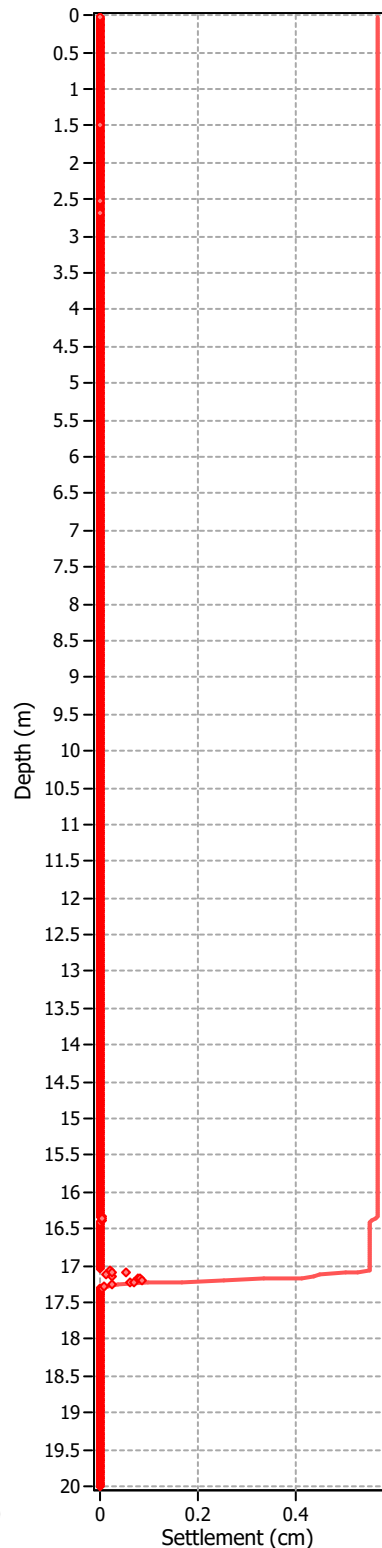
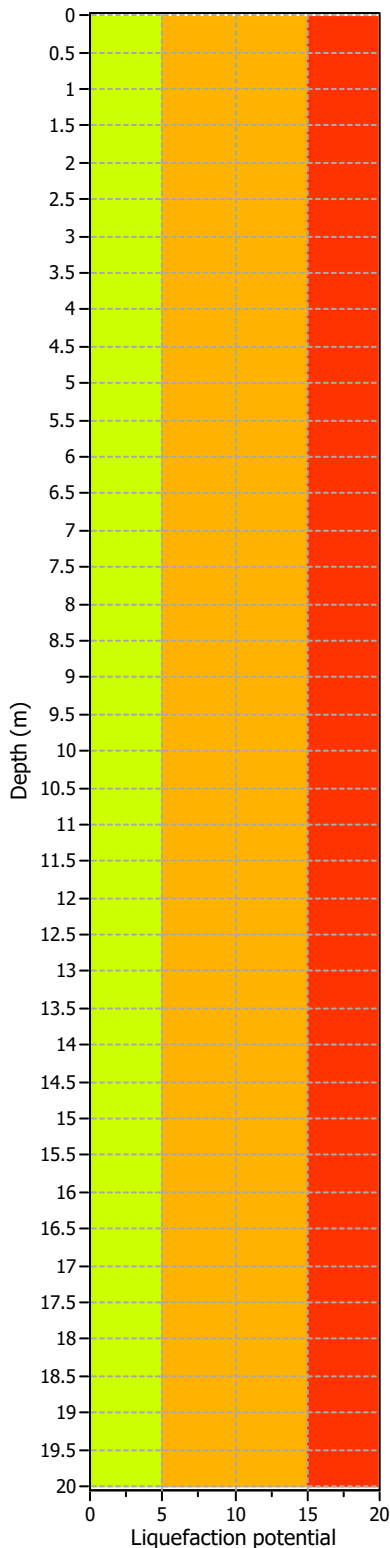
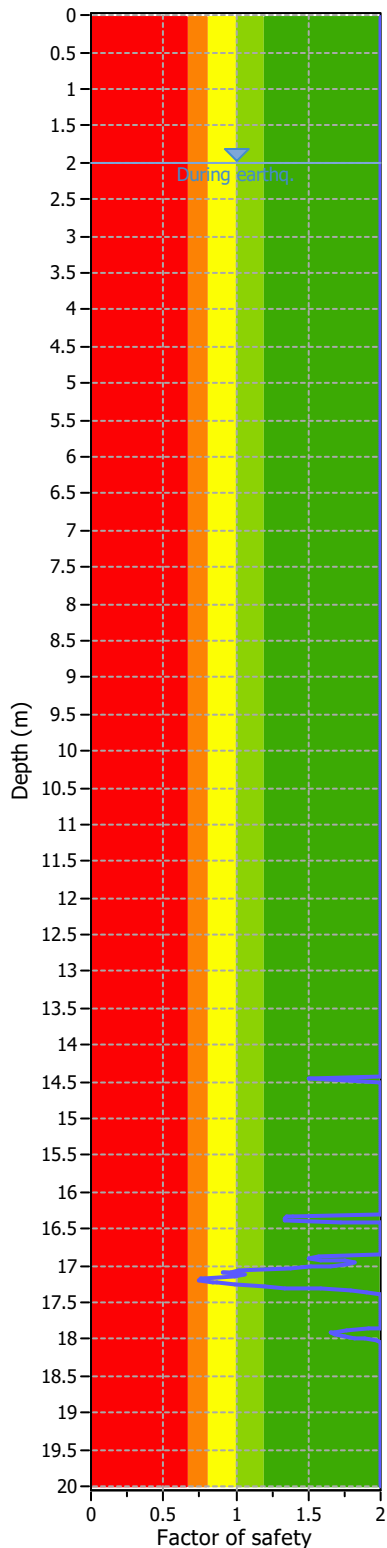
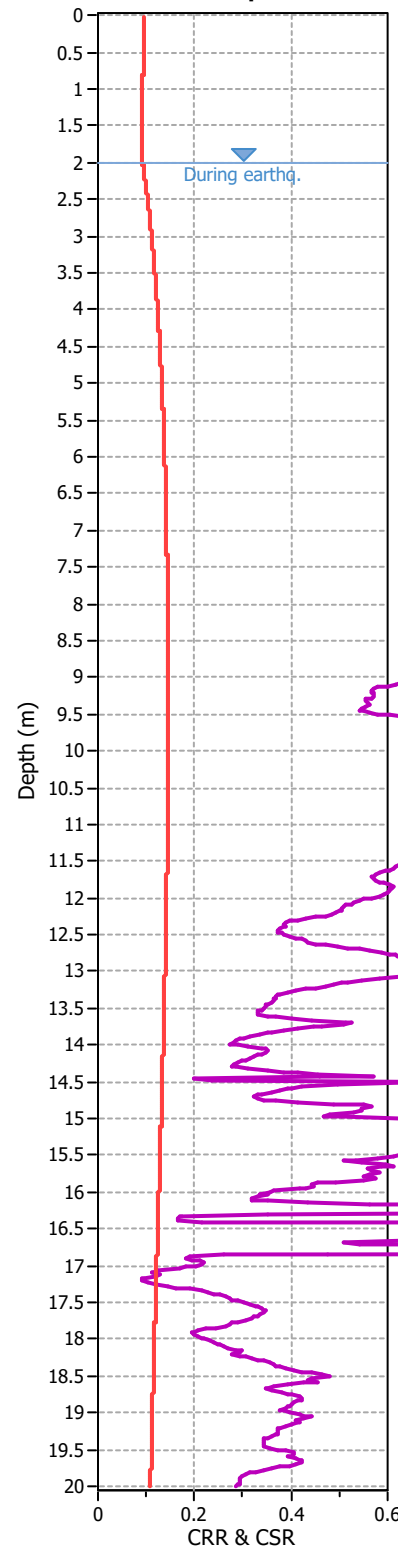


CRR plot

FS Plot

LPI

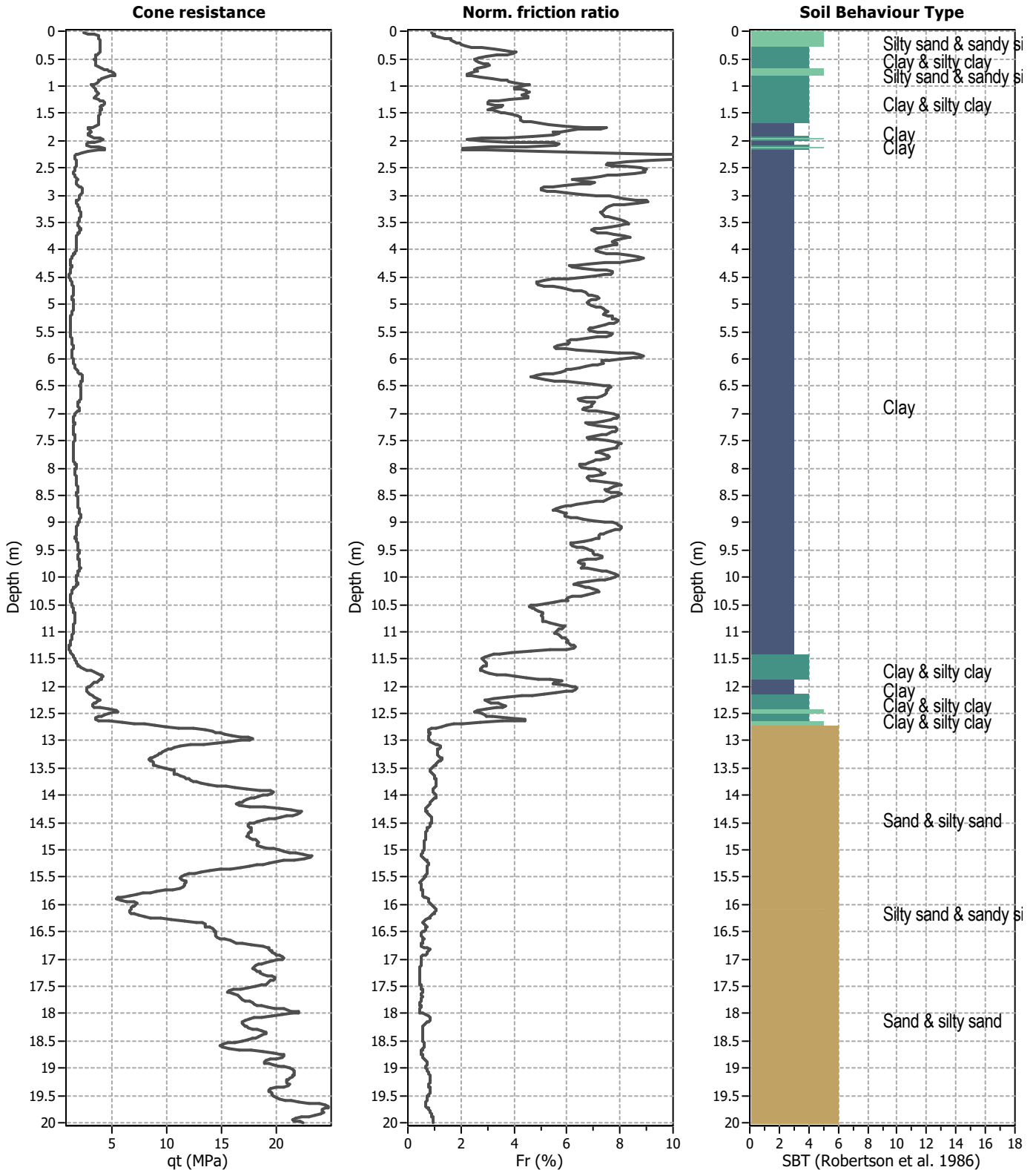
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	No
K_0 applied:	No

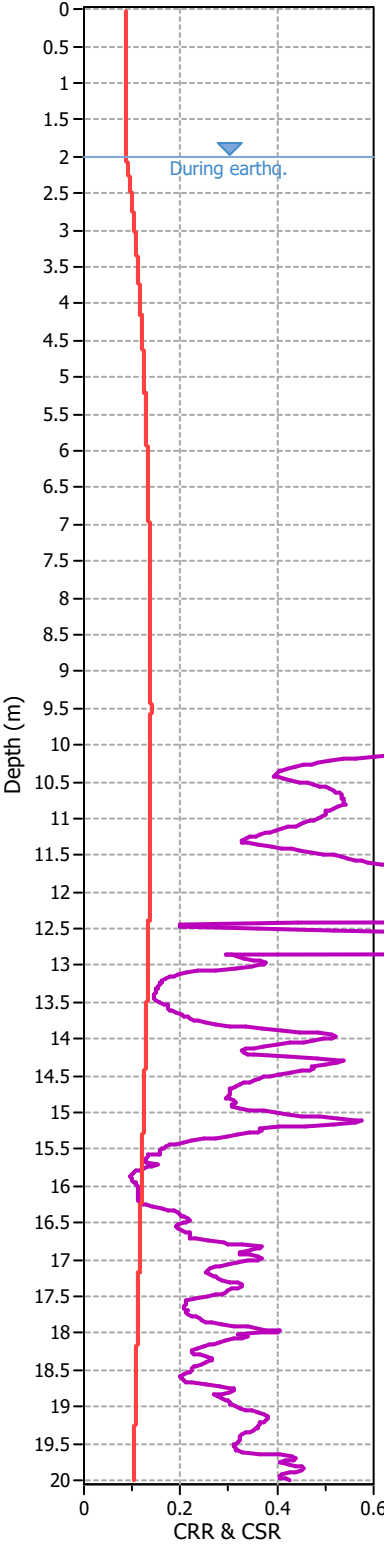
Clay like behavior applied:	All soils
Limit depth applied:	No
Limit depth:	N/A
MSF method:	Method based



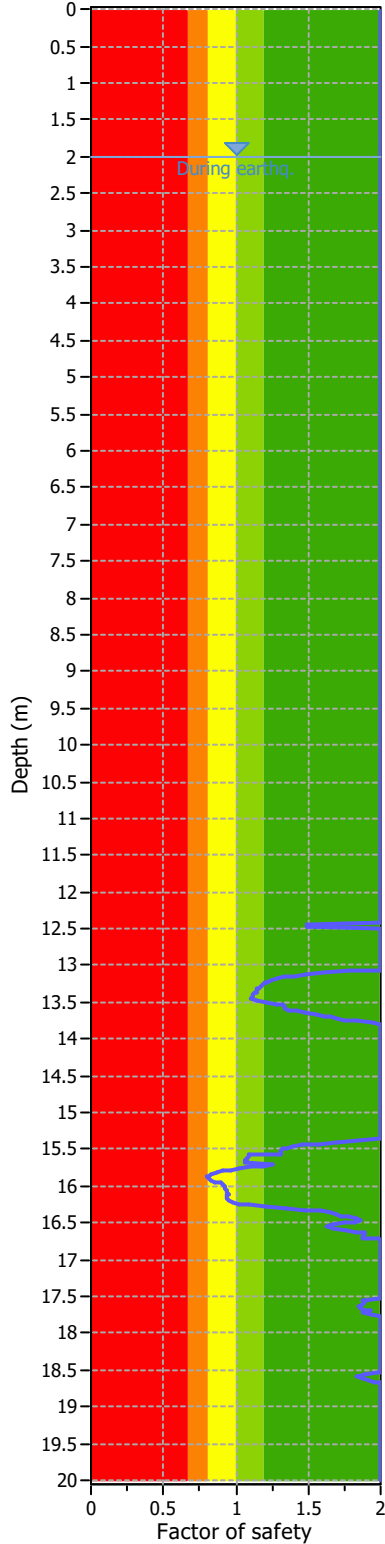
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



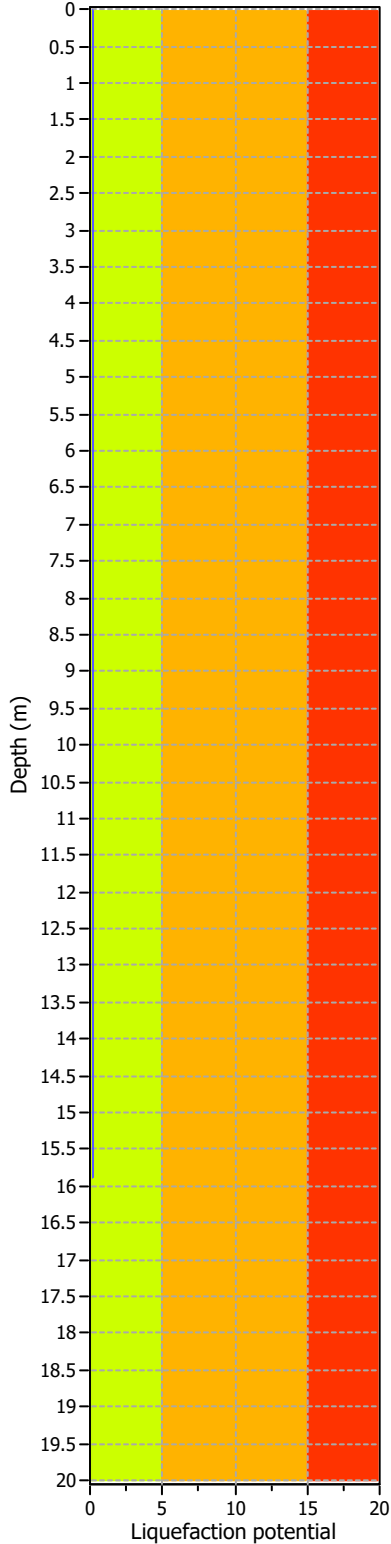
CRR plot



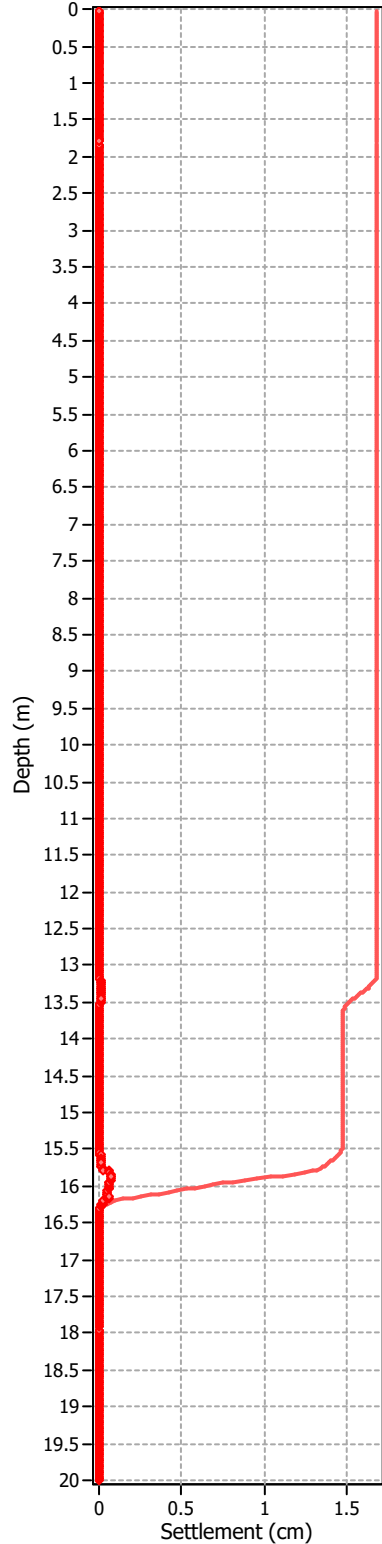
FS Plot



LPI



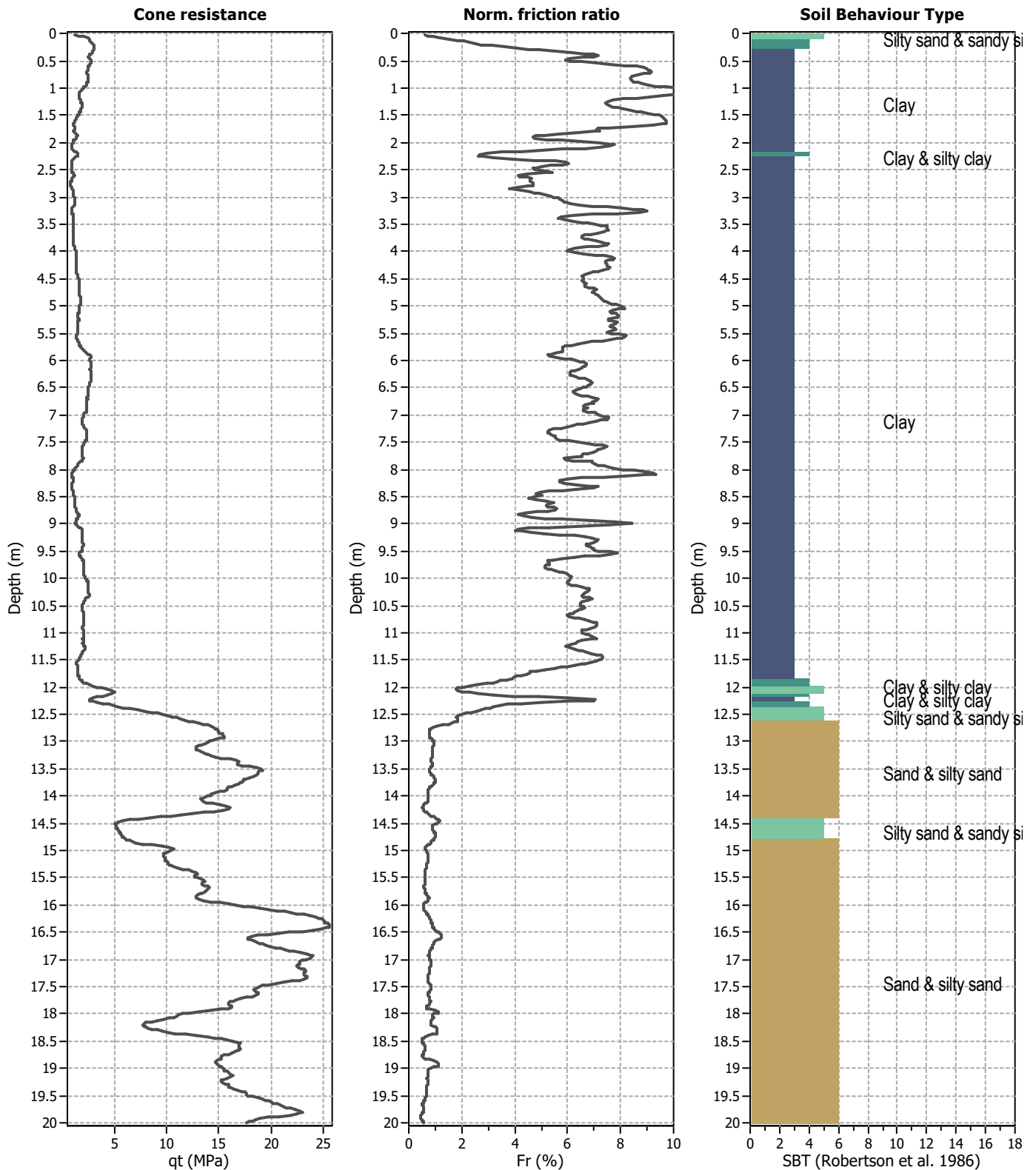
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

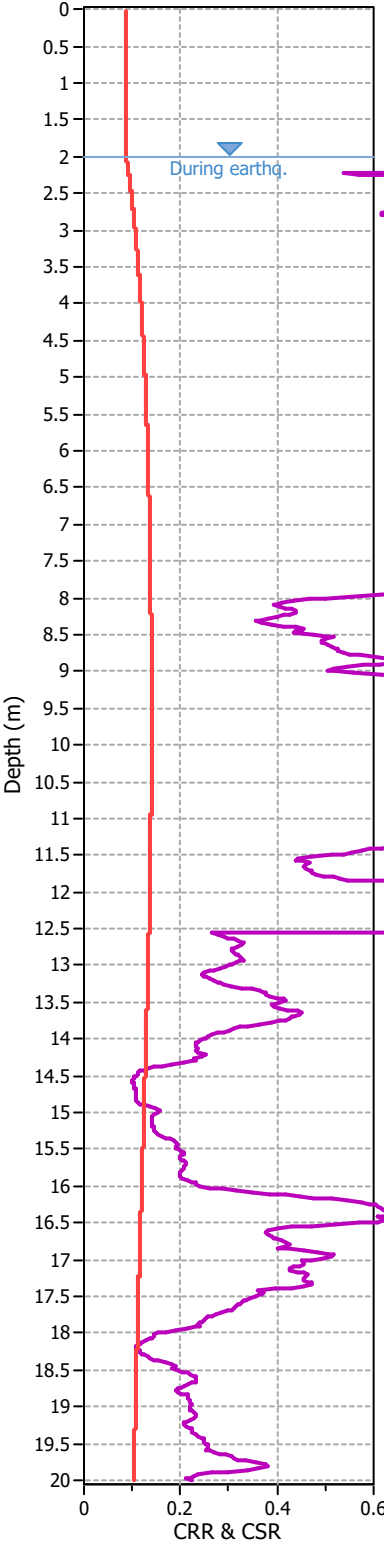
Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



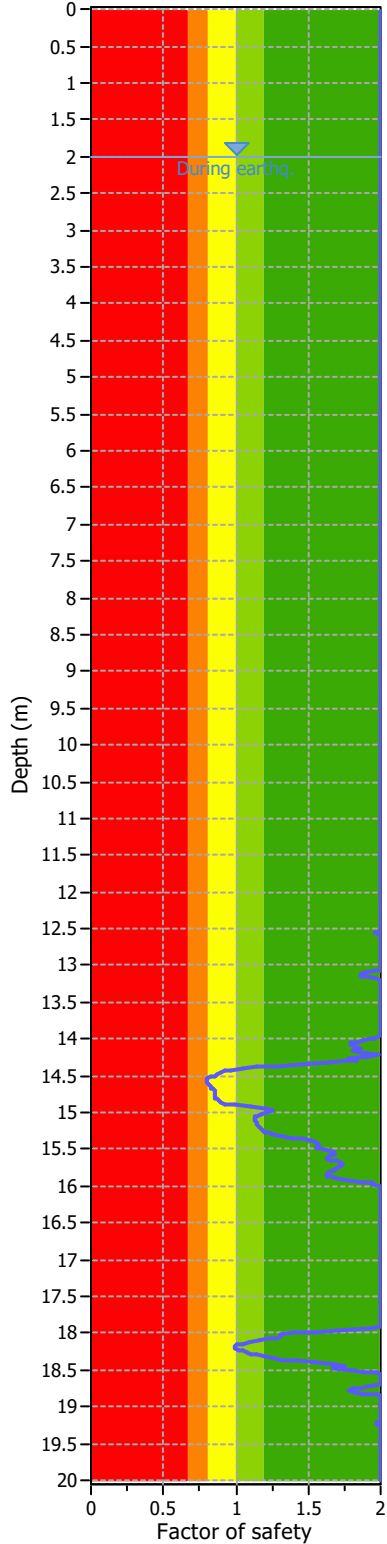
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



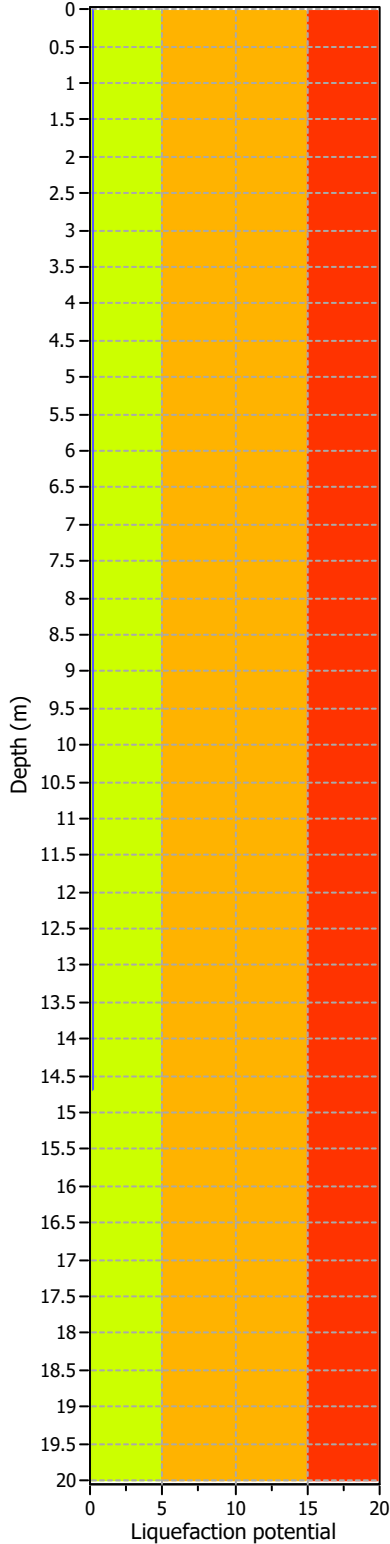
CRR plot



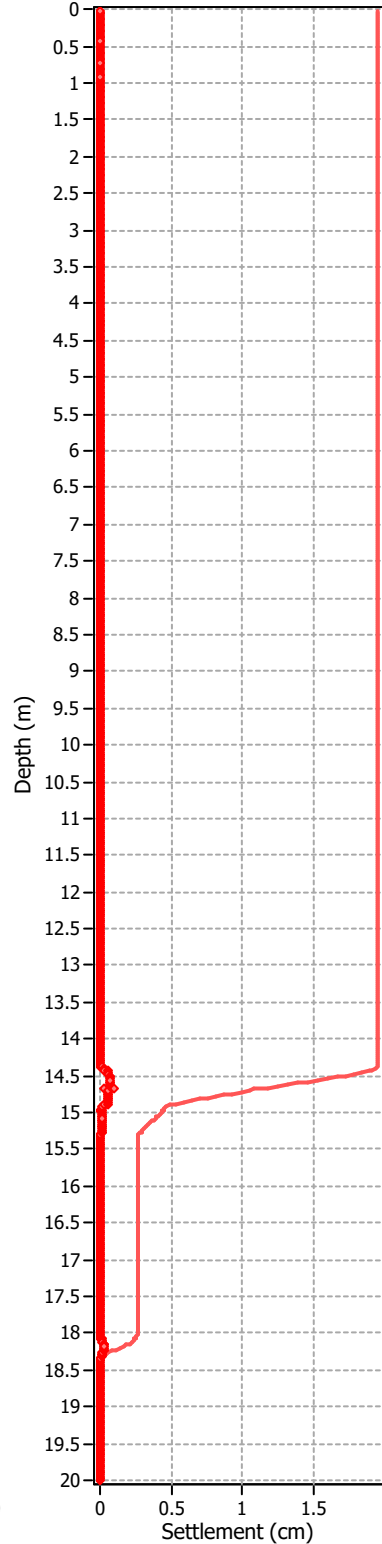
FS Plot



LPI



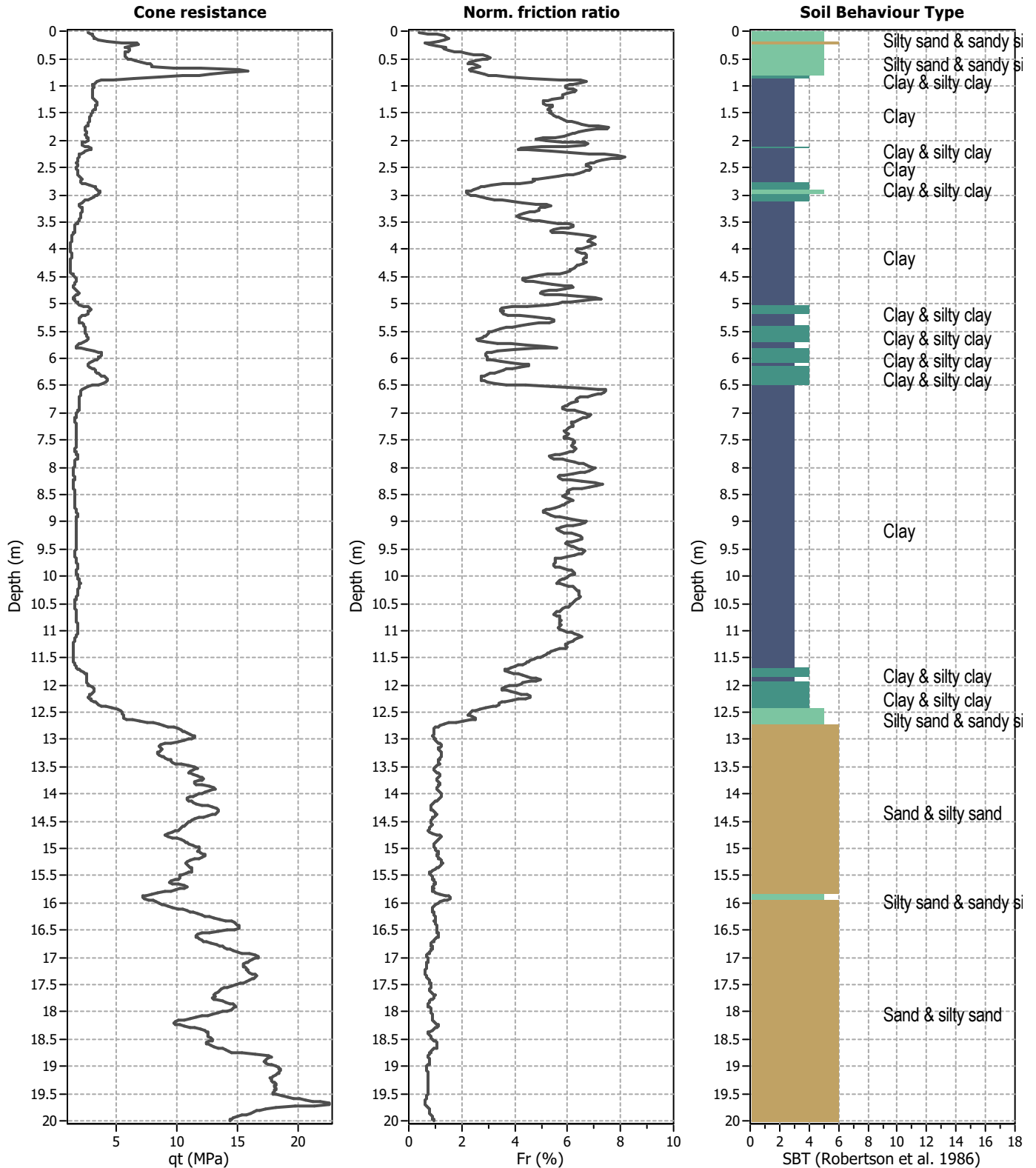
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based

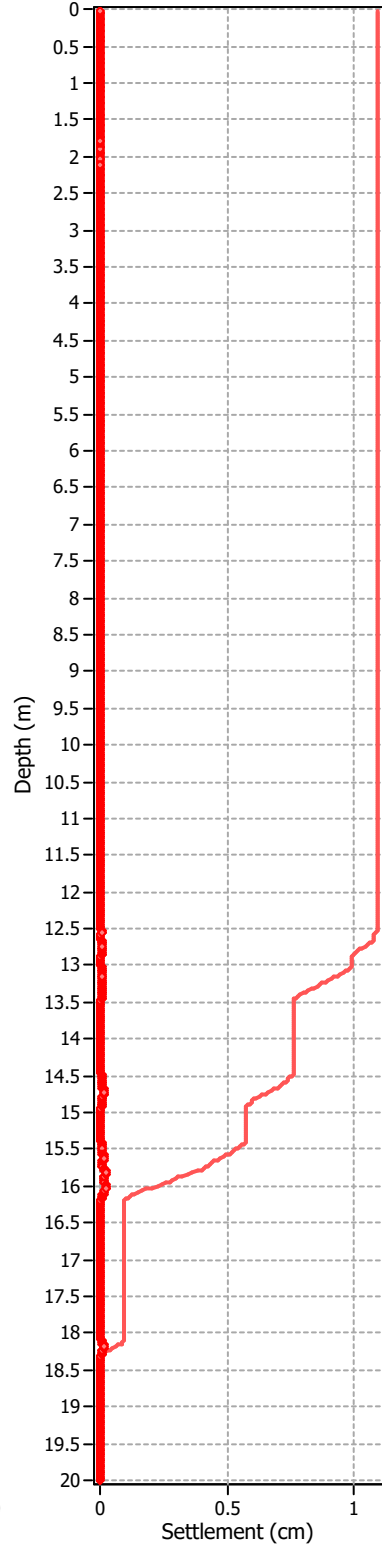
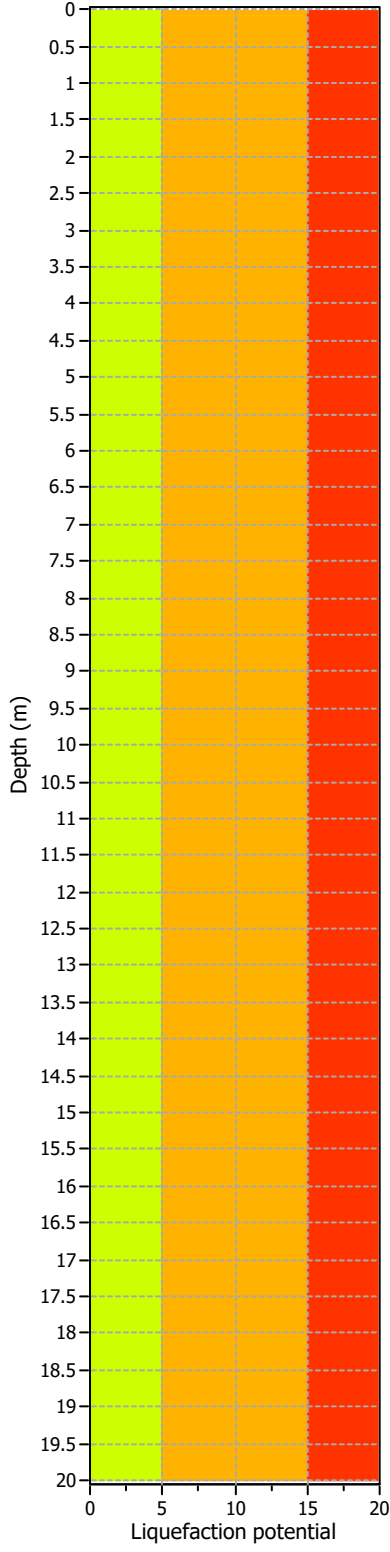
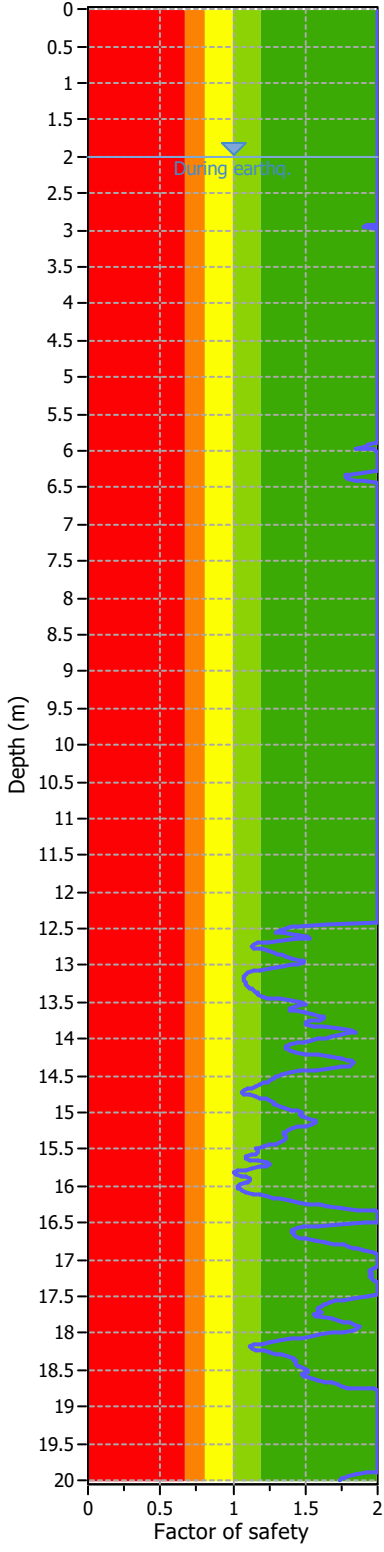
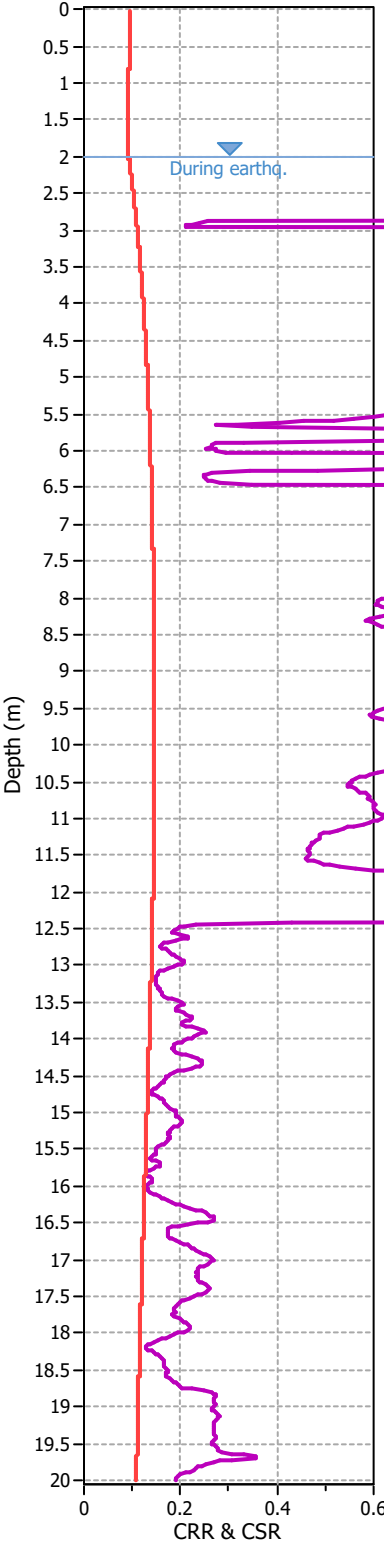


CRR plot

FS Plot

LPI

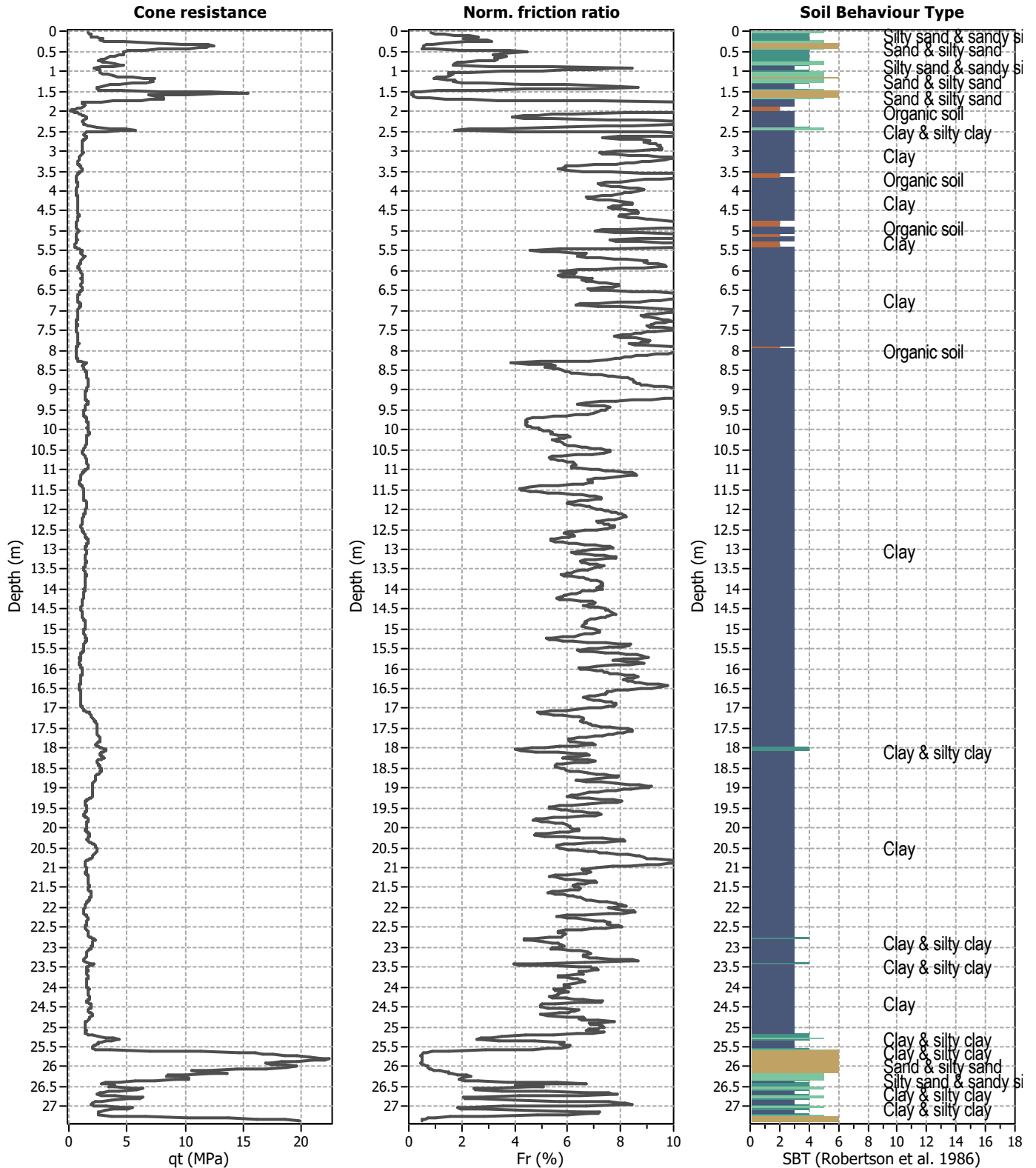
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

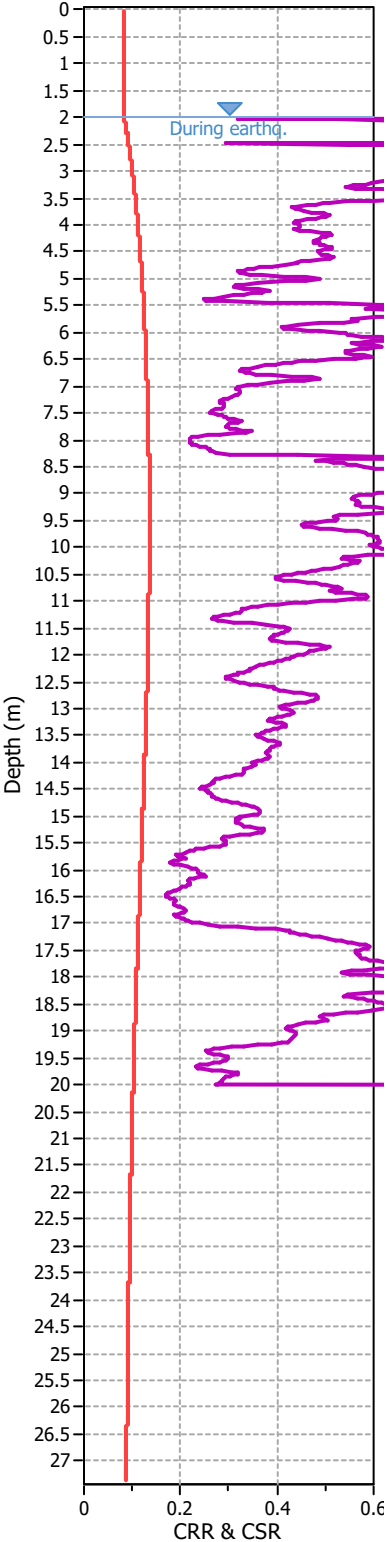
Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



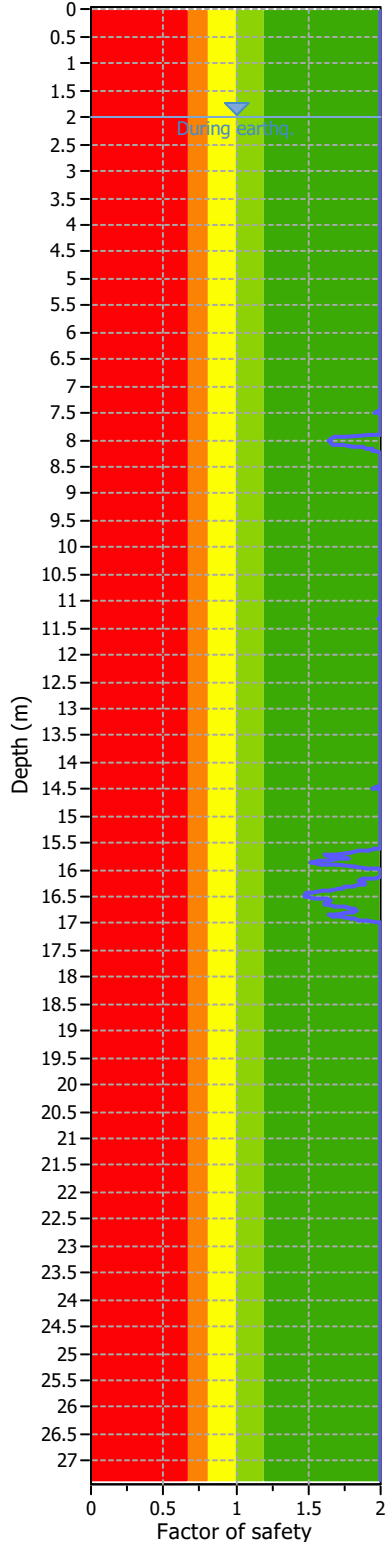
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.18	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



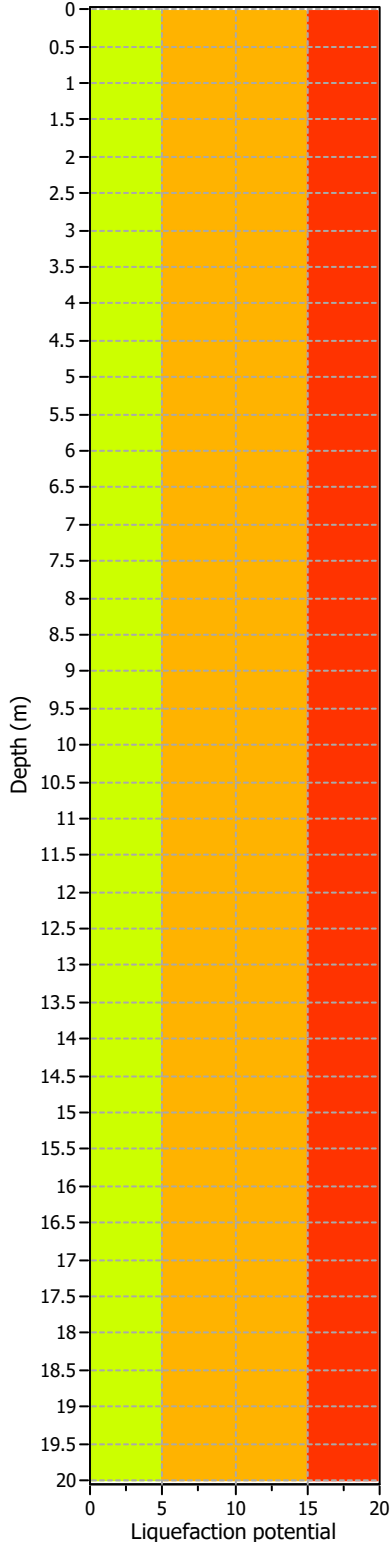
CRR plot



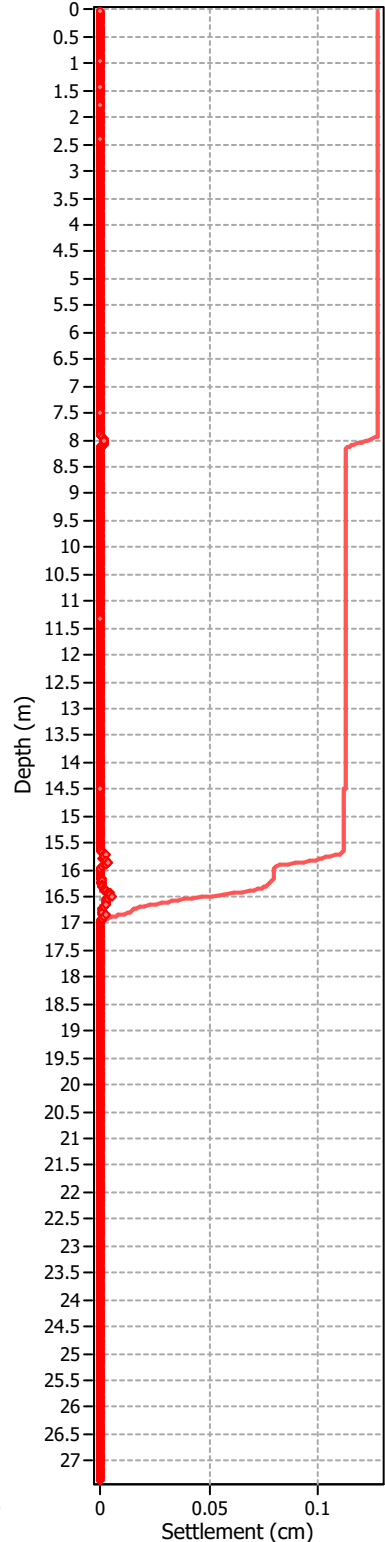
FS Plot



LPI



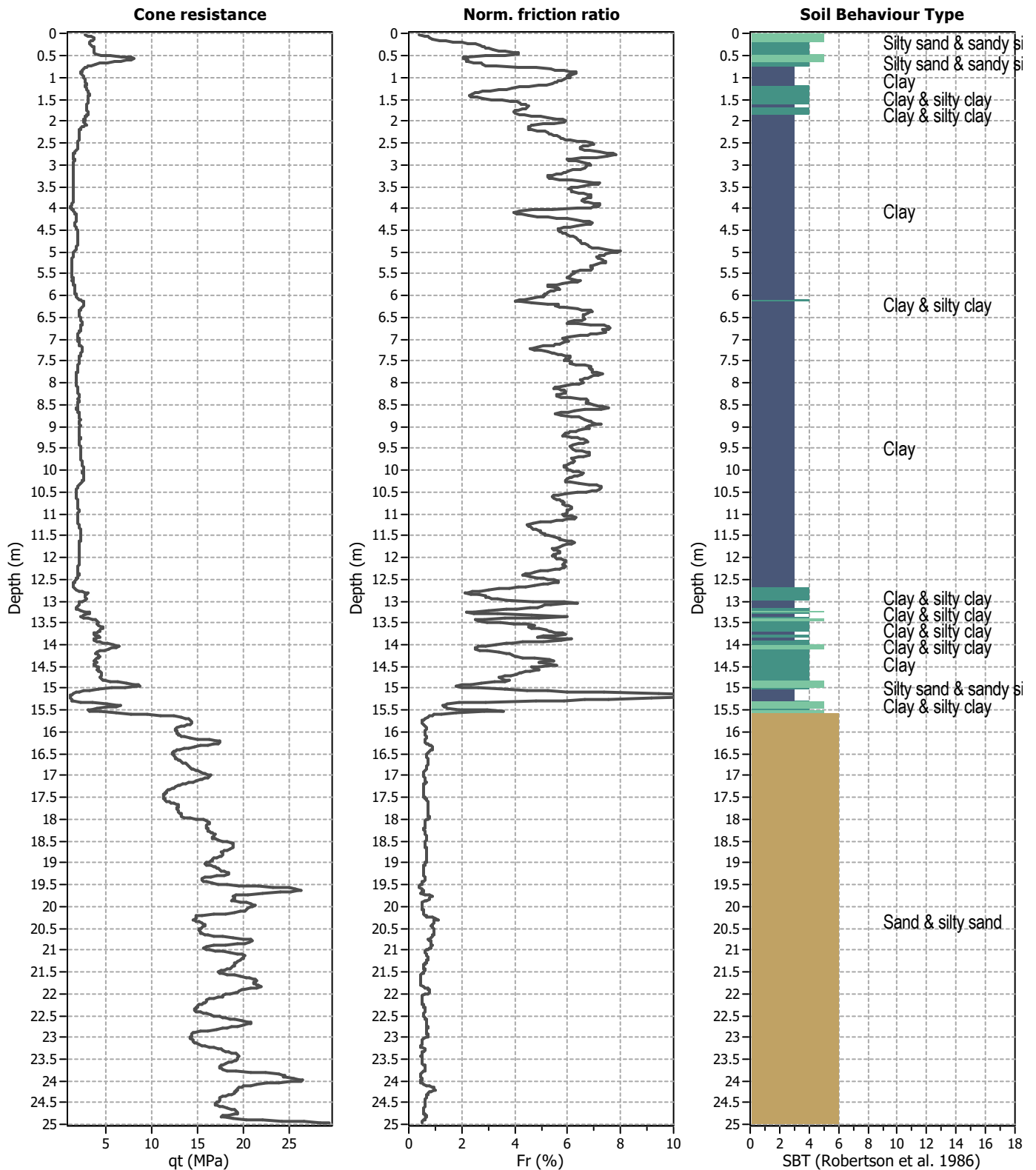
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.18	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

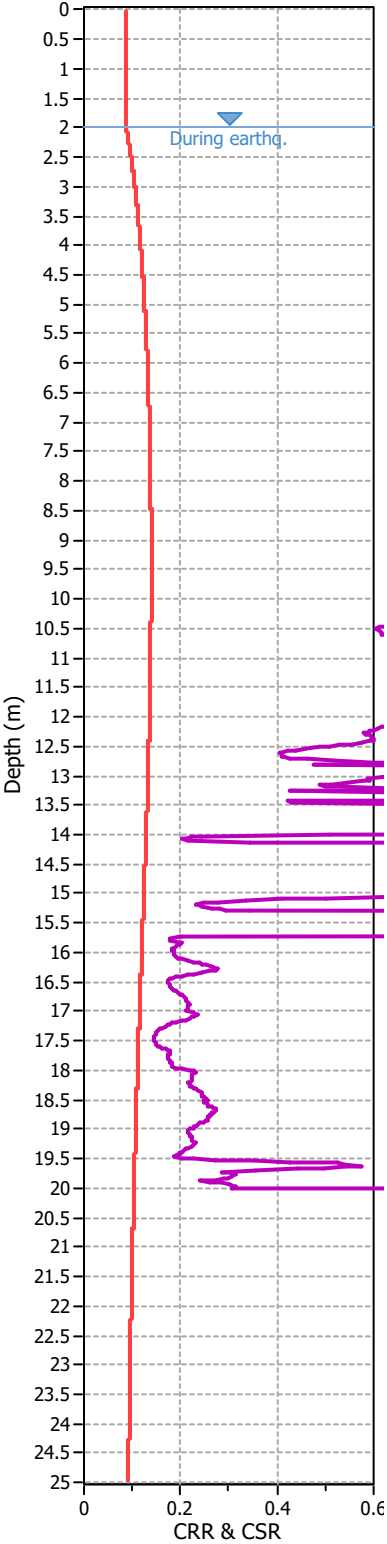
Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



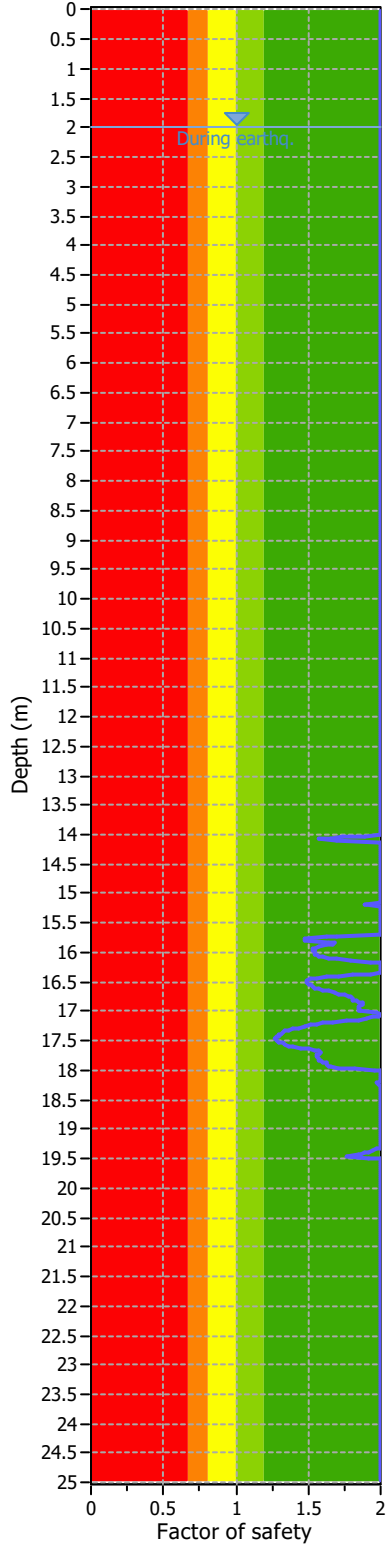
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



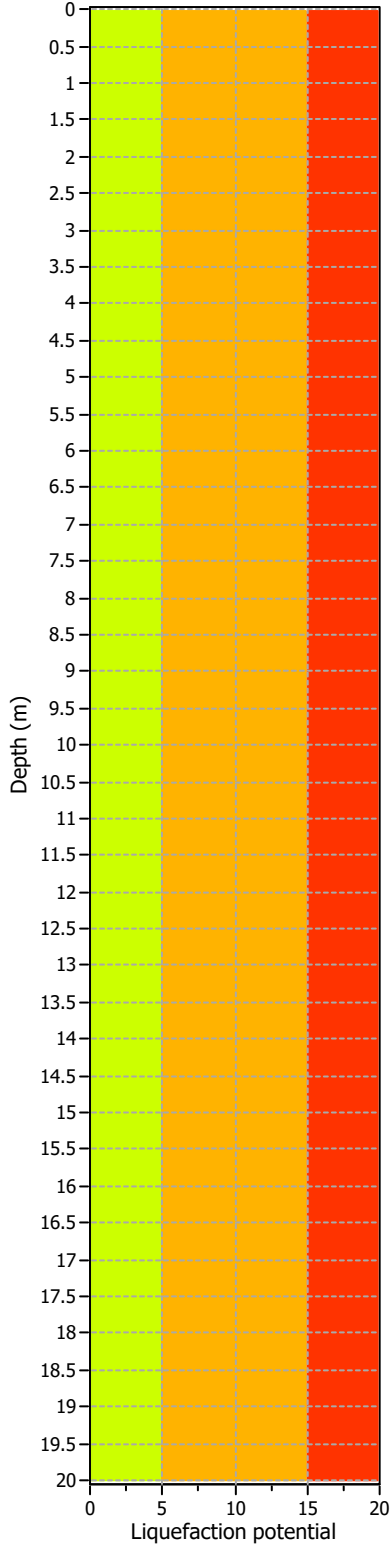
CRR plot



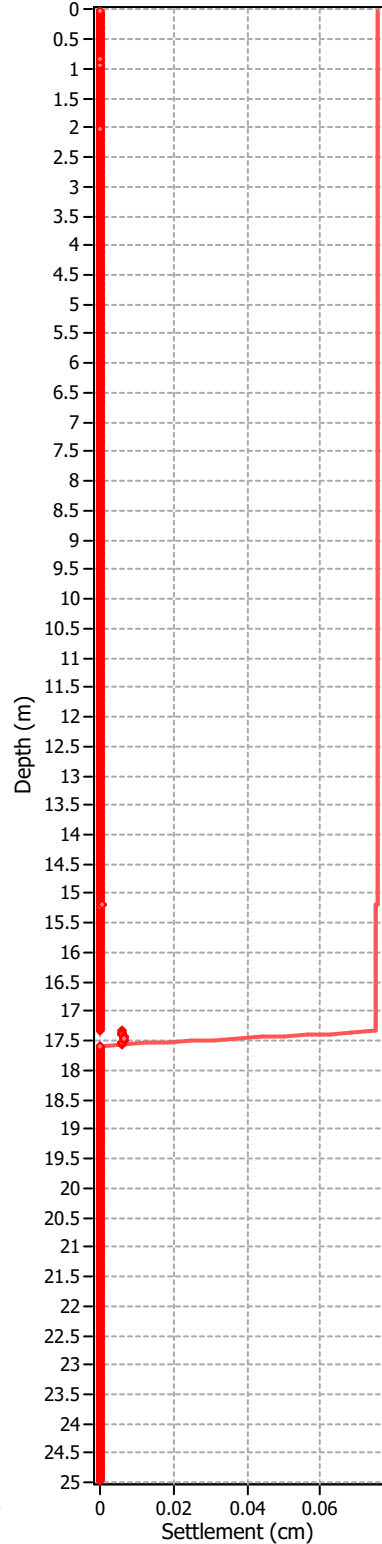
FS Plot



LPI



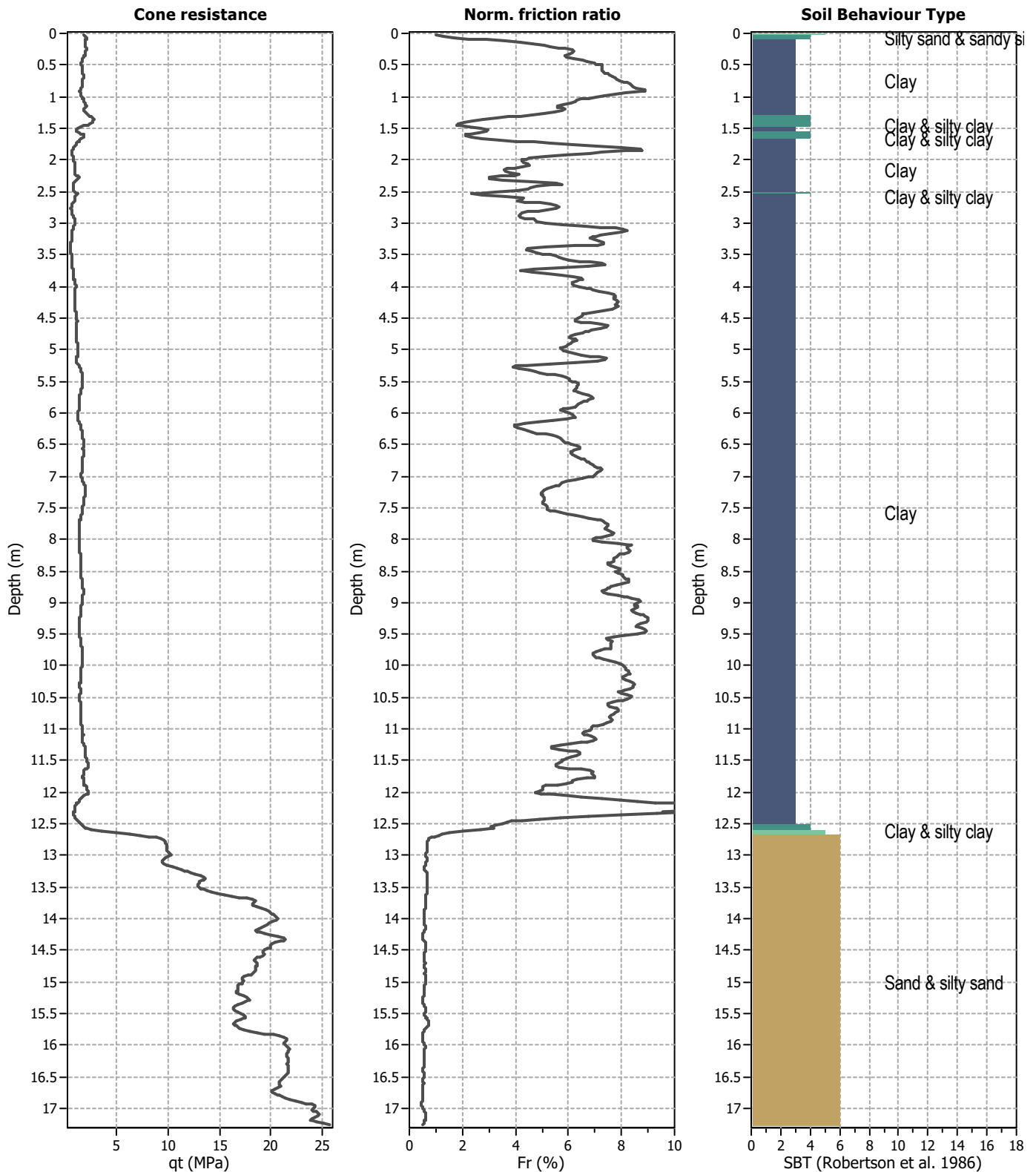
Vertical settlements



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.16	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based

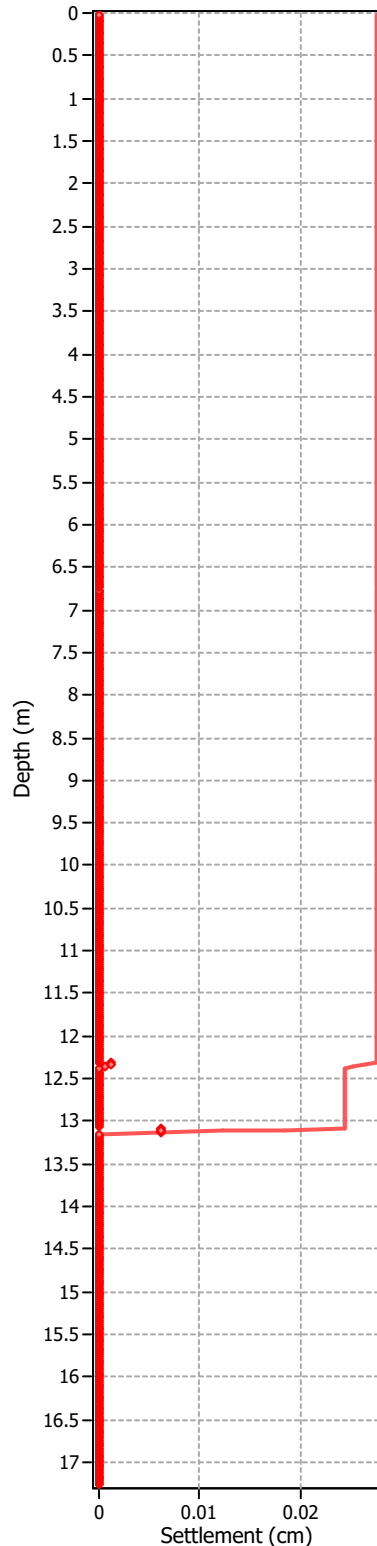
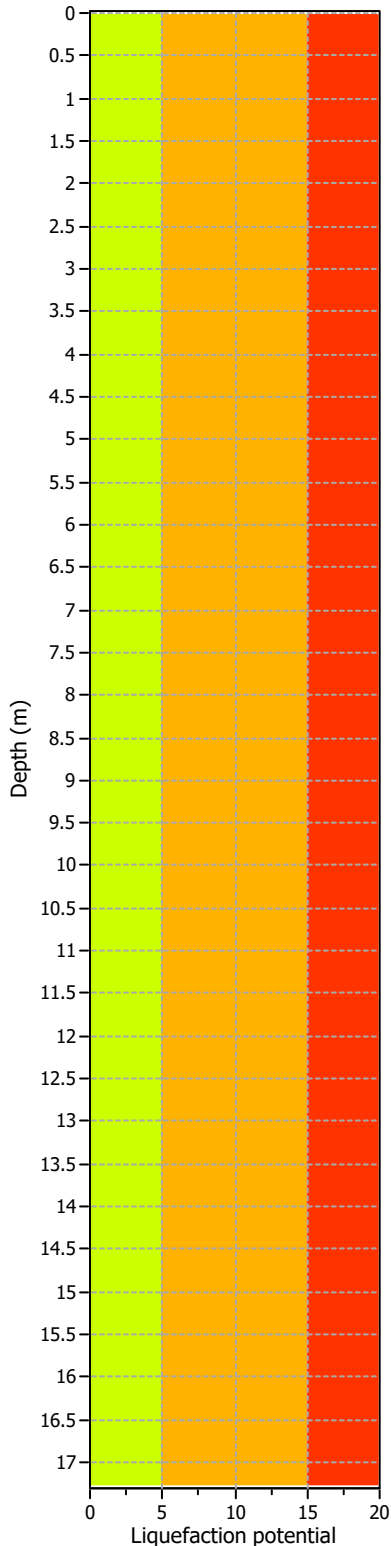
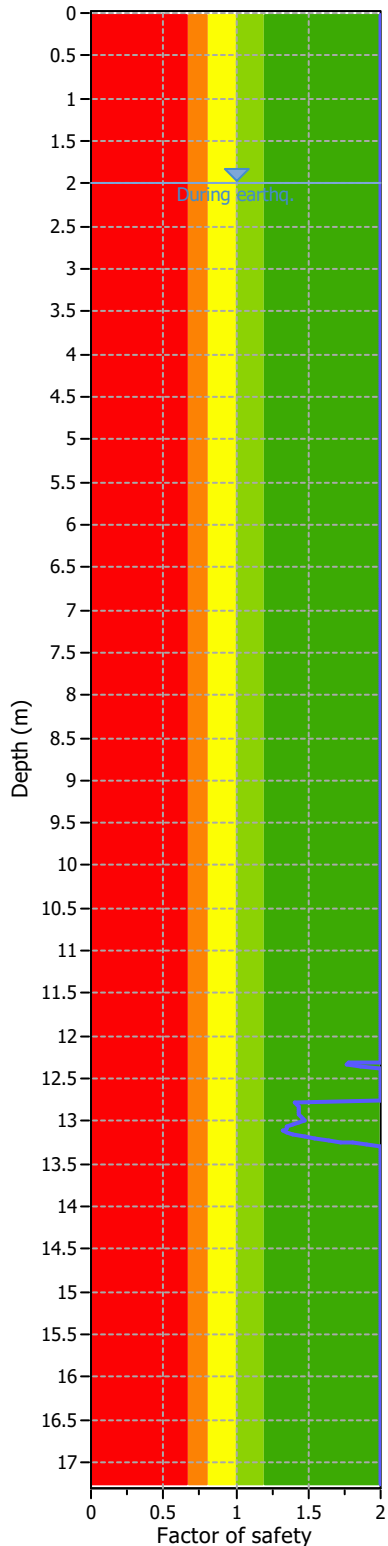
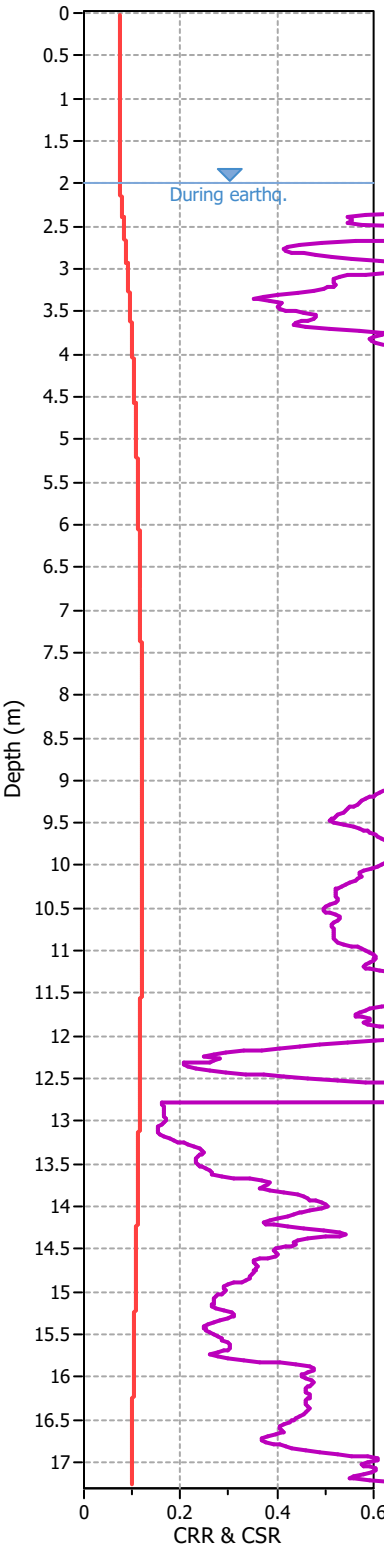


CRR plot

FS Plot

LPI

Vertical settlements

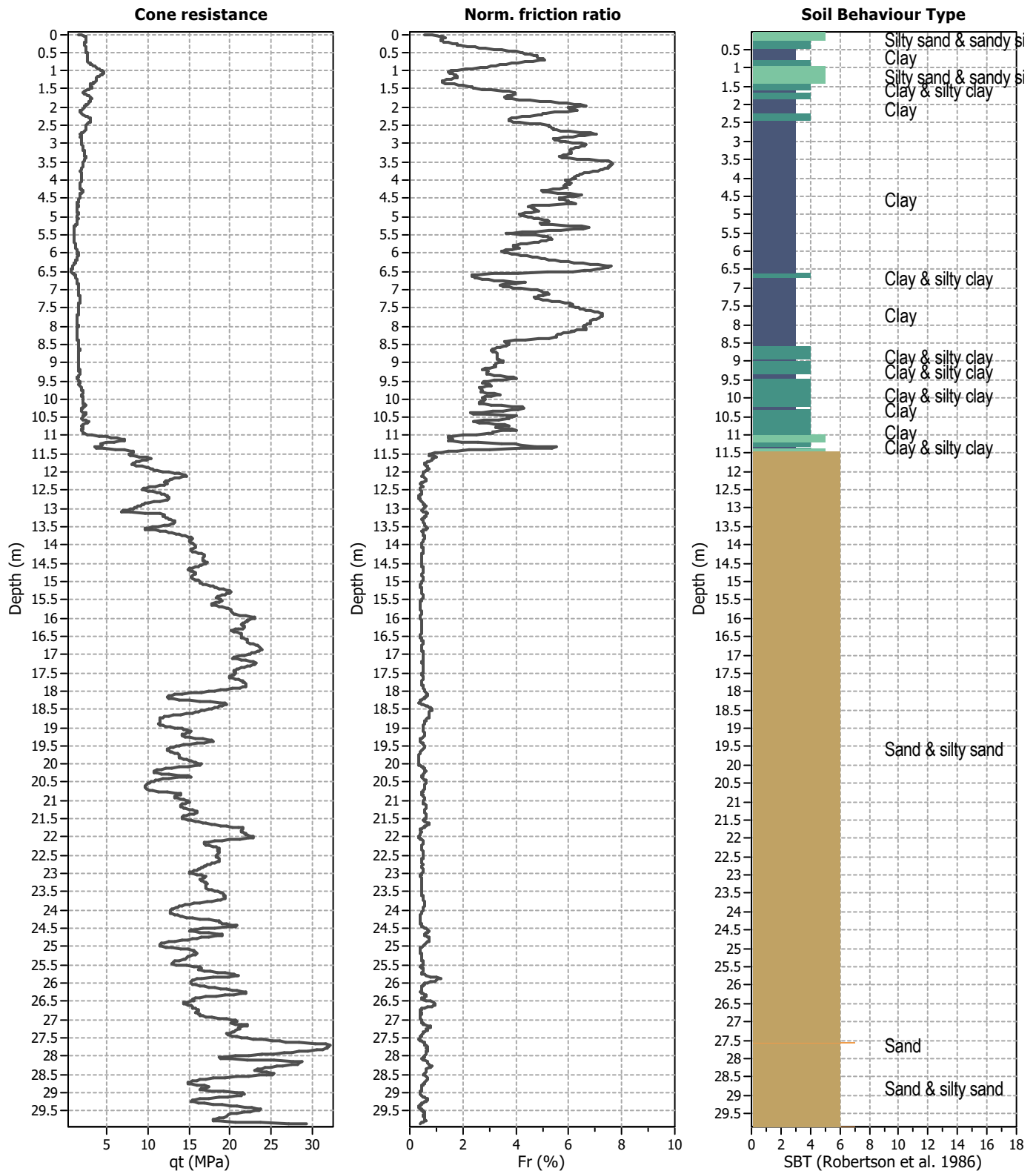


Analysis method: Robertson (2009)
Fines correction method: Robertson (2009)
Points to test: Based on Ic value
Earthquake magnitude M_w : 6.14
Peak ground acceleration: 0.16

G.W.T. (in-situ): 3.00 m
G.W.T. (earthq.): 2.00 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT

Use fill: No
Fill height: N/A
Fill weight: N/A
Trans. detect. applied: Yes
 K_o applied: No

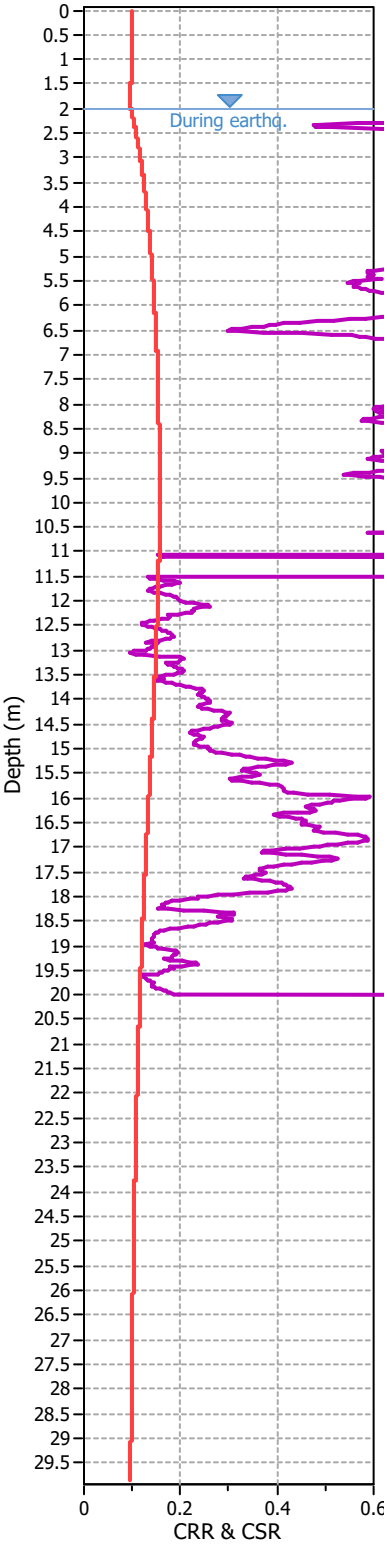
Clay like behavior applied: All soils
Limit depth applied: Yes
Limit depth: 20.00 m
MSF method: Method based



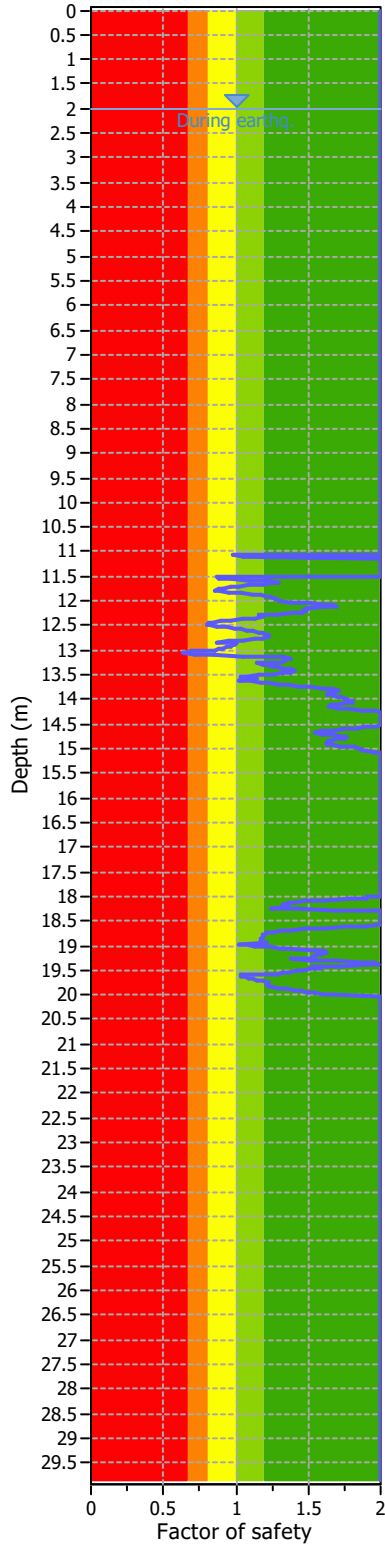
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.21	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



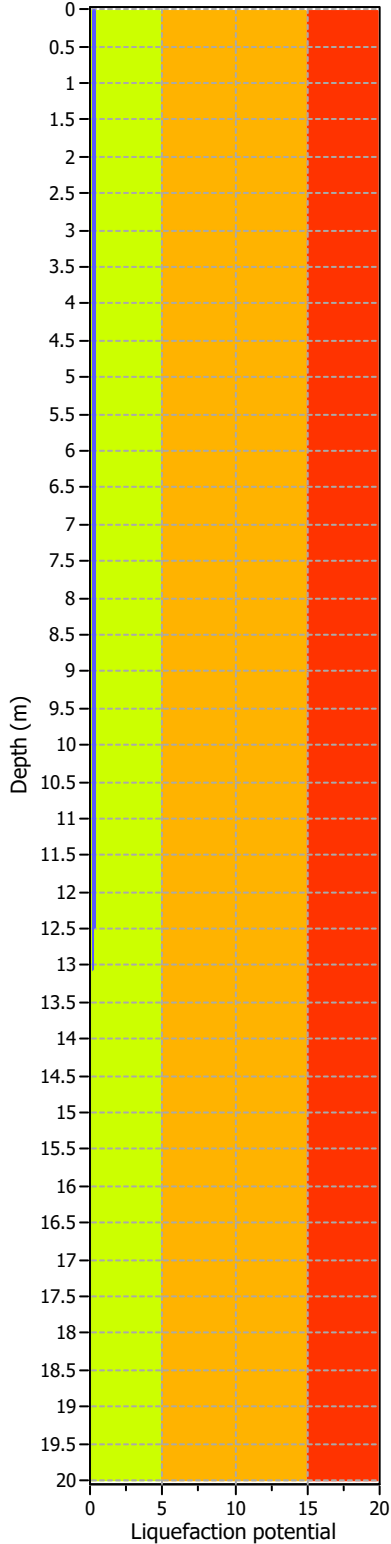
CRR plot



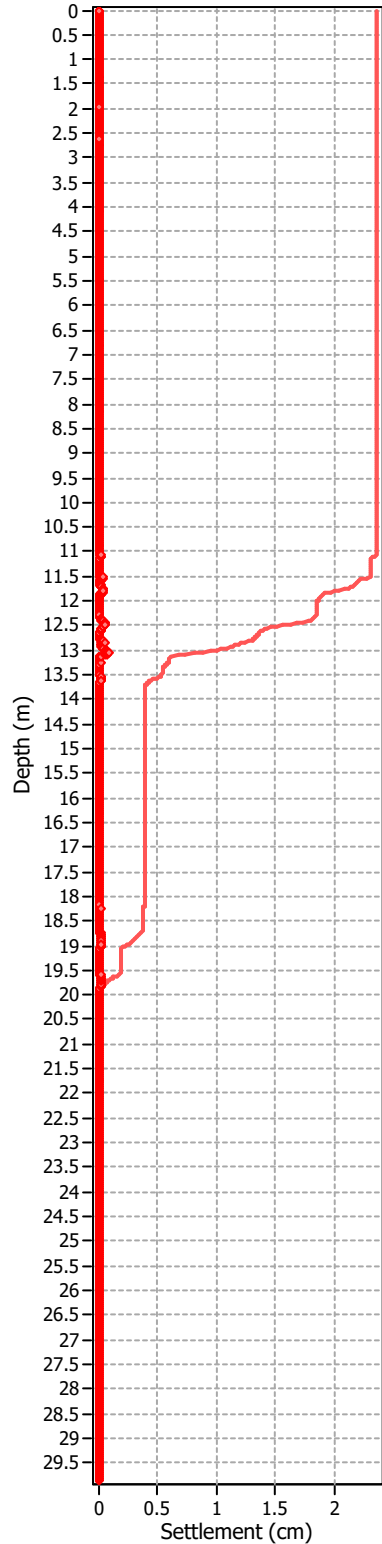
FS Plot



LPI



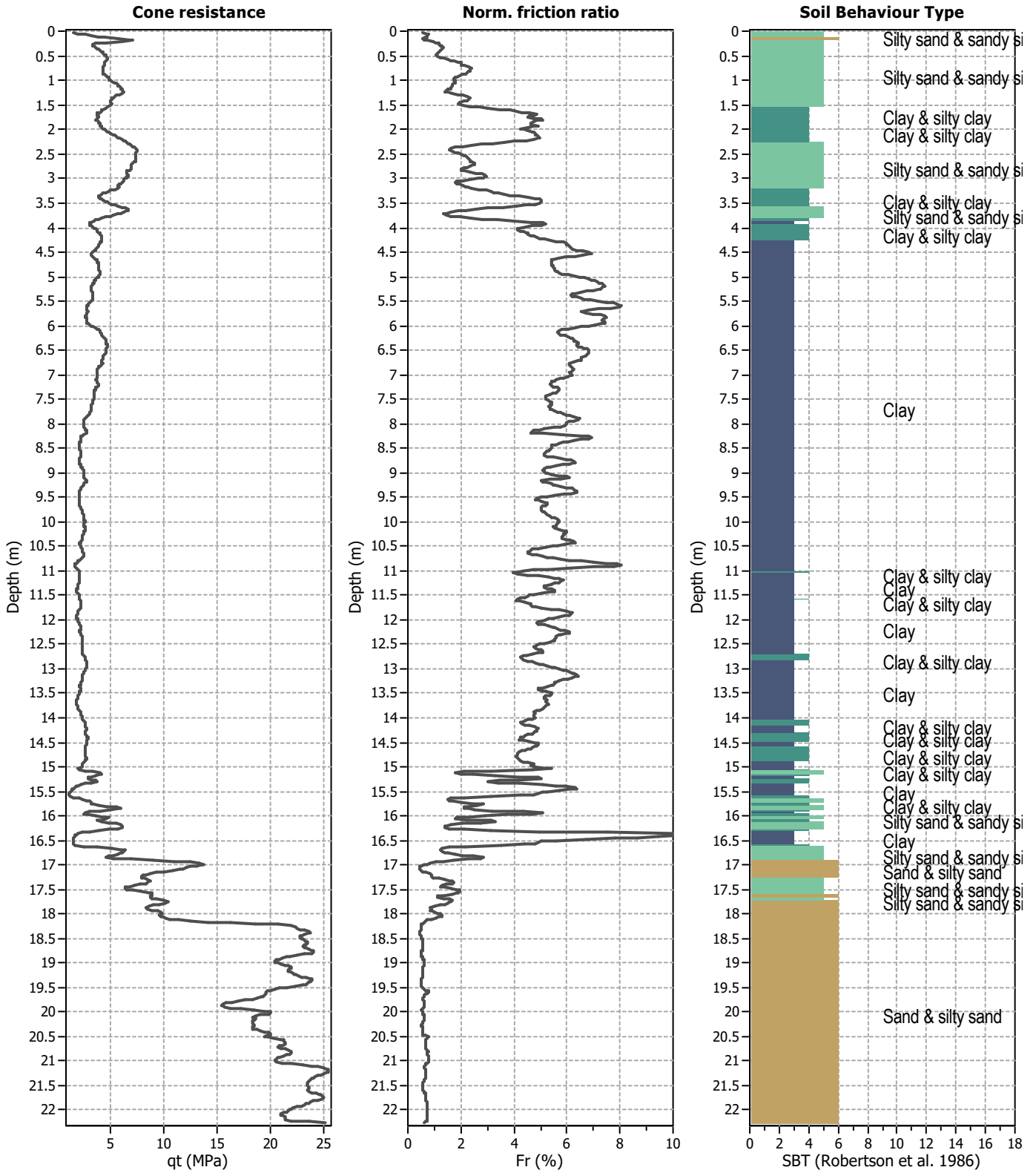
Vertical settlements



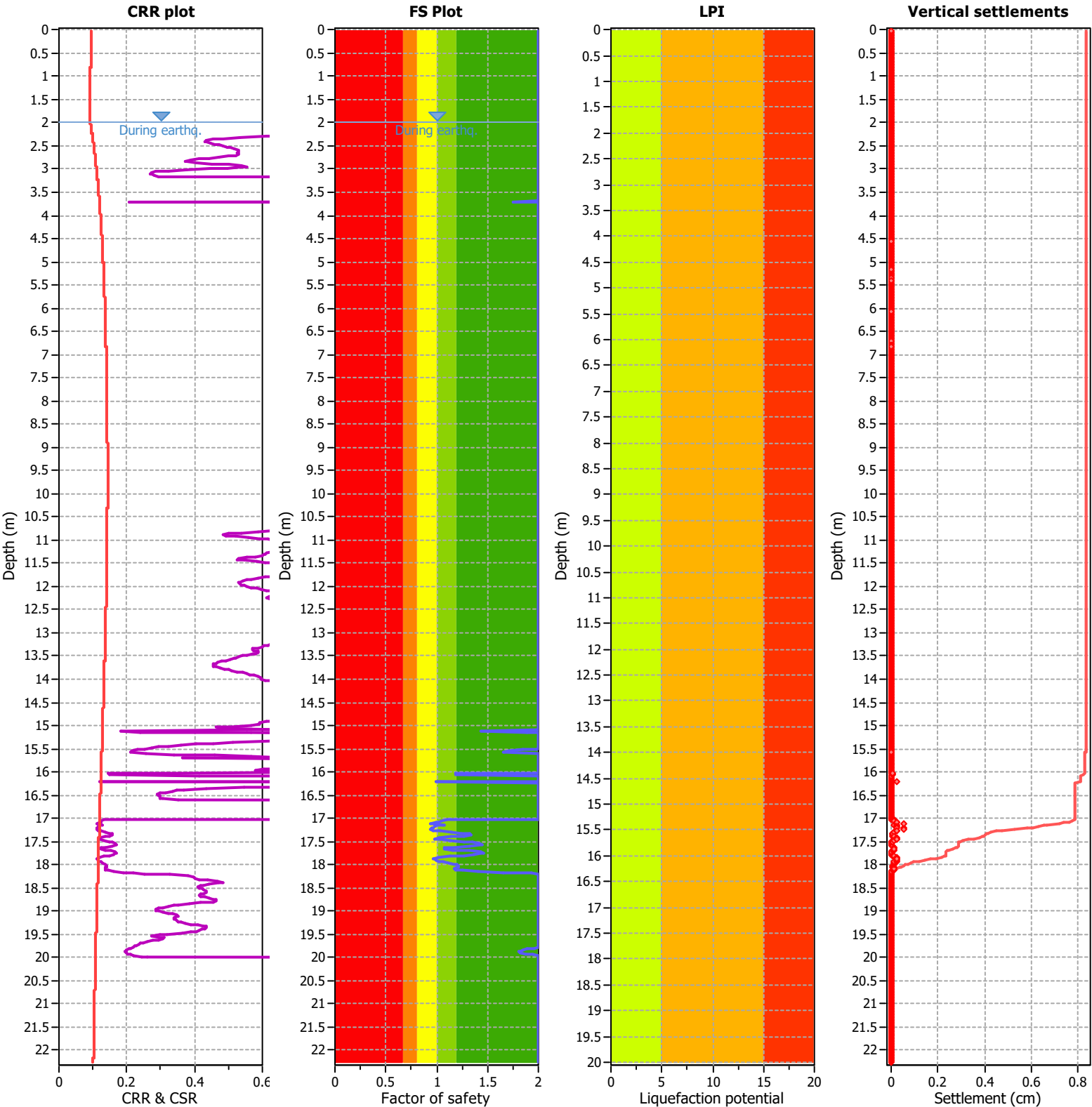
Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.21	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m	Use fill:	No	Clay like behavior	
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	All soils
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT	K_σ applied:	No	MSF method:	Method based



Analysis method:	Robertson (2009)	G.W.T. (in-situ):	3.00 m
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	2.00 m
Points to test:	Based on Ic value	Average results interval:	3
Earthquake magnitude M_w :	6.14	Ic cut-off value:	2.60
Peak ground acceleration:	0.20	Unit weight calculation:	Based on SBT

Use fill:	No
Fill height:	N/A
Fill weight:	N/A
Trans. detect. applied:	Yes
K_0 applied:	No

Clay like behavior applied:	All soils
Limit depth applied:	Yes
Limit depth:	20.00 m
MSF method:	Method based