

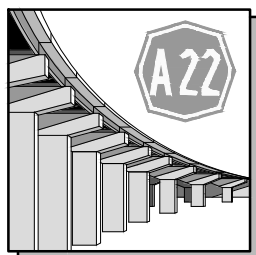

# autostrada del brennero

PROGETTO DEFINITIVO PER LA REALIZZAZIONE  
DELLA TERZA CORSIA NEL TRATTO COMPRESO  
TRA VERONA NORD (KM 223) E L'INTERSEZIONE  
CON L'AUTOSTRADA A1 (KM 314)

## RICHIESTA DEL COMUNE DI CAMPOGALLIANO

4.13

ELABORATI PER IL POC - STRALCIO DEL COMUNE DI CAMPOGALLIANO  
GEOLOGIA, IDROGEOLOGIA E SISMICA  
Allegato 6: Verifiche a liquefazione

0	SETT. 2021	RICHIESTA COMUNE CAMPOGALLIANO	ENGEO SRL	M. TAMANINI	C. COSTA
REVISIONE:	DATA:	DESCRIZIONE:	REDAZIONE:	VERIFICA:	APPROVAZIONE:
DATA PROGETTO:			DIREZIONE TECNICA GENERALE		IL DIRETTORE TECNICO GENERALE E PROGETTISTA: 
LUGLIO 2009					
NUMERO PROGETTO:					
31/09					

COMUNE DI CAMPOGALLIANO  
PROVINCIA DI MODENA

**Relazione geologica, idrogeologica e  
sismica per il POC del Comune di  
Campogalliano (MO) nell'ambito del  
S.I.A. relativo alla realizzazione  
della terza corsia nel tratto  
compreso tra Verona nord (km 223)  
e l'intersezione con l'autostrada A1  
(km 314)**

VERIFICHE A LIQUEFAZIONE

elaborato:

All. 6

I Geologi:

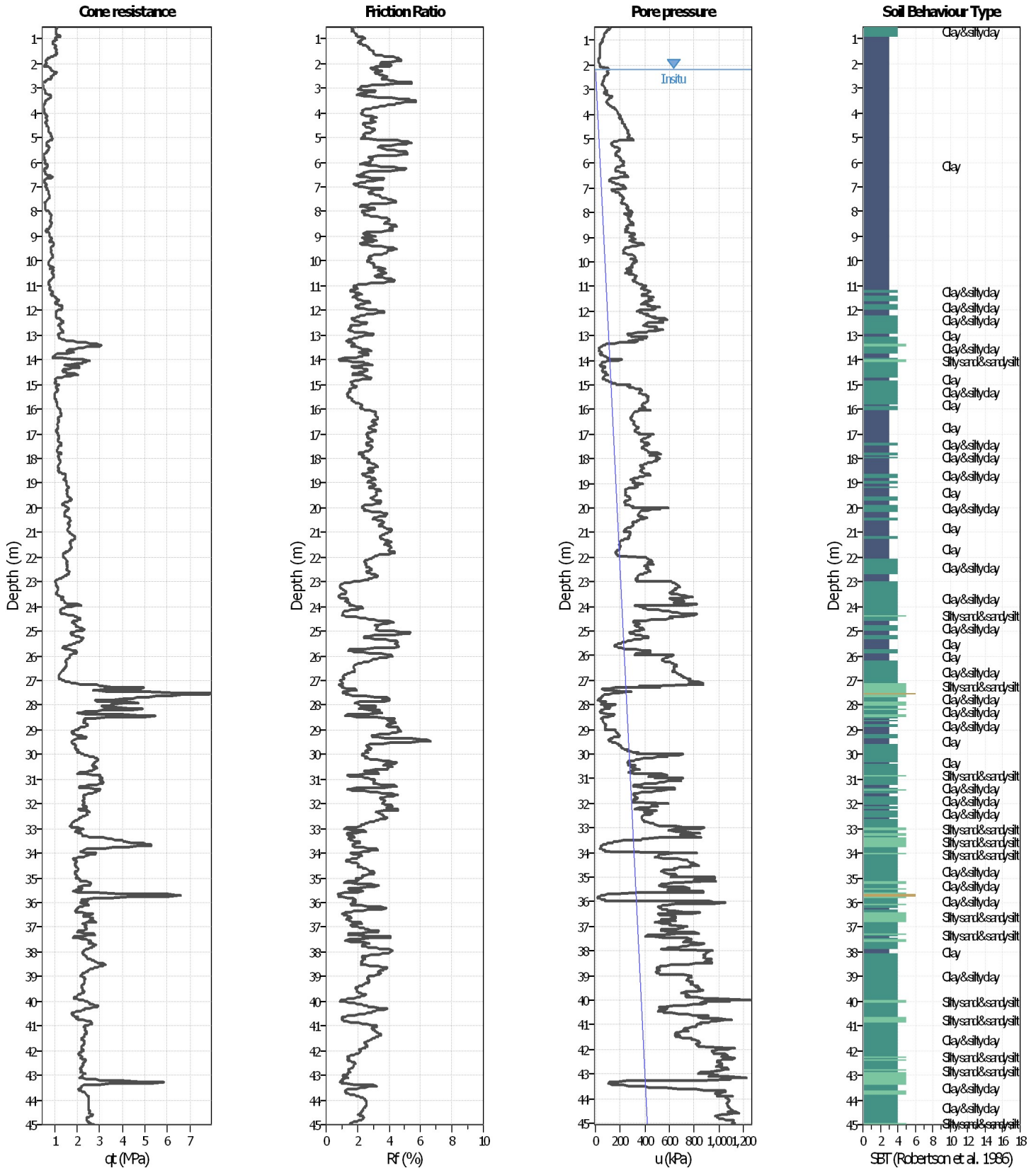
**Dr. Carlo Caleffi**

**Dr. Francesco Cerutti**



**EN GEO** S.r.l.  
ENGINEERING GEOLOGY  
www.engeo.it

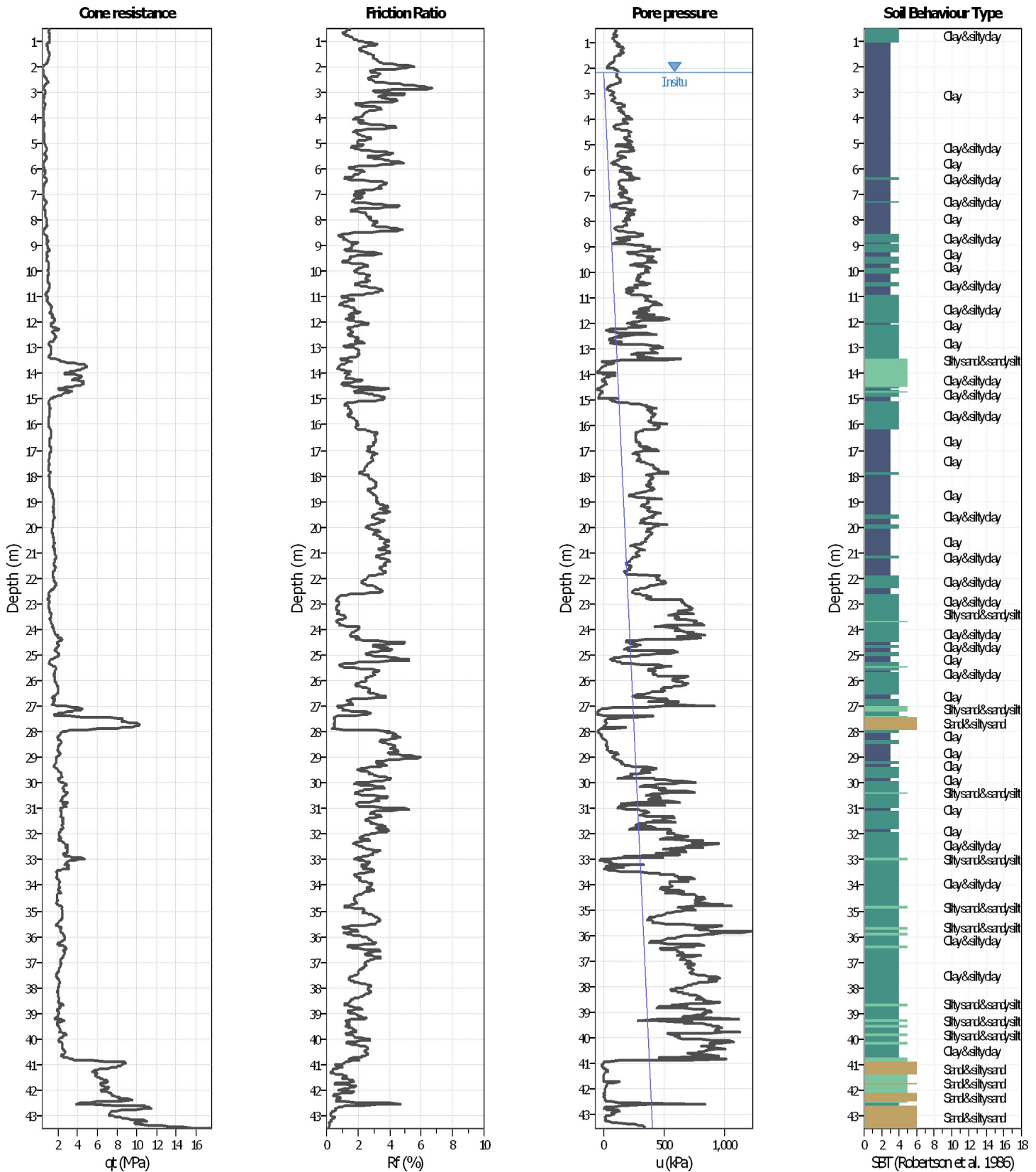
Sede legale: Via Suor Maria Adorni, 2 - 43121 Parma  
Uffici: Via Suor Maria Adorni, 2 - 43121 Parma Tel. 0521 233999 - Fax 0521 200181  
Via Ferrari 5/G - 46065 Marmirolo (MN) Tel. Fax 0376 467967  
E-mail: info@engeo.it



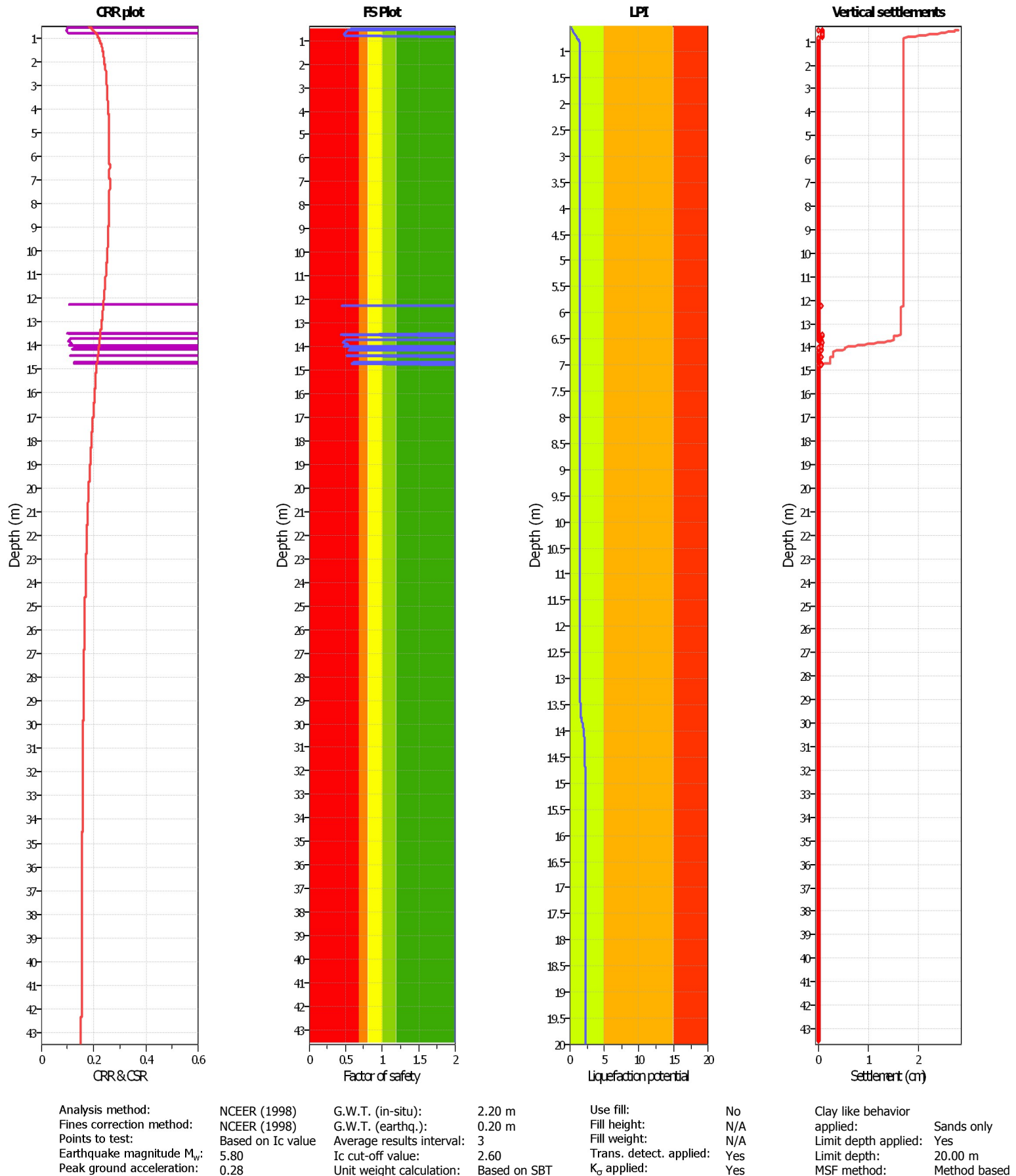
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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.20 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based

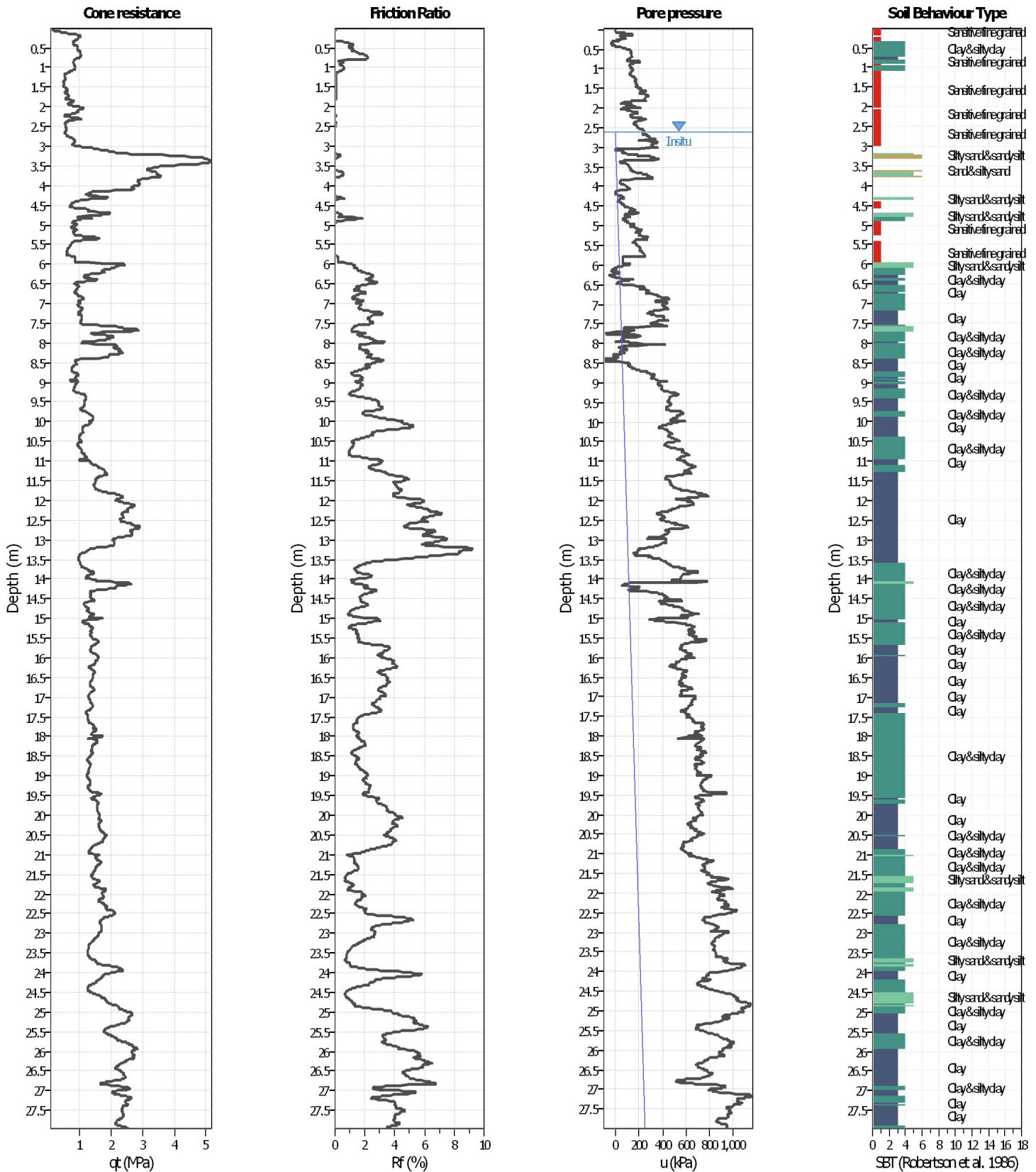


Analysis method:	NCEER (1998)	G.W.T. (in-situ):	2.20 m	Use fill:	No	Clay like behavior	
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.20 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based

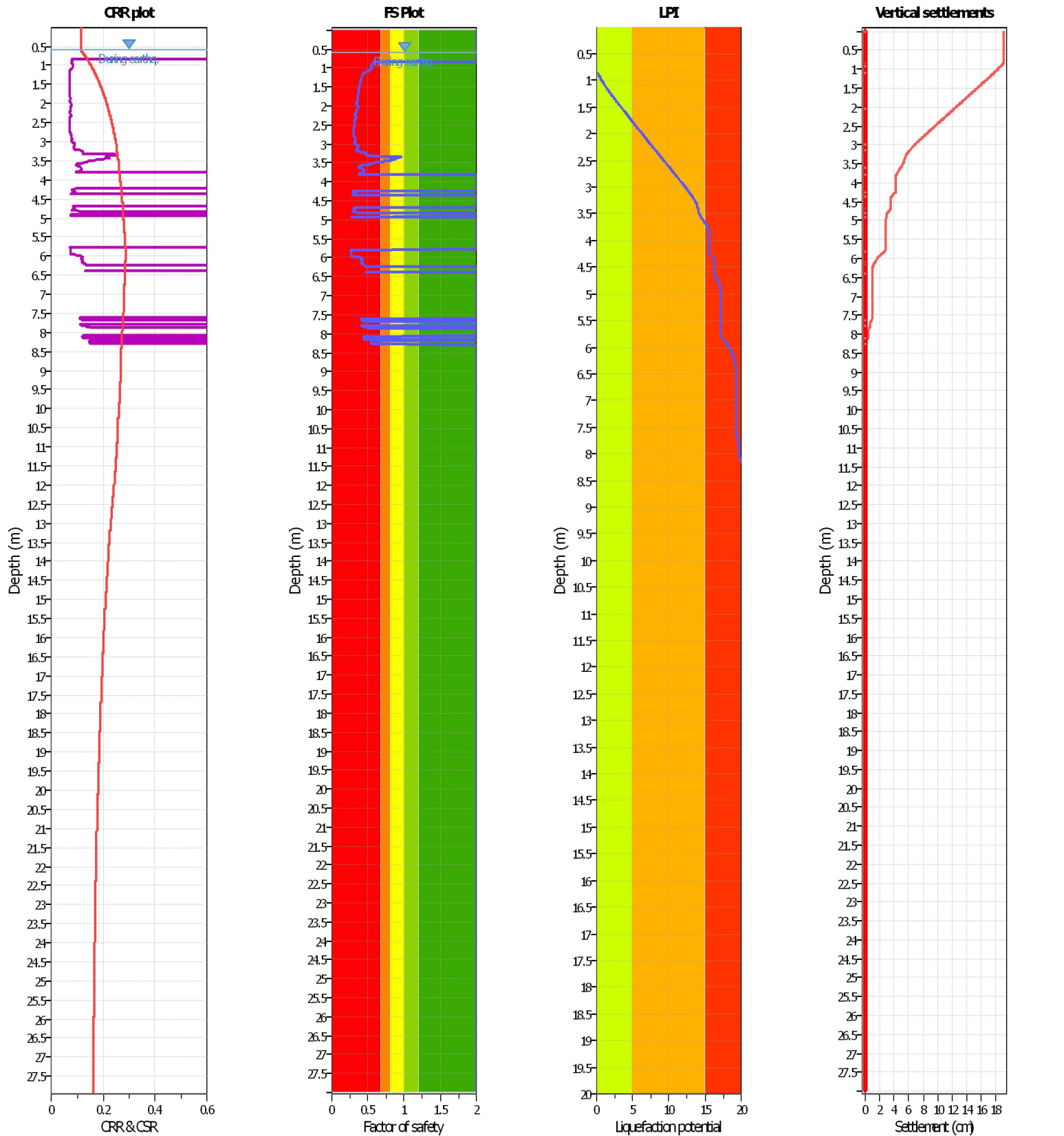


Analysis method:	NCEER (1998)	G.W.T. (in-situ):	2.20 m	Use fill:	No	Clay like behavior	
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.20 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on $I_c$ value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	$I_c$ cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



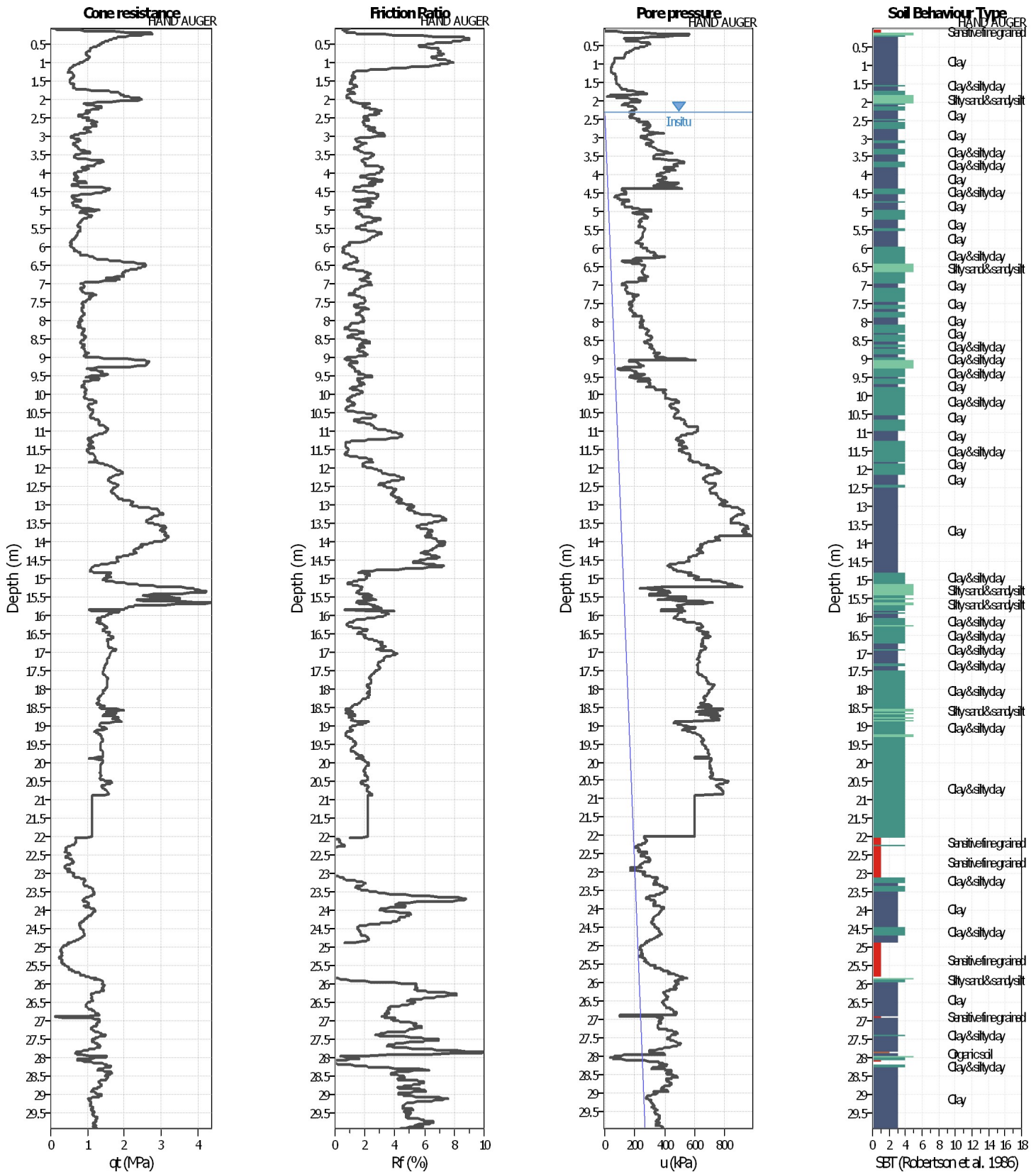


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Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



Analysis method:	NCEER (1998)	G.W.T. (in-situ):	2.60 m	Use fill:	No	Clay like behavior applied:	Sands only
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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes		

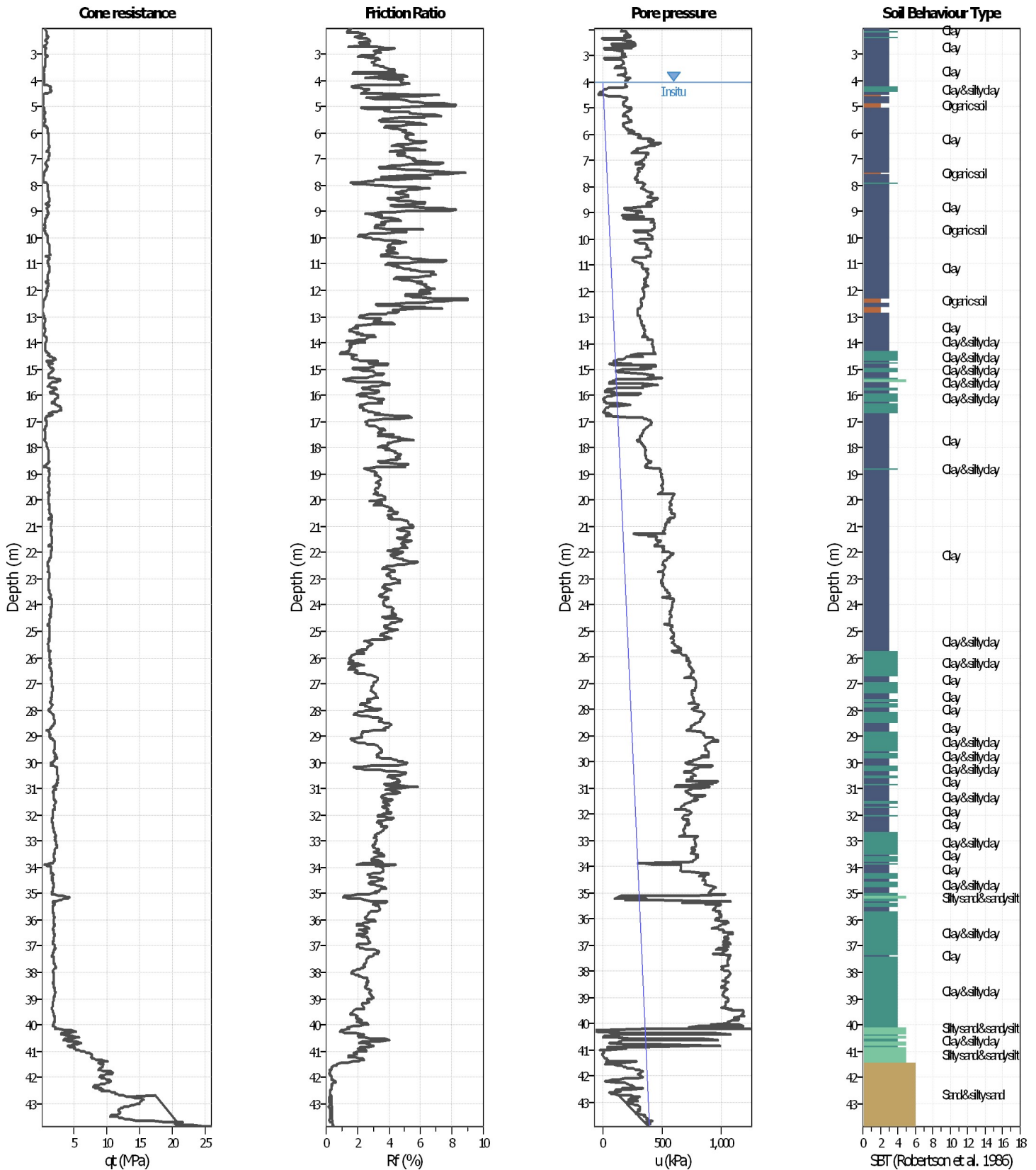




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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



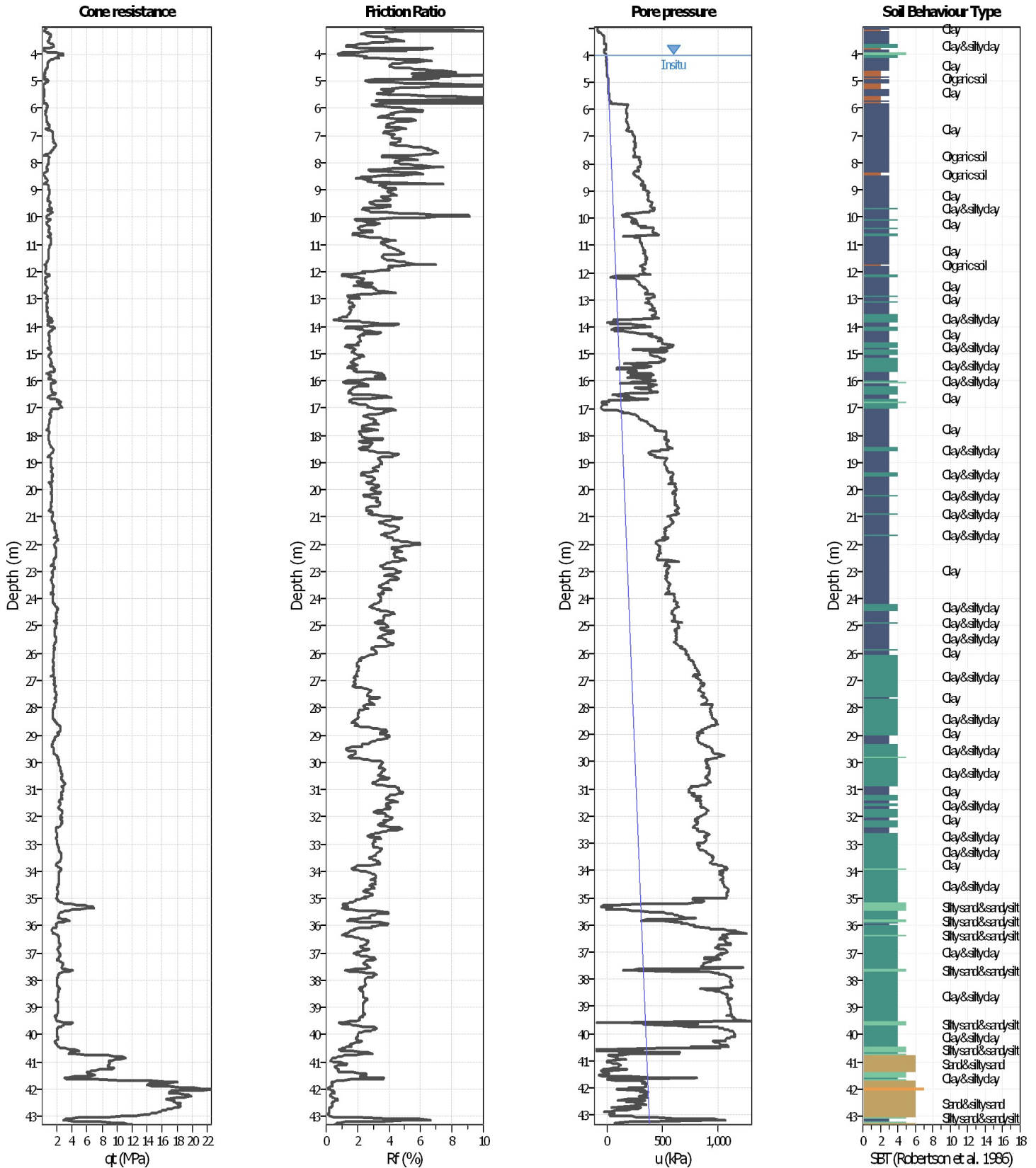
Analysis method:	NCEER (1998)	G.W.T. (in-situ):	2.30 m	Use fill:	No	Clay like behavior	
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	0.30 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



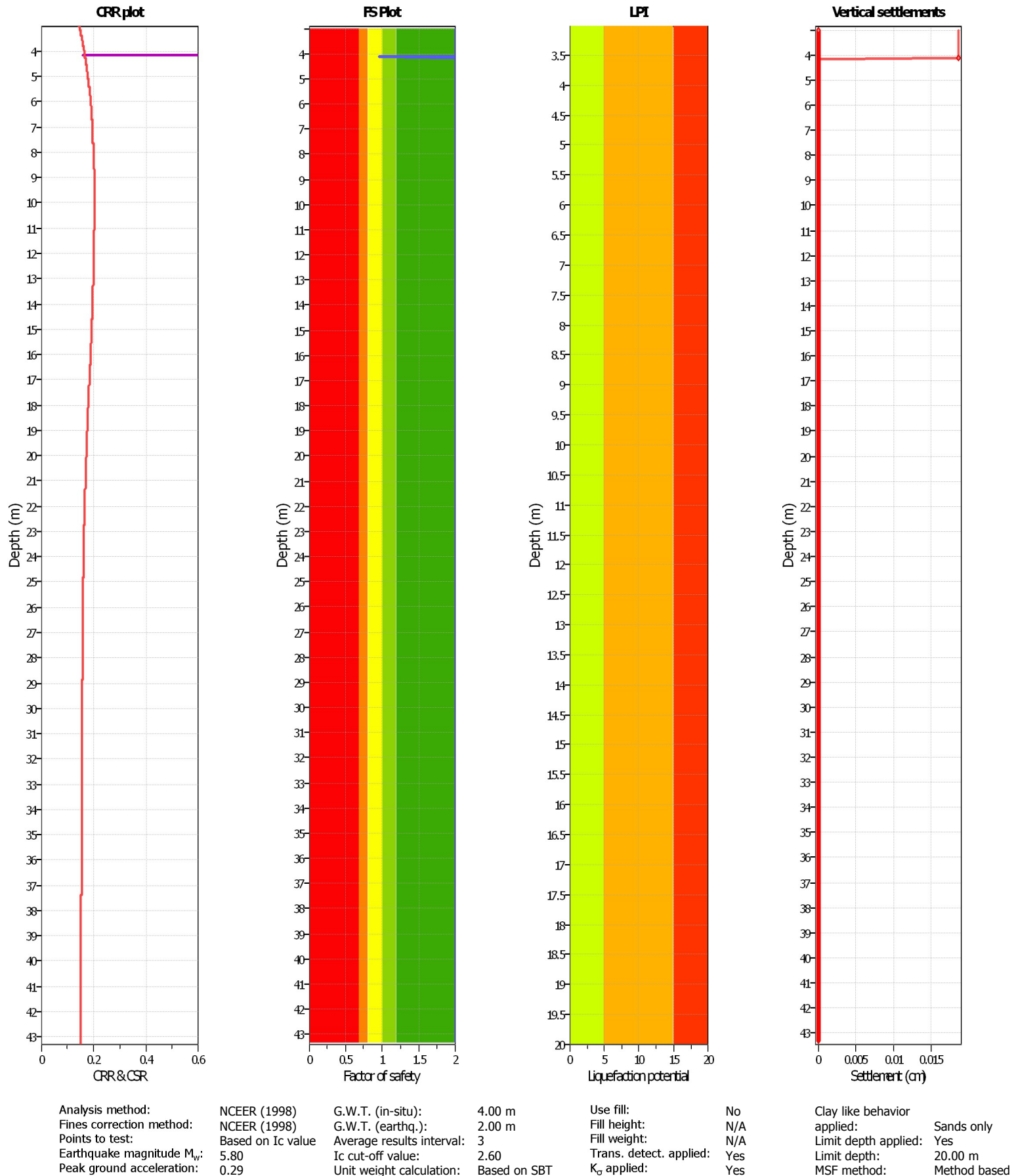
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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.29	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based

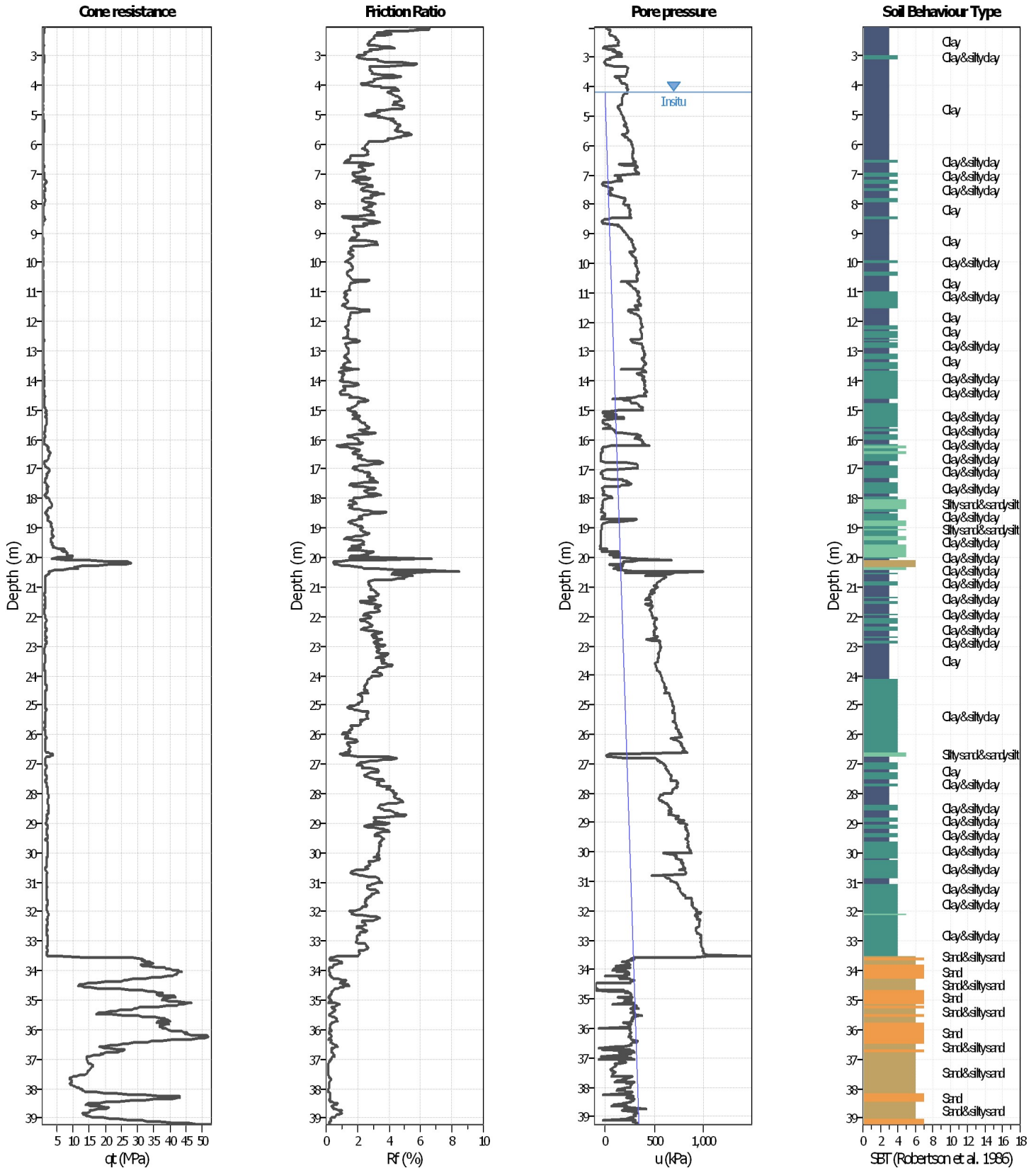


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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.29	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based

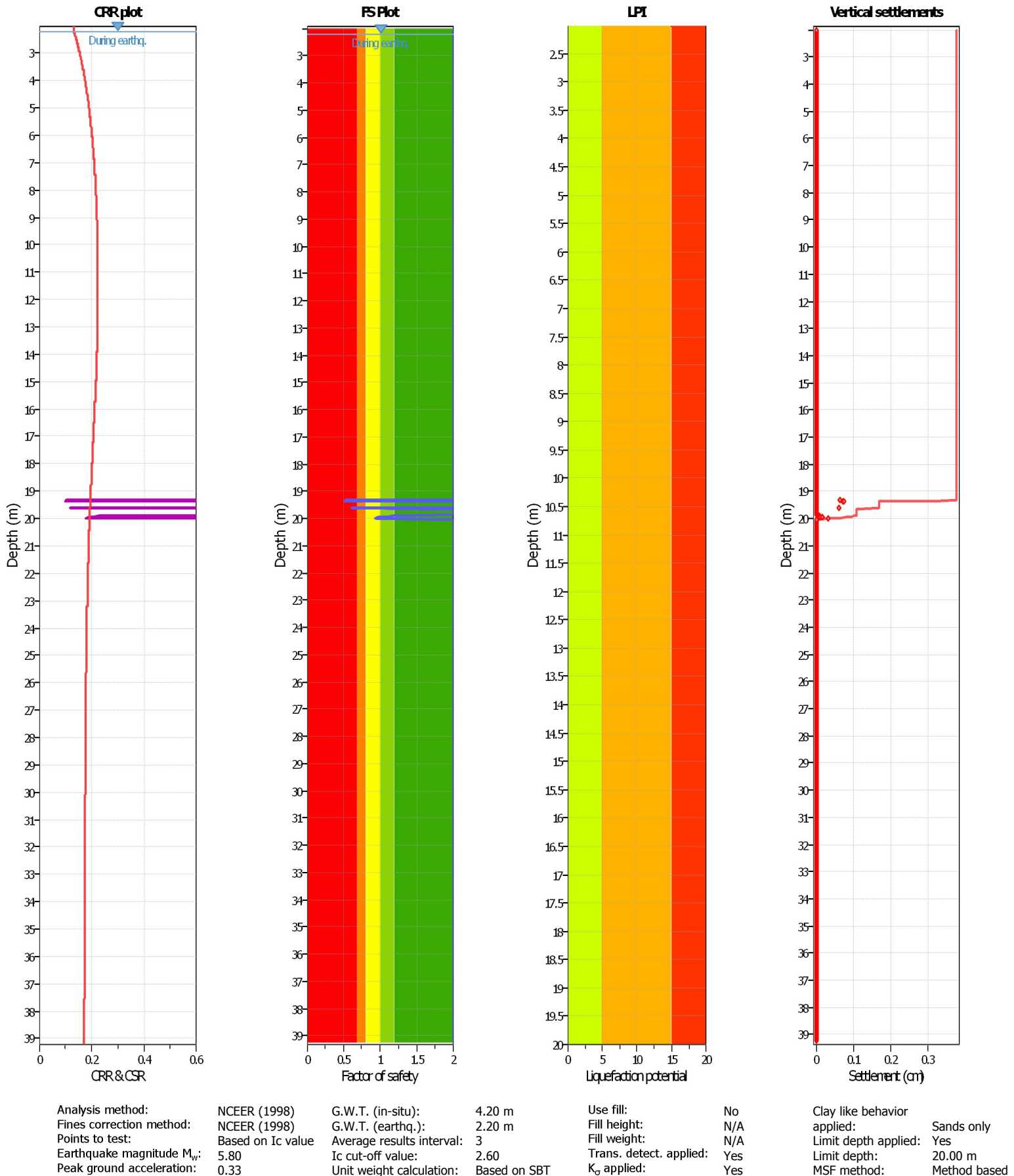


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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
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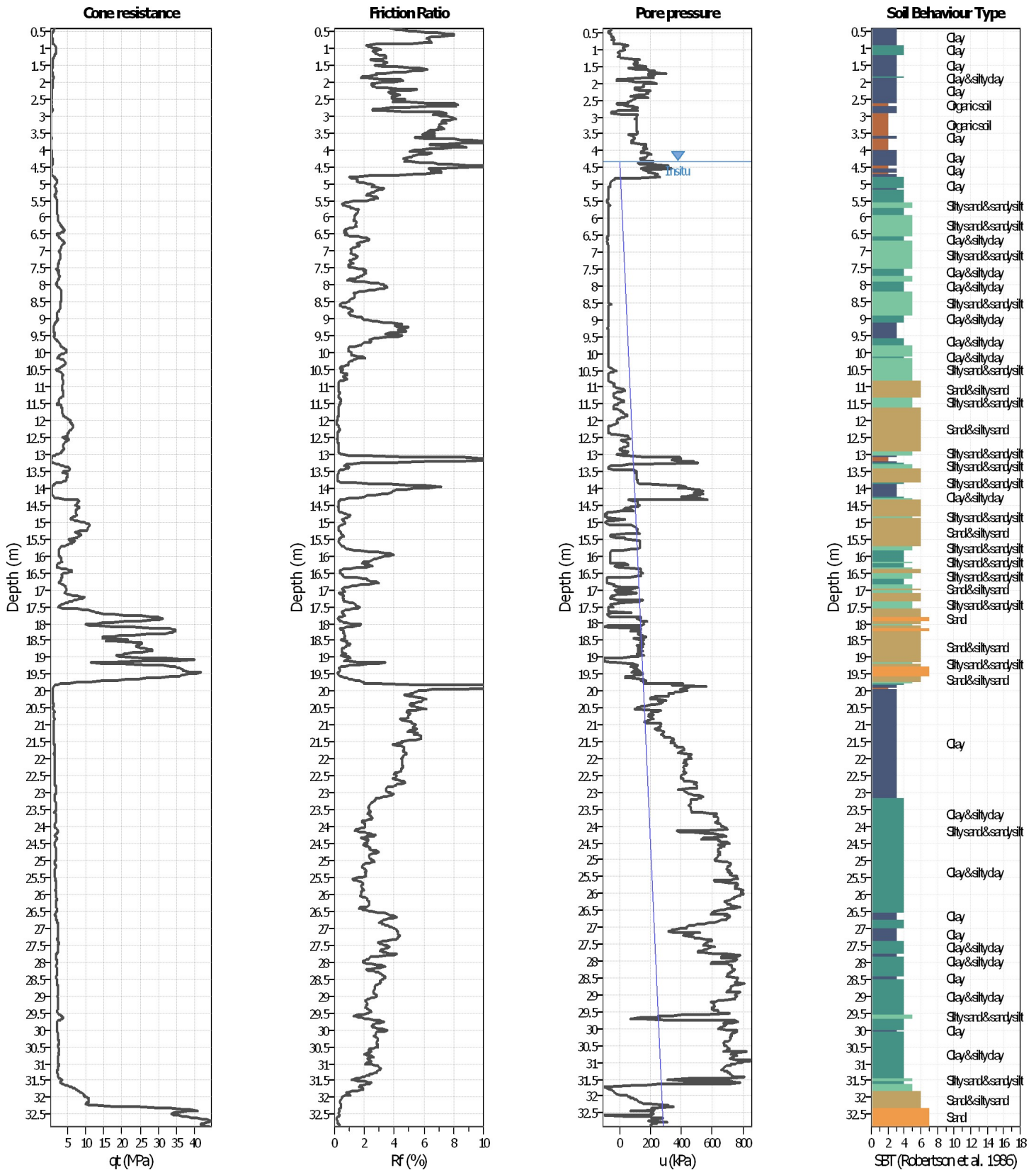




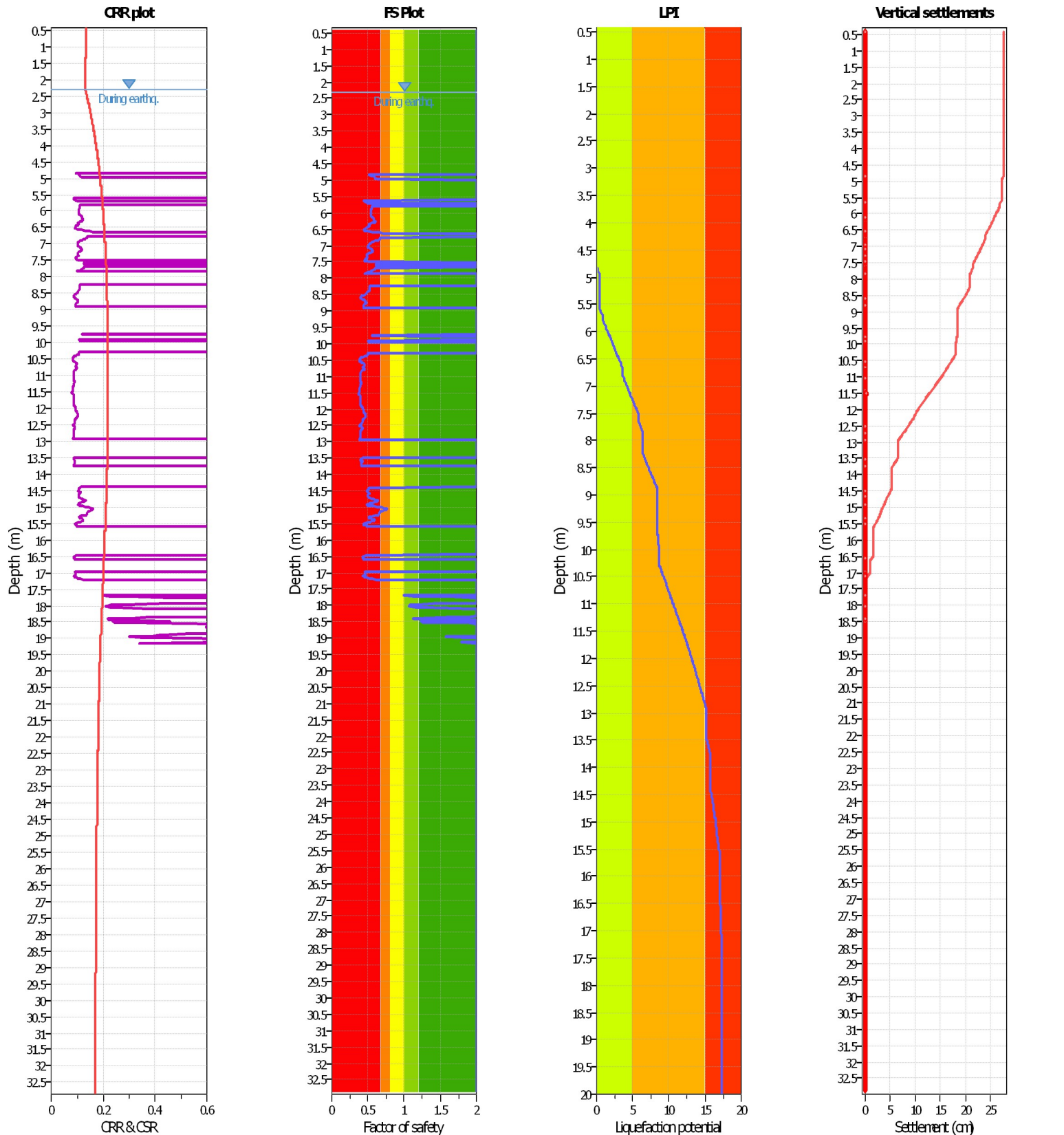
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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.33	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



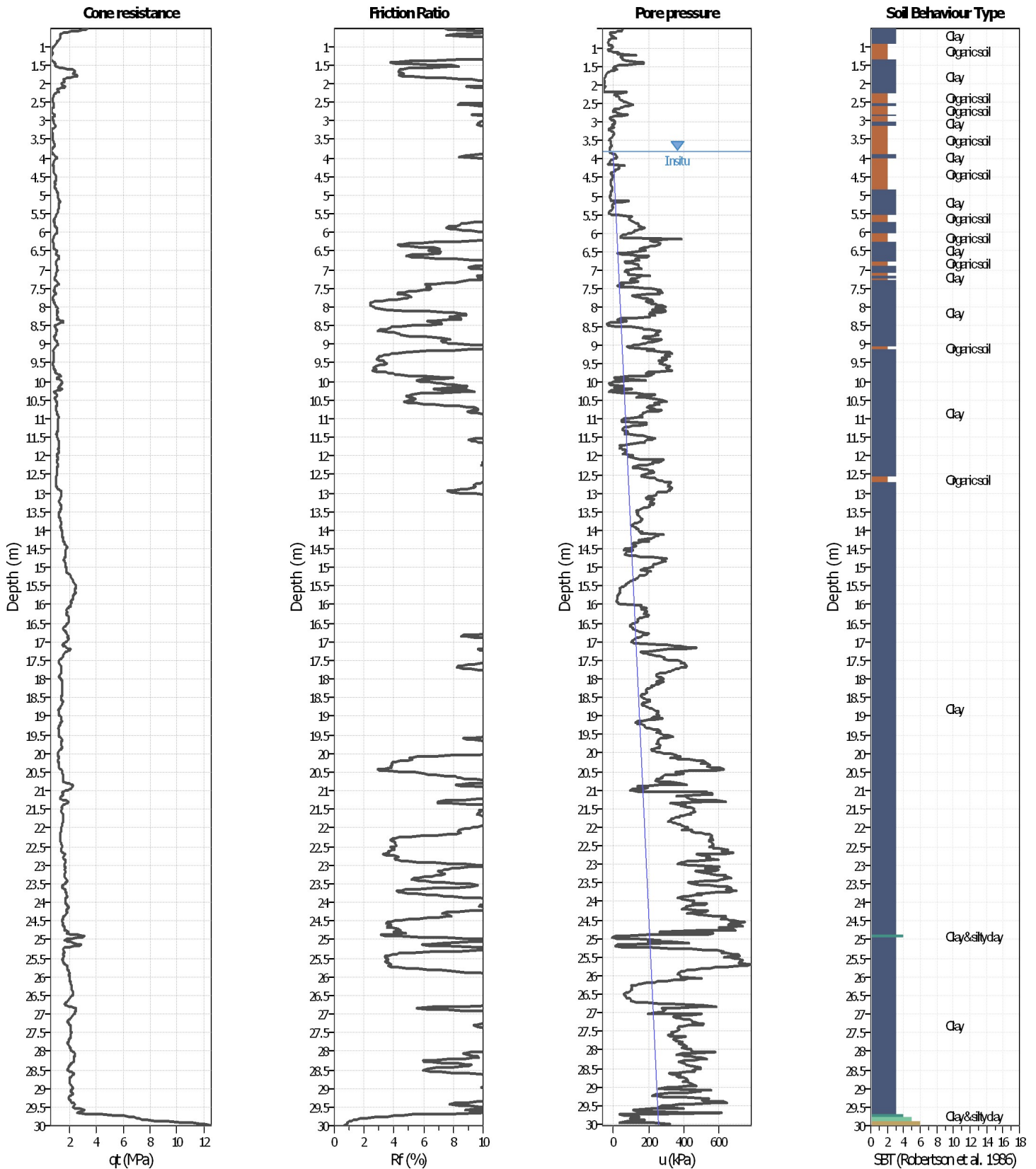




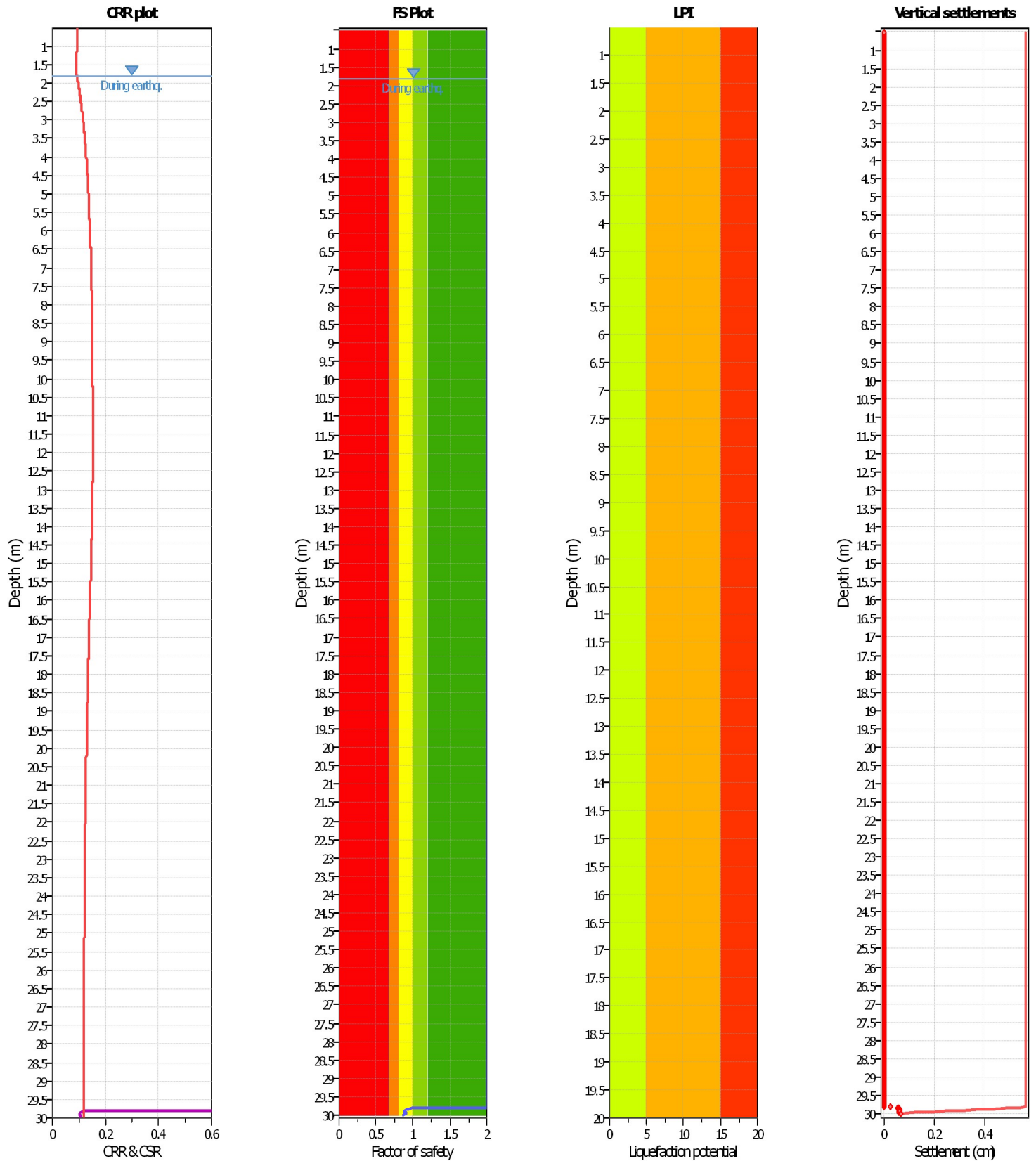
Analysis method:	NCEER (1998)	G.W.T. (in-situ):	4.30 m	Use fill:	No	Clay like behavior	
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.30 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on $I_c$ value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude $M_w$ :	5.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	20.00 m
Peak ground acceleration:	0.33	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



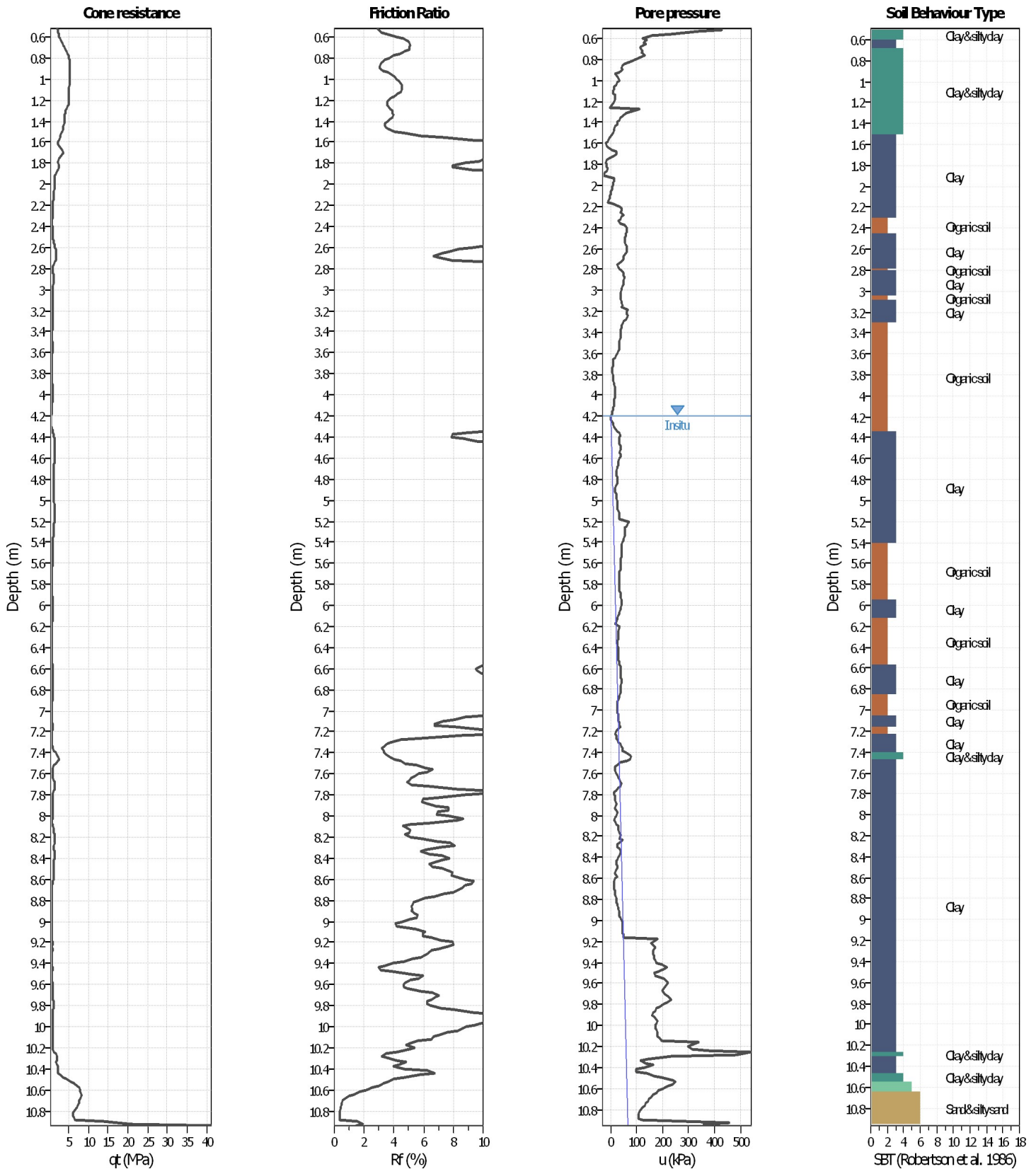
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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.30 m	Fill height:	N/A	applied:	Sands only
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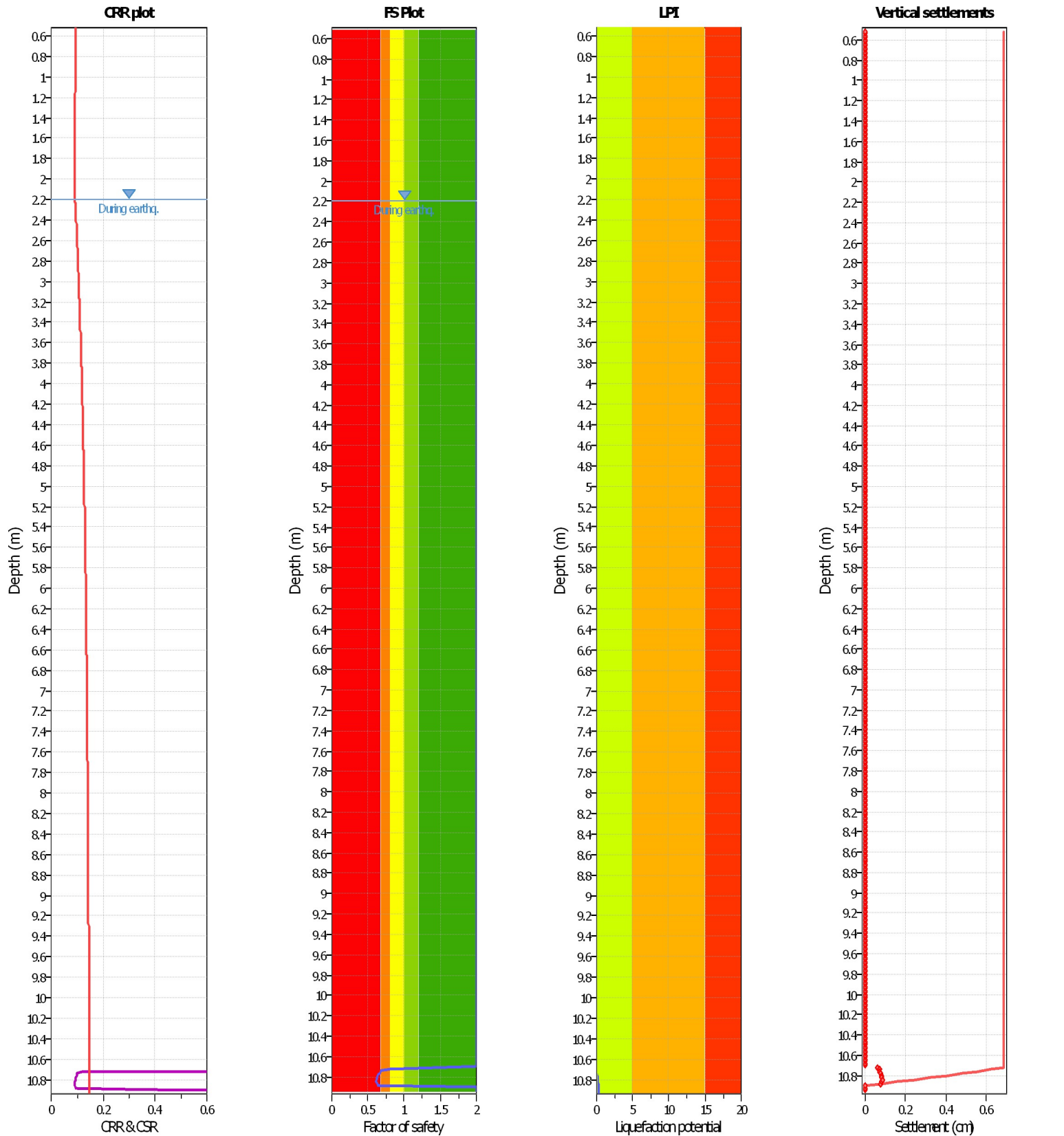
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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude $M_w$ :	5.70	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.29	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



Analysis method:	NCEER (1998)	G.W.T. (in-situ):	3.80 m	Use fill:	No	Clay like behavior	
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	1.80 m	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude $M_w$ :	5.70	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.29	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes	MSF method:	Method based



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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.20 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 $M_w$ :	5.70	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.29	Unit weight calculation:	Based on SBT	$K_0$ applied:	Yes		



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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	2.20 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
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