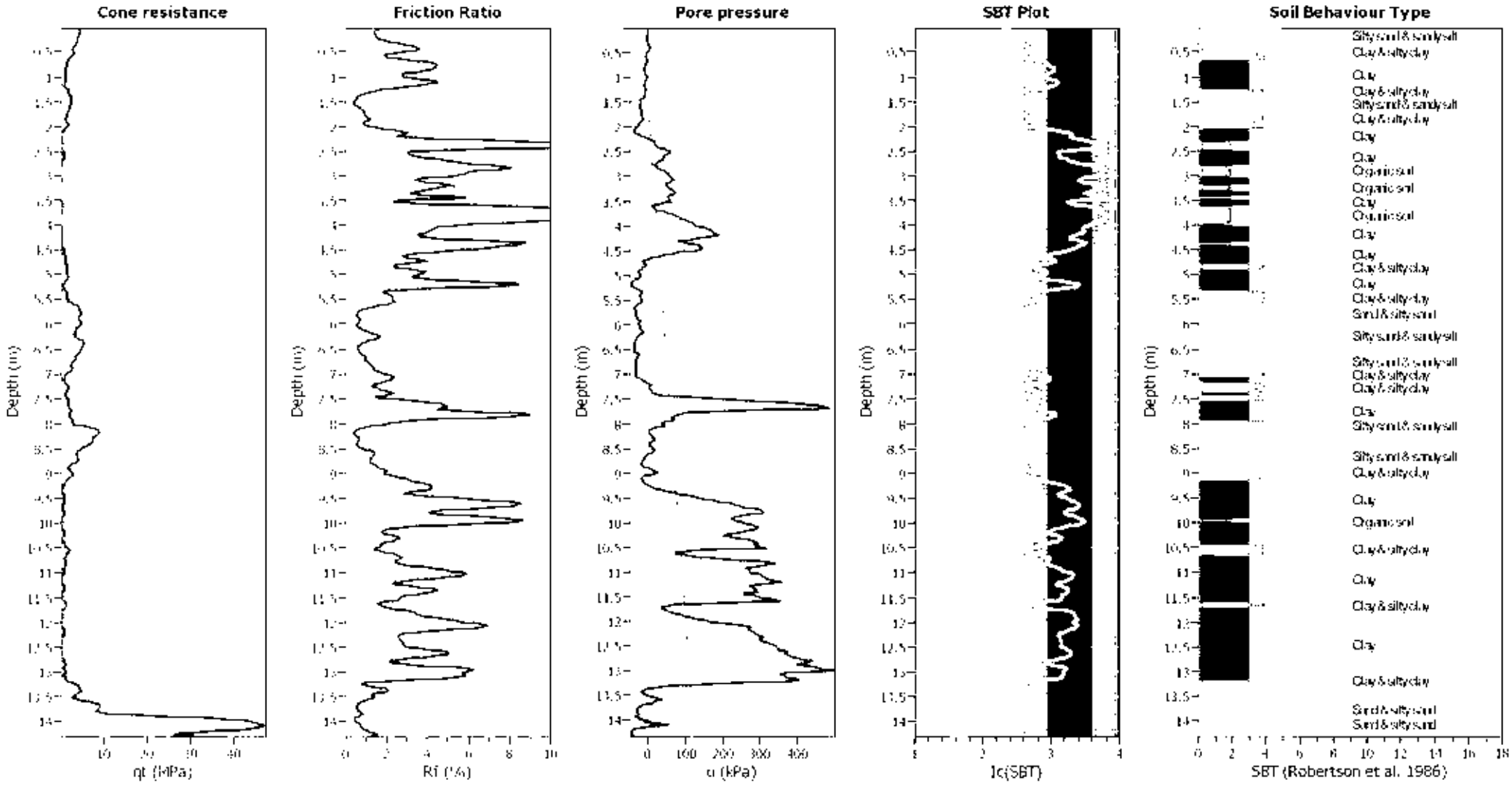
CPT basic interpretation plots



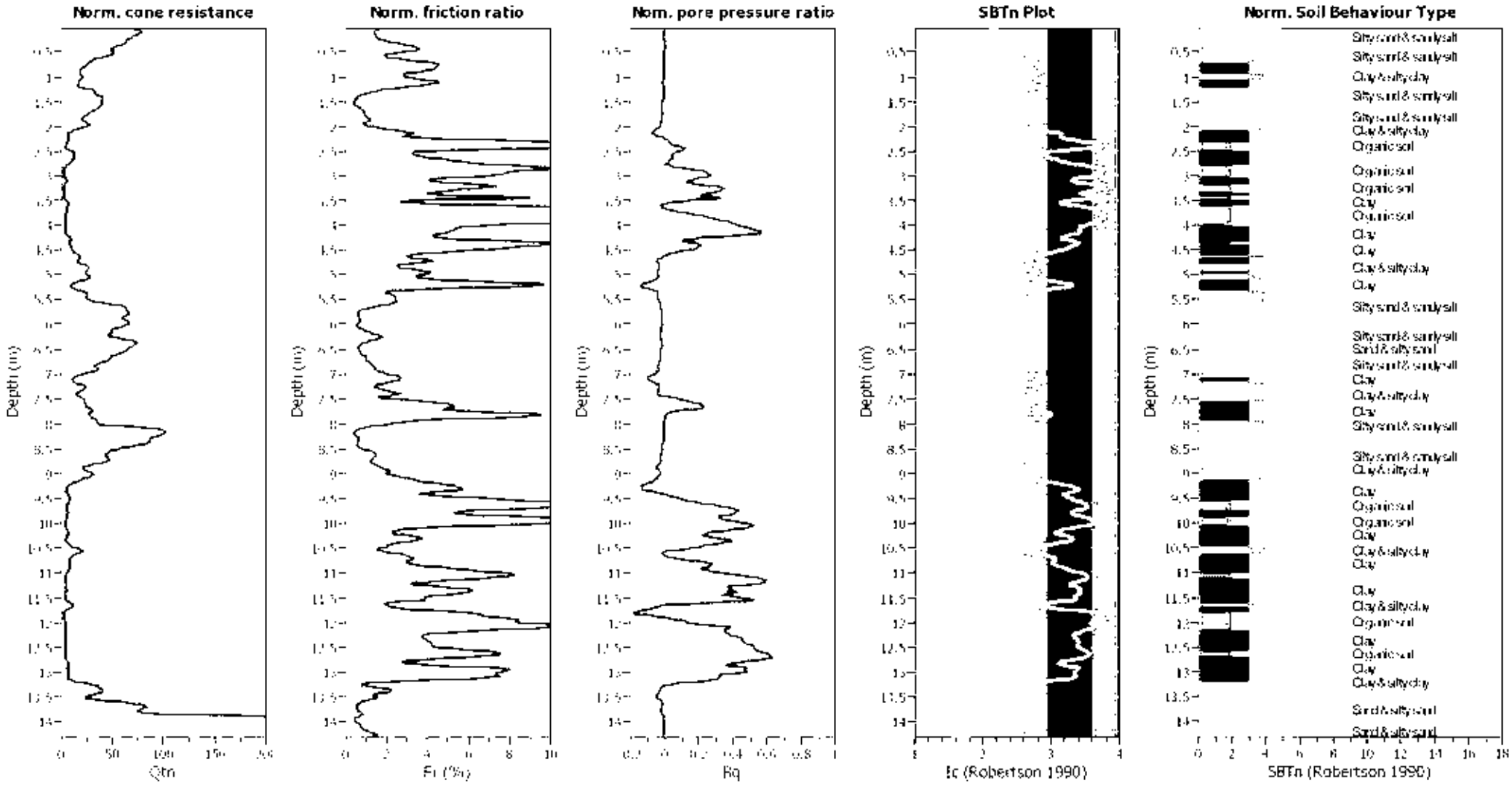
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



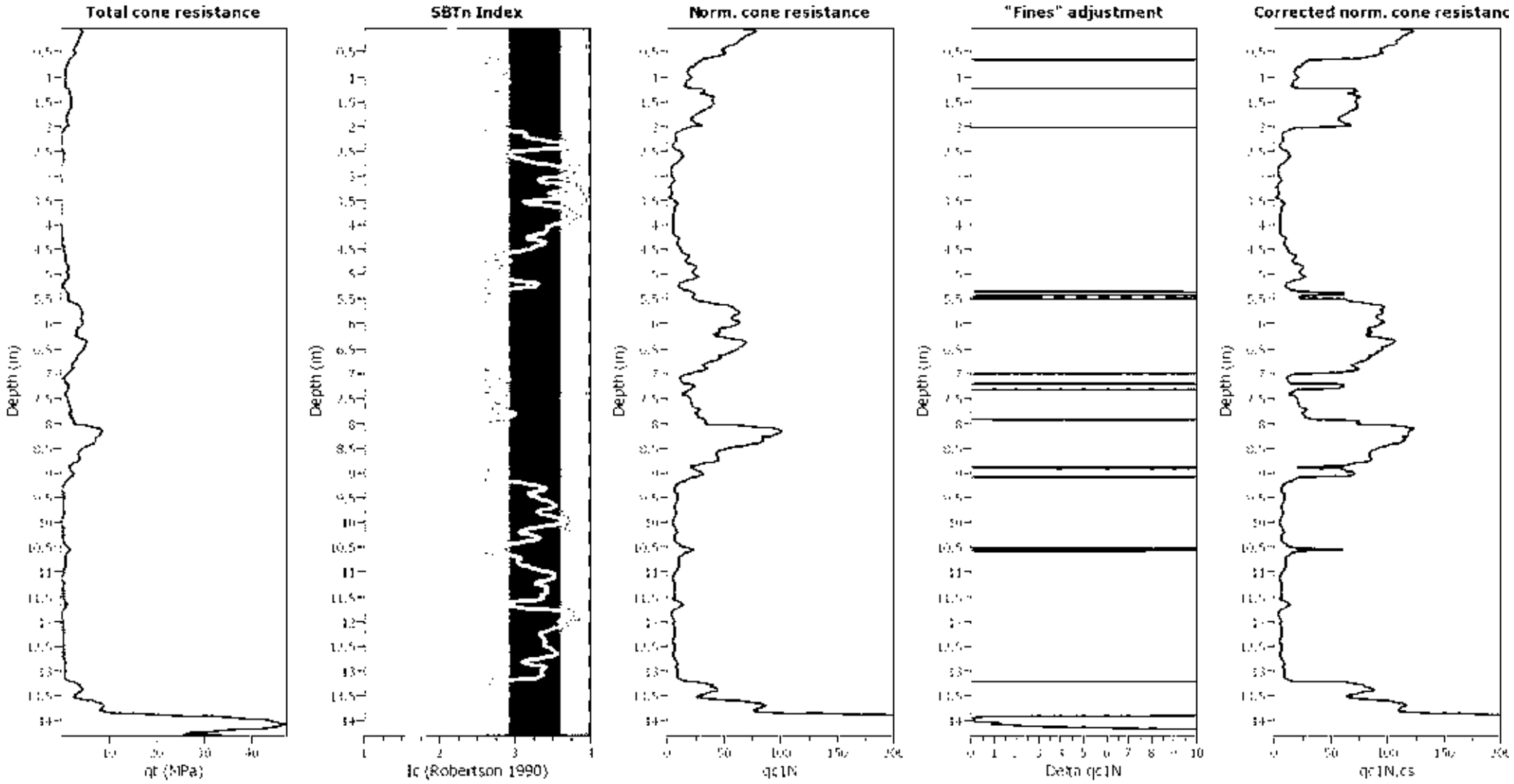
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

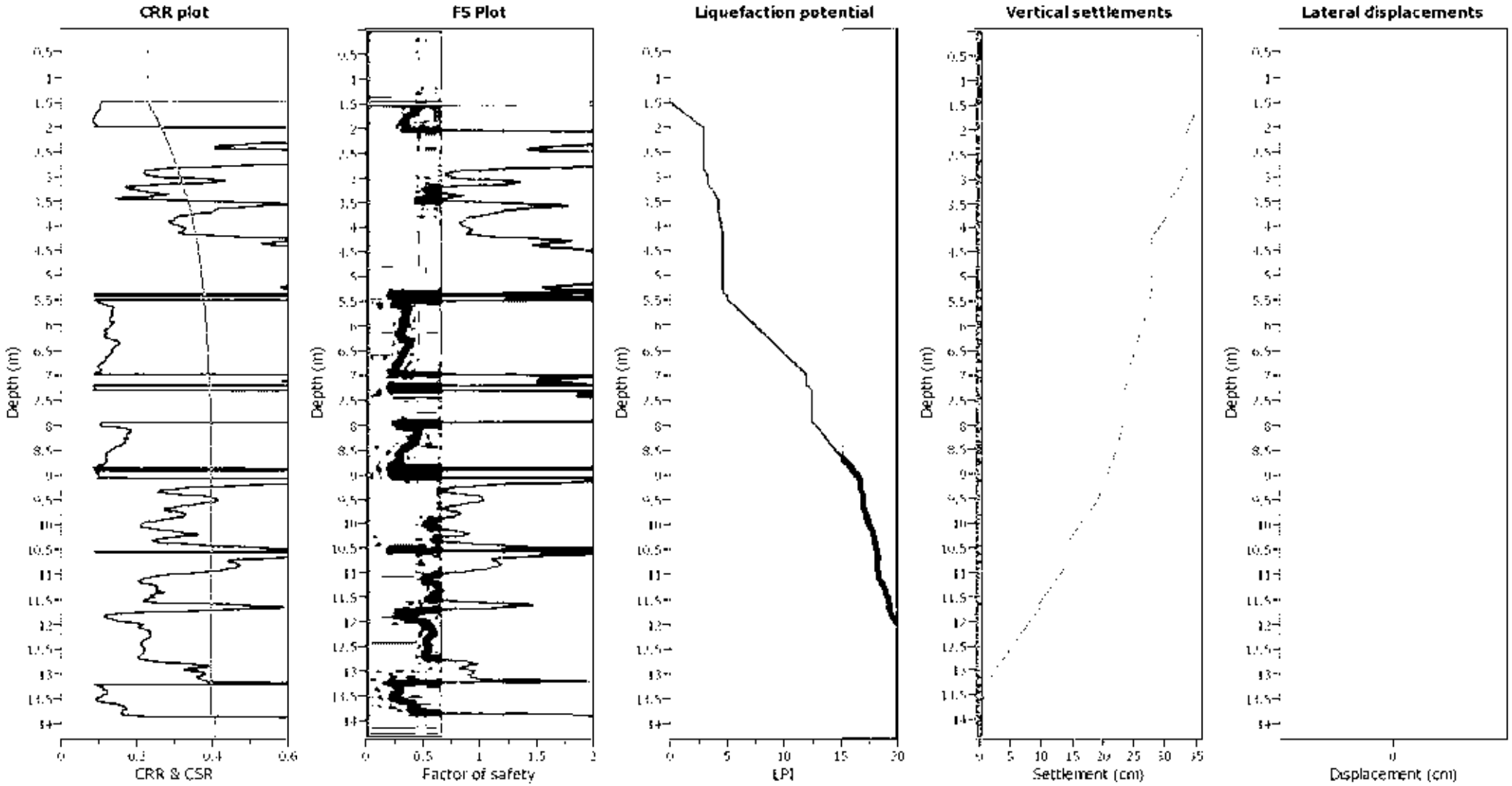
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

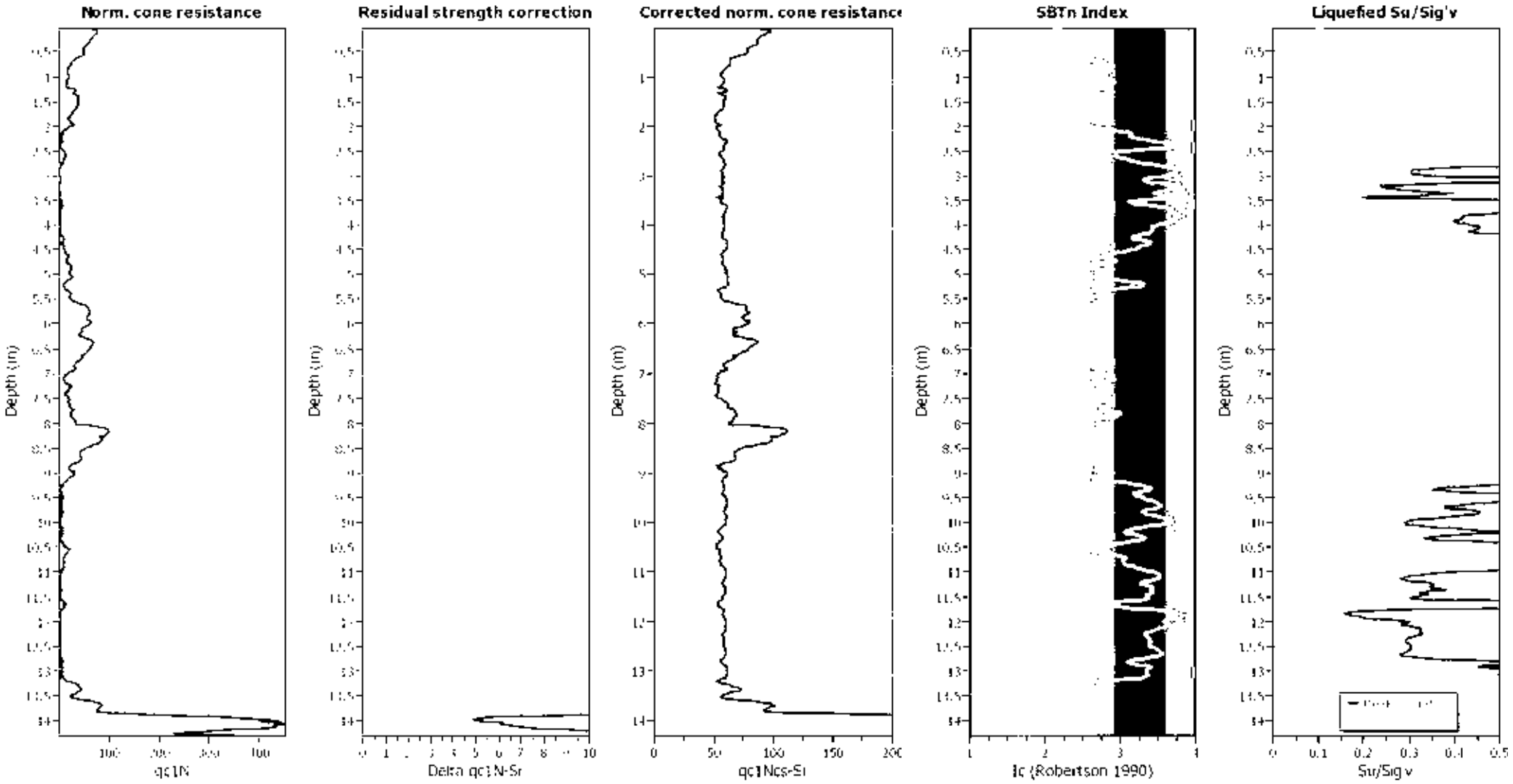
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

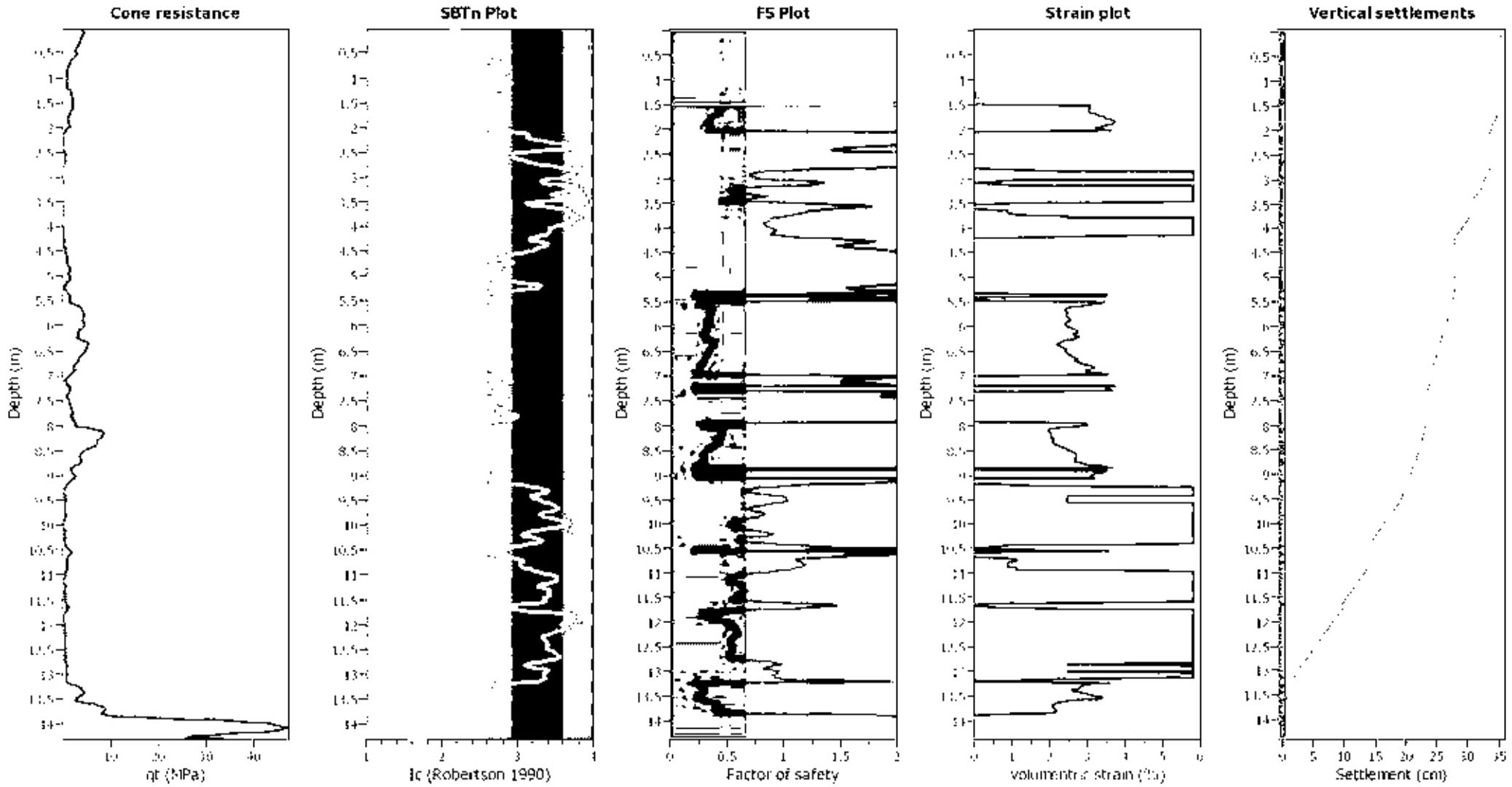
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

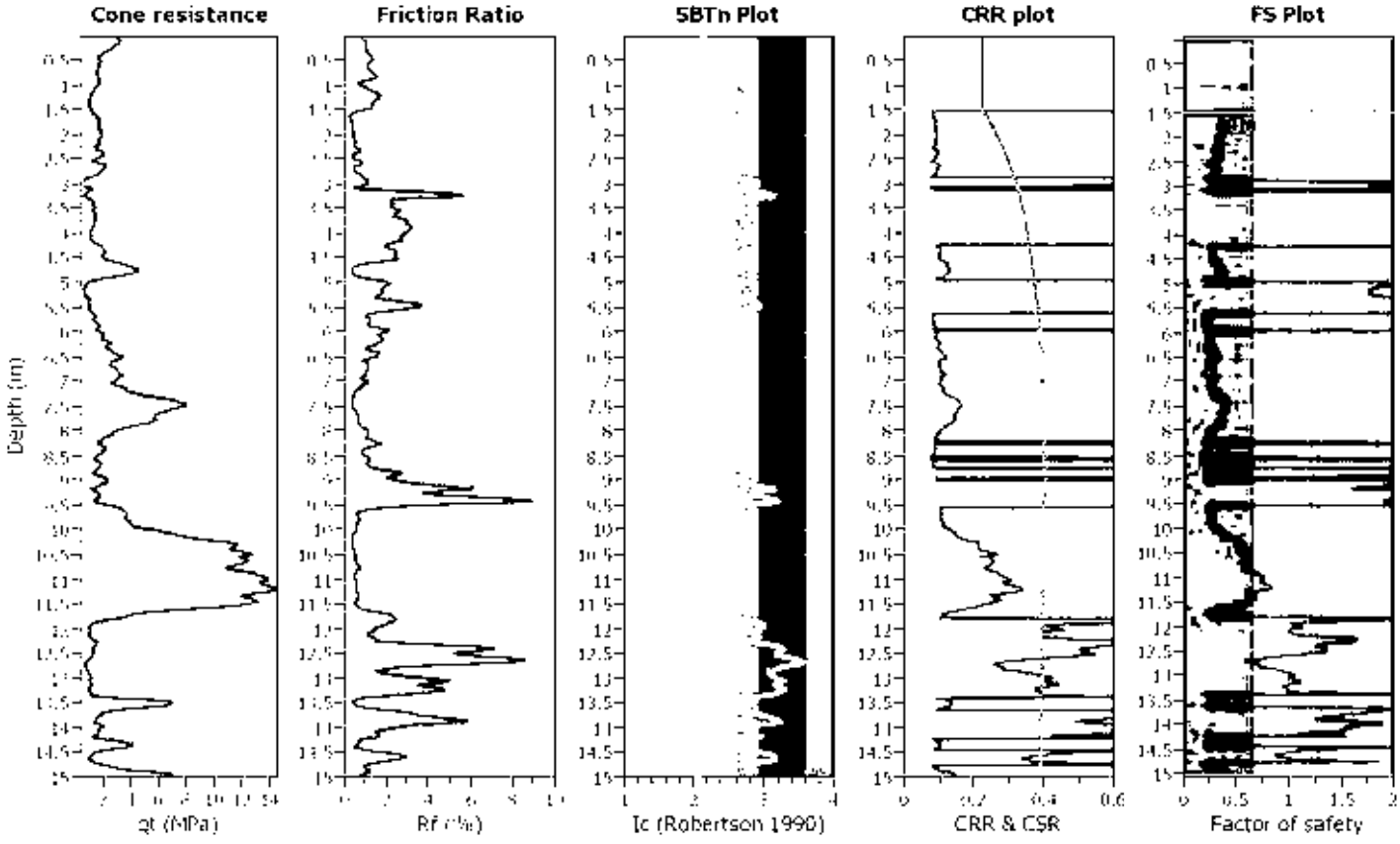
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

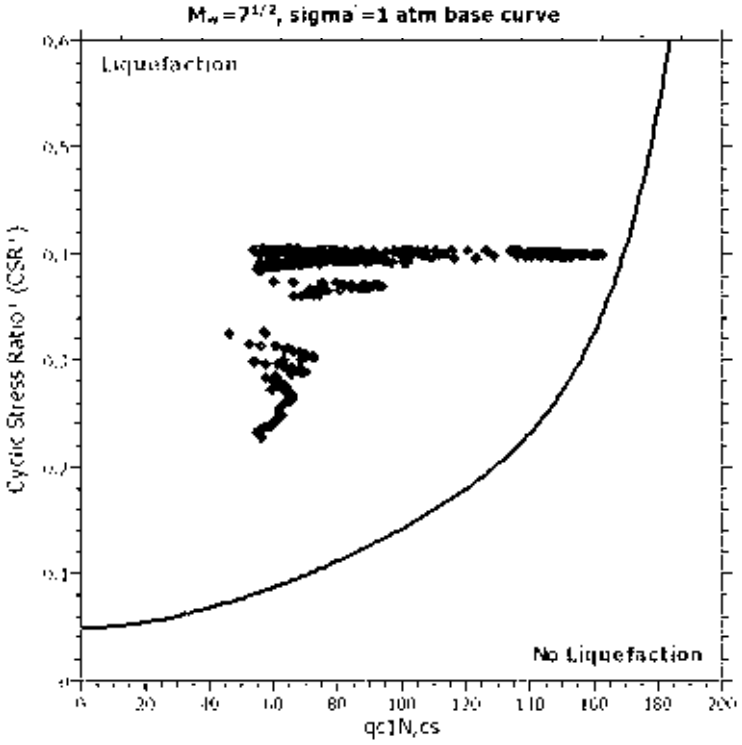
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

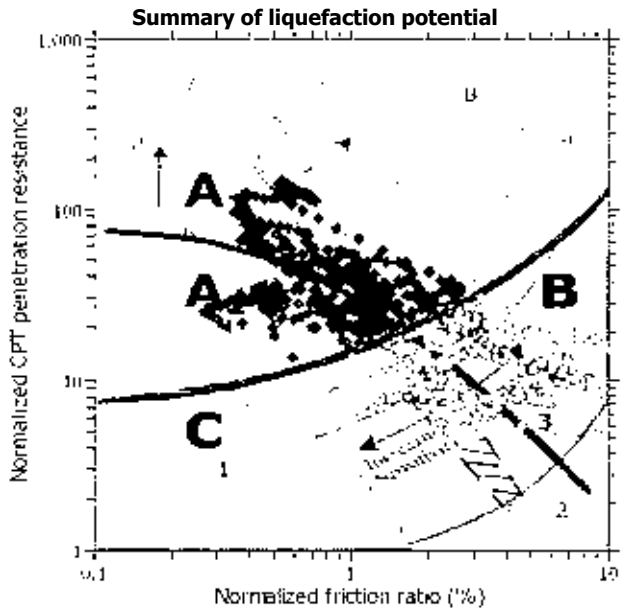
CPT file : CPT15_101SabysRd

Input parameters and analysis data

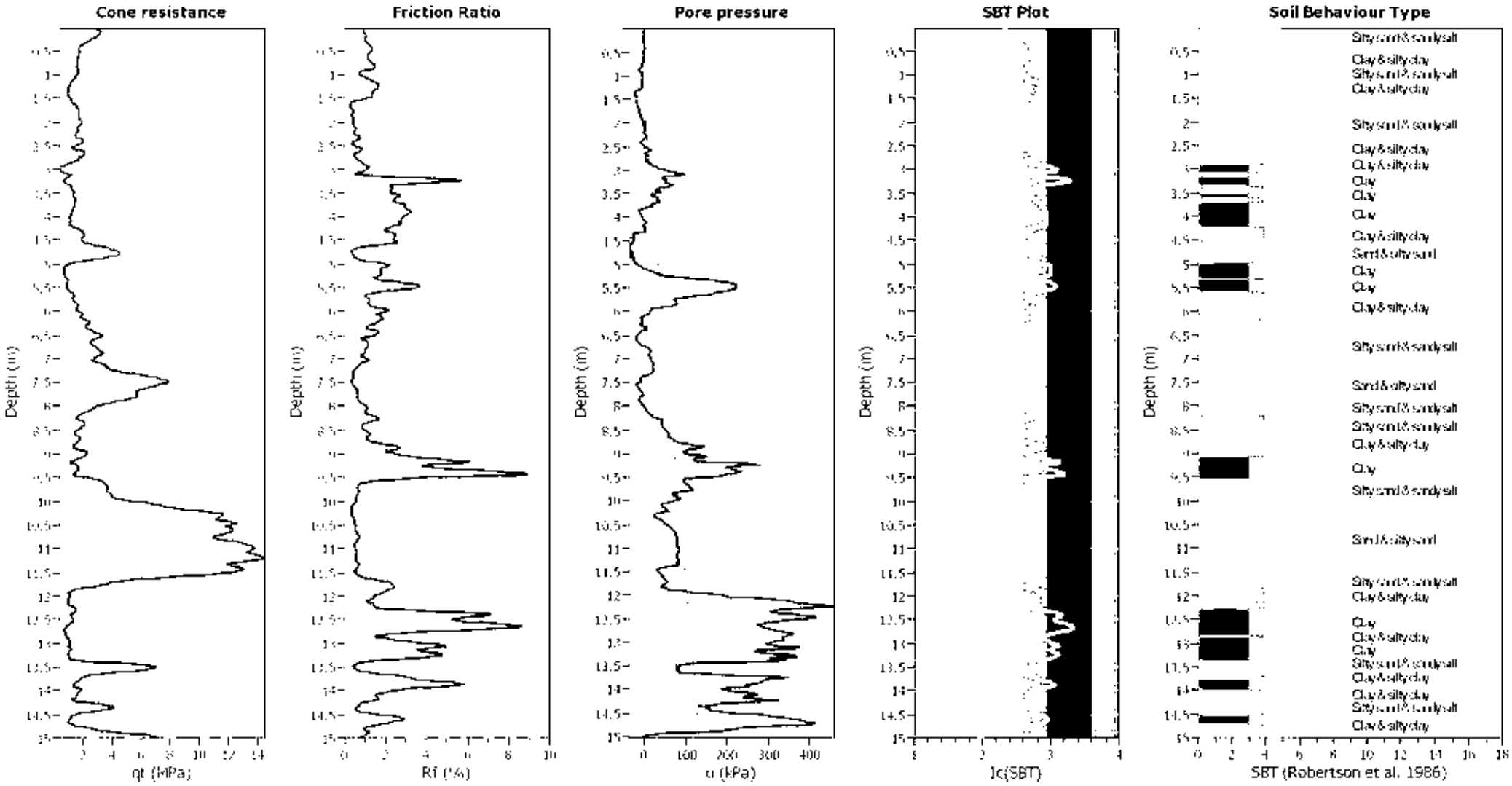
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



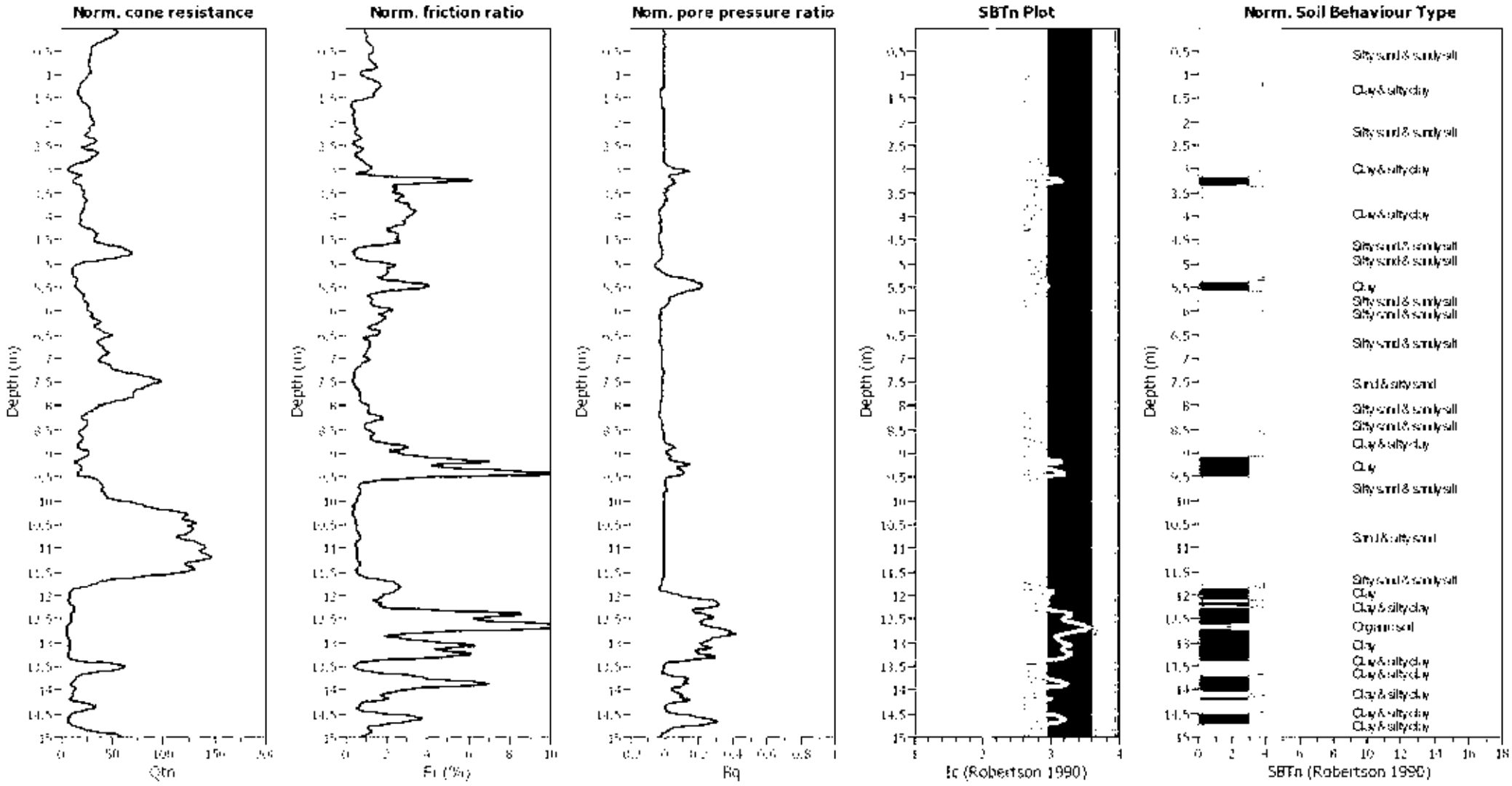
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



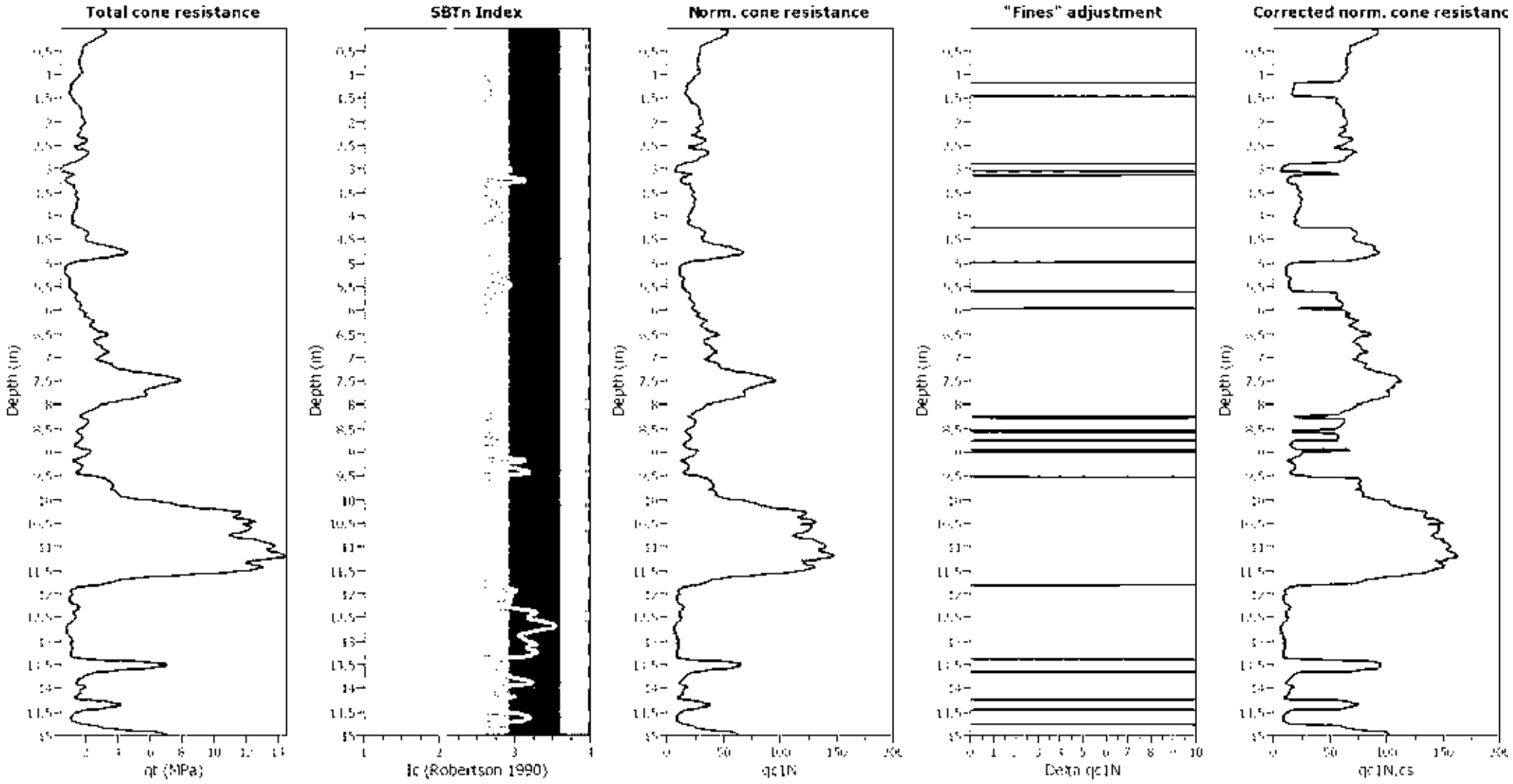
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

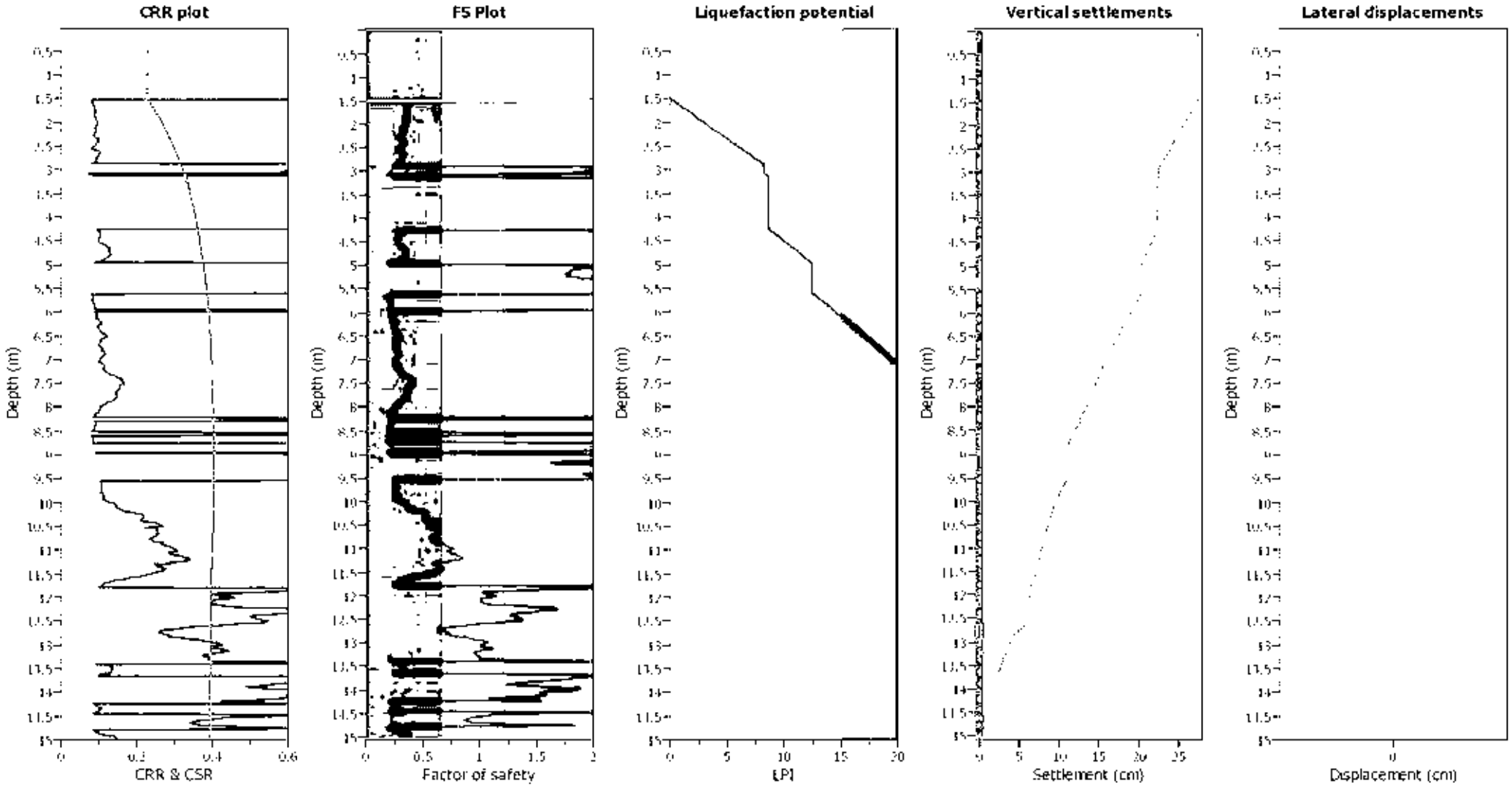
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

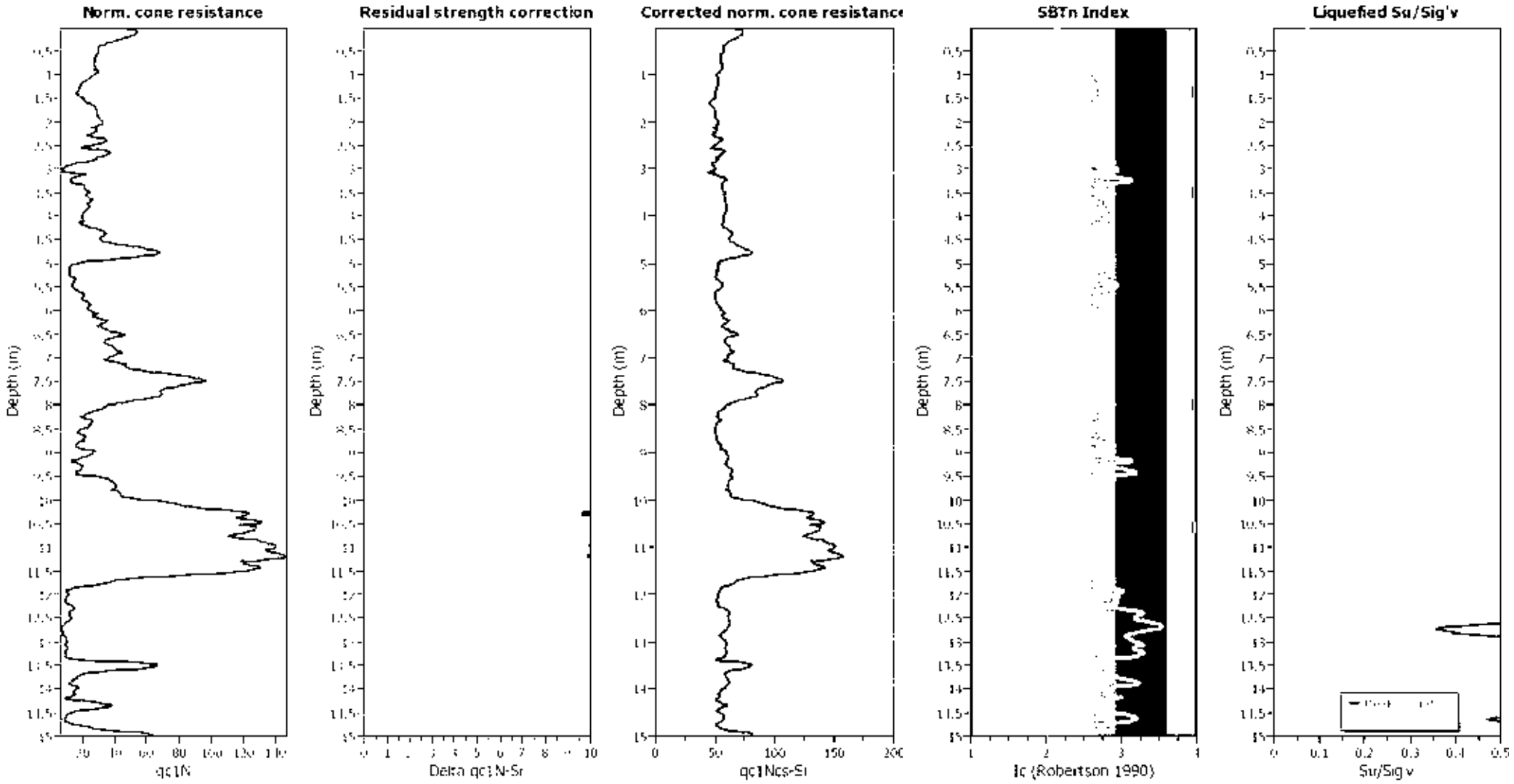
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

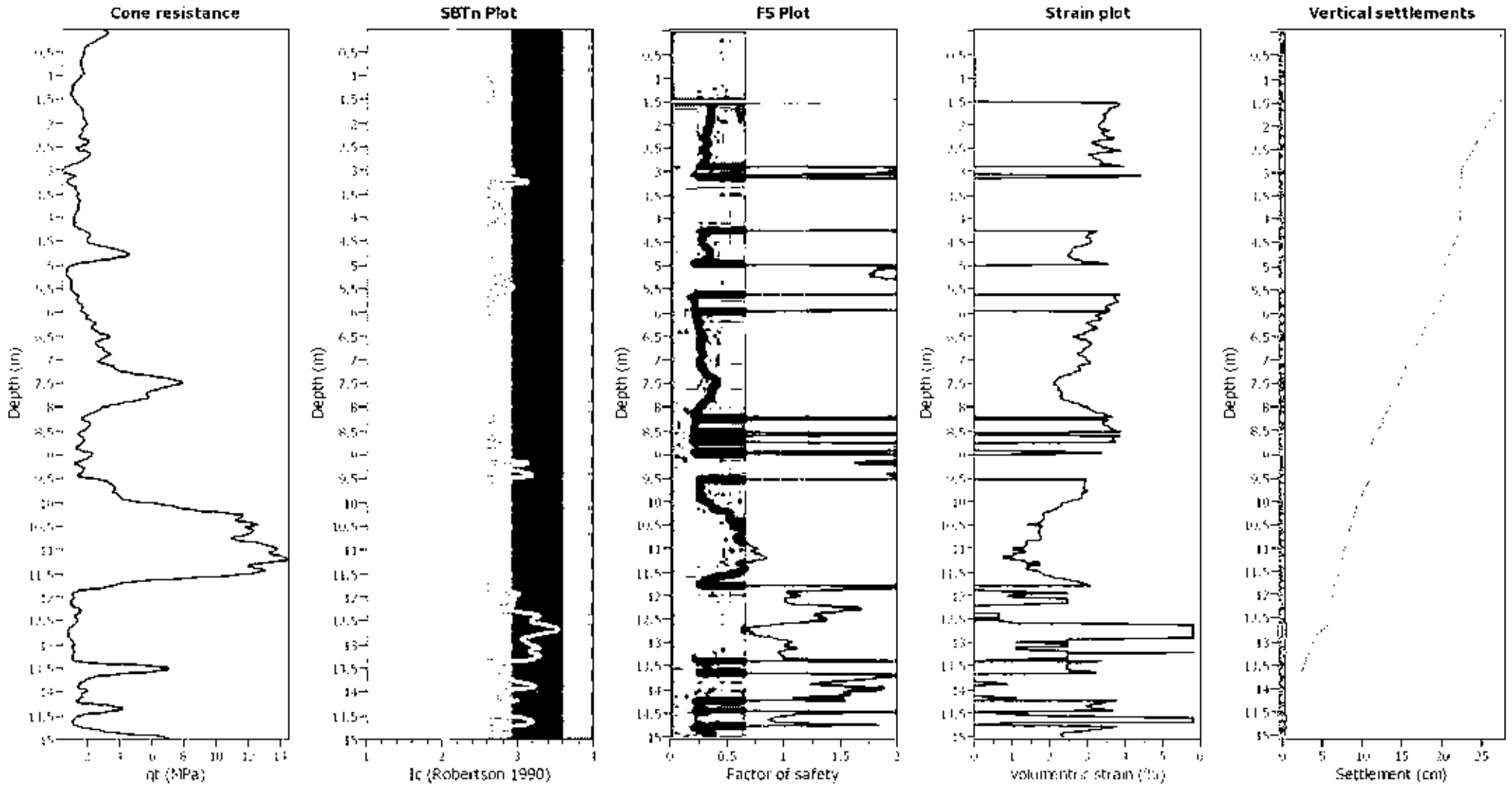
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

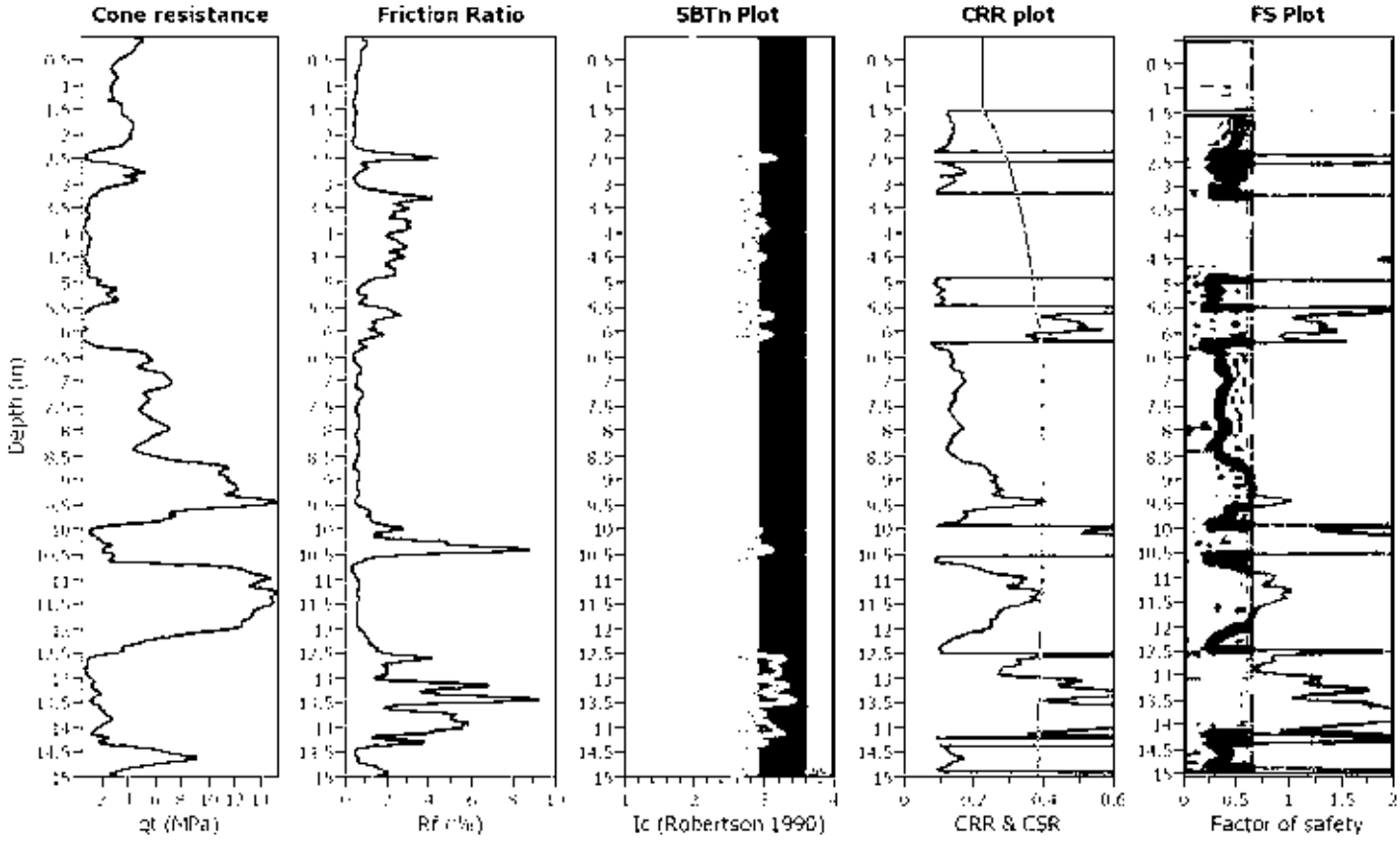
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

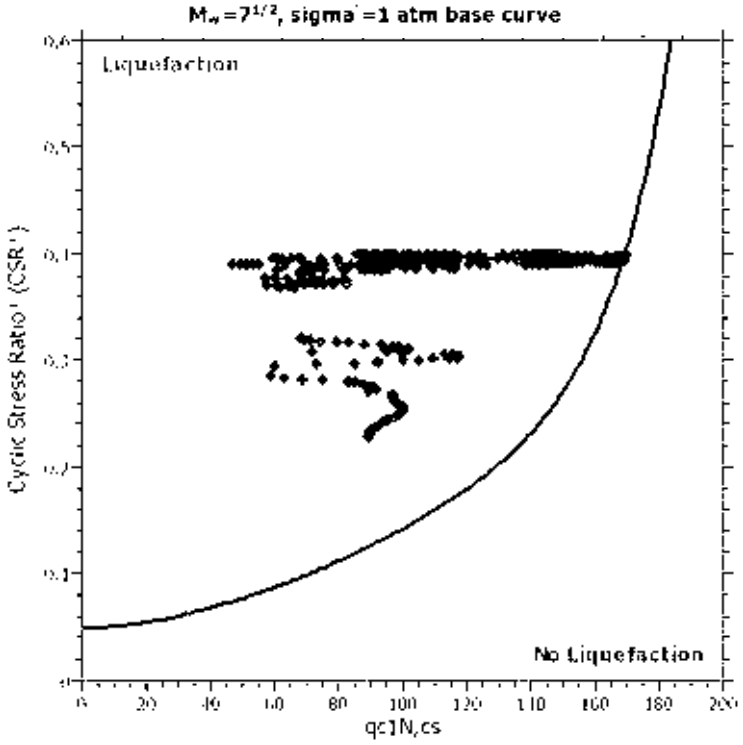
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

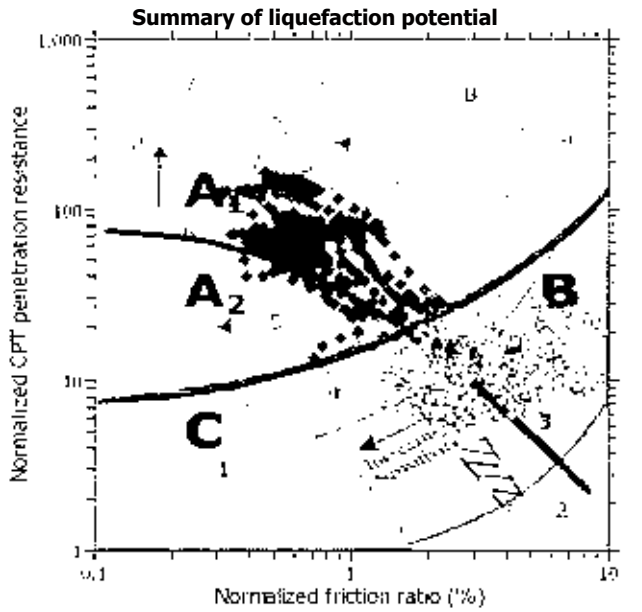
CPT file : CPT16_101SabysRd

Input parameters and analysis data

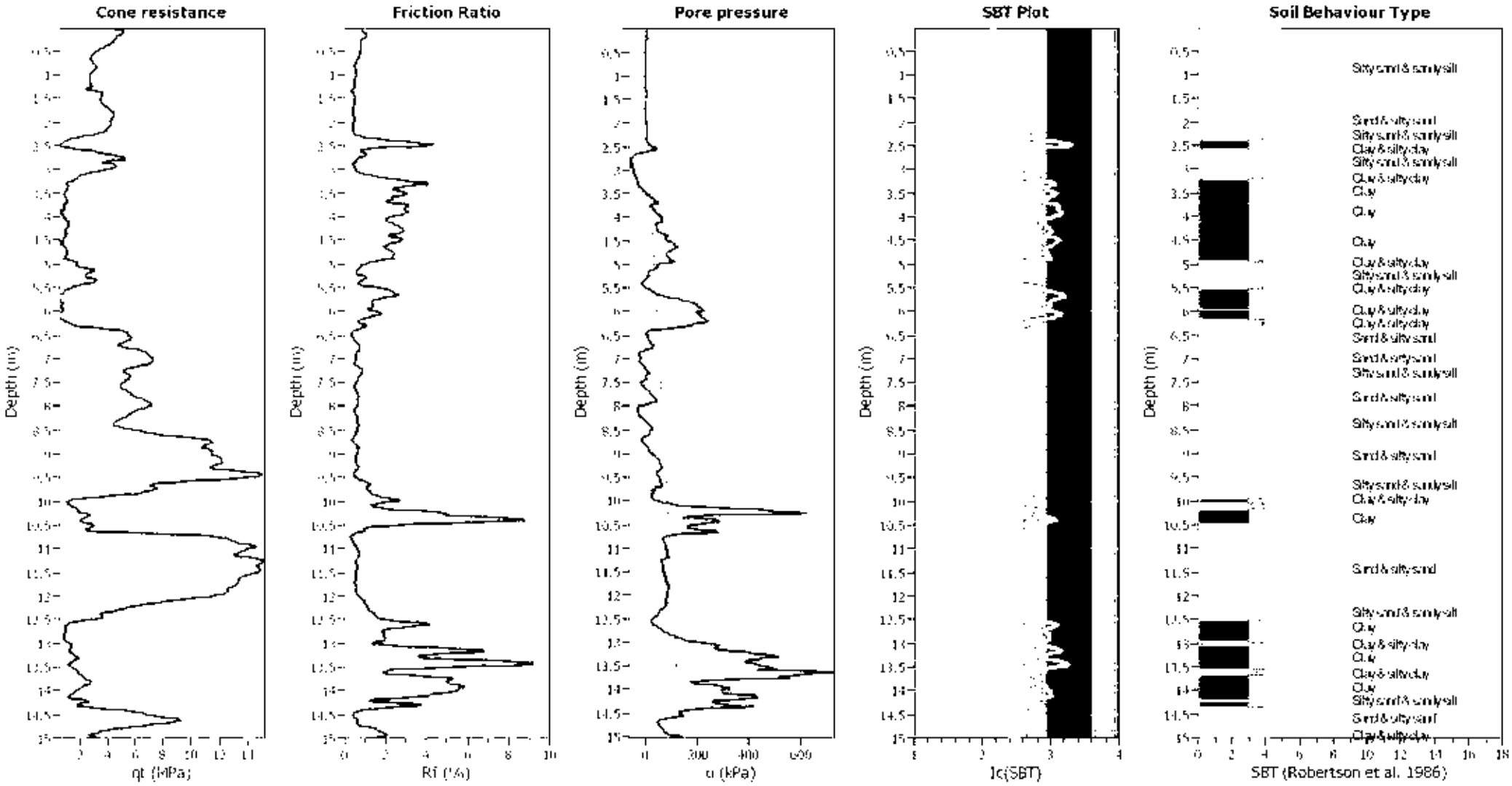
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



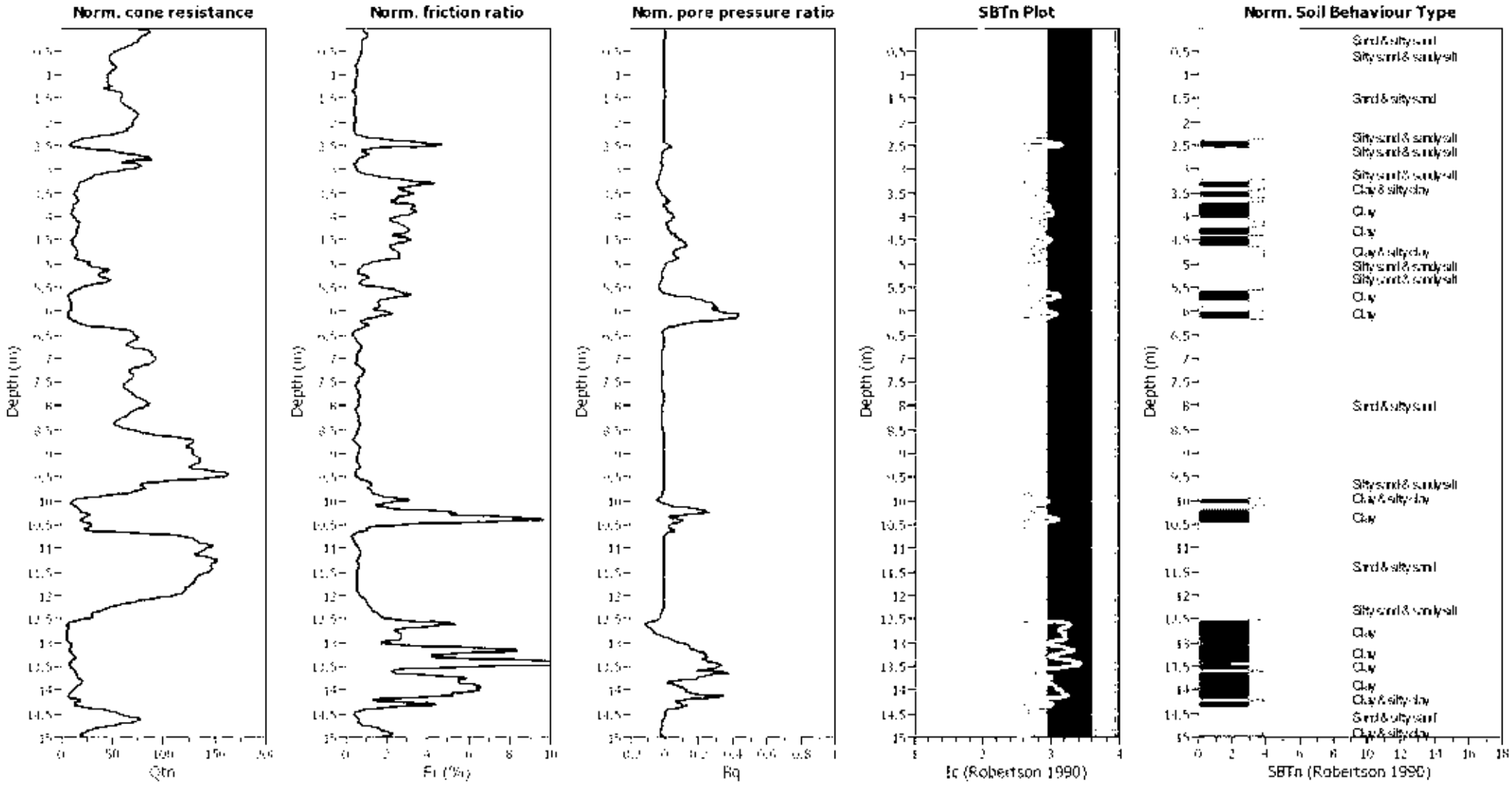
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



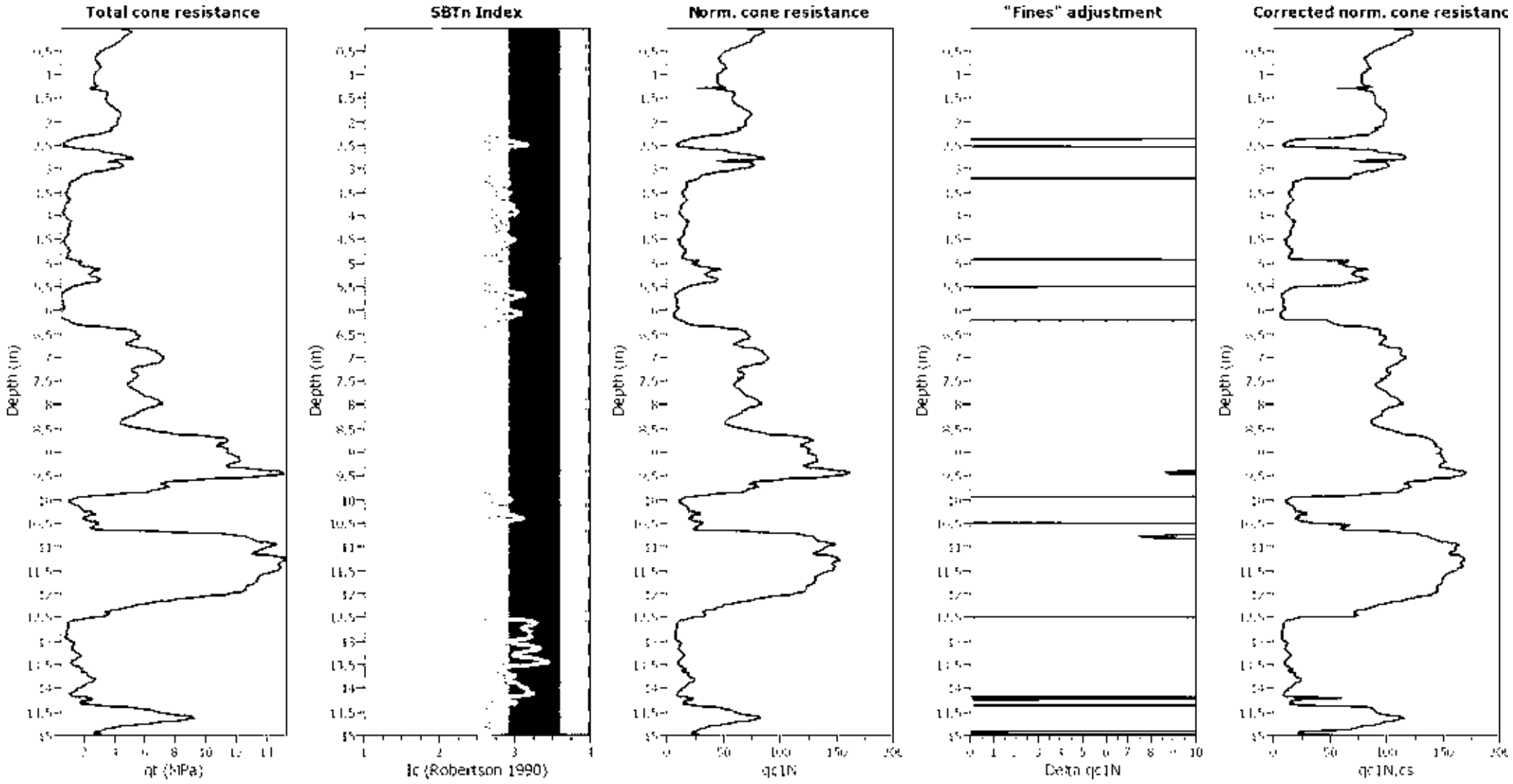
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

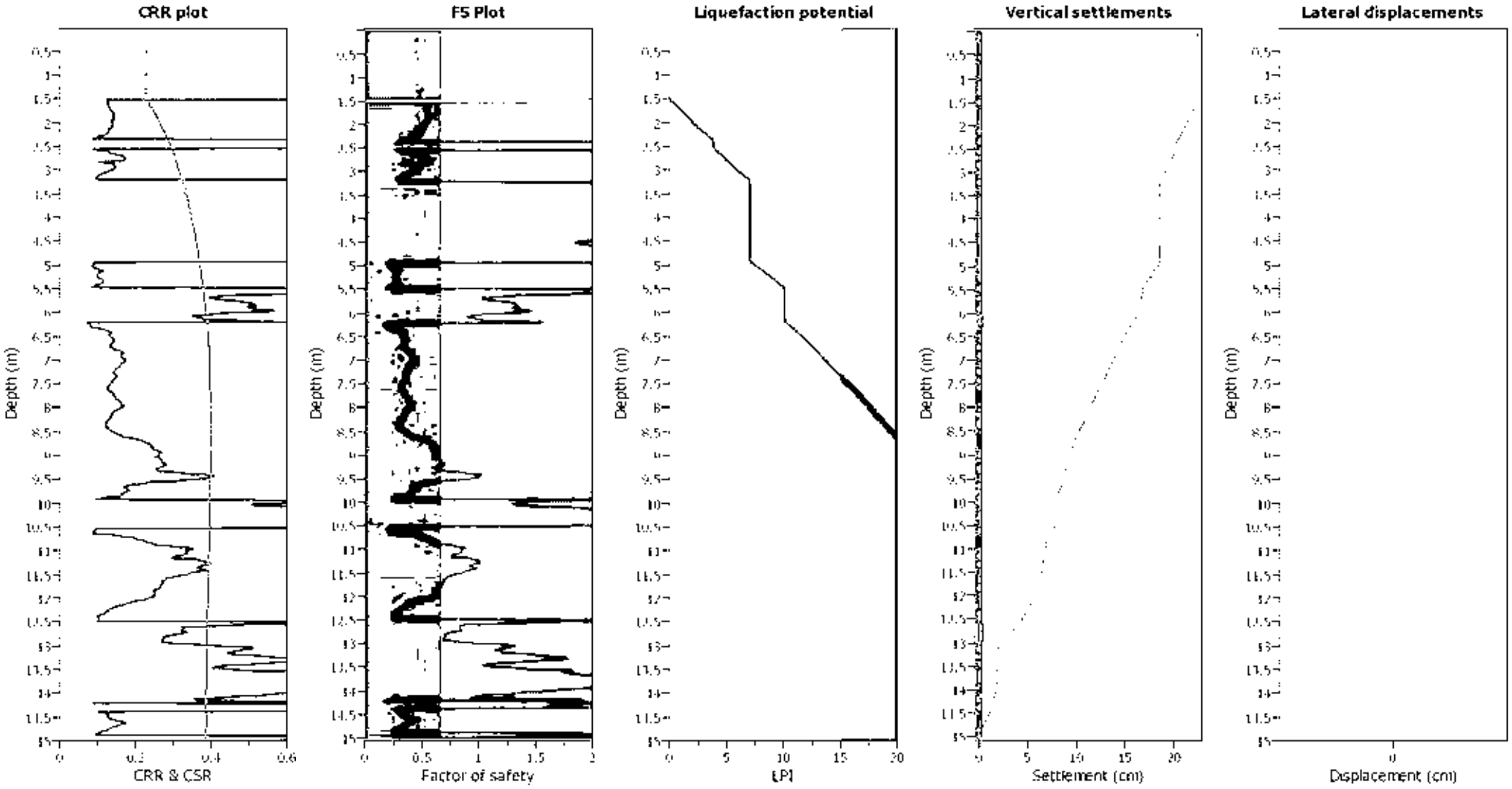
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

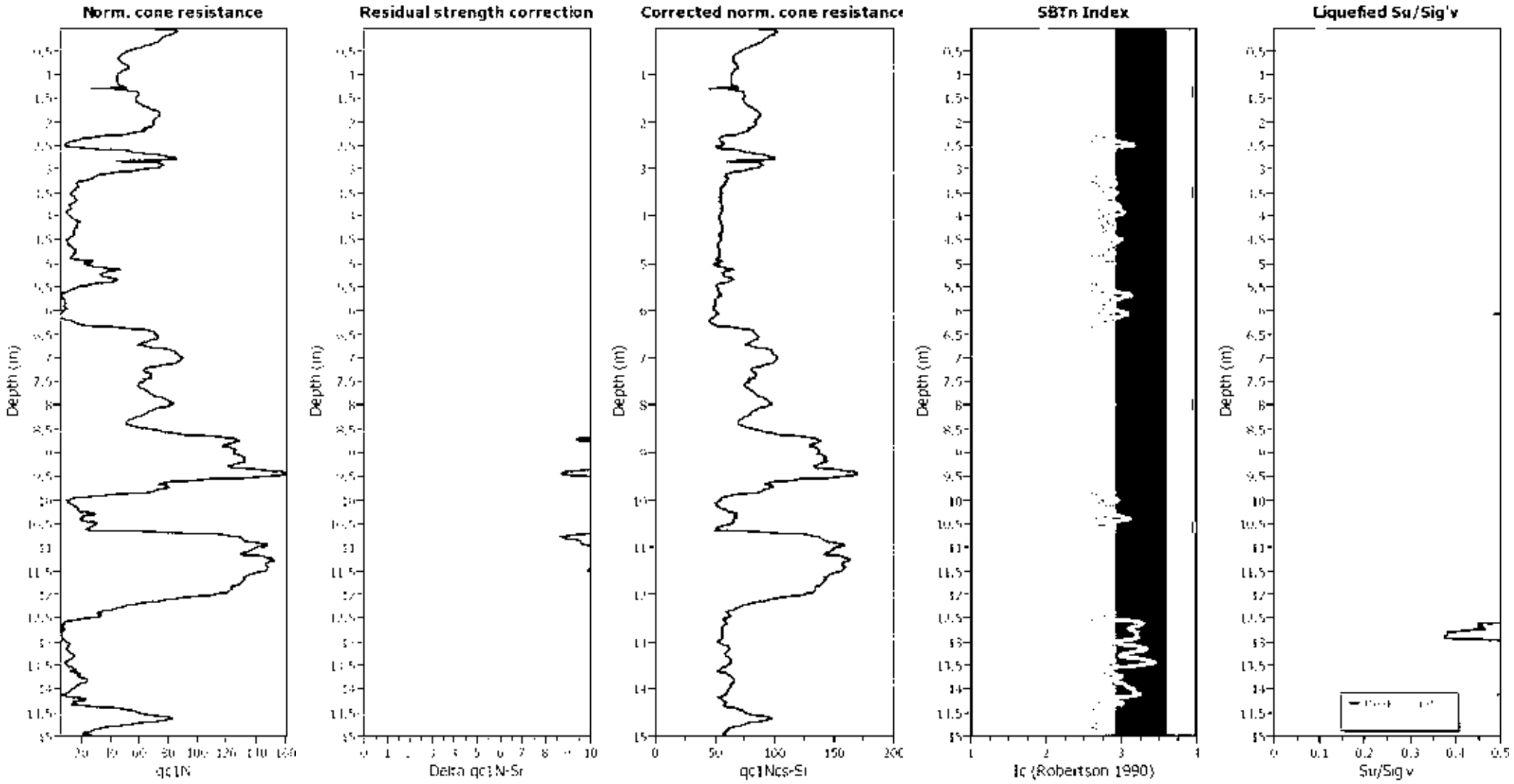
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

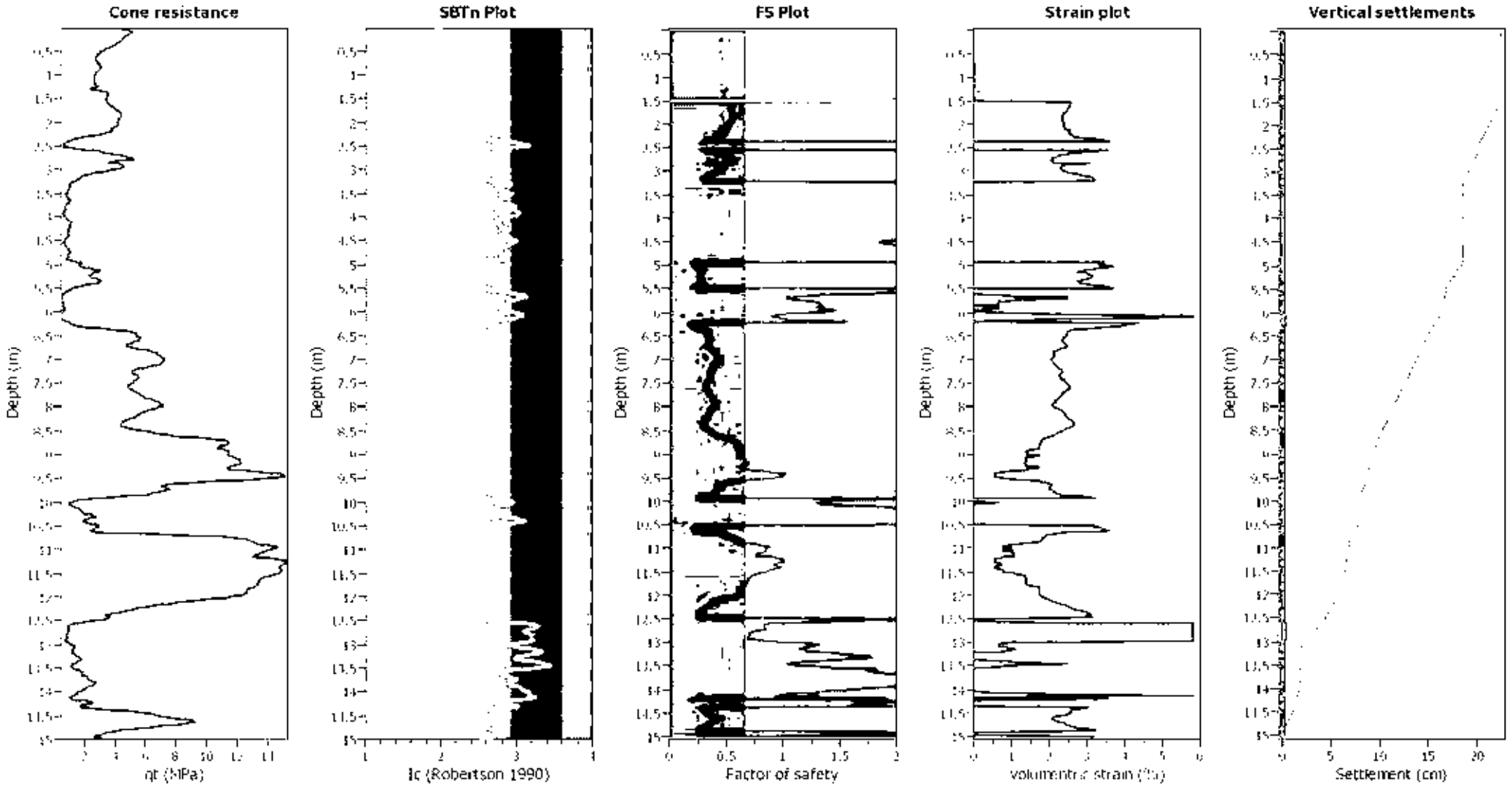
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

Qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

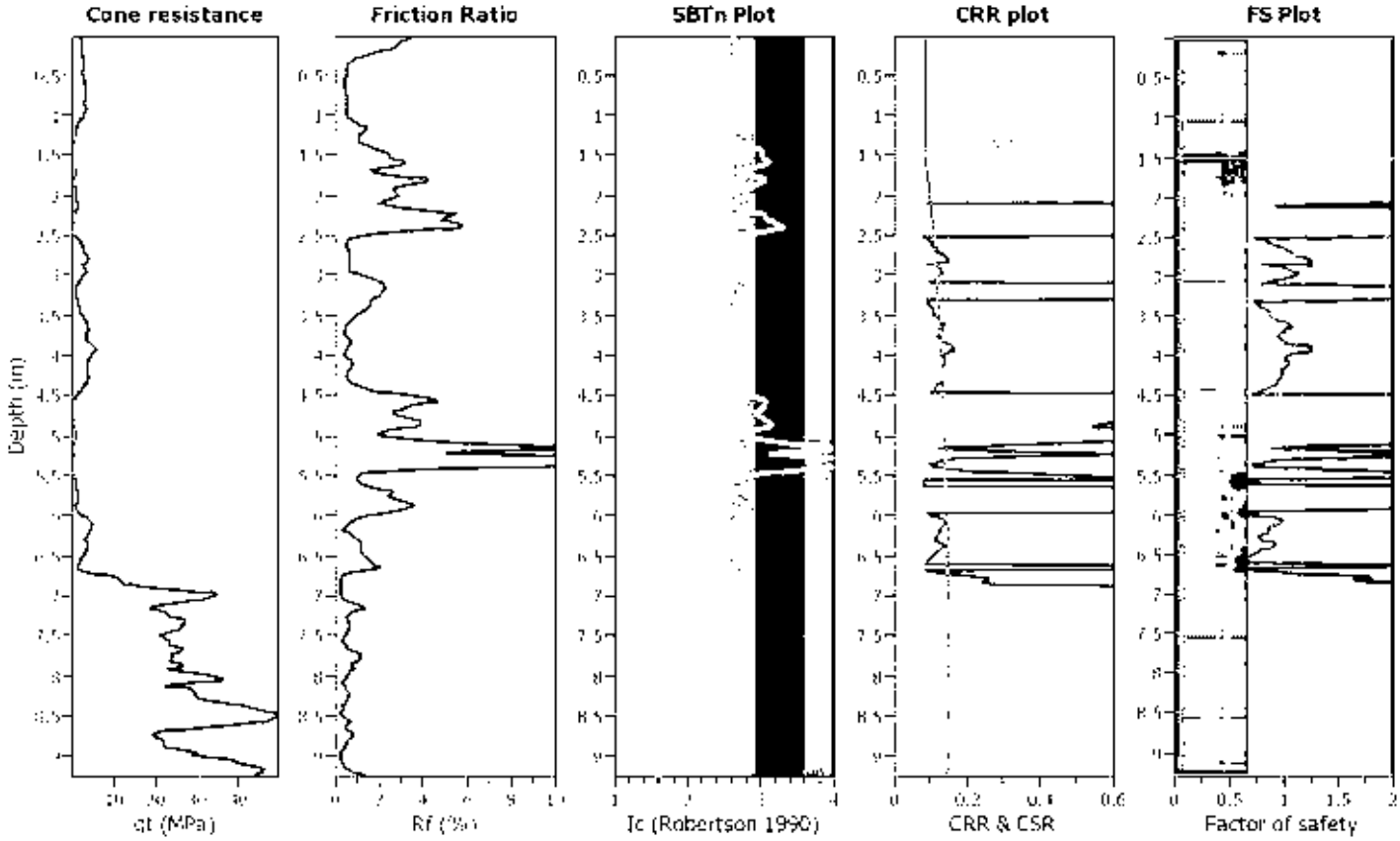
Beca Ltd
Geotechnical Engineers
www.beca.com

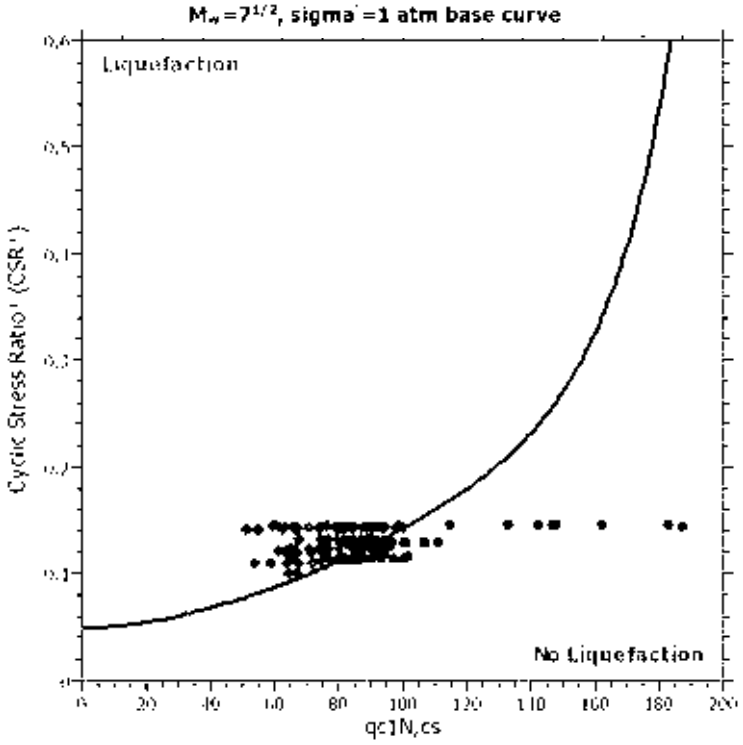
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

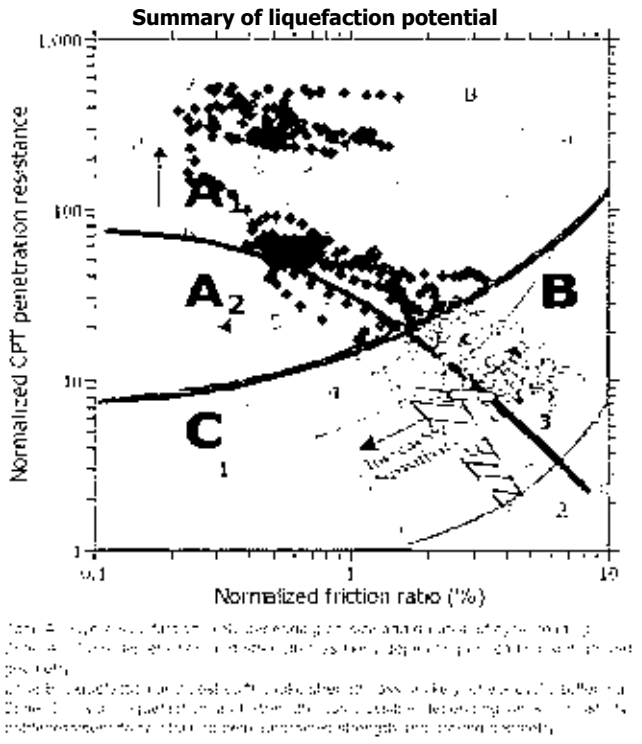
CPT file : CPT17_511HalswellRd

Input parameters and analysis data

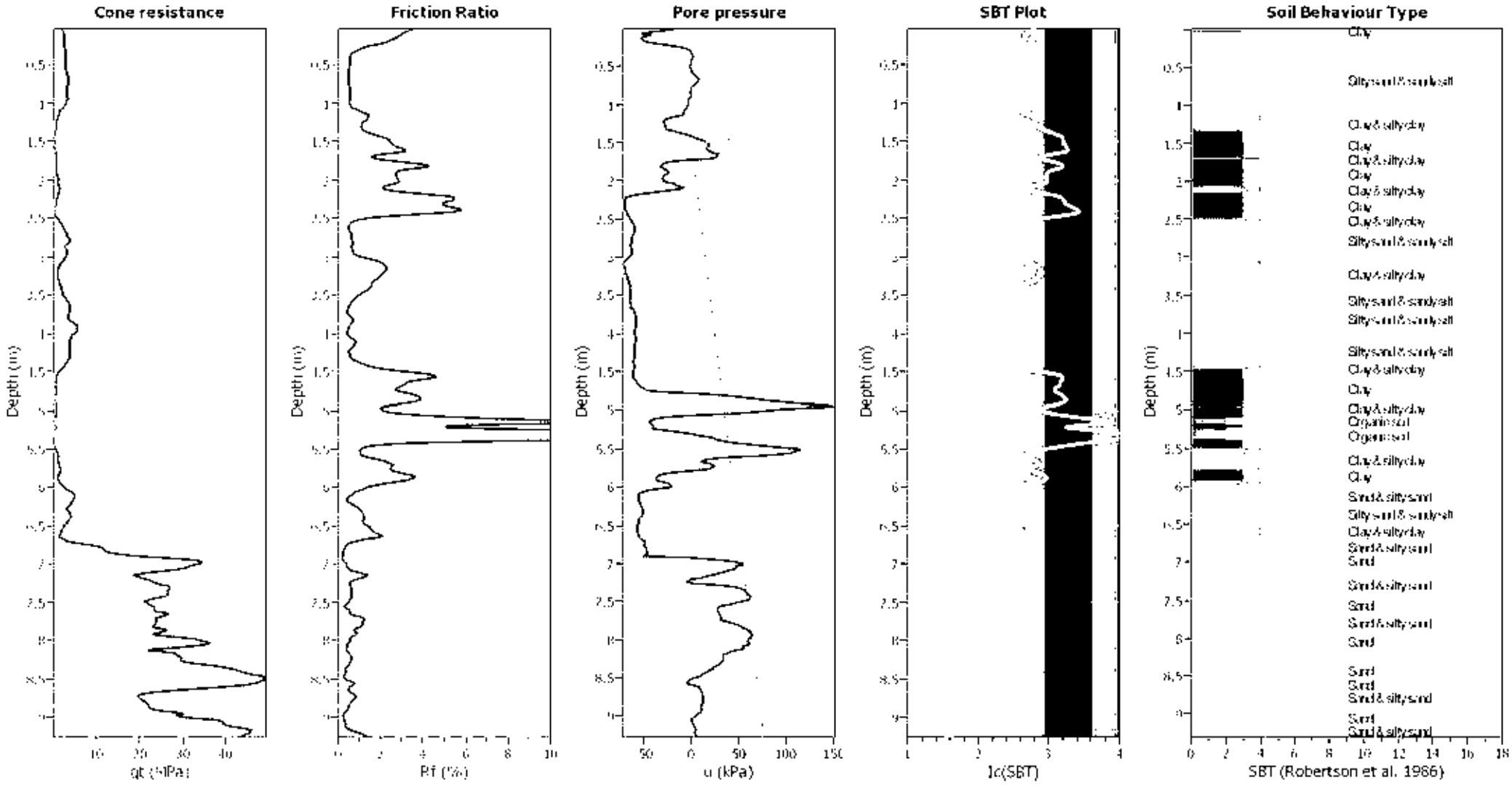
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



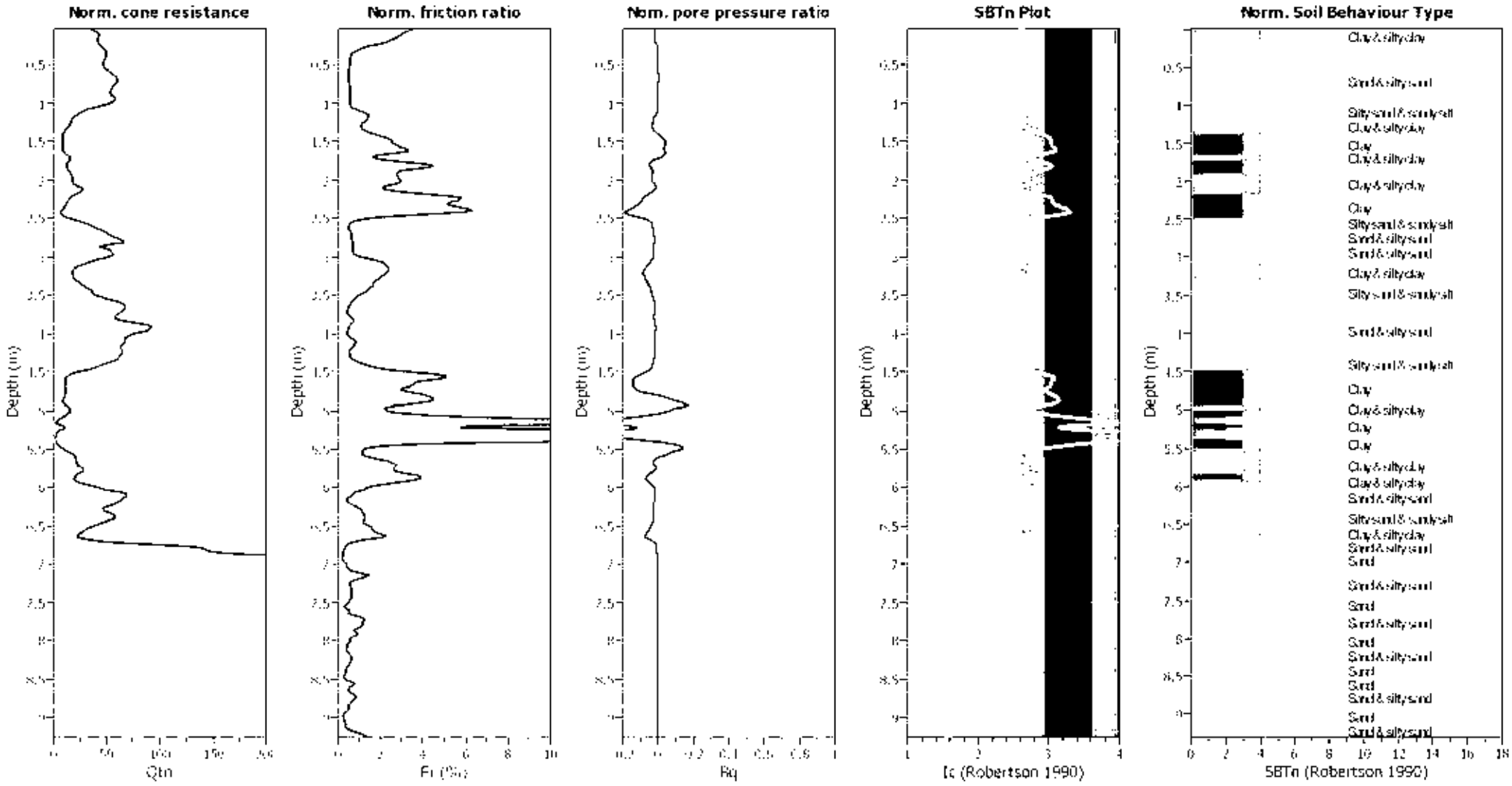
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



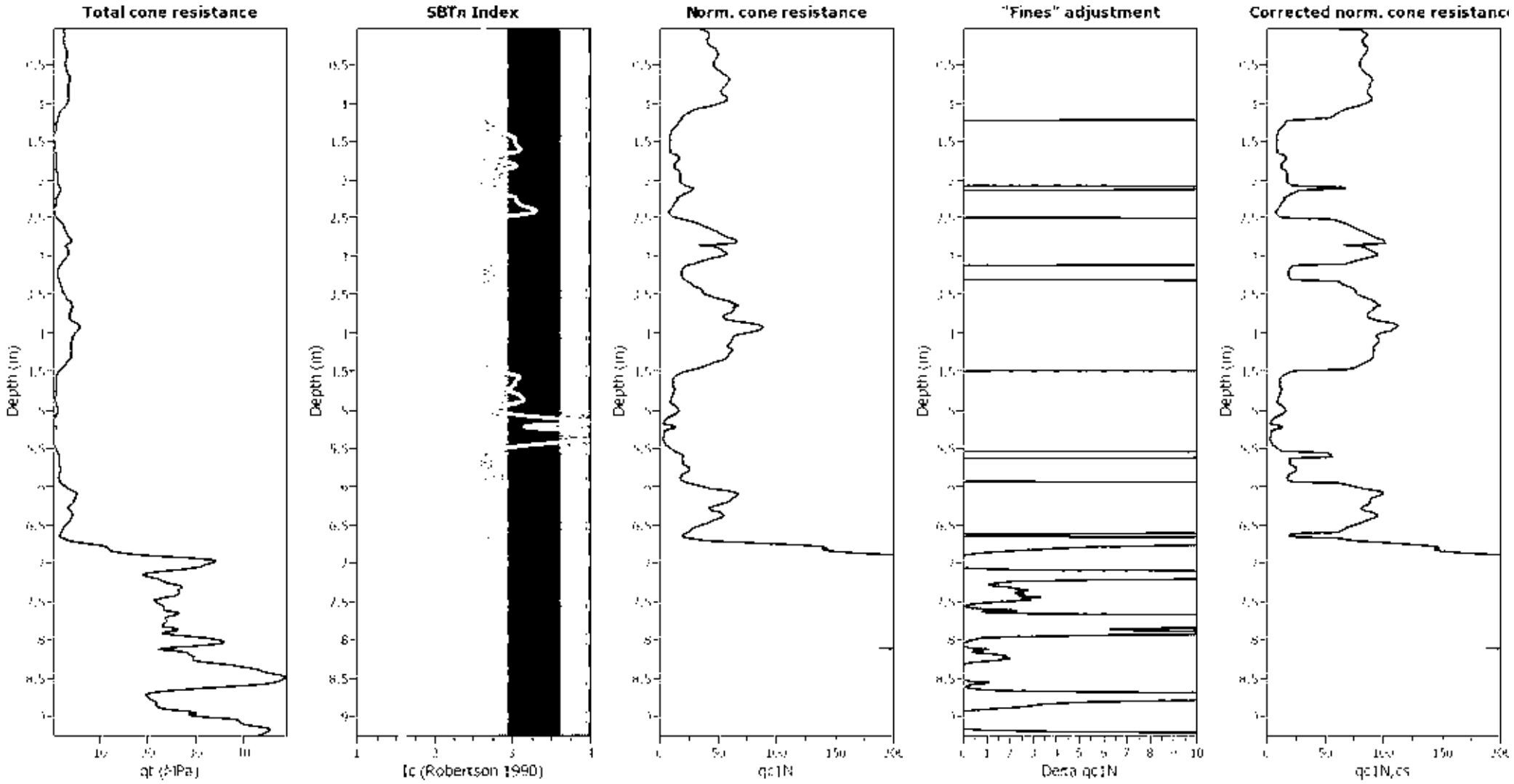
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

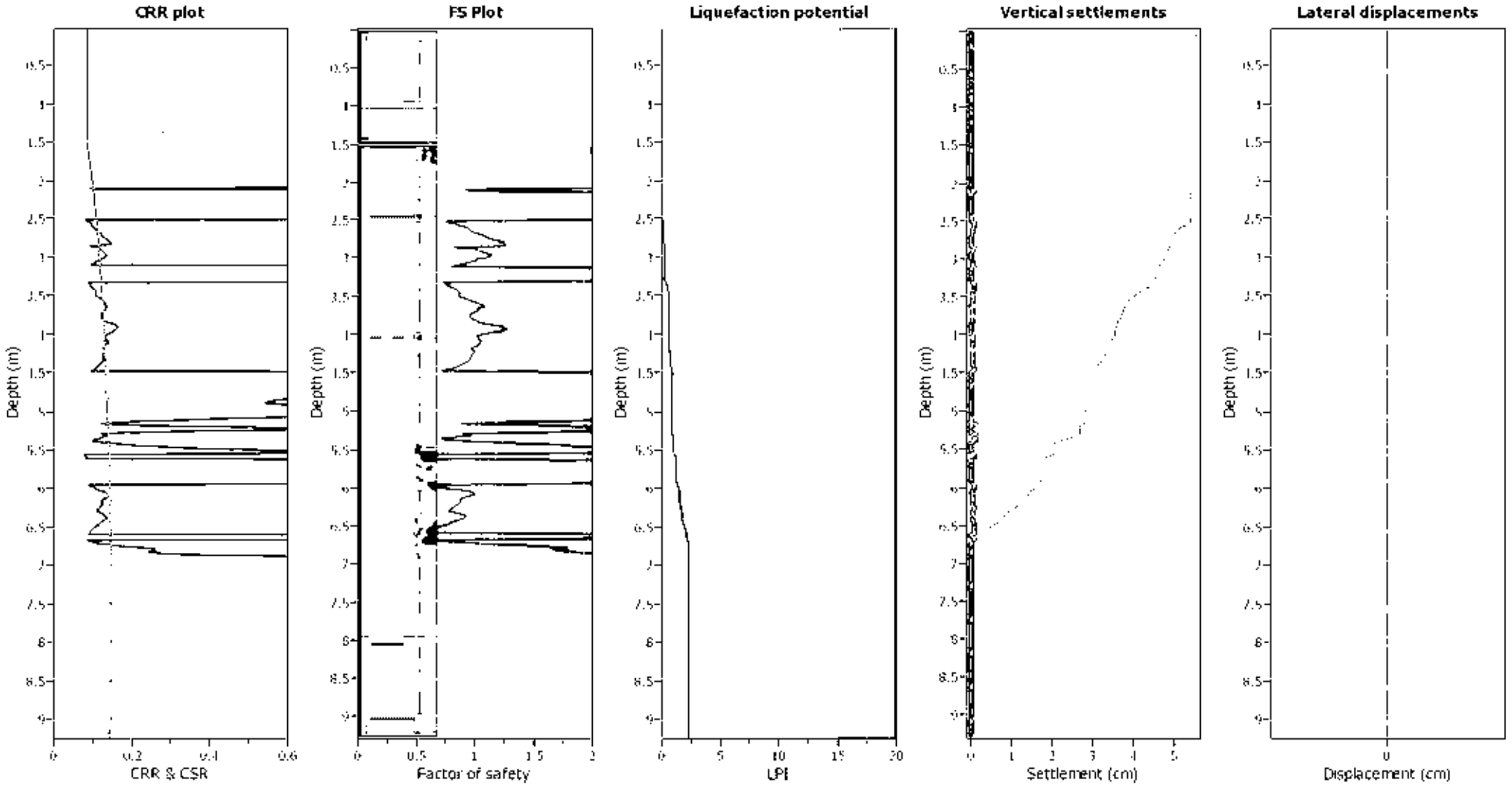
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

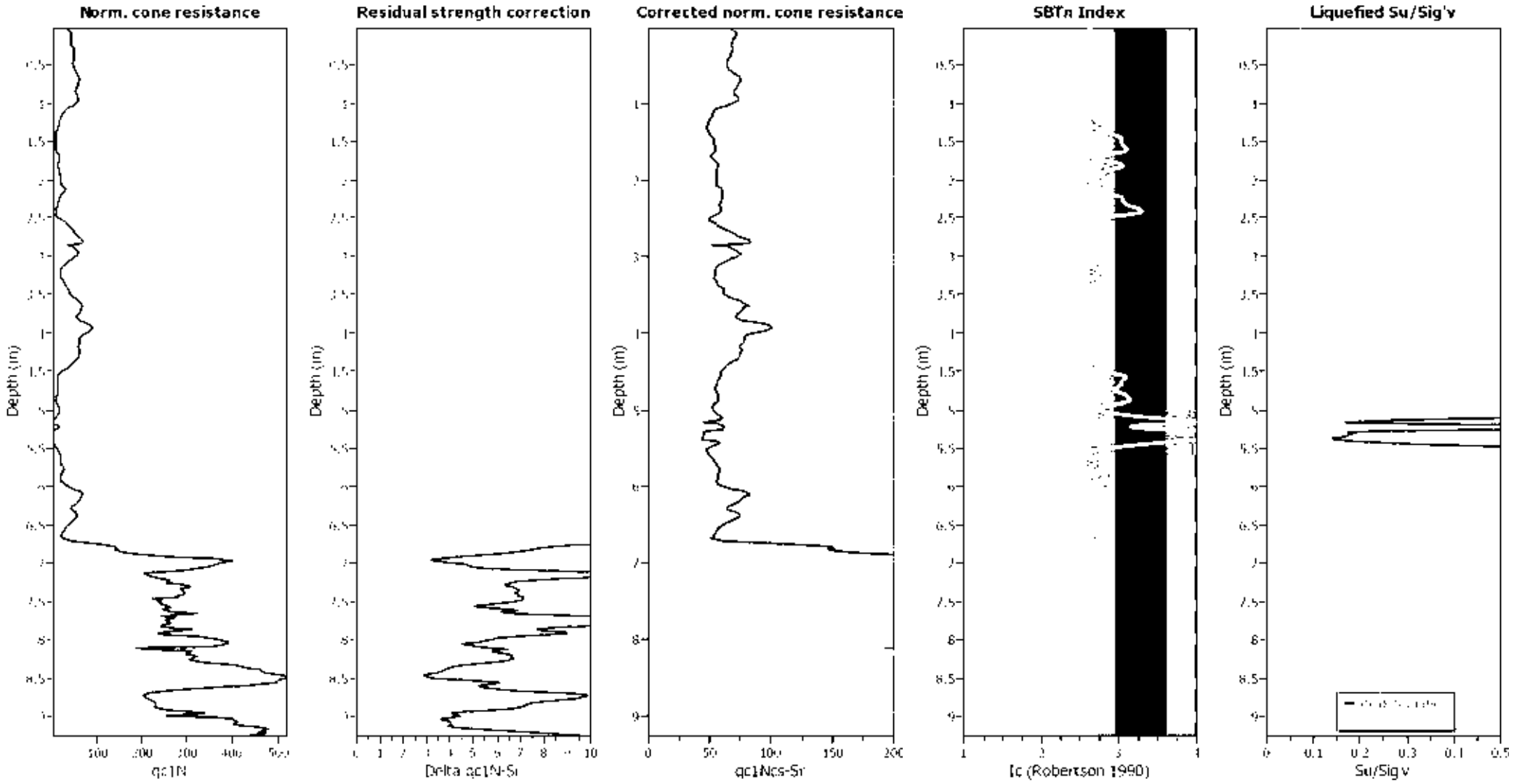
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

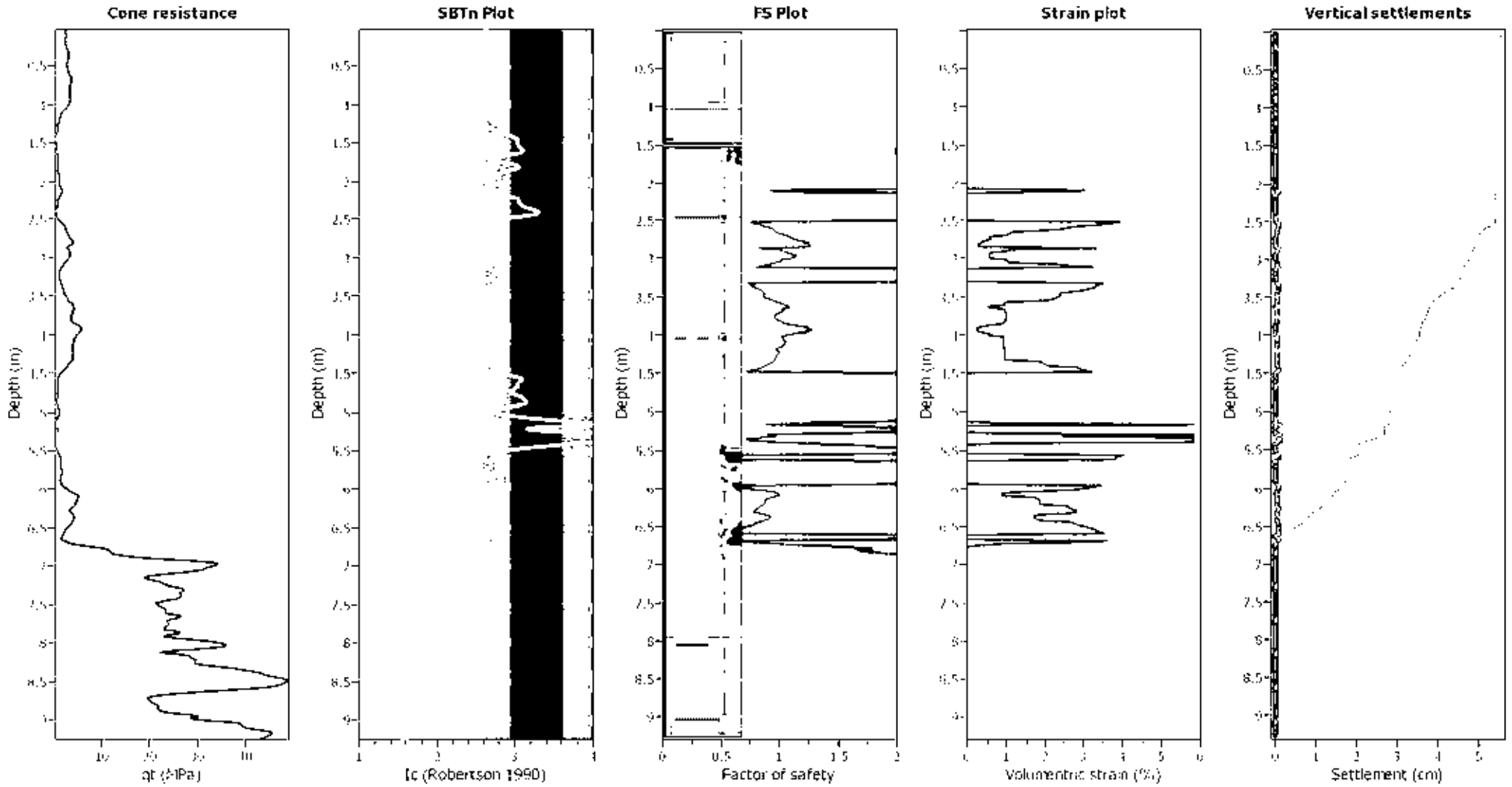
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

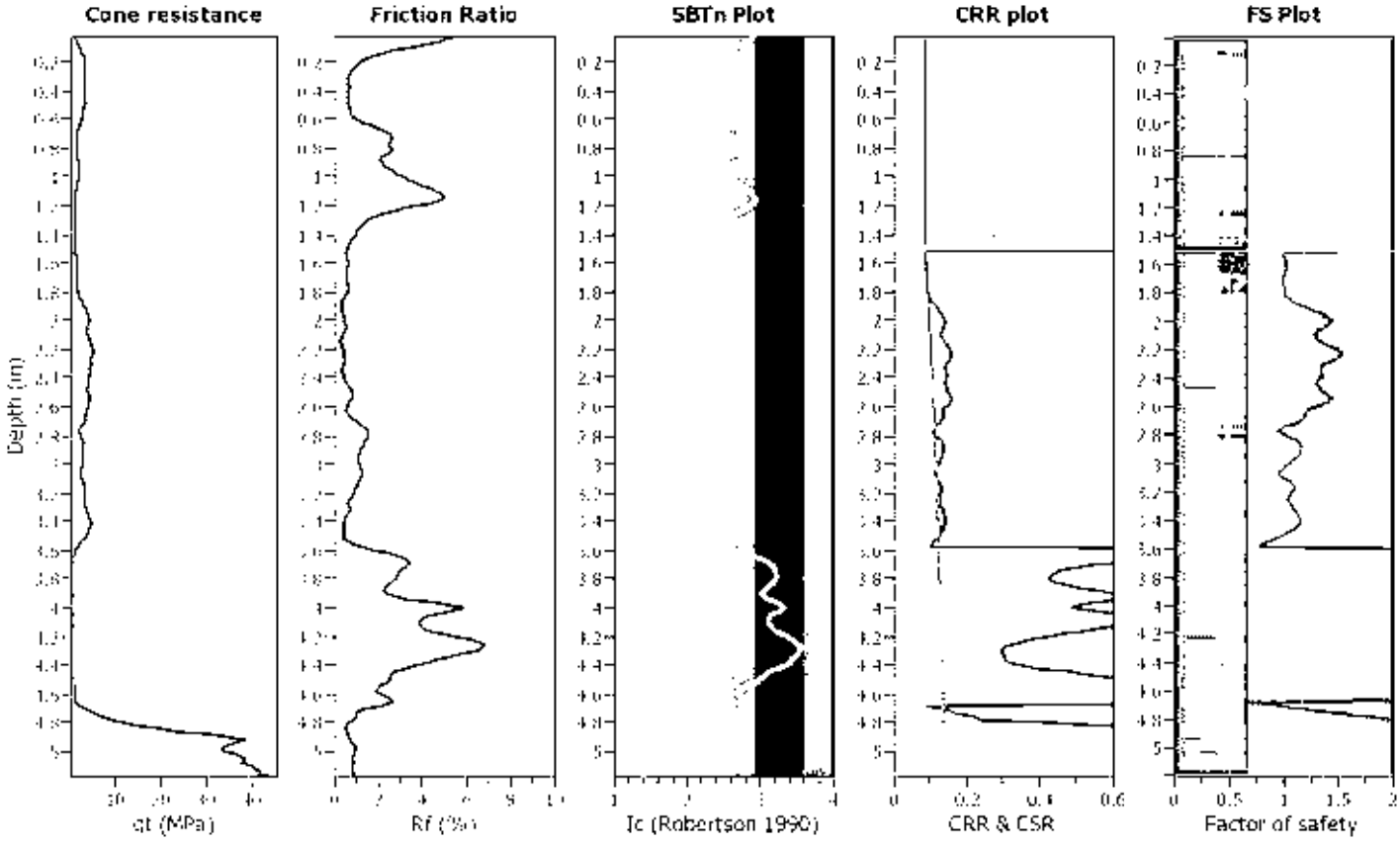
qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

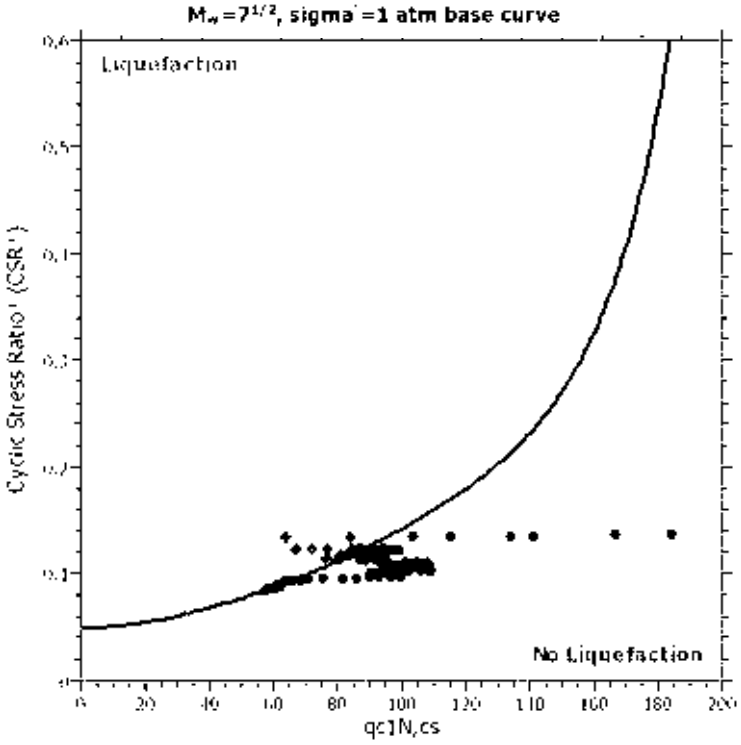
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

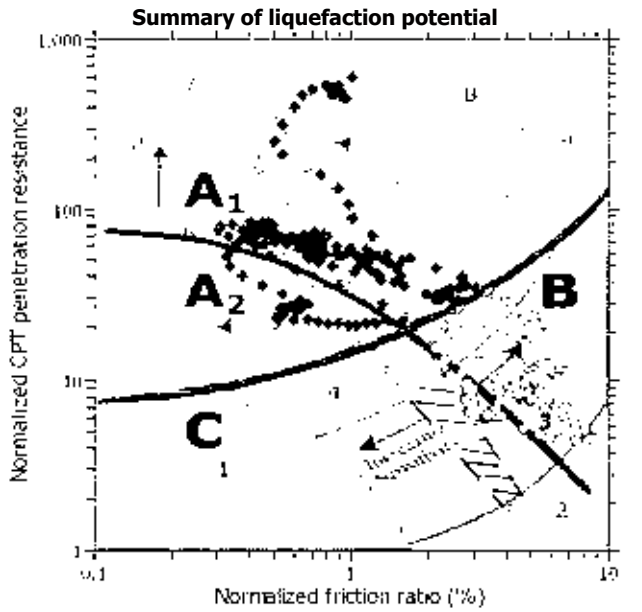
CPT file : CPT18_511HalswellRd

Input parameters and analysis data

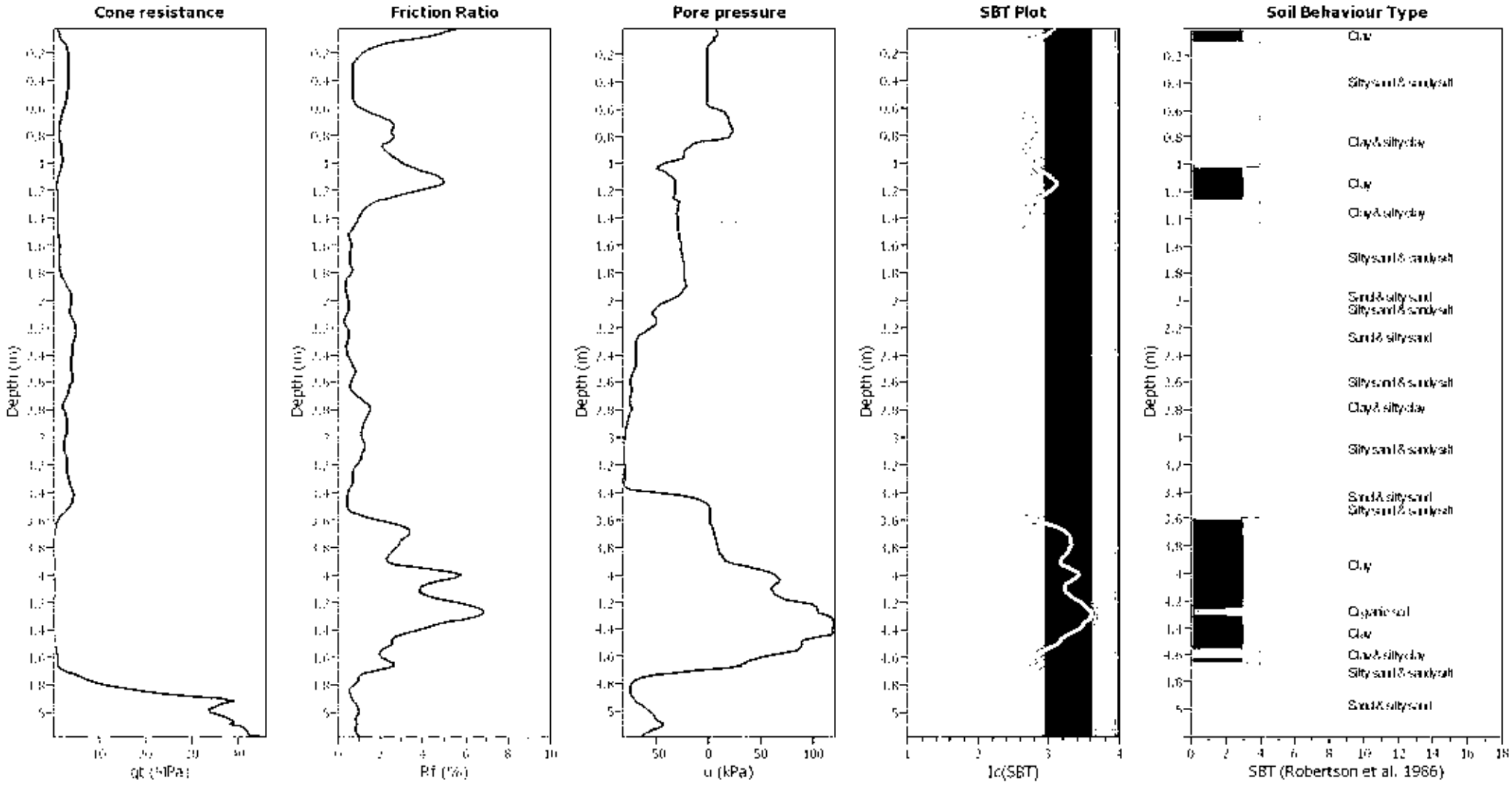
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



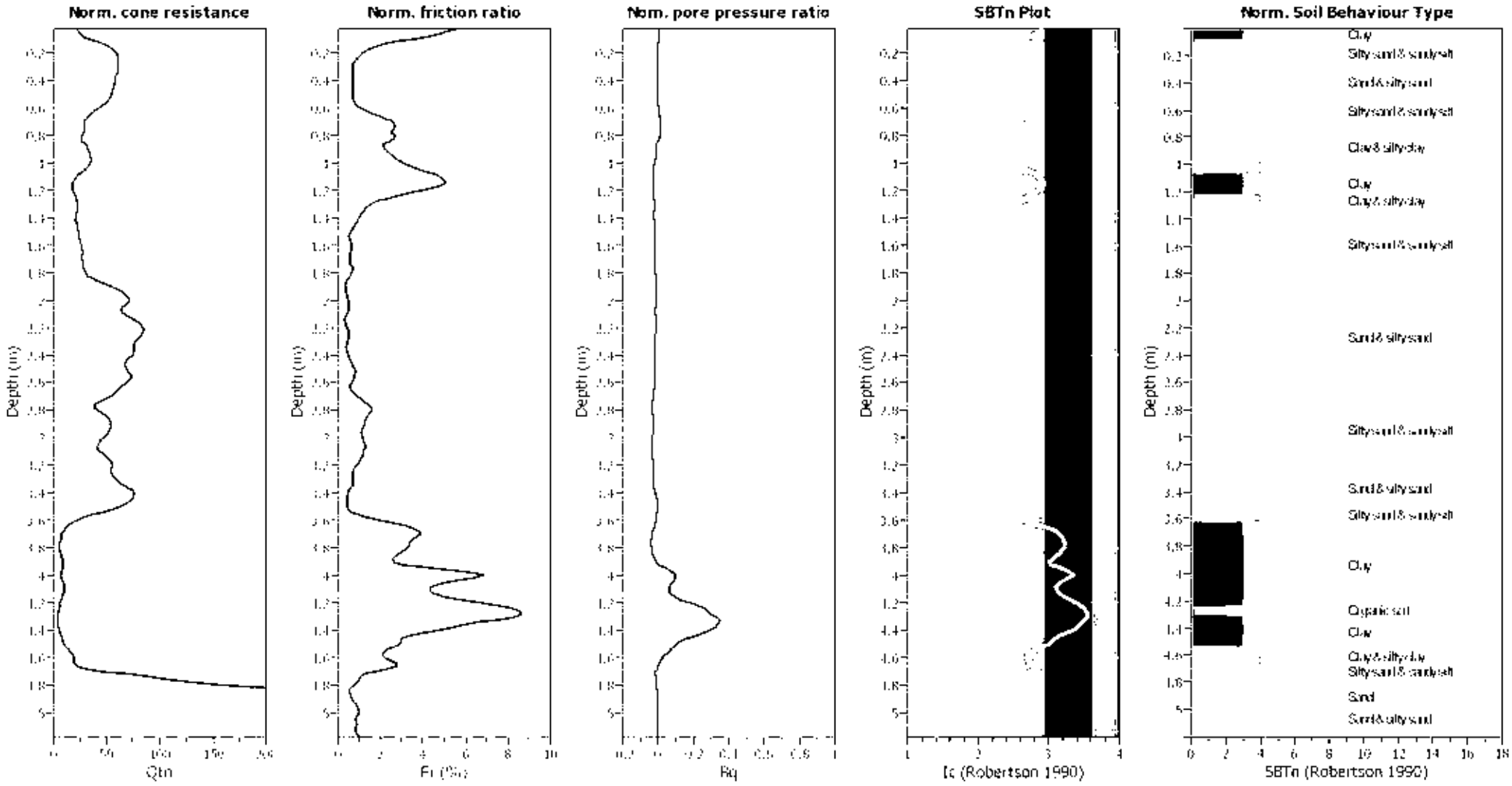
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



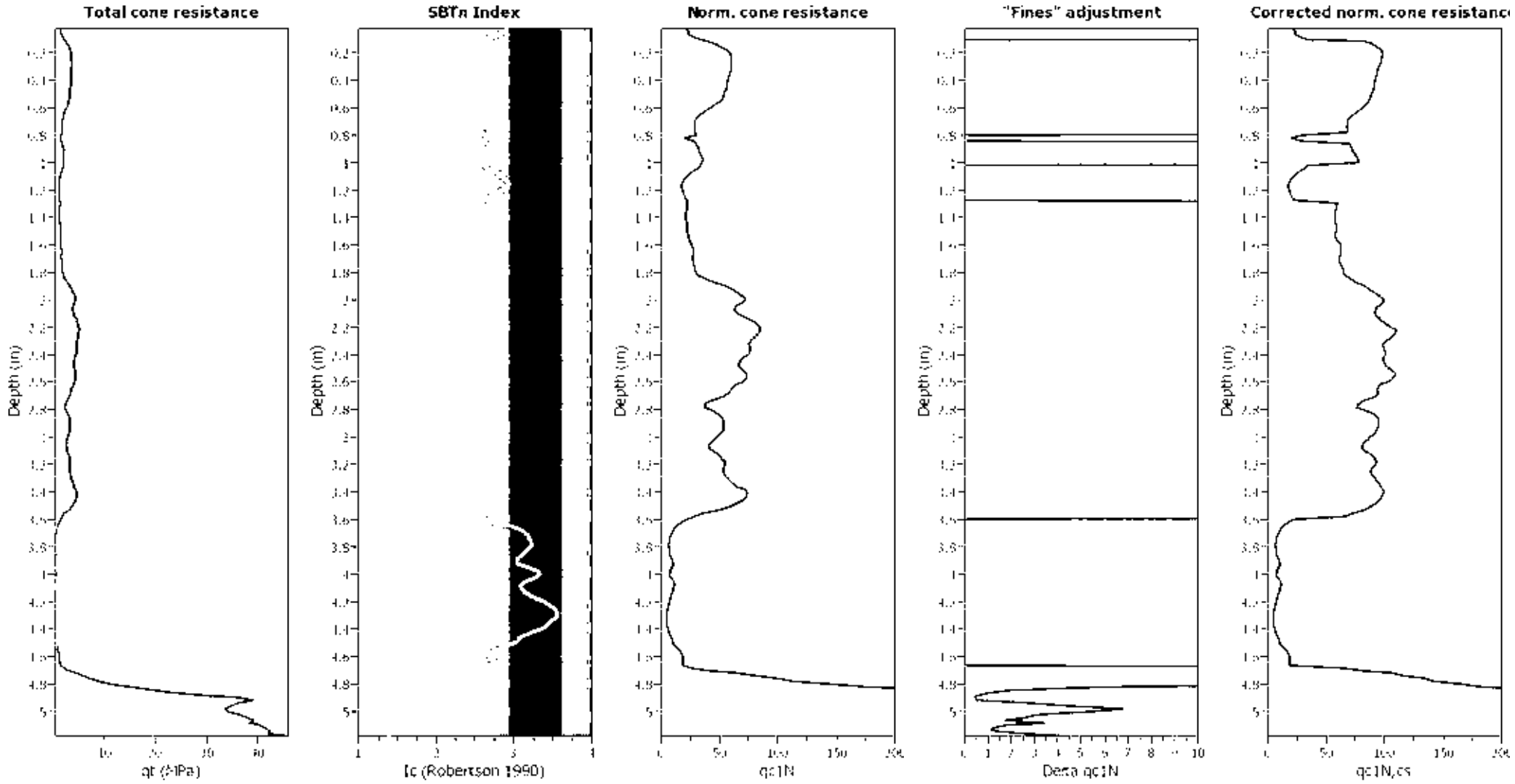
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

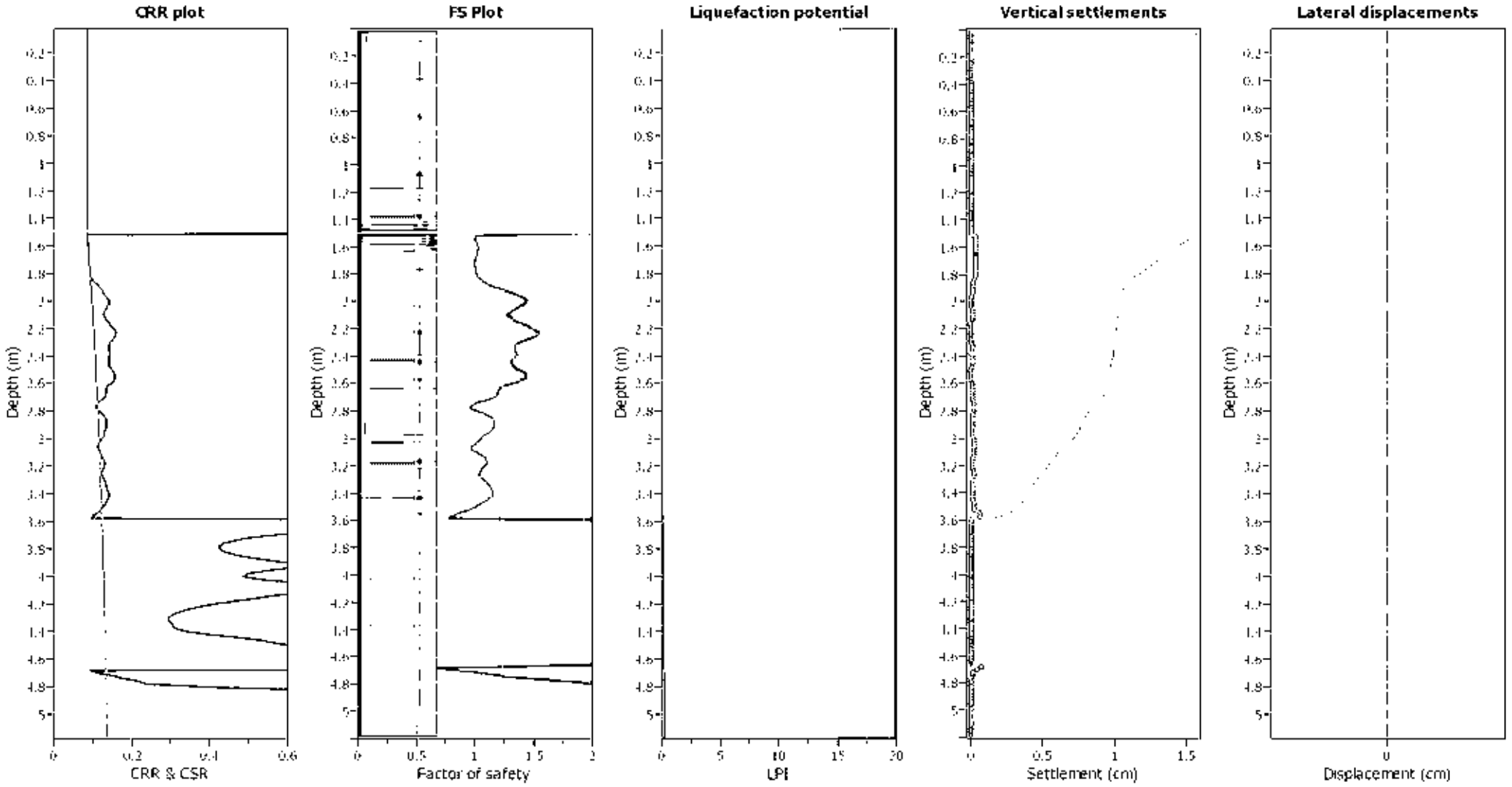
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

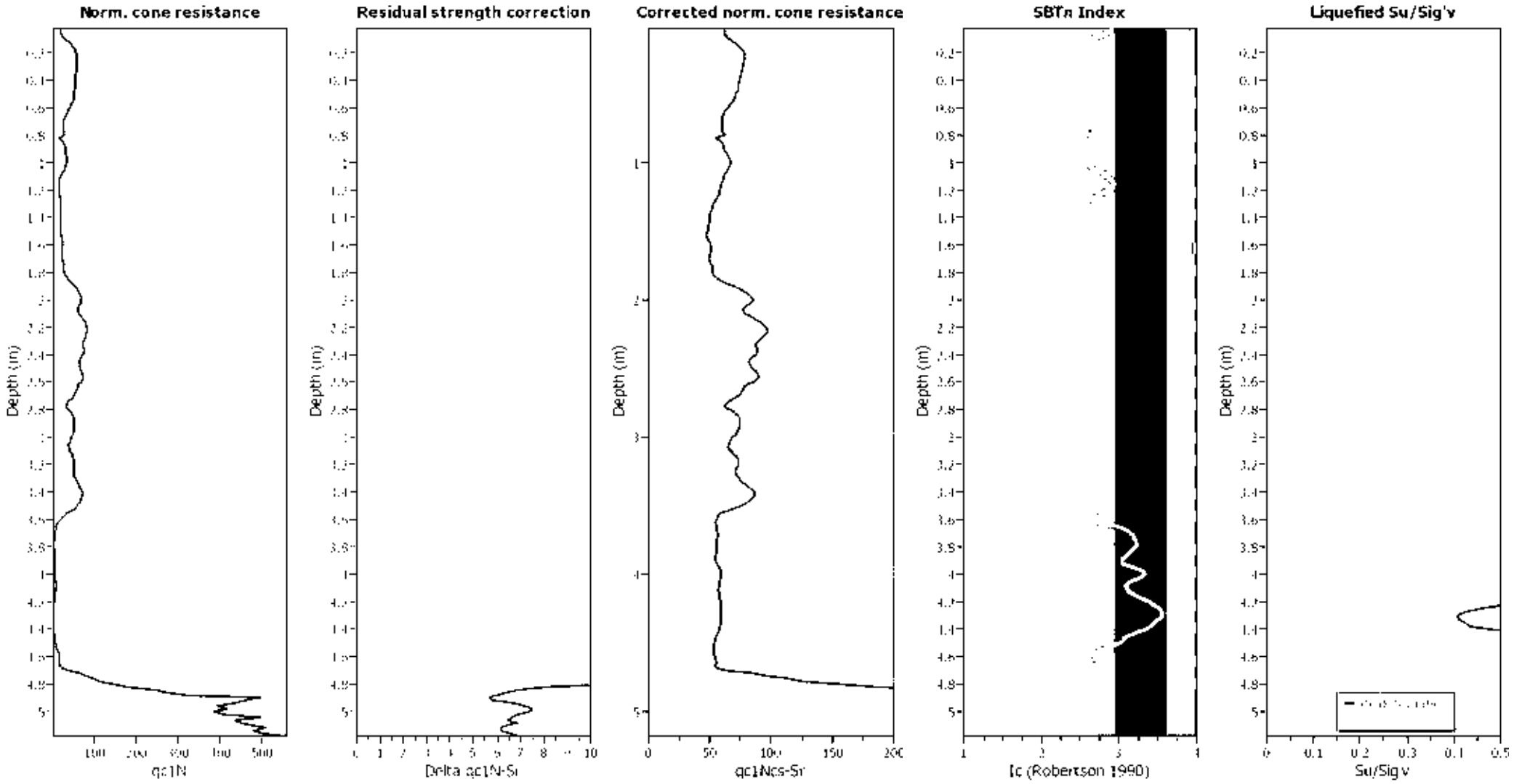
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

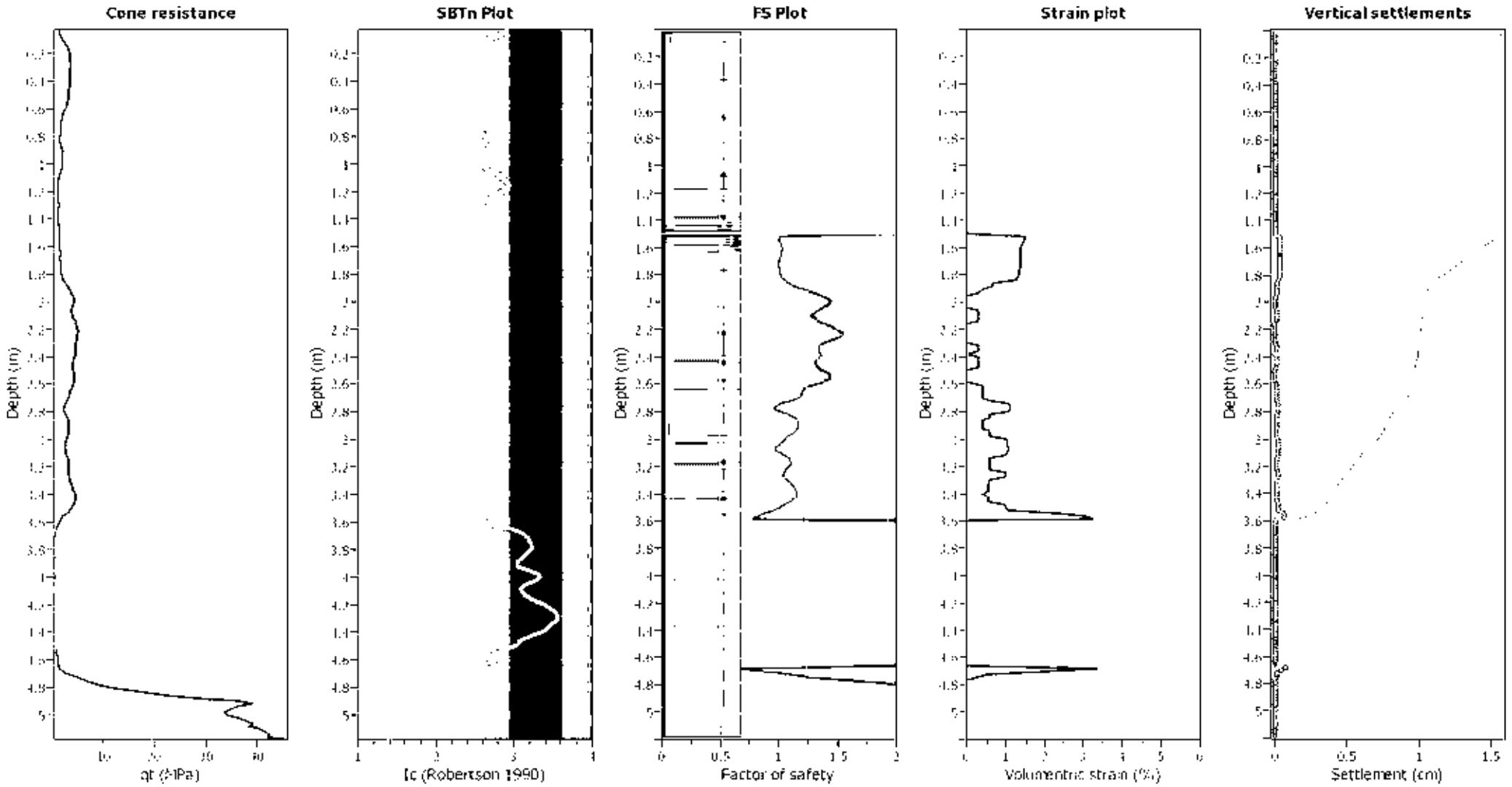
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

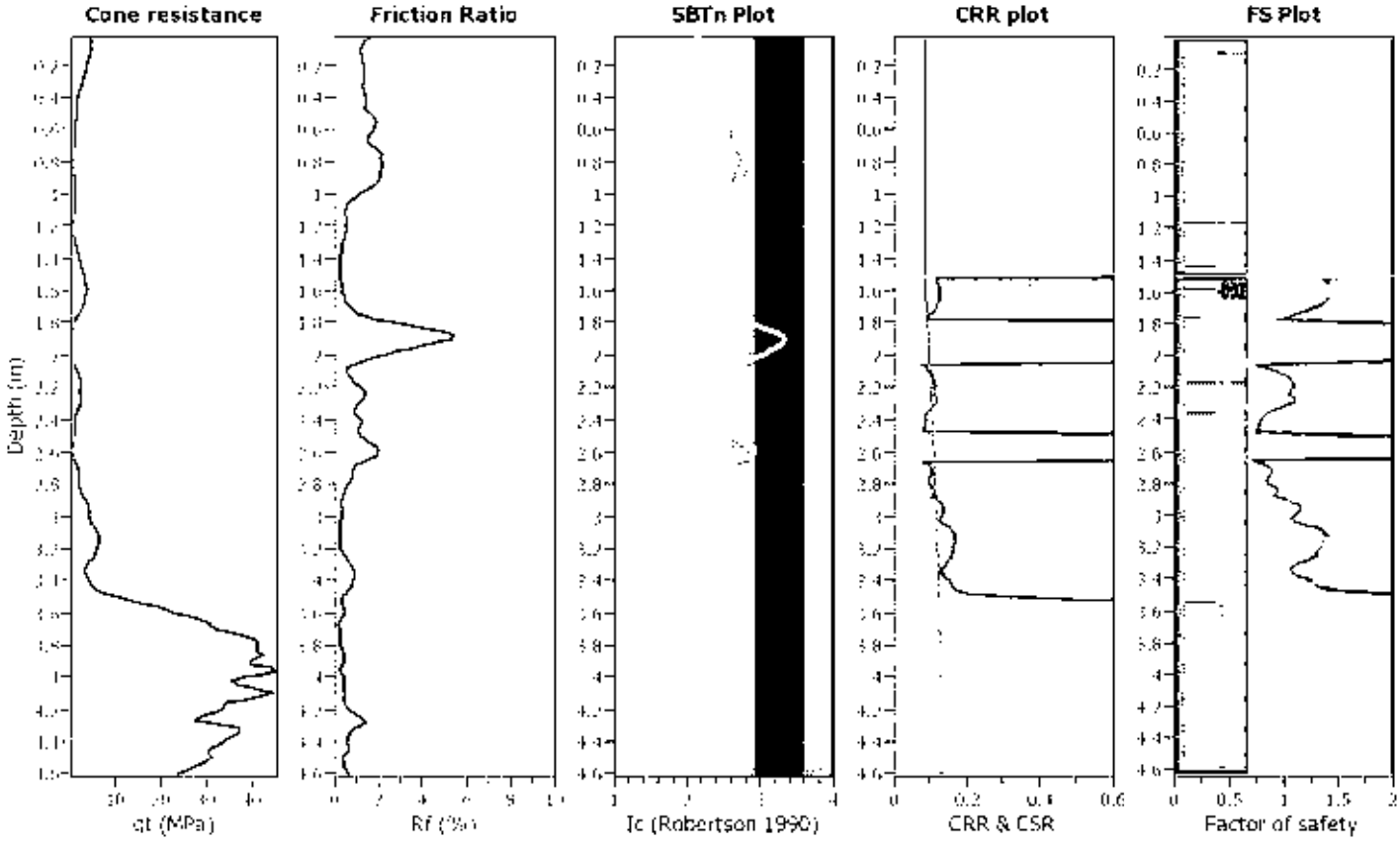
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

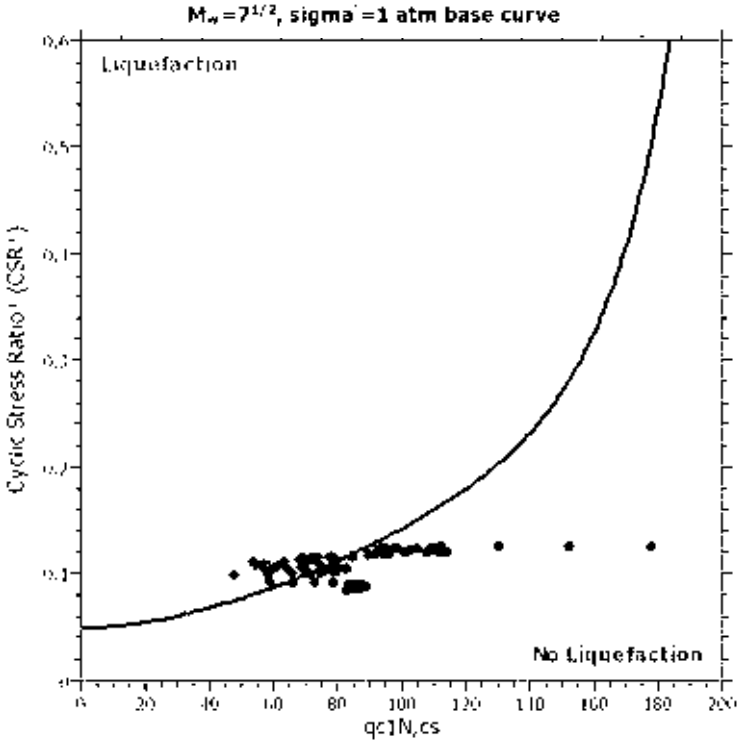
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

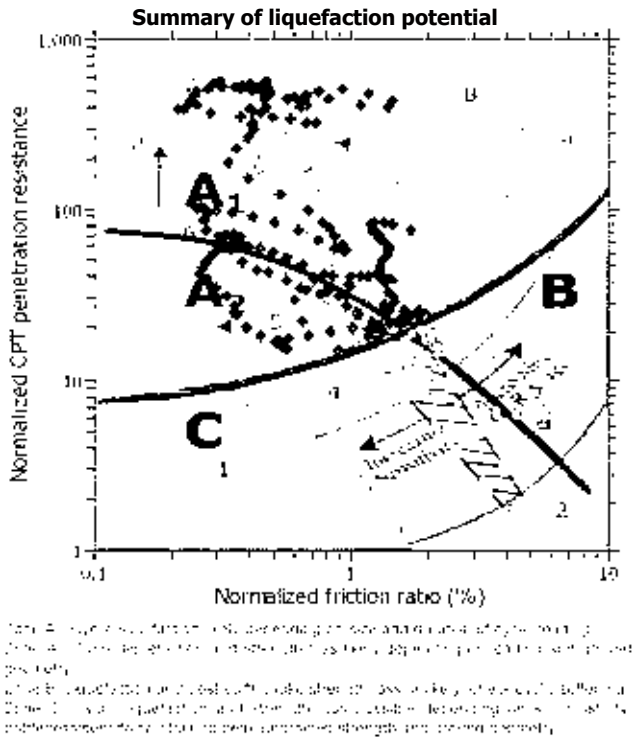
CPT file : CPT19_511HalswellRd

Input parameters and analysis data

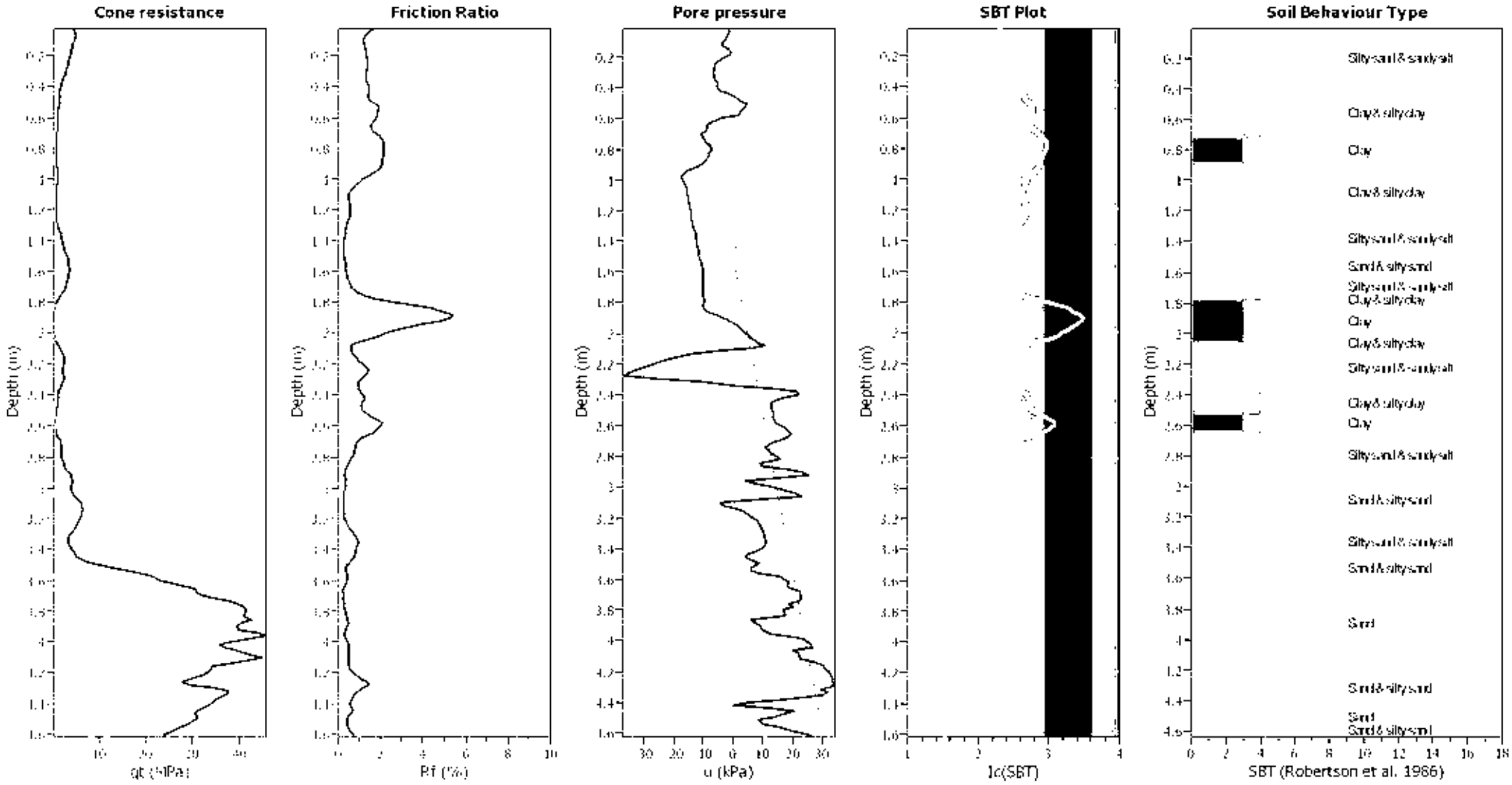
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



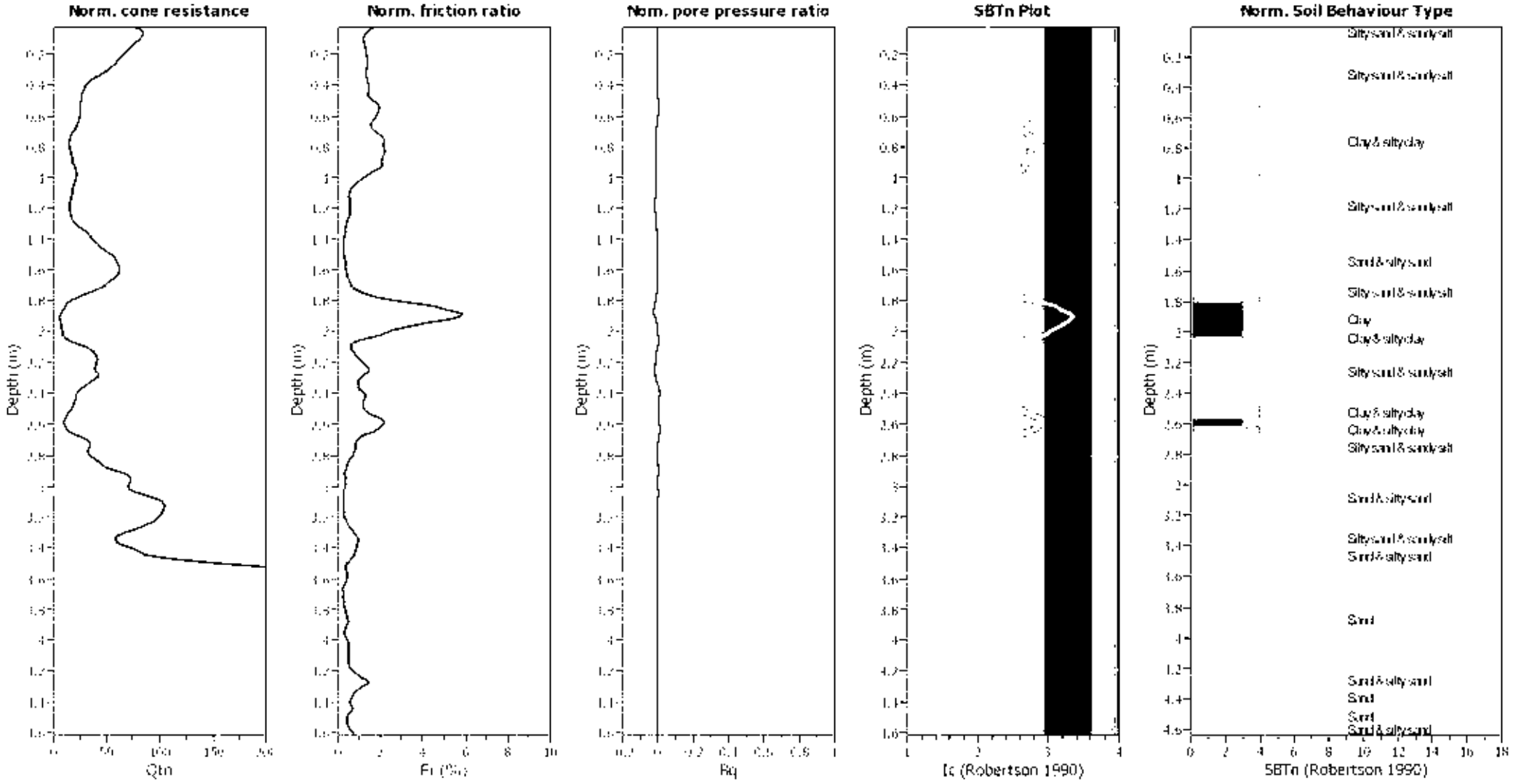
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



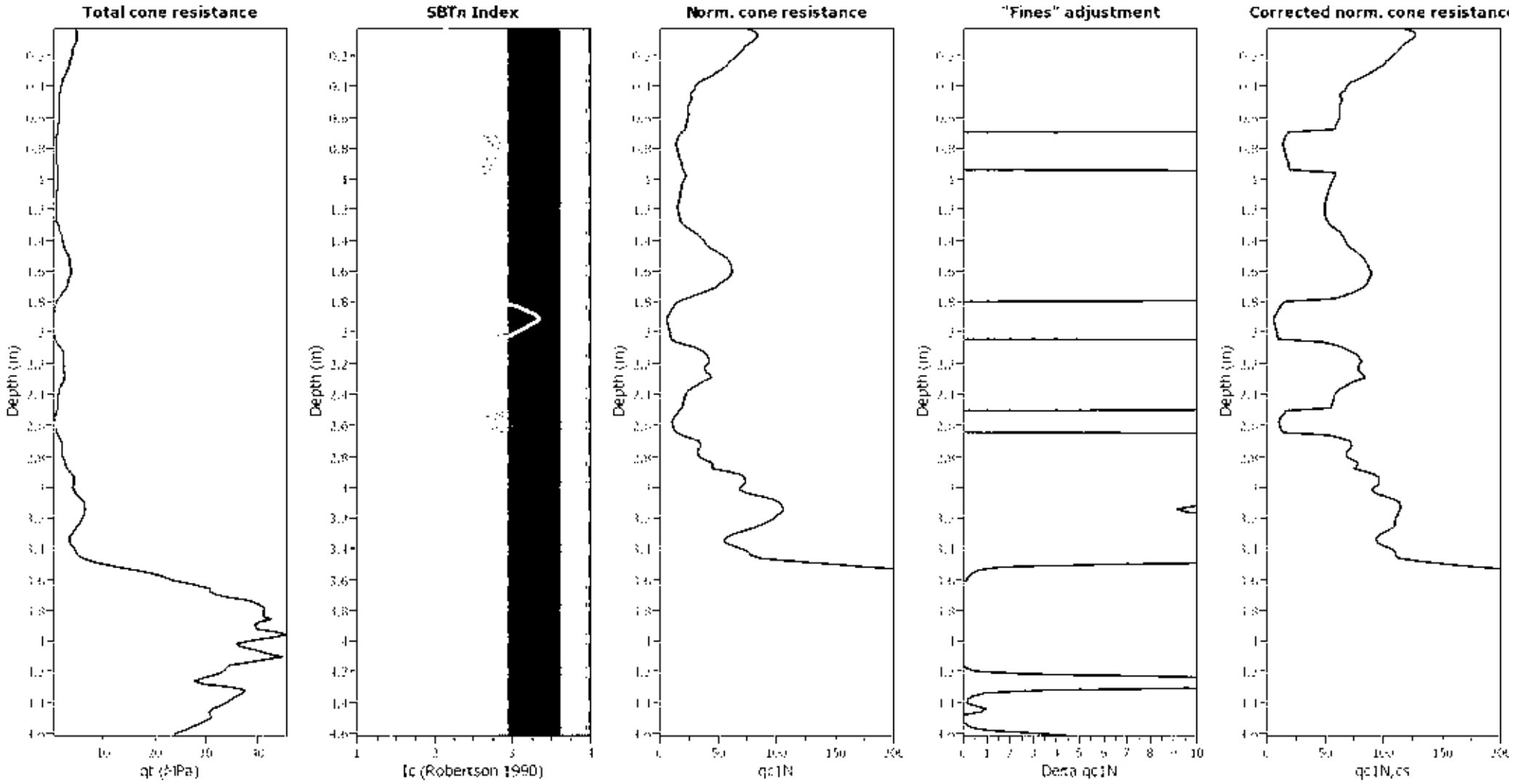
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

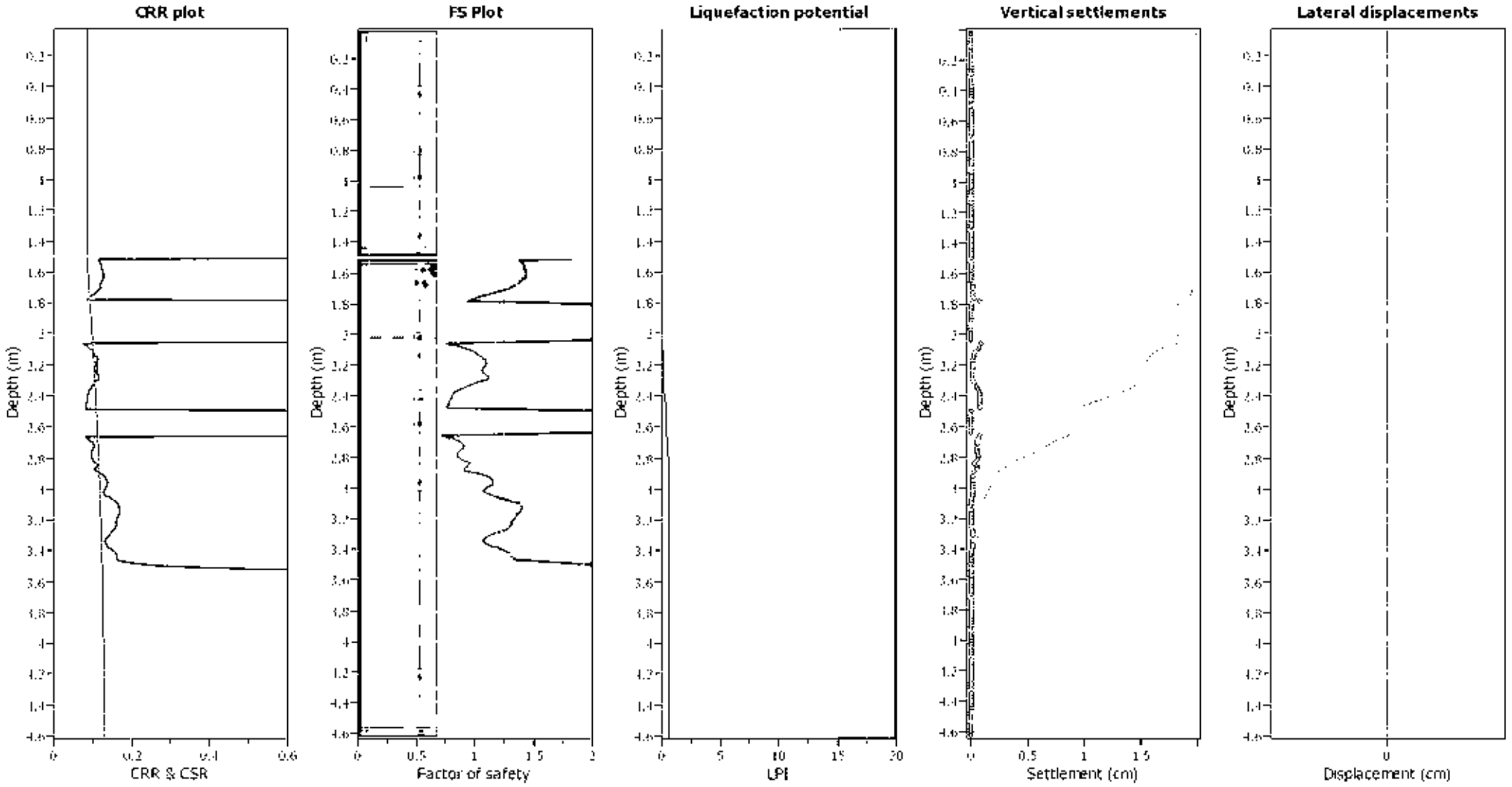
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

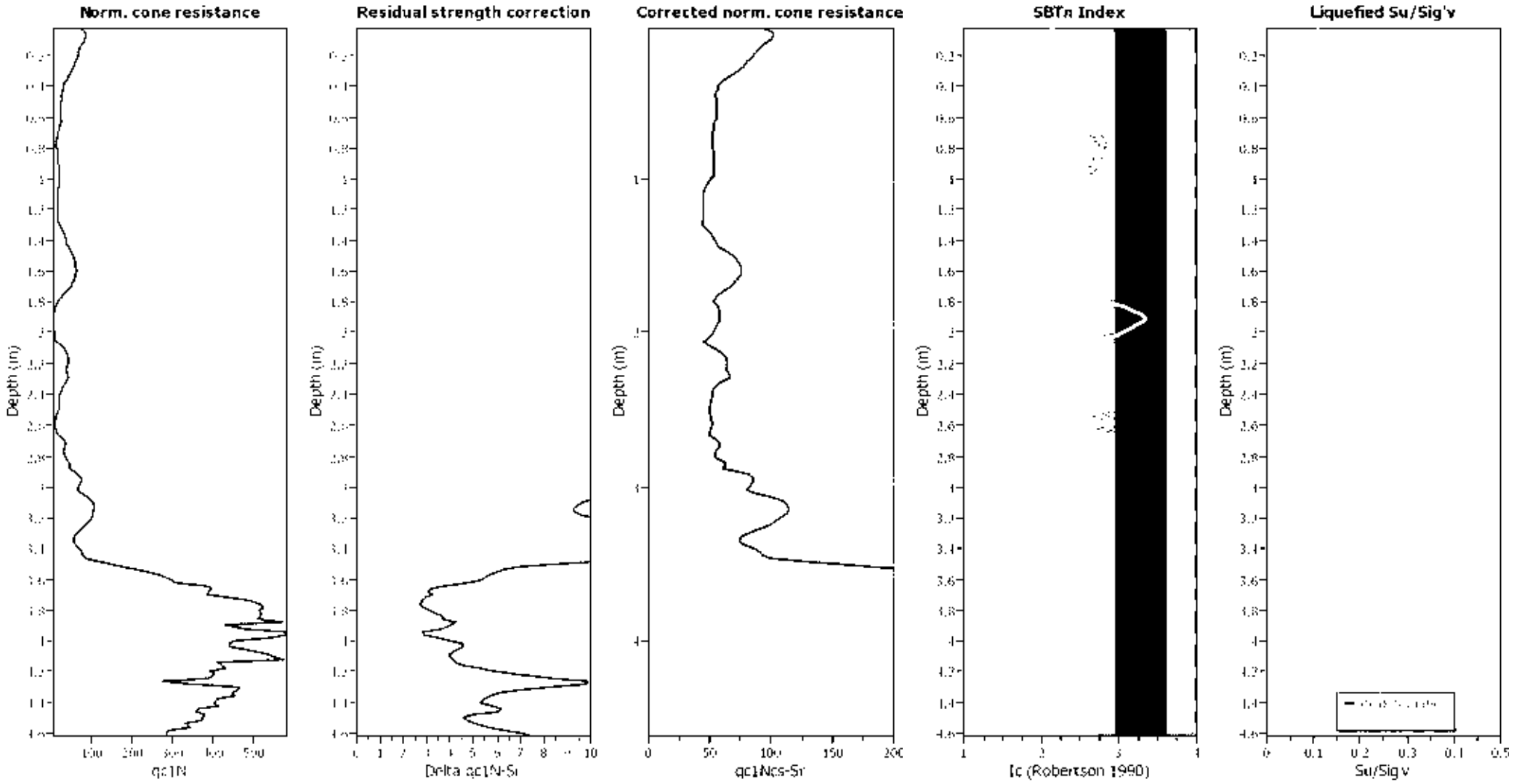
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

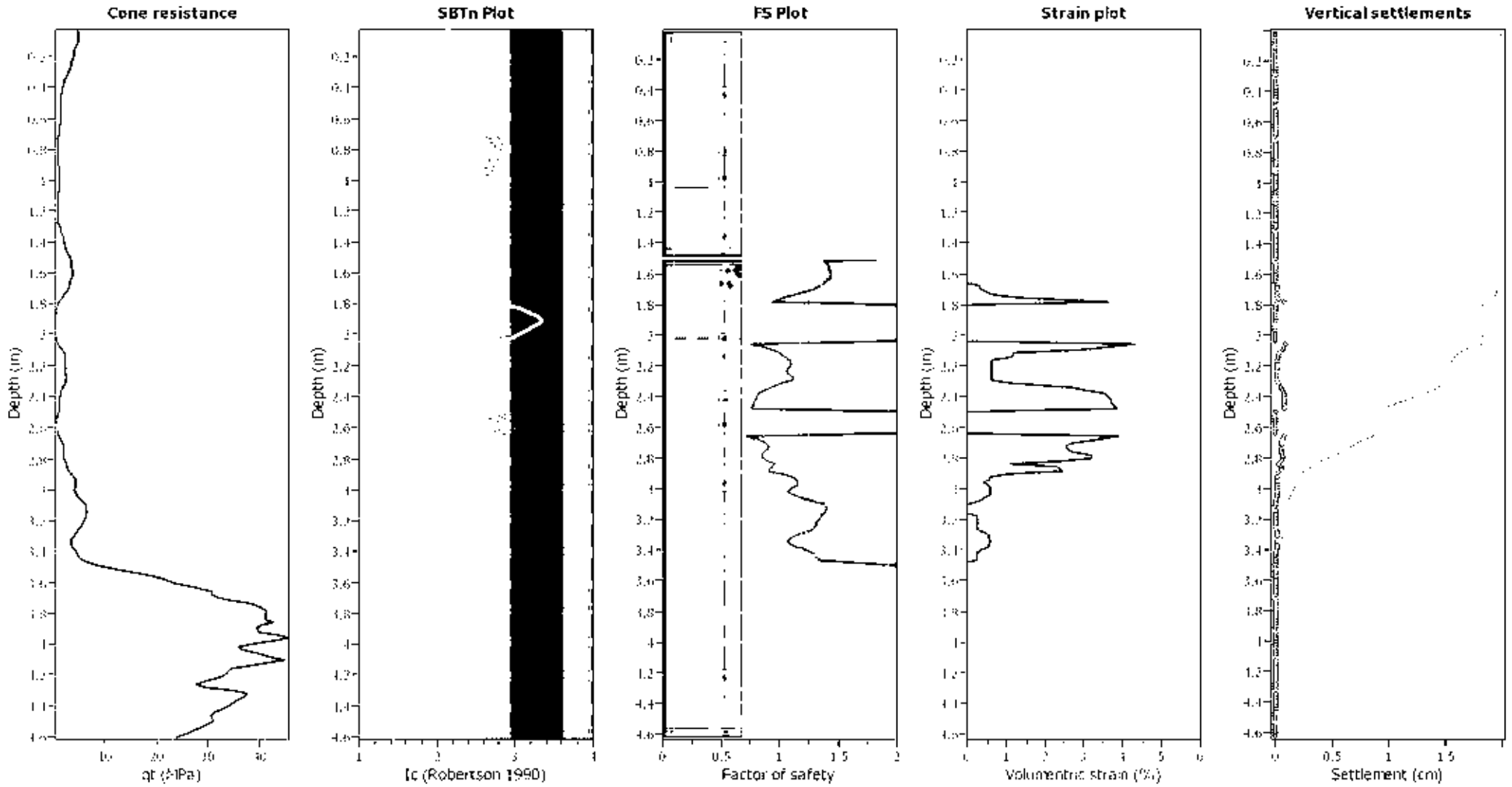
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

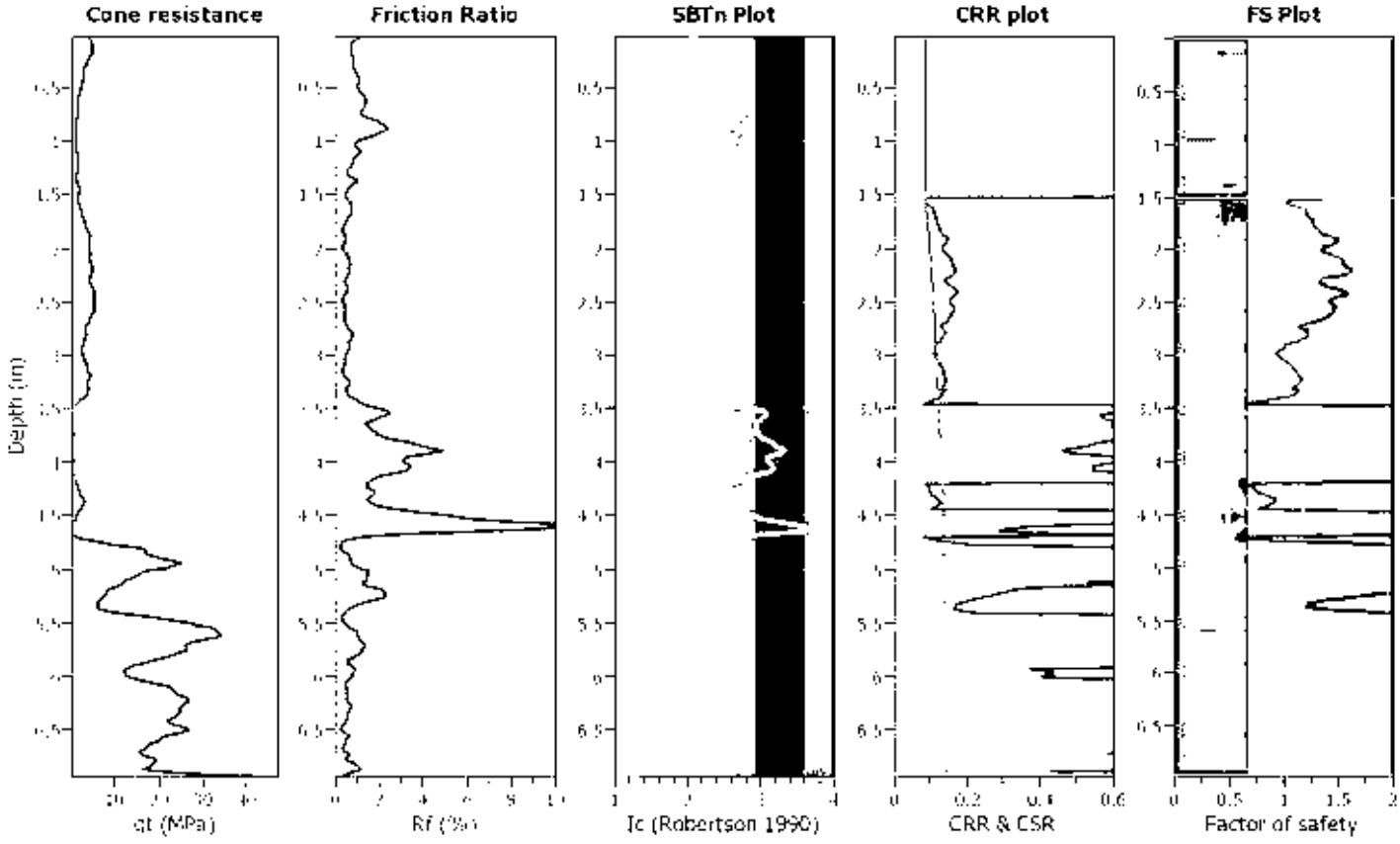
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

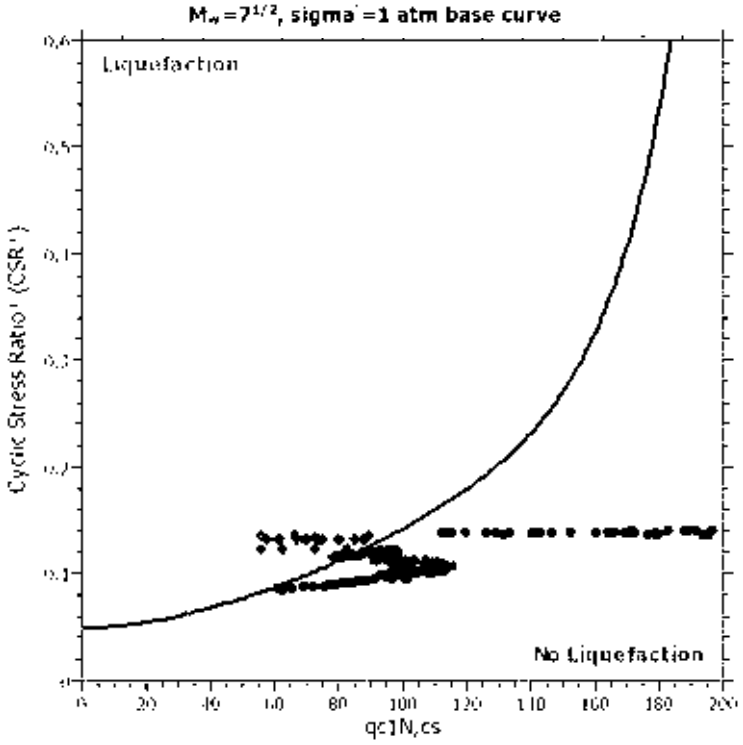
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

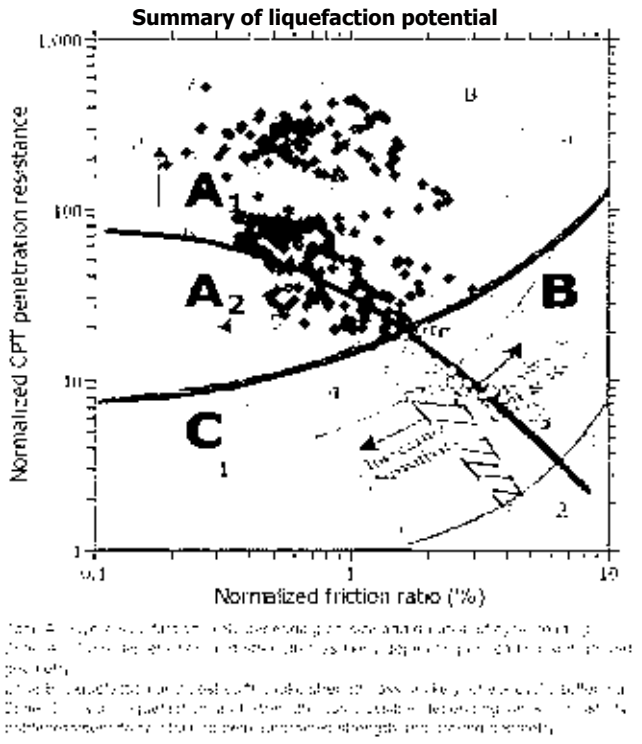
CPT file : CPT20_511HalswellRd

Input parameters and analysis data

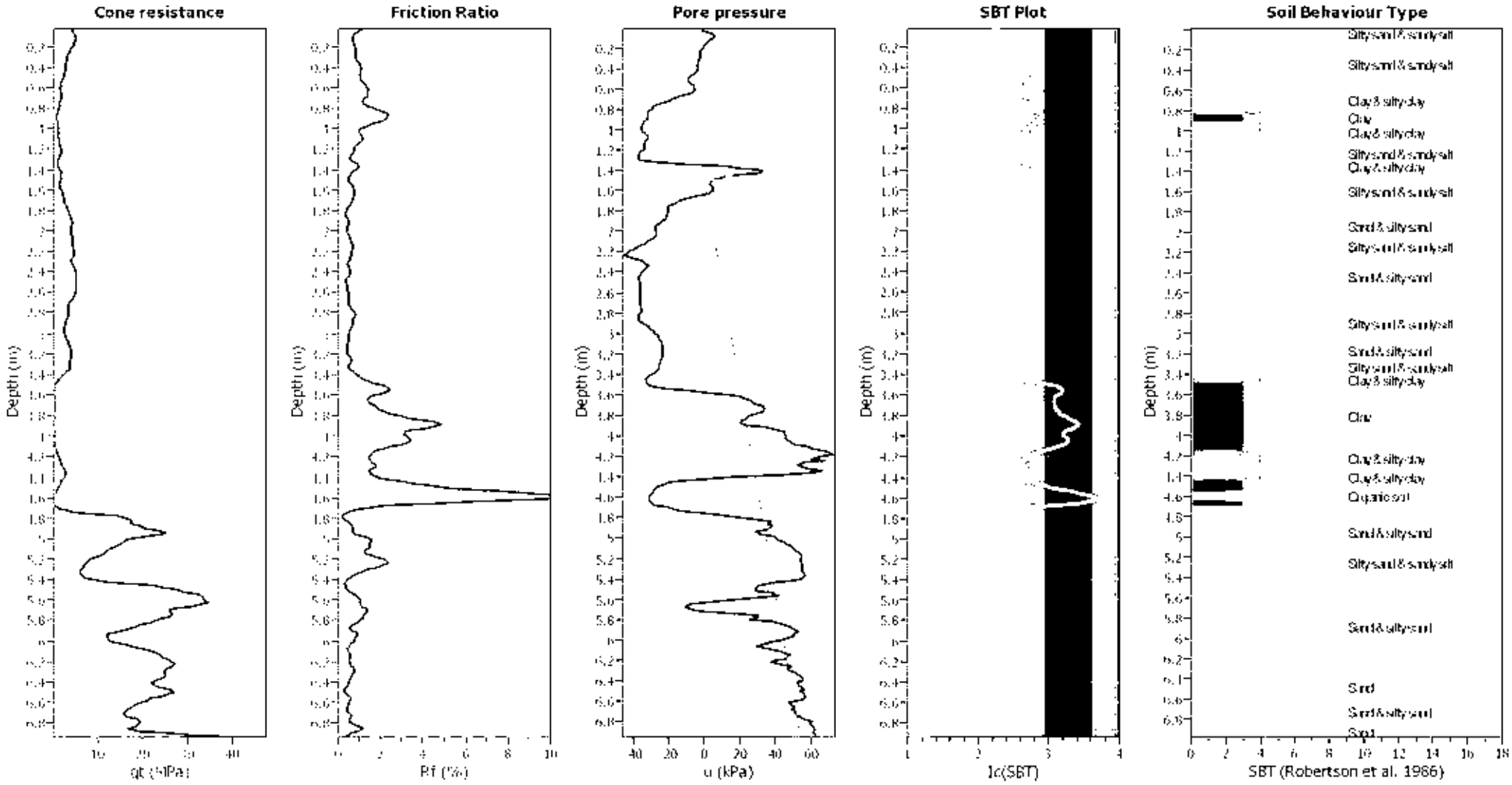
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



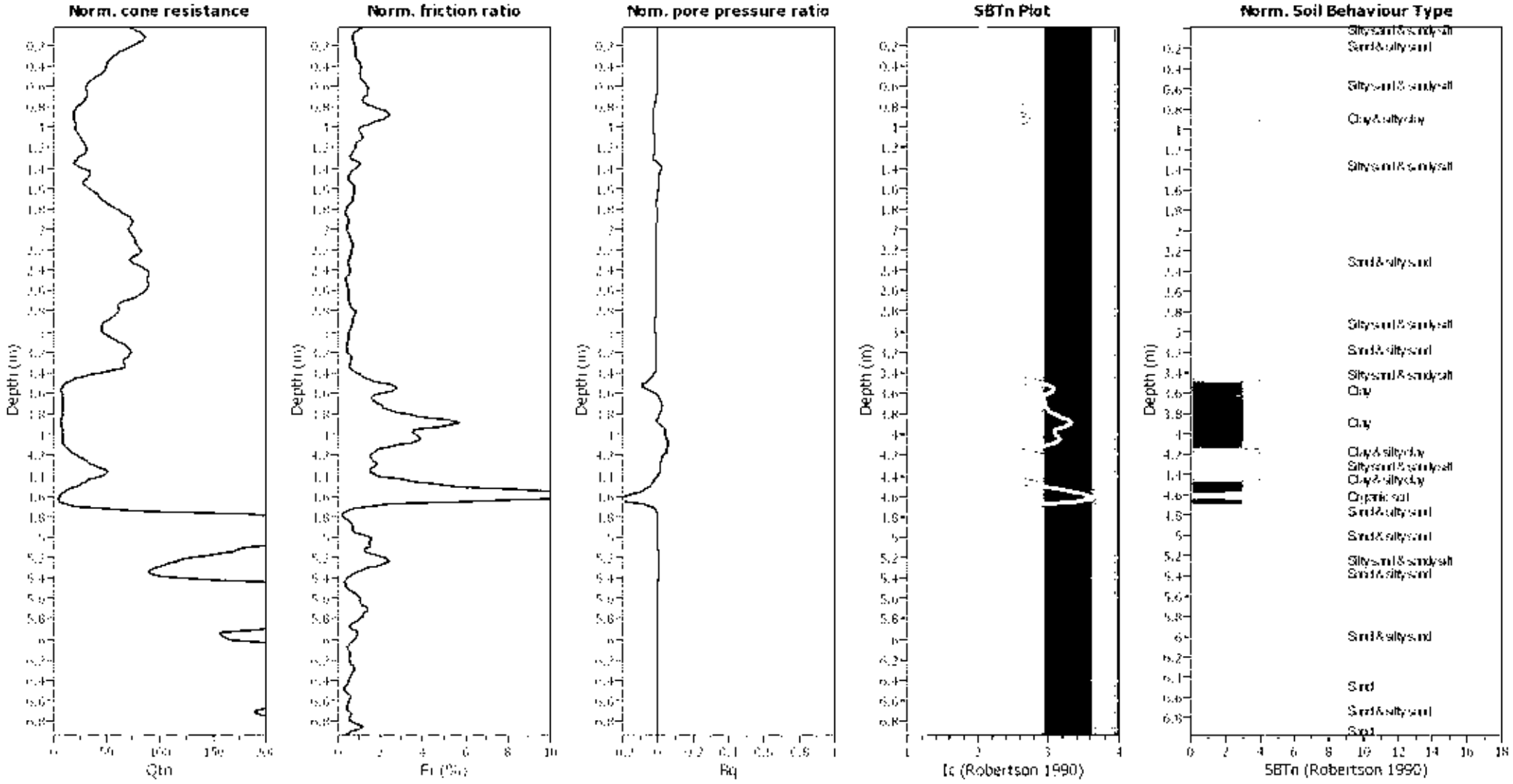
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



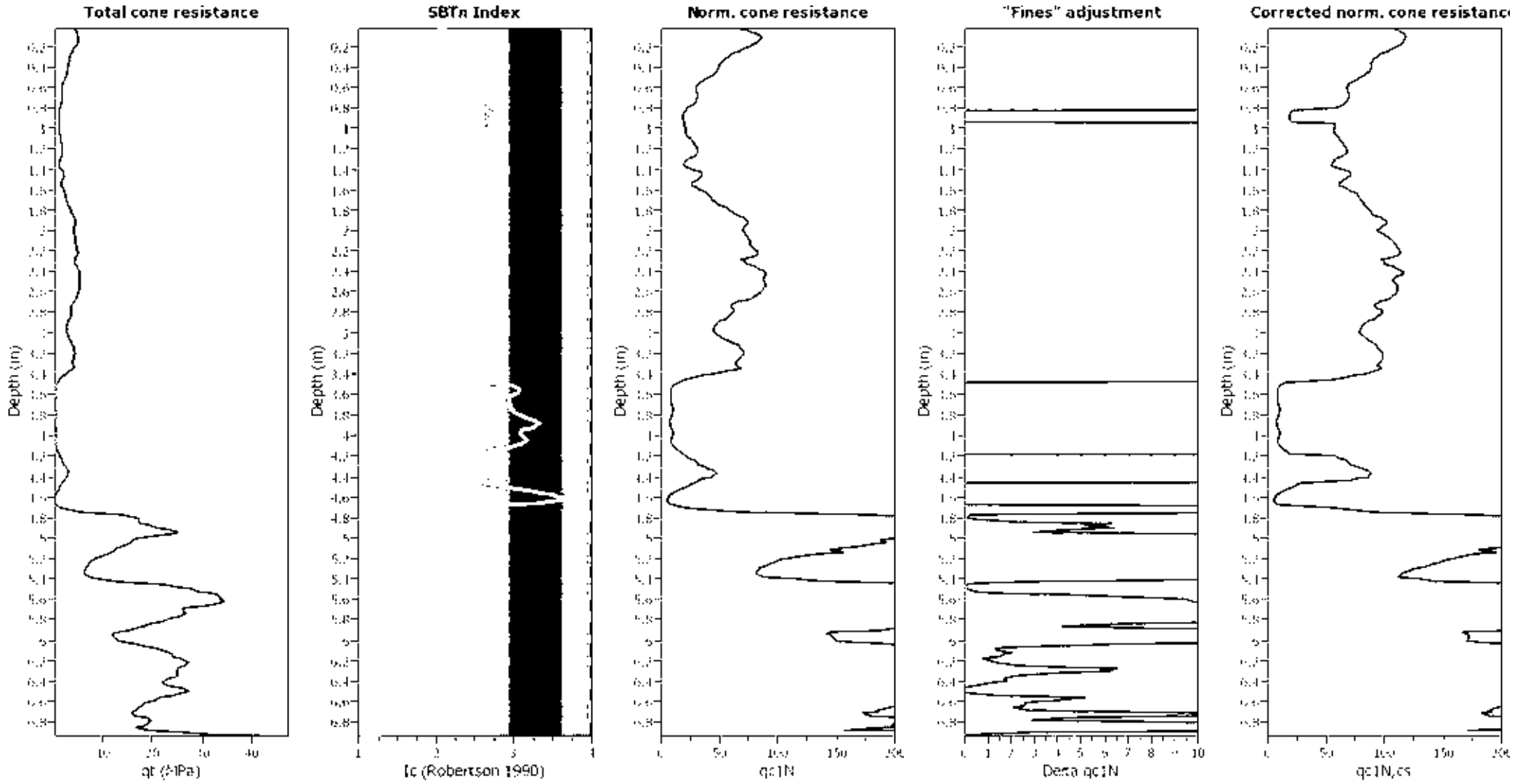
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

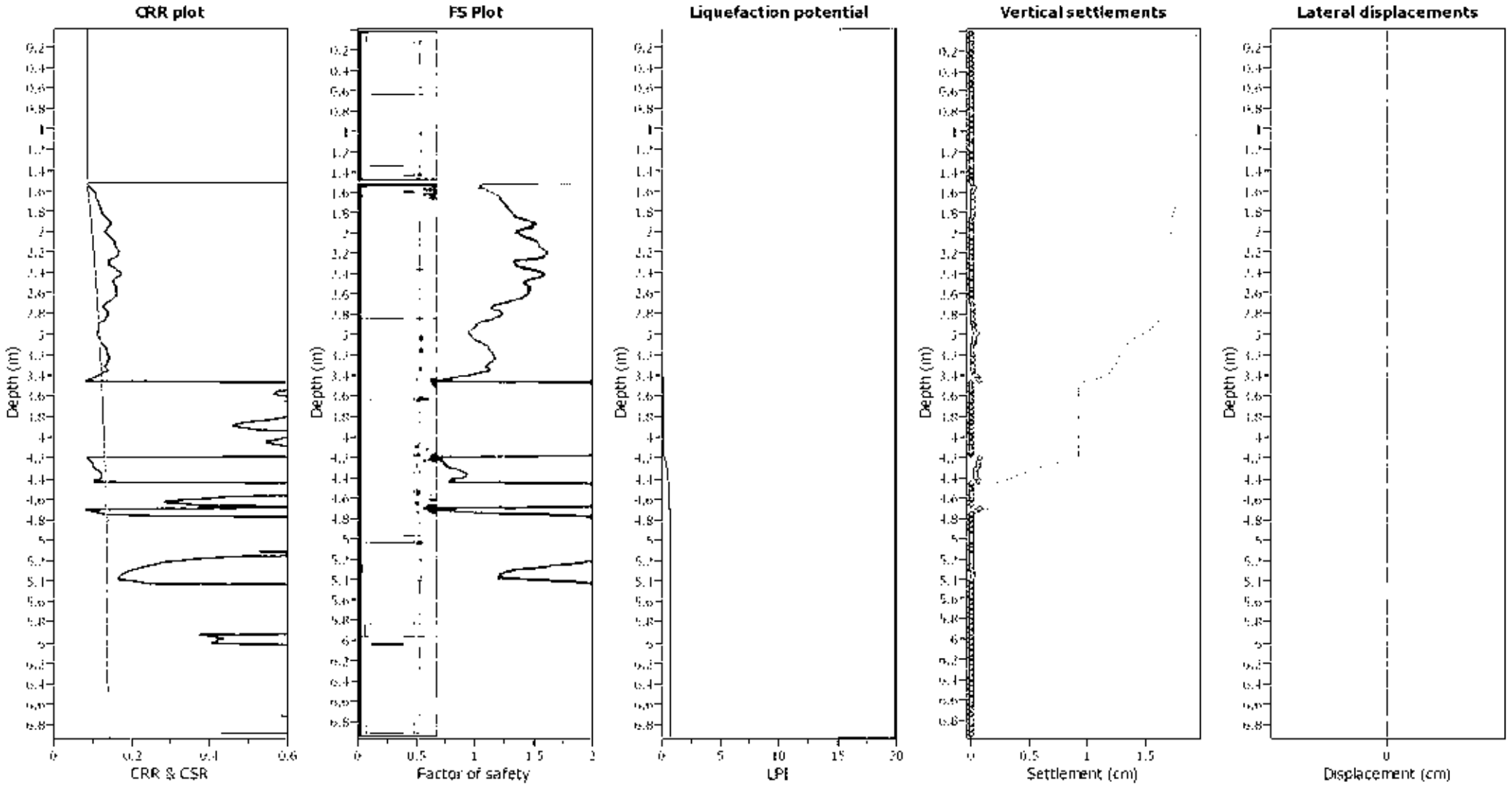
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

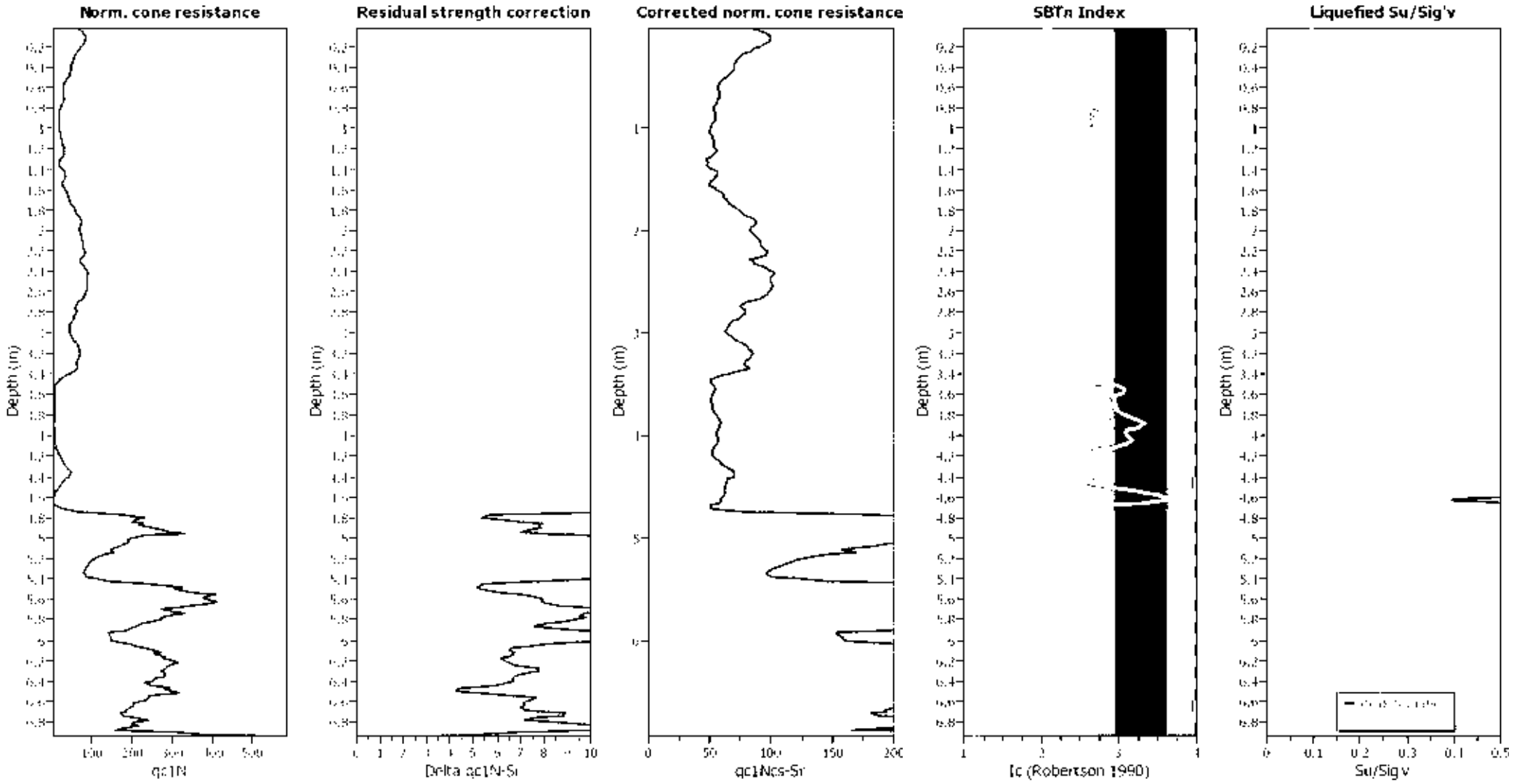
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

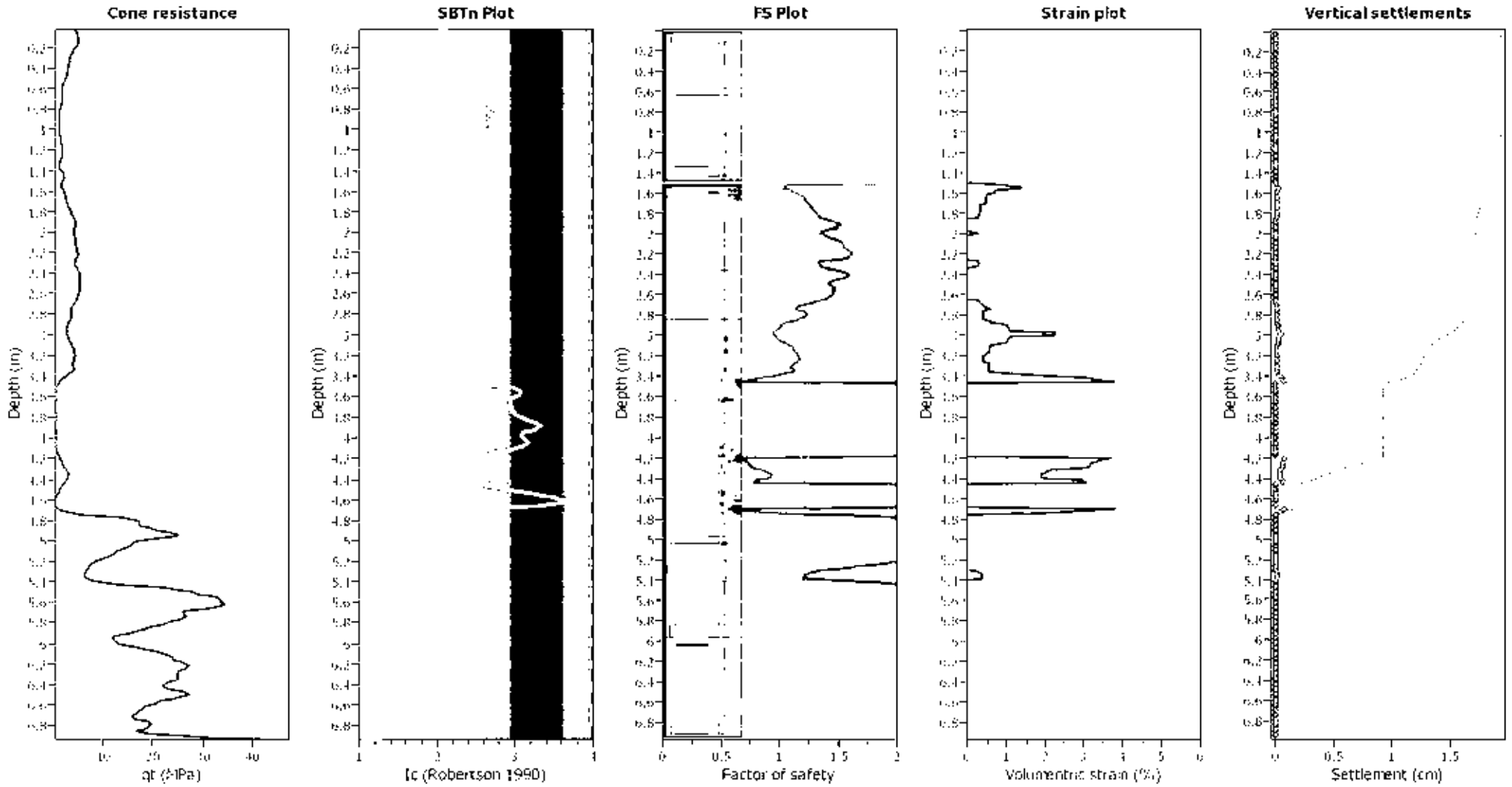
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

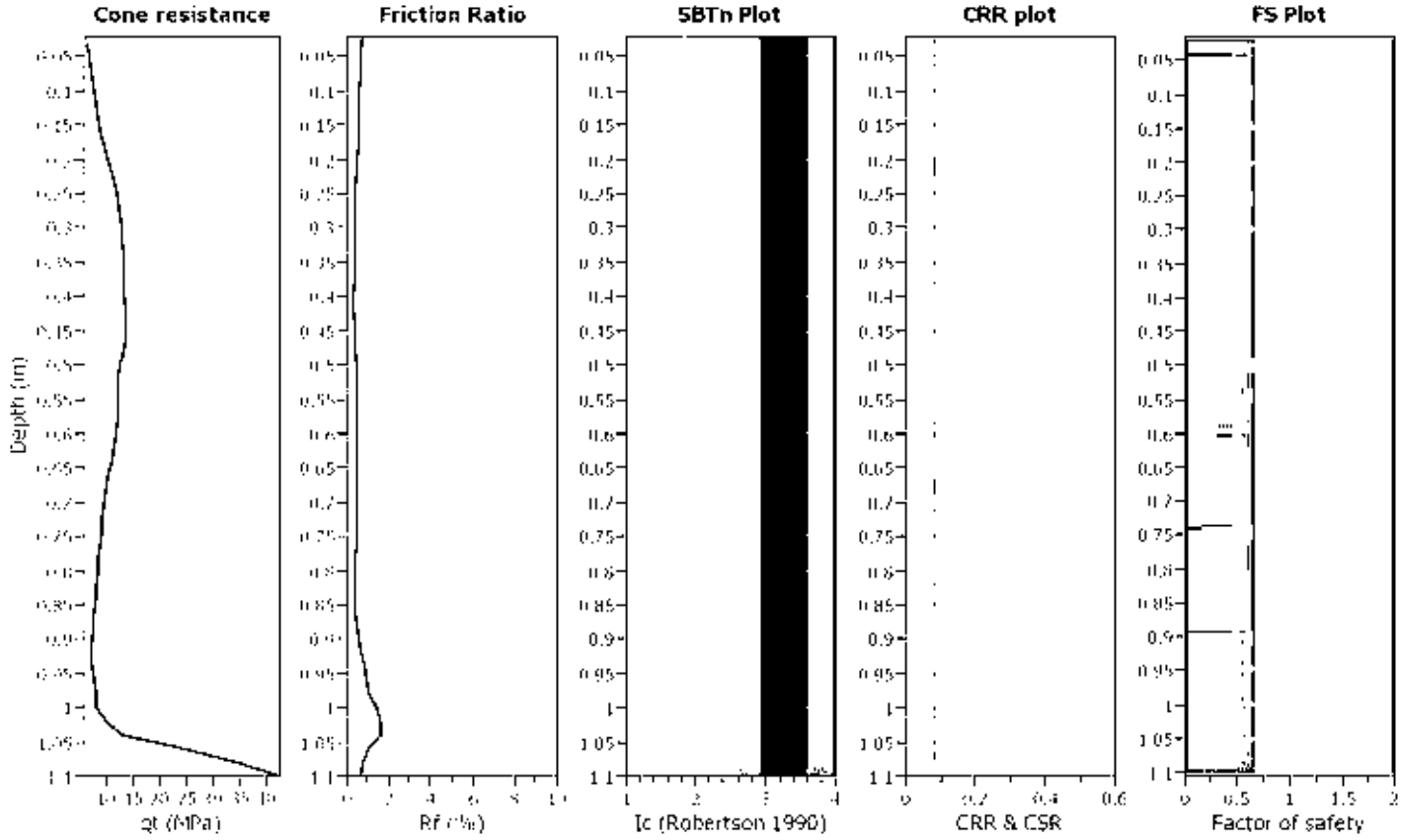
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

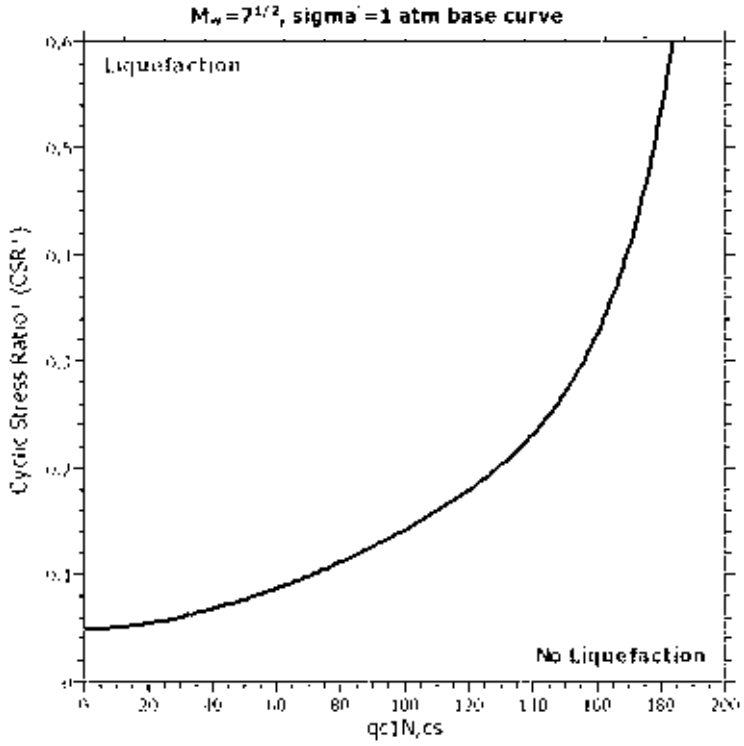
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

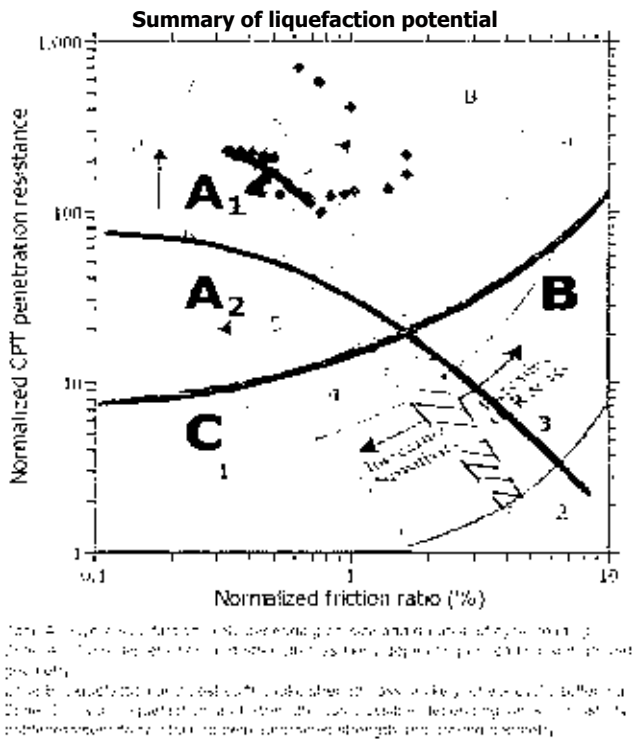
CPT file : CPT21_30GloversRd

Input parameters and analysis data

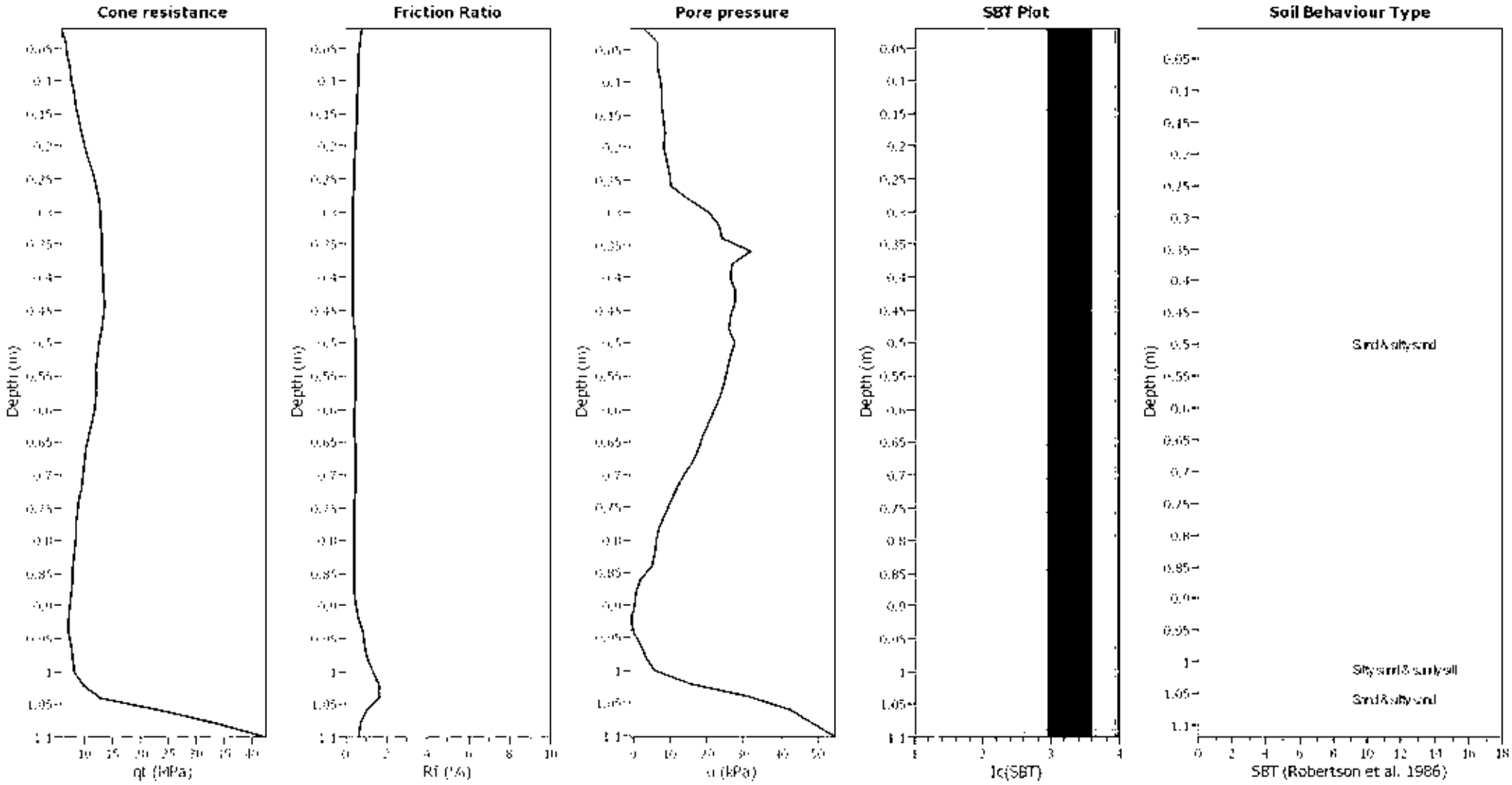
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



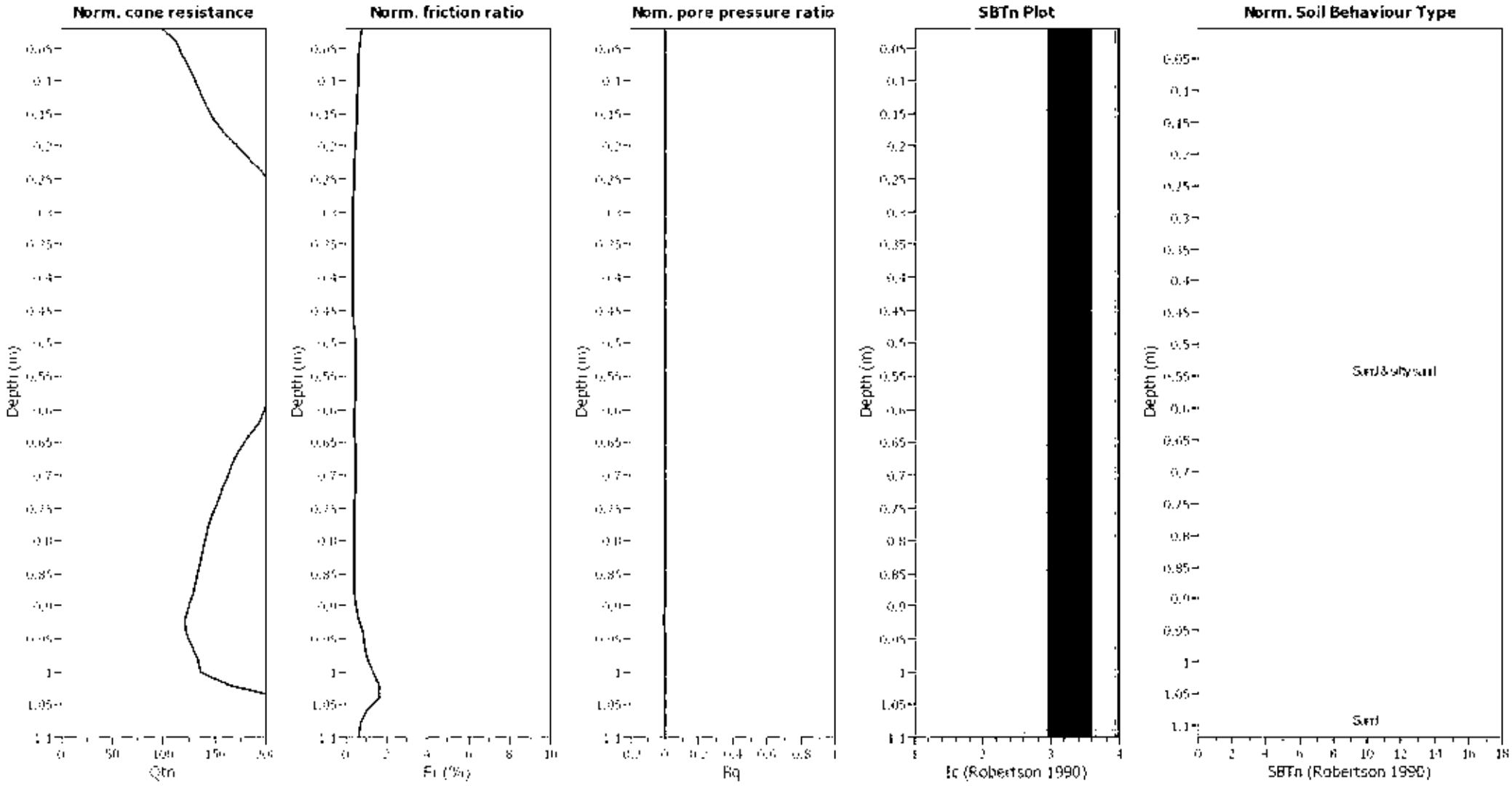
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



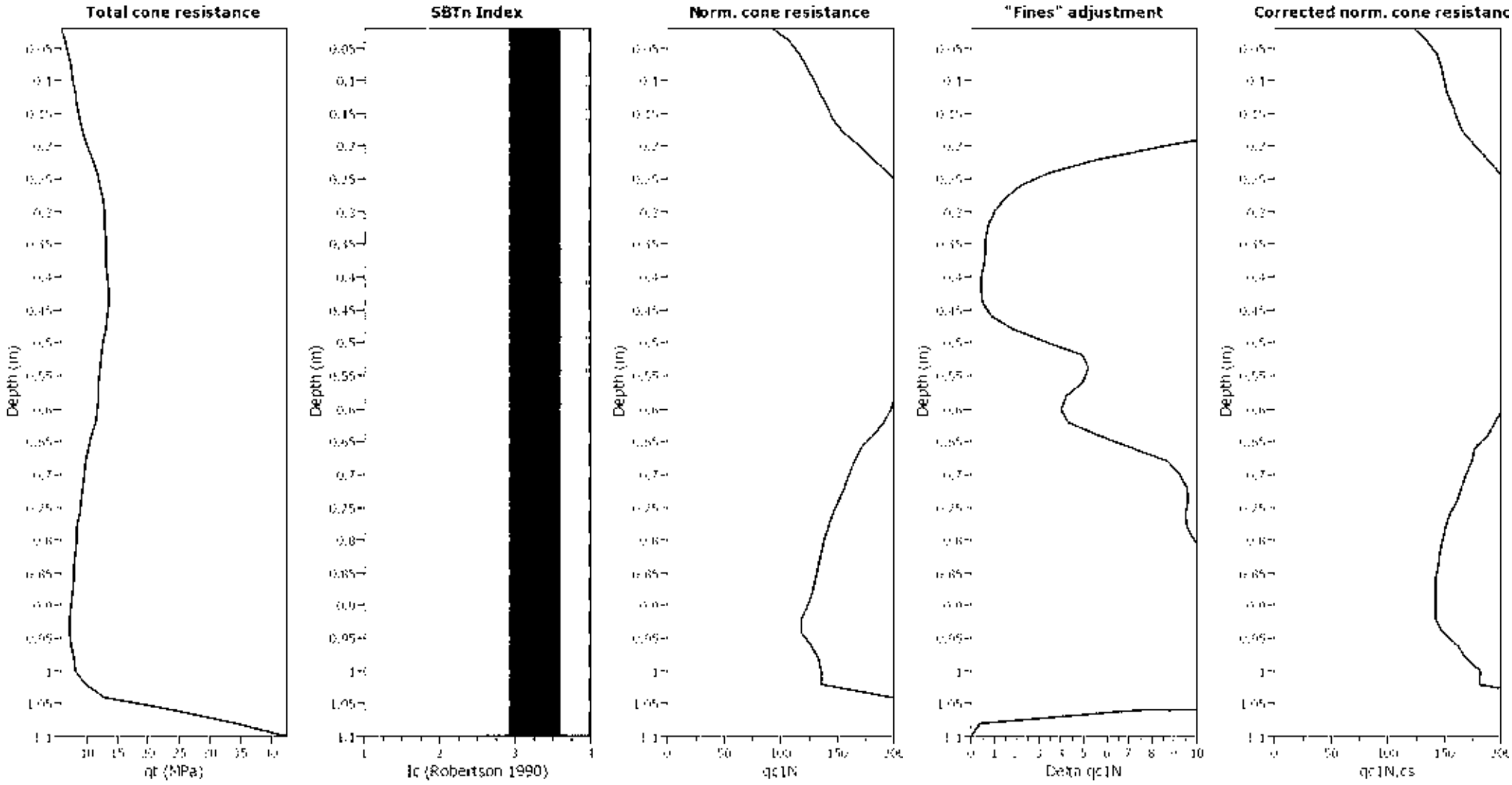
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

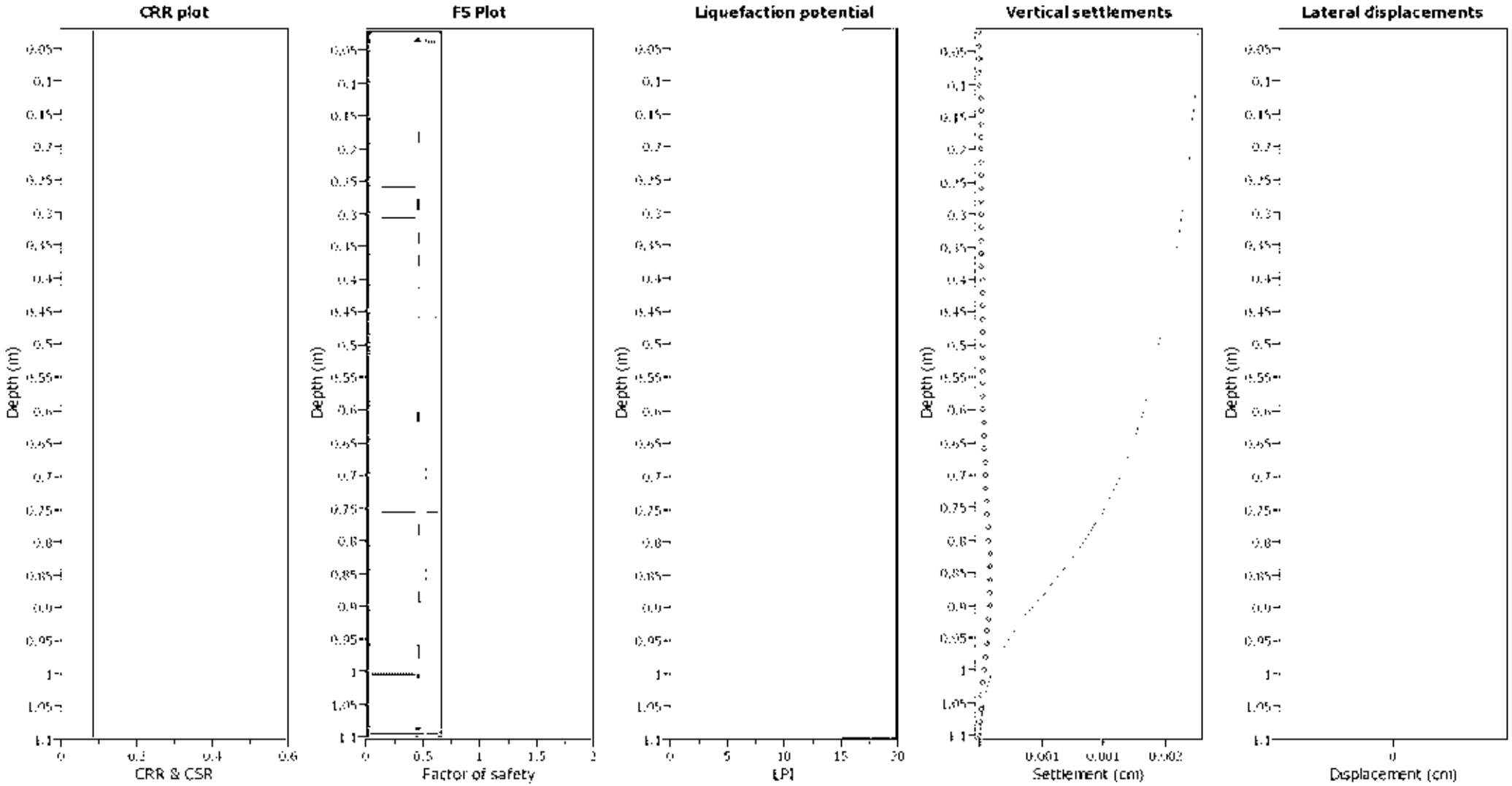
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

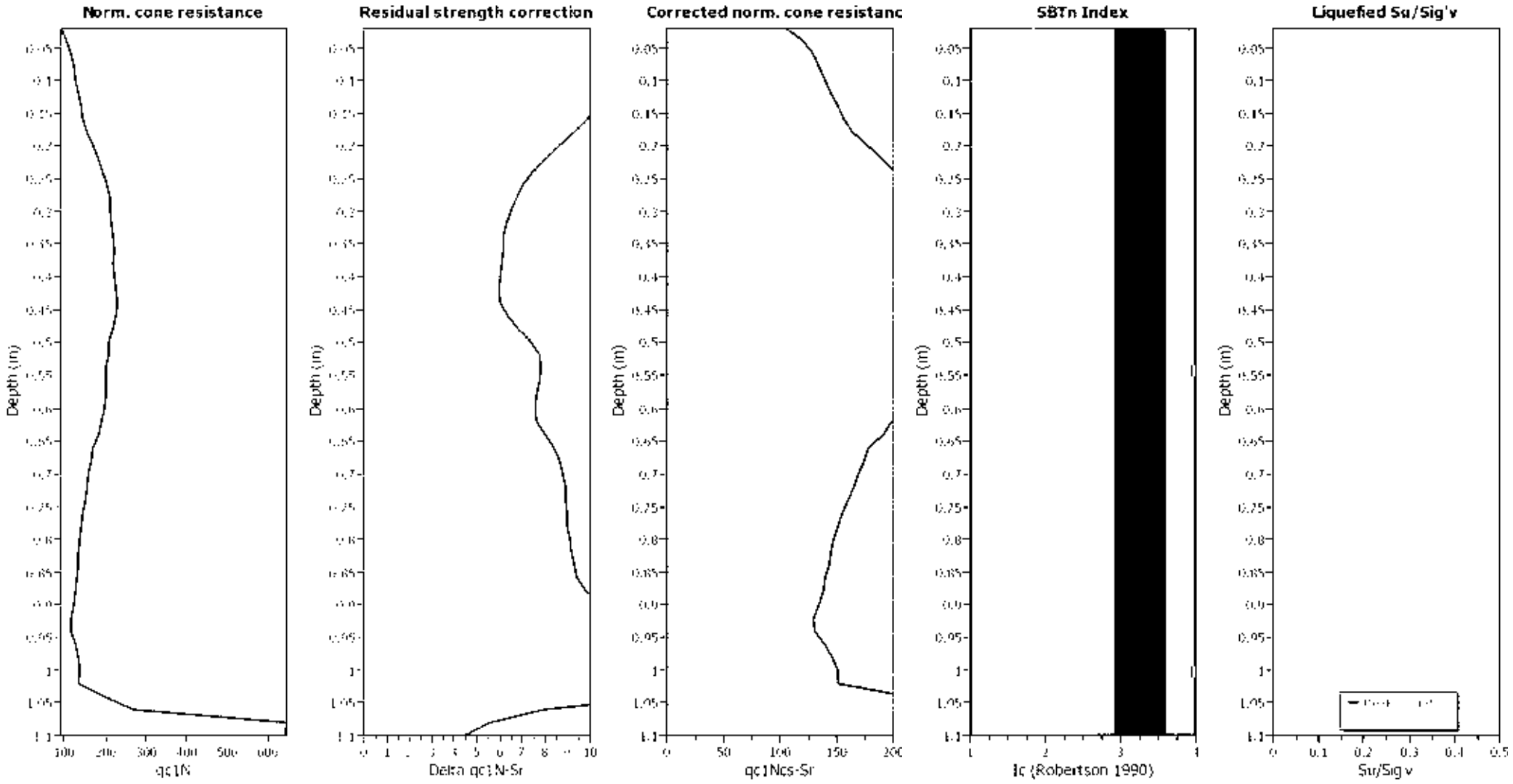
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

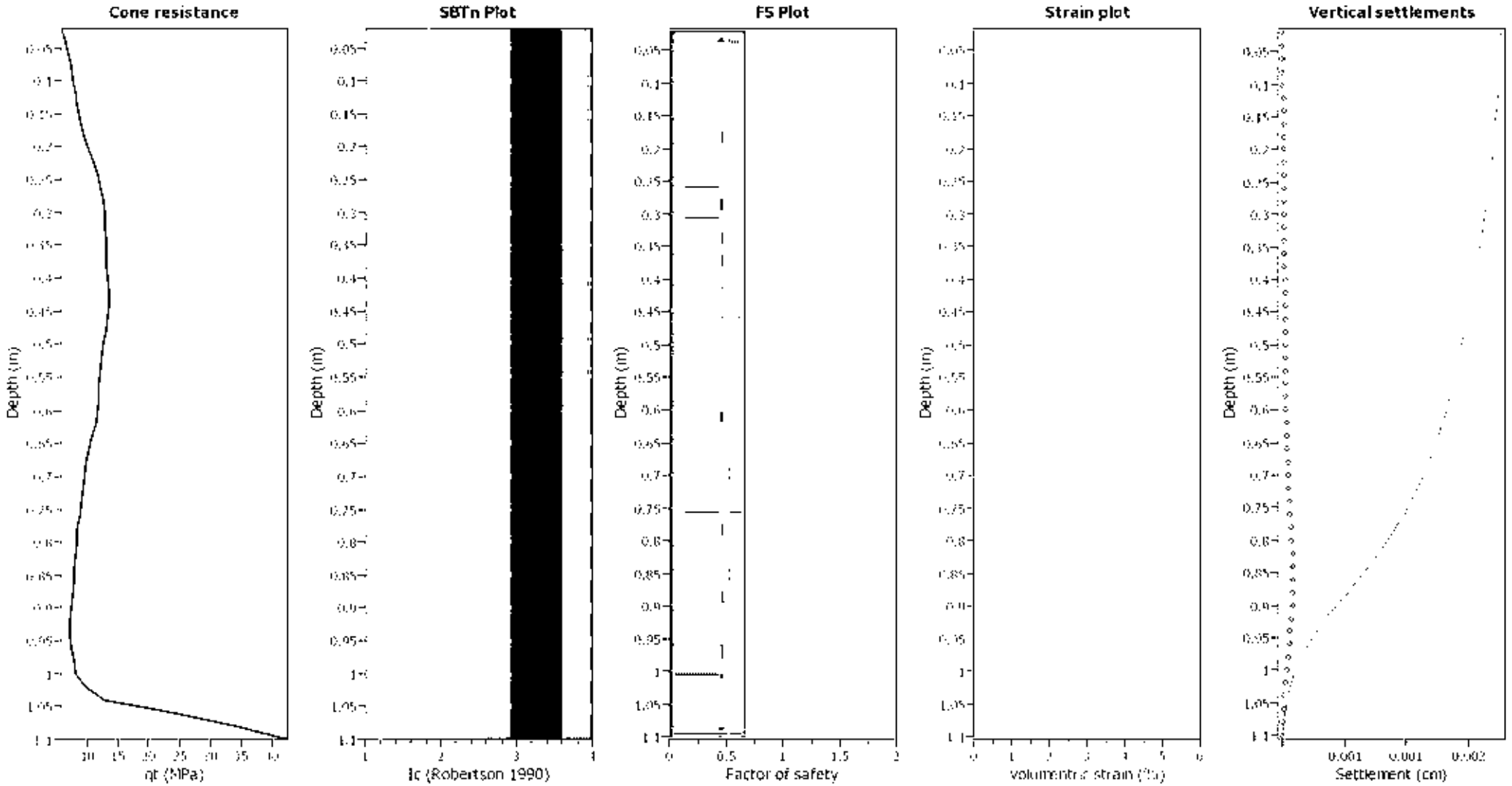
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

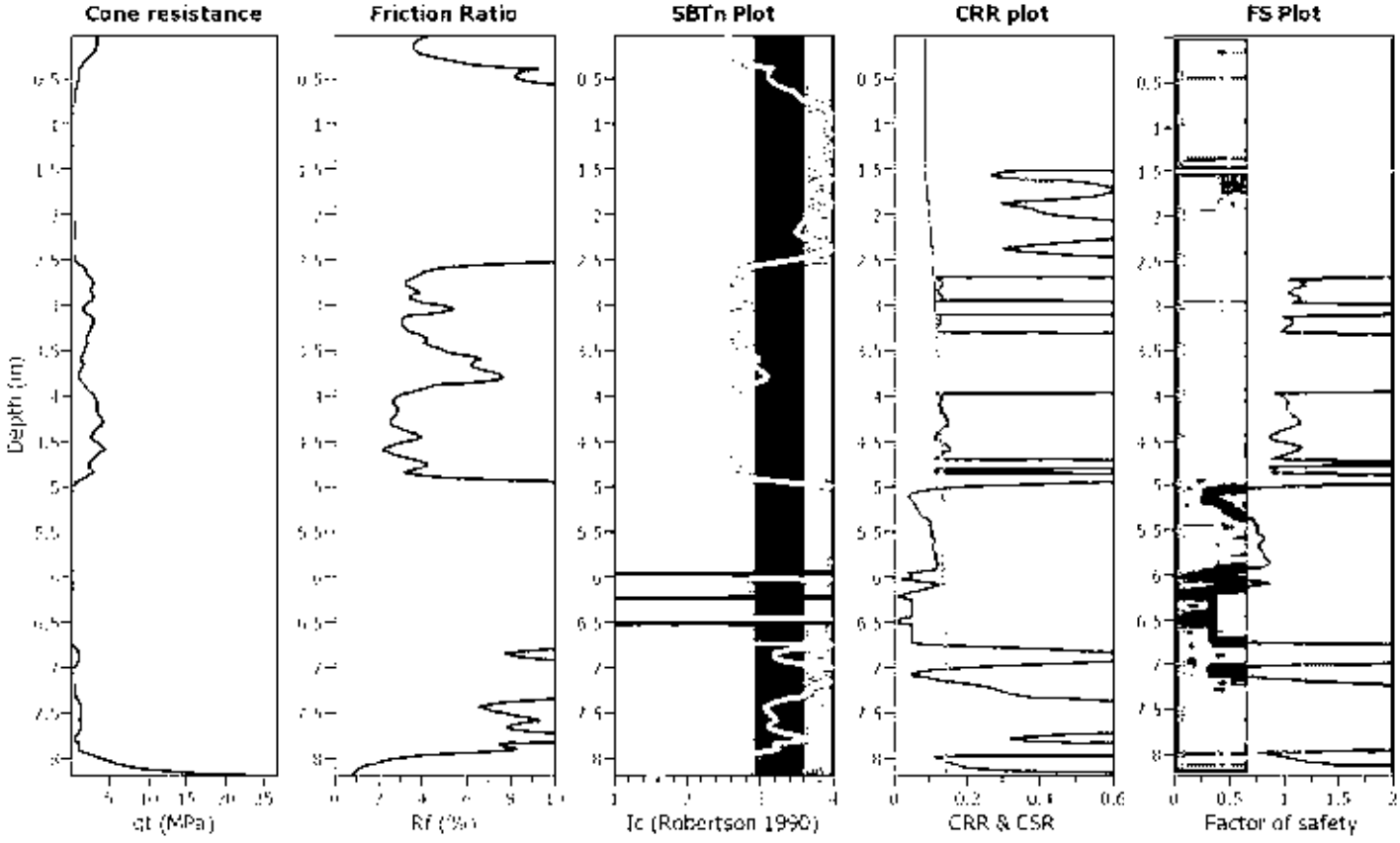
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

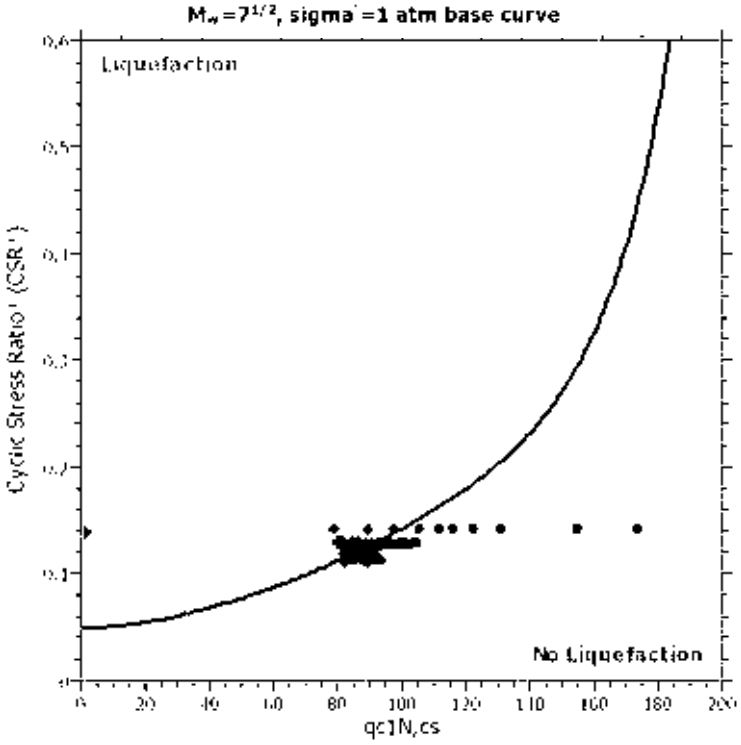
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

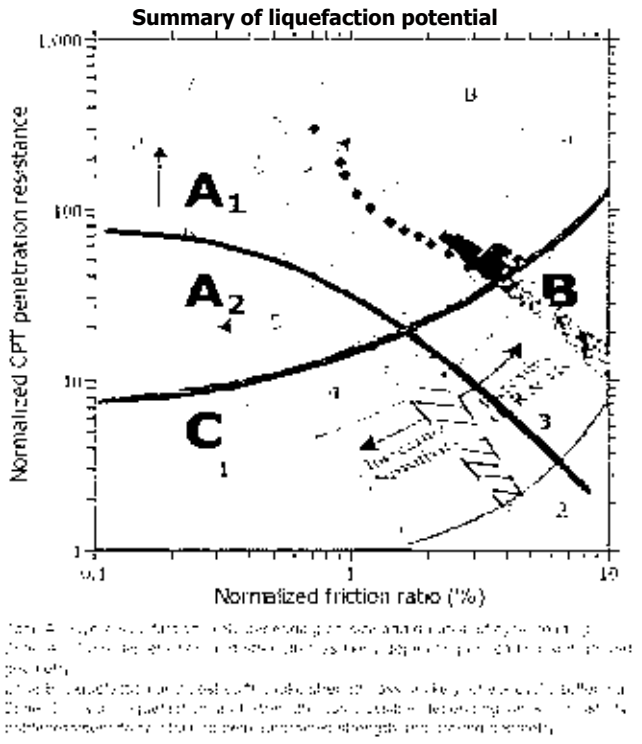
CPT file : CPT22_117KennedysBushRoad

Input parameters and analysis data

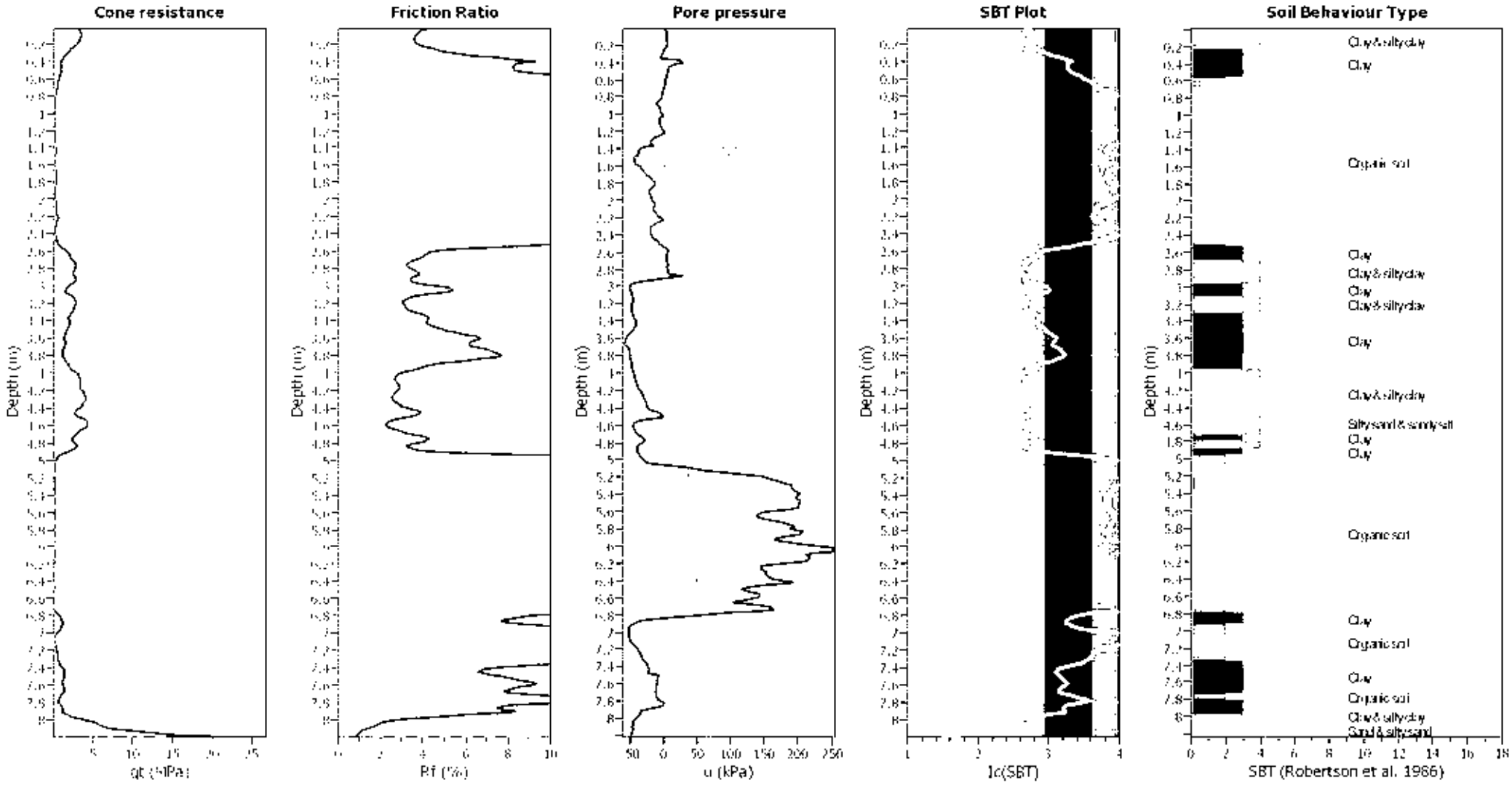
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



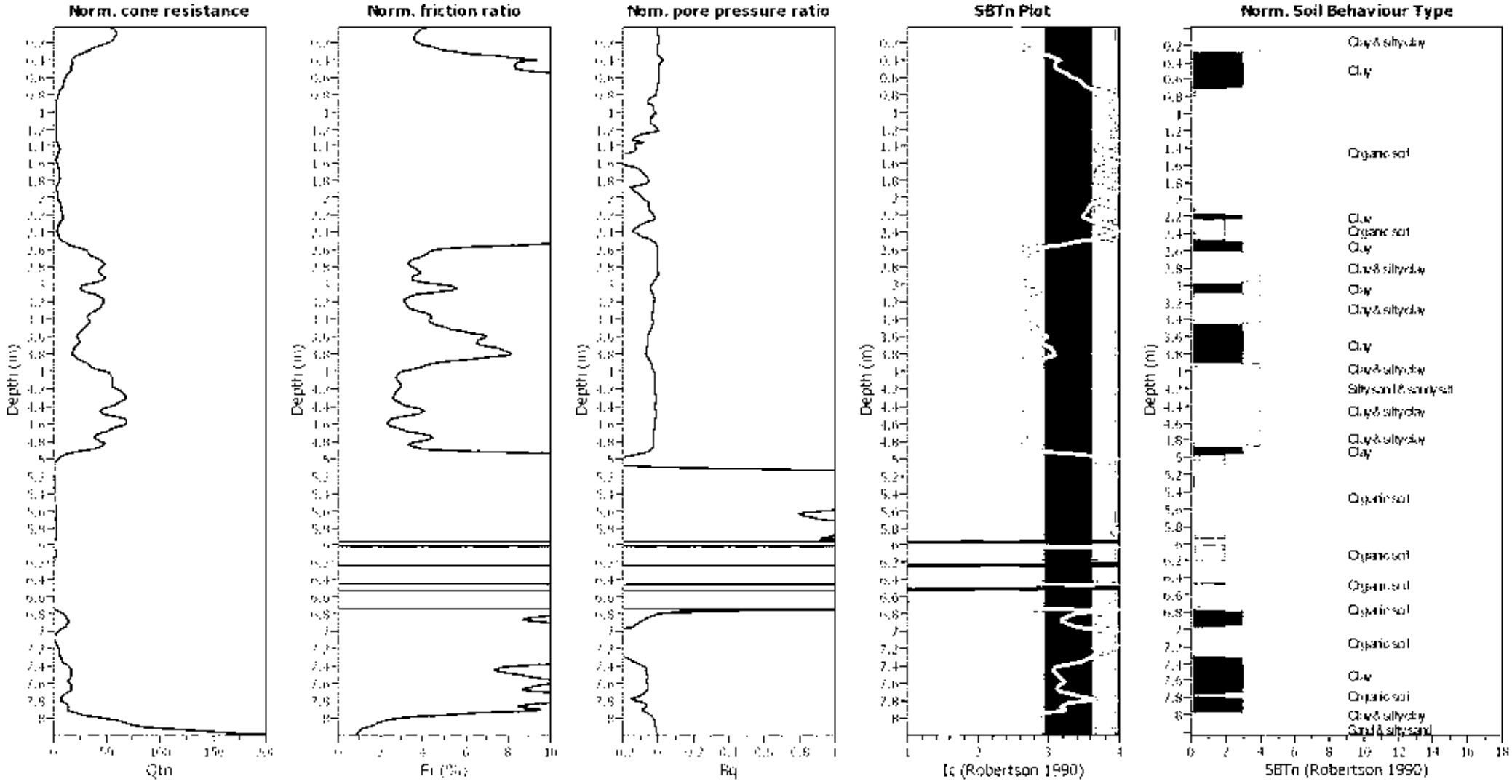
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



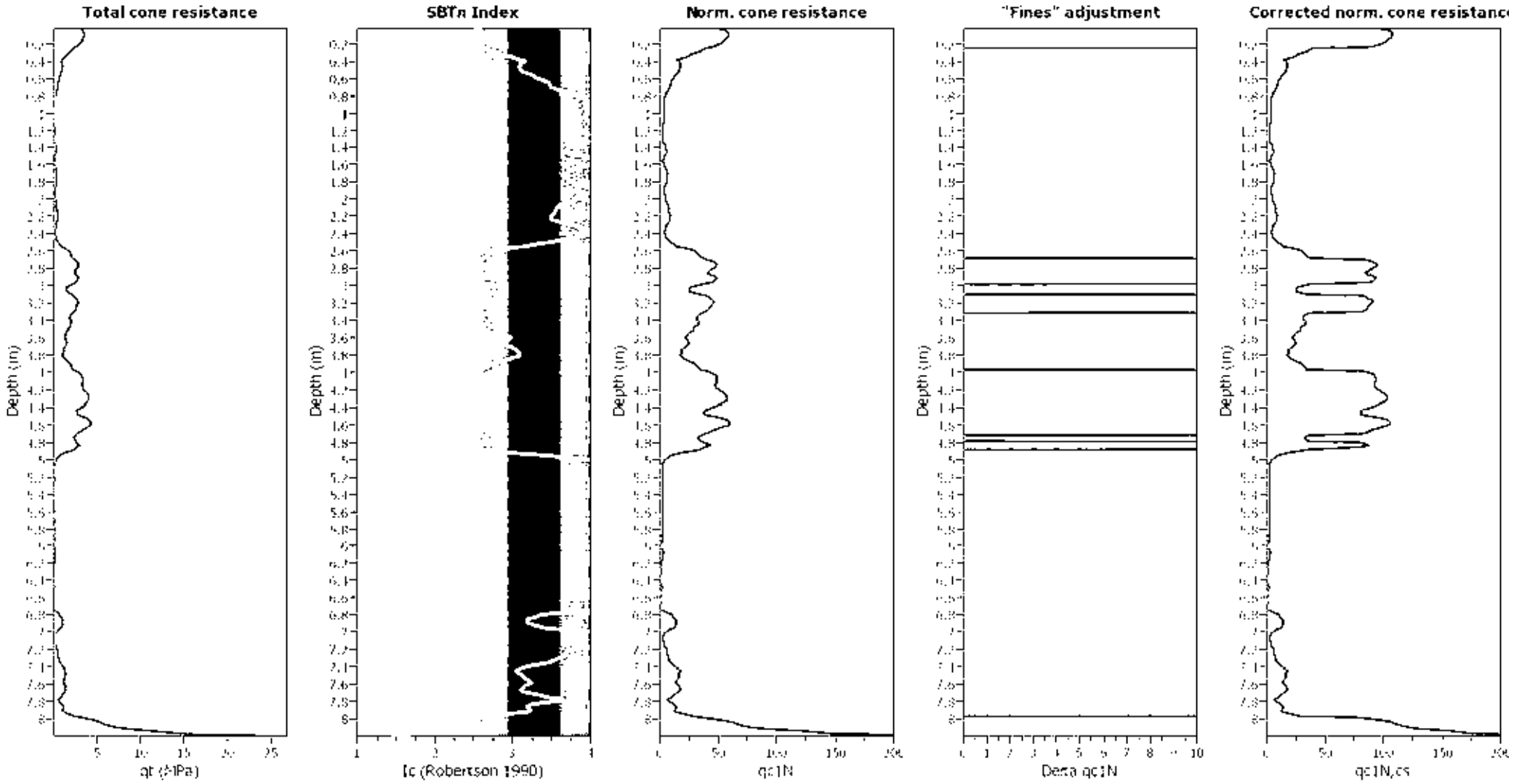
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

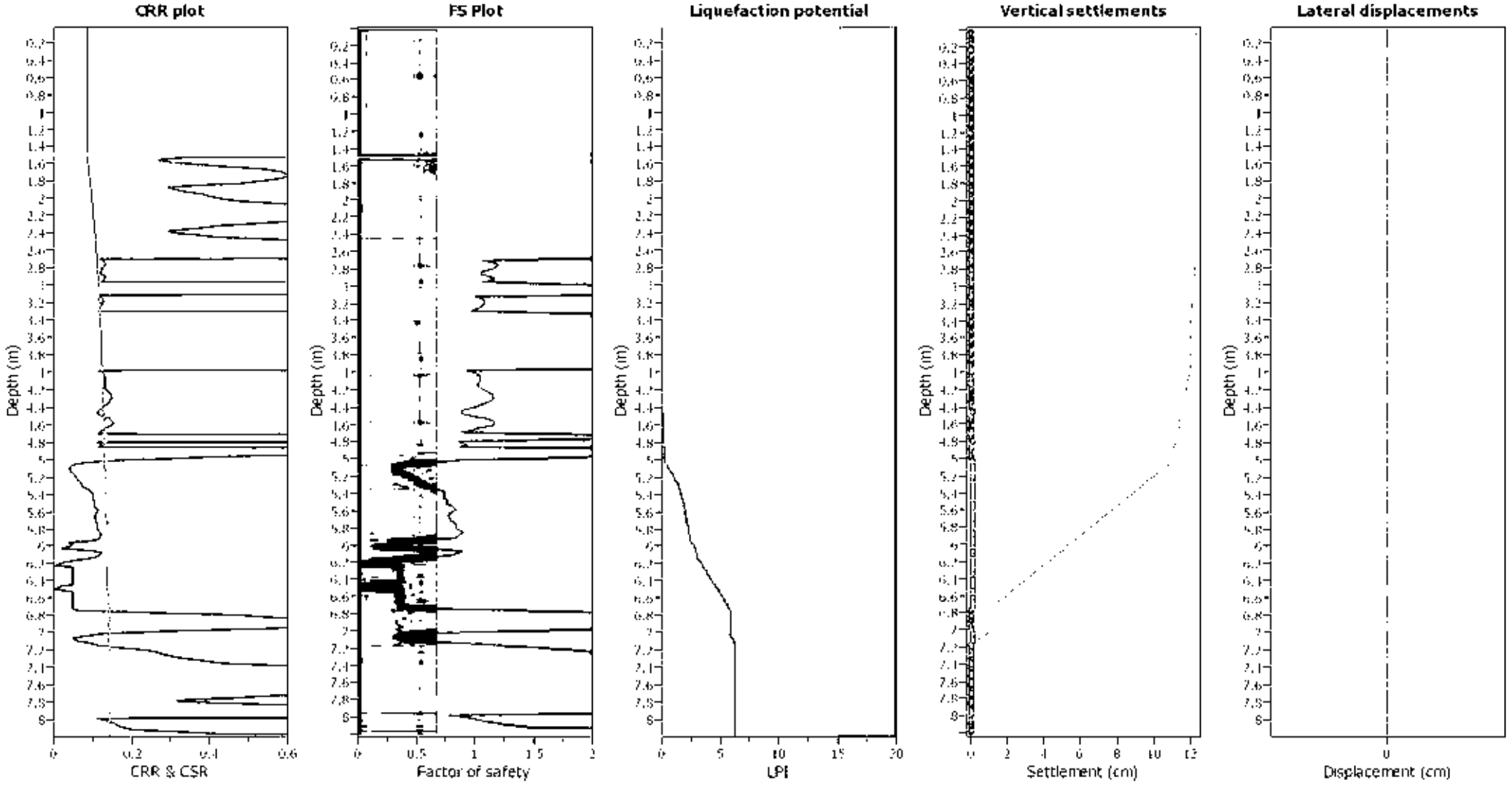
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

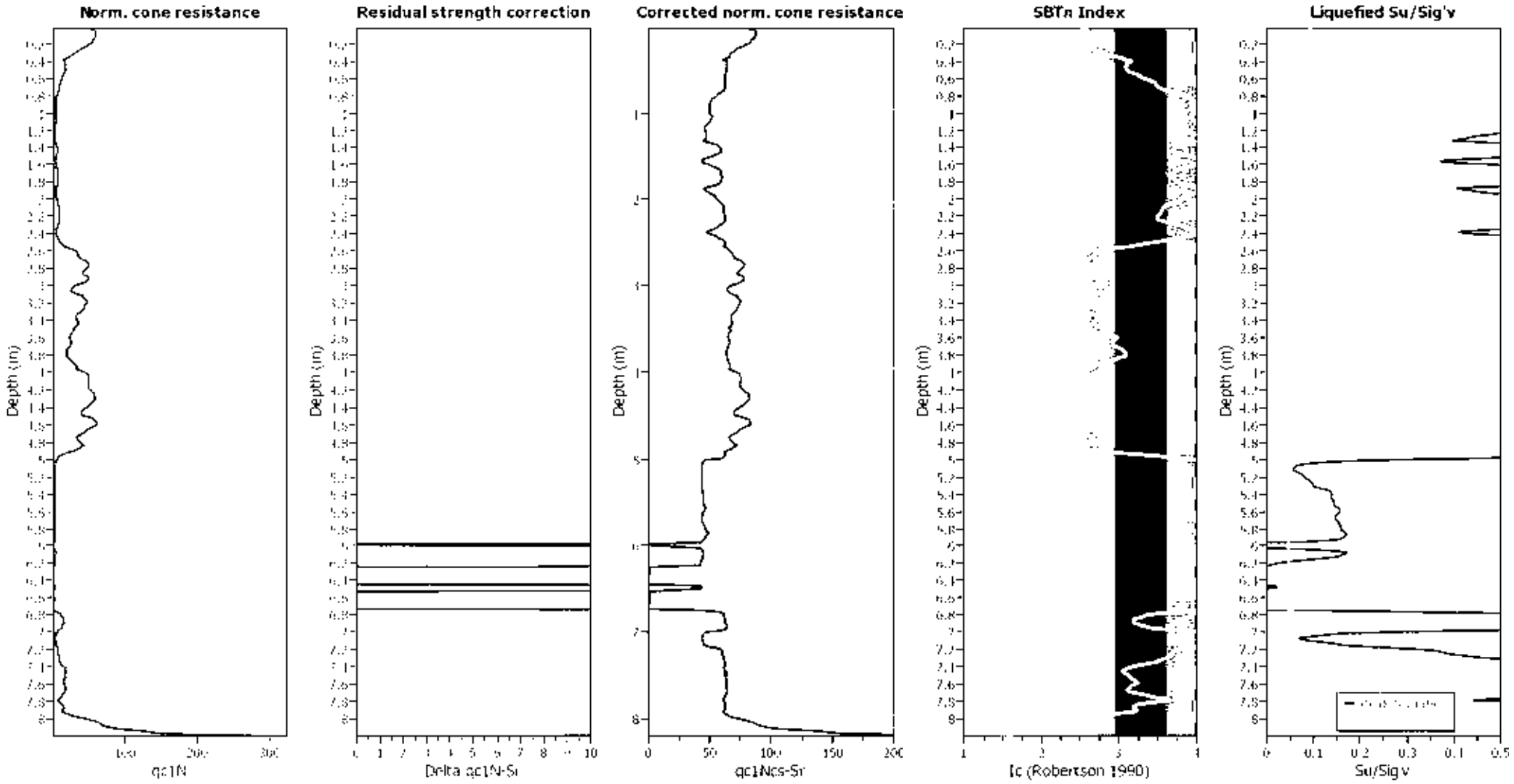
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

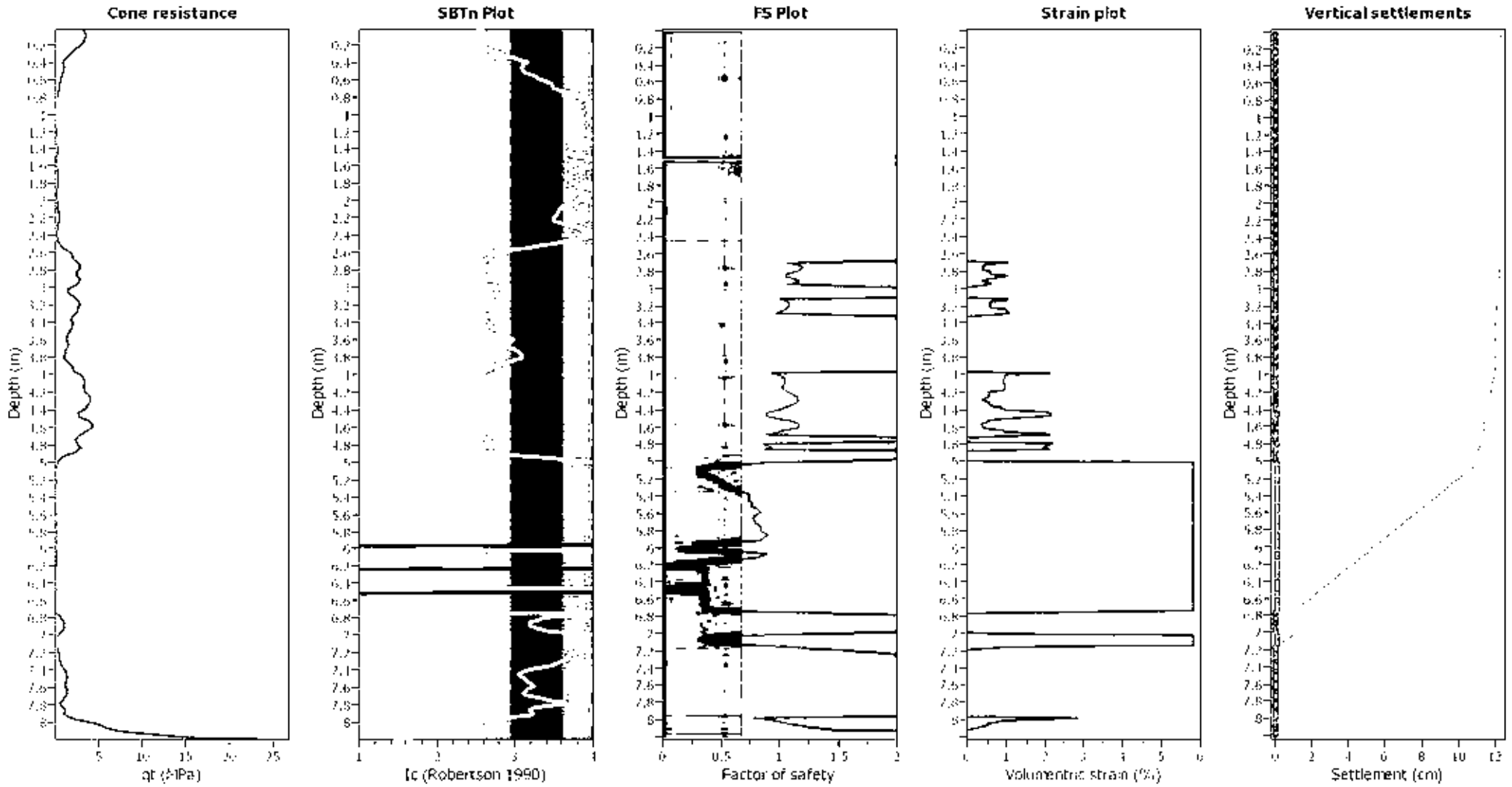
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

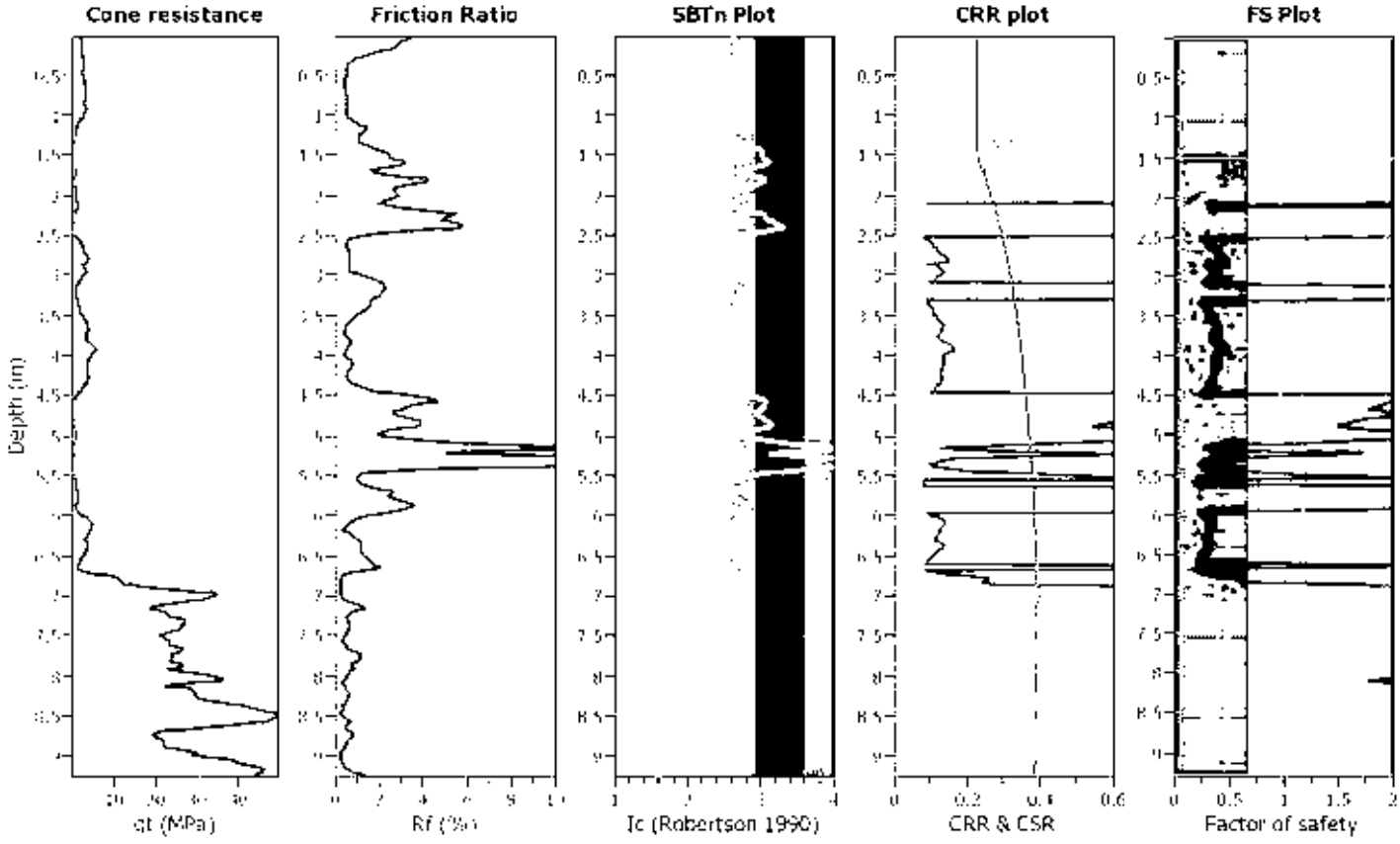
Beca Ltd
Geotechnical Engineers
www.beca.com

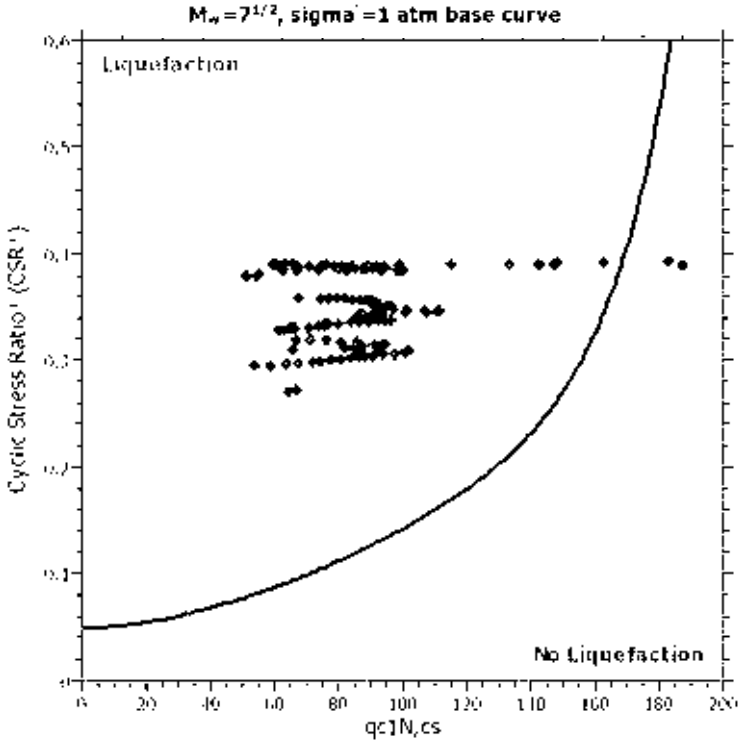
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

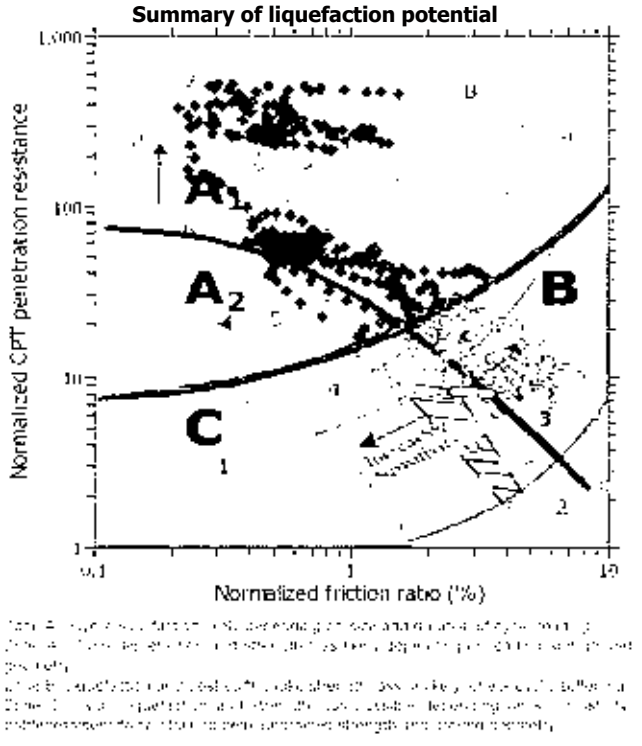
CPT file : CPT17_511HalswellRd

Input parameters and analysis data

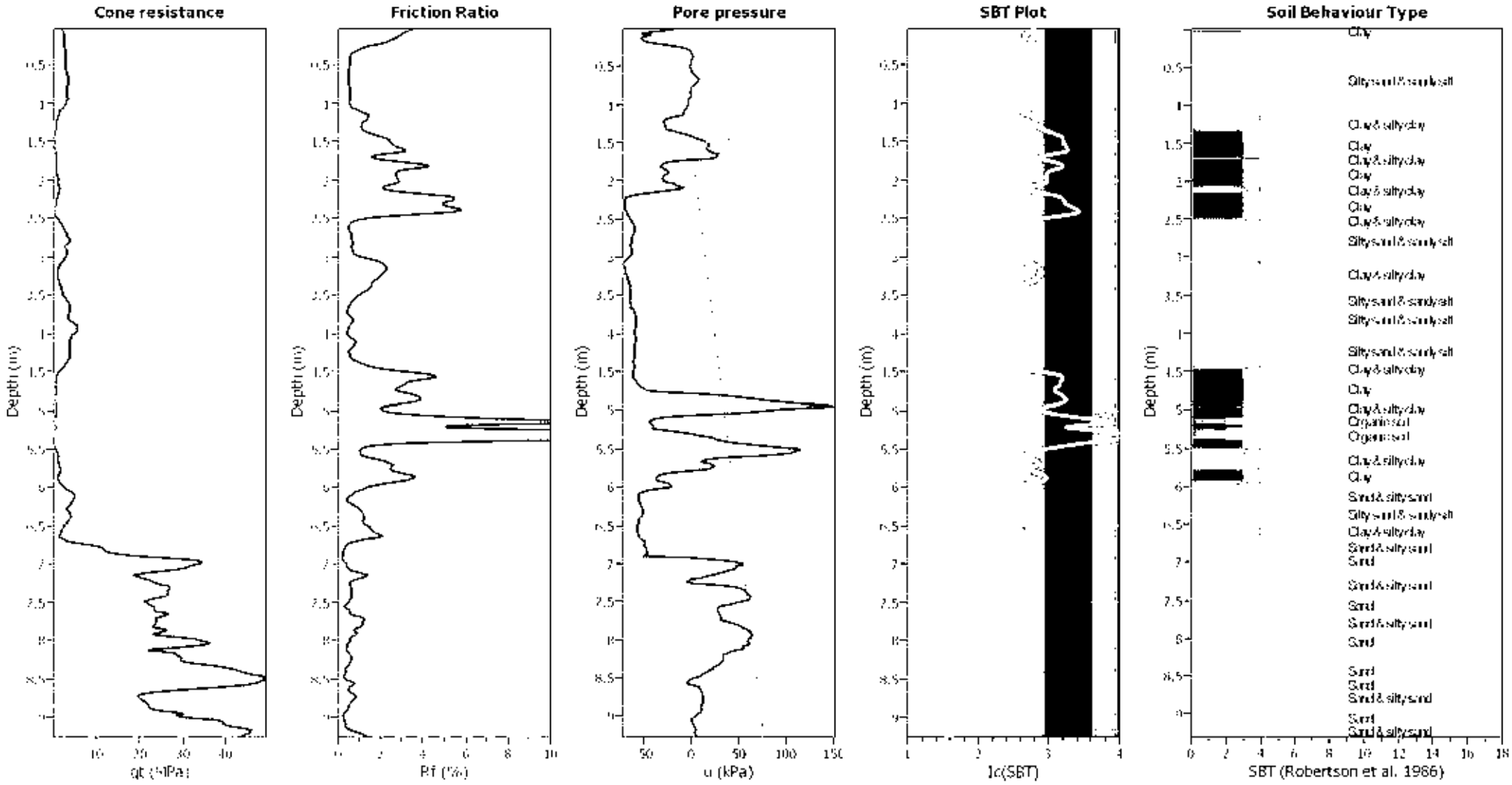
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



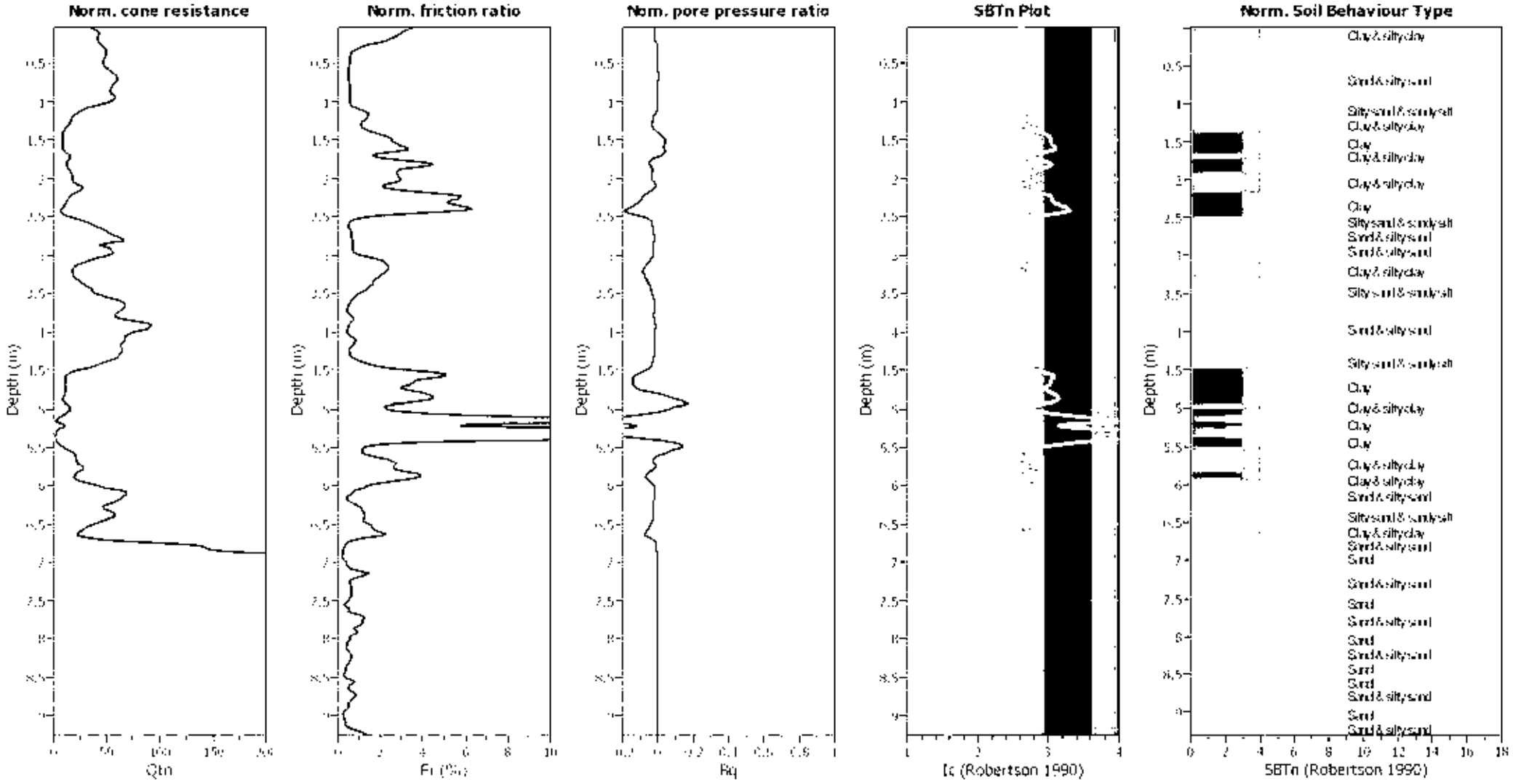
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



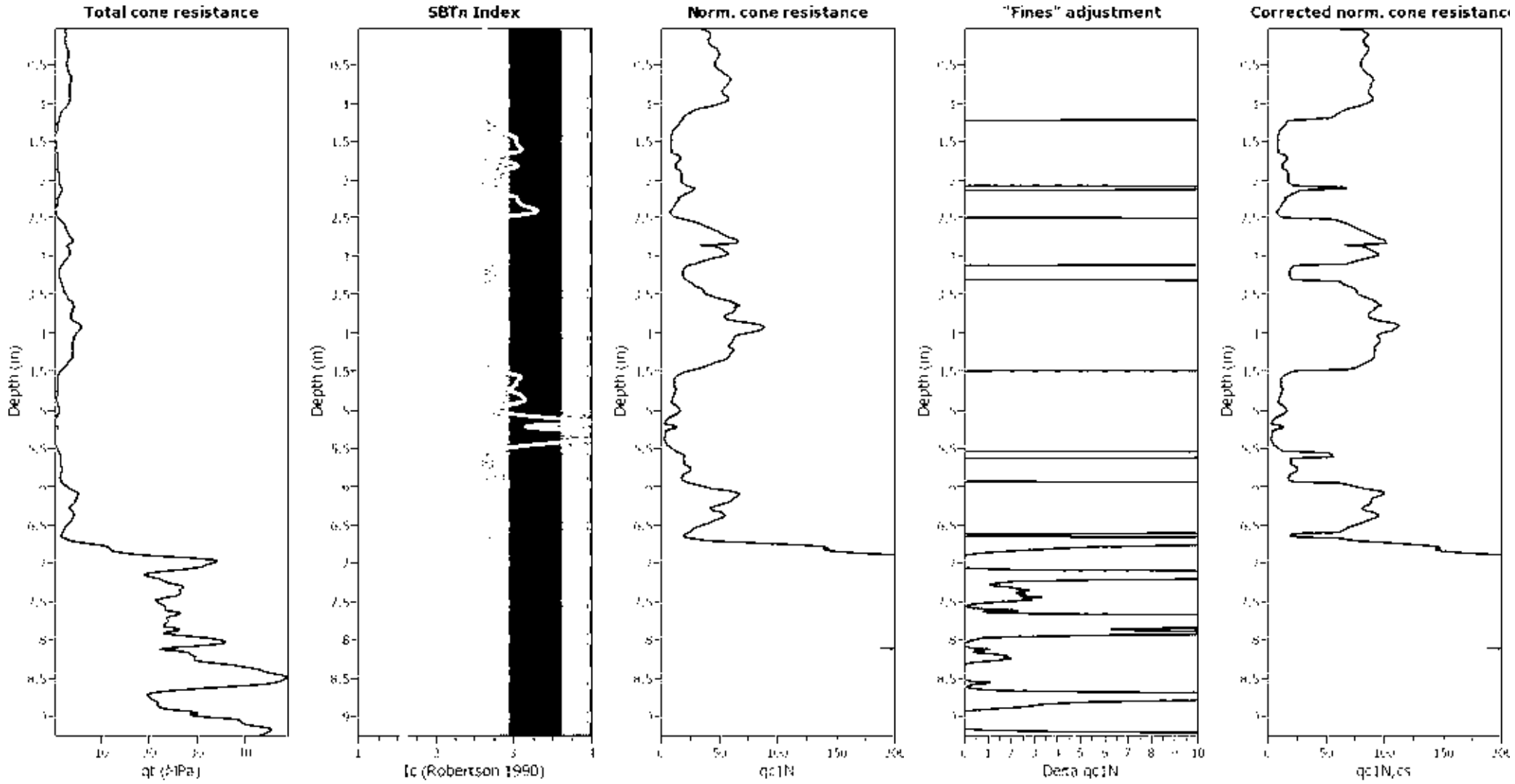
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

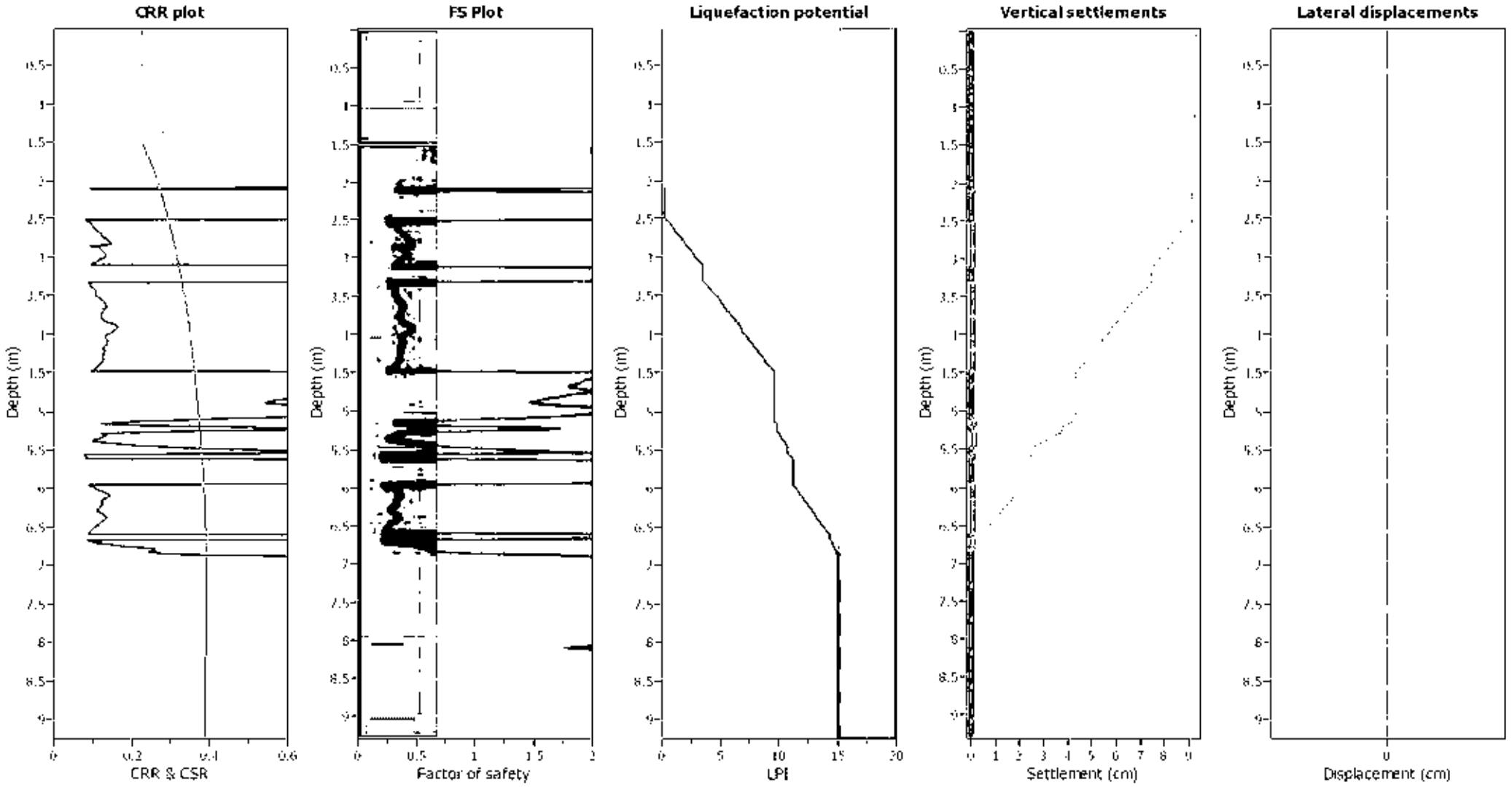
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

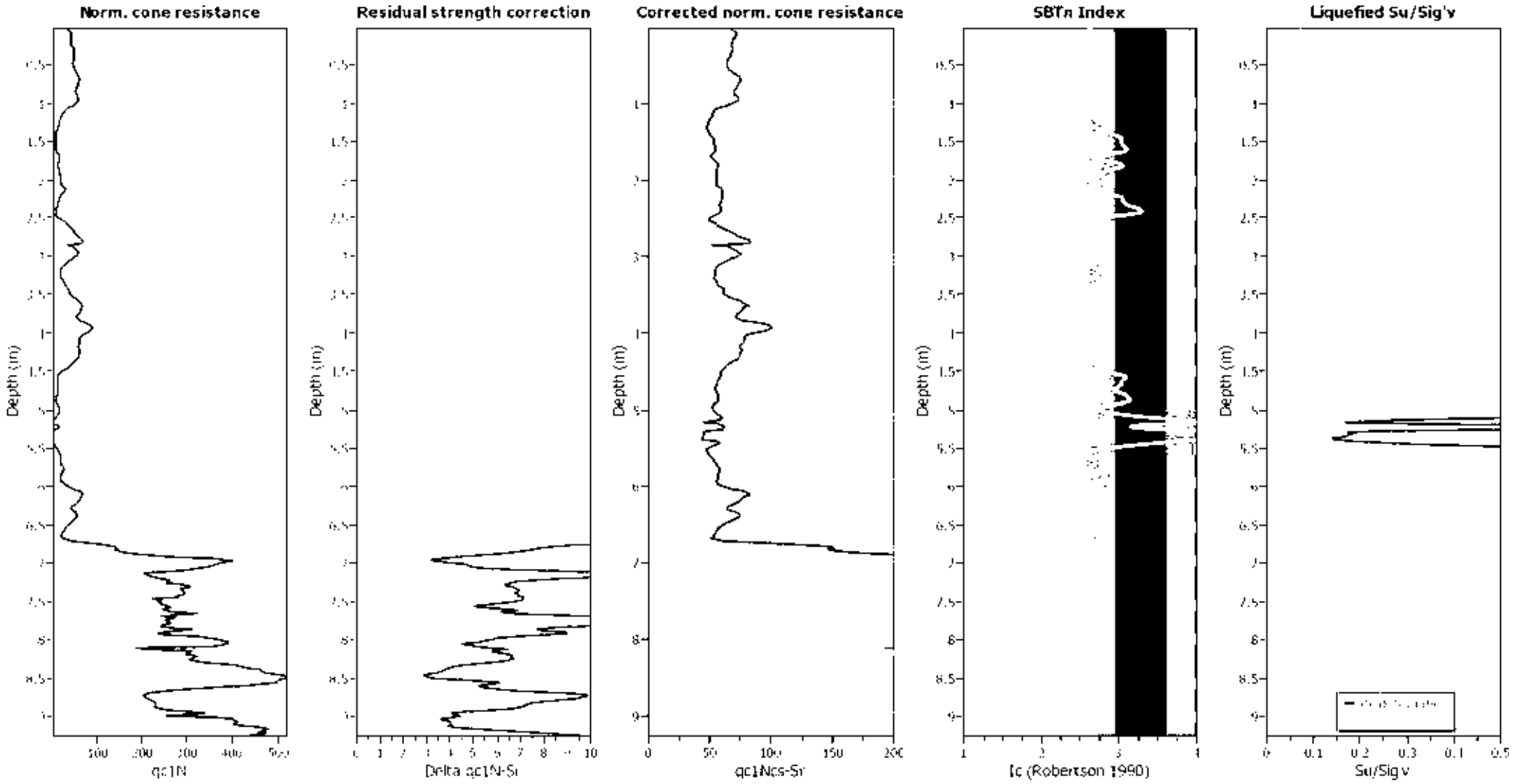
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

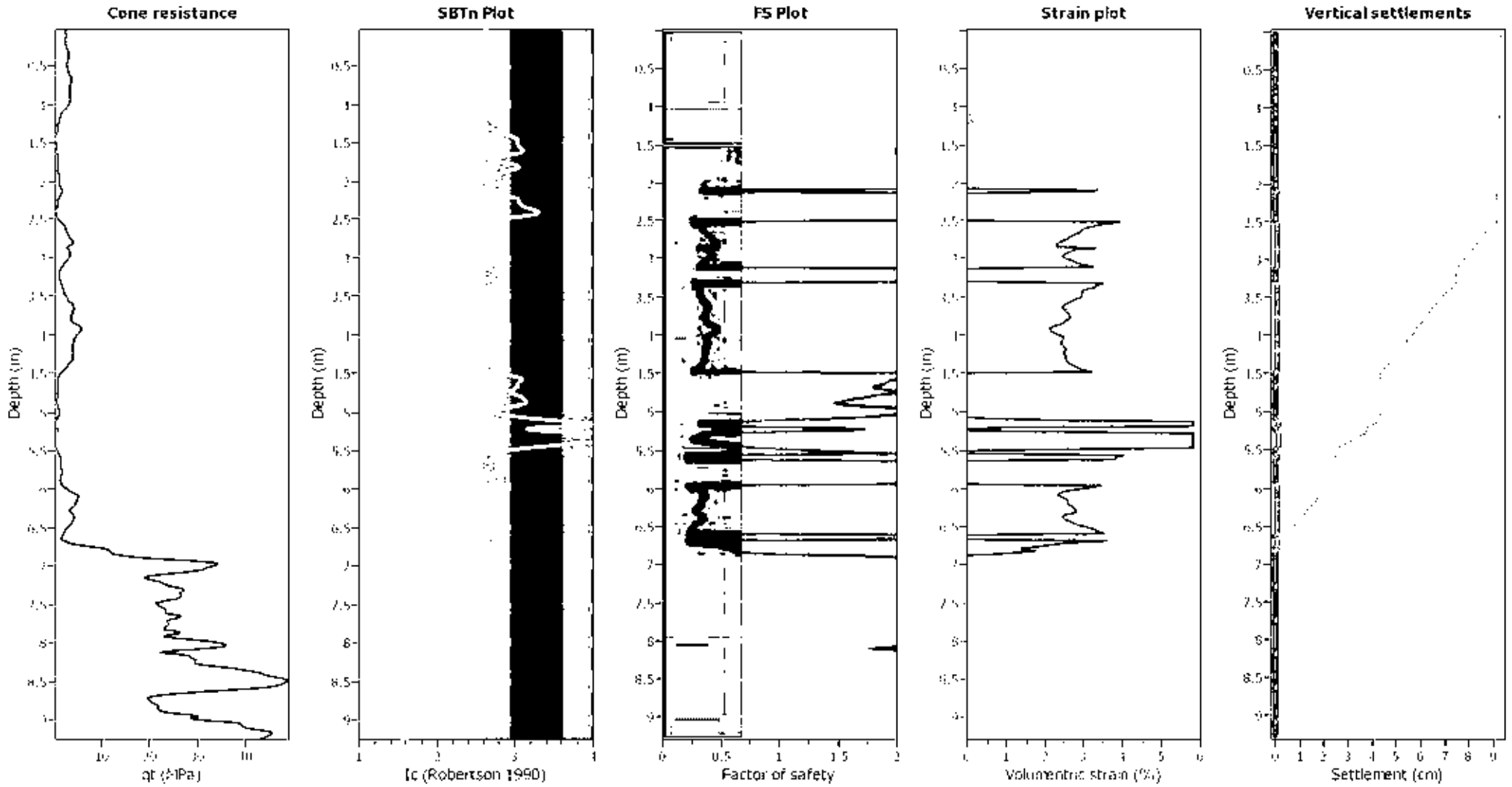
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

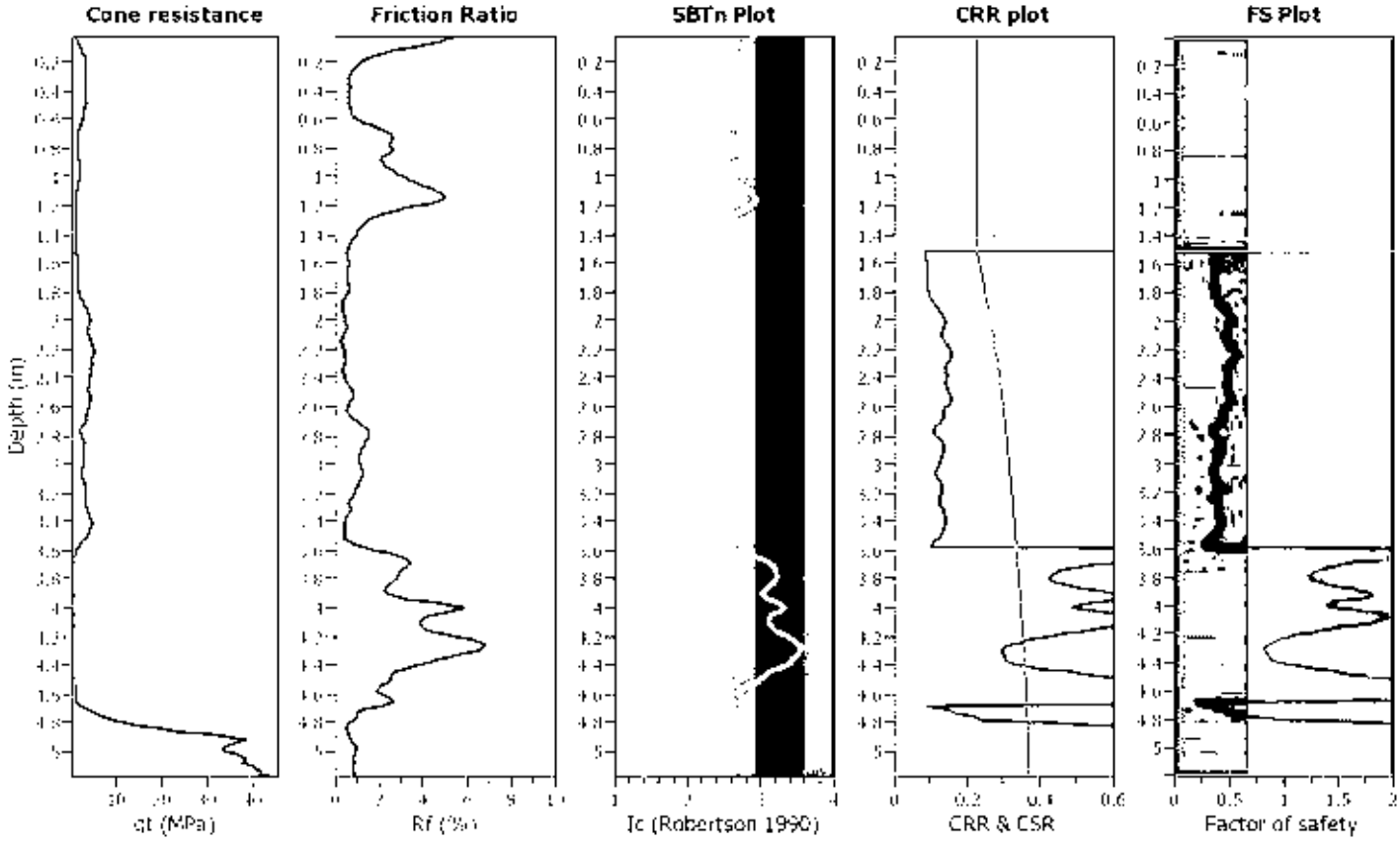
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain	Post liquefaction volumetric strain

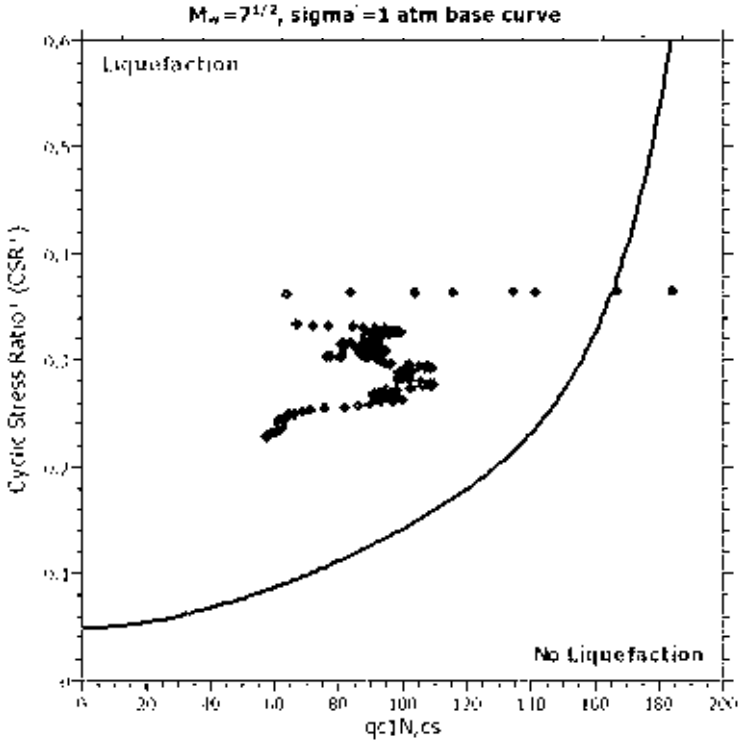
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

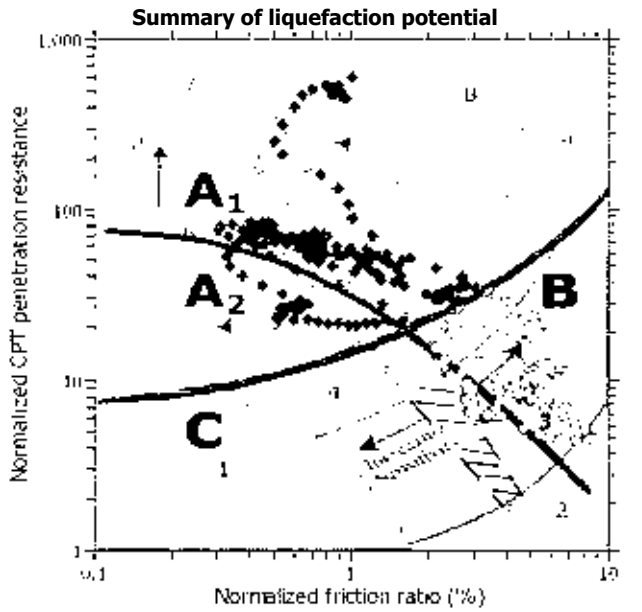
CPT file : CPT18_511HalswellRd

Input parameters and analysis data

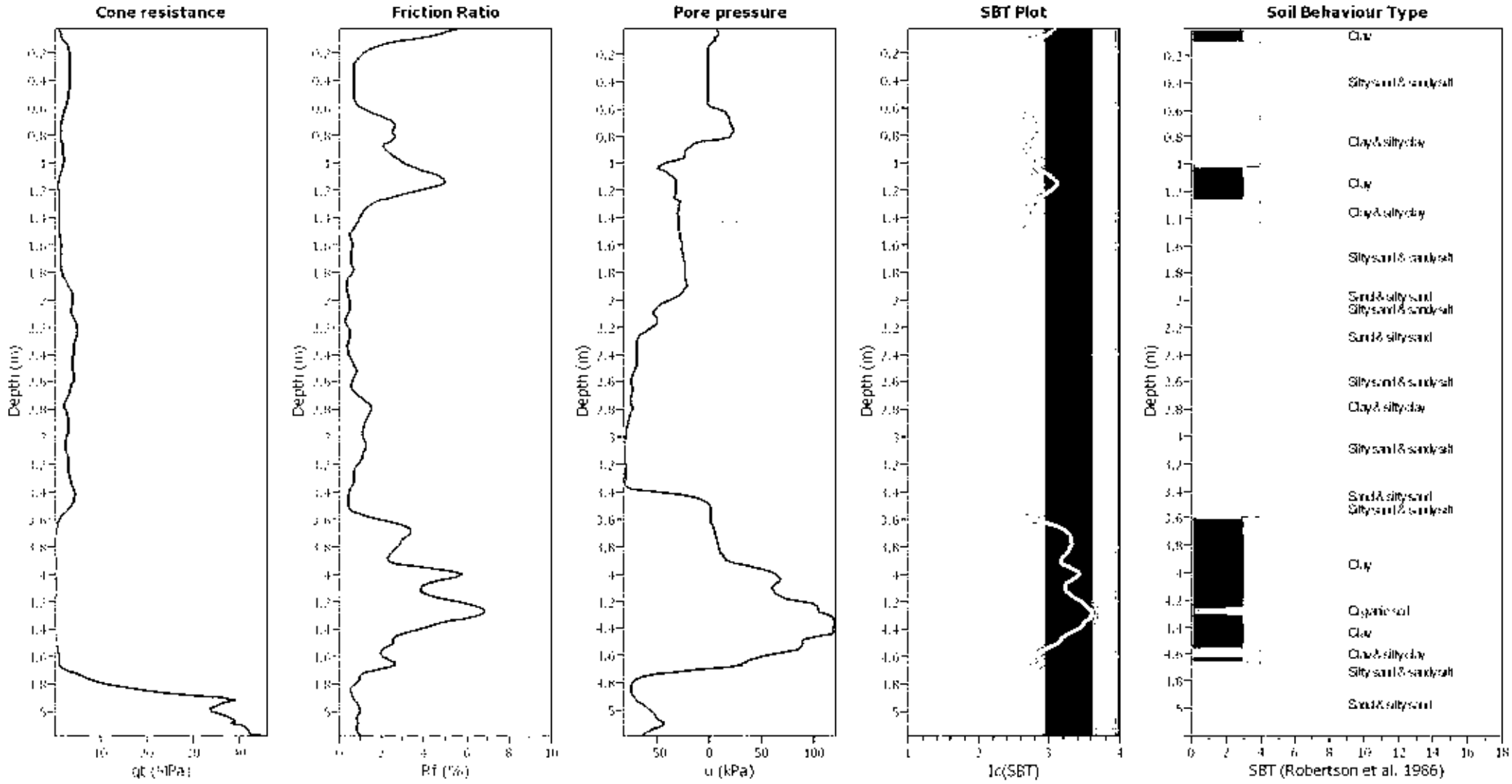
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



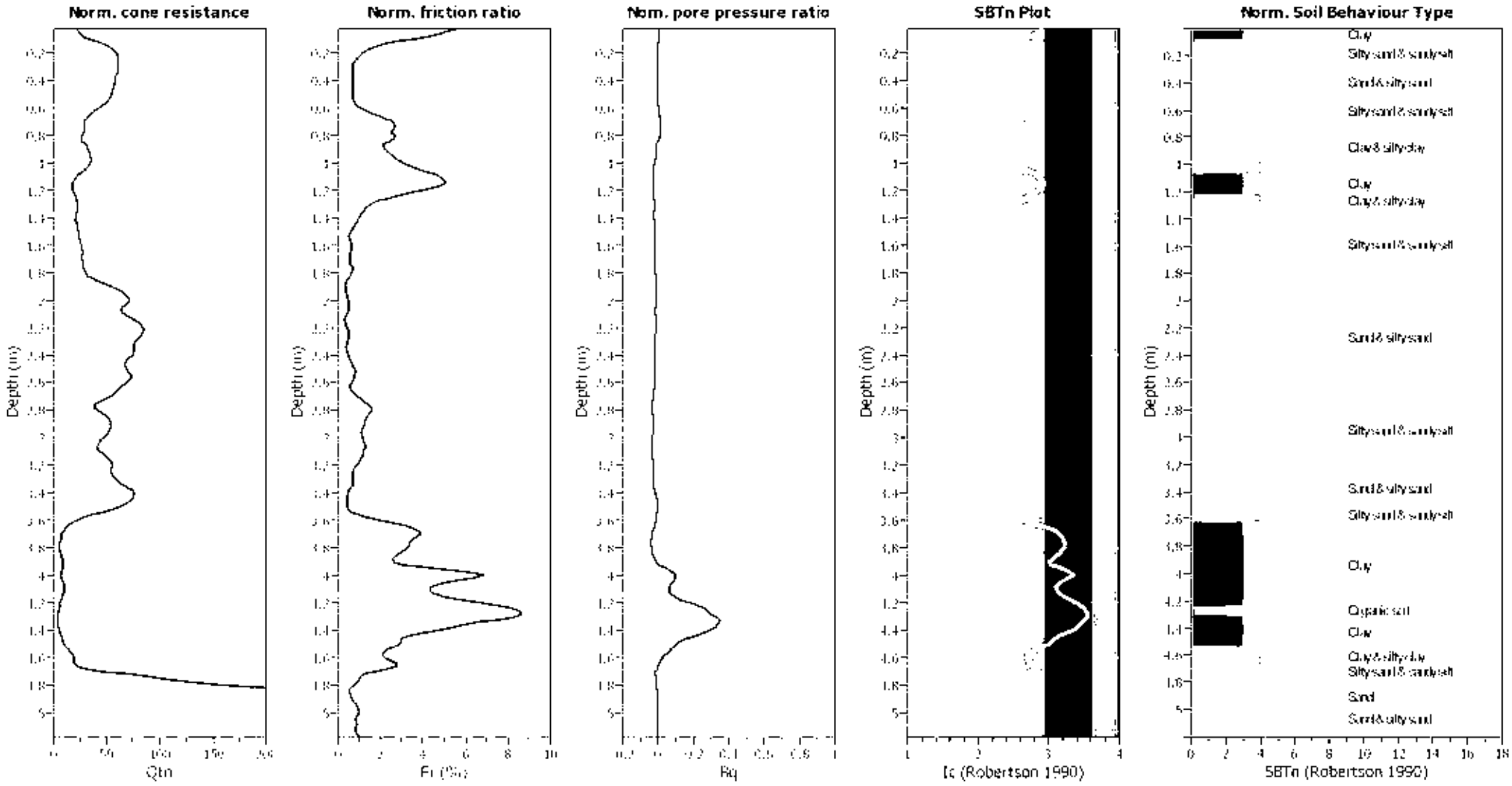
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



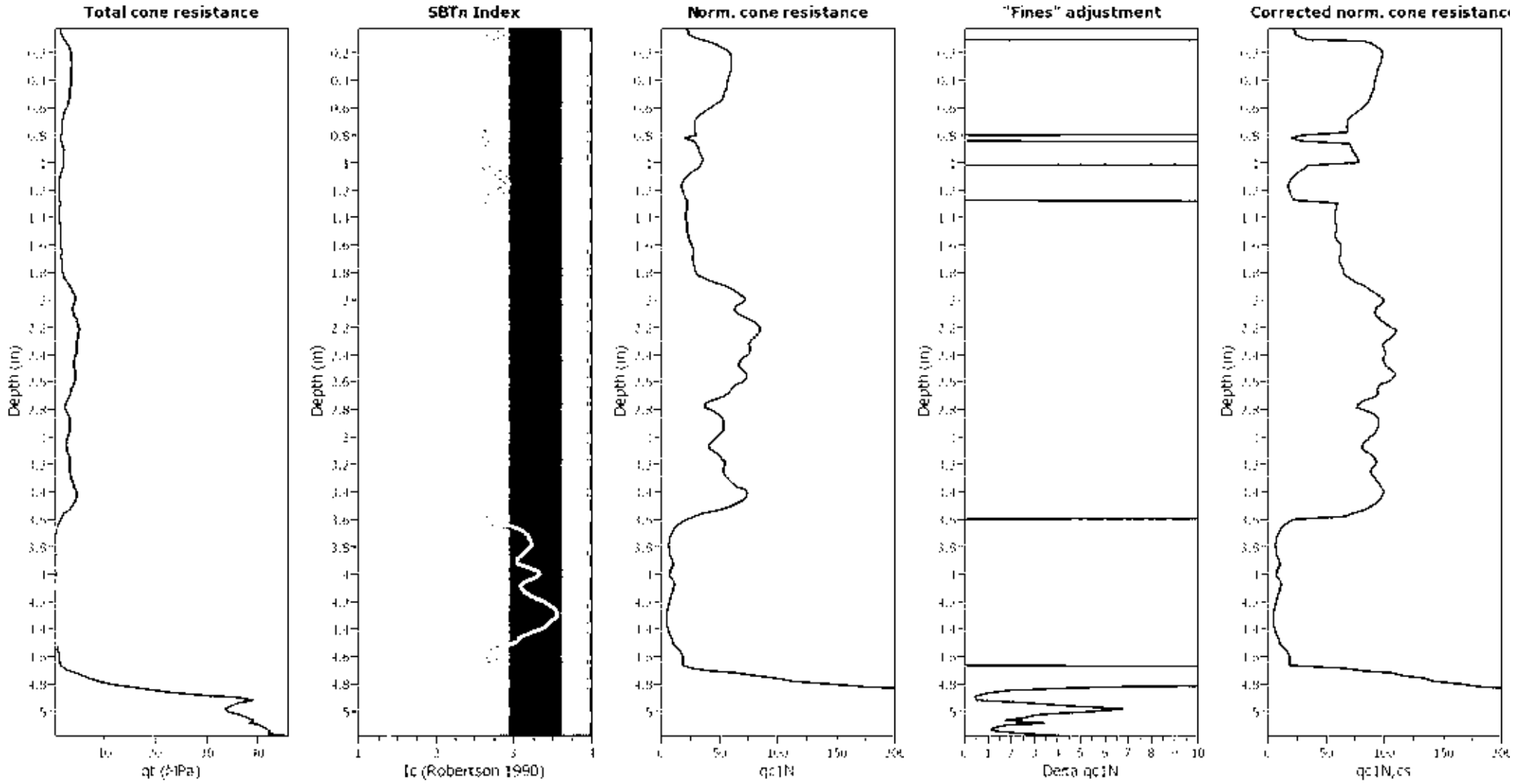
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

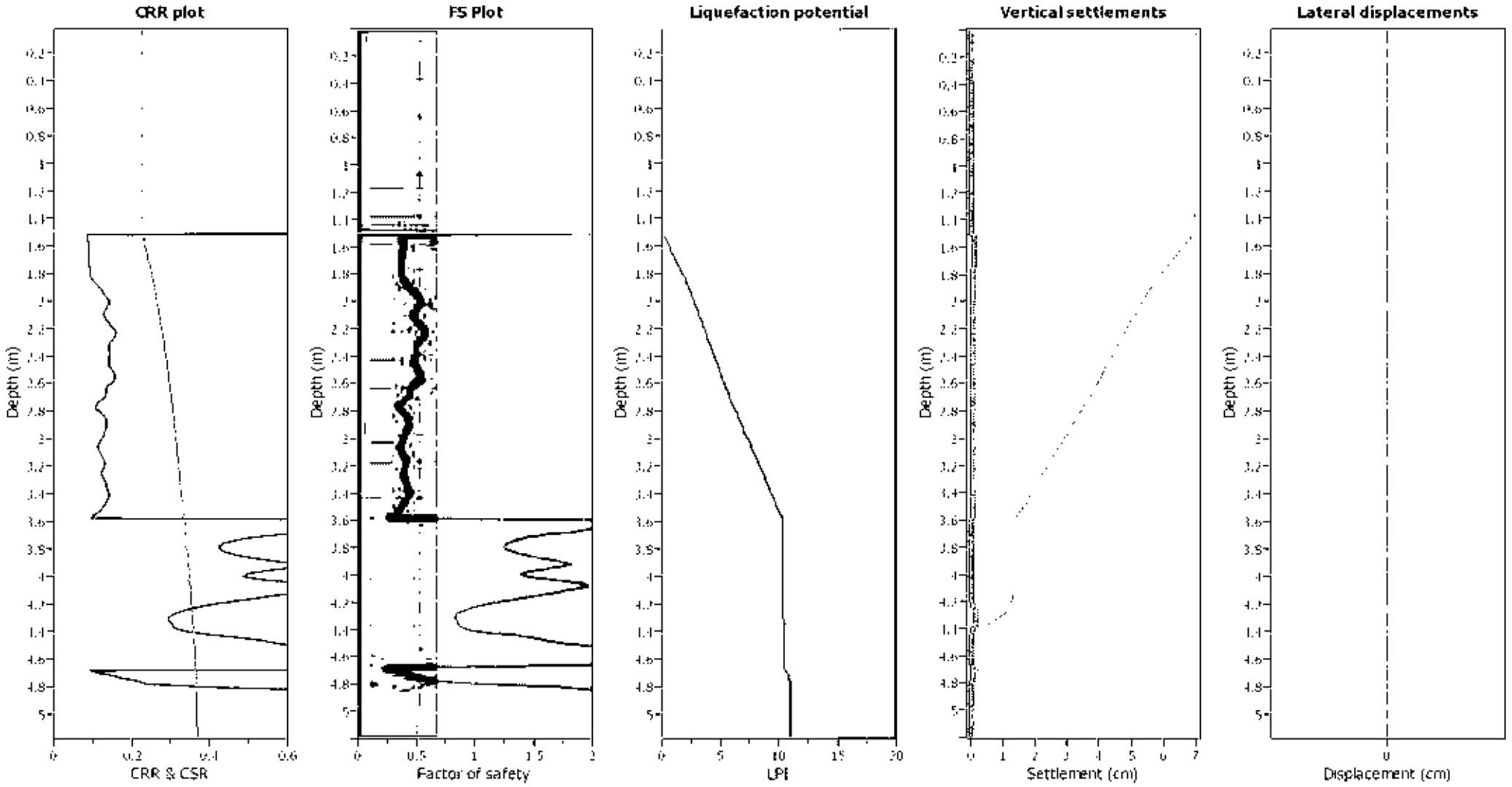
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

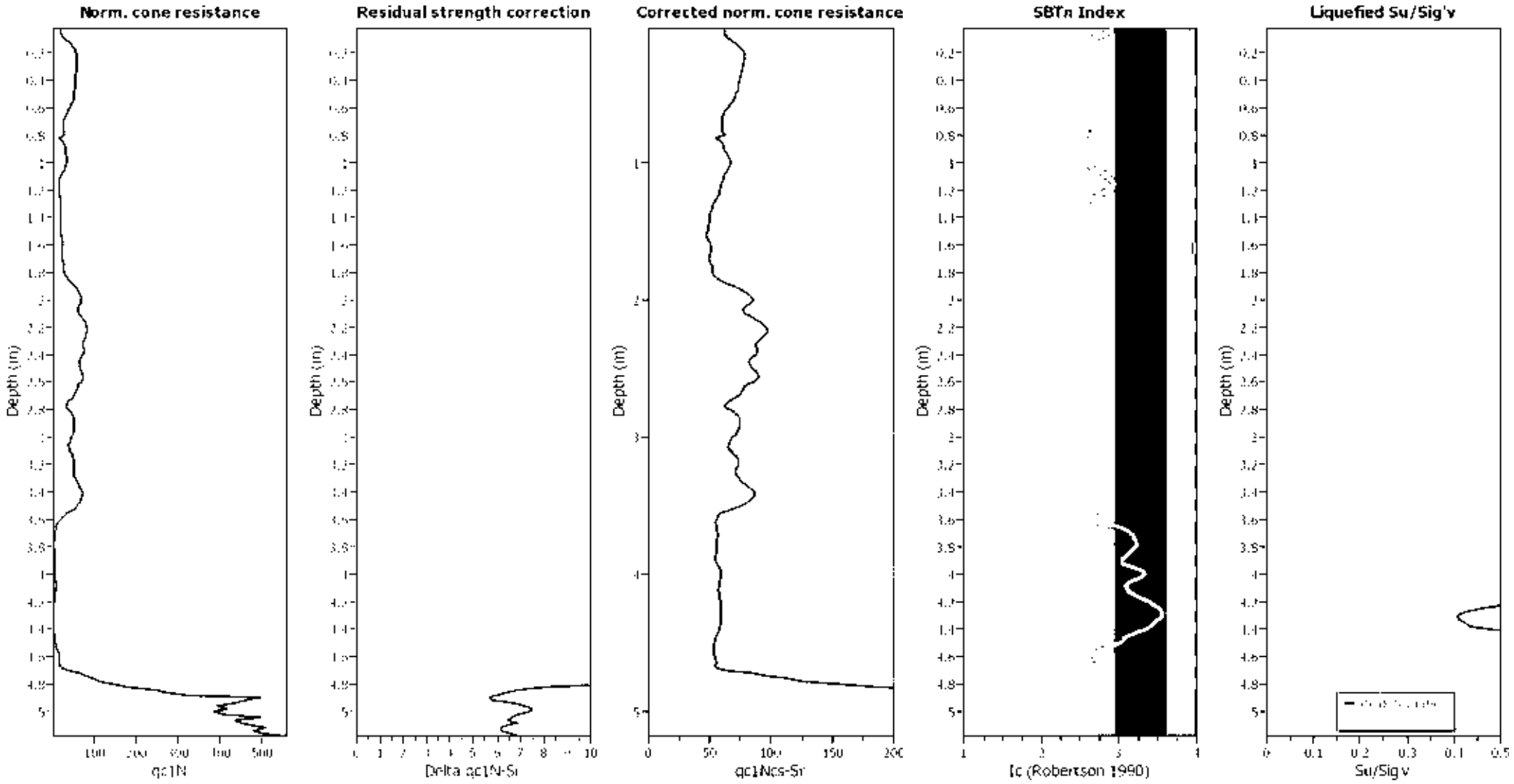
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

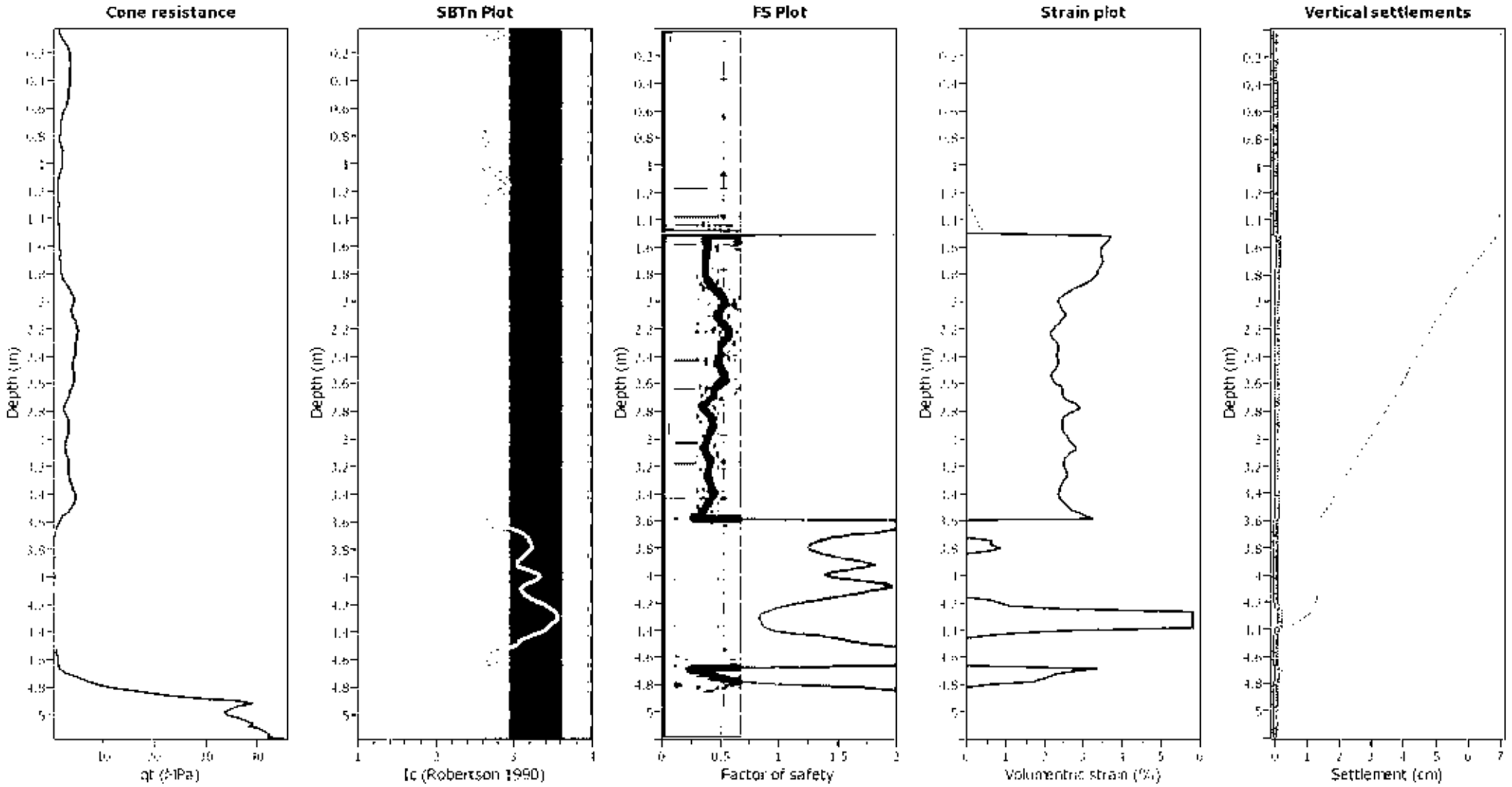
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

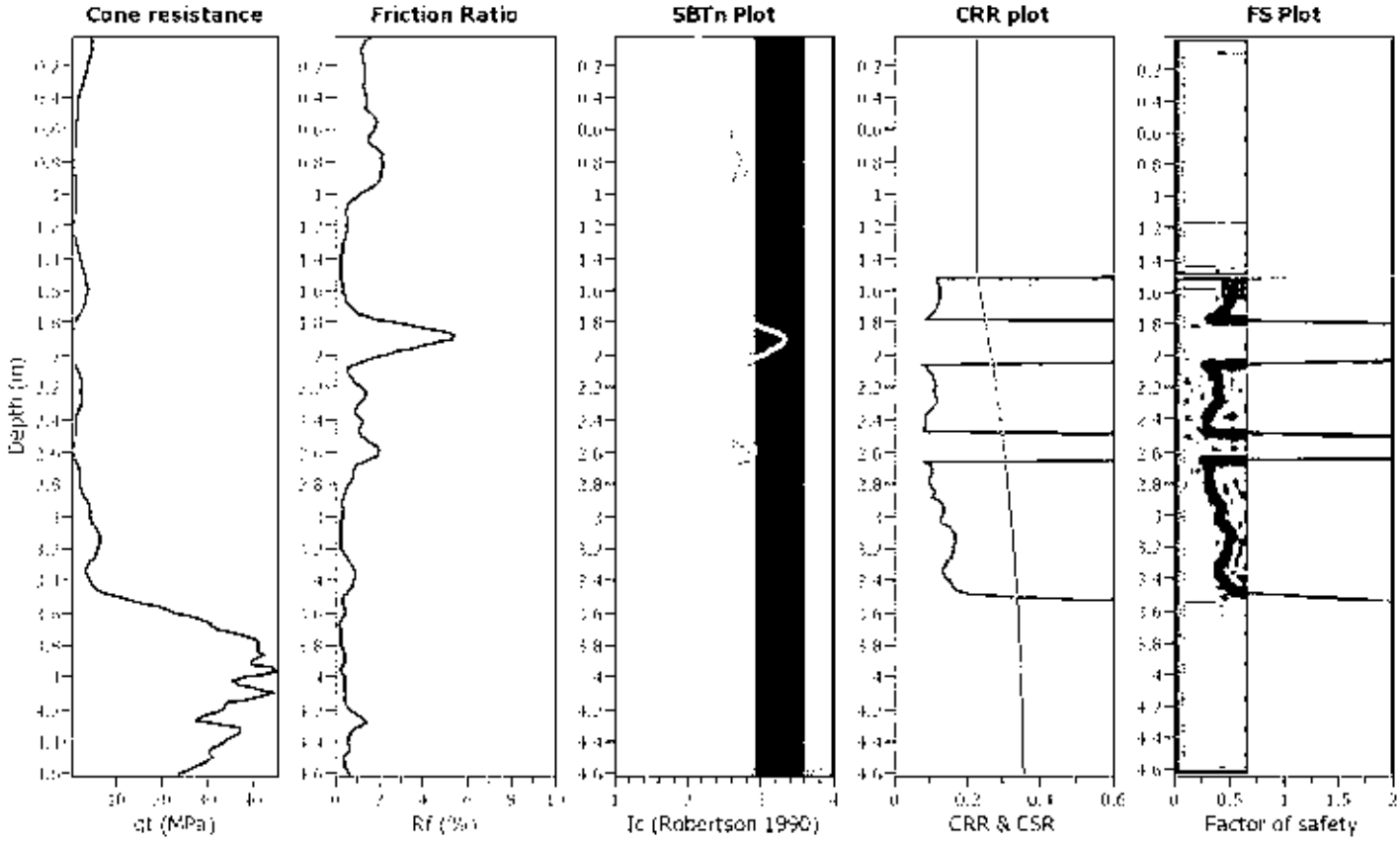
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

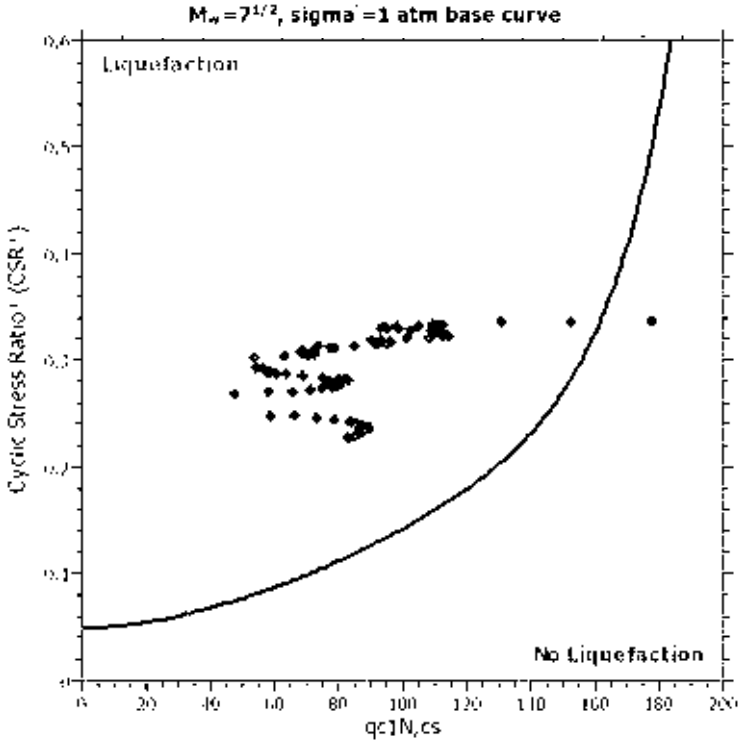
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

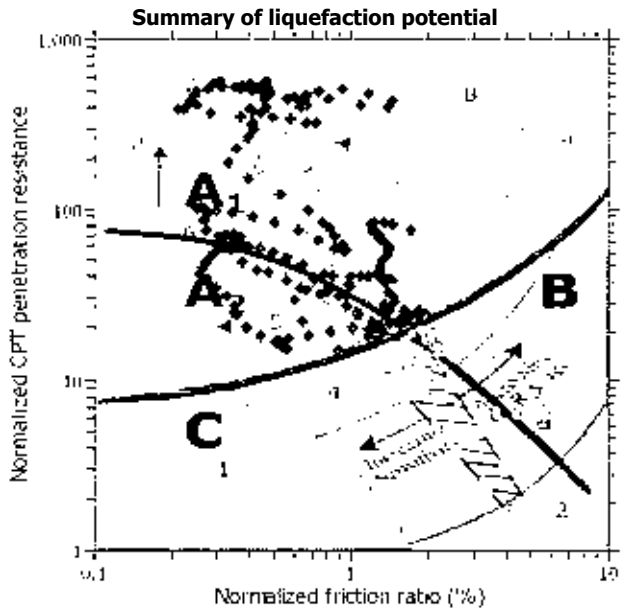
CPT file : CPT19_511HalswellRd

Input parameters and analysis data

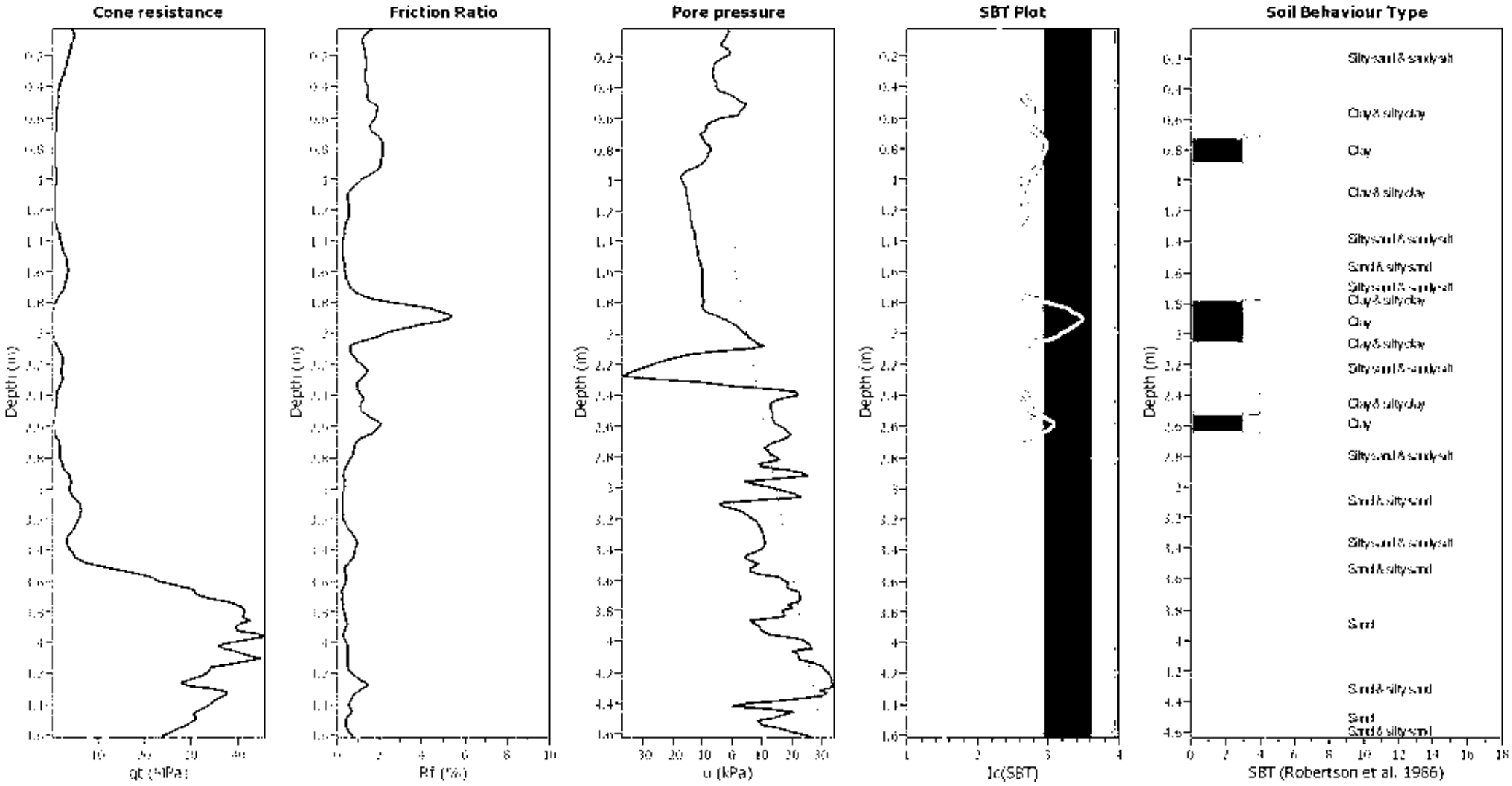
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



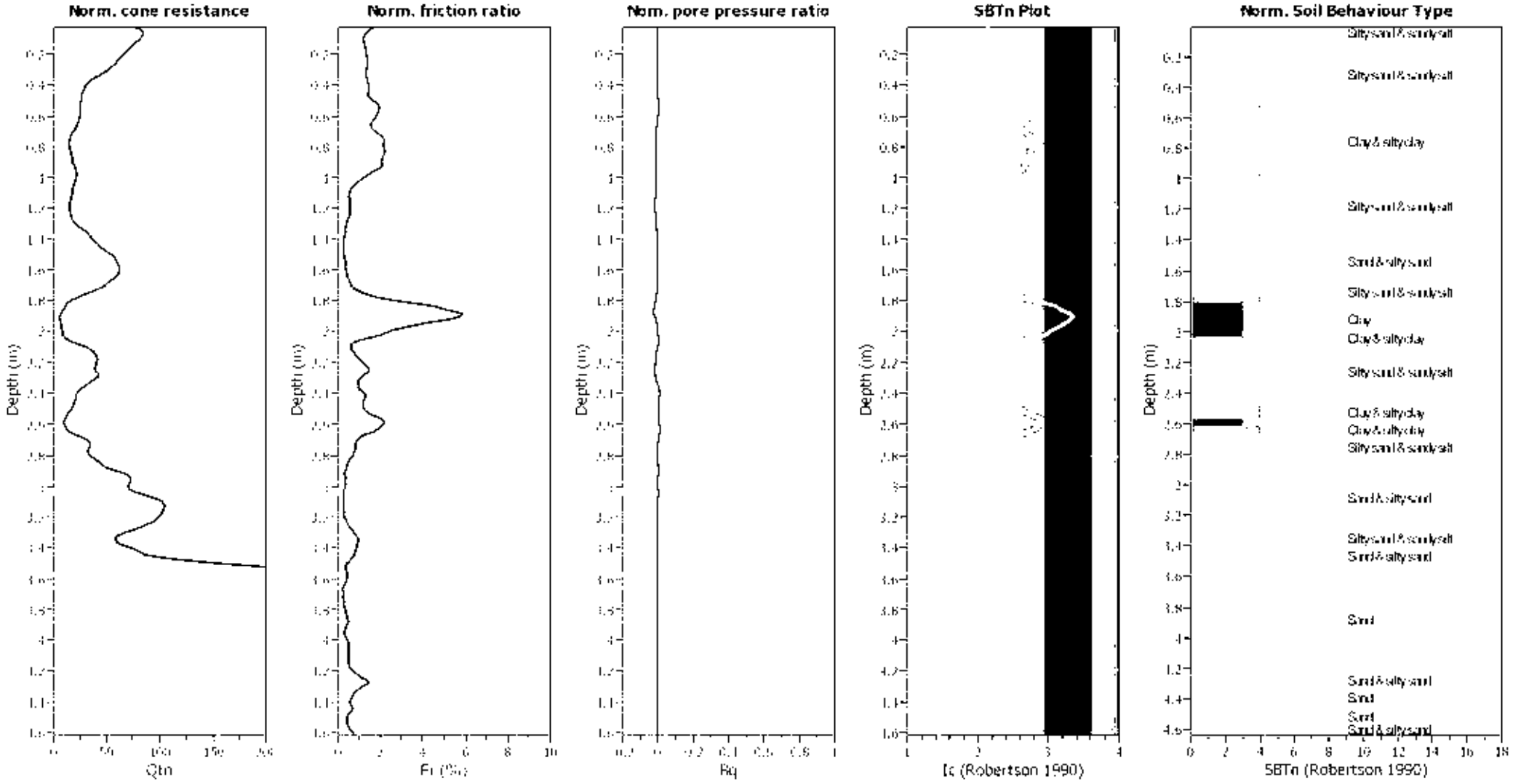
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



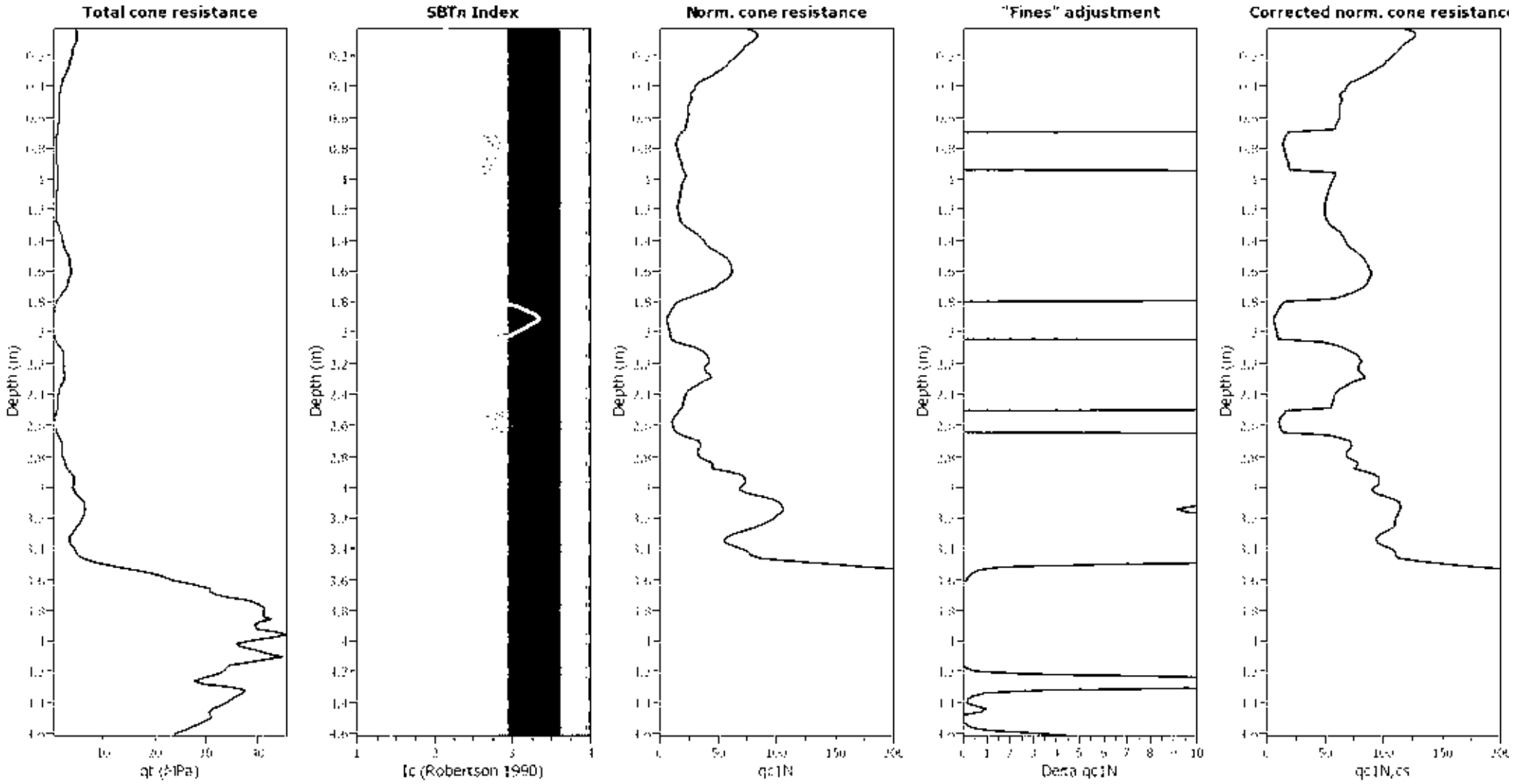
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

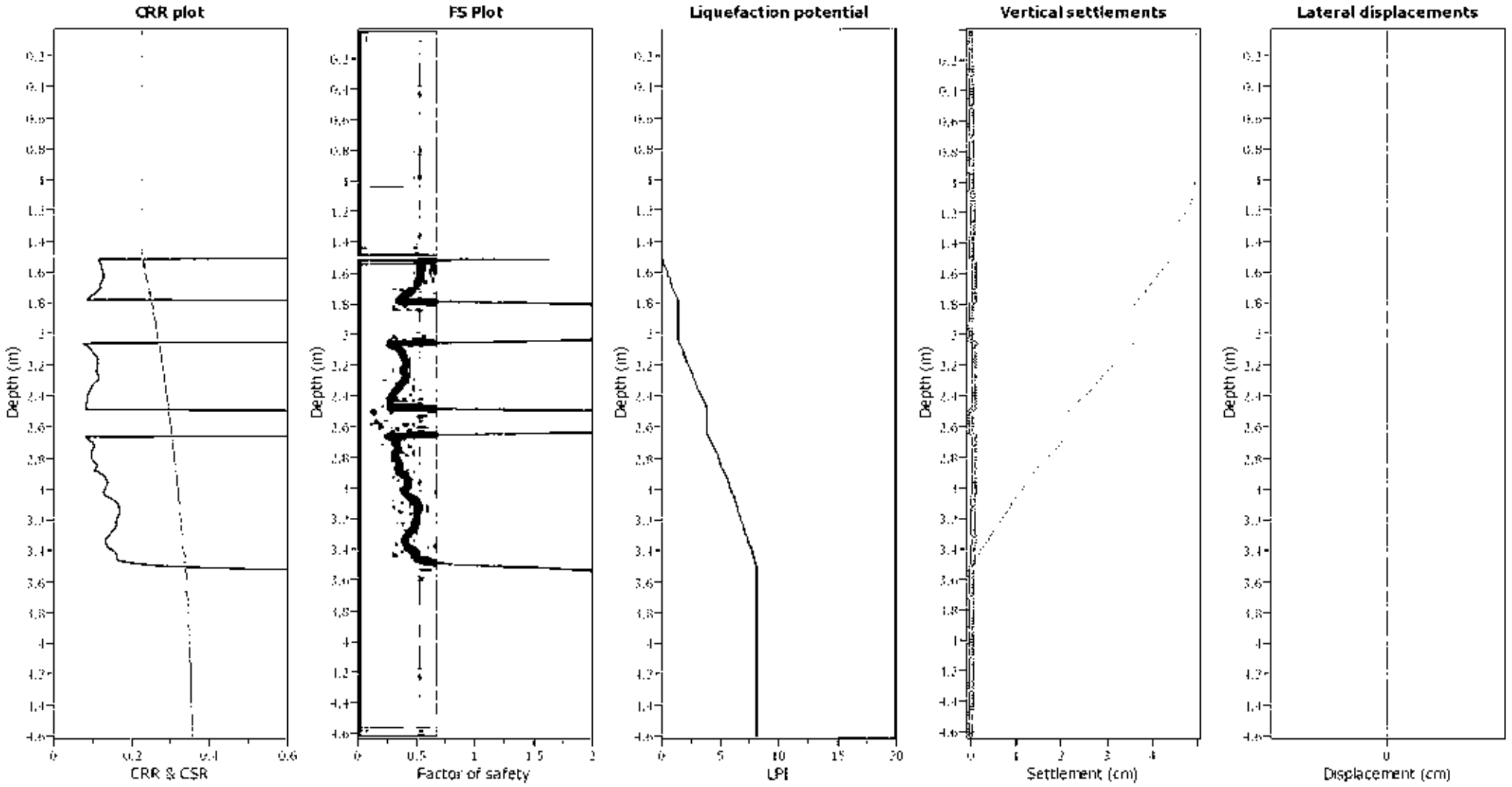
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

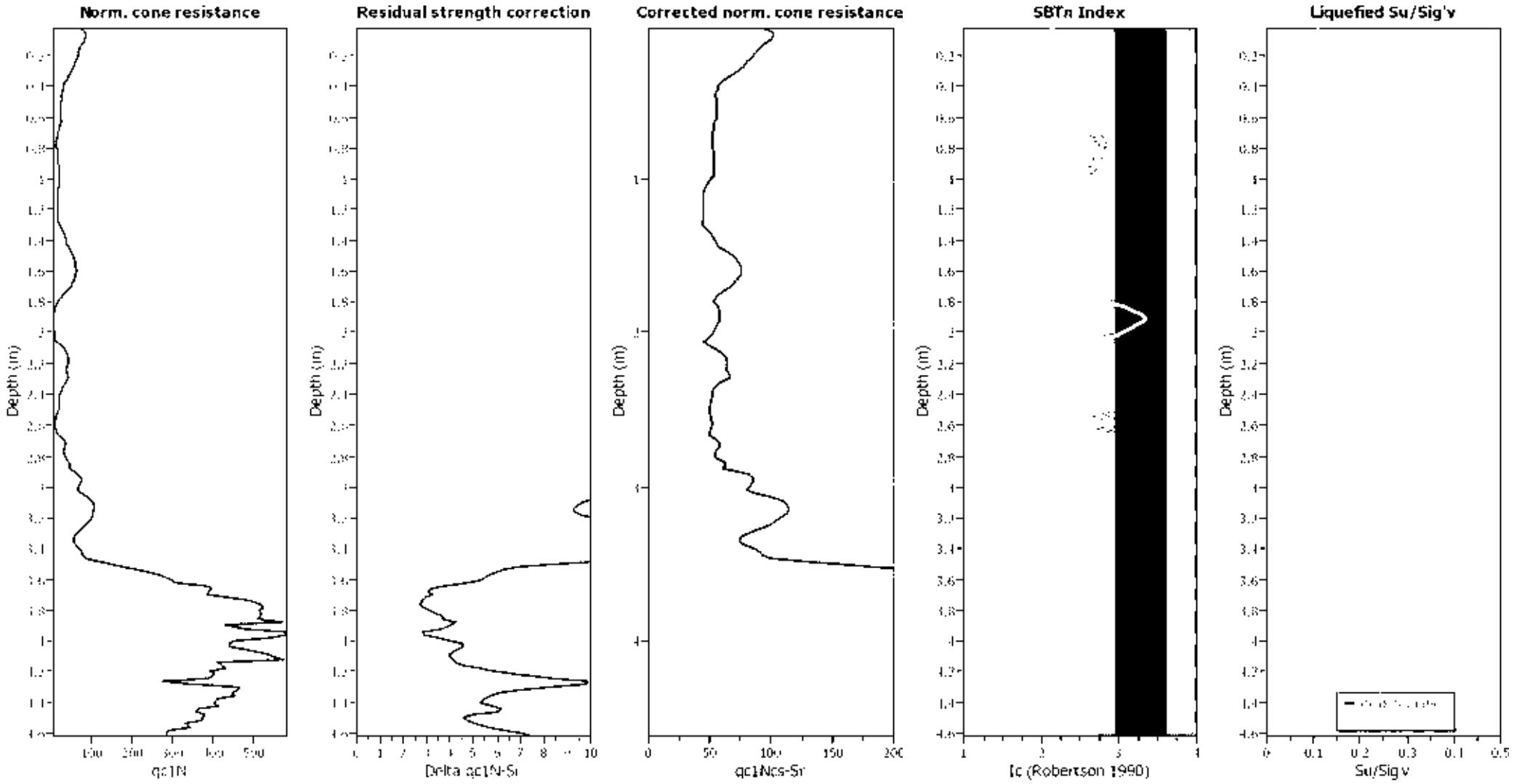
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

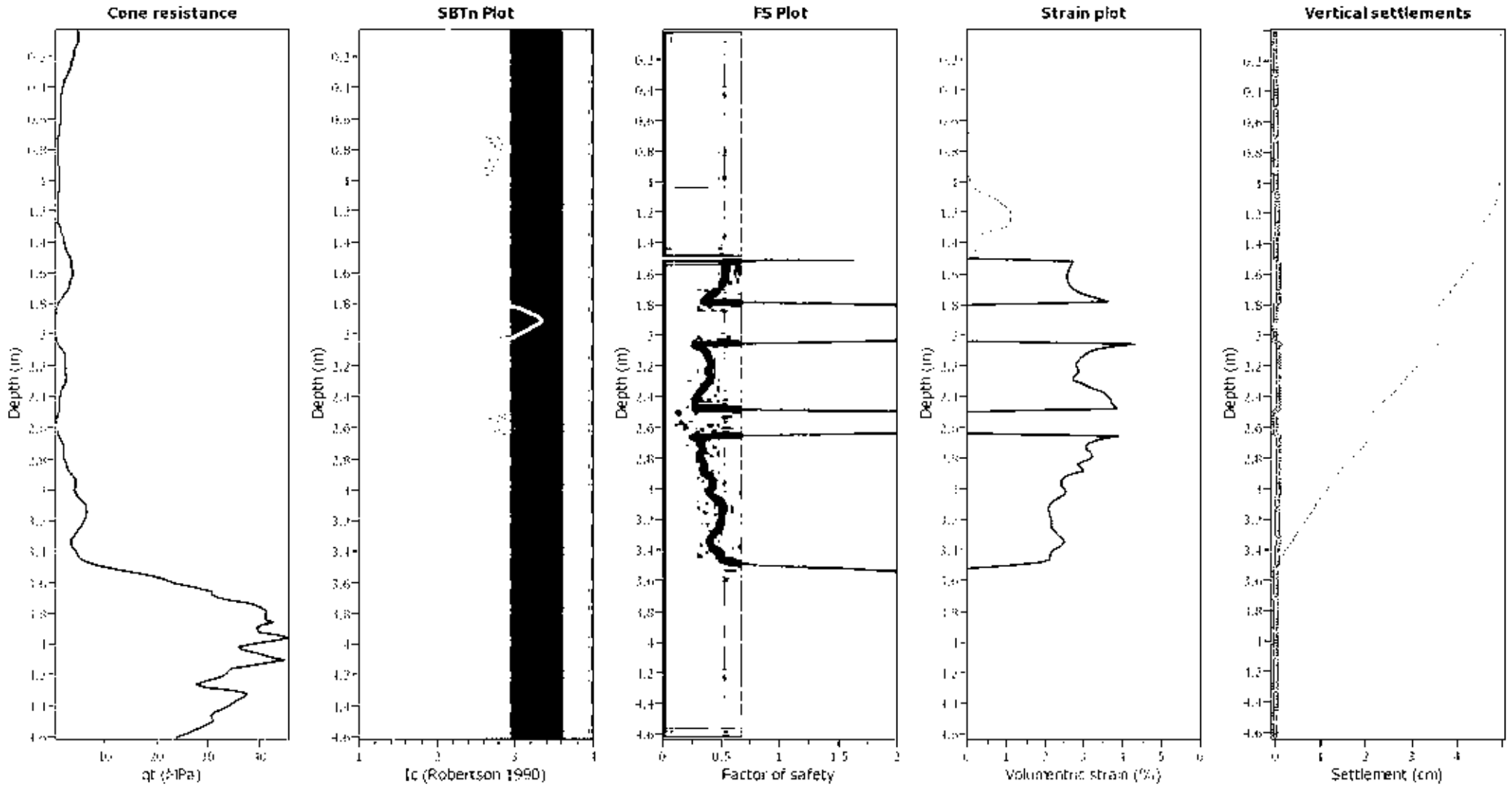
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

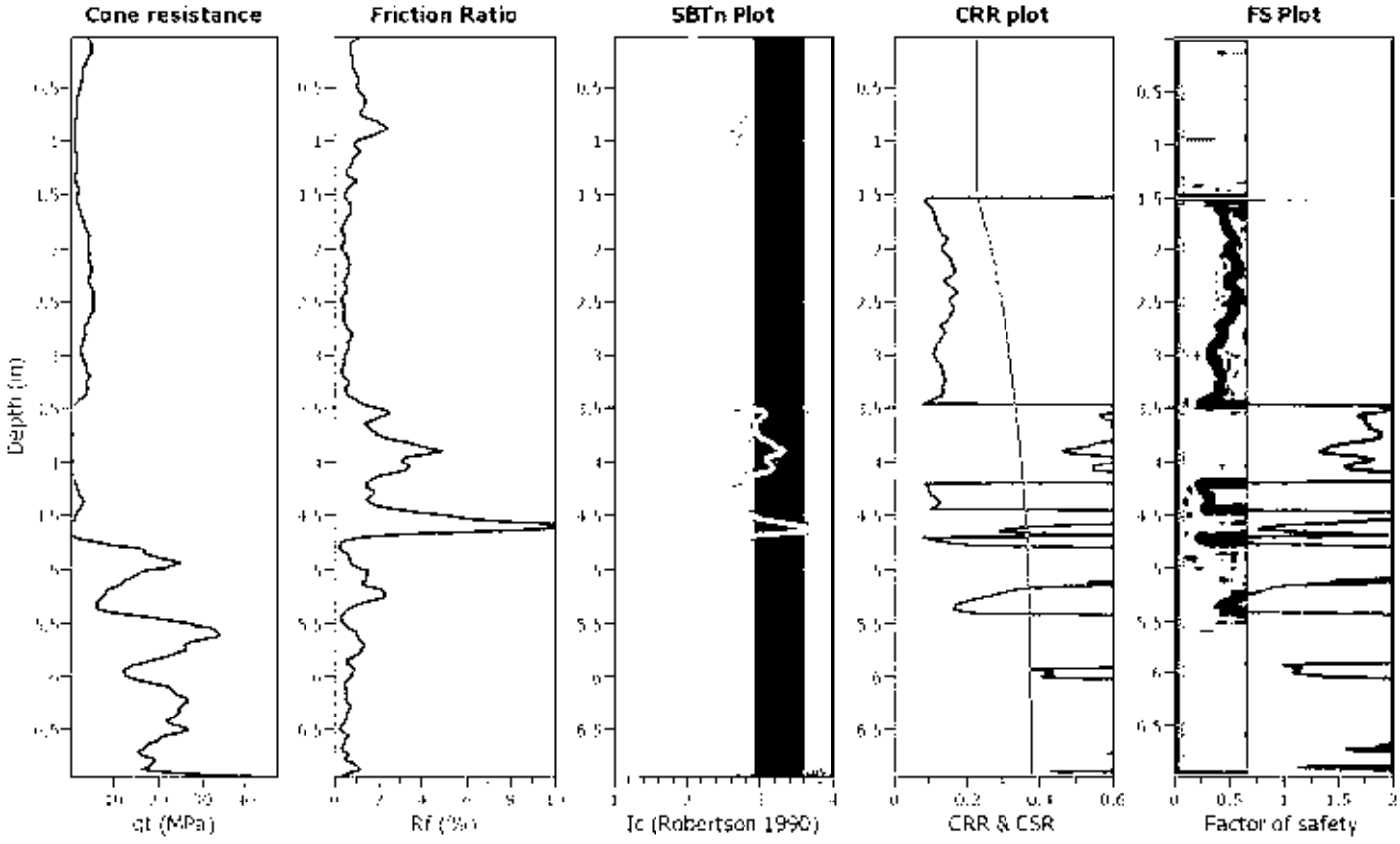
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

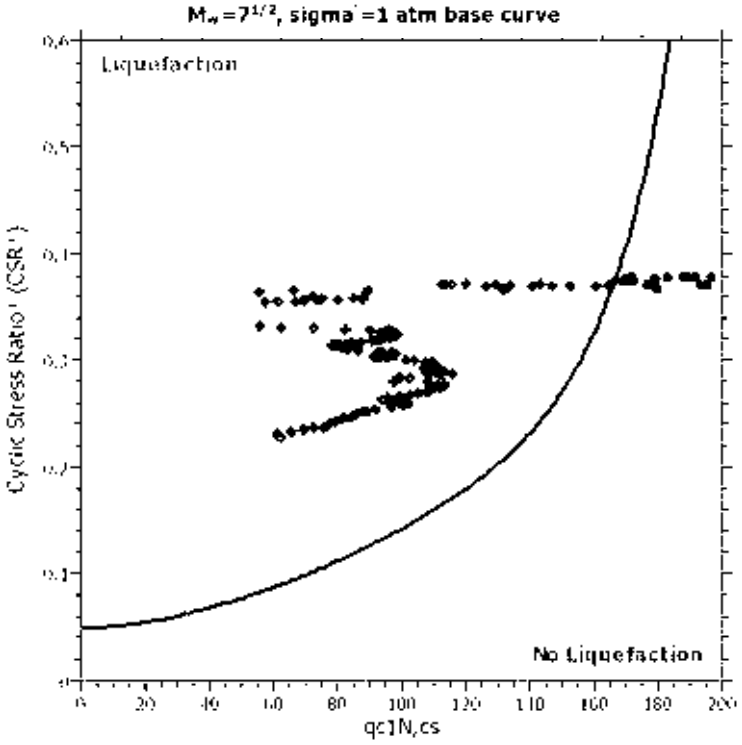
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

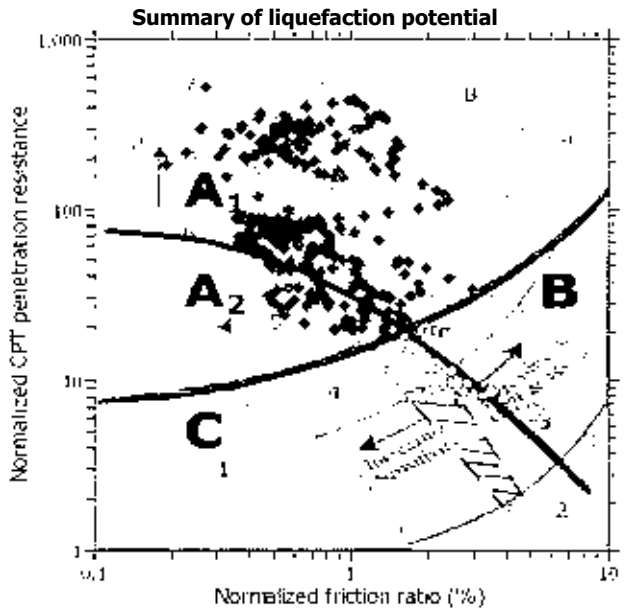
CPT file : CPT20_511HalswellRd

Input parameters and analysis data

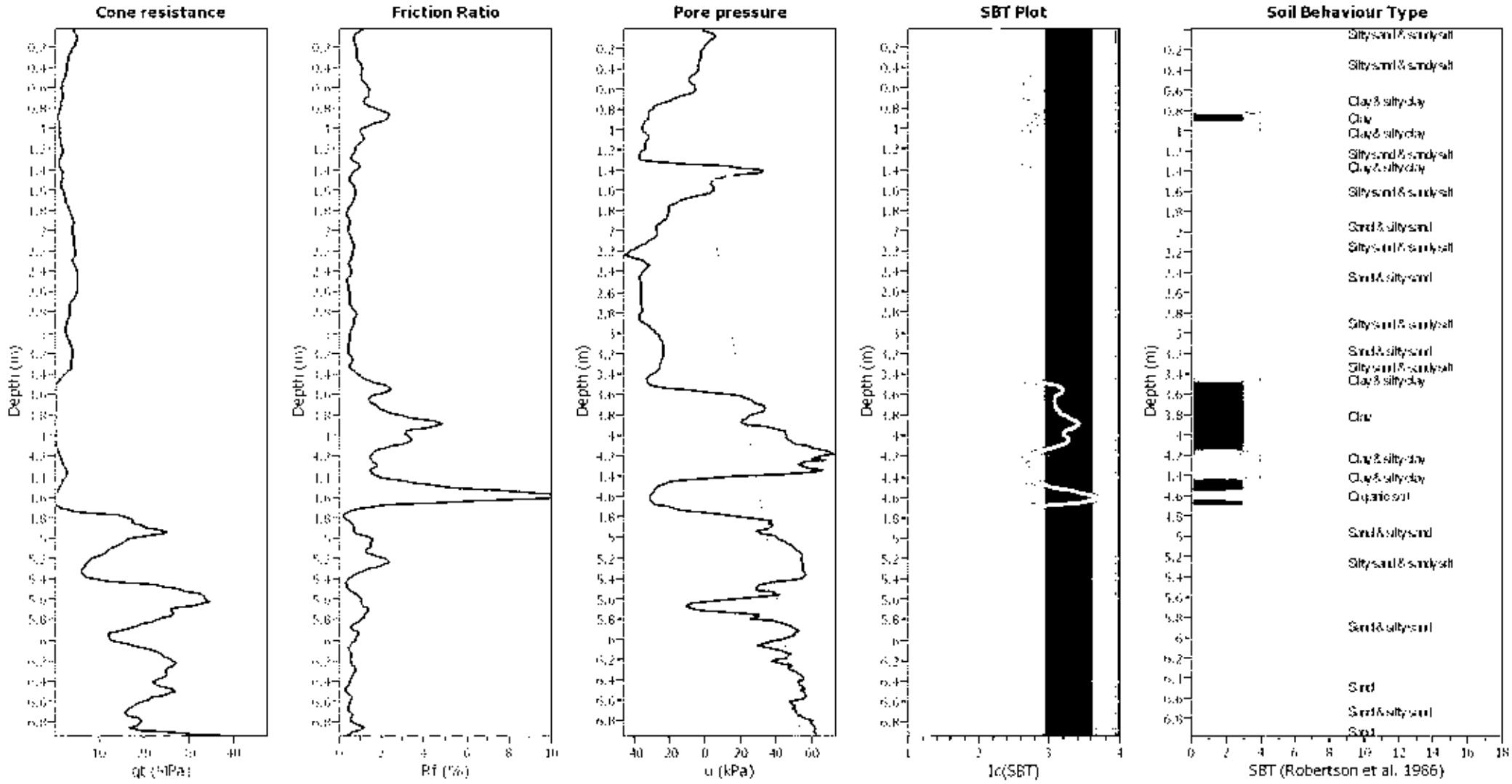
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



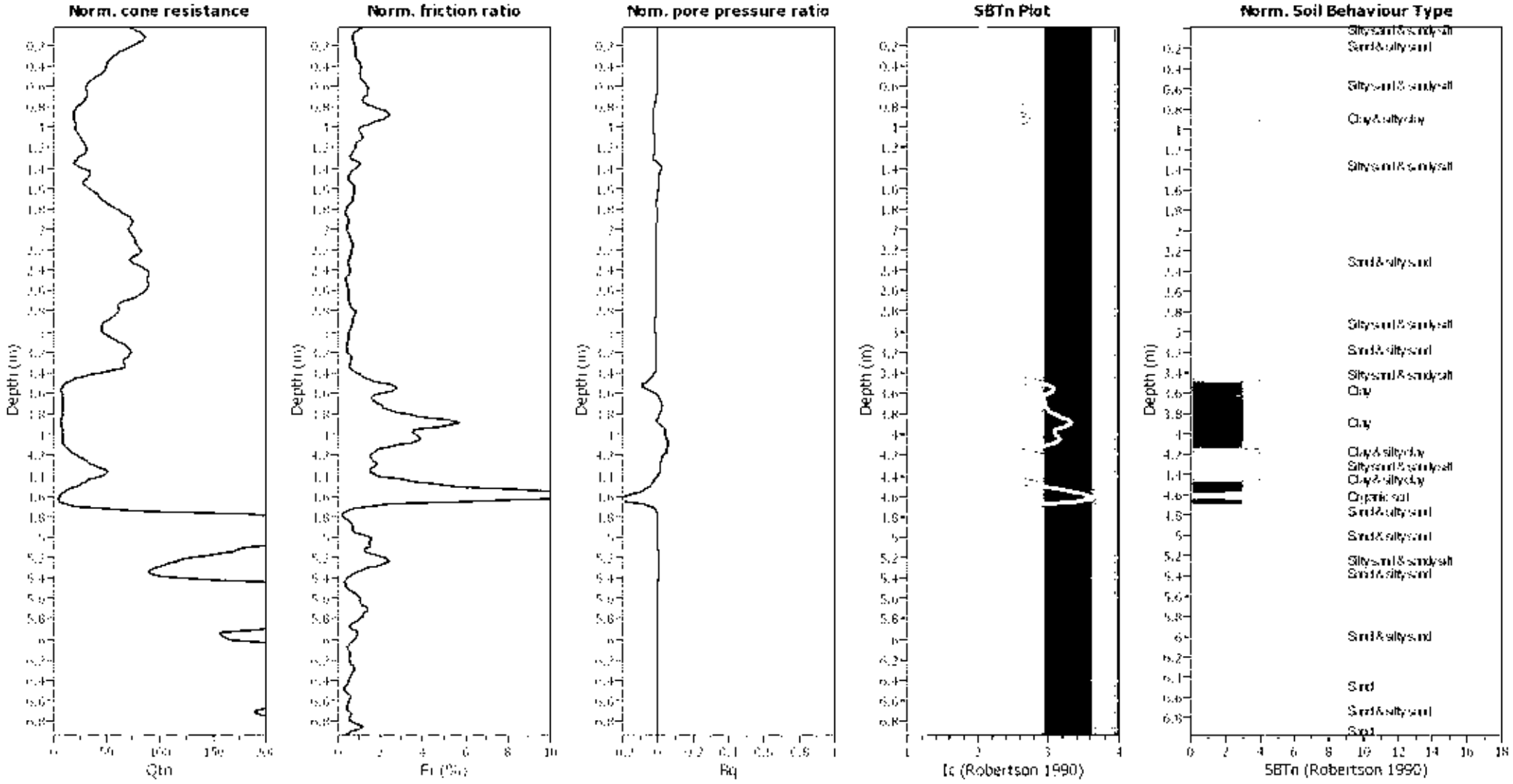
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



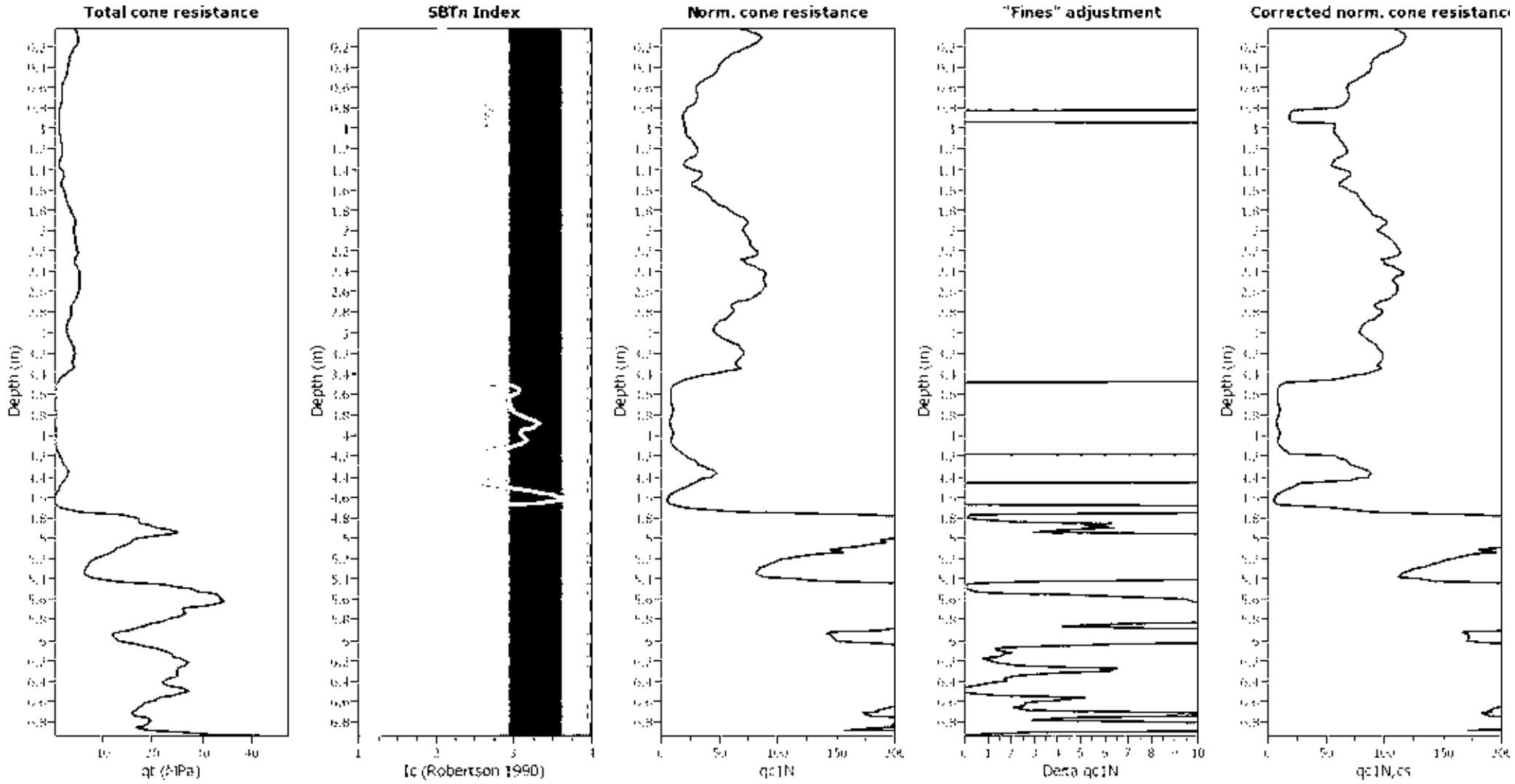
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

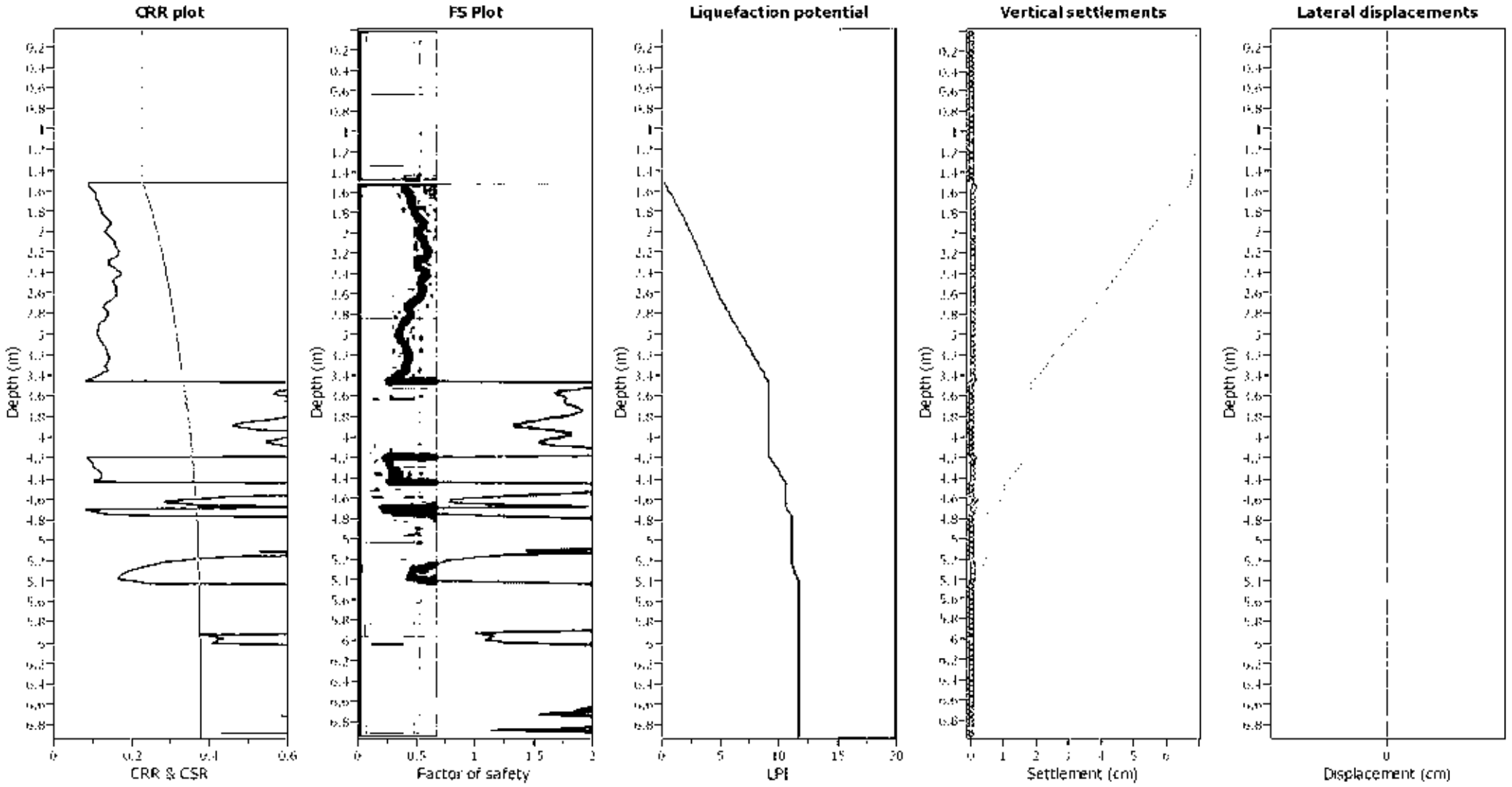
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

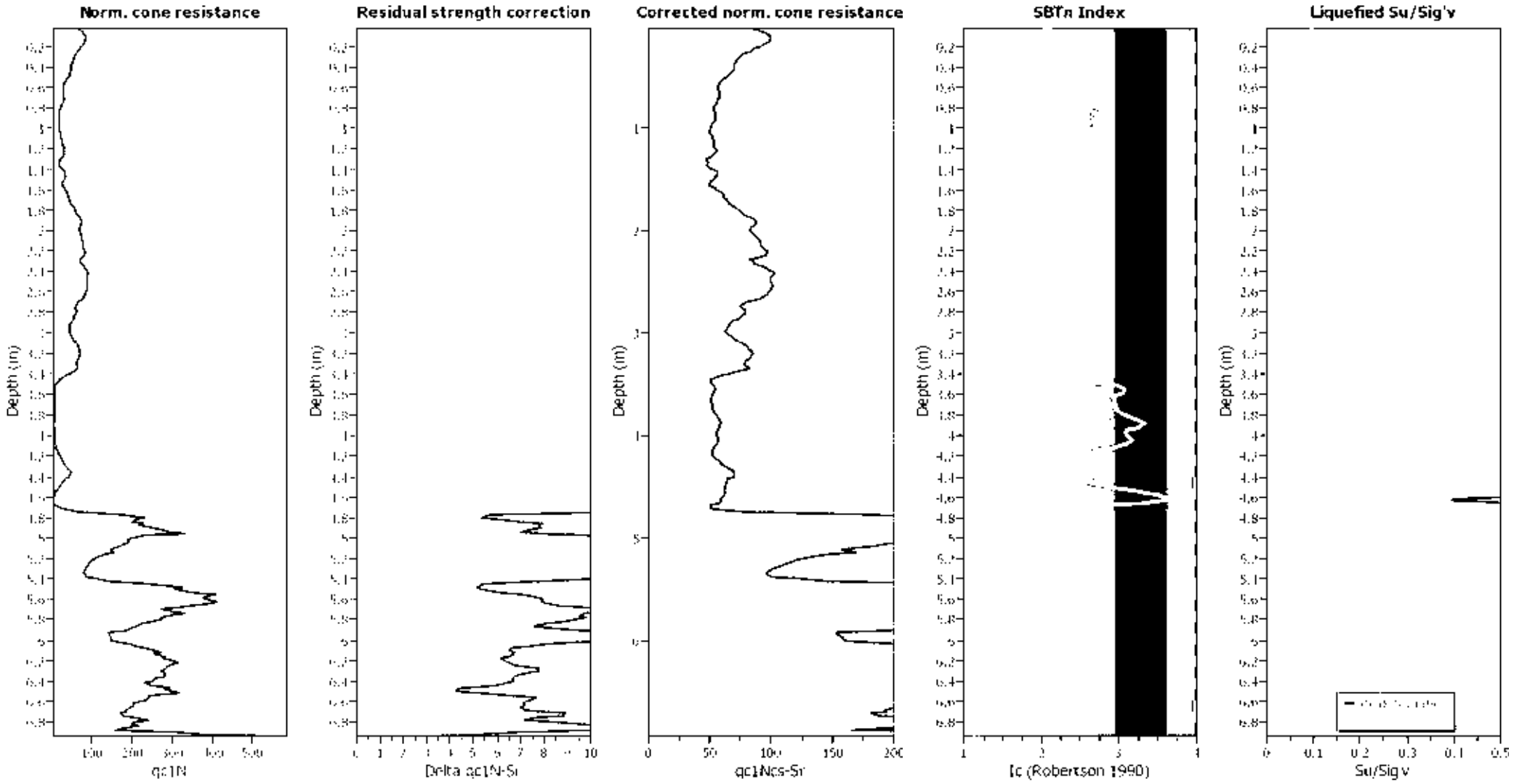
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

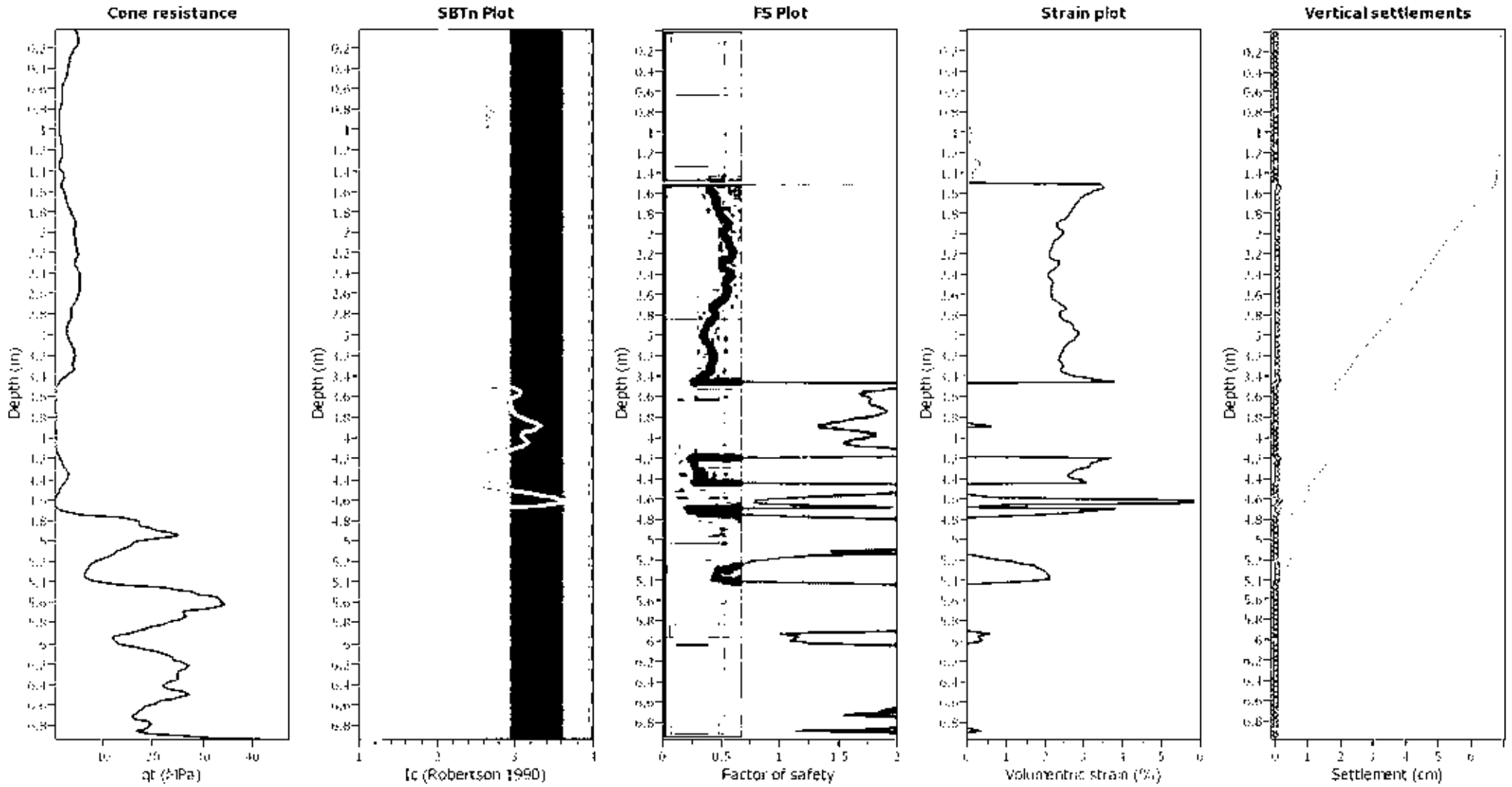
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

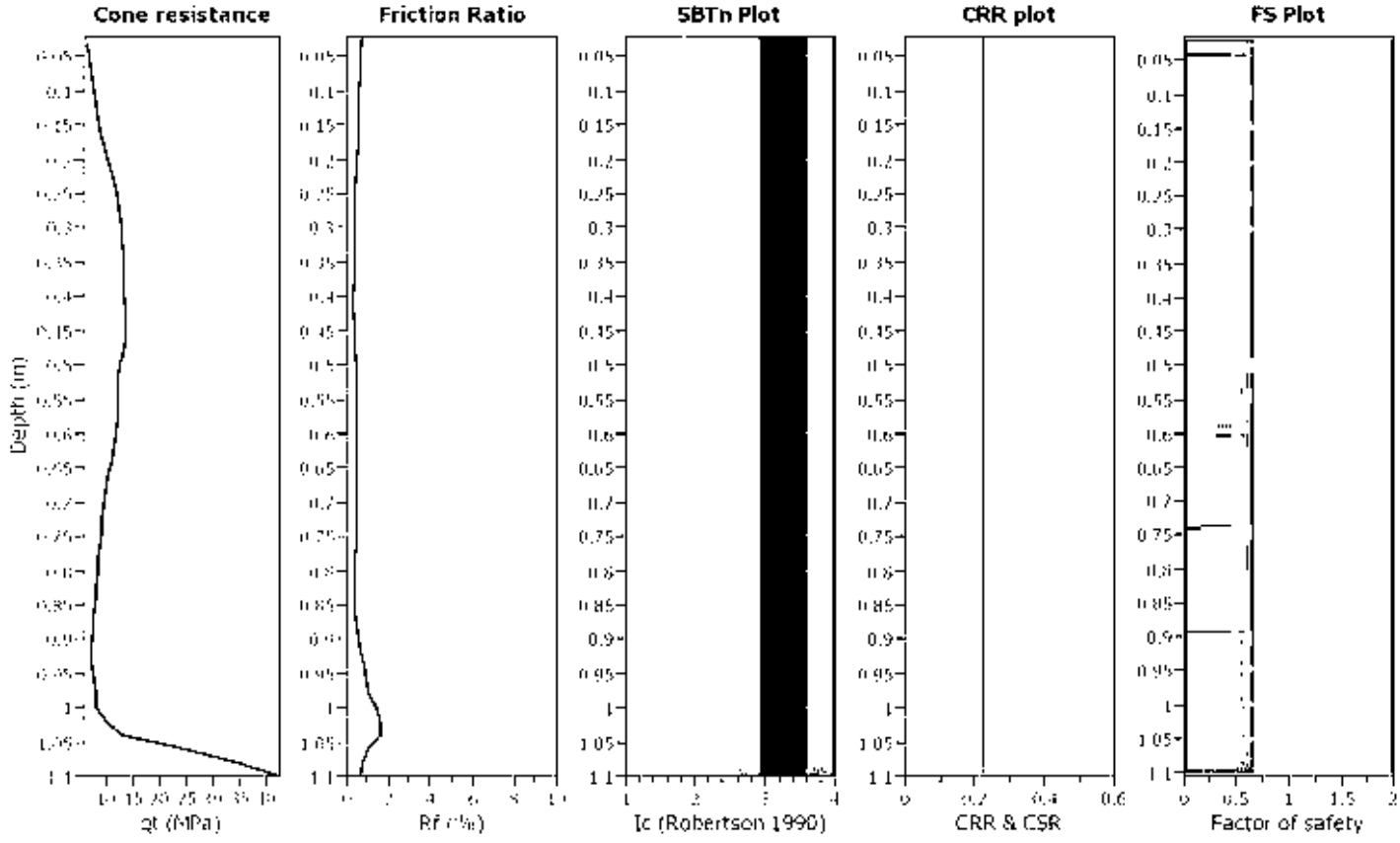
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

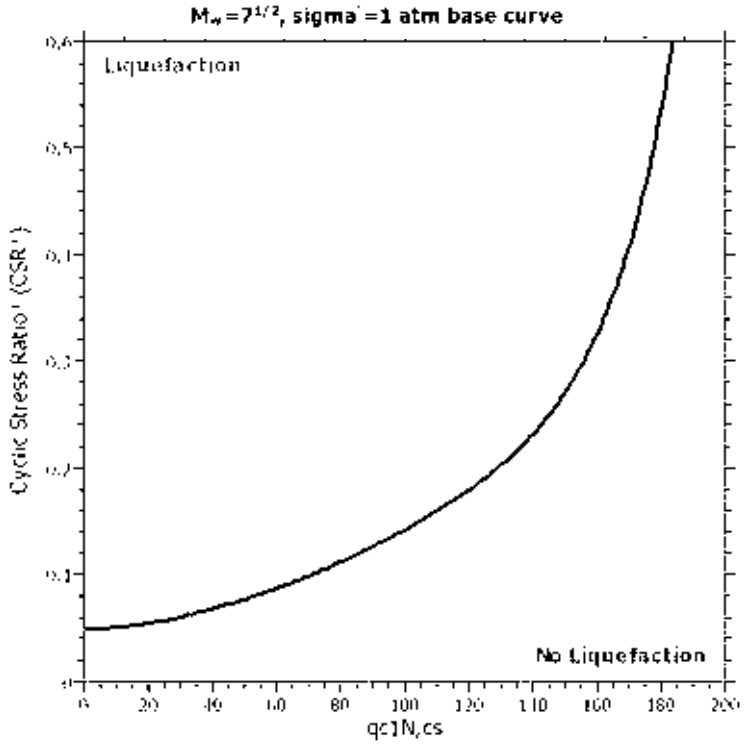
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

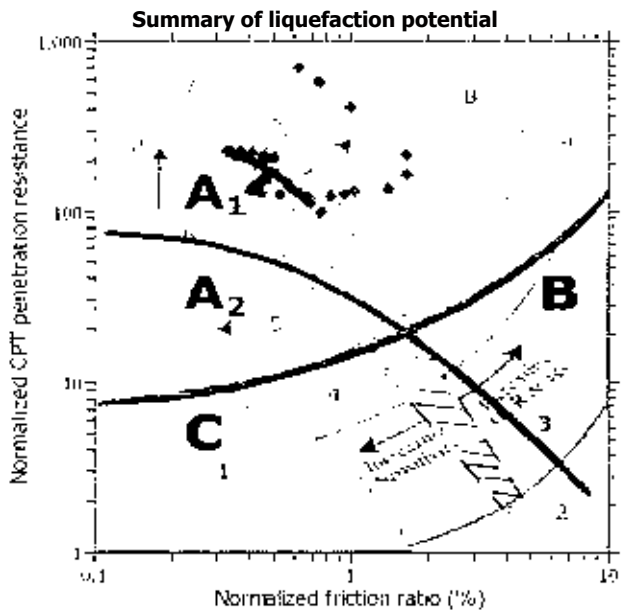
CPT file : CPT21_30GloversRd

Input parameters and analysis data

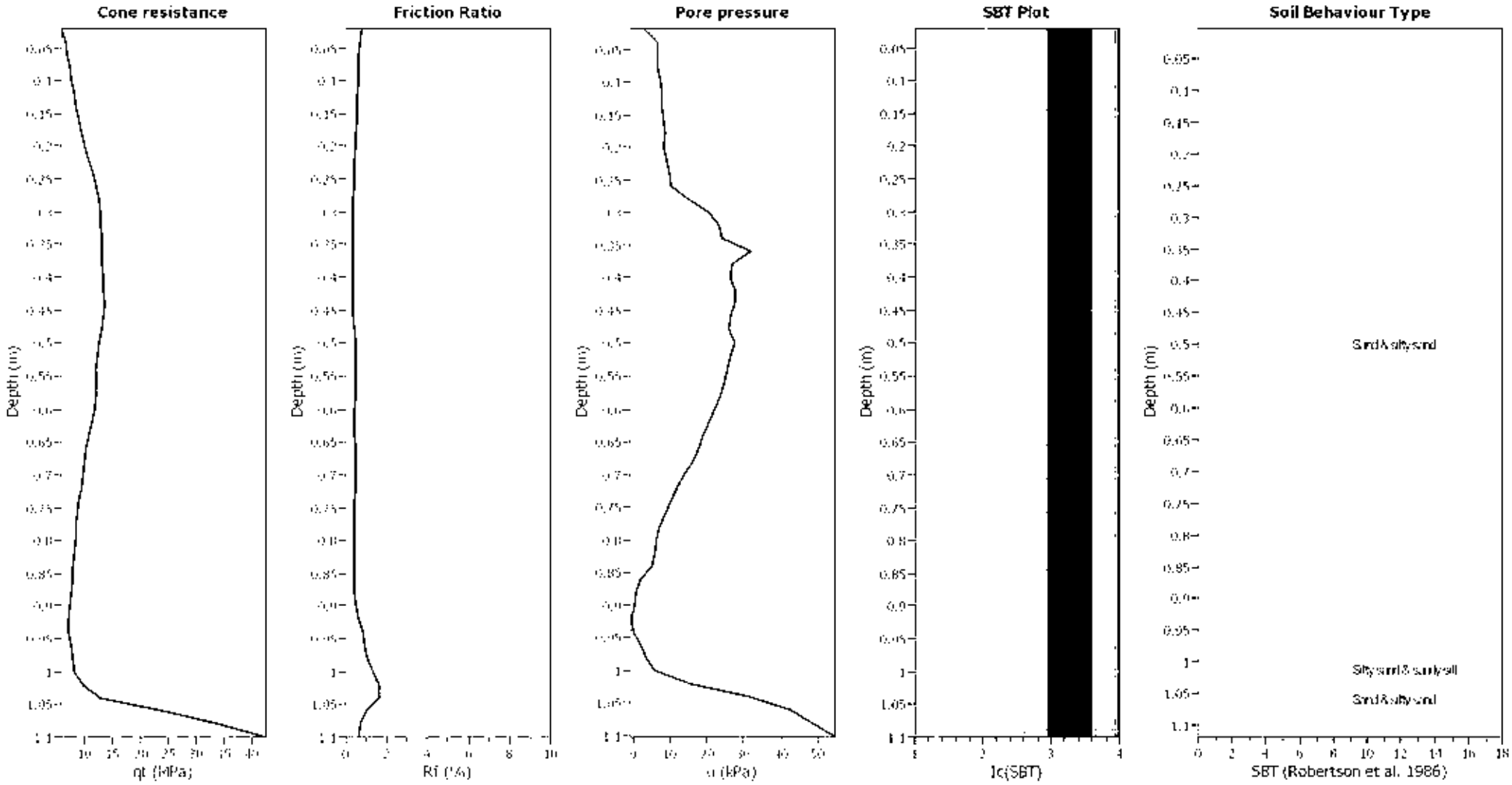
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



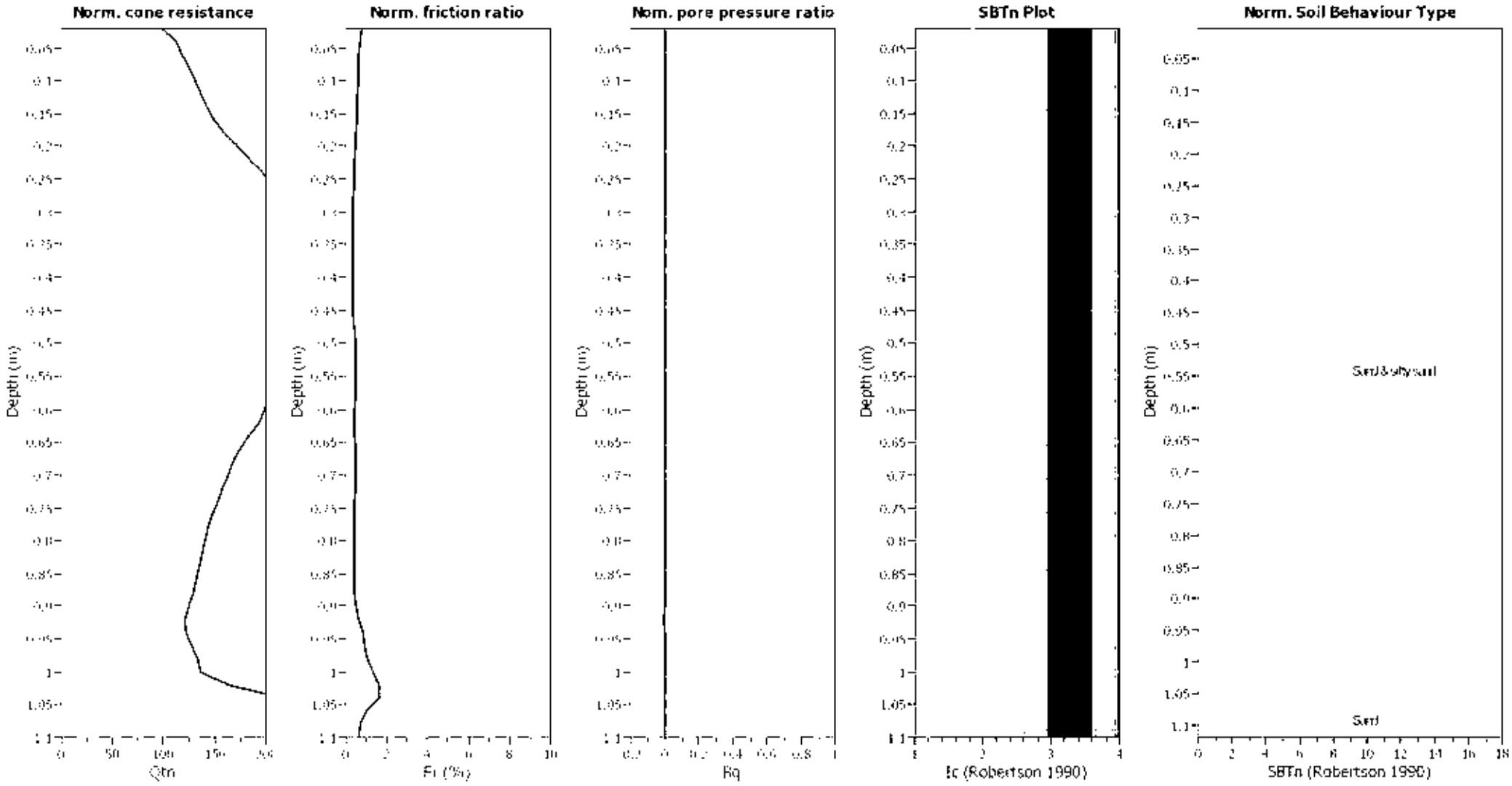
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



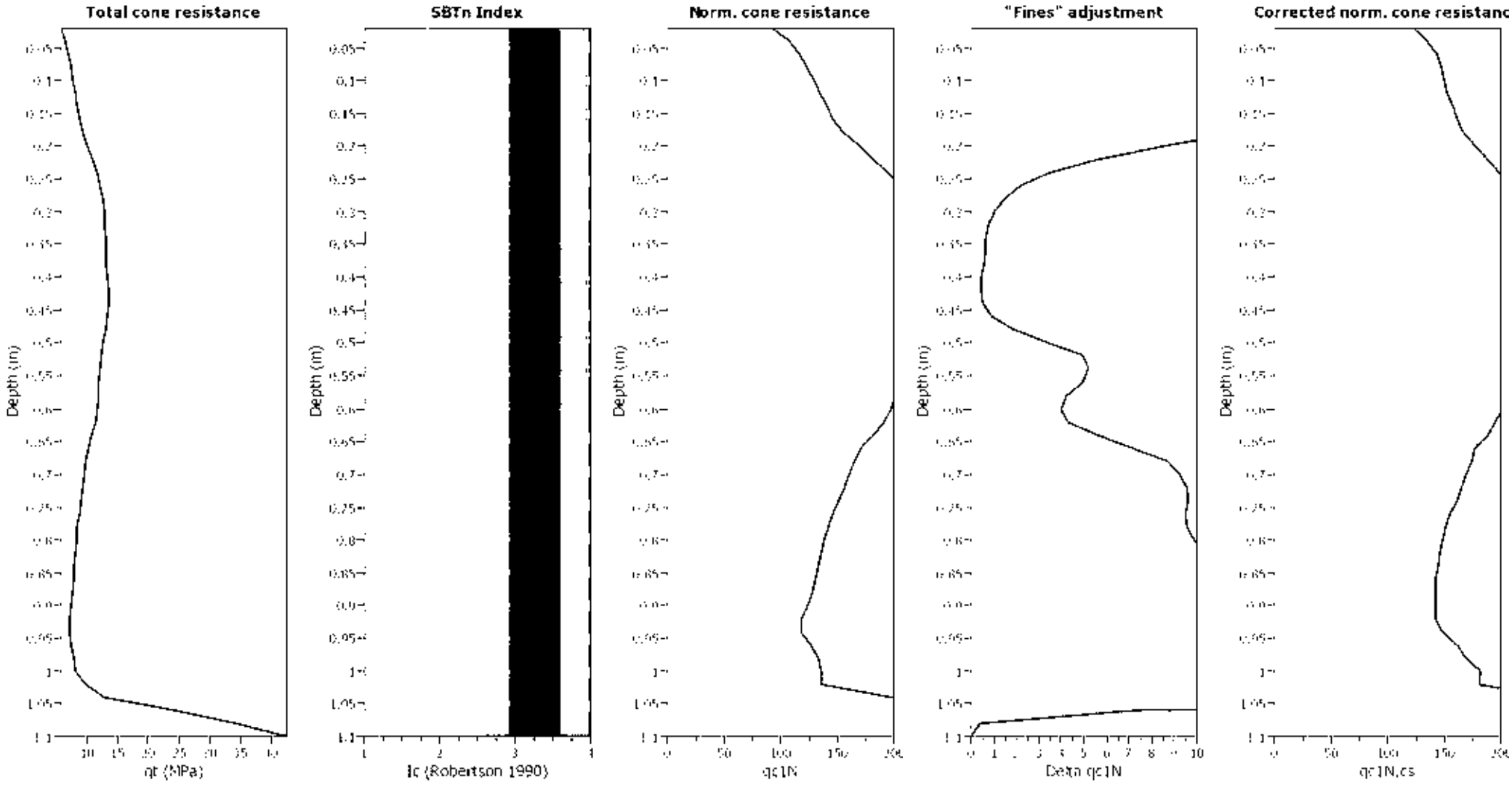
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

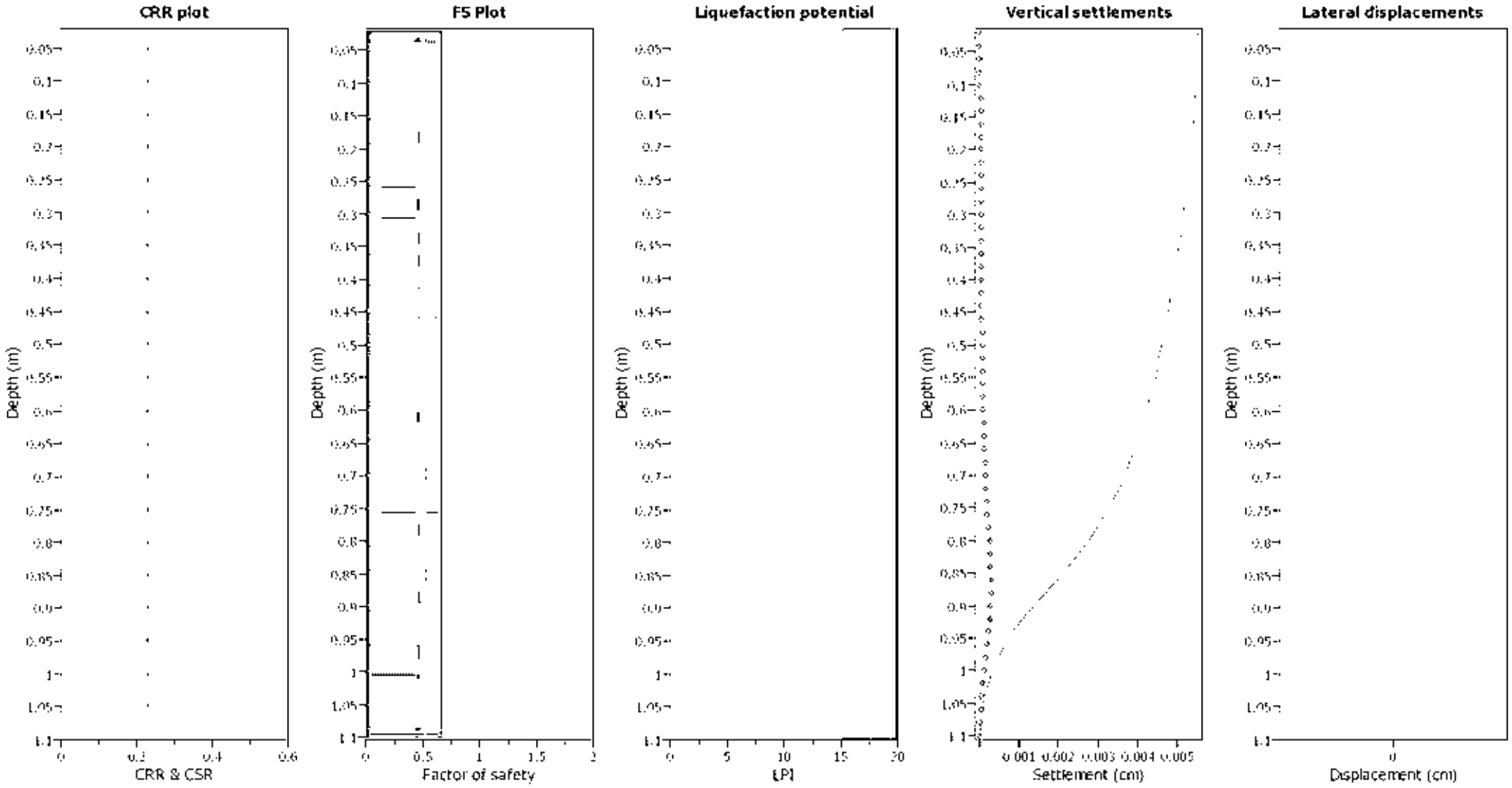
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

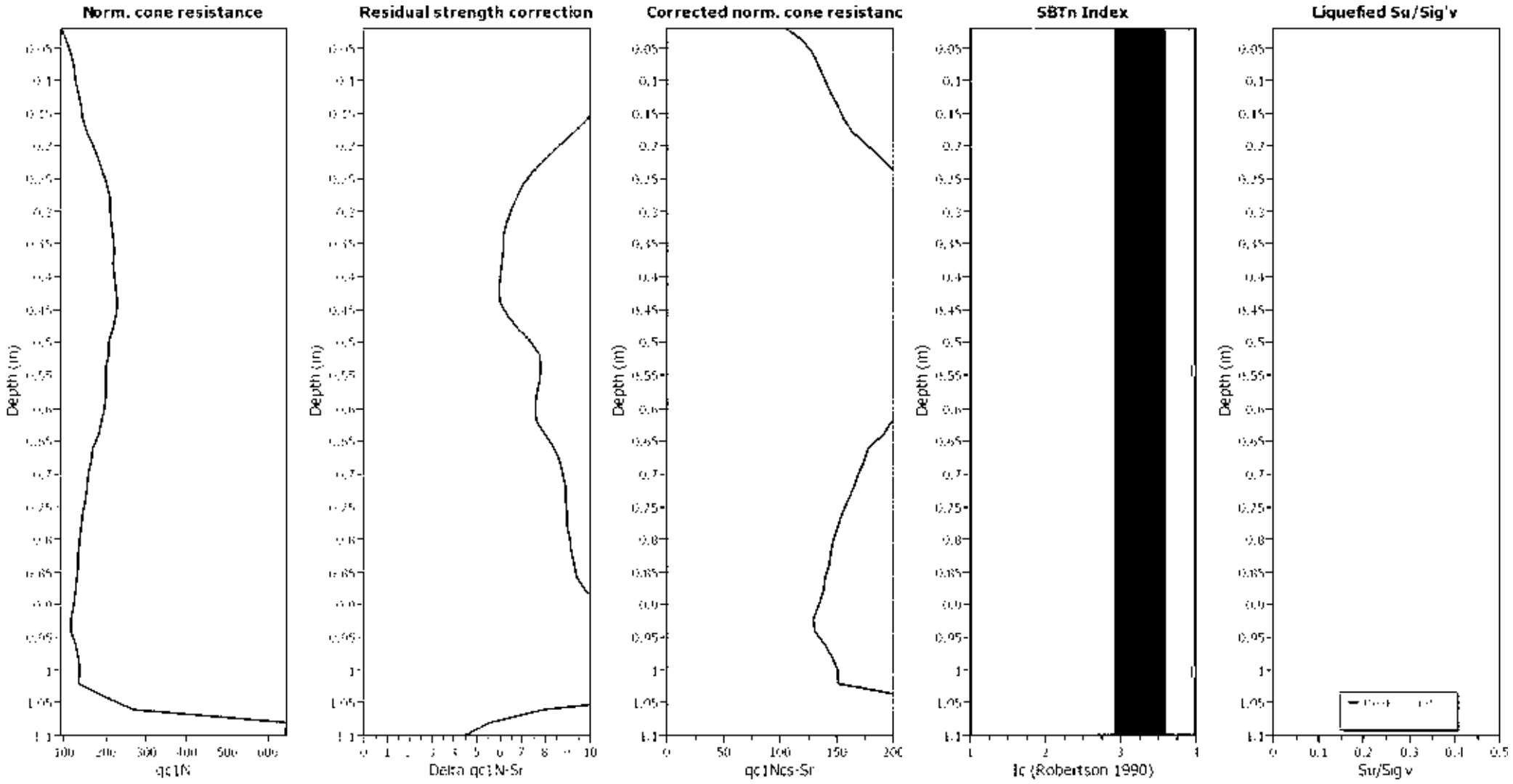
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

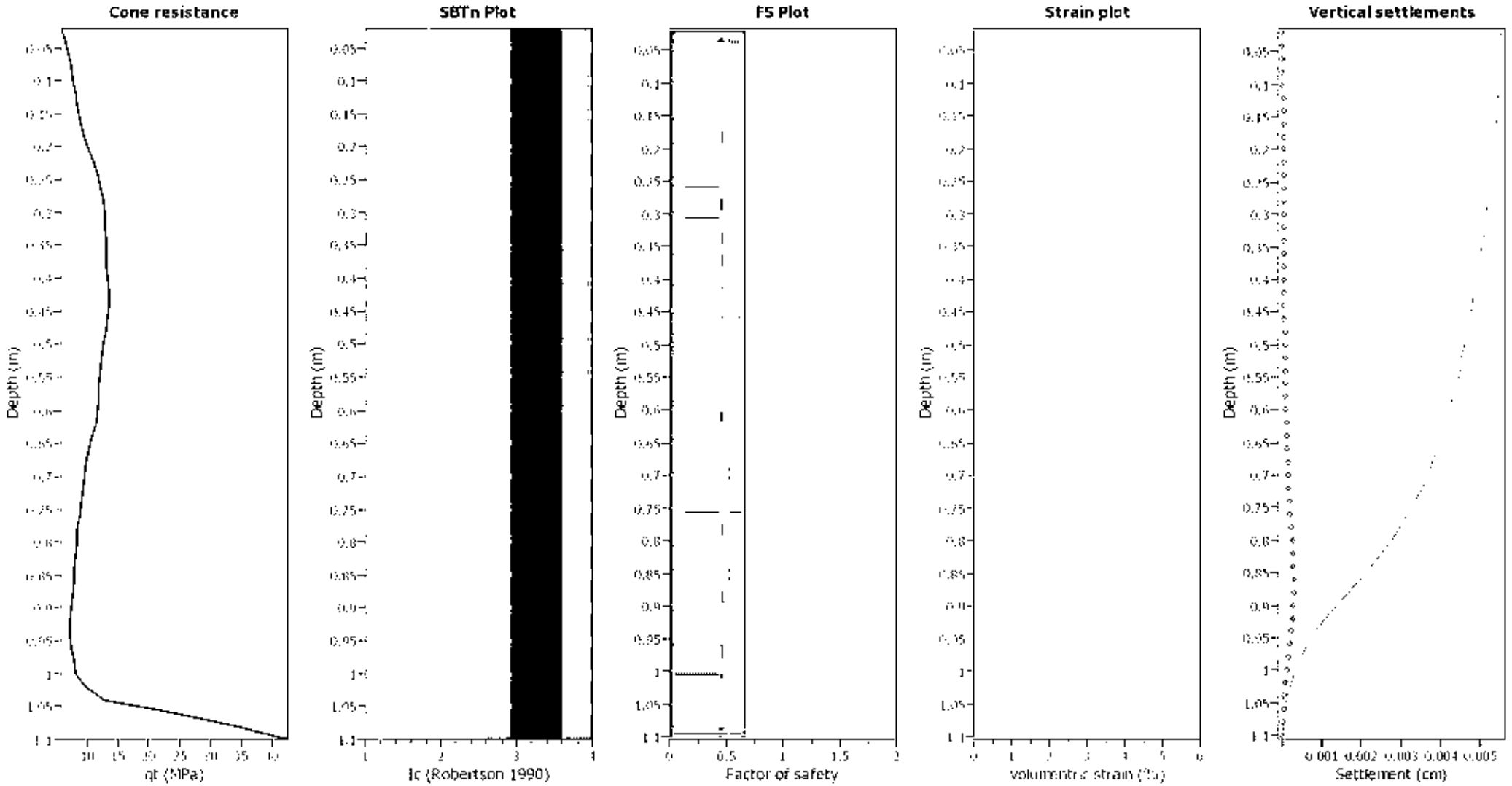
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

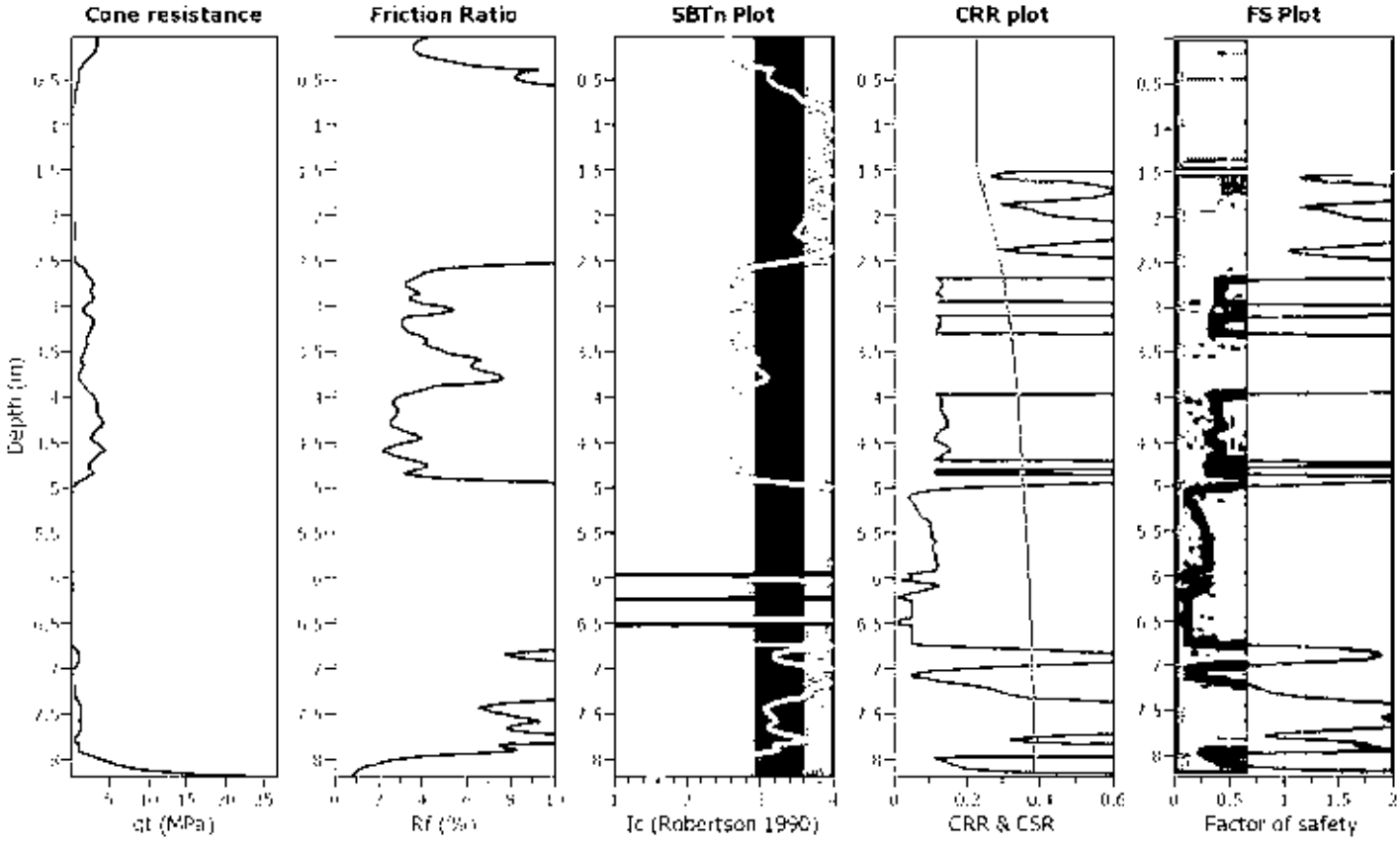
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

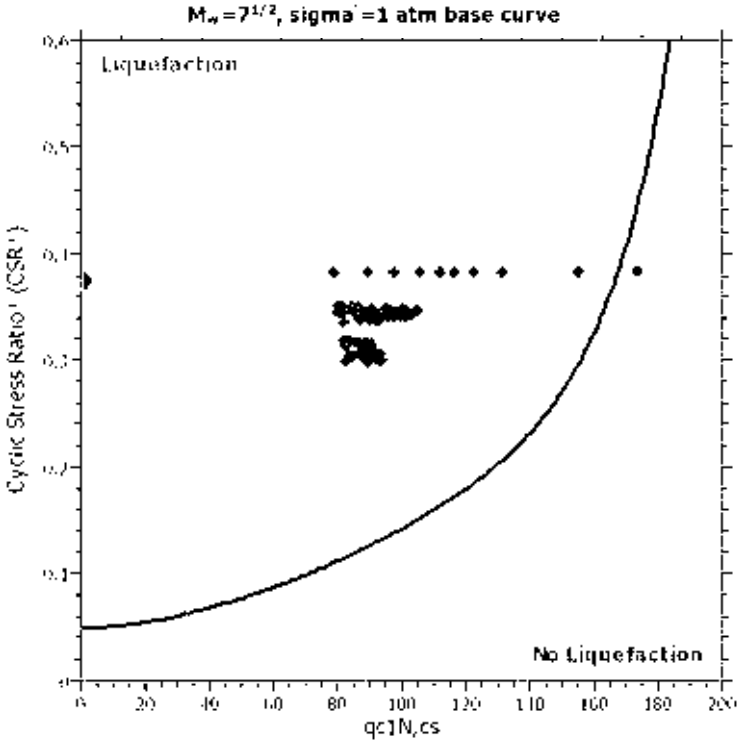
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

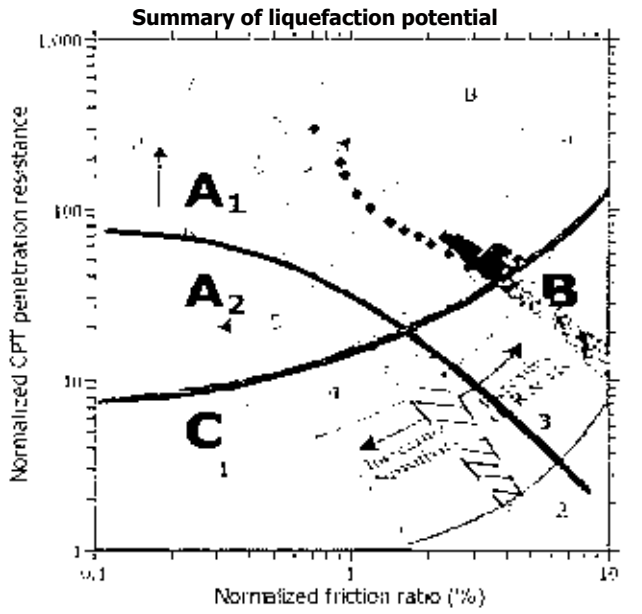
CPT file : CPT22_117KennedysBushRoad

Input parameters and analysis data

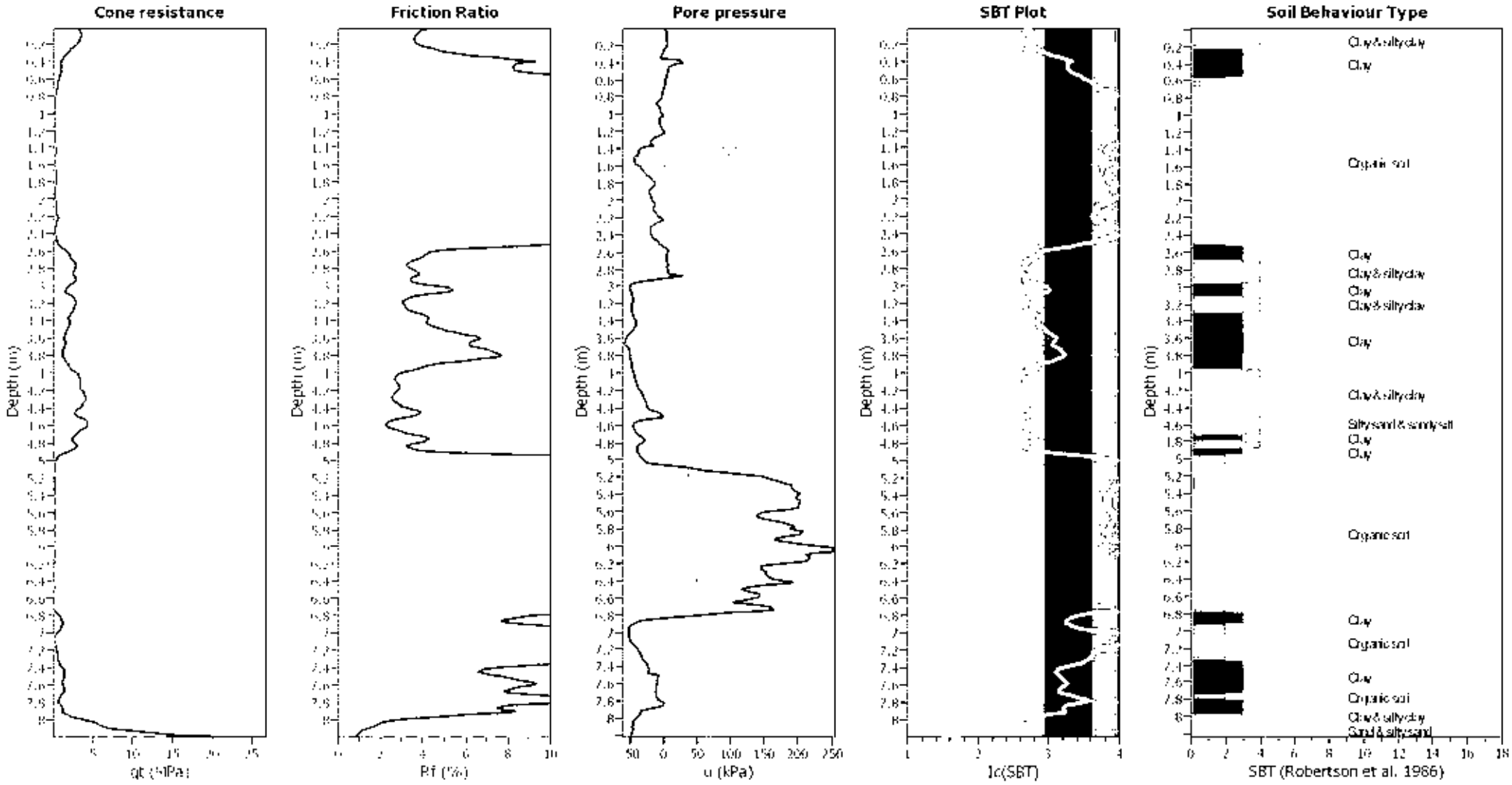
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



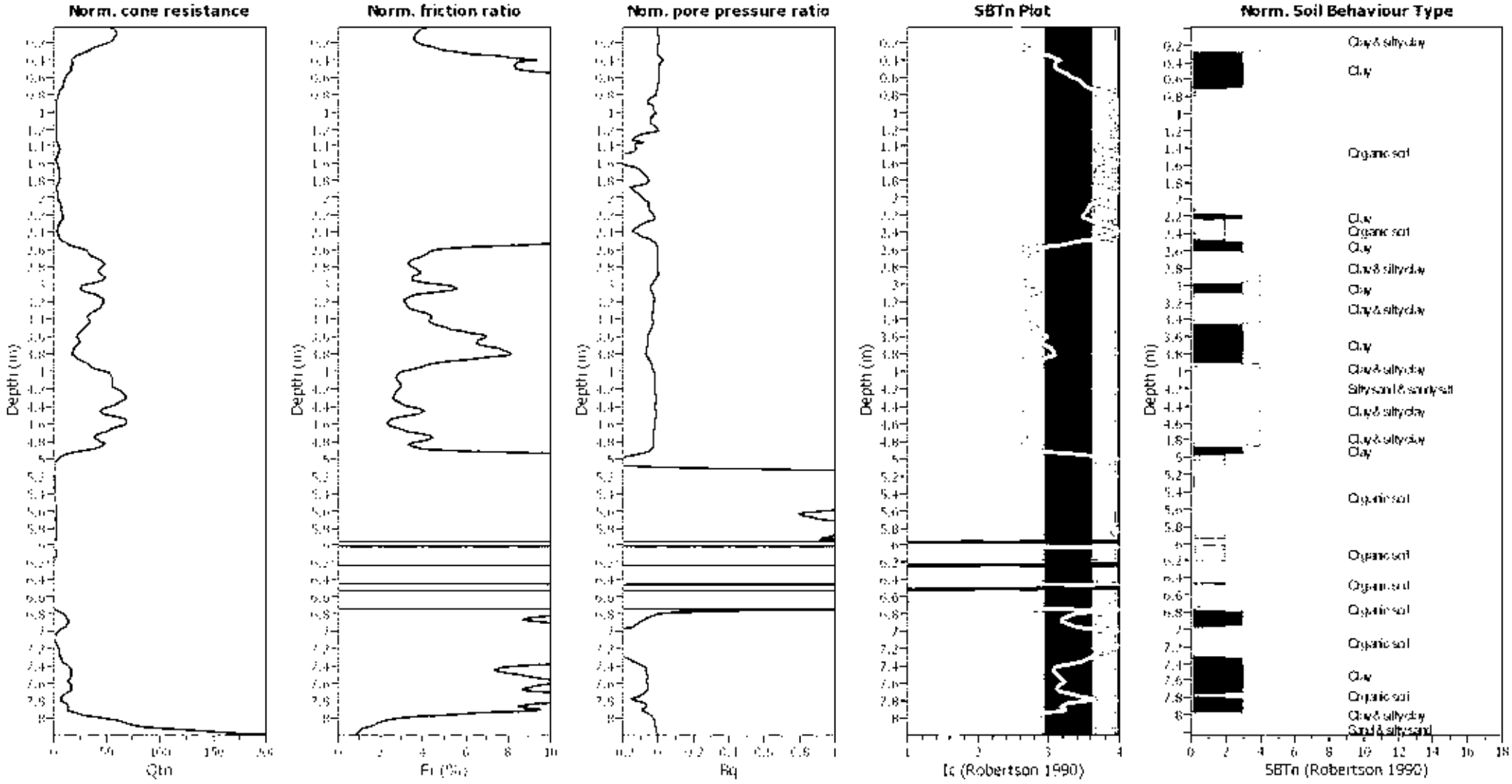
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



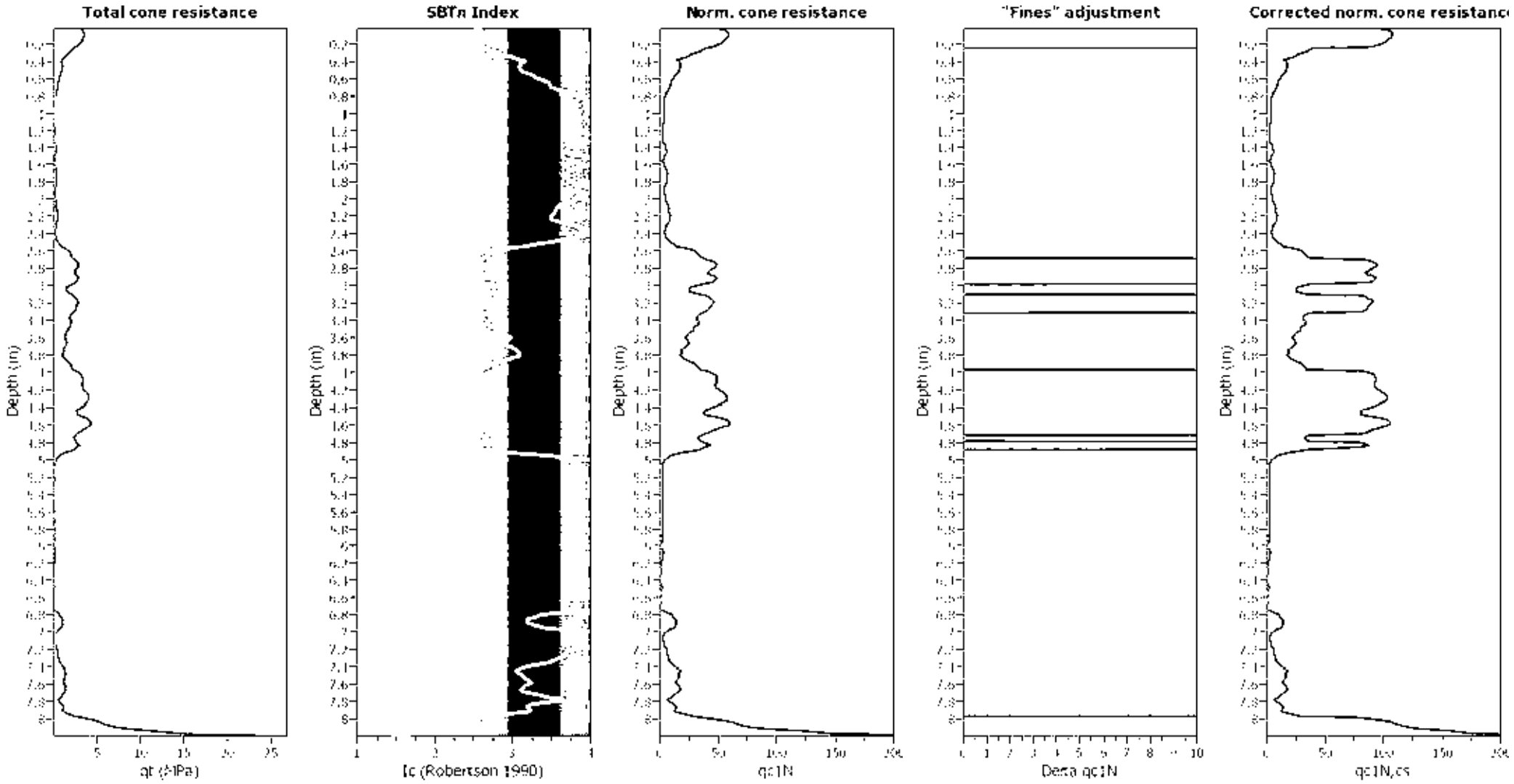
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

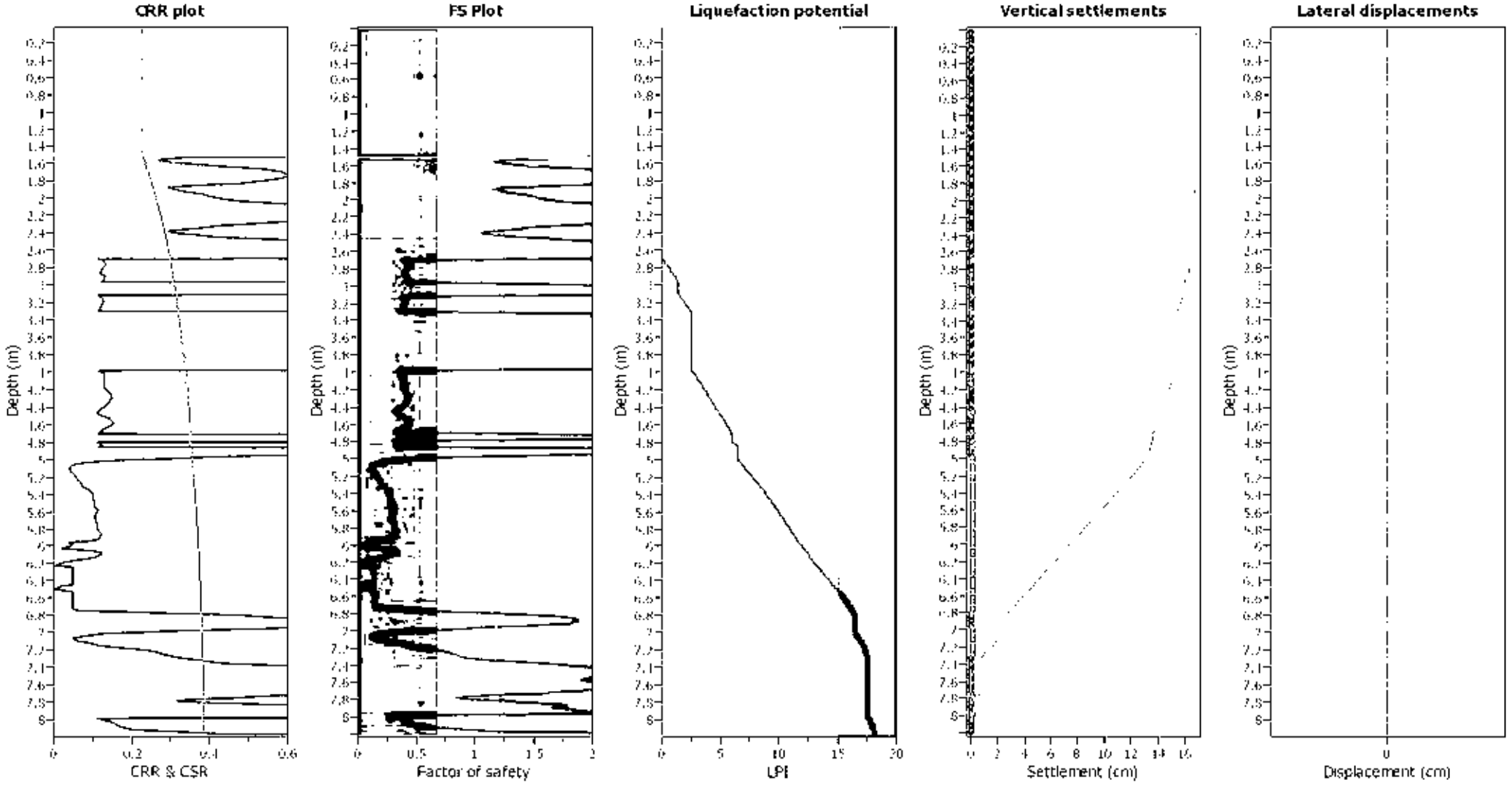
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

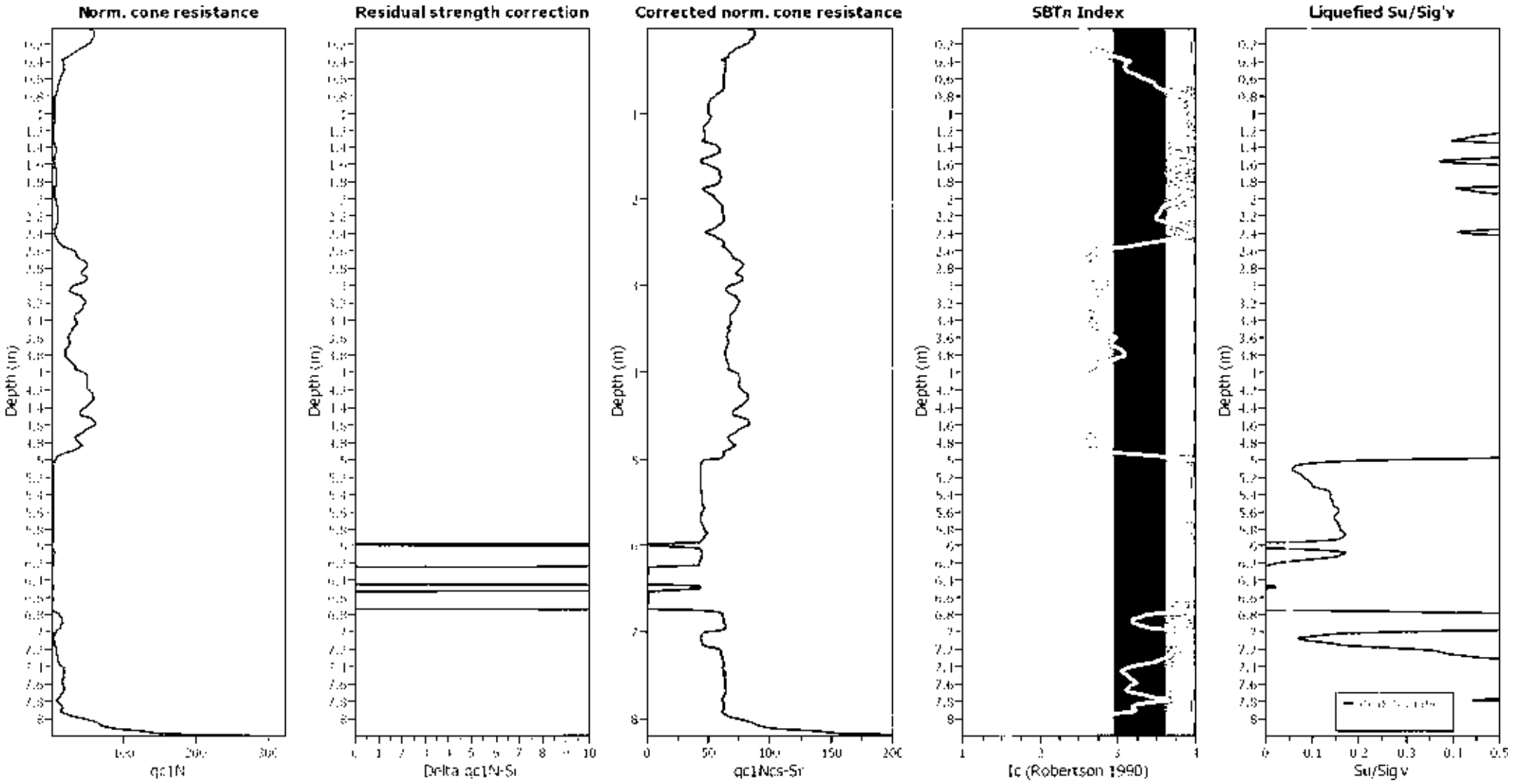
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

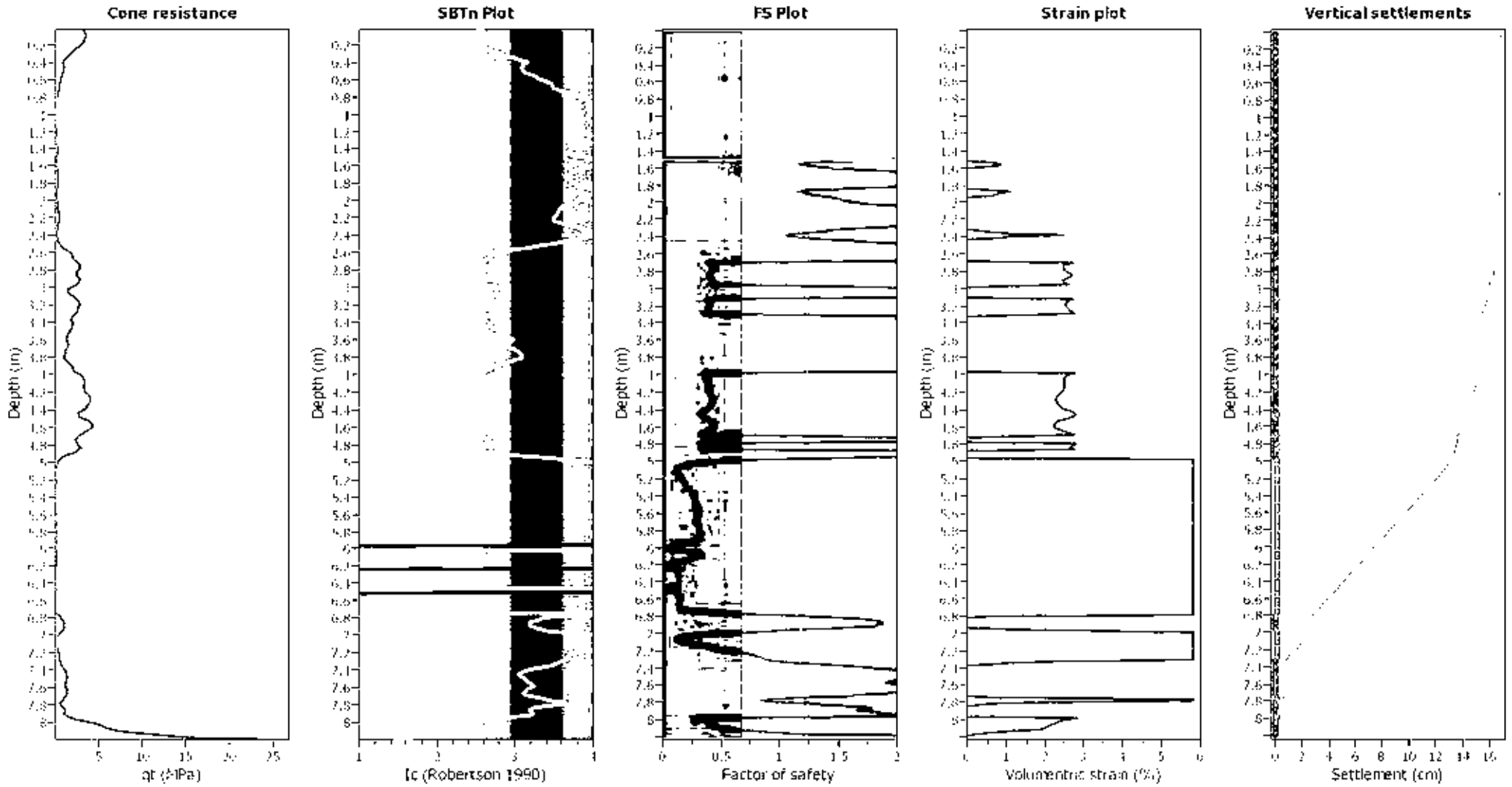
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

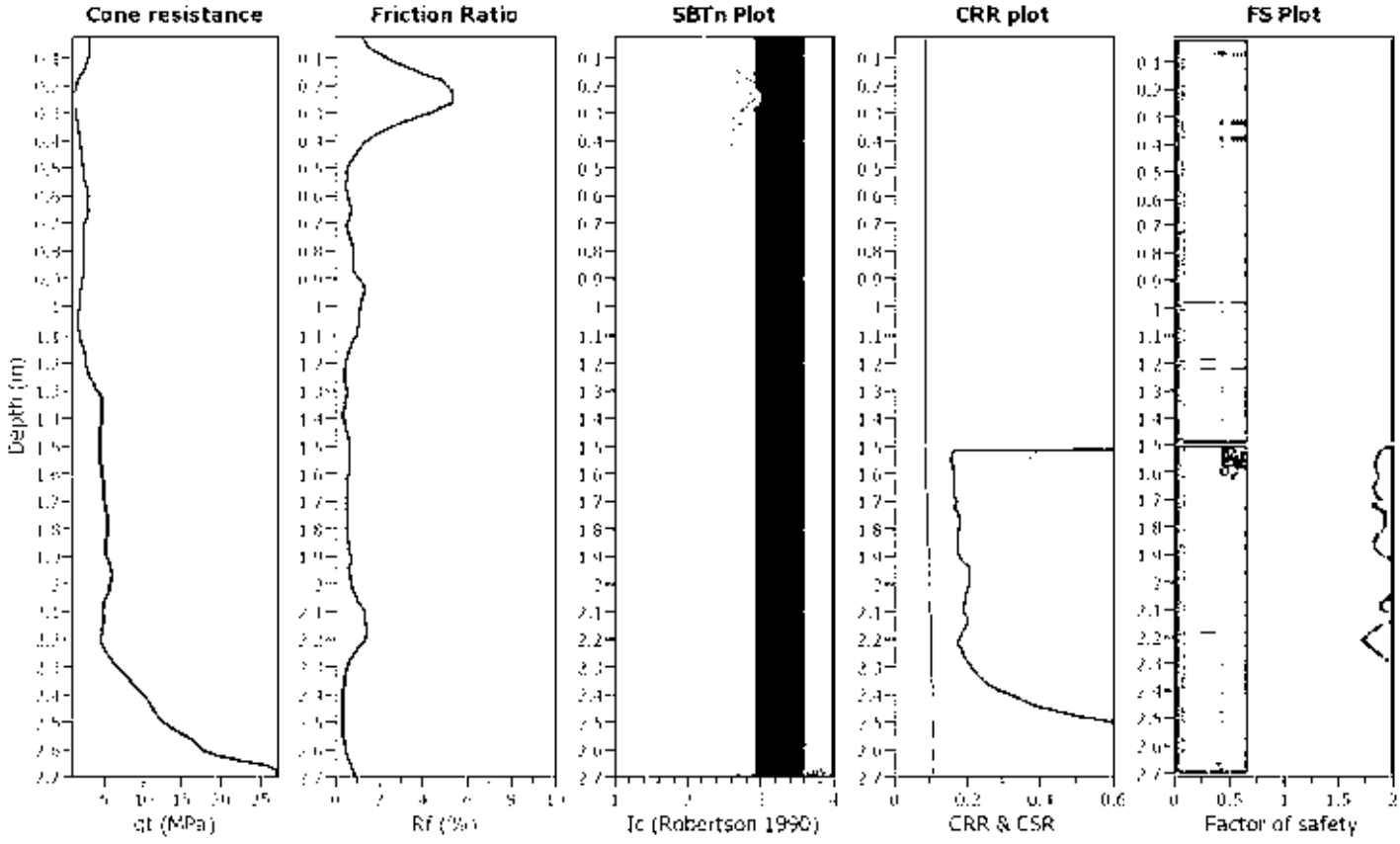
Beca Ltd
Geotechnical Engineers
www.beca.com

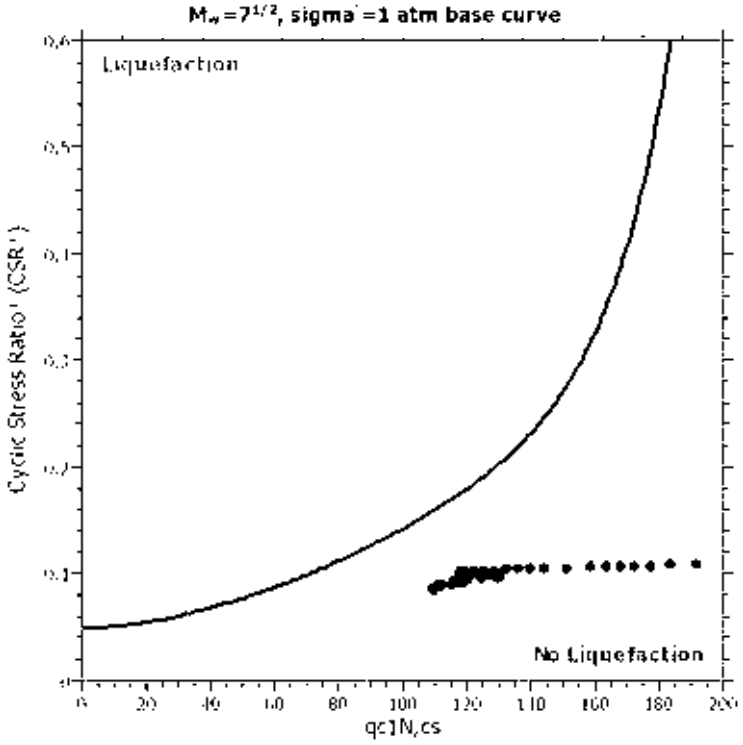
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

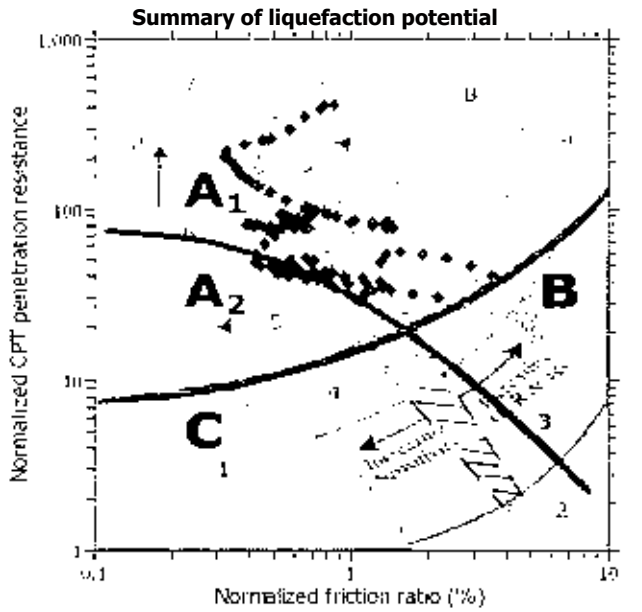
CPT file : CPT23_470SparksRd

Input parameters and analysis data

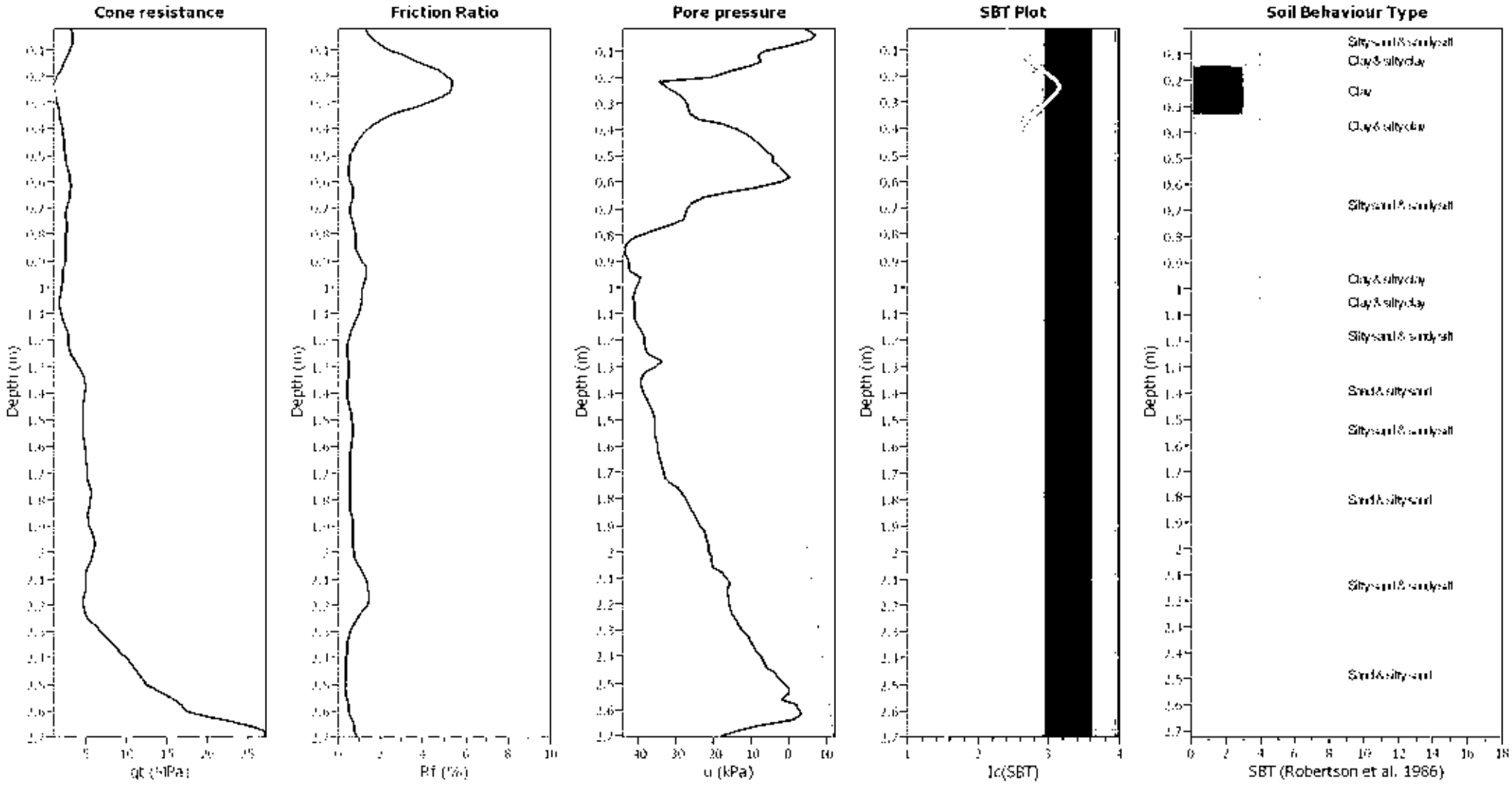
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



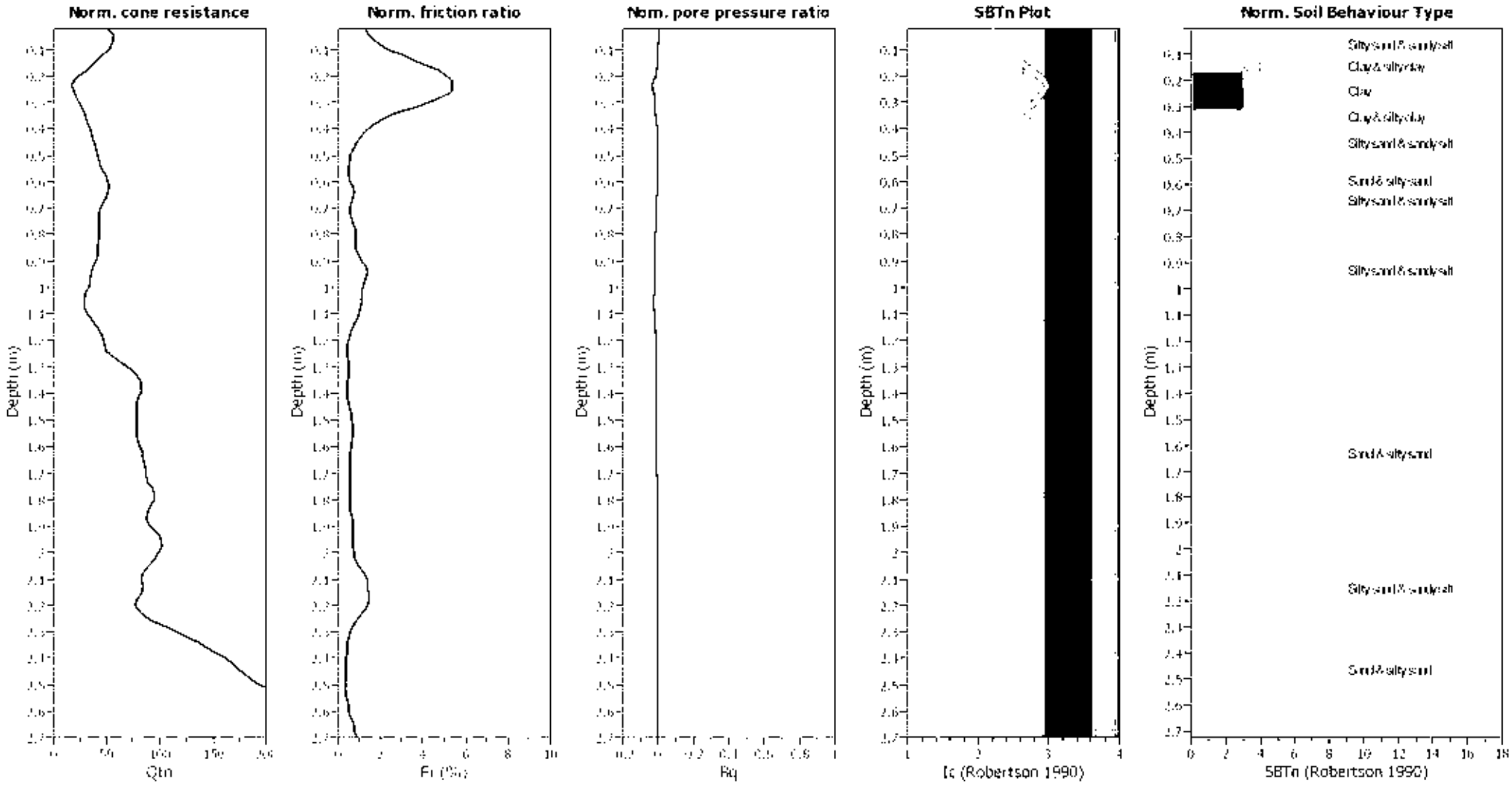
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



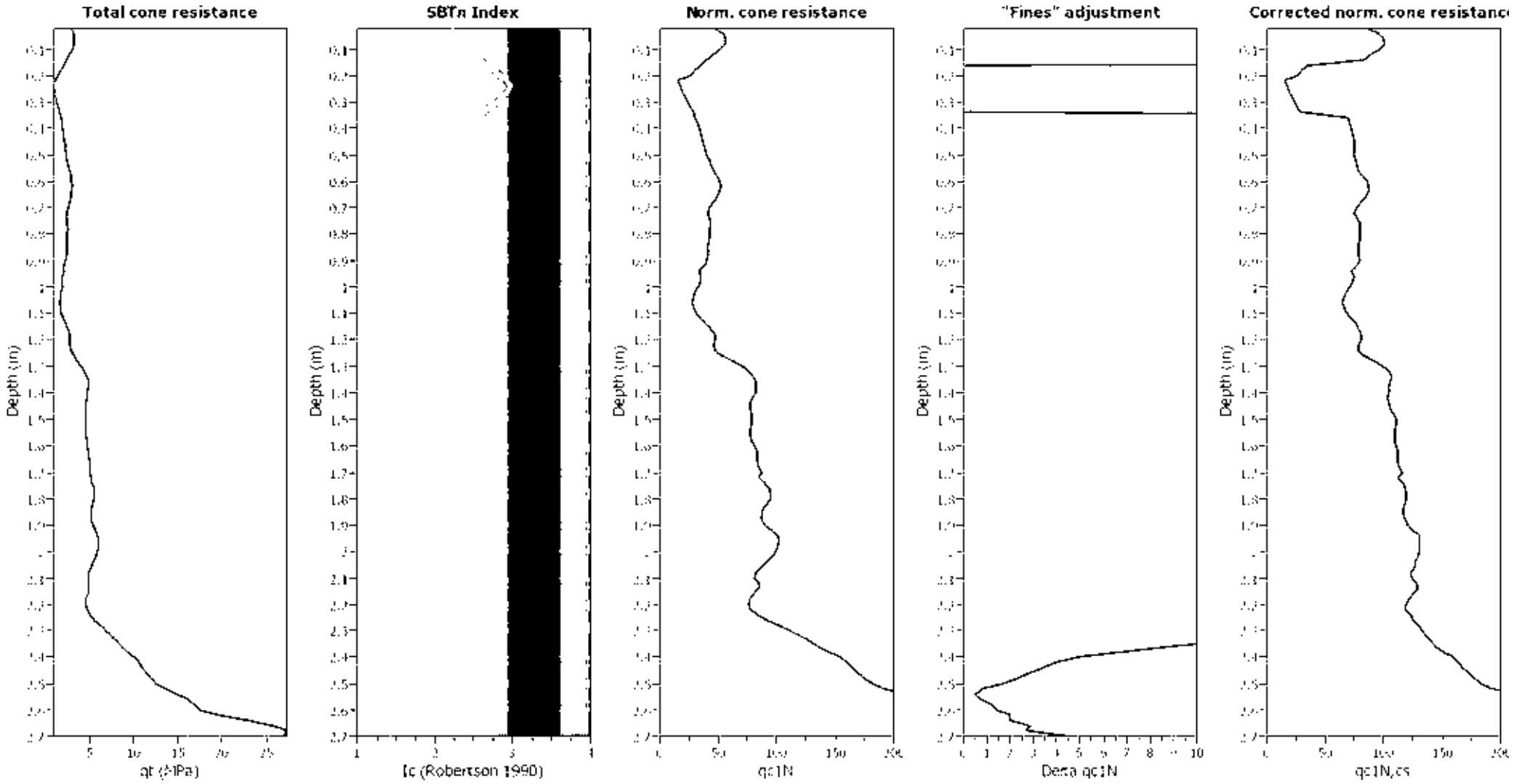
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

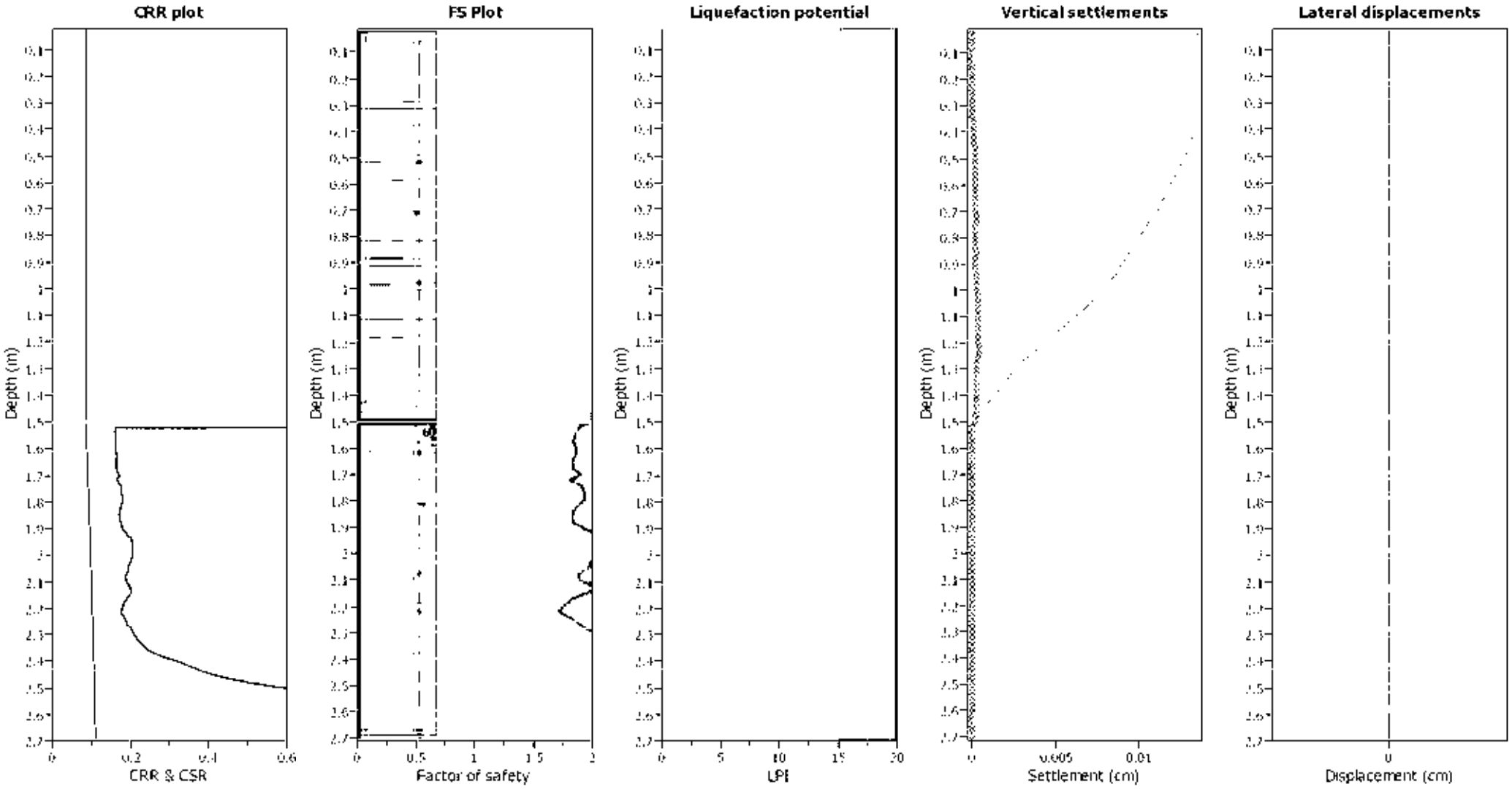
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

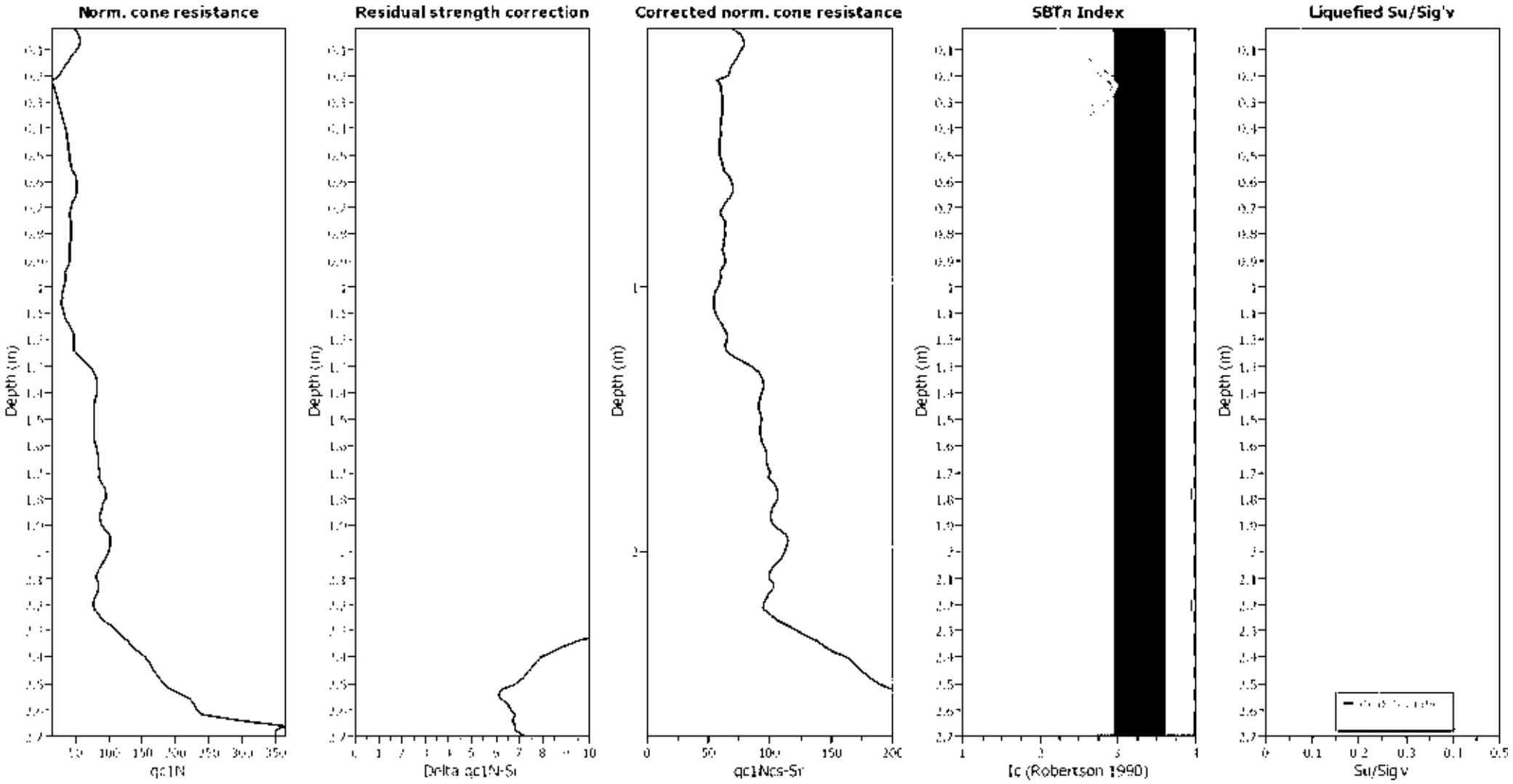
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

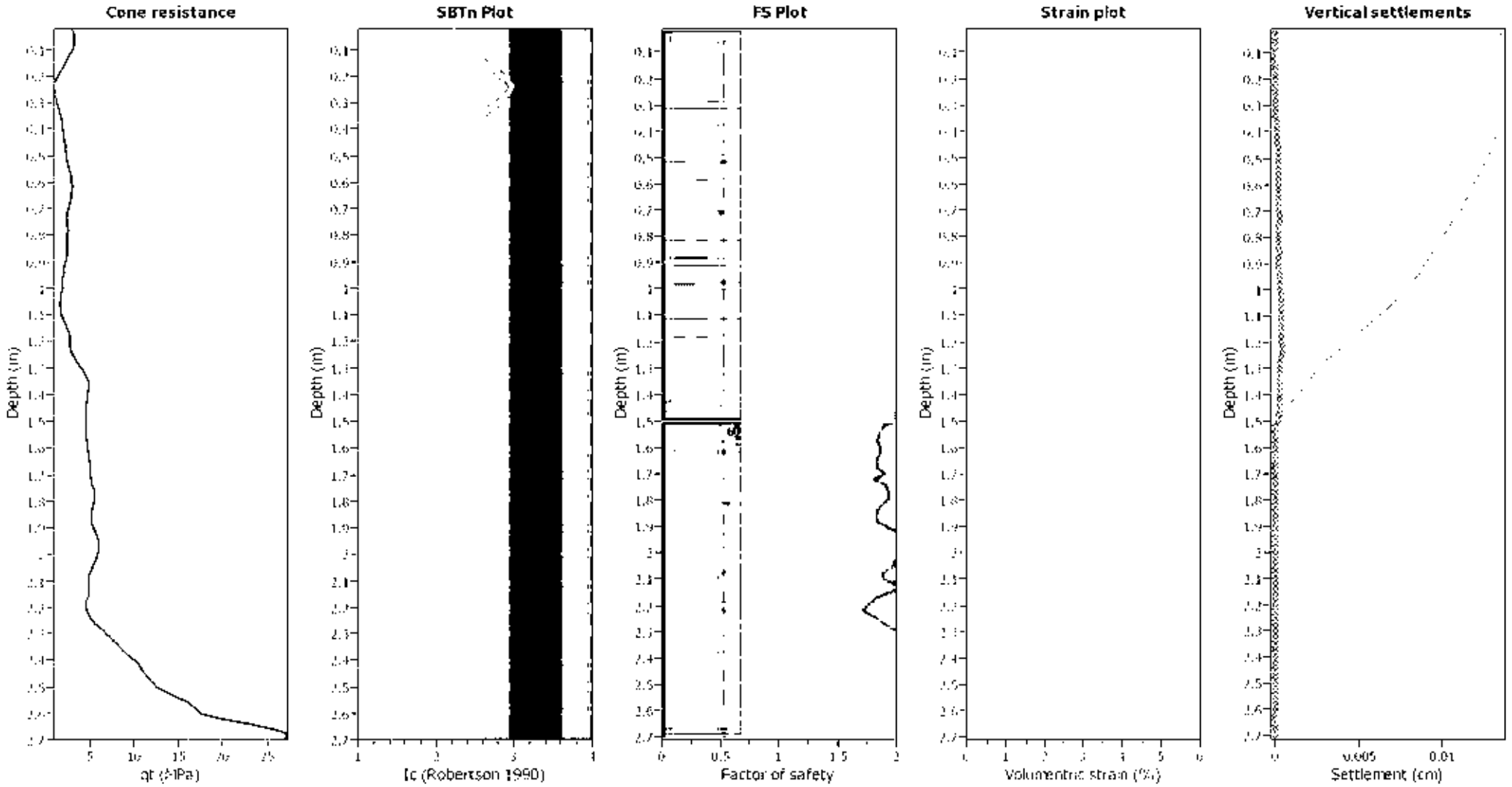
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

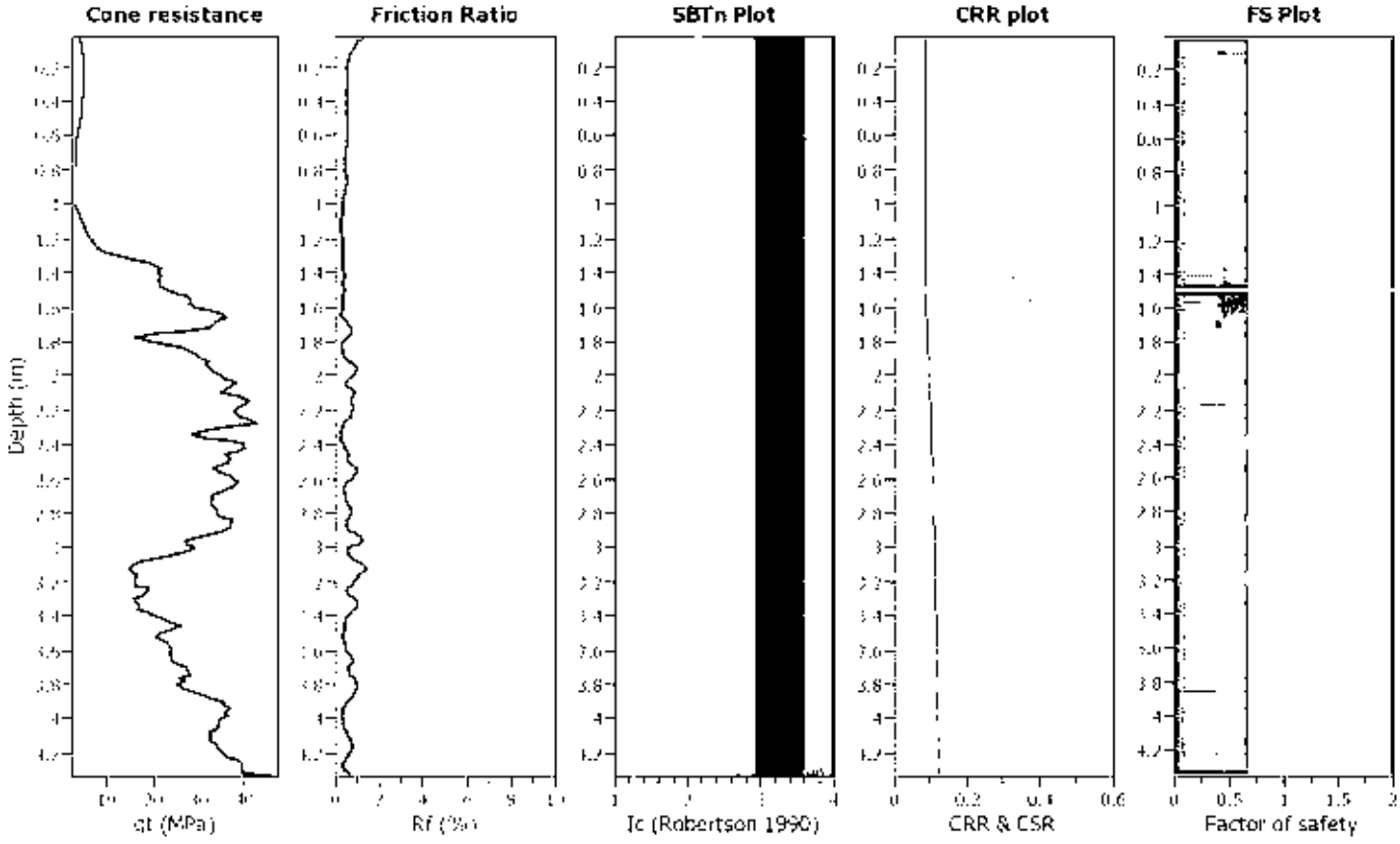
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

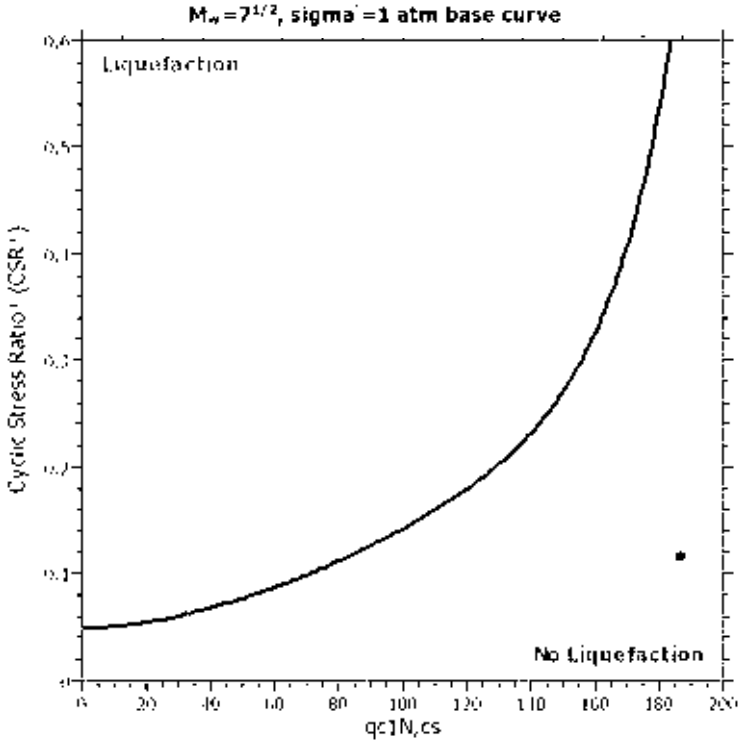
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

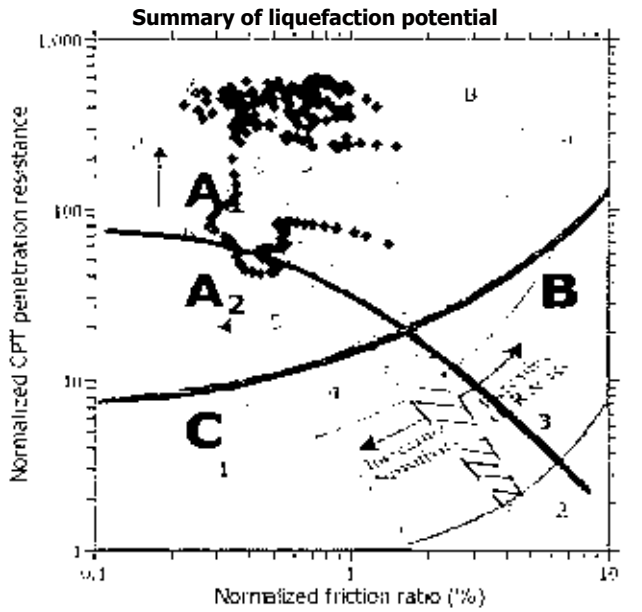
CPT file : CPT24_119SutherlandsRd

Input parameters and analysis data

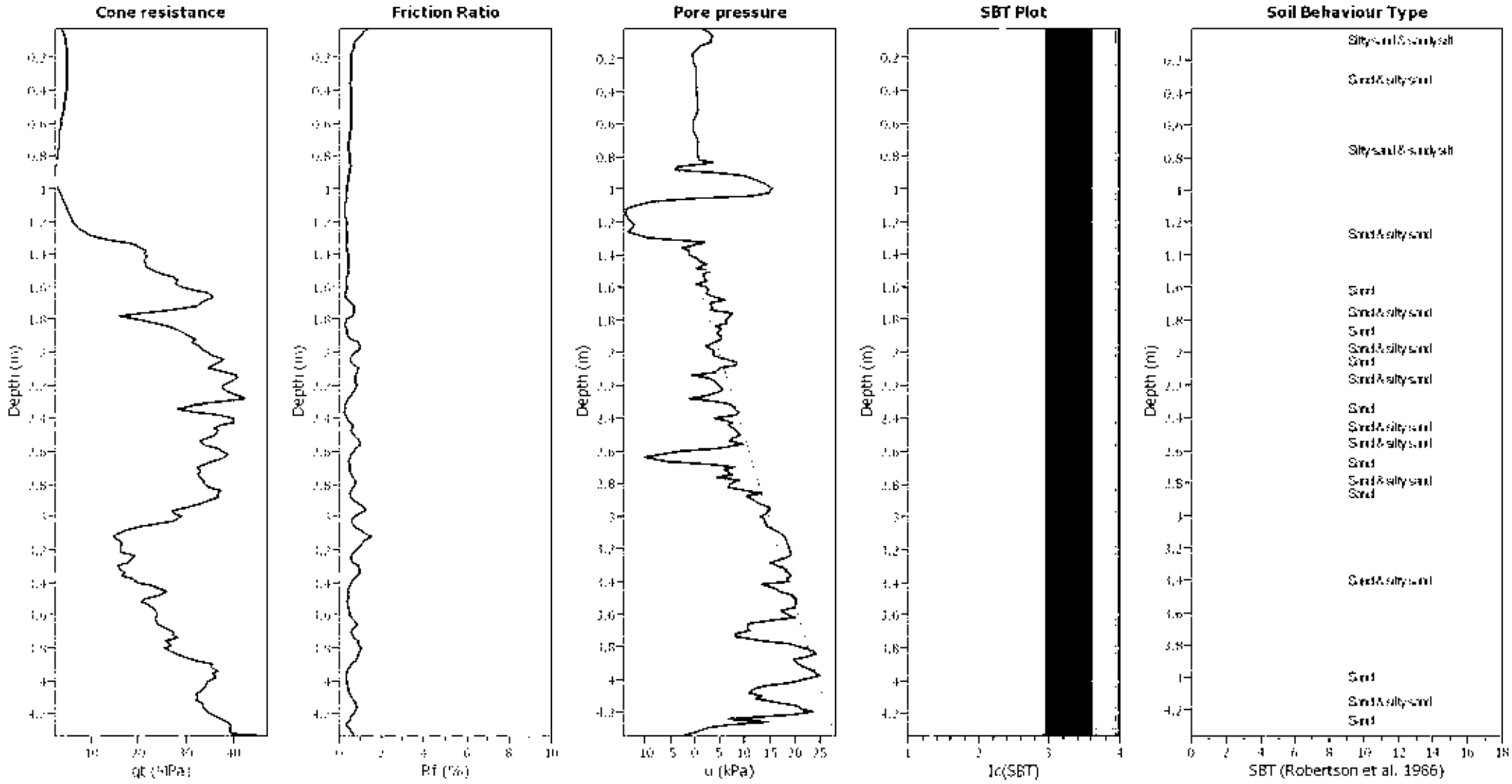
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



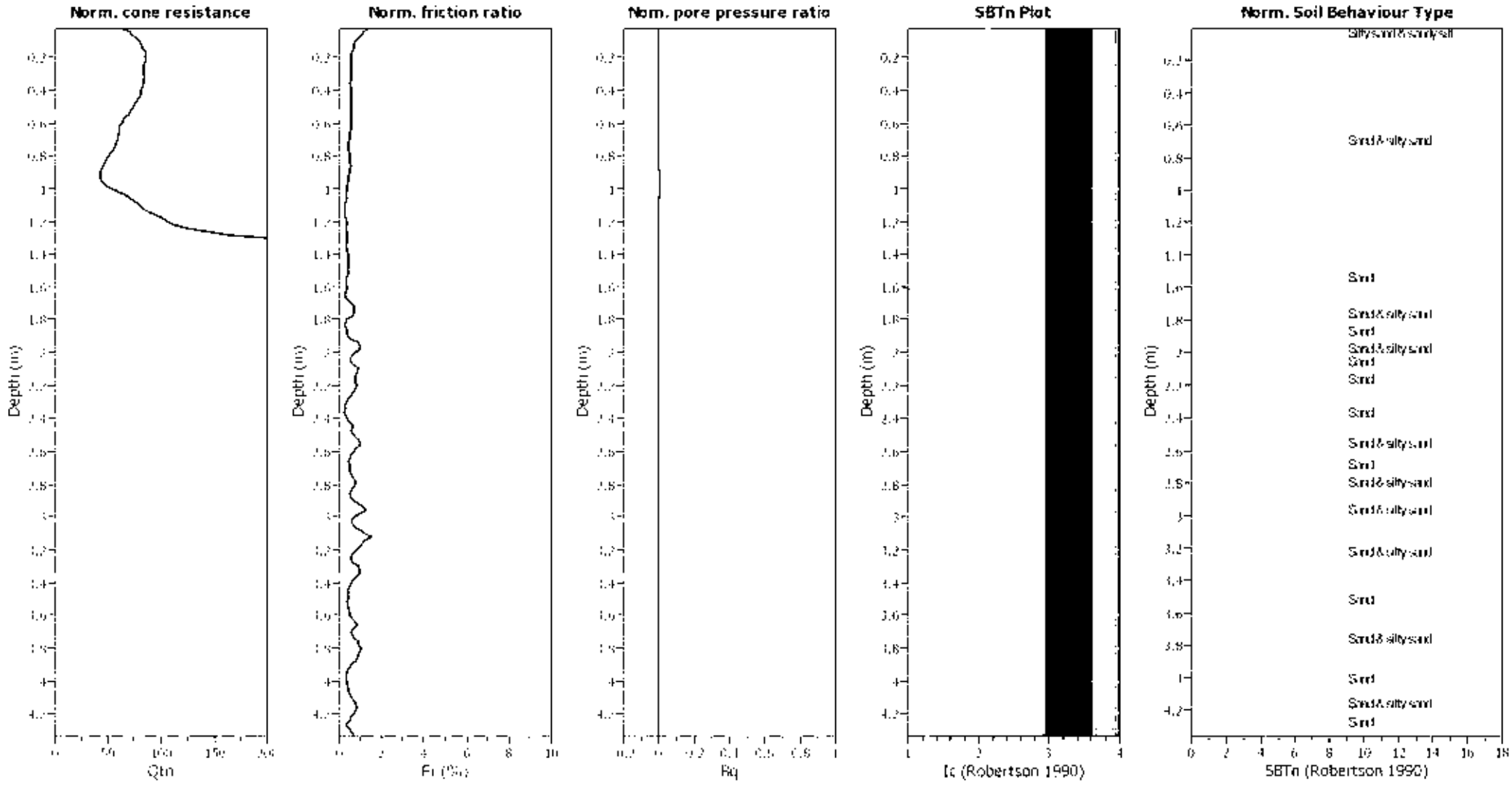
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



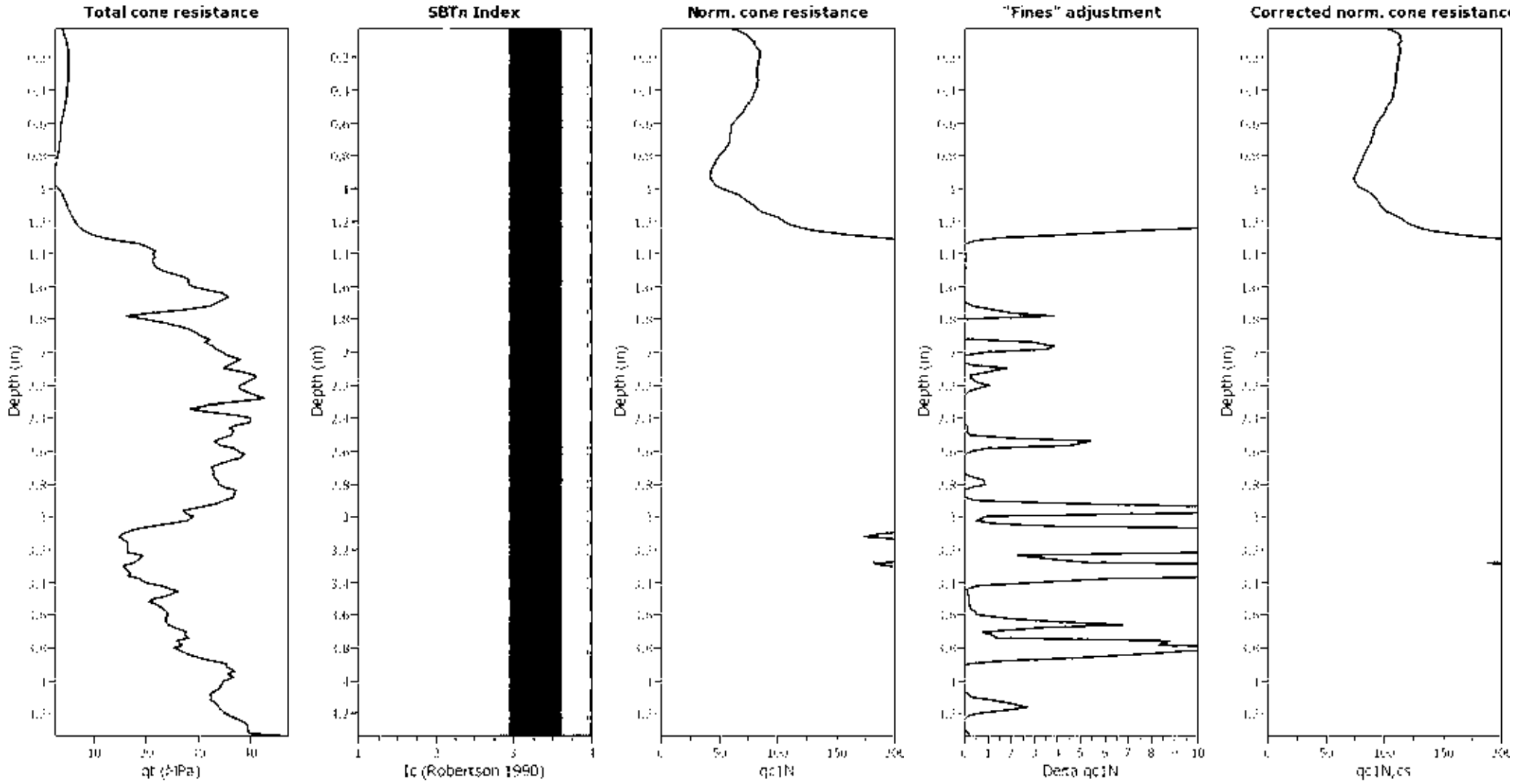
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

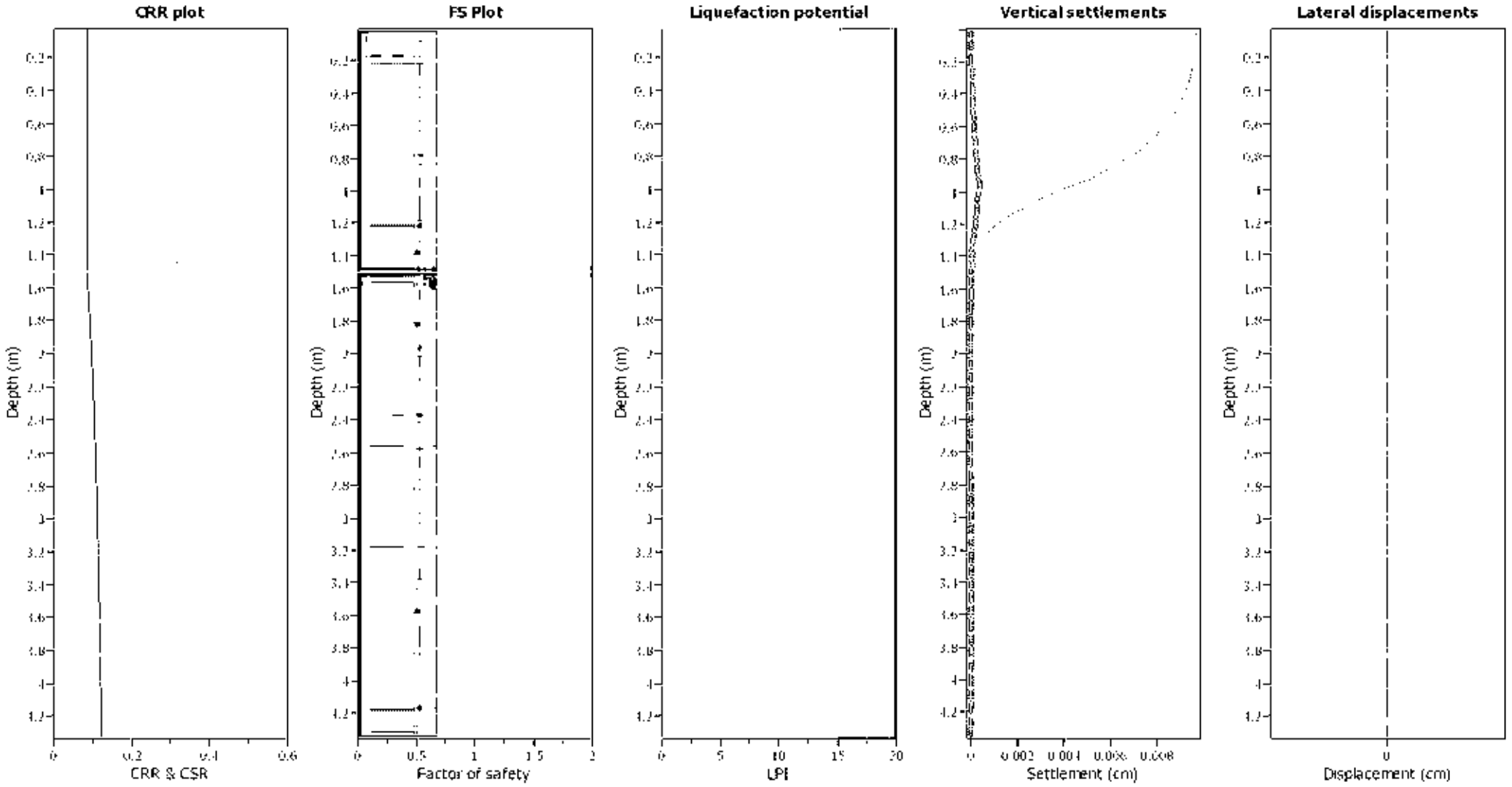
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

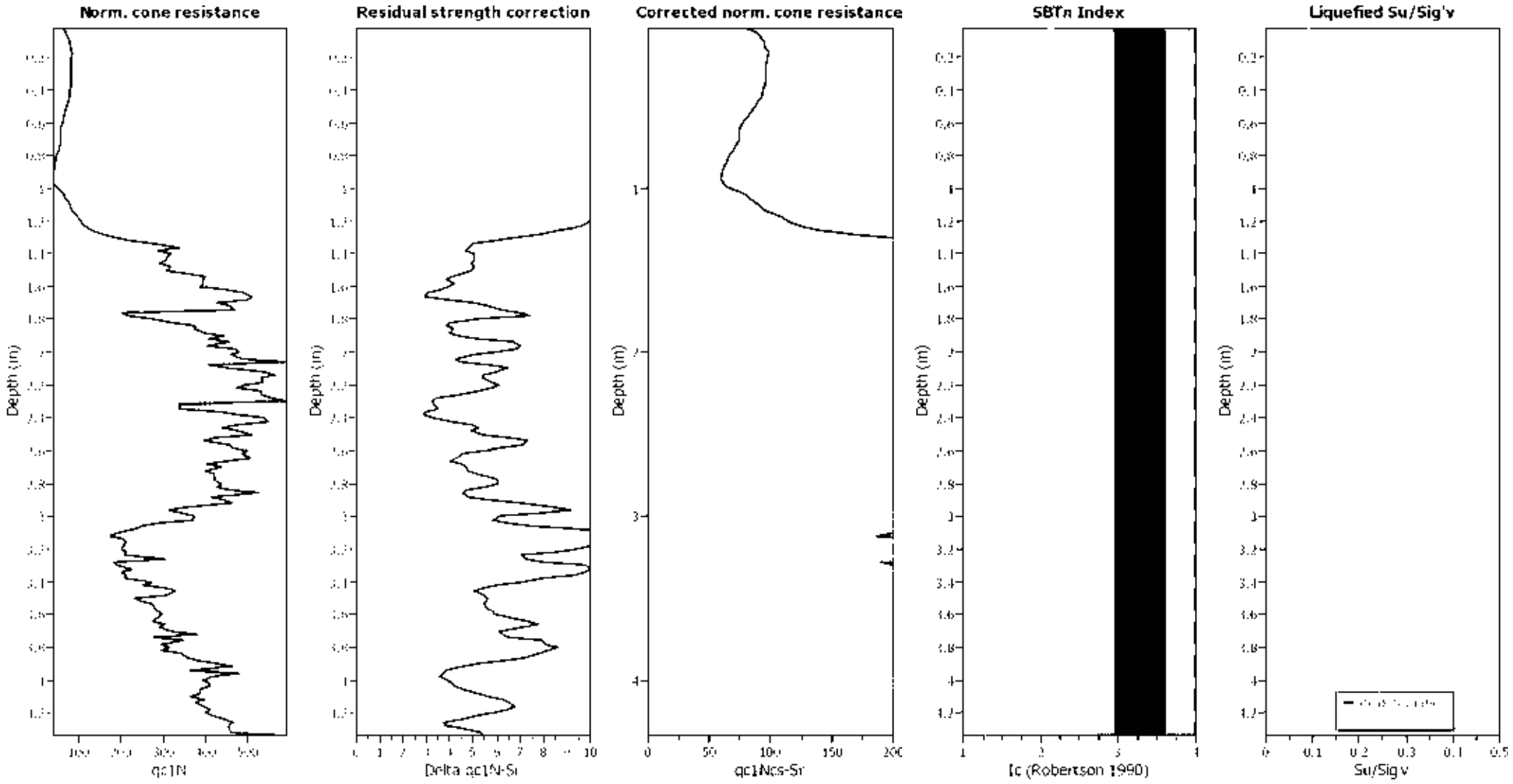
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

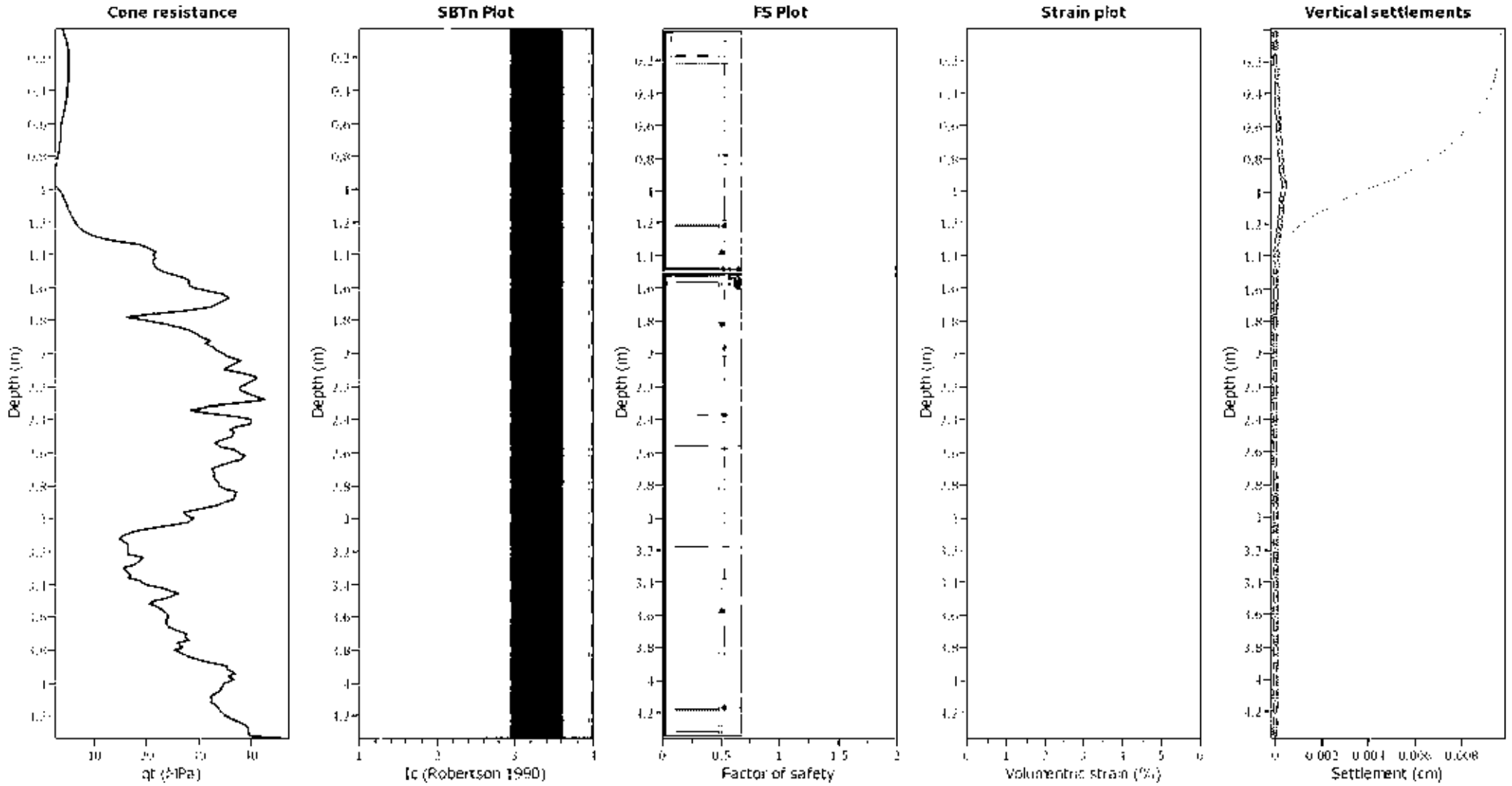
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

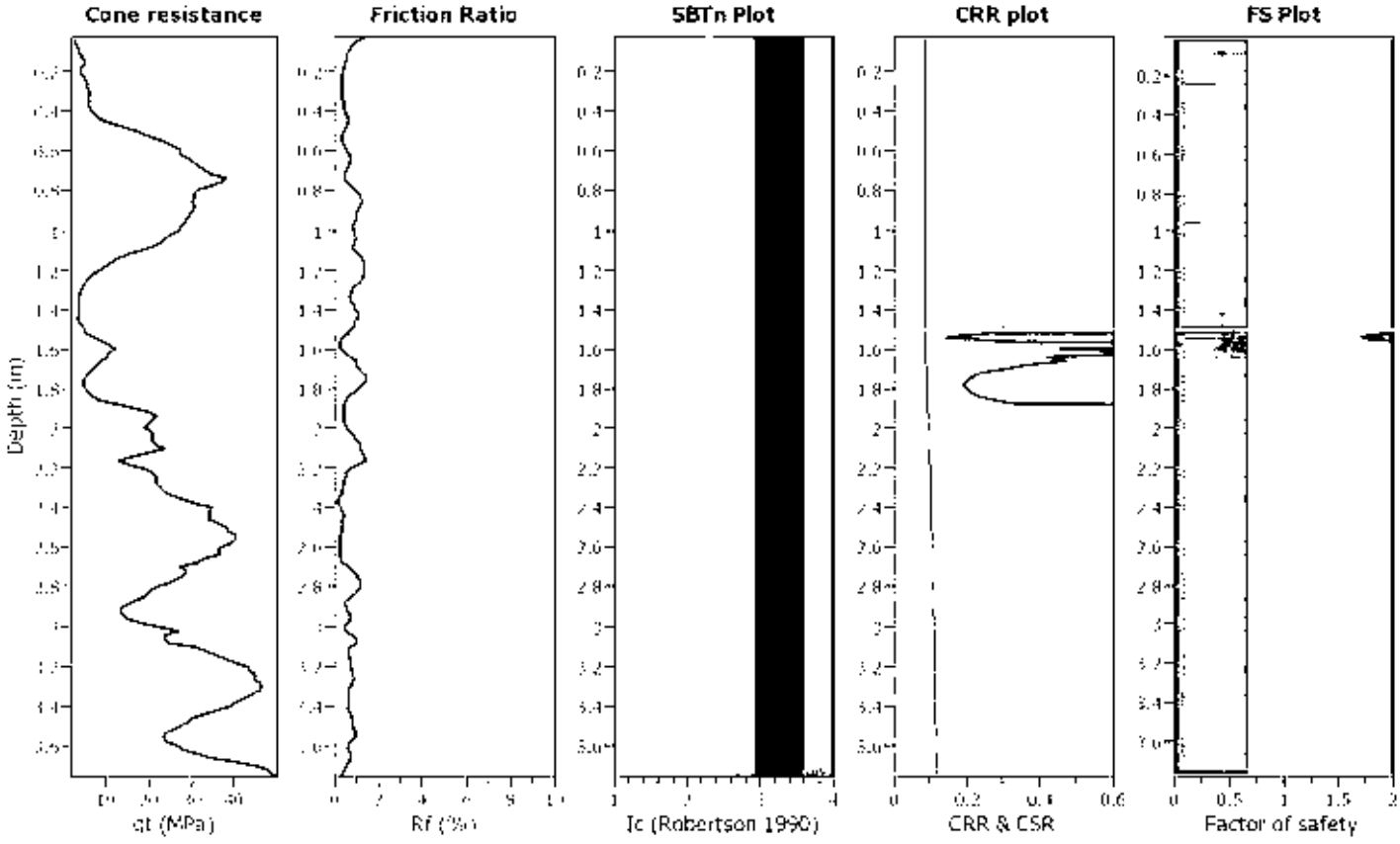
qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

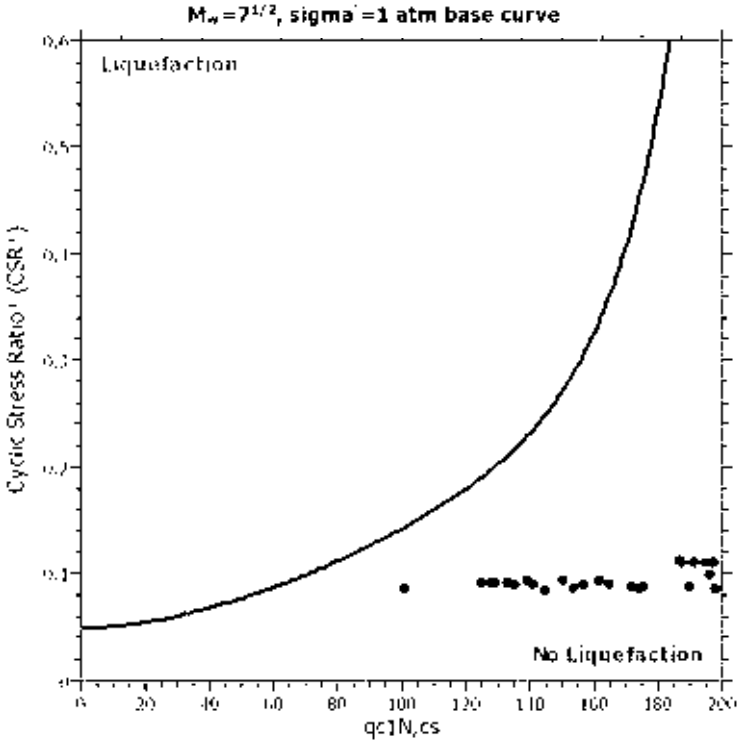
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

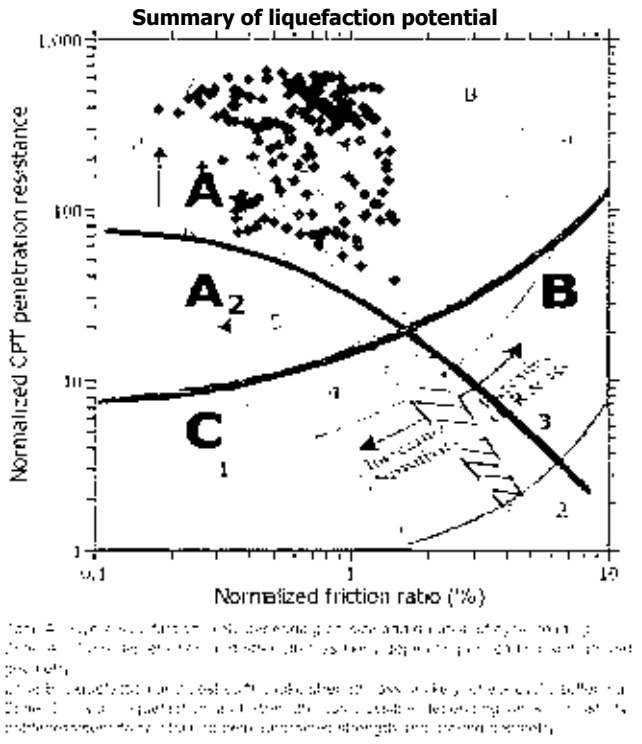
CPT file : CPT25_25KennedysBushRd

Input parameters and analysis data

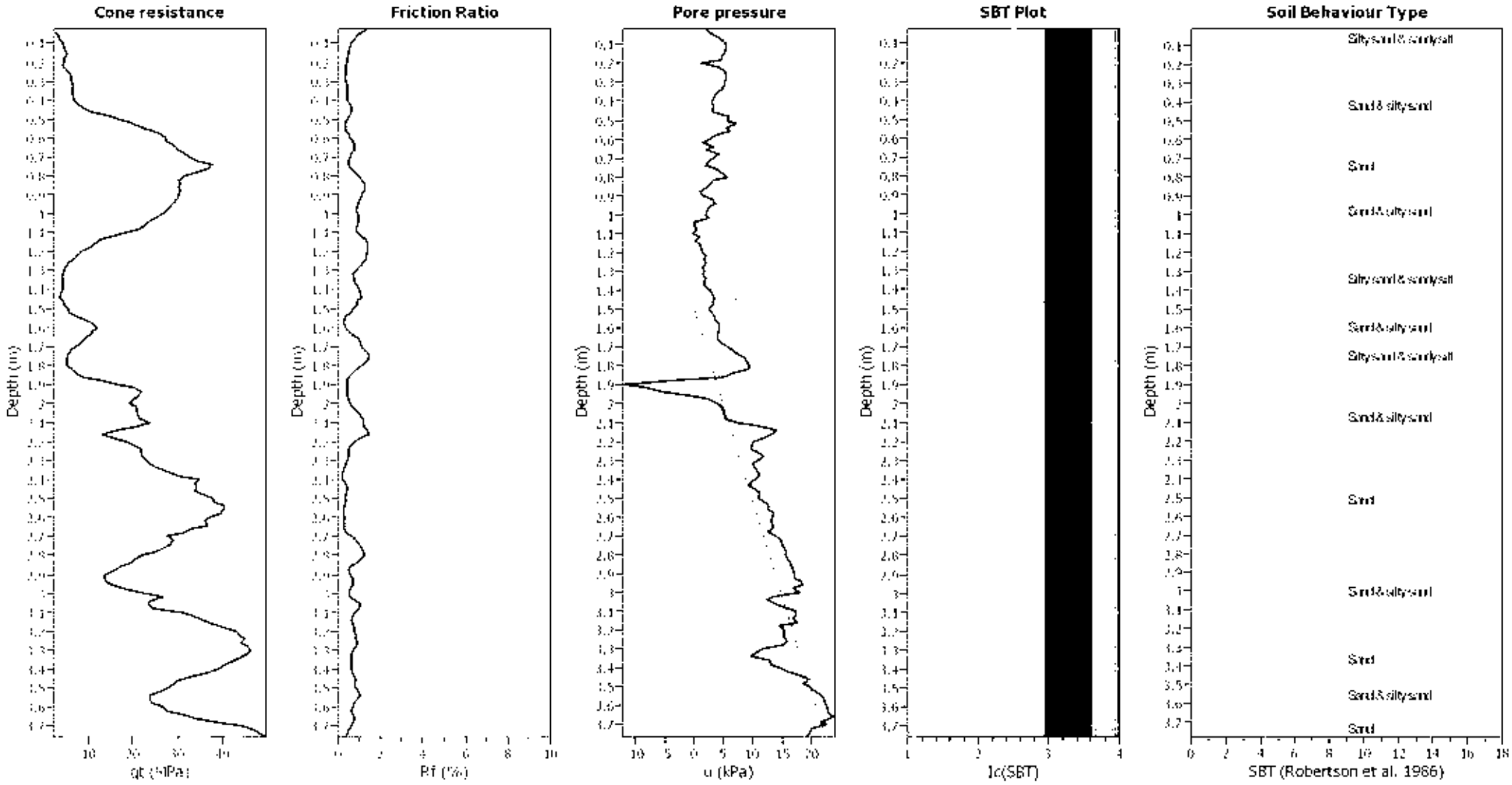
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



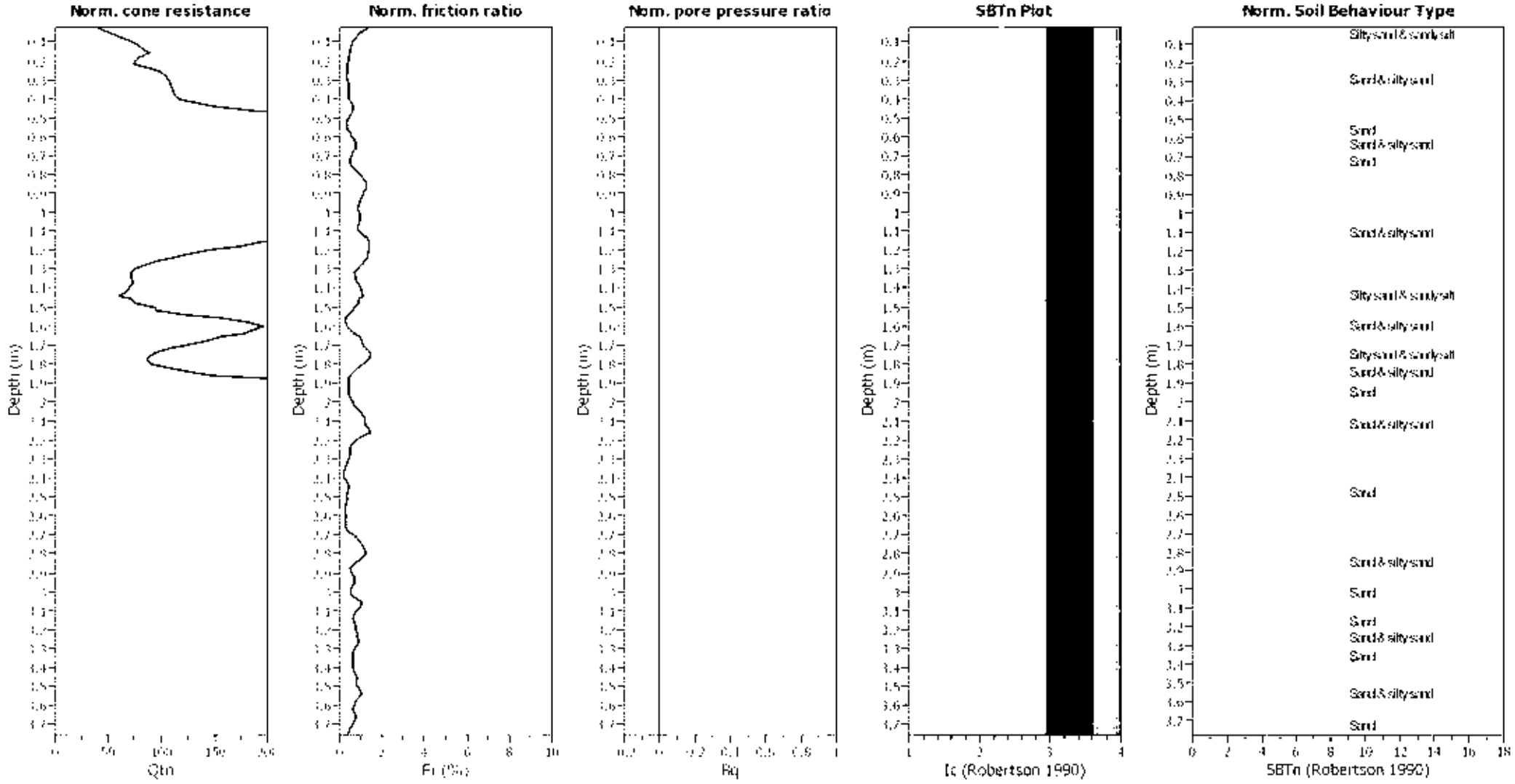
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



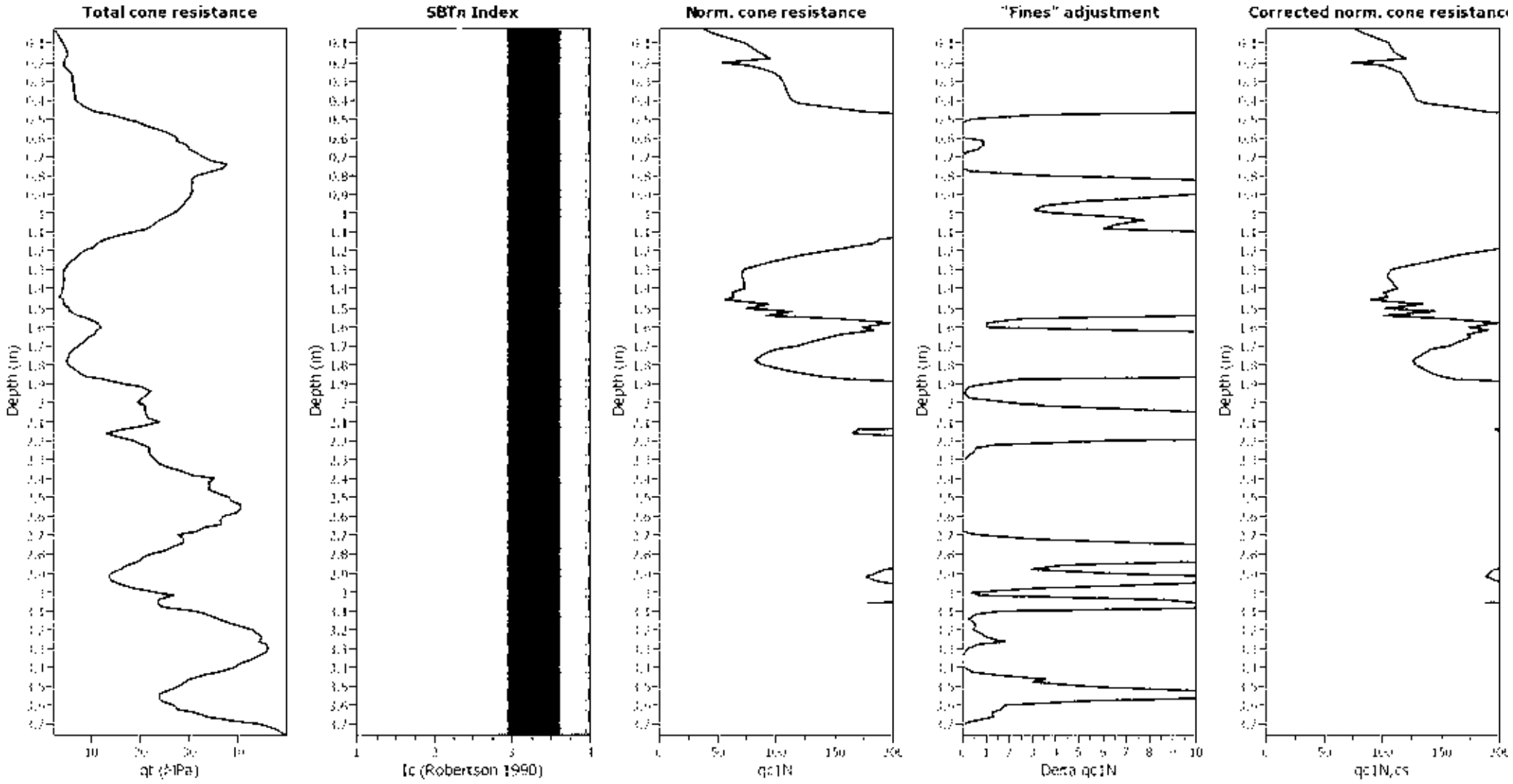
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

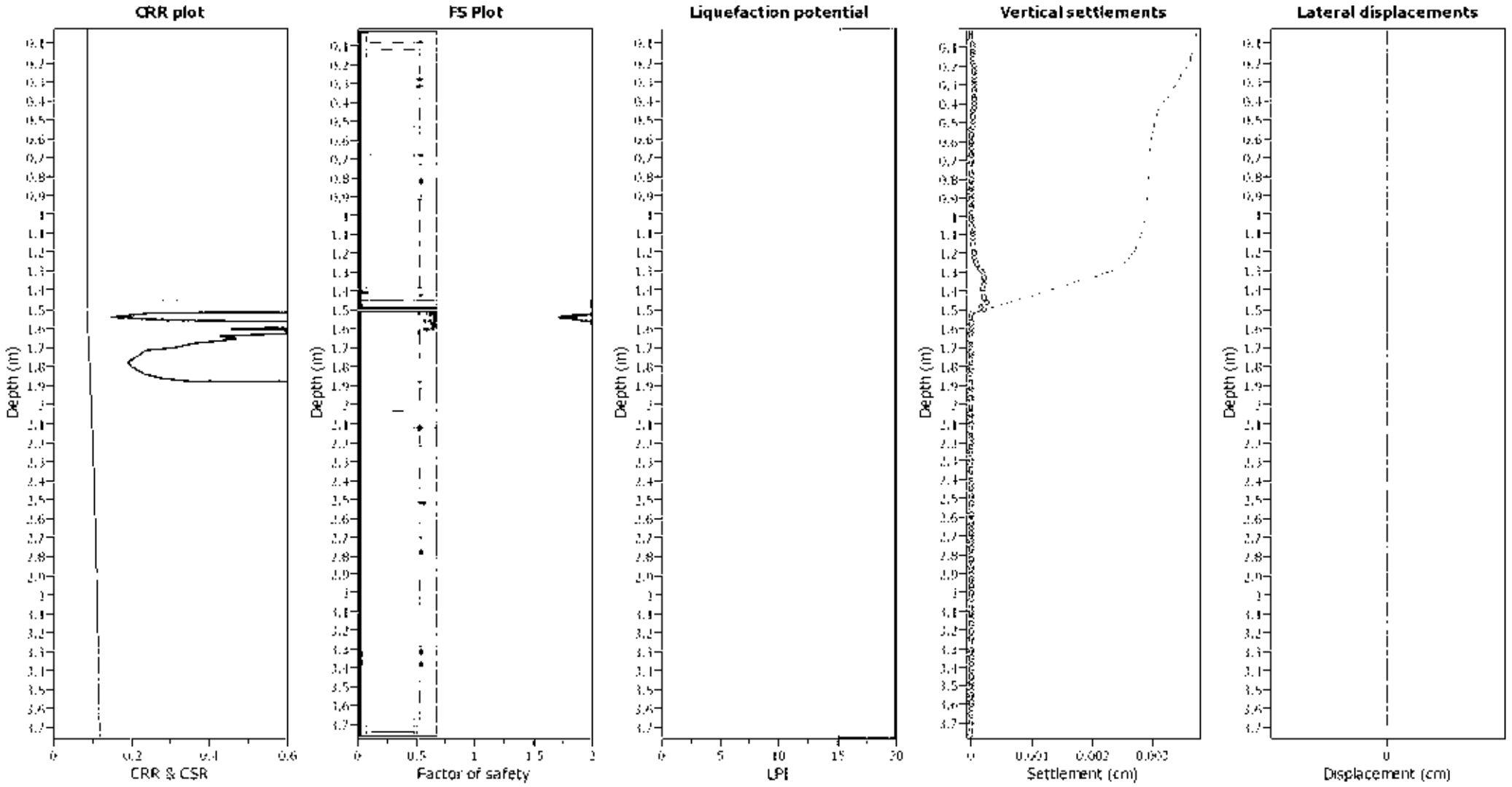
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

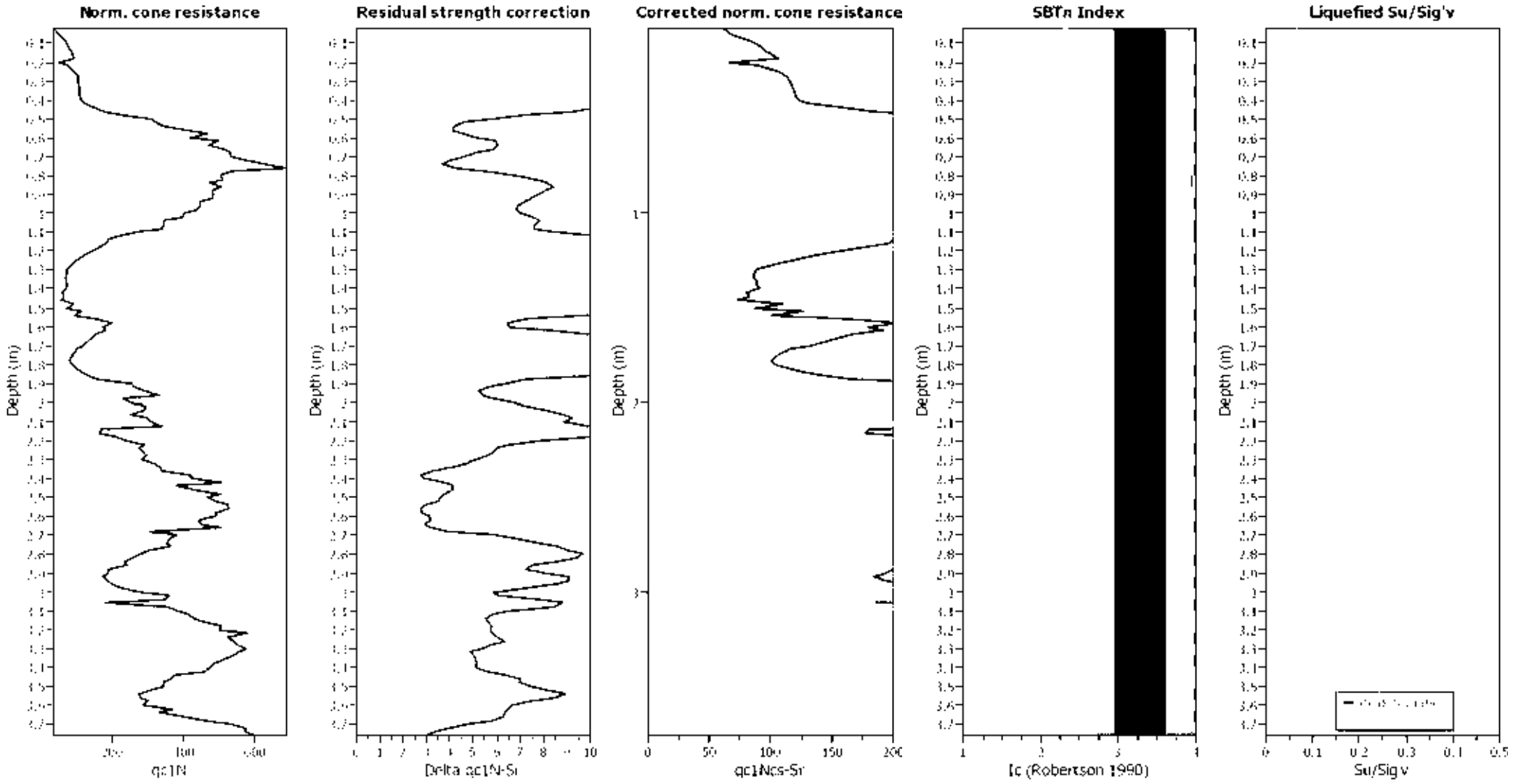
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

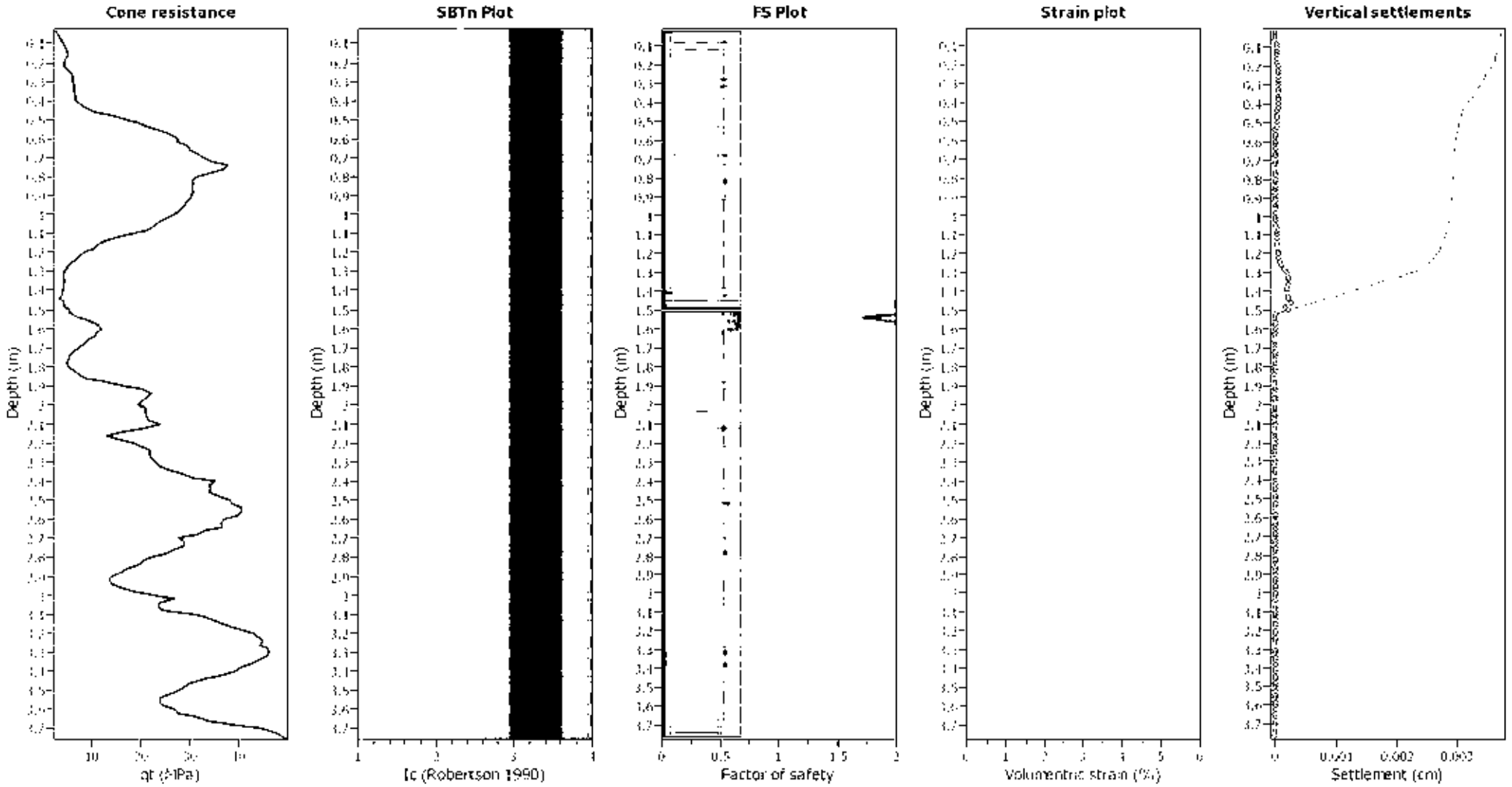
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

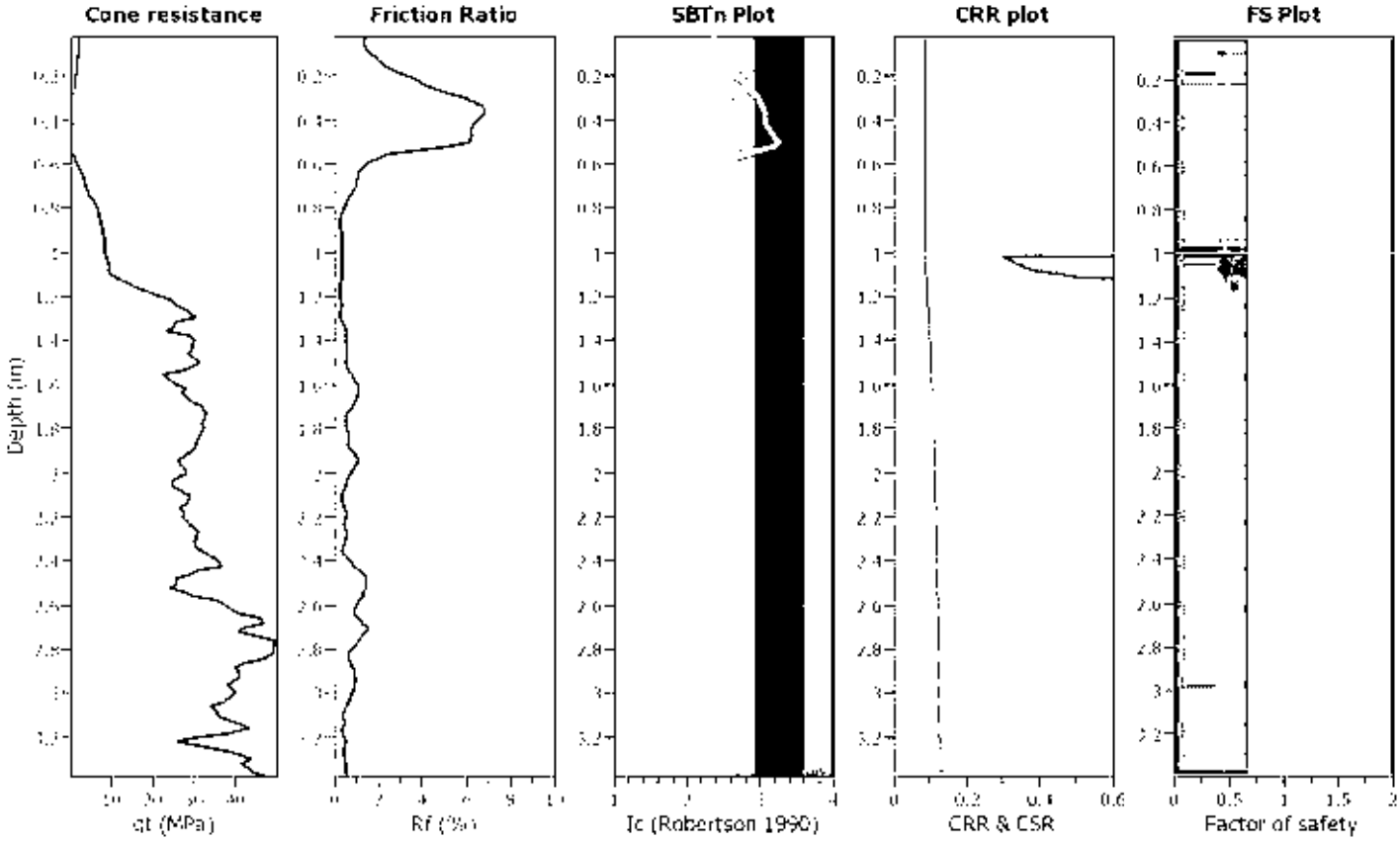
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain	Post liquefaction volumentric strain

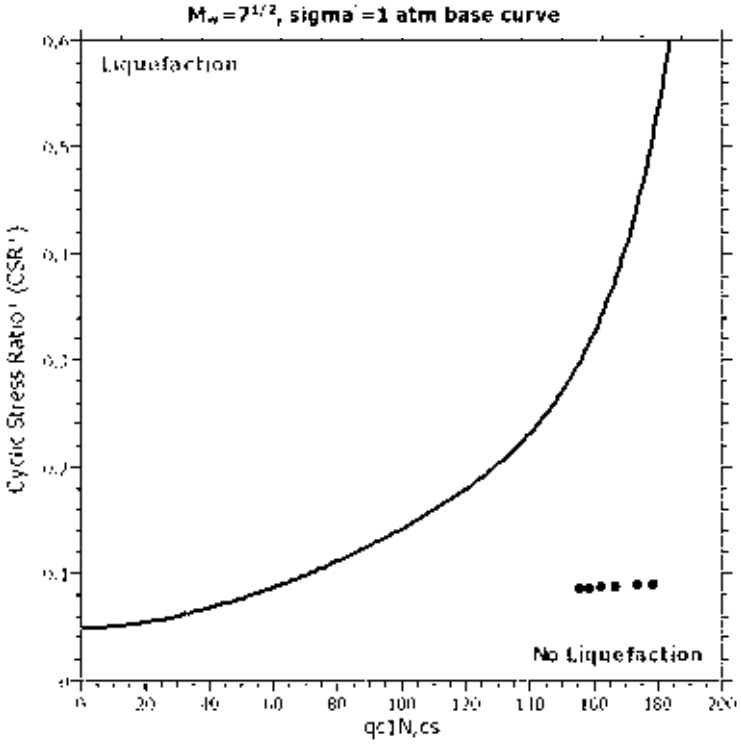
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

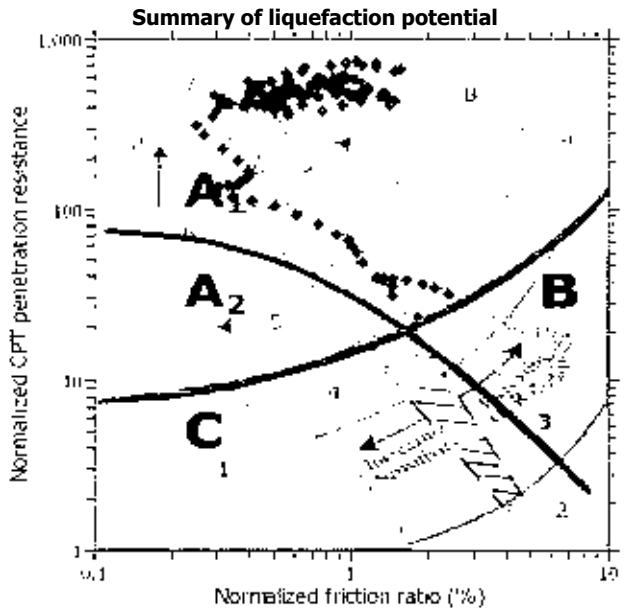
CPT file : CPT26_95SutherlandsRd

Input parameters and analysis data

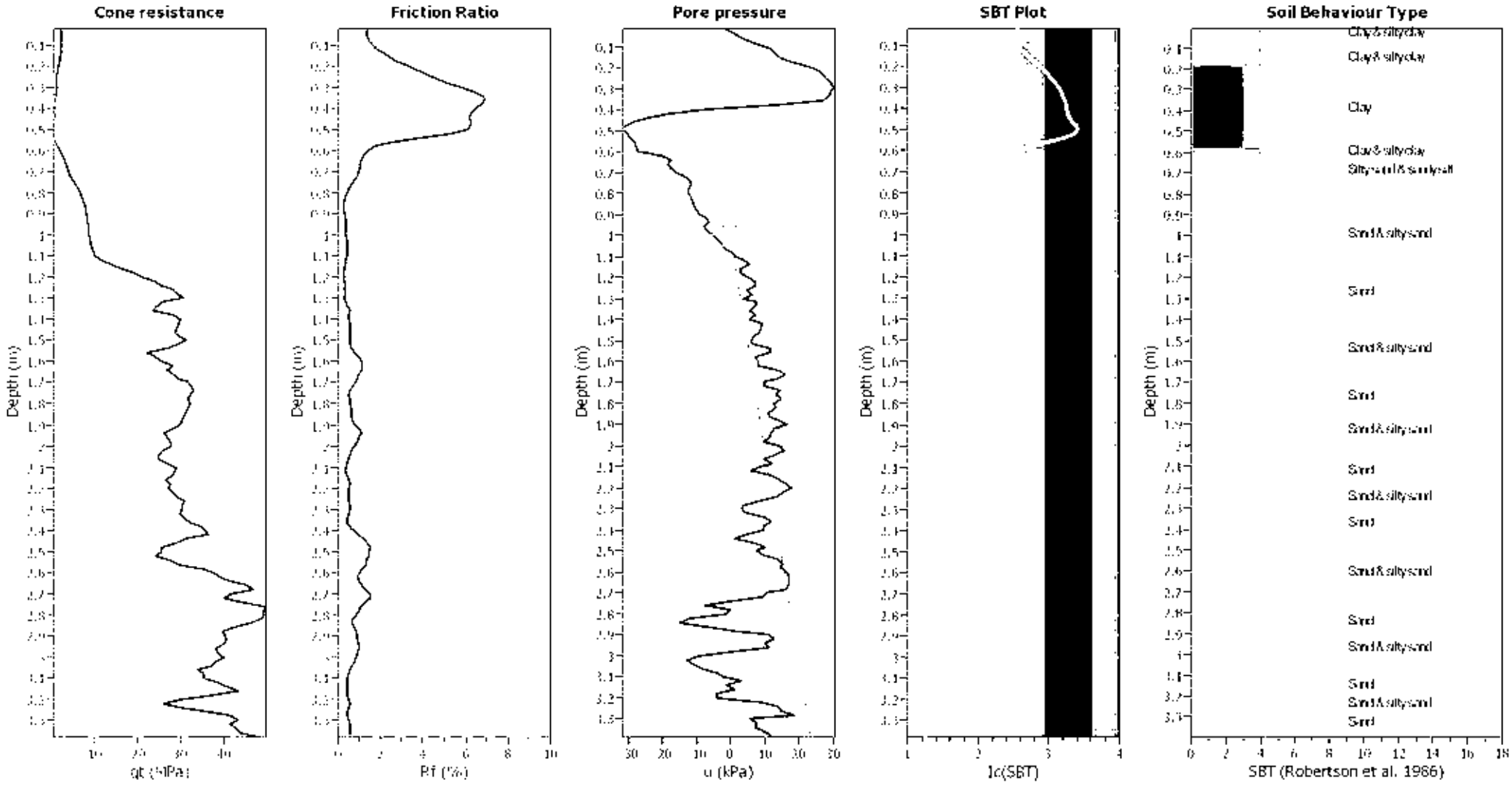
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



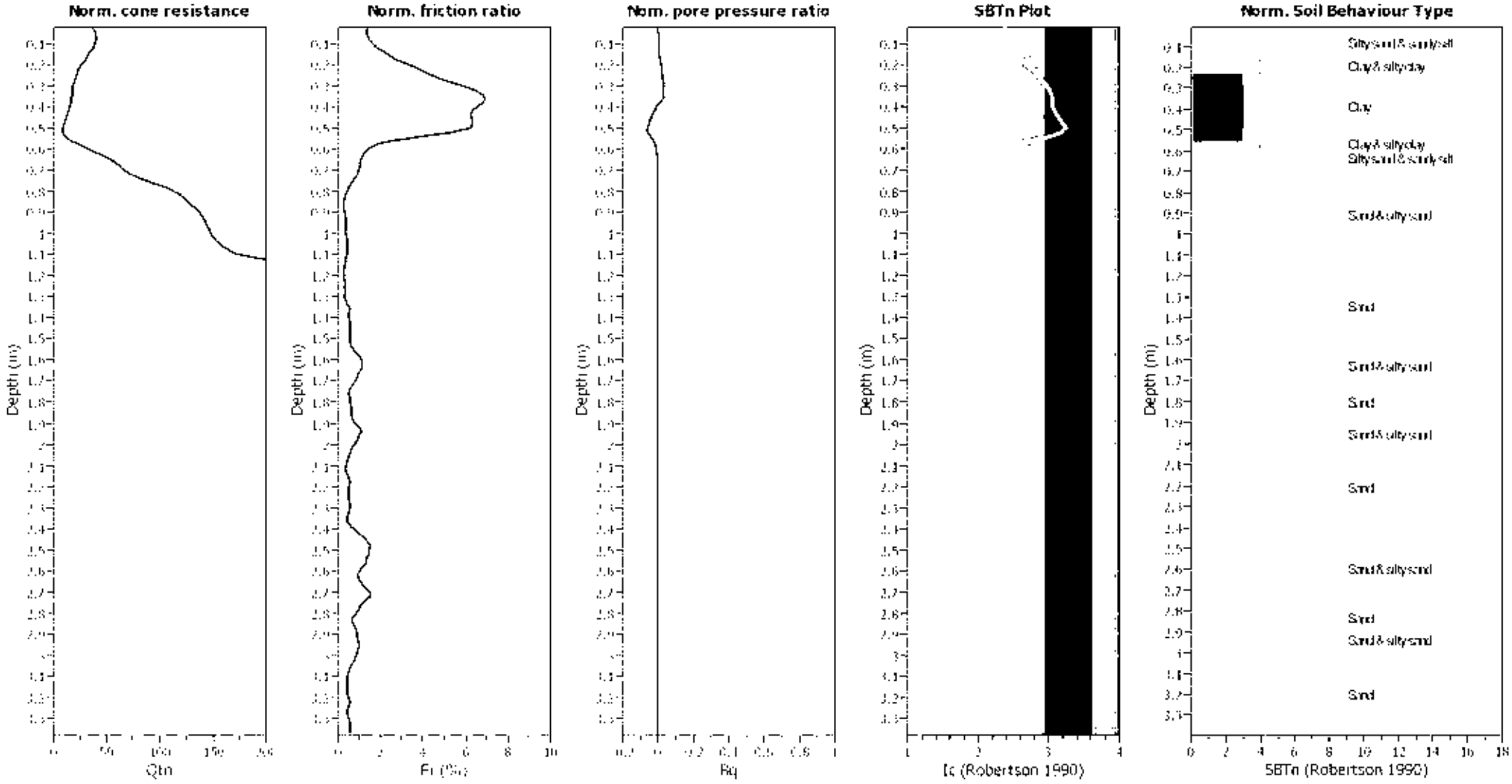
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



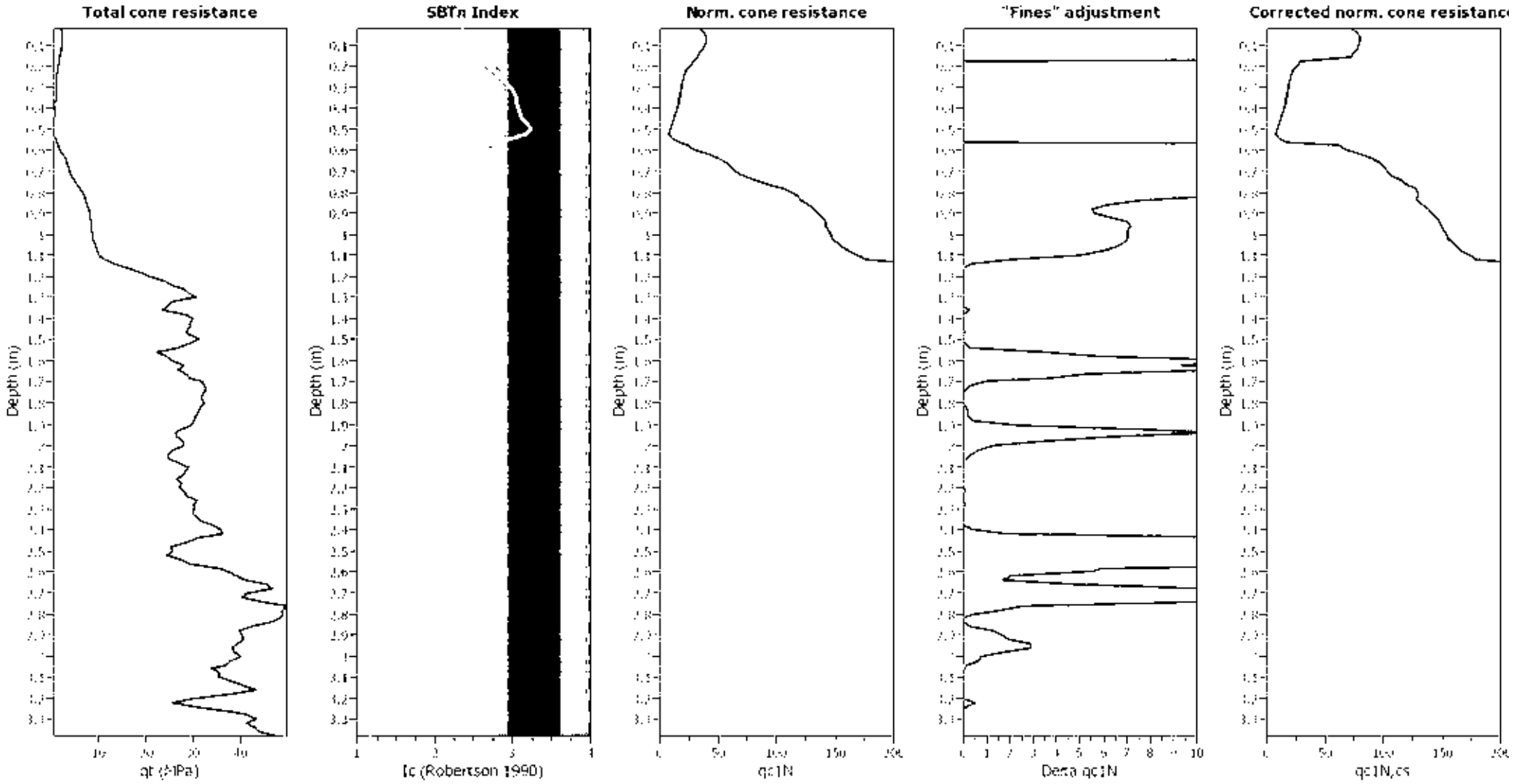
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

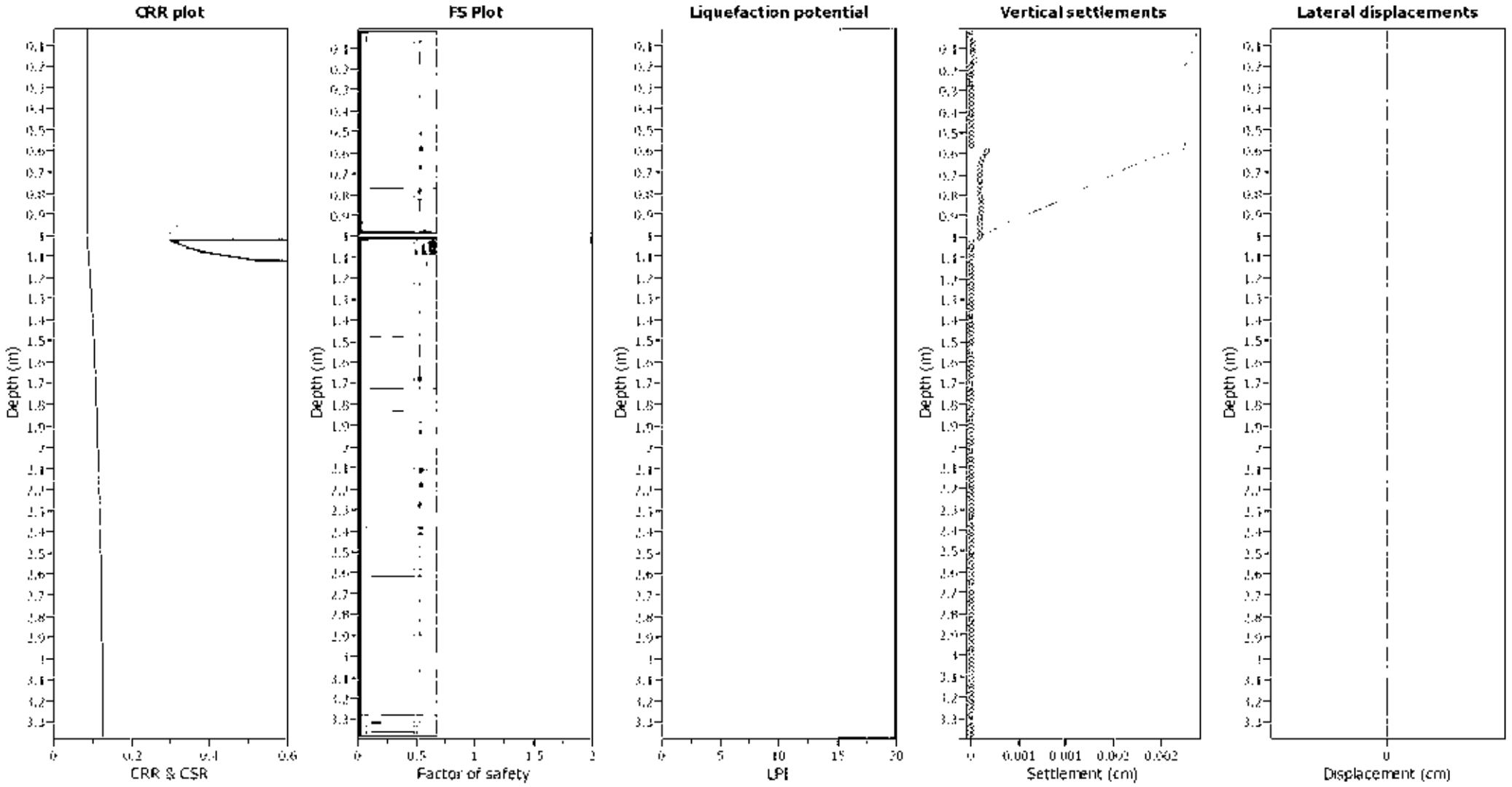
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

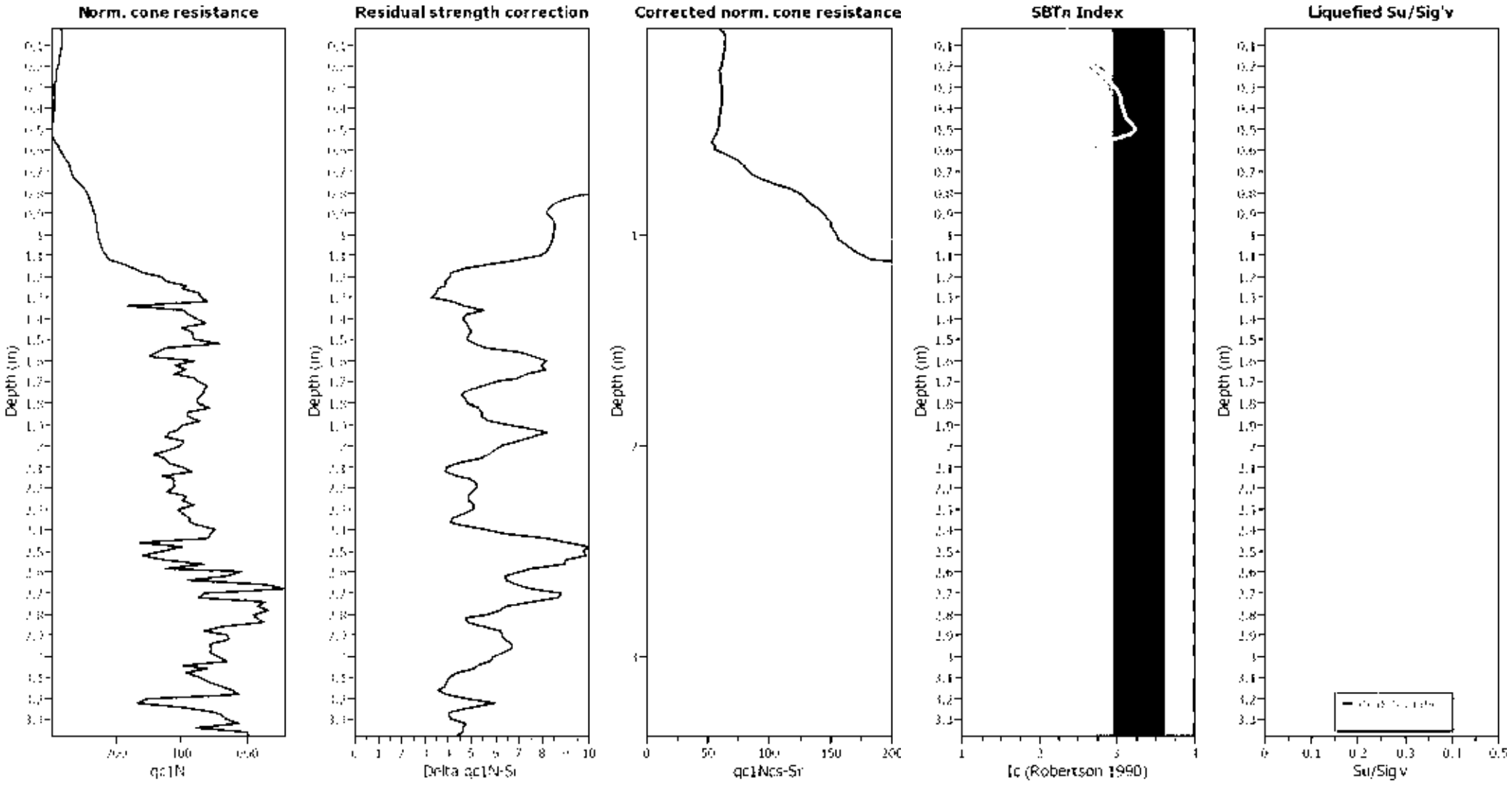
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

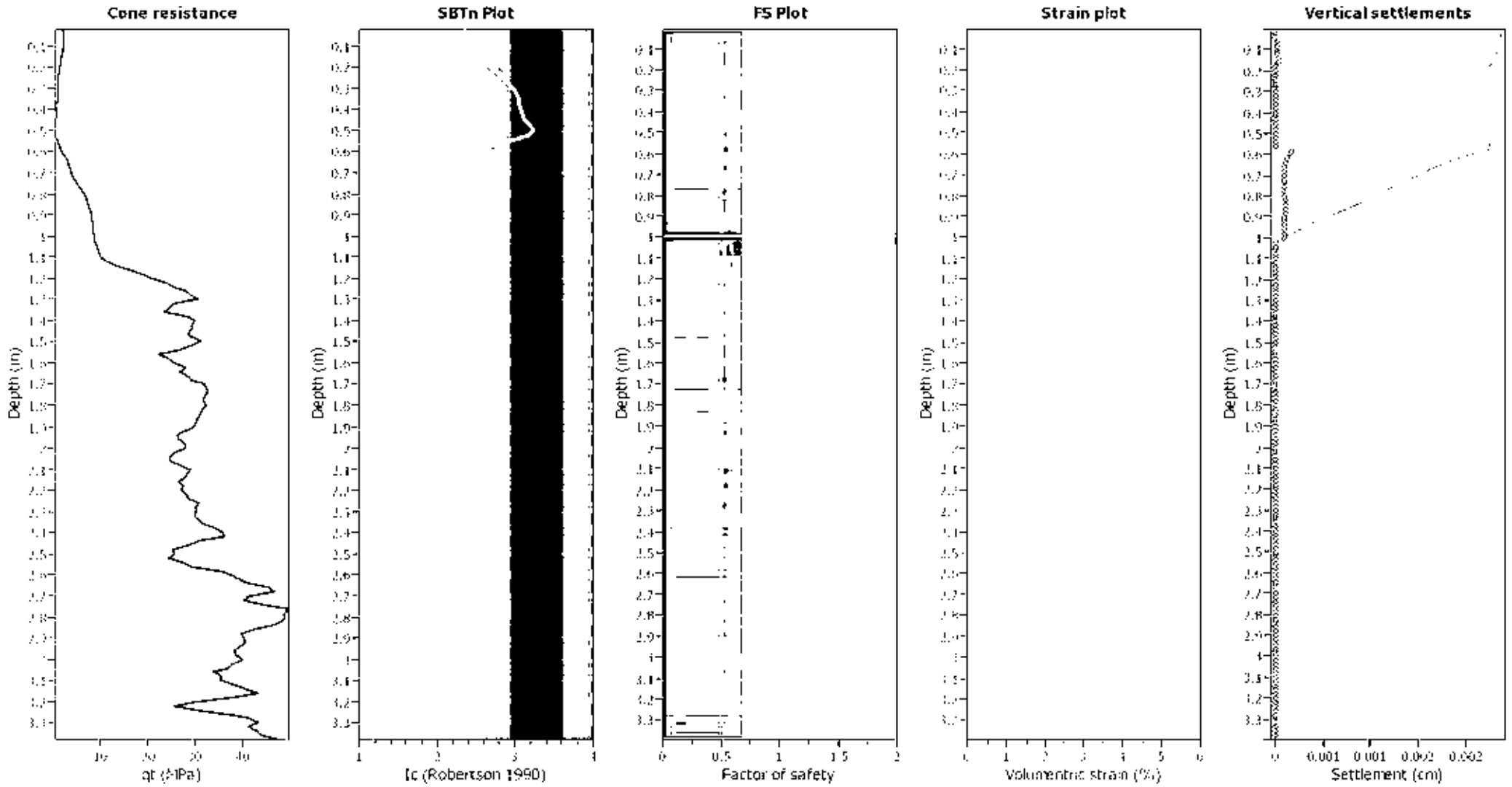
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

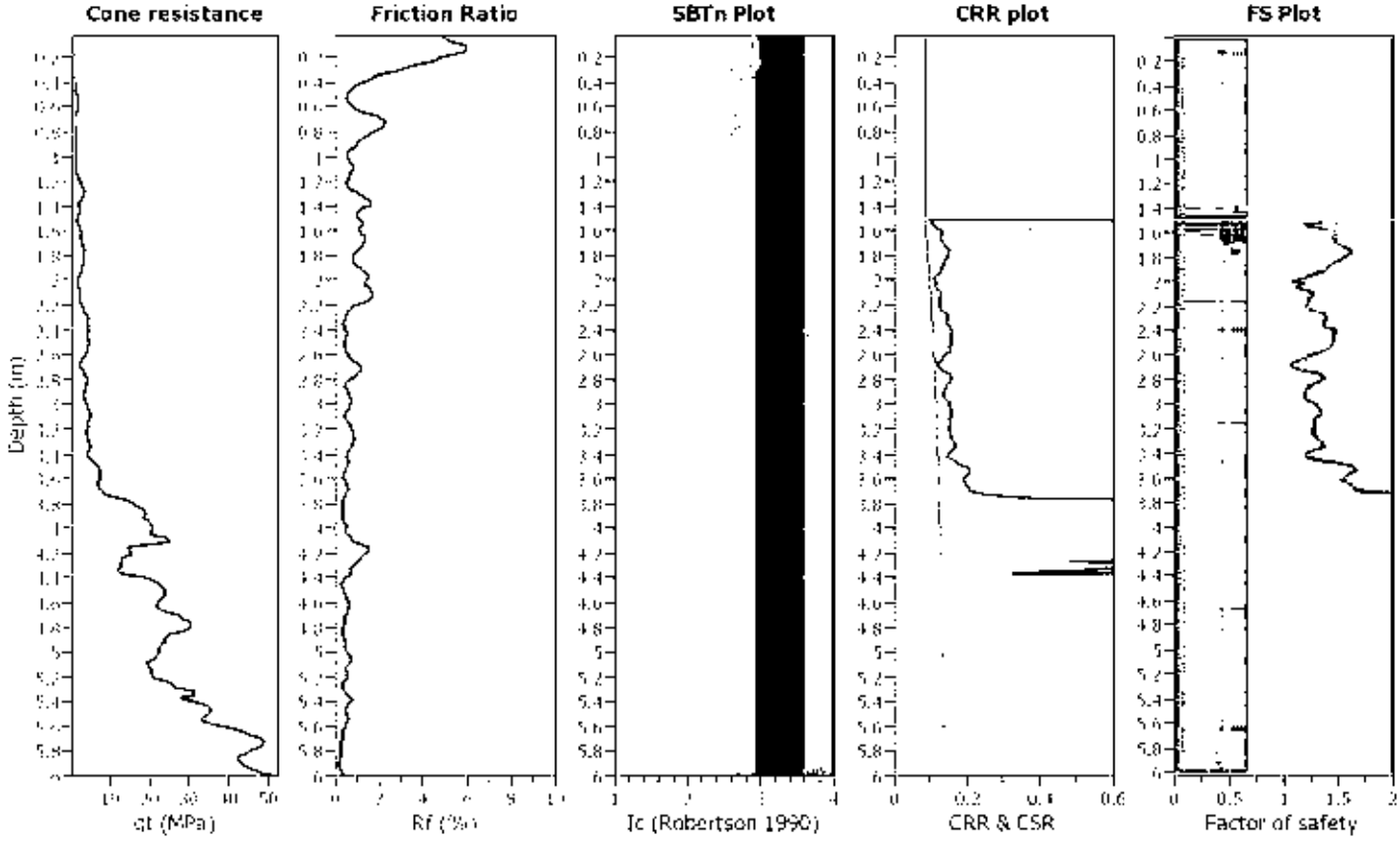
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

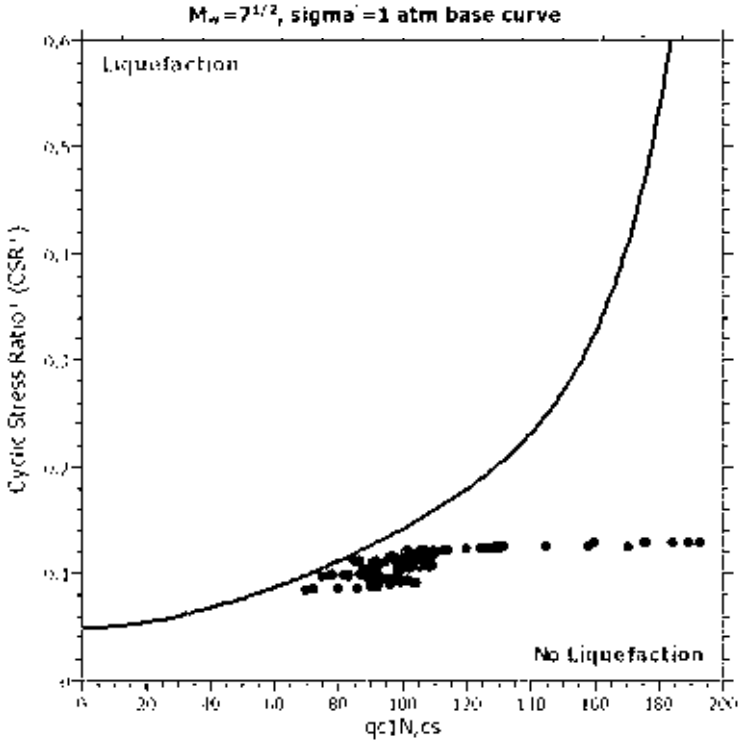
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

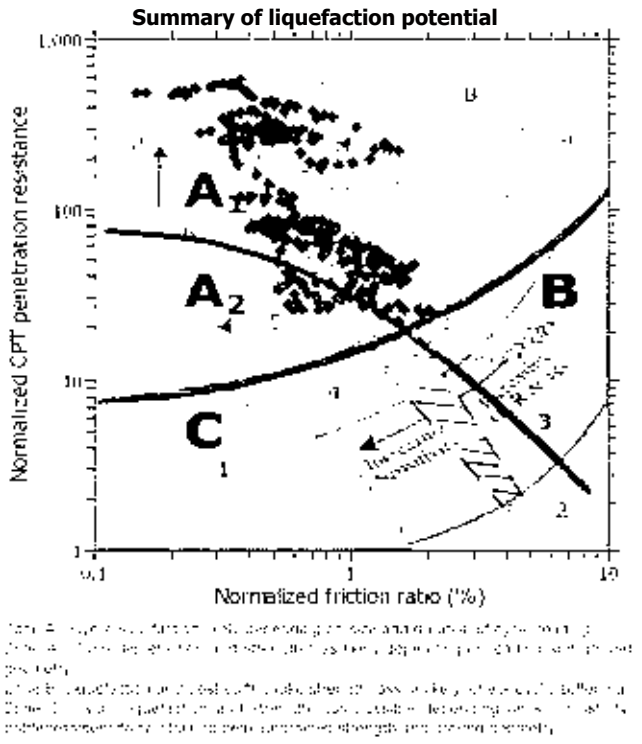
CPT file : CPT27_47KennedysBushRd

Input parameters and analysis data

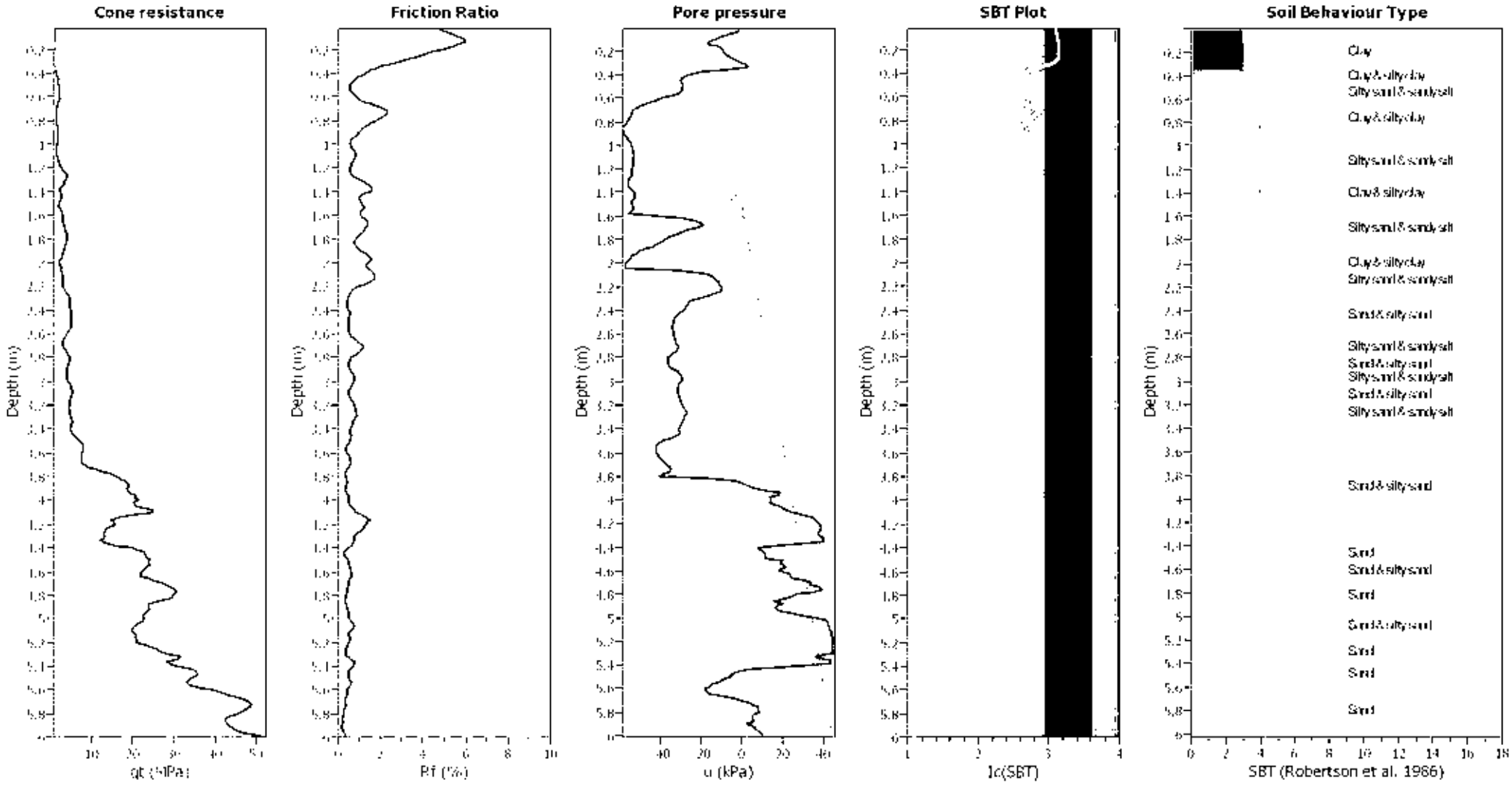
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



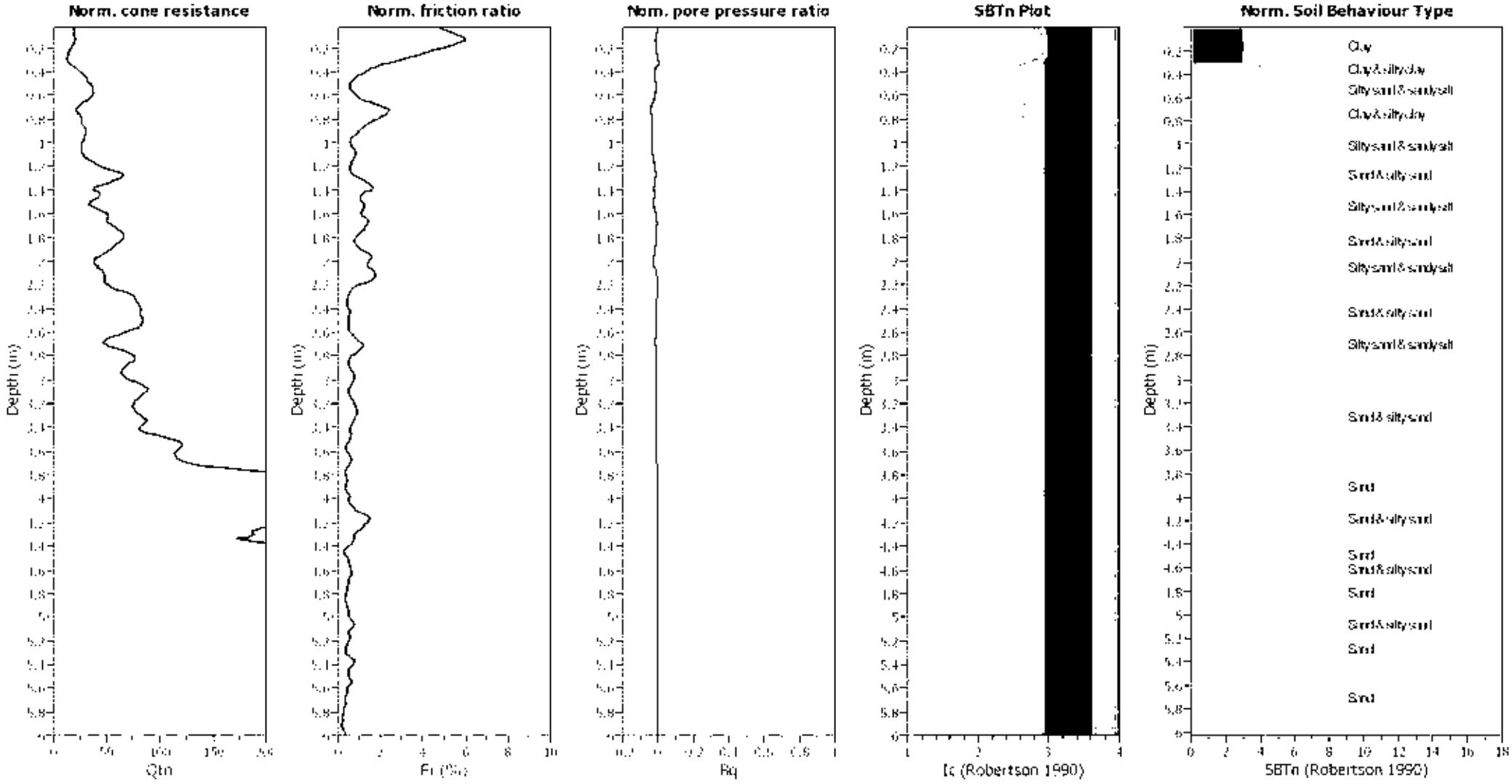
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



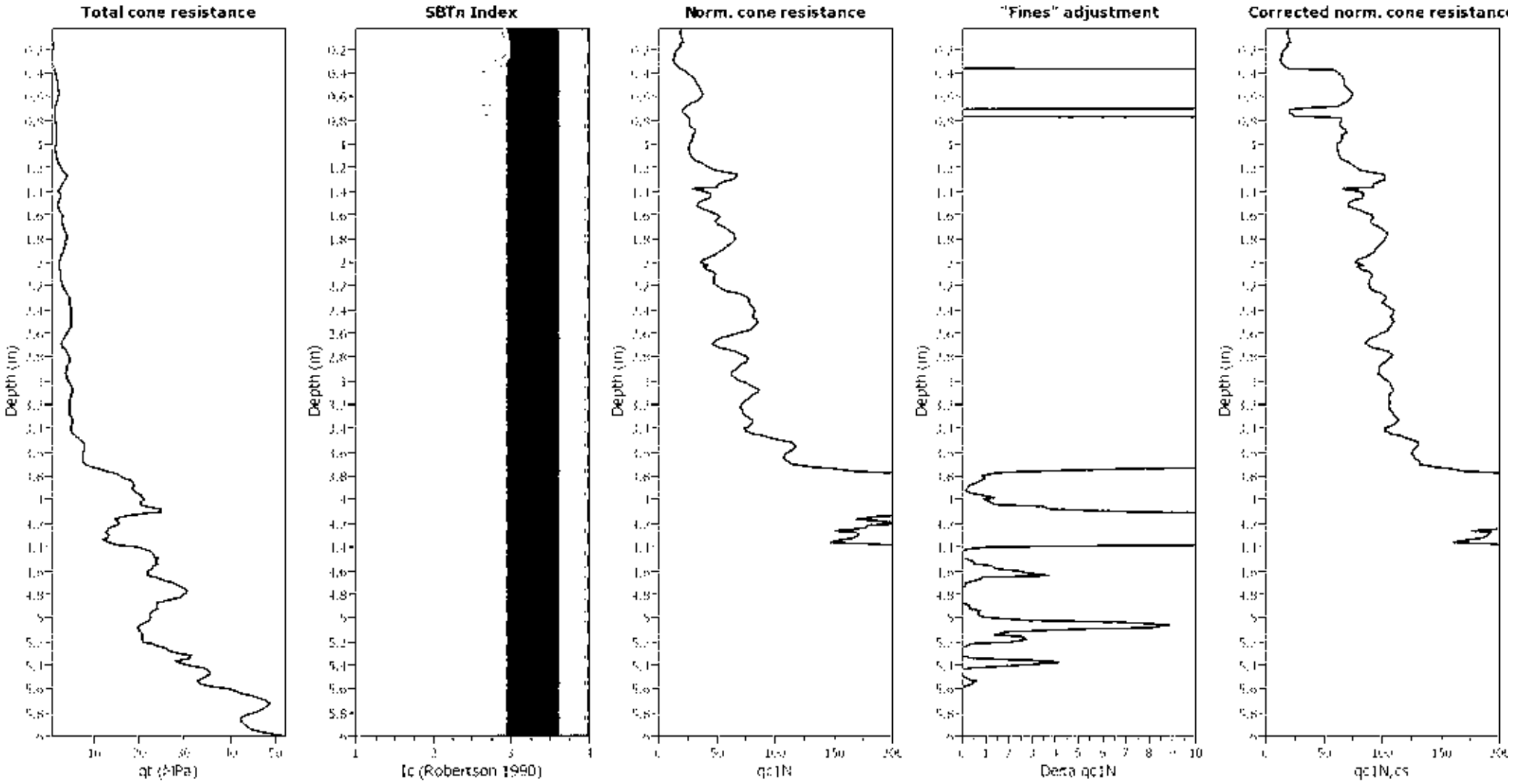
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

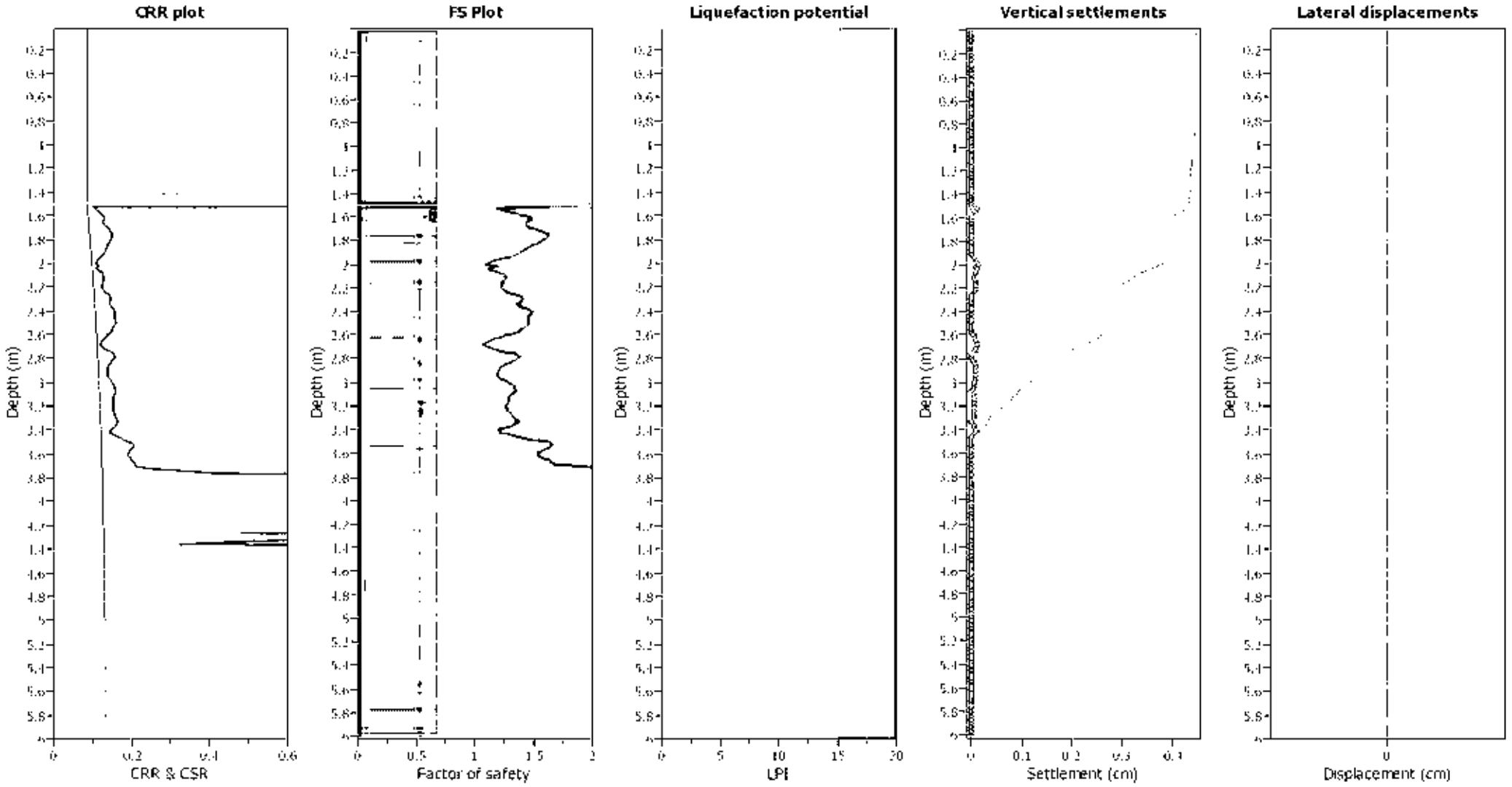
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

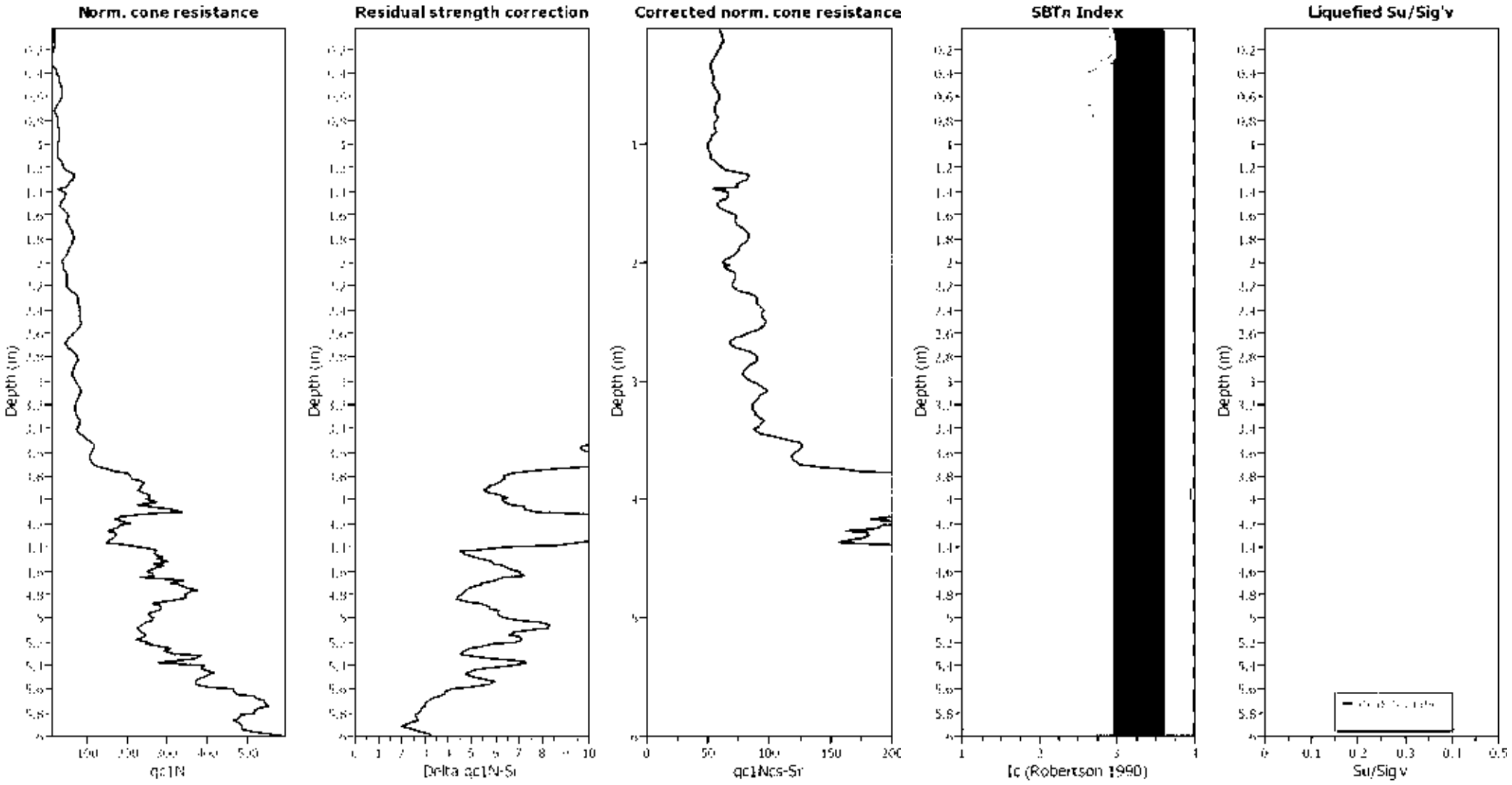
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

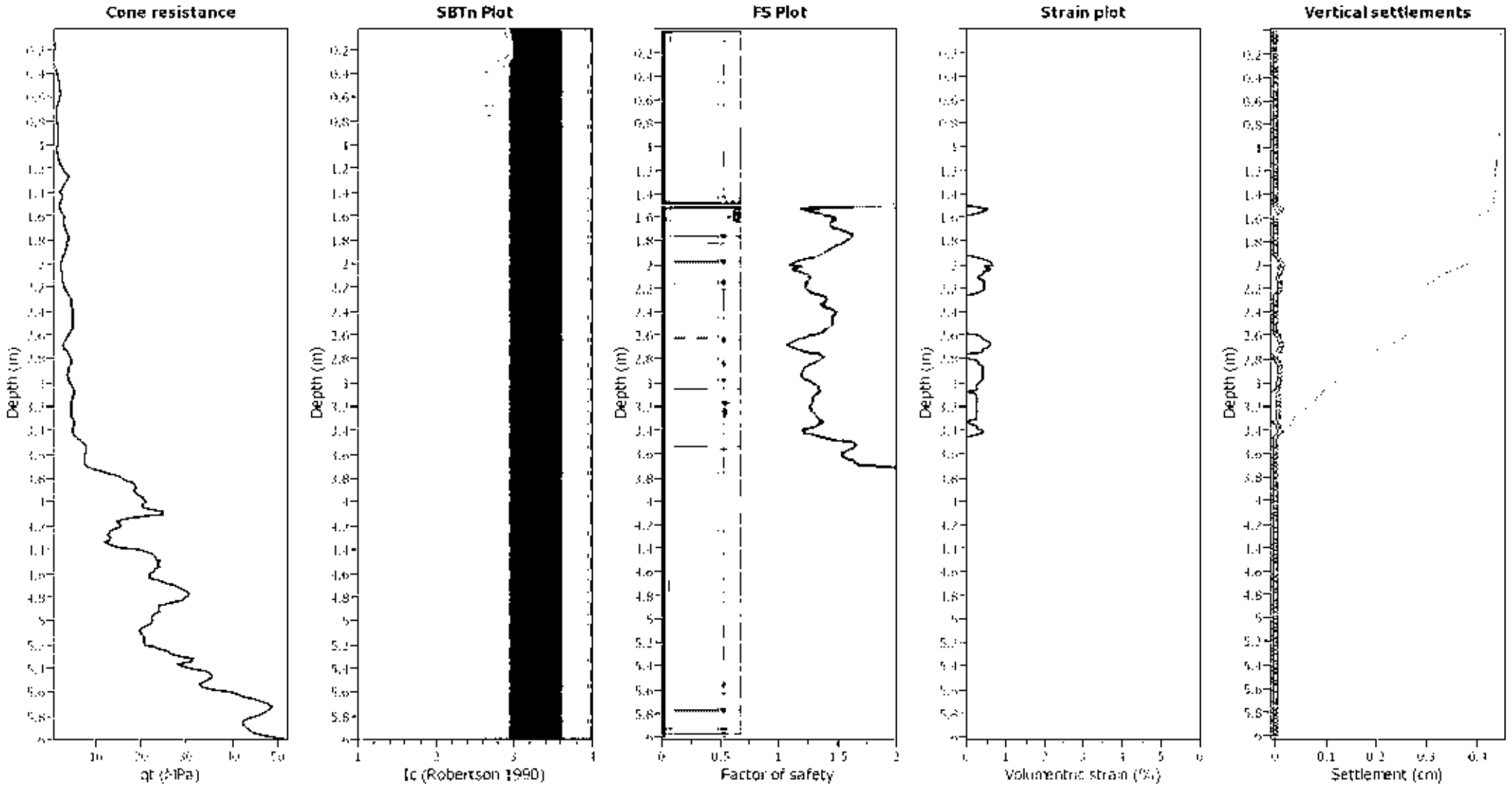
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

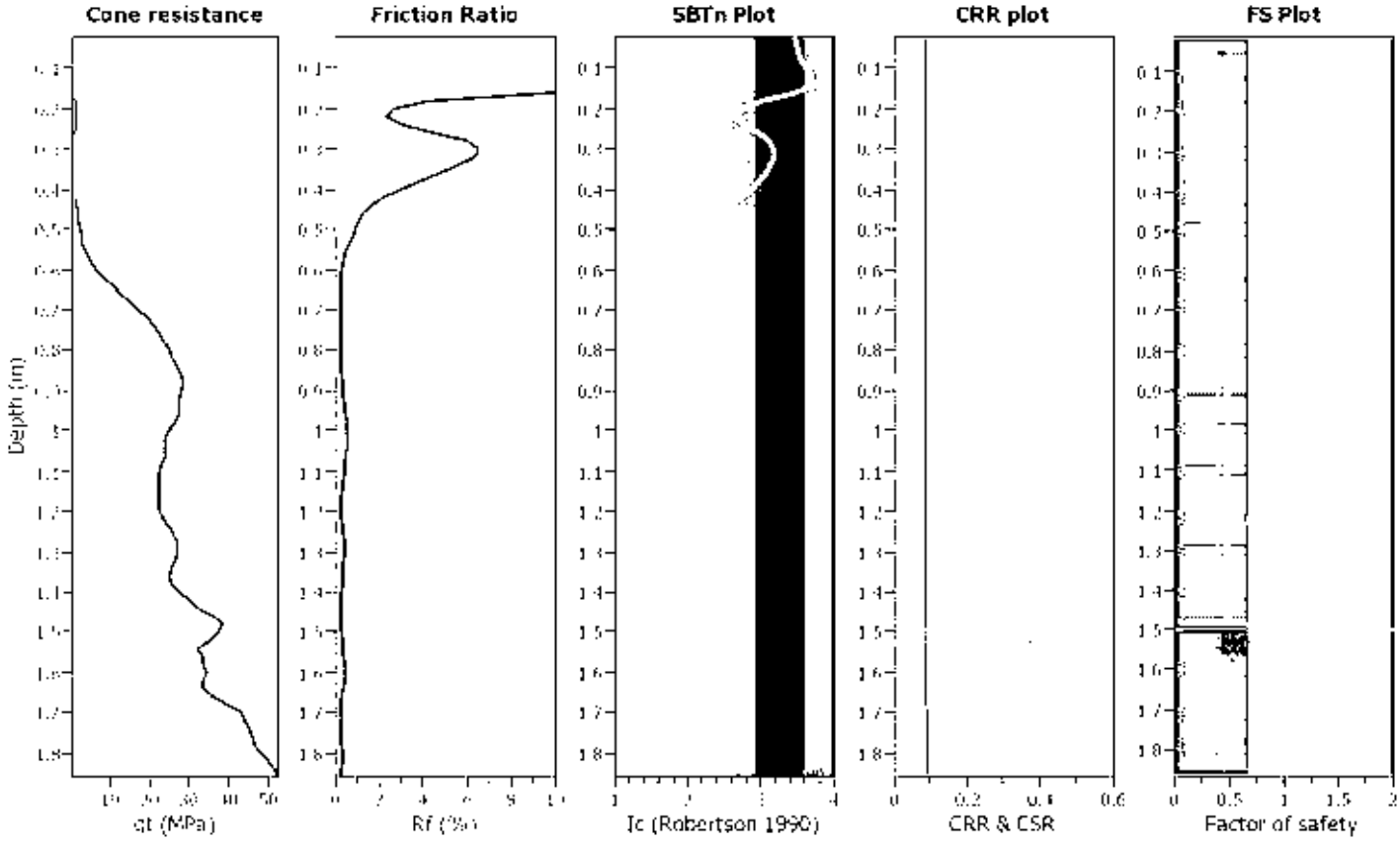
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

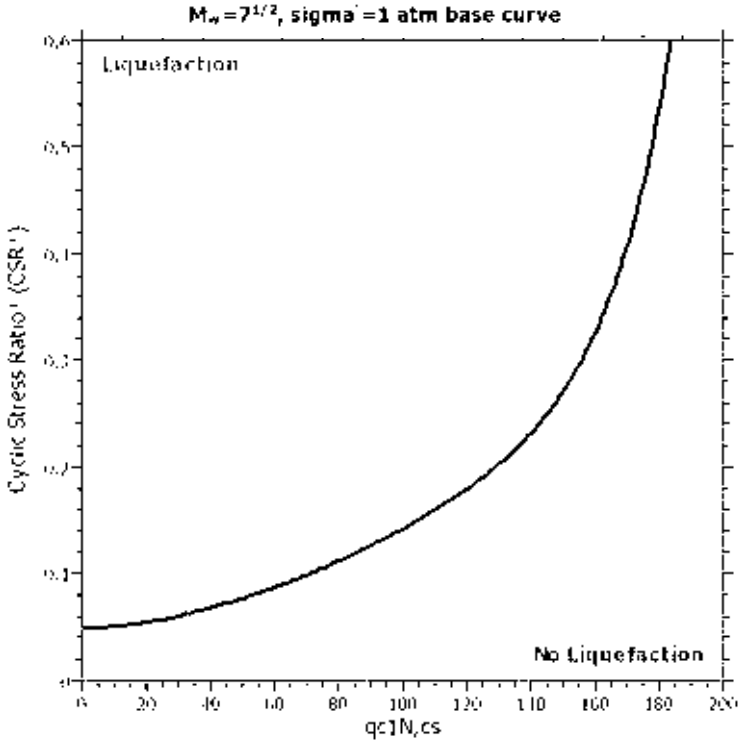
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

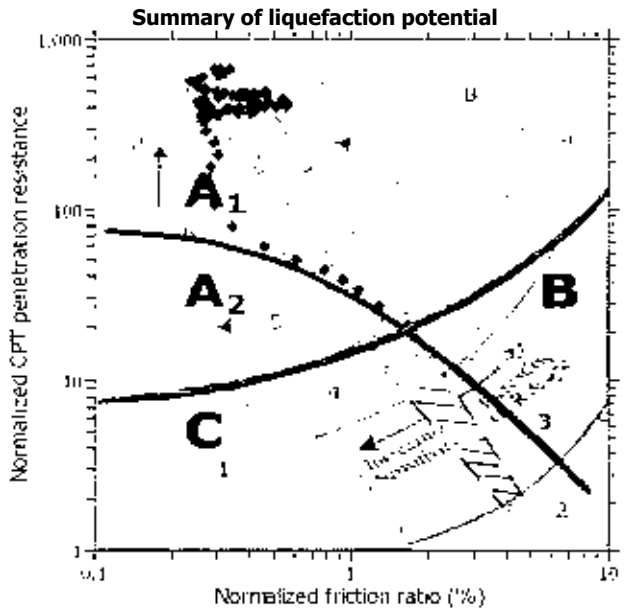
CPT file : CPT28_57SutherlandsRd

Input parameters and analysis data

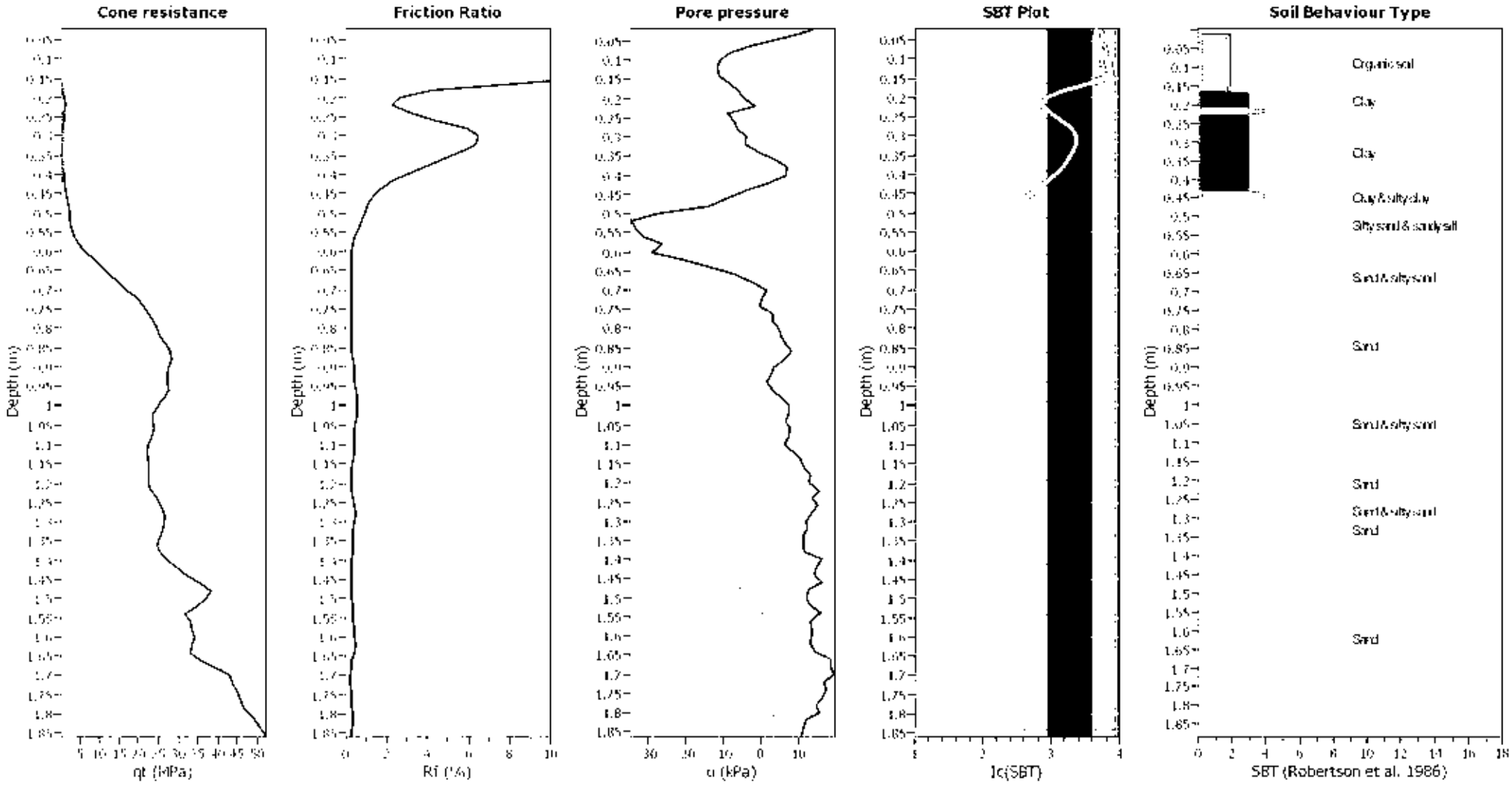
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



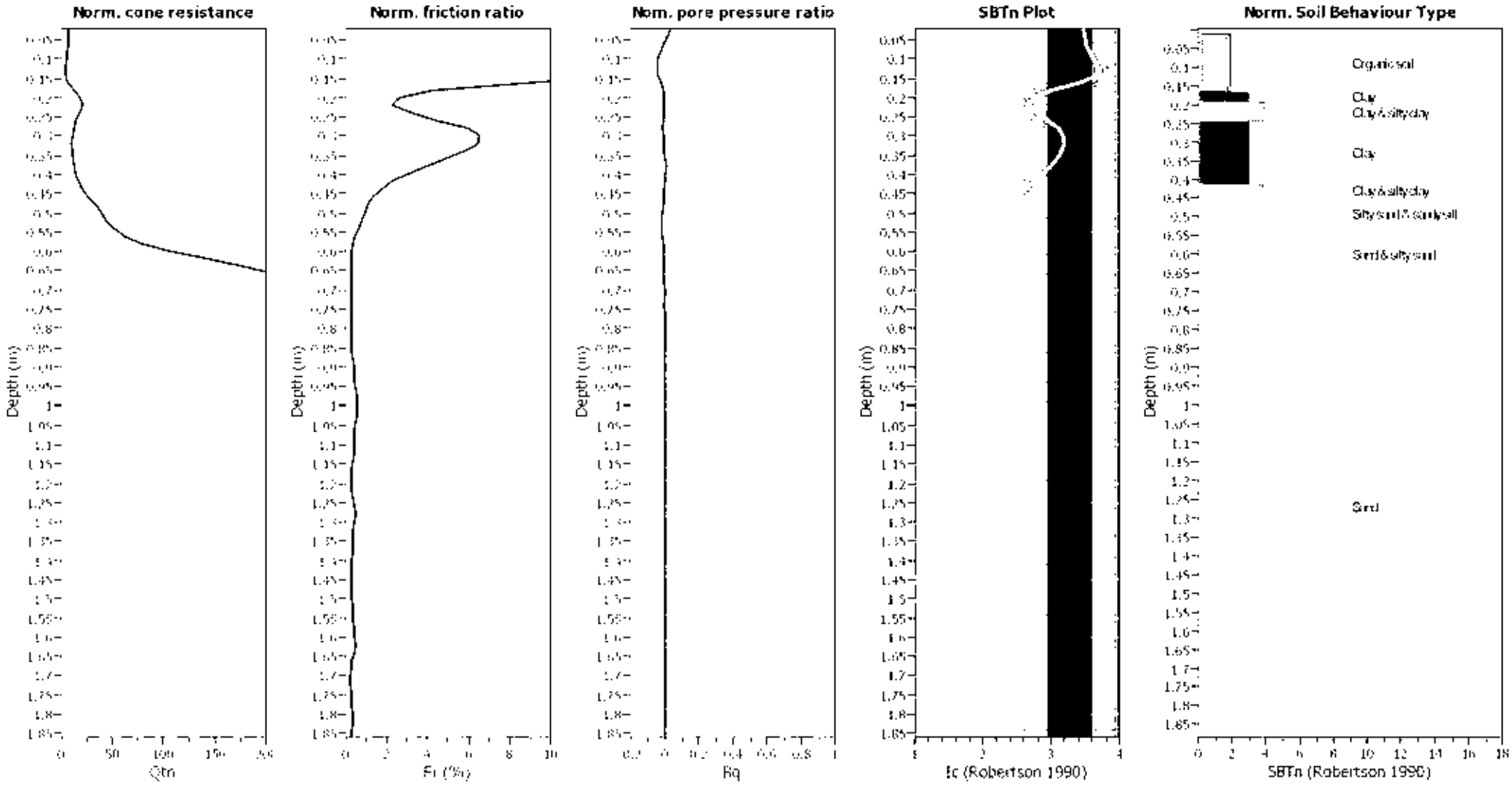
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



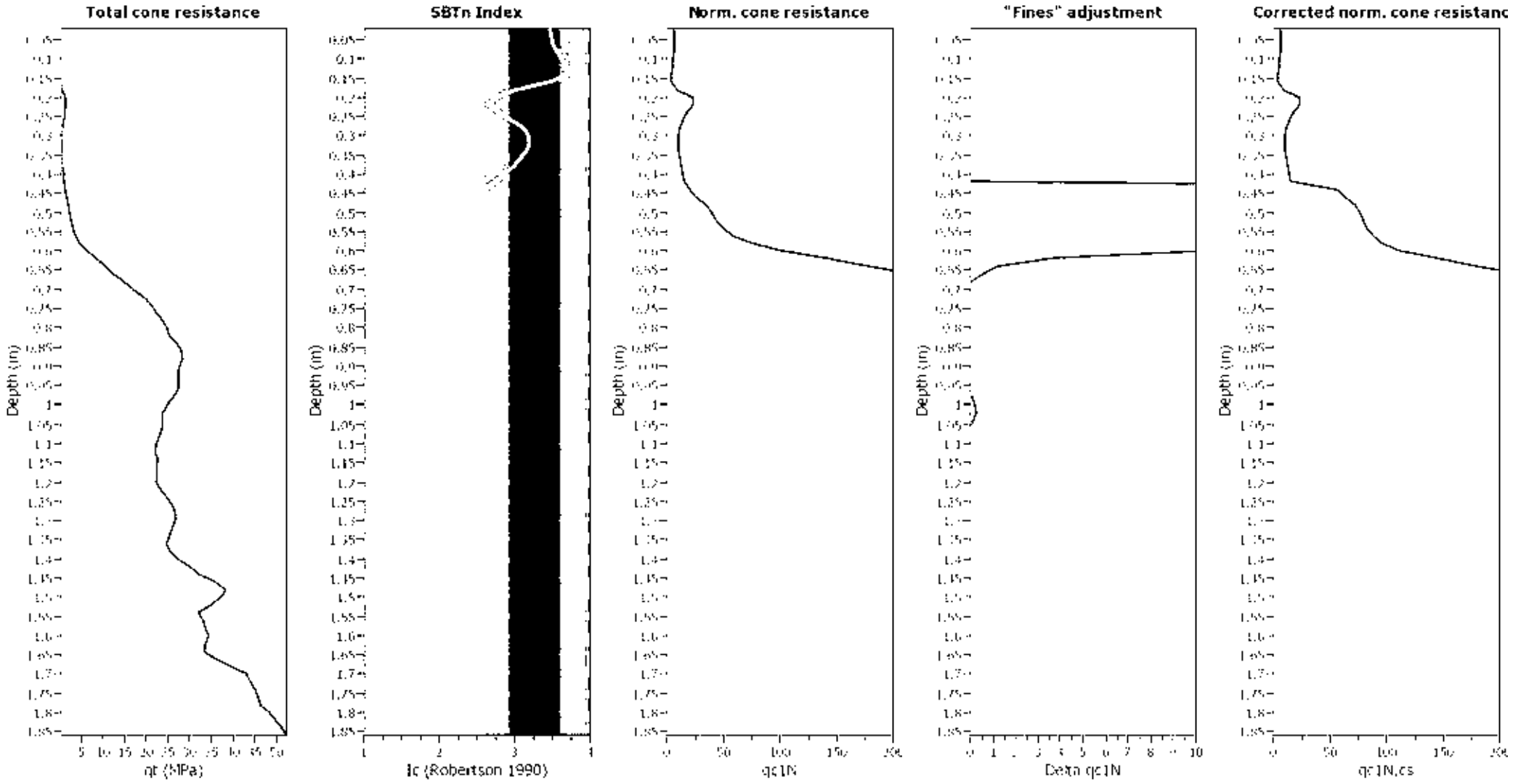
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

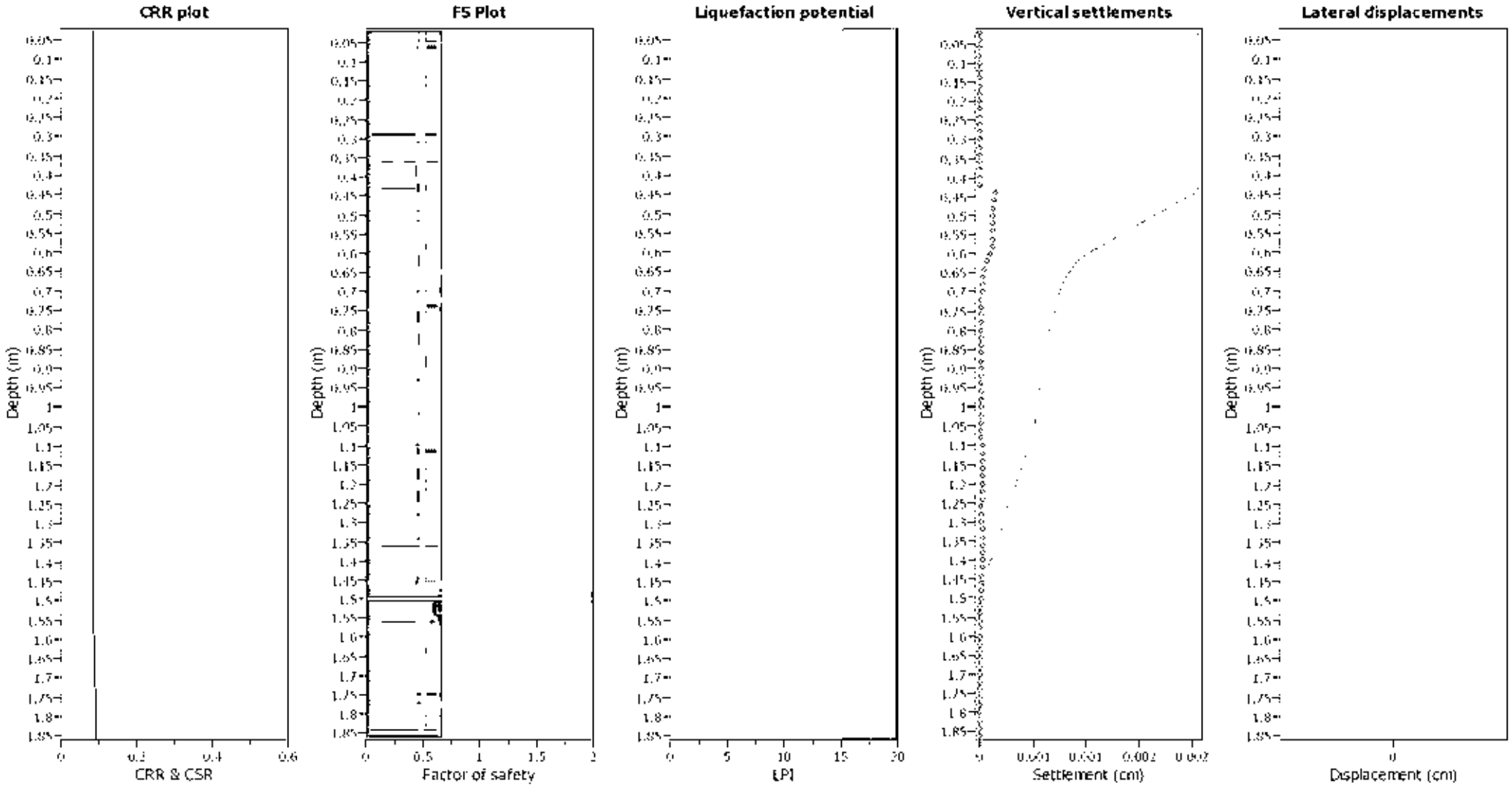
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

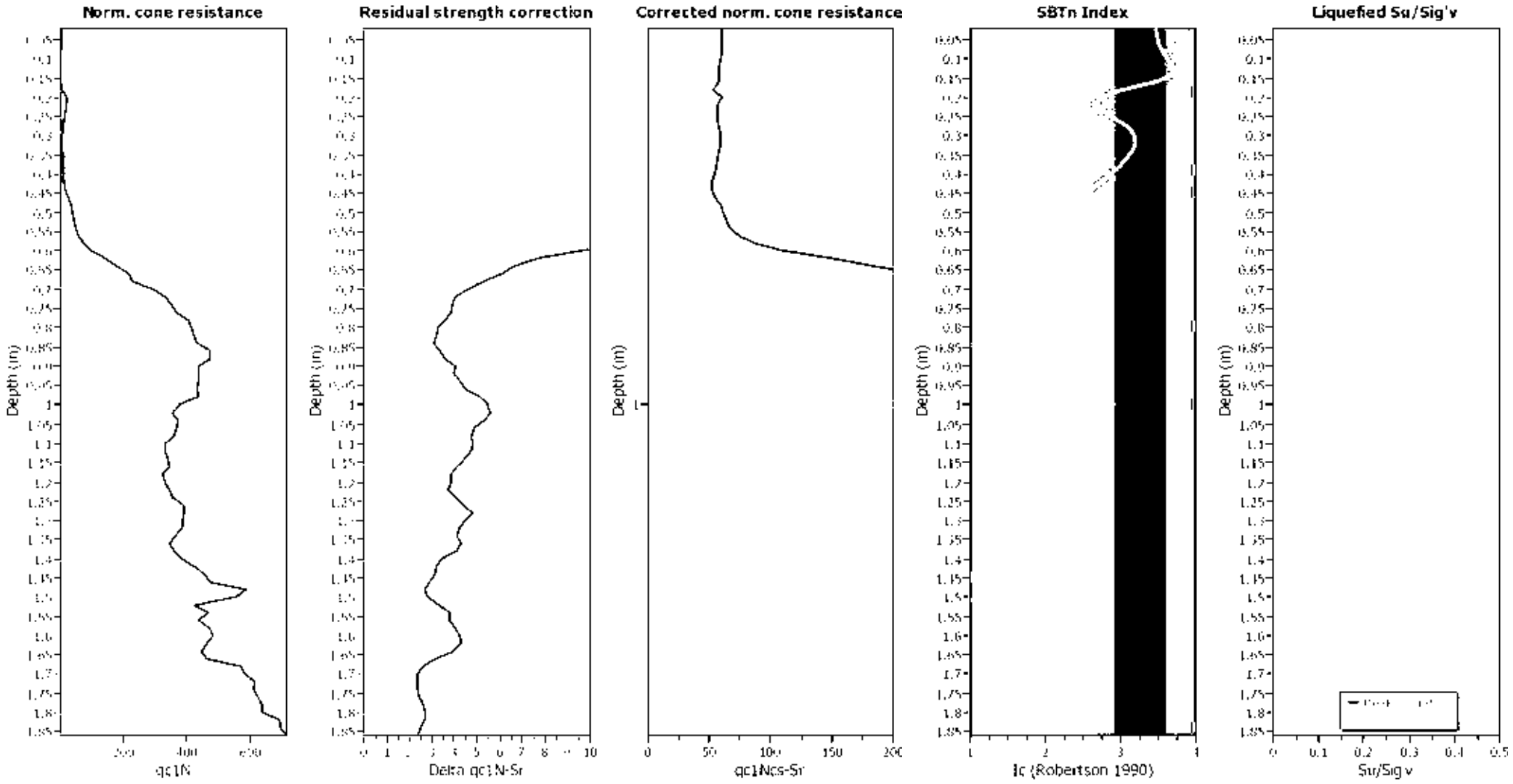
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

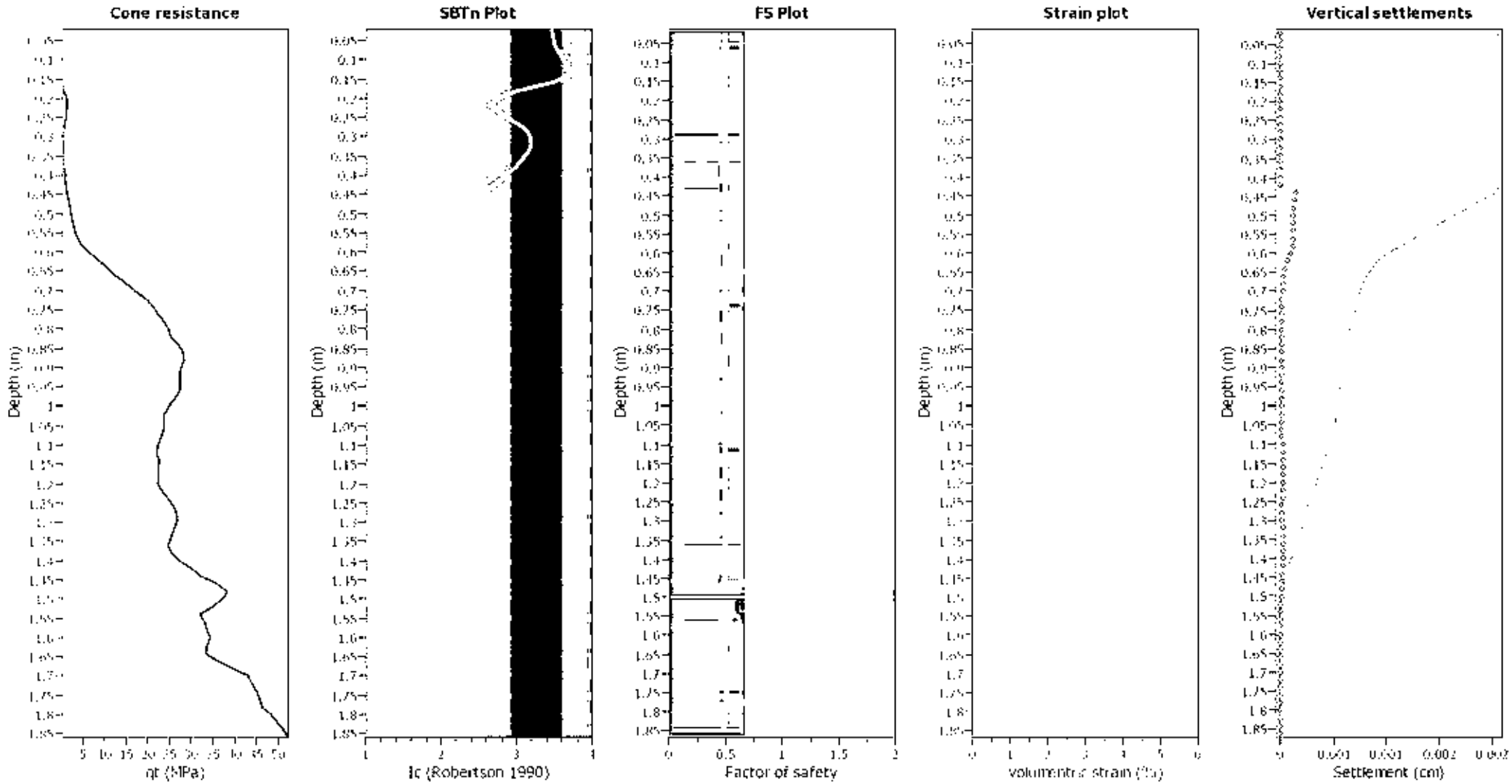
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

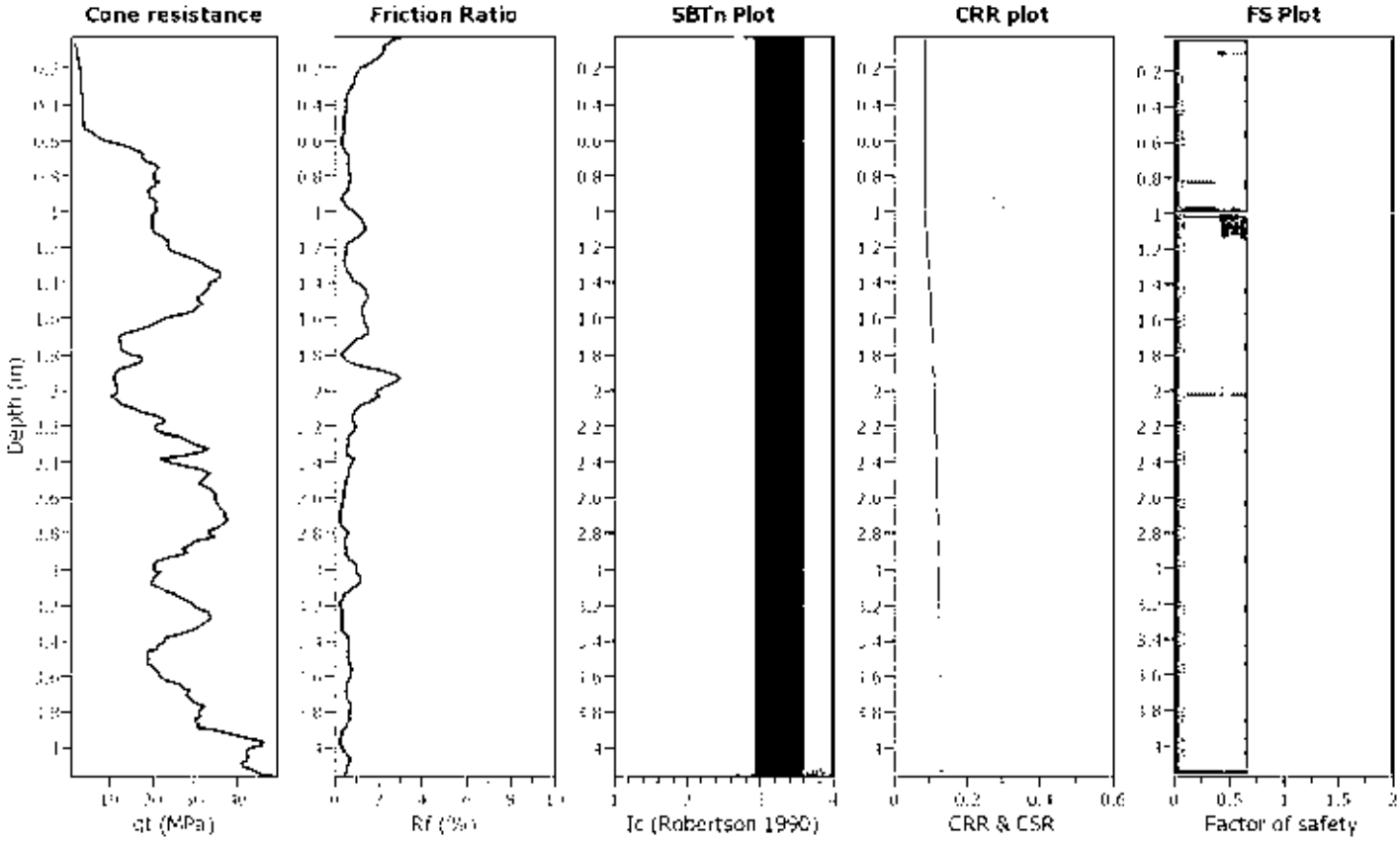
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

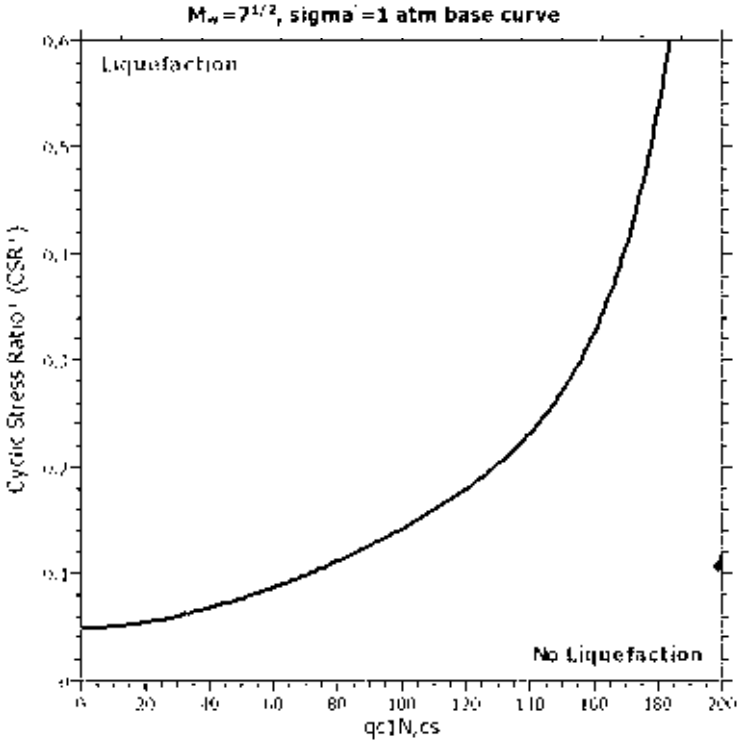
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

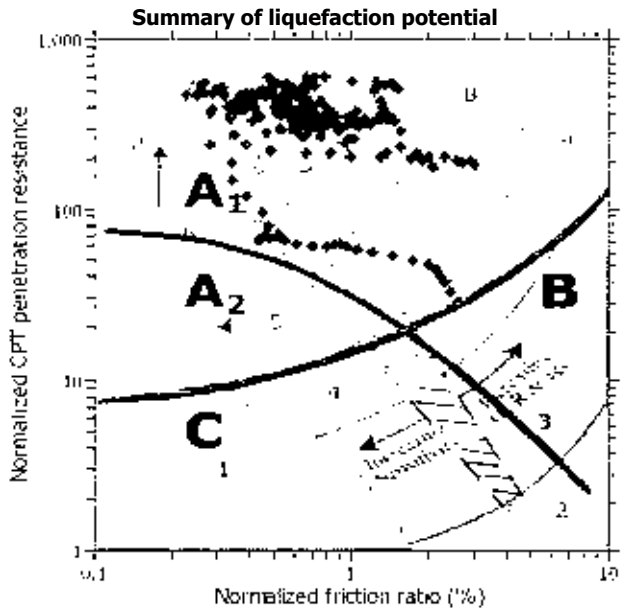
CPT file : CPT29_57SutherlandsRd

Input parameters and analysis data

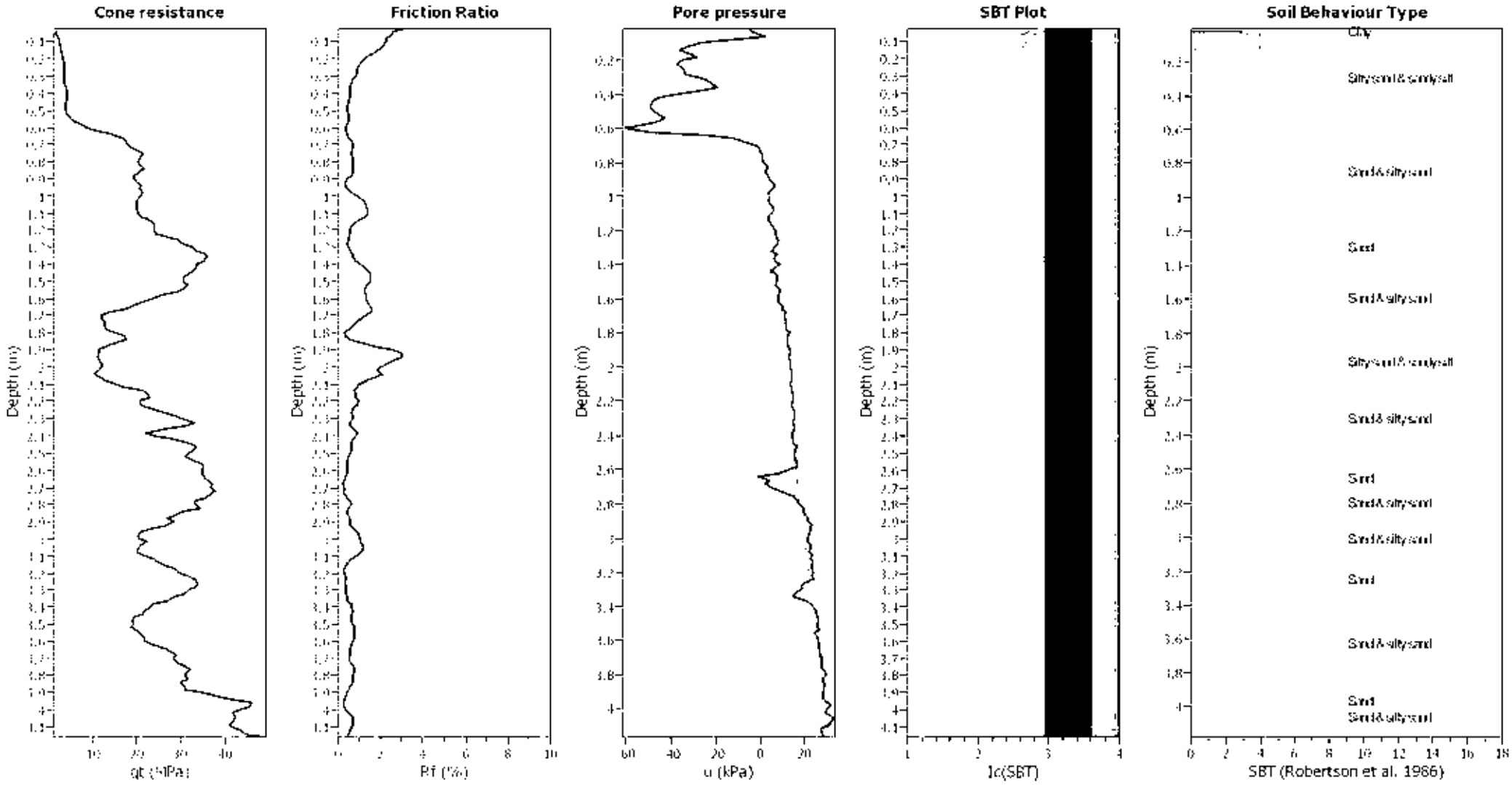
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



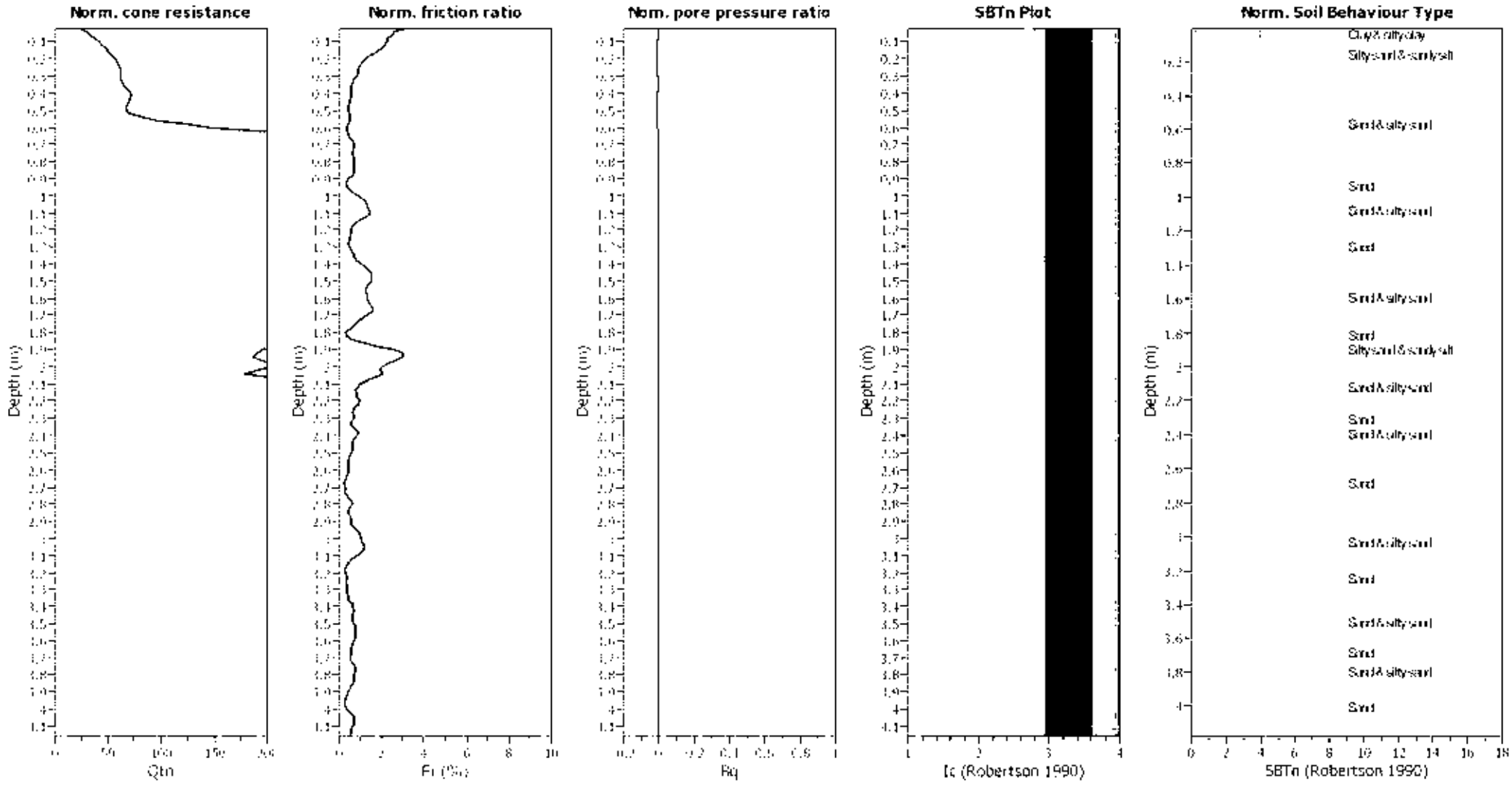
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

■ 1. Sensitive fine grained	□ 4. Clayey silt to silty	□ 7. Gravely sand to sand
□ 2. Organic material	□ 5. Silty sand to sandy silt	□ 8. Very stiff sand to
■ 3. Clay to silty clay	□ 6. Clean sand to silty sand	□ 9. Very stiff fine grained

CPT basic interpretation plots (normalized)



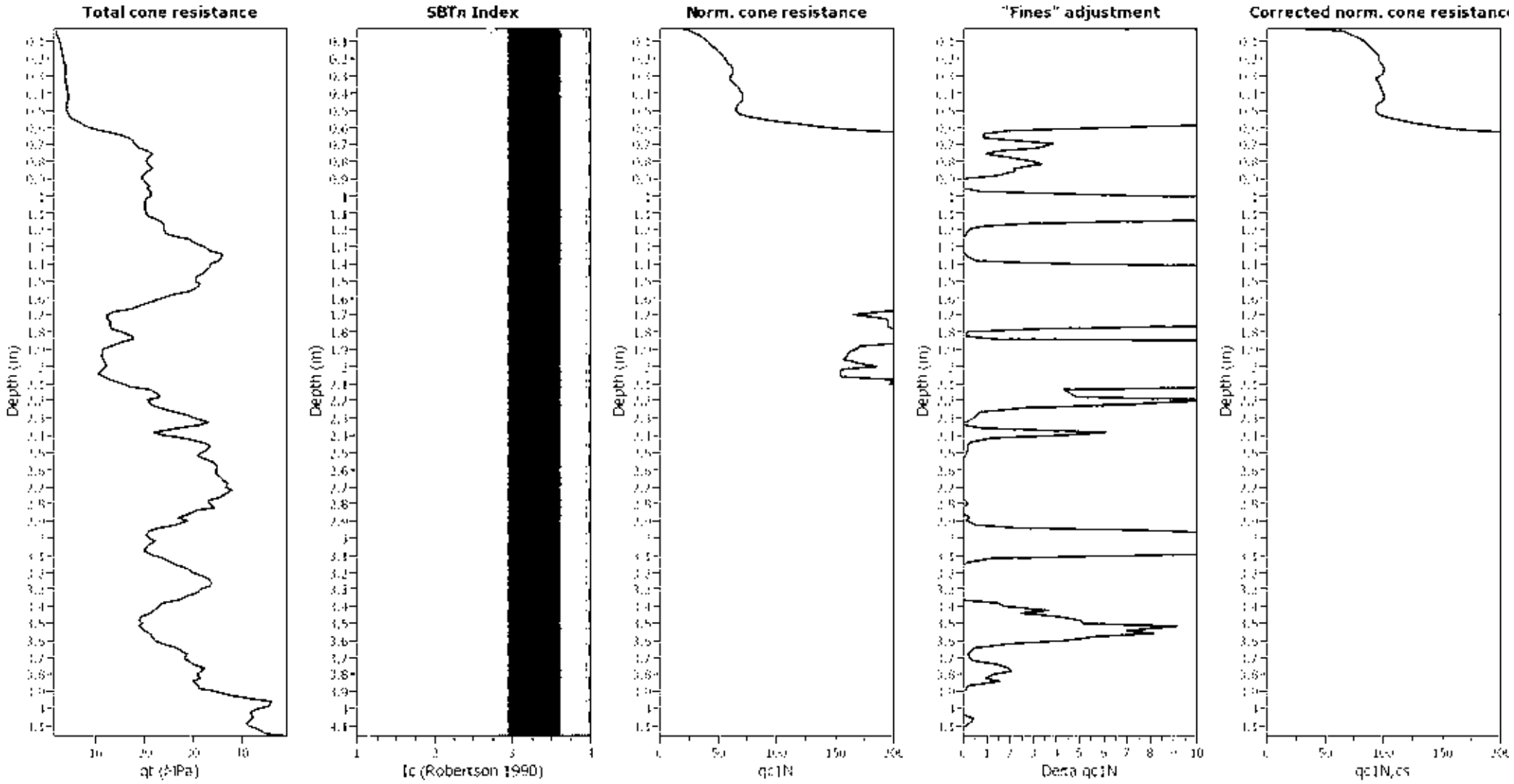
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

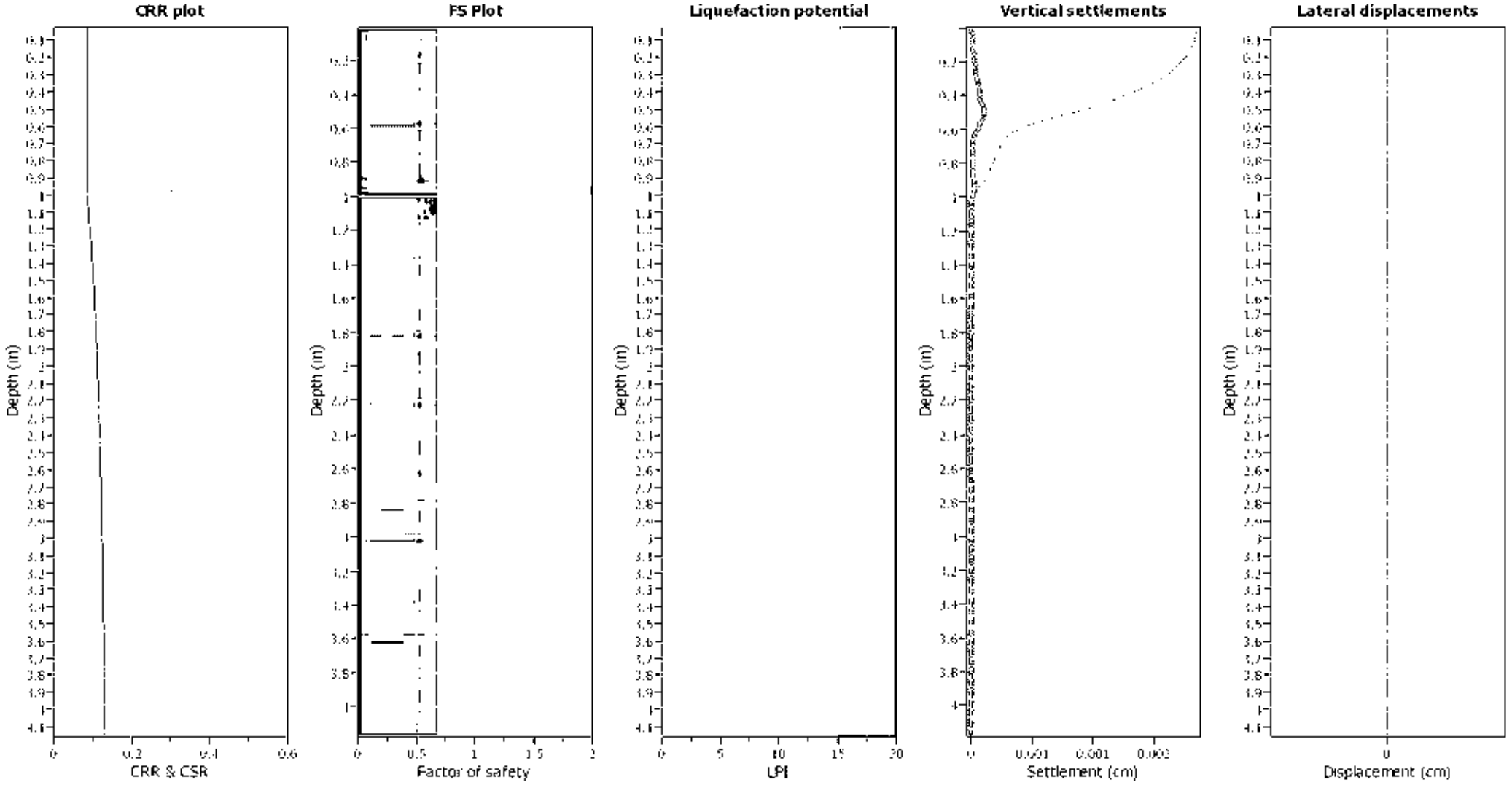
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

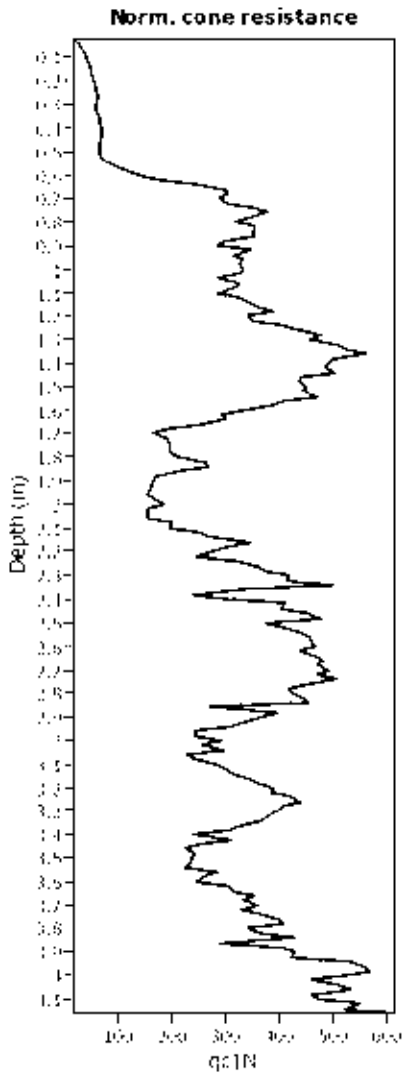
F.S. color scheme

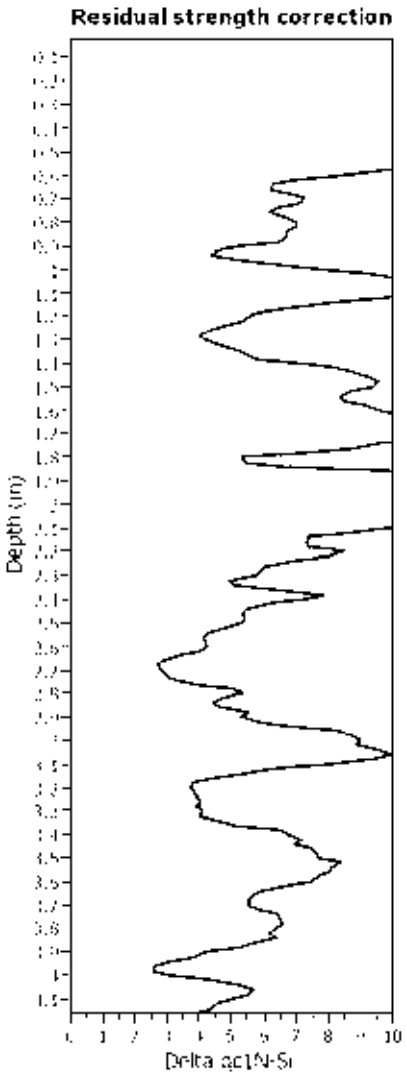
- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

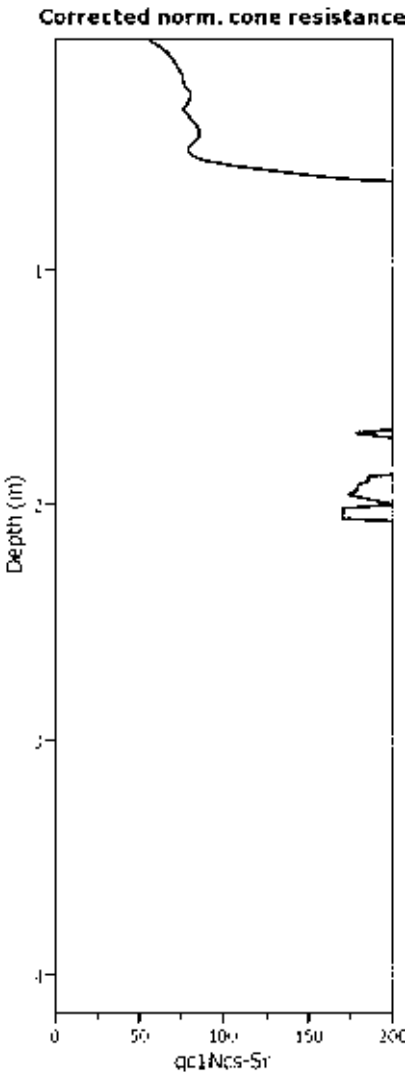
LPI color scheme

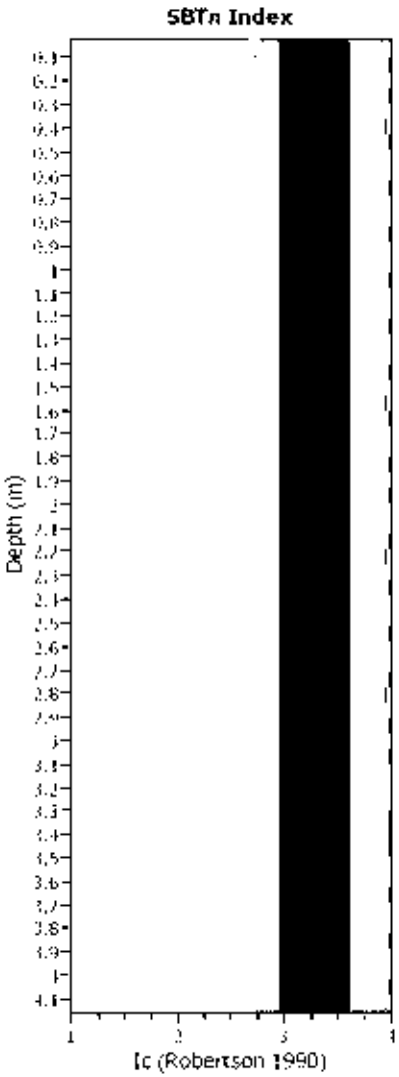
- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

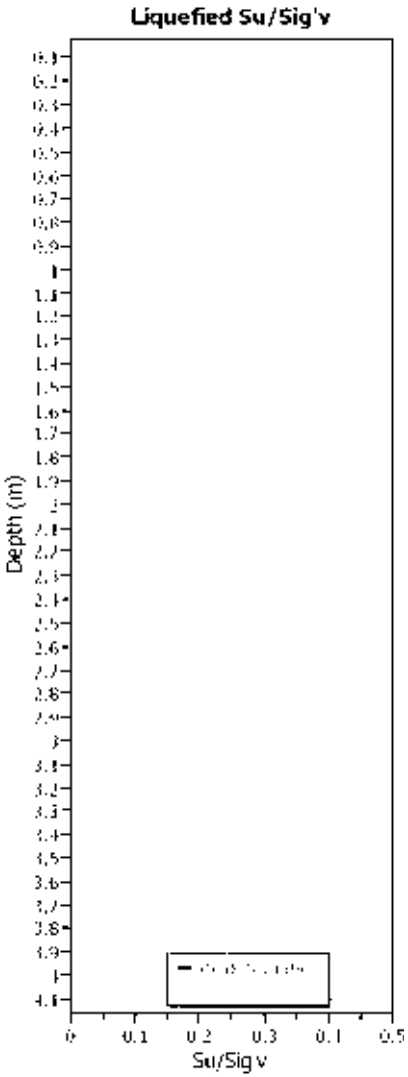
Check for strength loss plots (Idriss & Boulanger (2008))







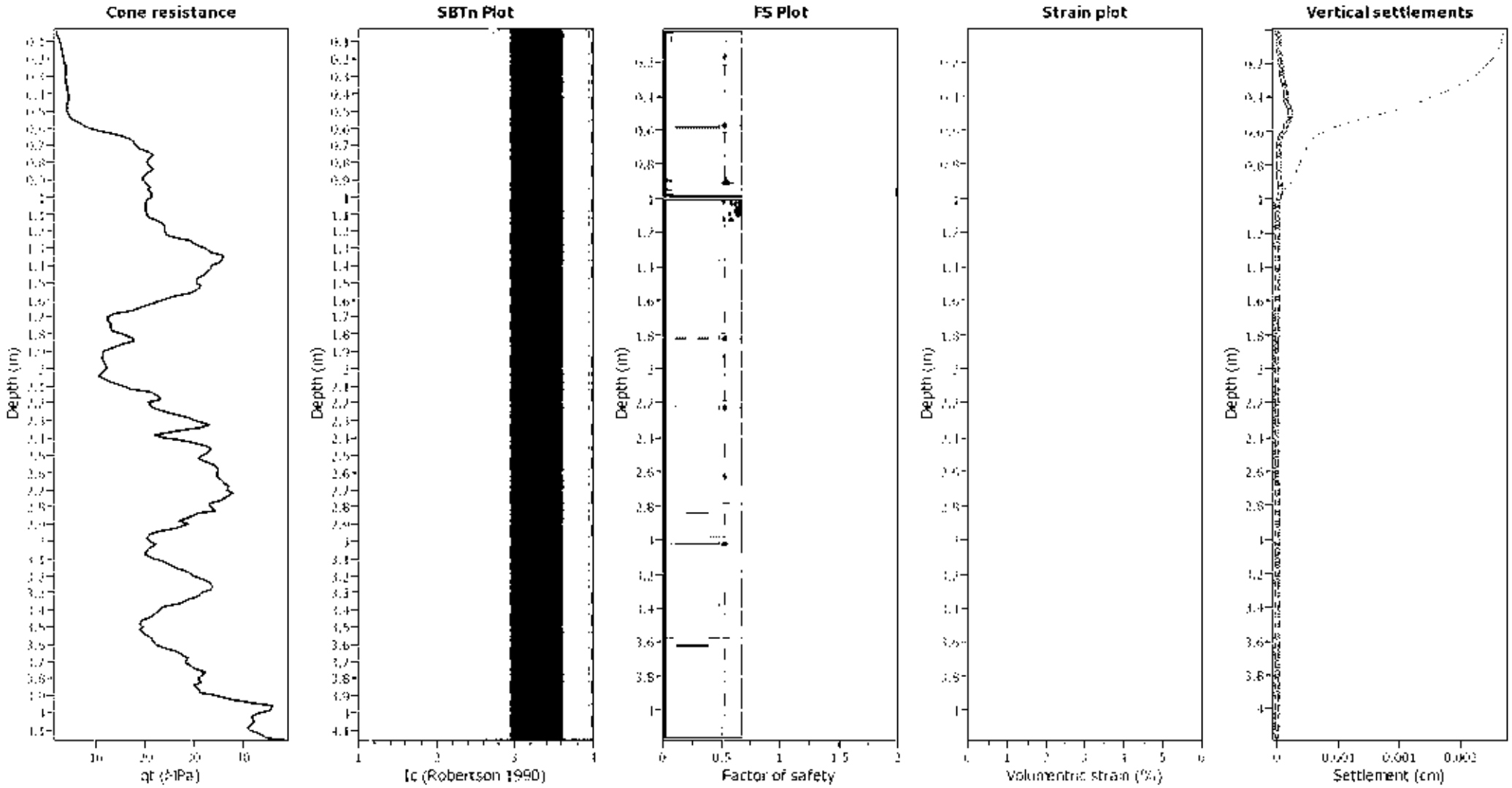




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

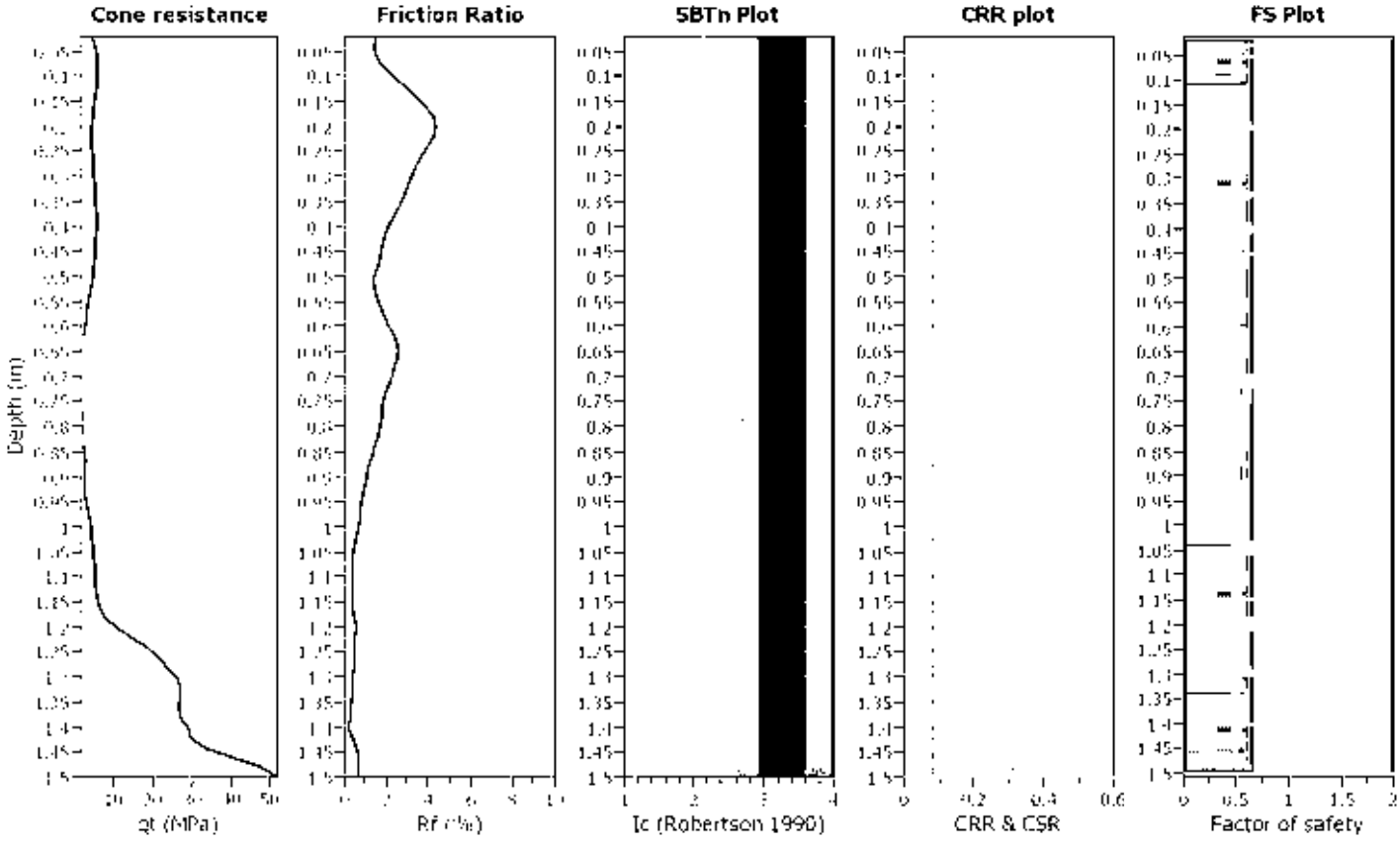
qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

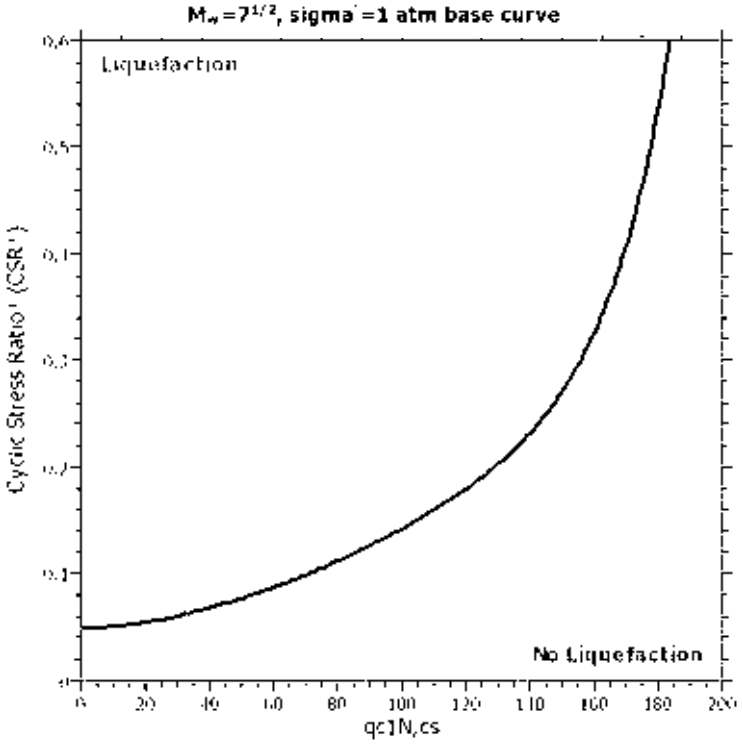
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

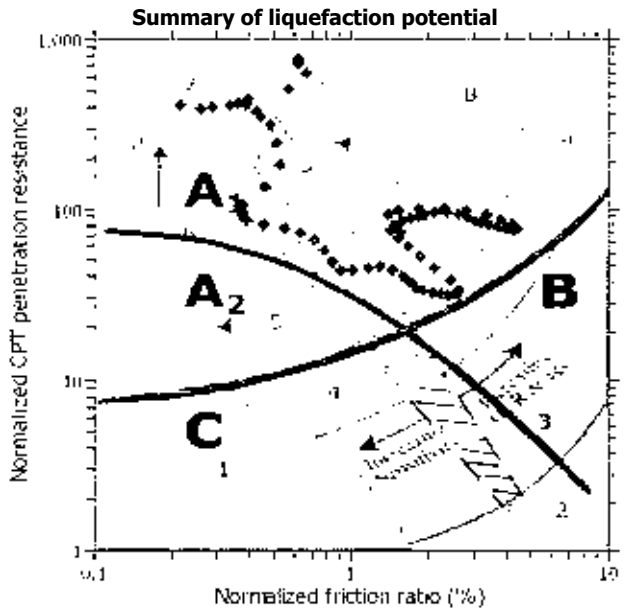
CPT file : CPT30_29rProvincialRd

Input parameters and analysis data

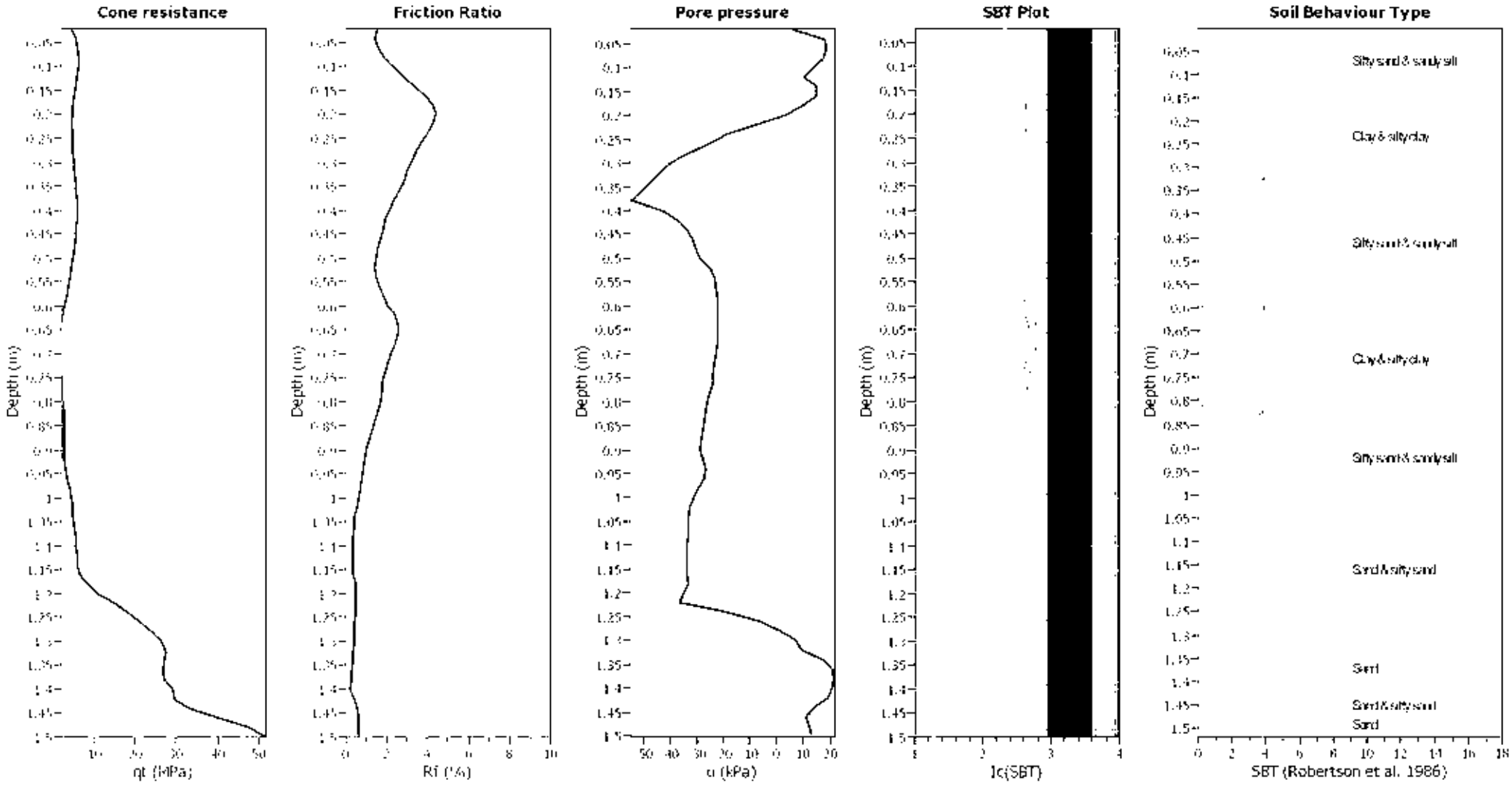
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



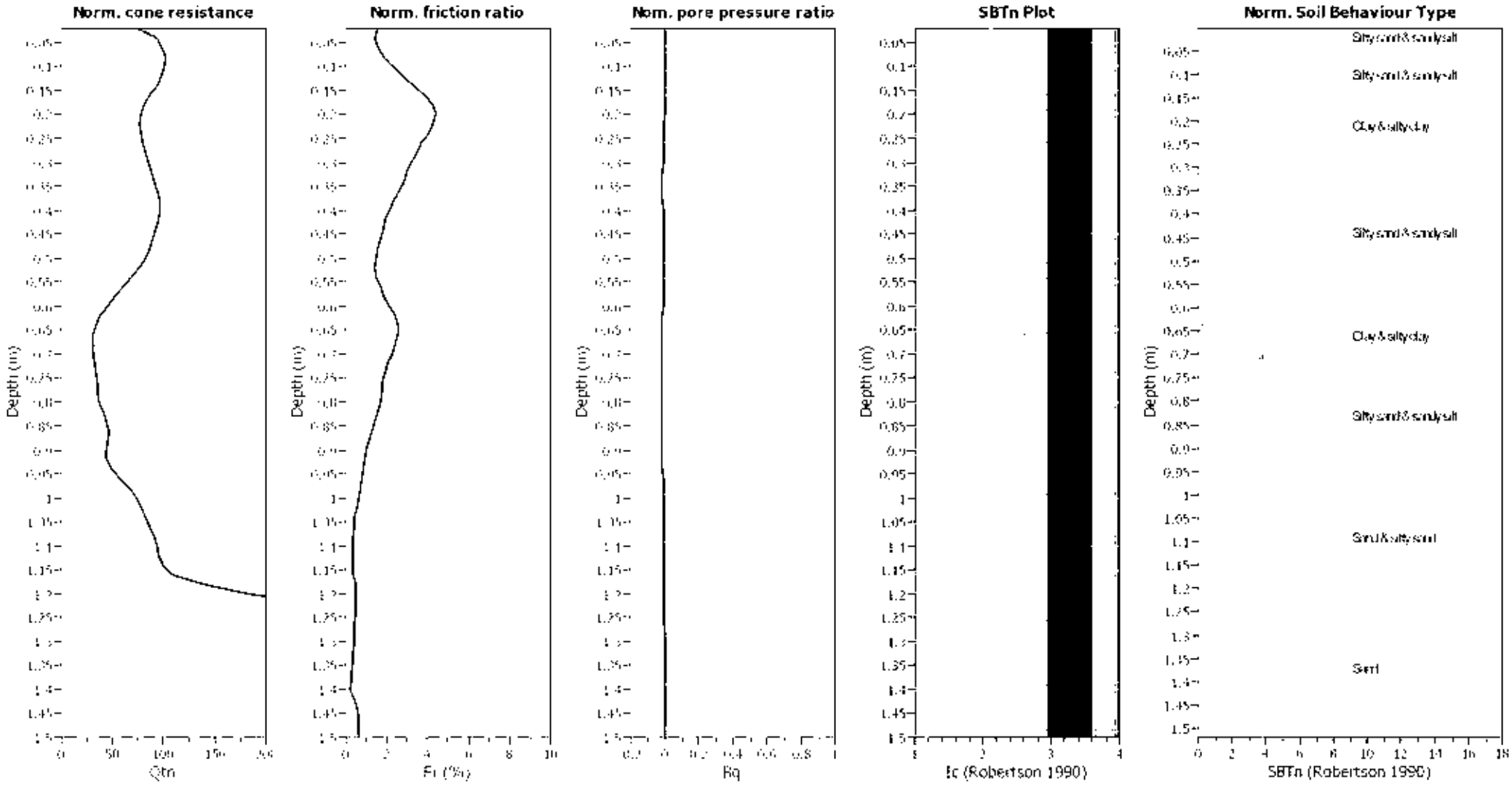
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



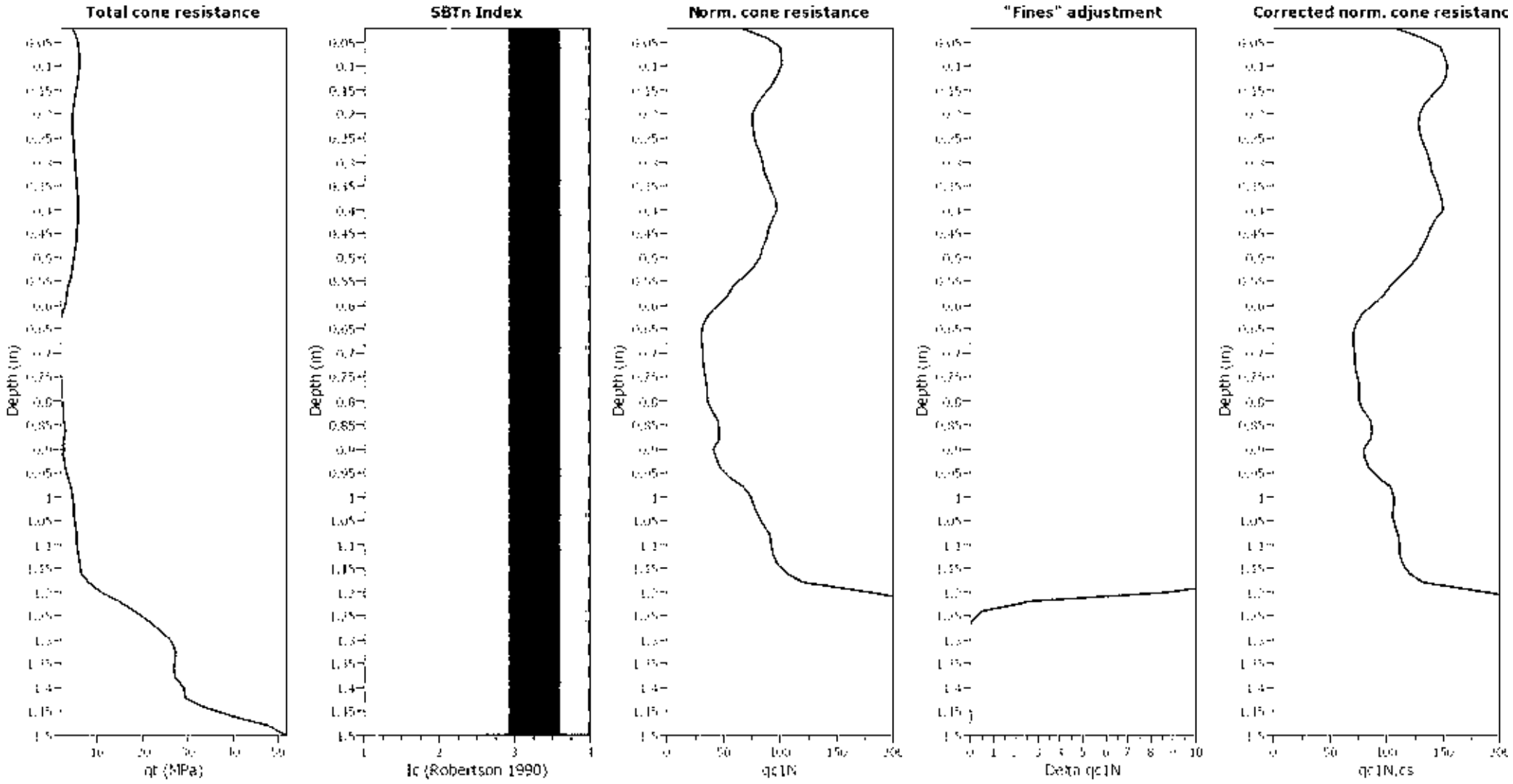
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

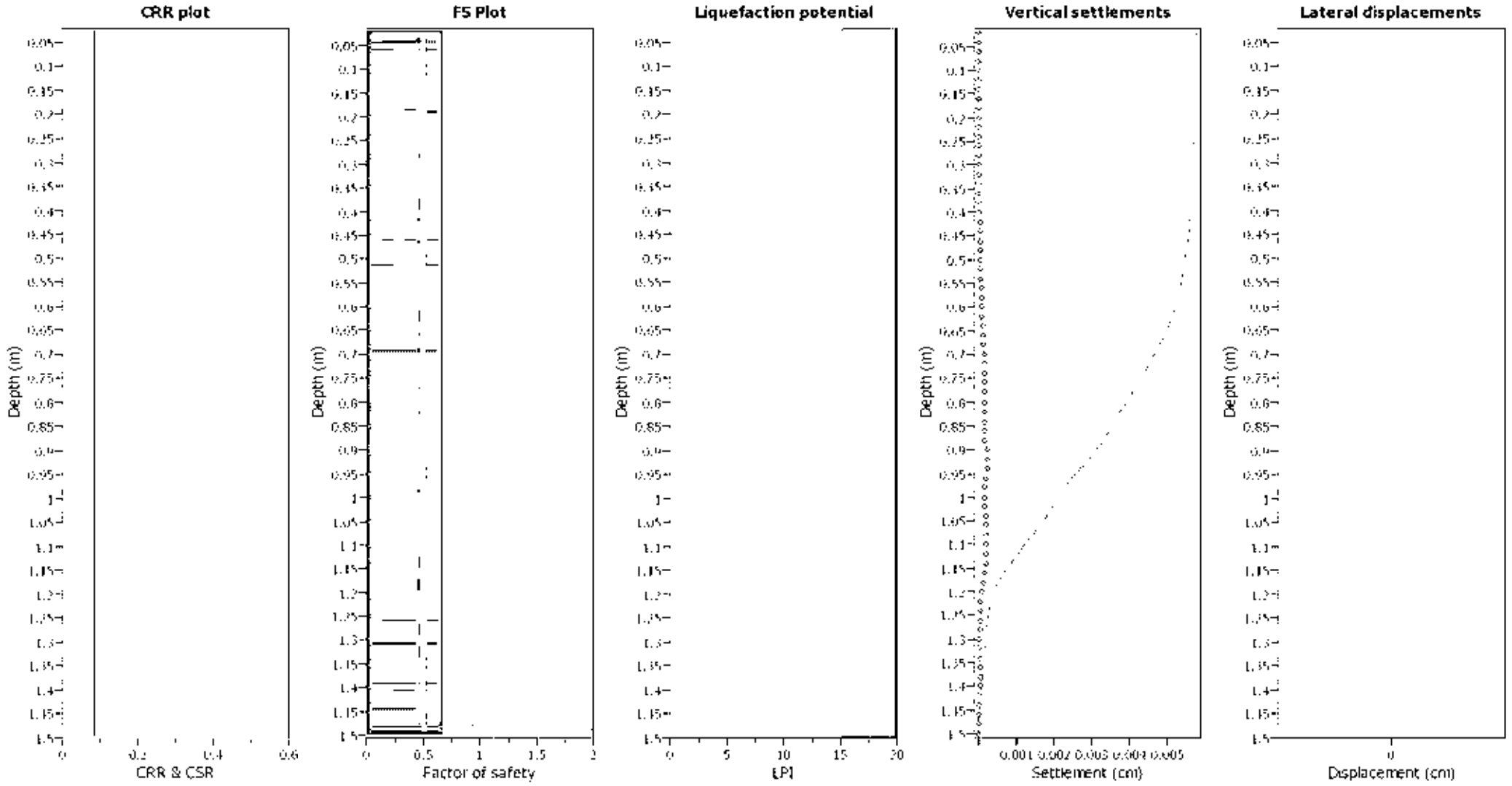
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

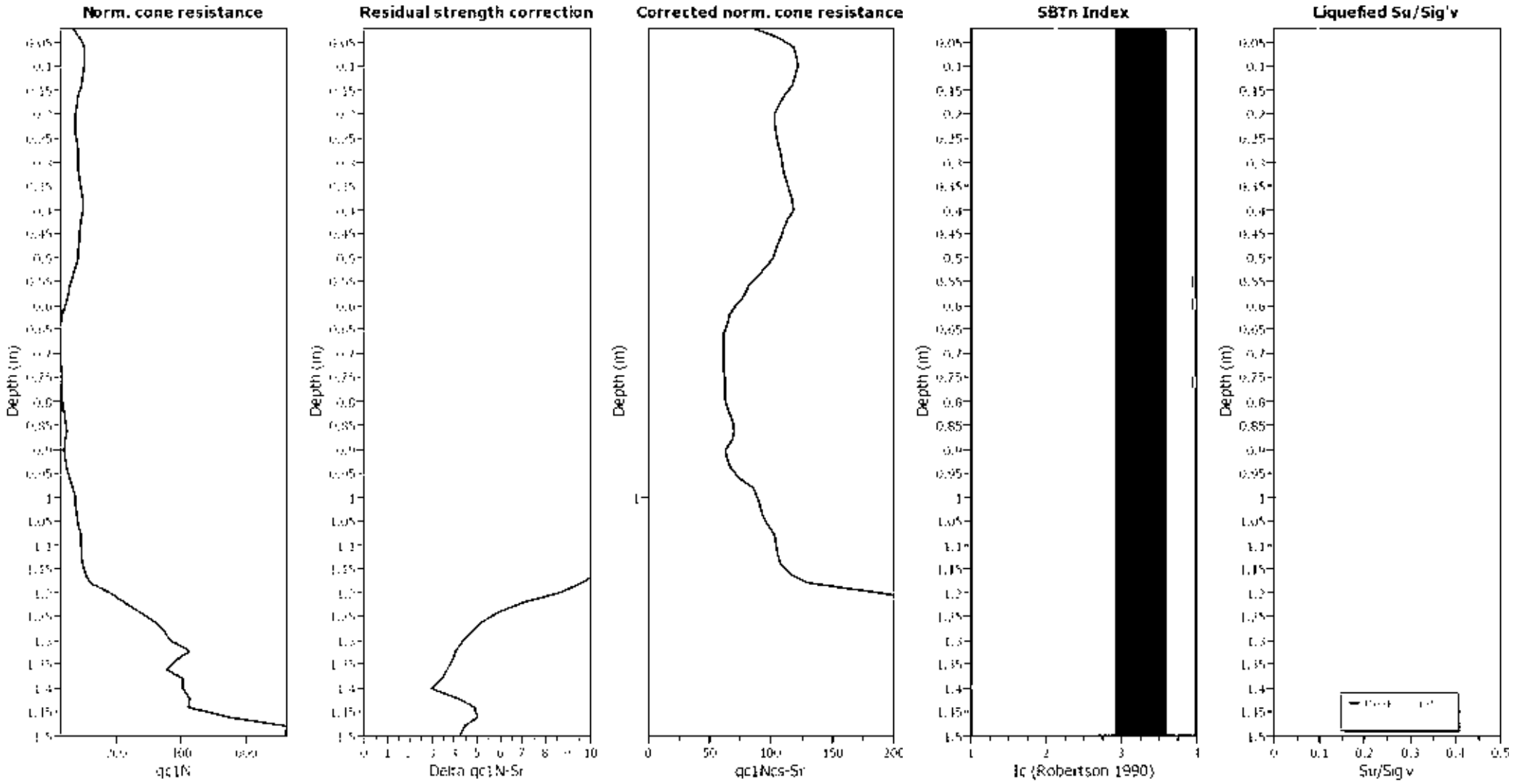
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

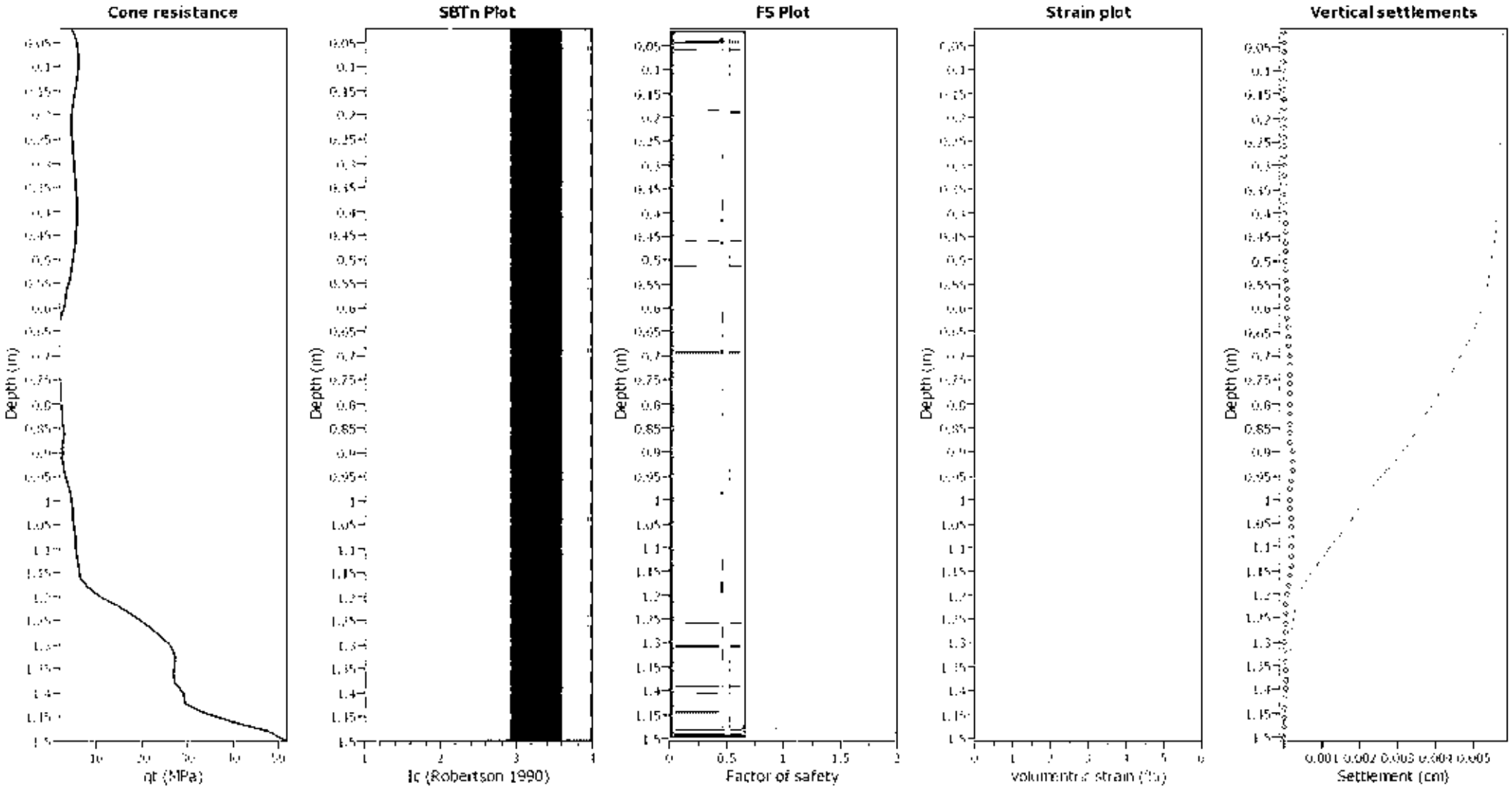
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

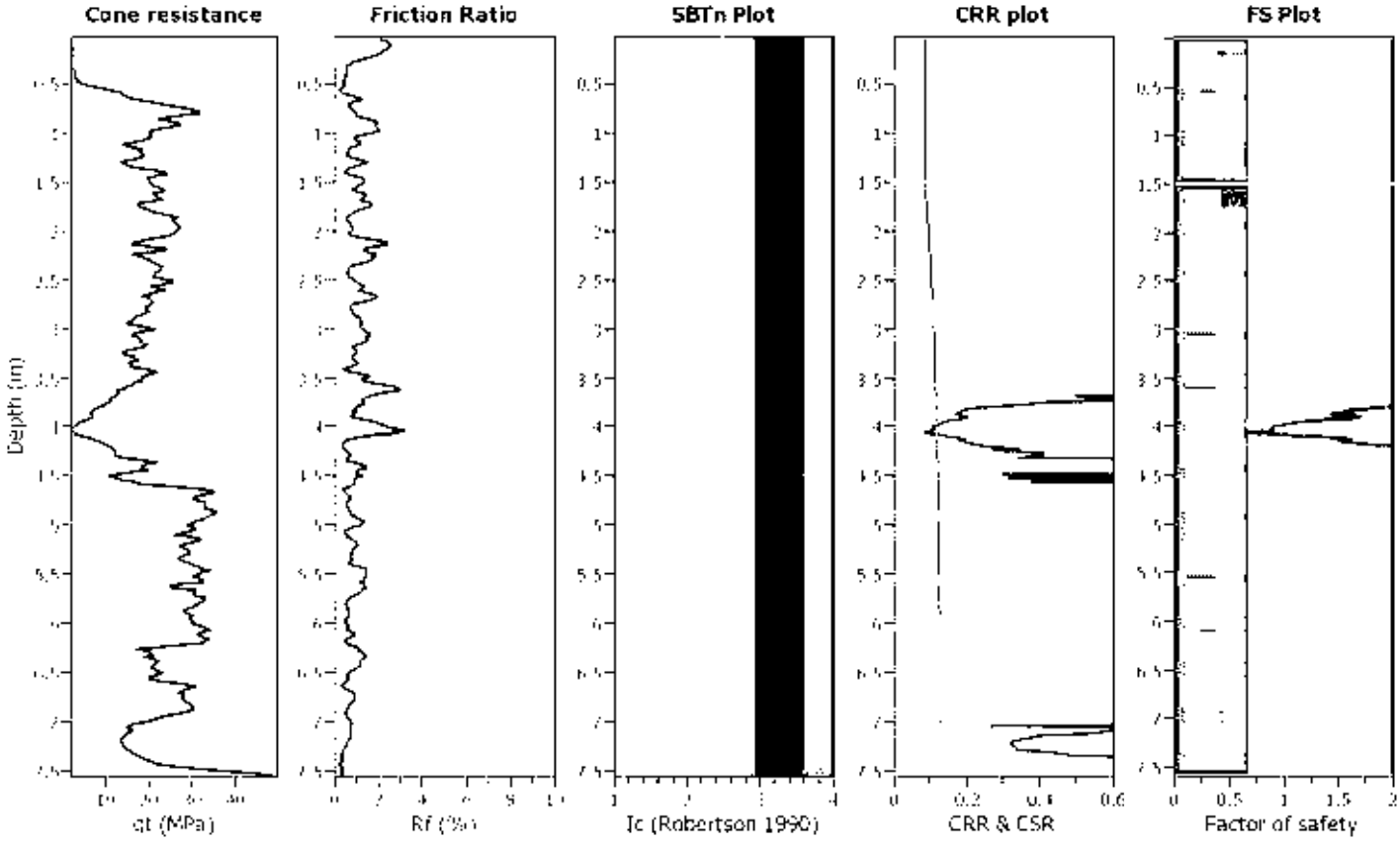
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

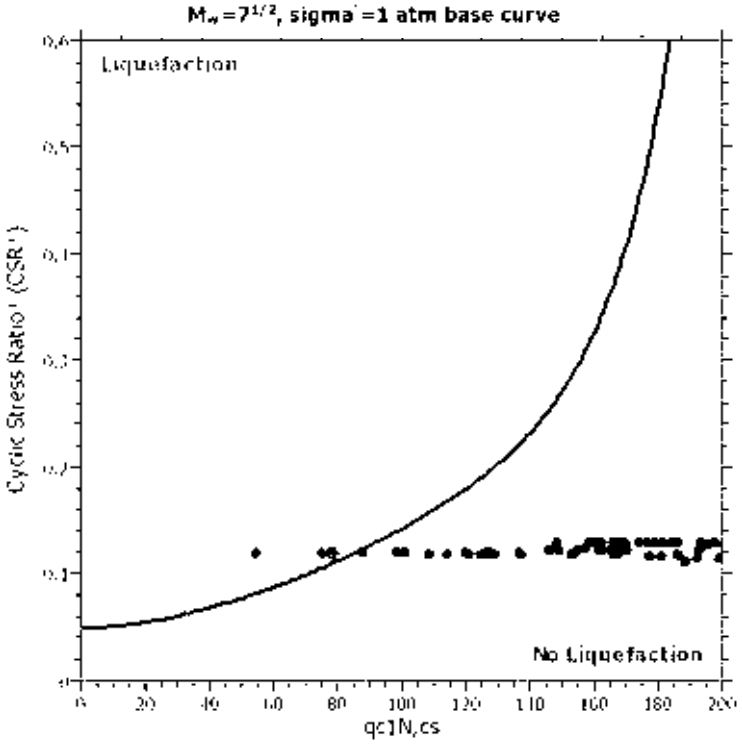
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

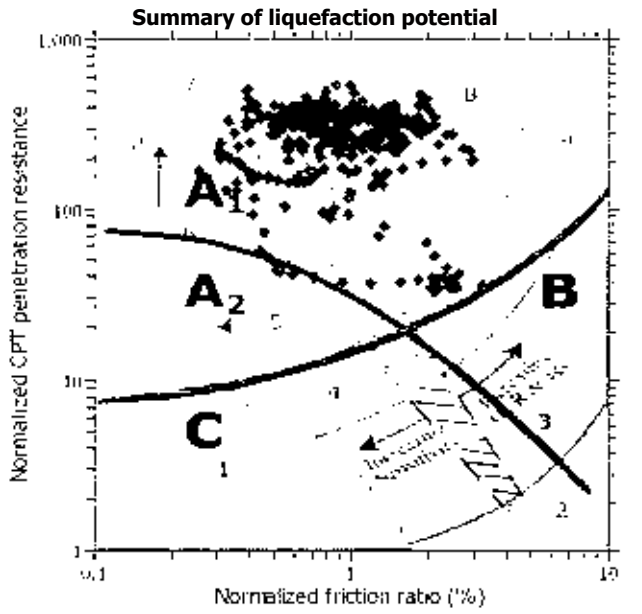
CPT file : CPT31_25KennedysBushRd

Input parameters and analysis data

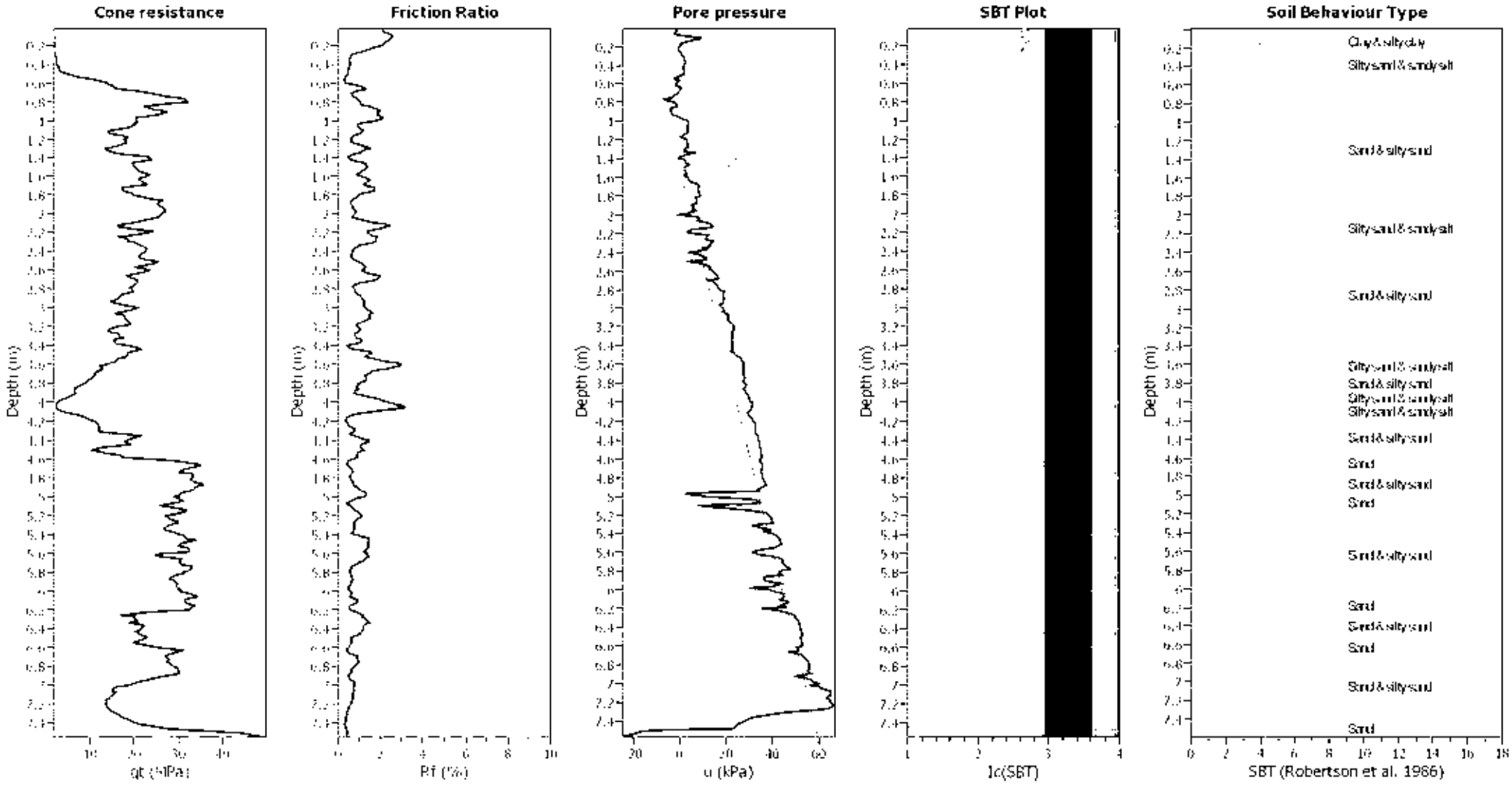
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



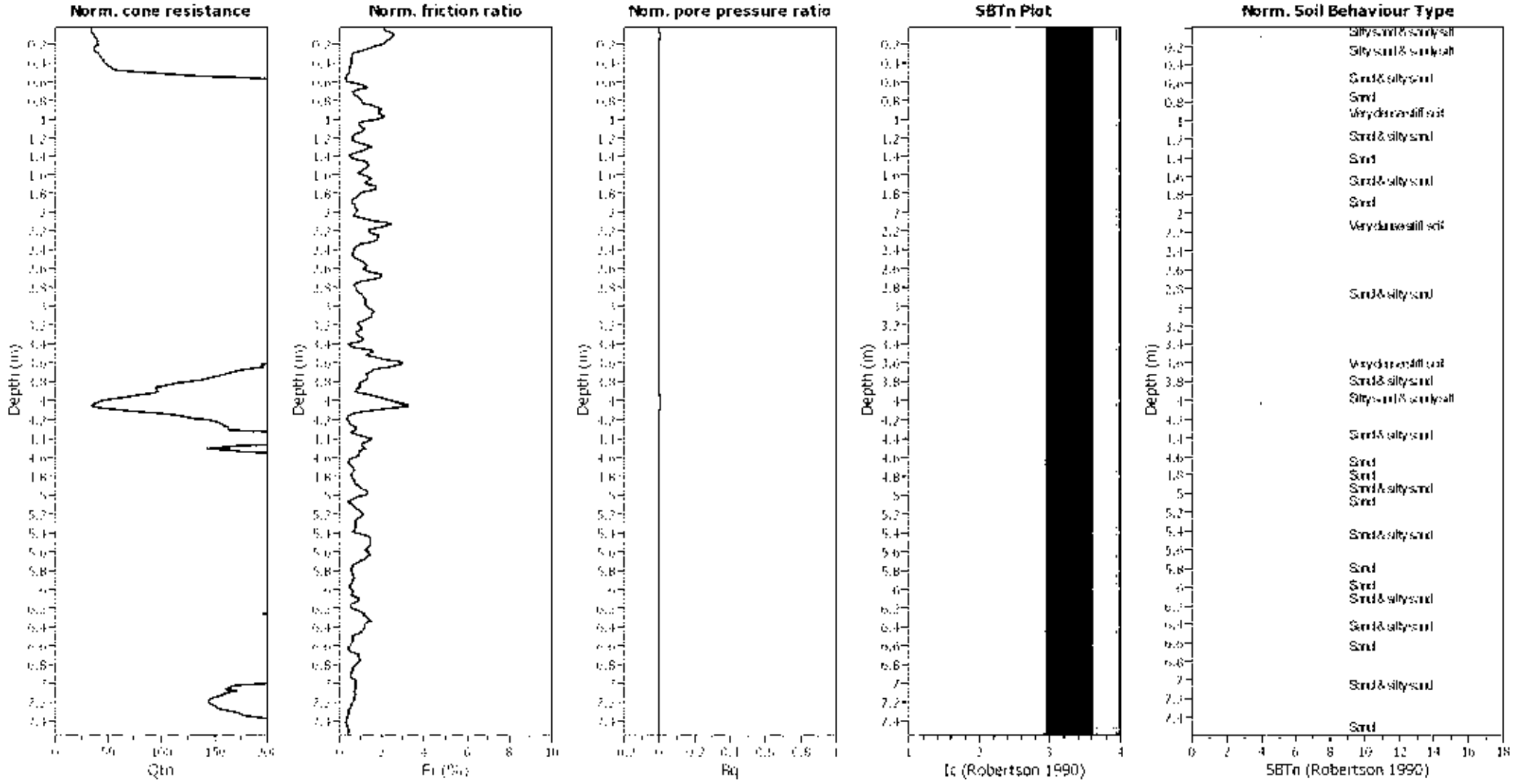
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



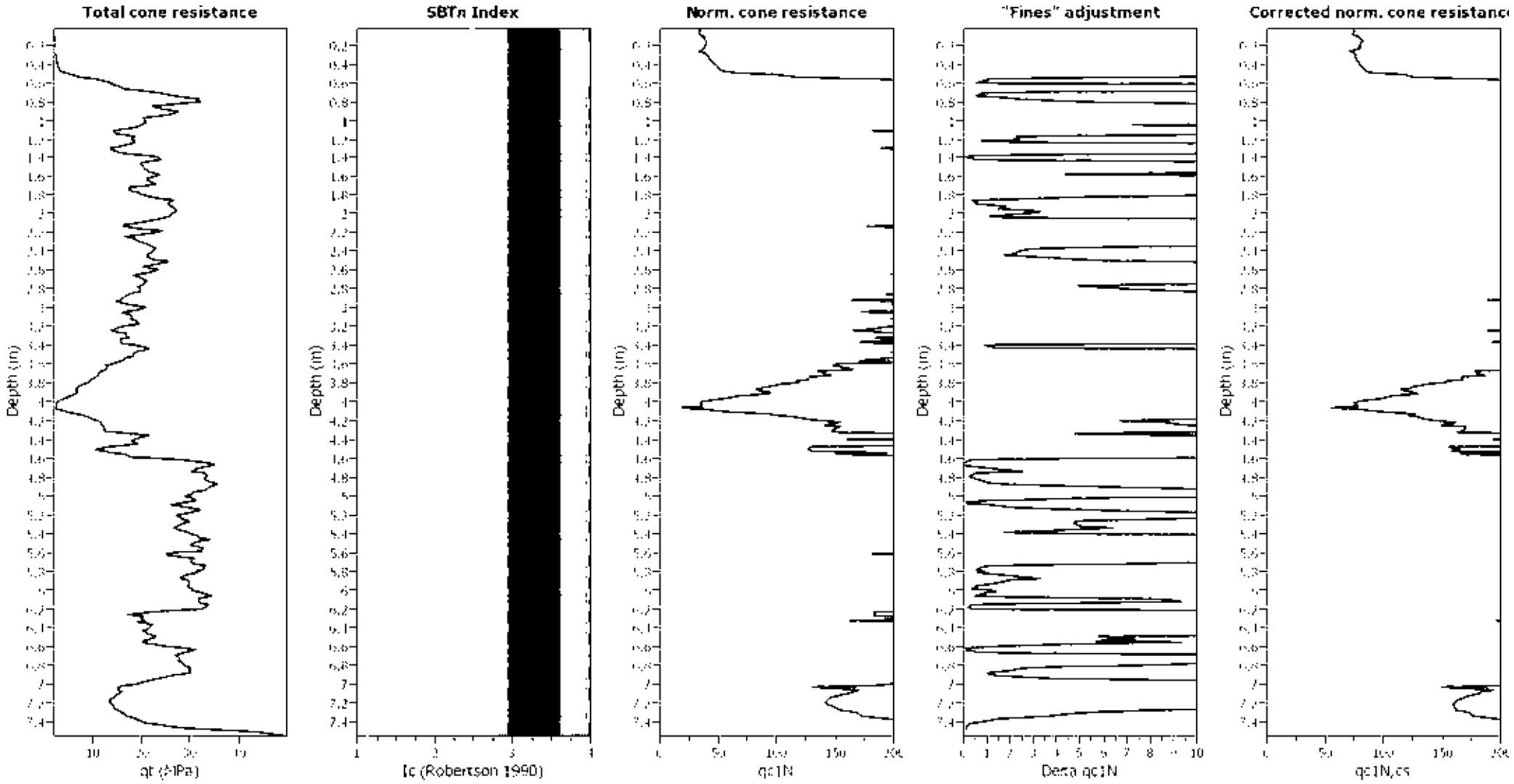
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

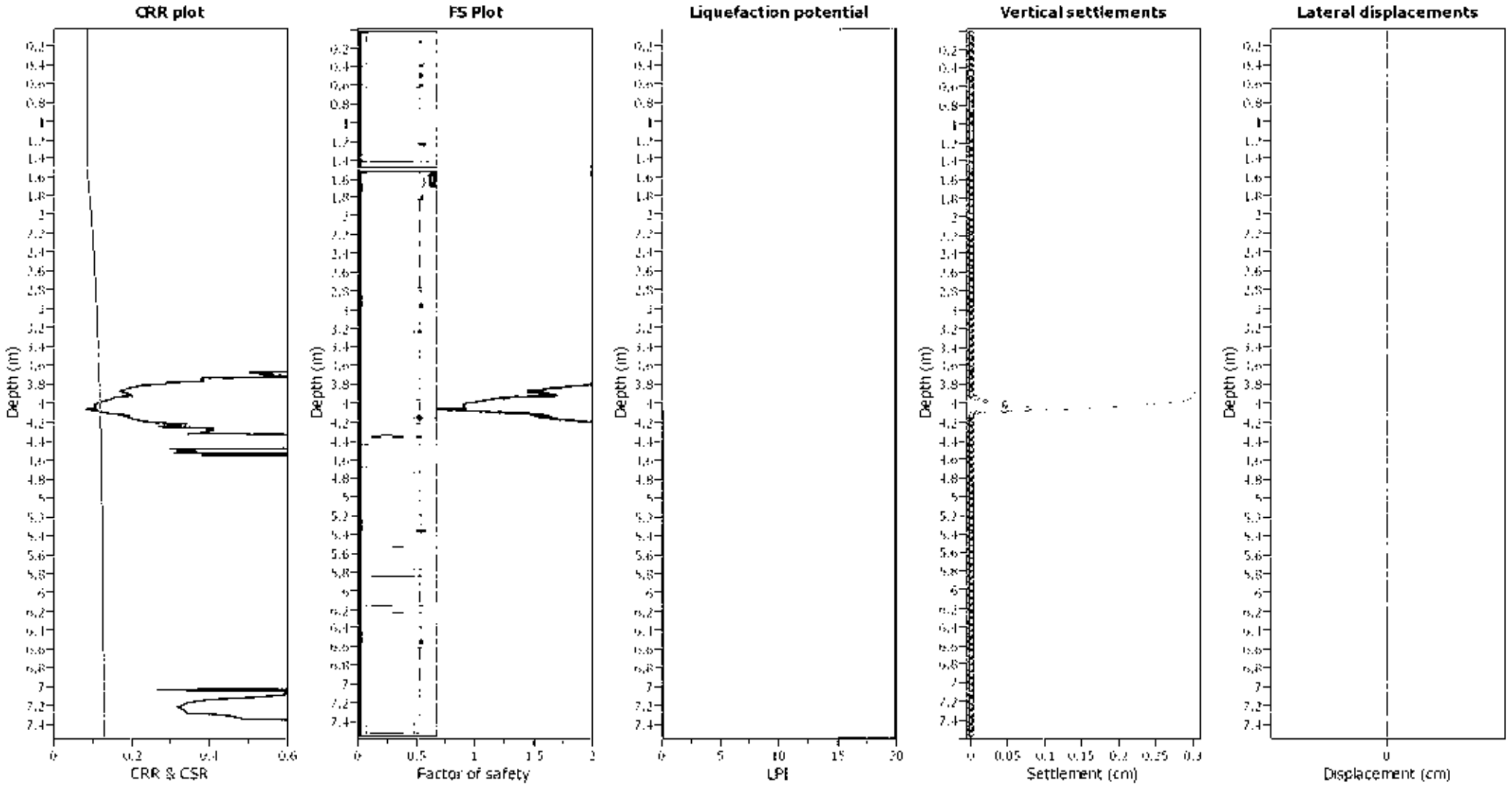
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

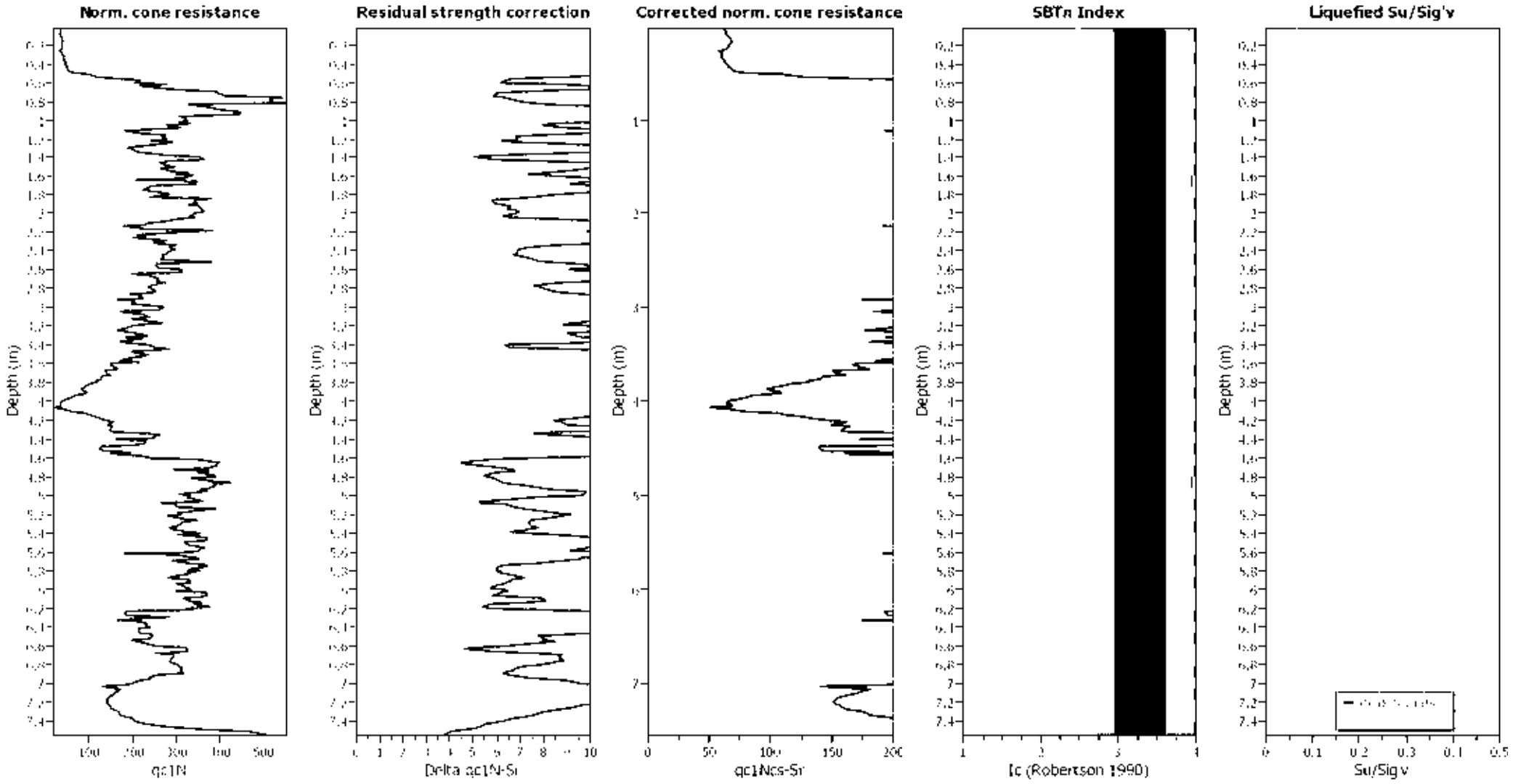
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

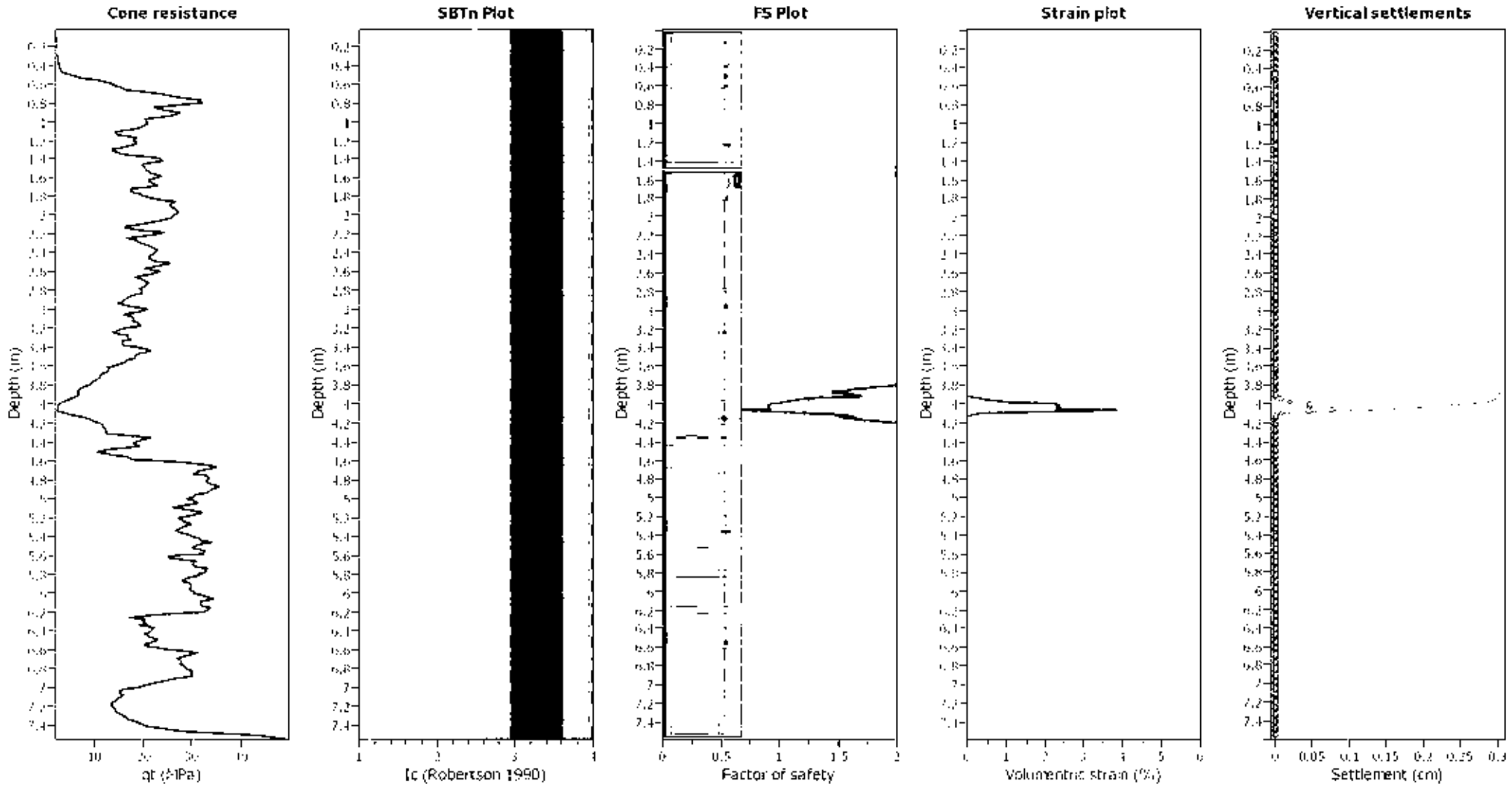
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

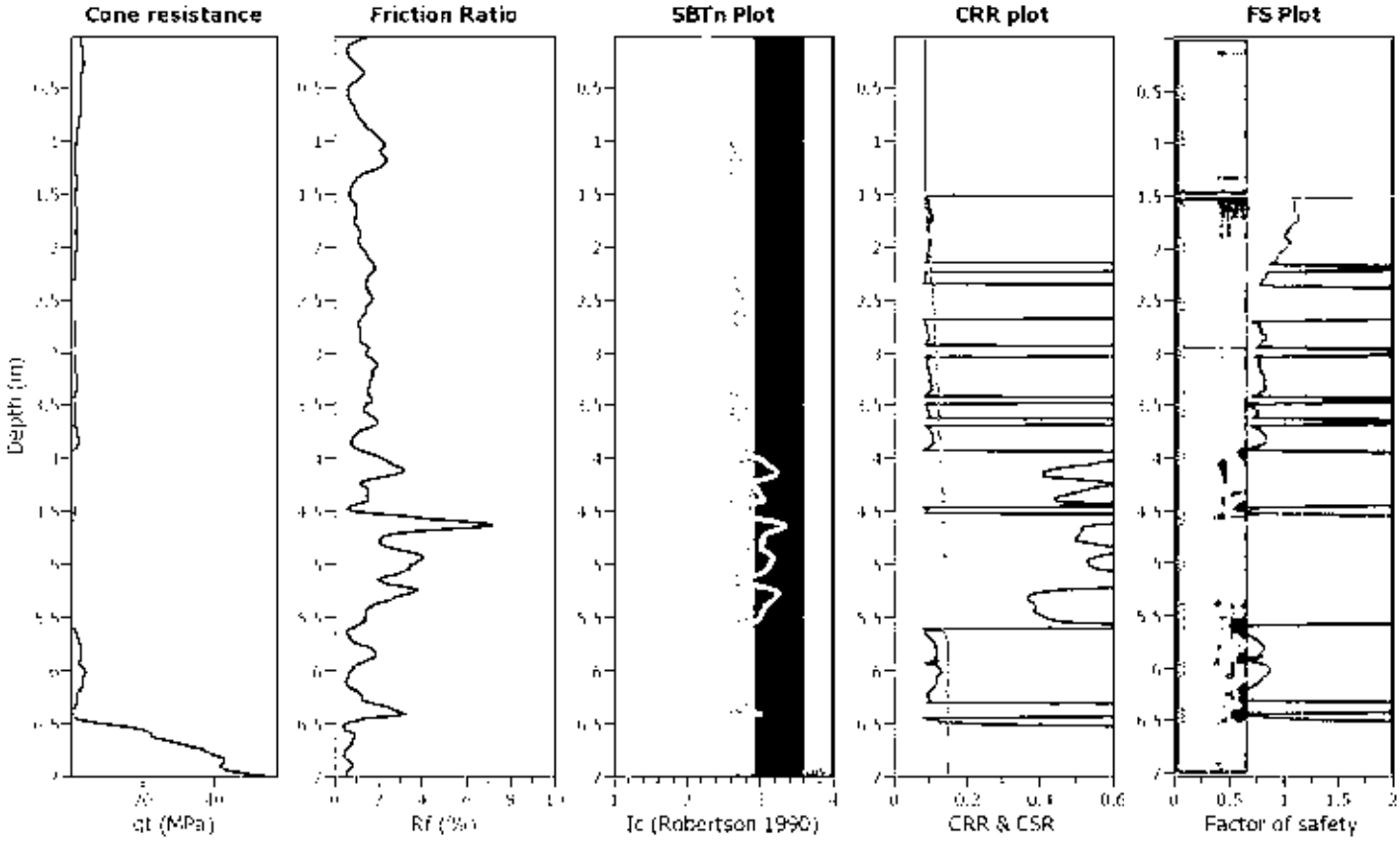
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

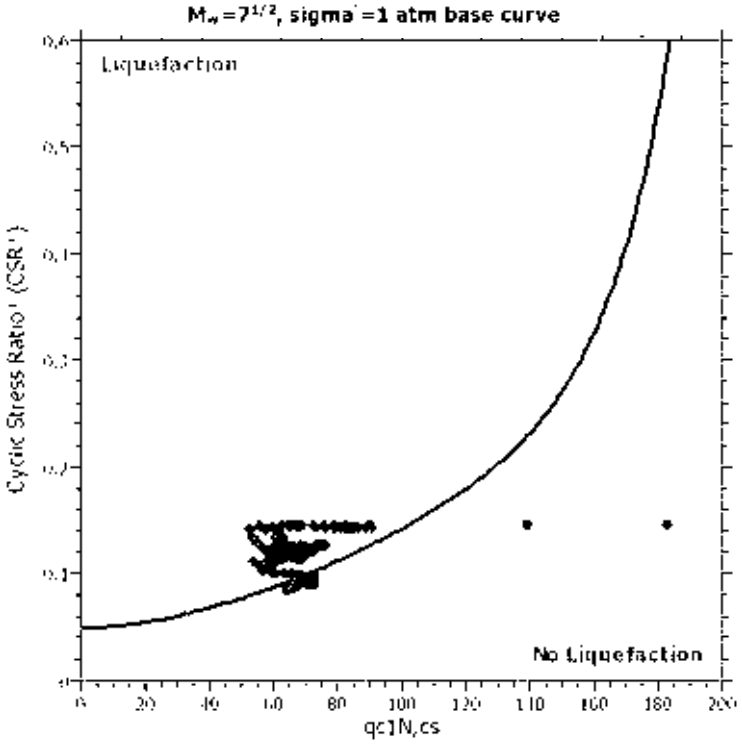
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

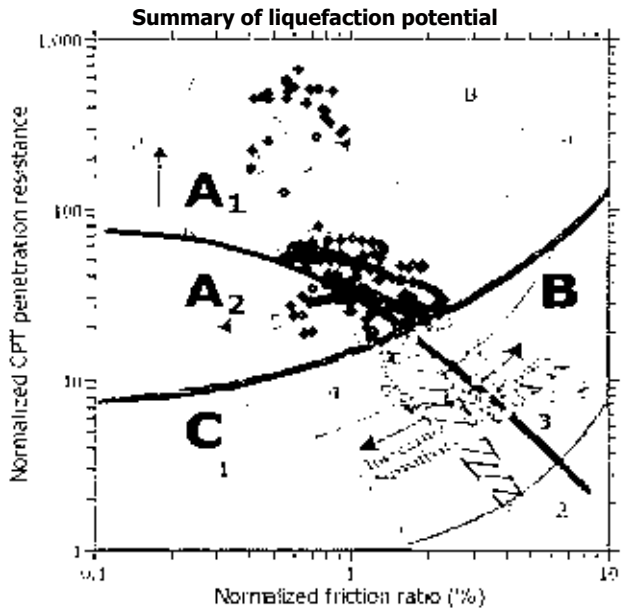
CPT file : CPT32_1SutherlandsRd

Input parameters and analysis data

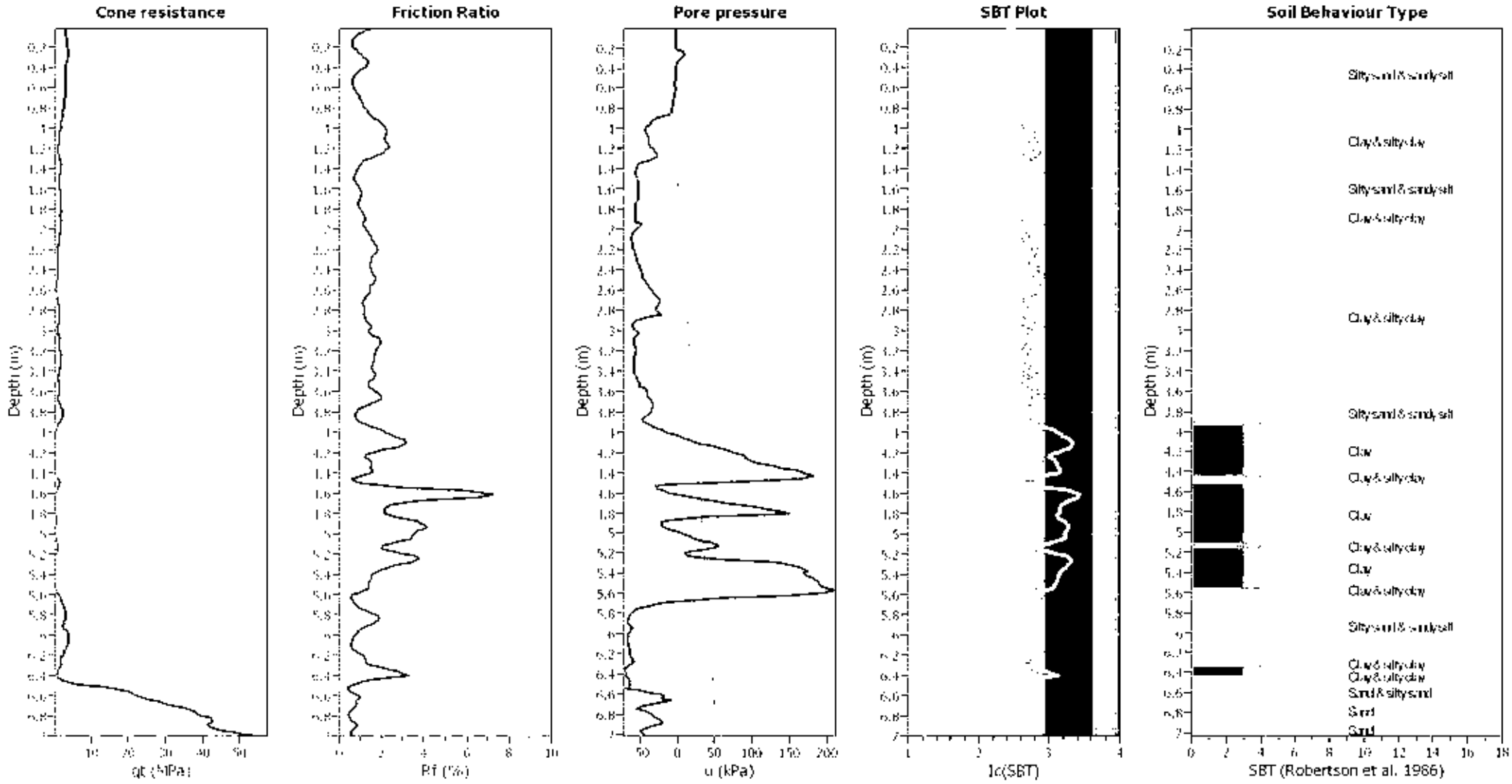
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



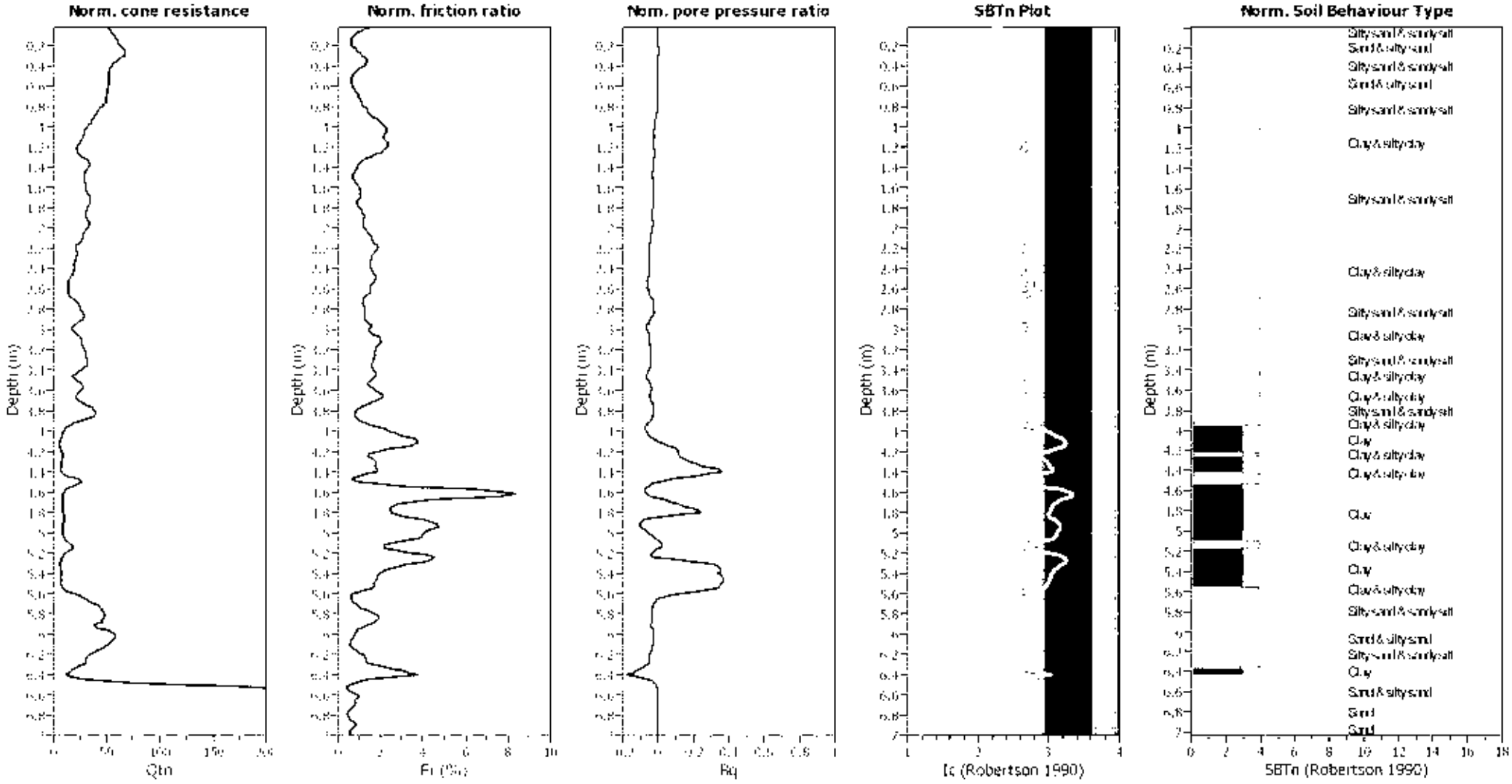
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



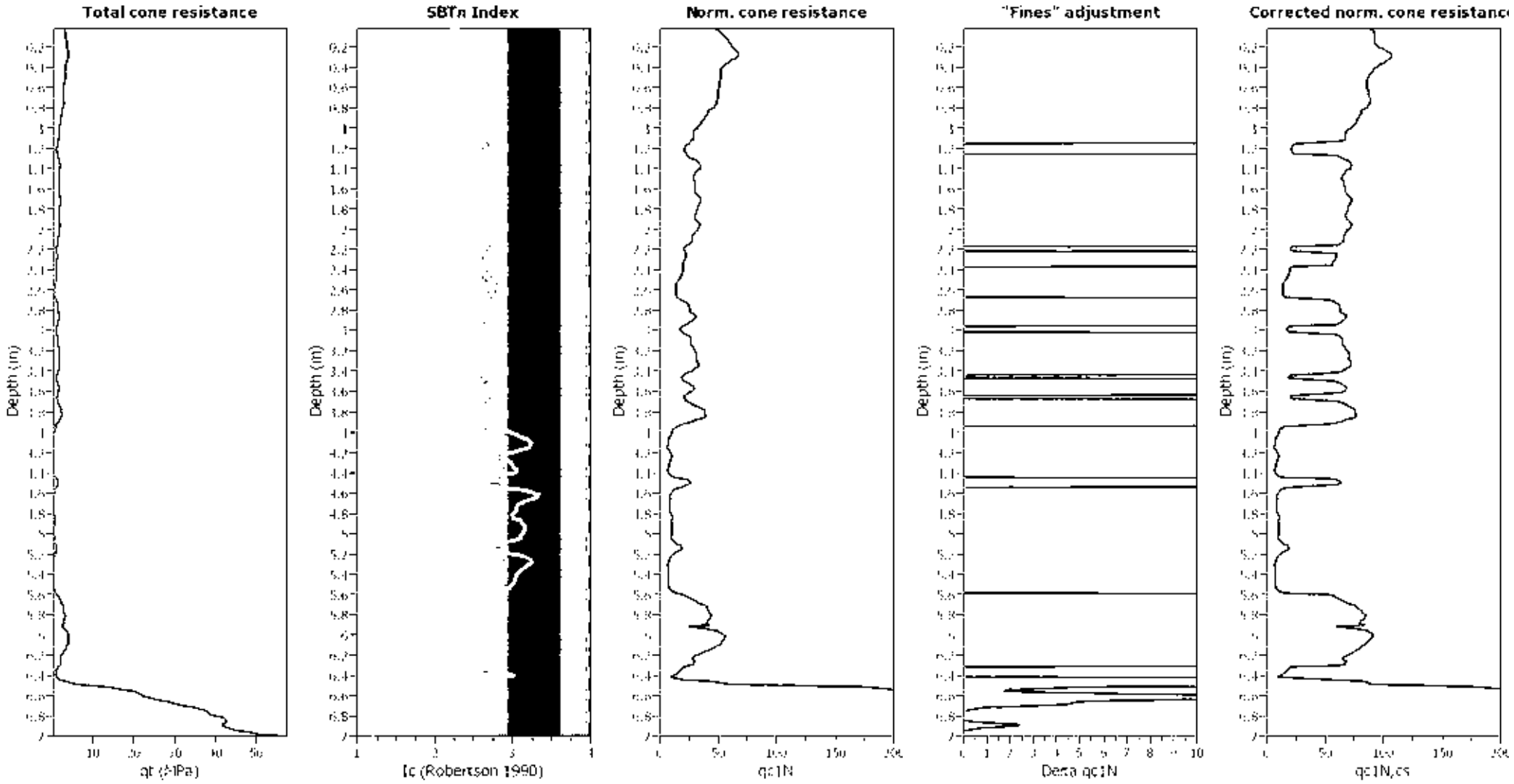
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

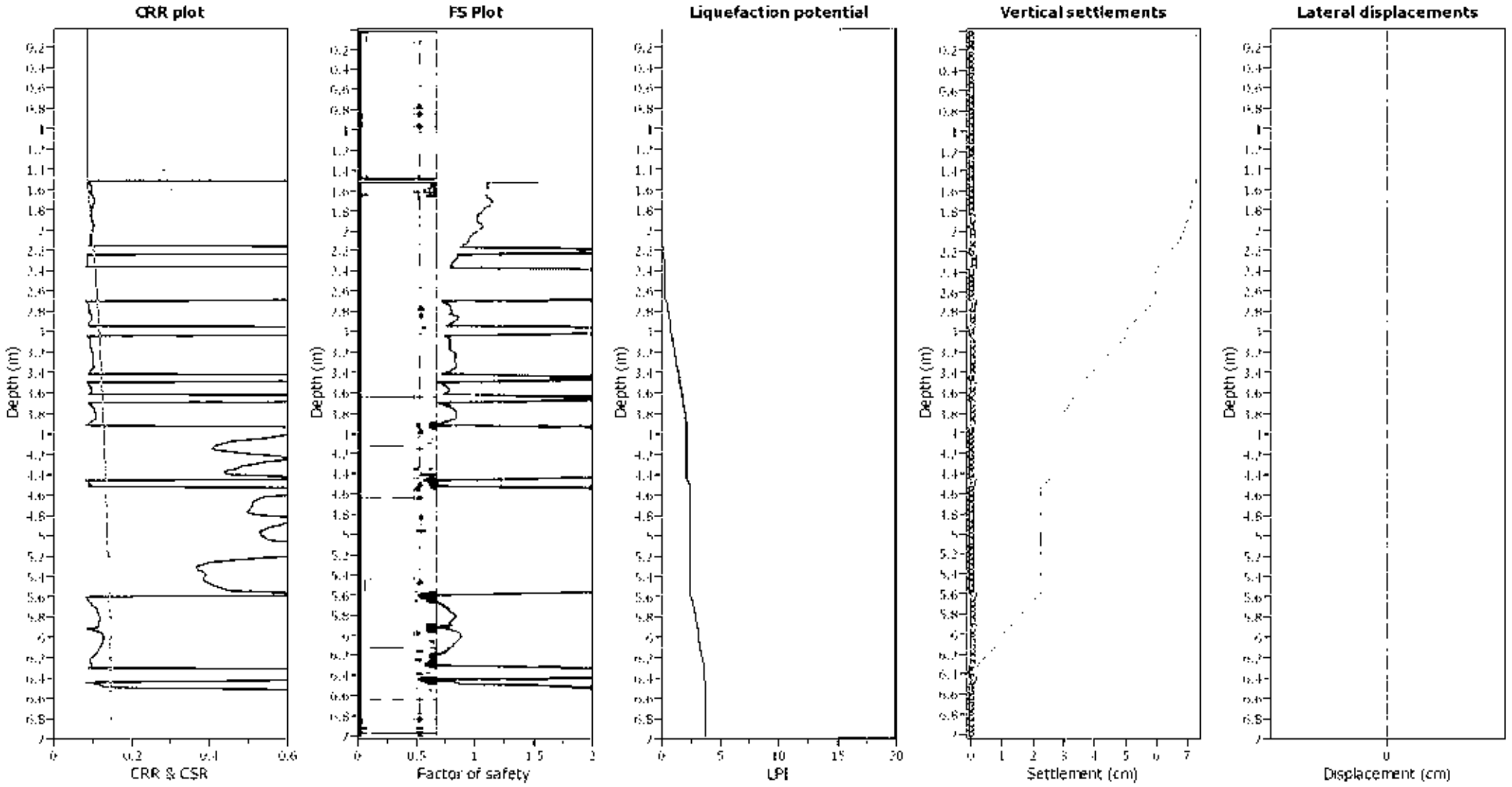
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

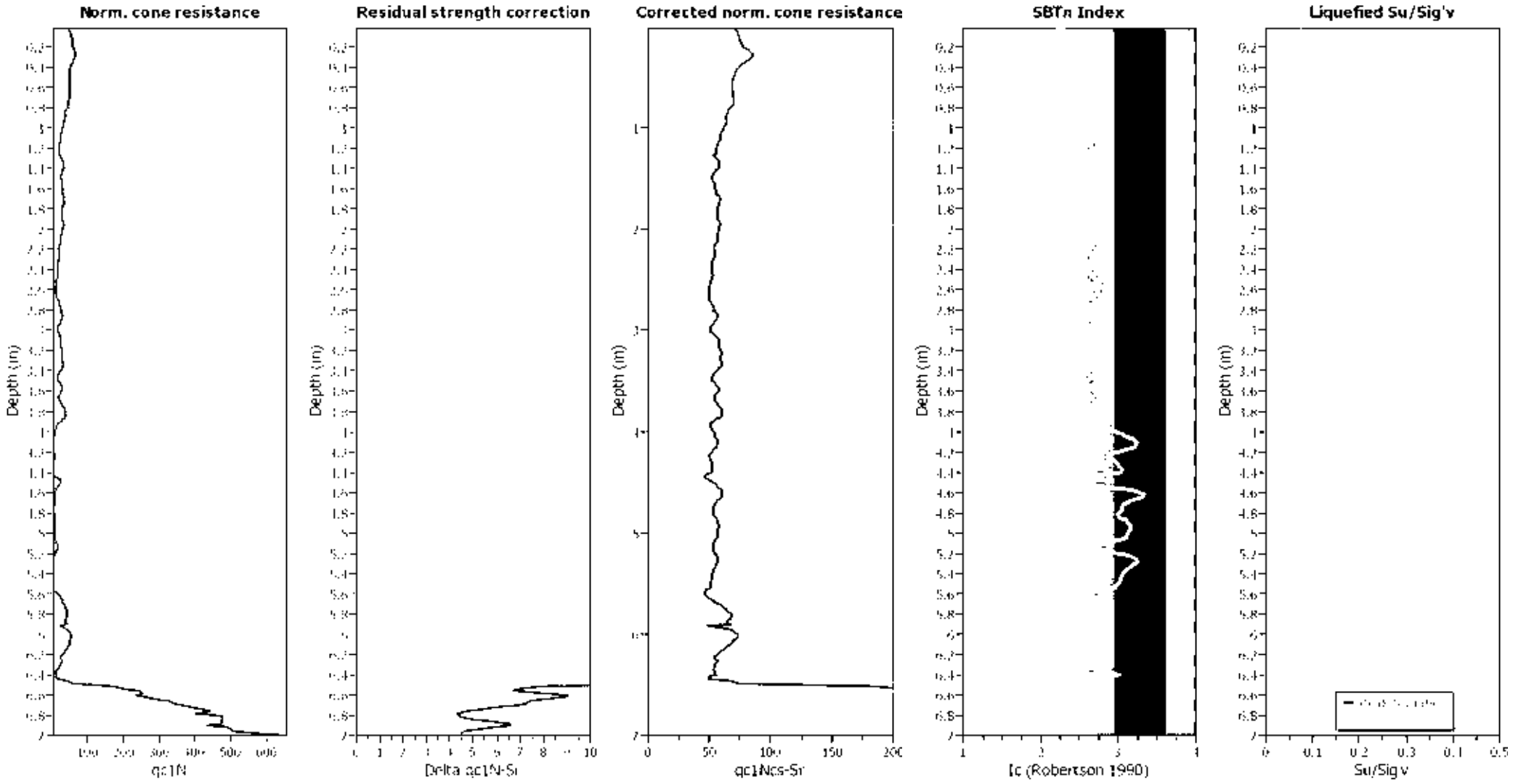
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

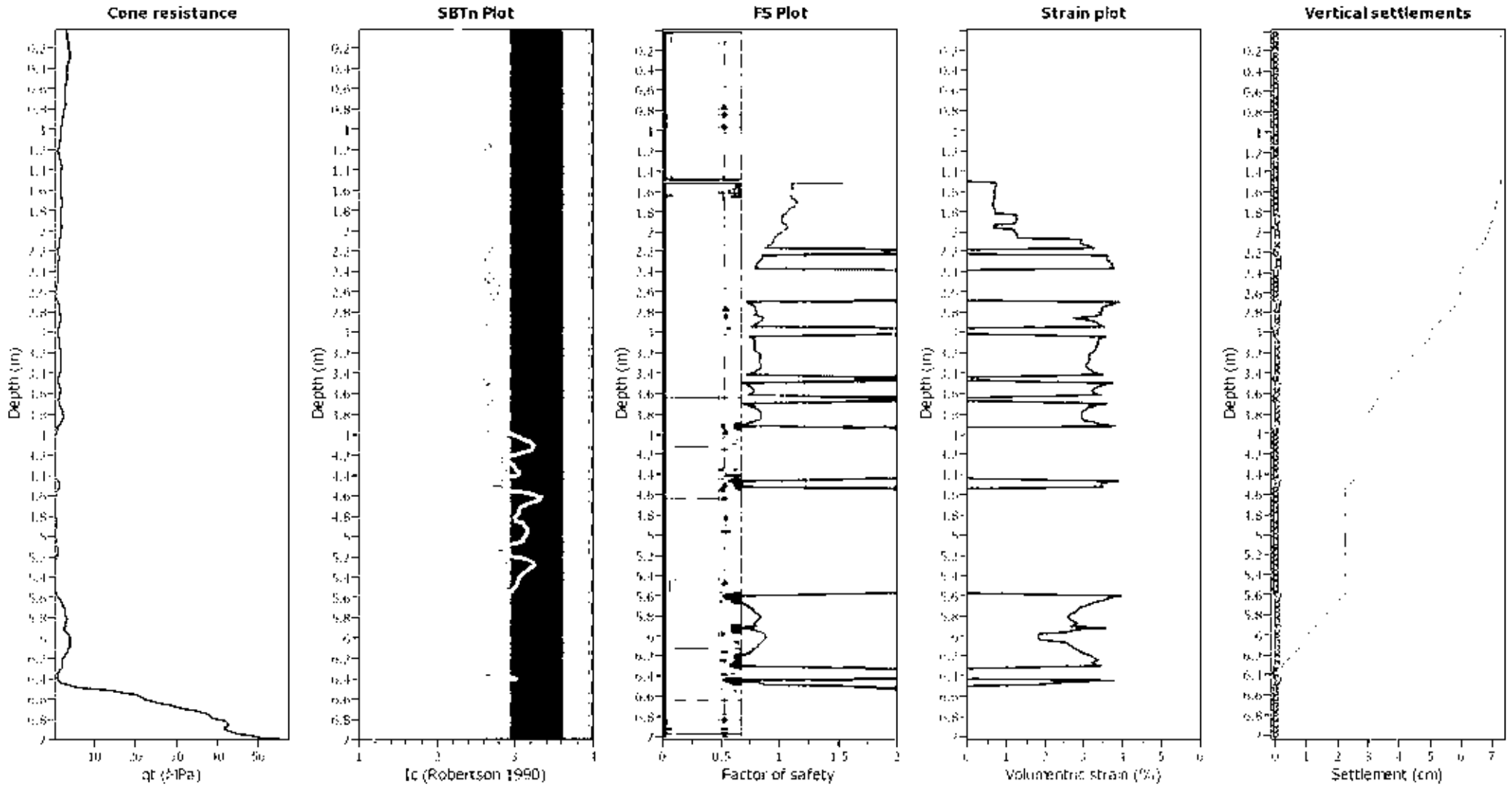
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

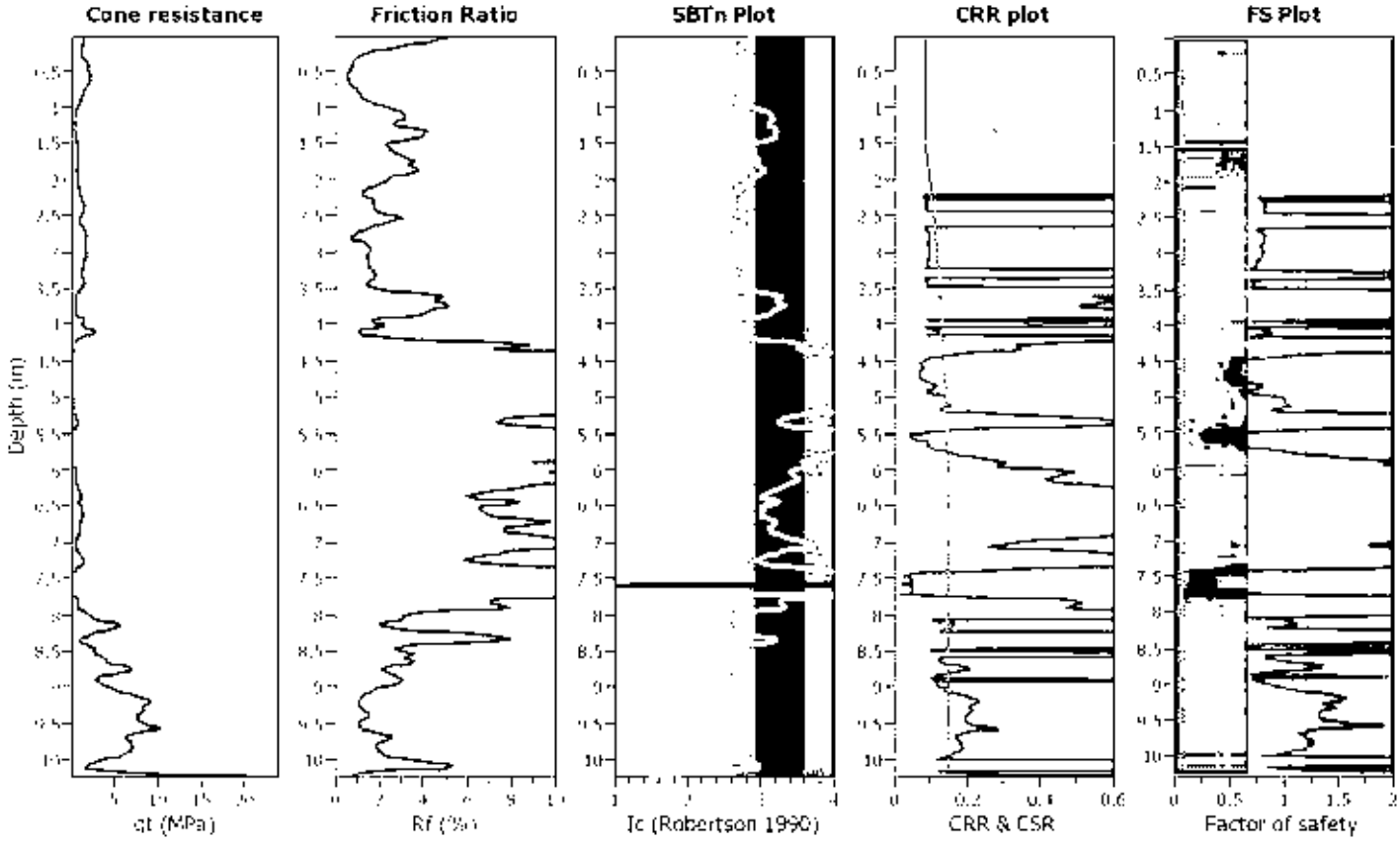
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

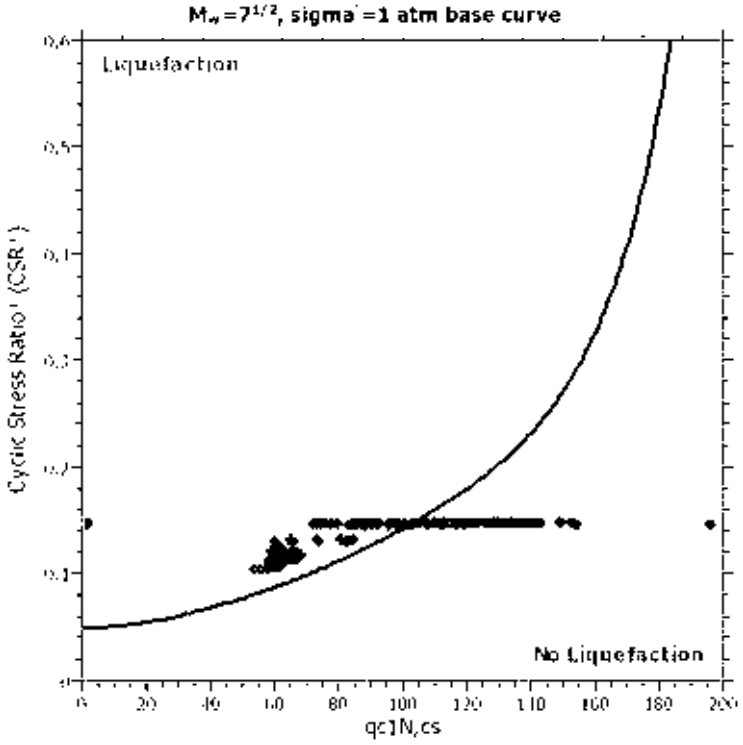
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

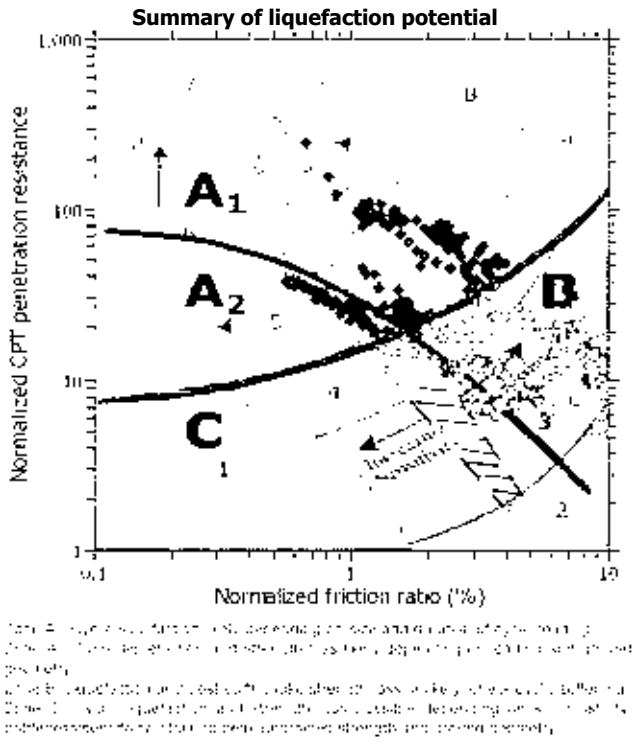
CPT file : CPT33_876CashmereRd

Input parameters and analysis data

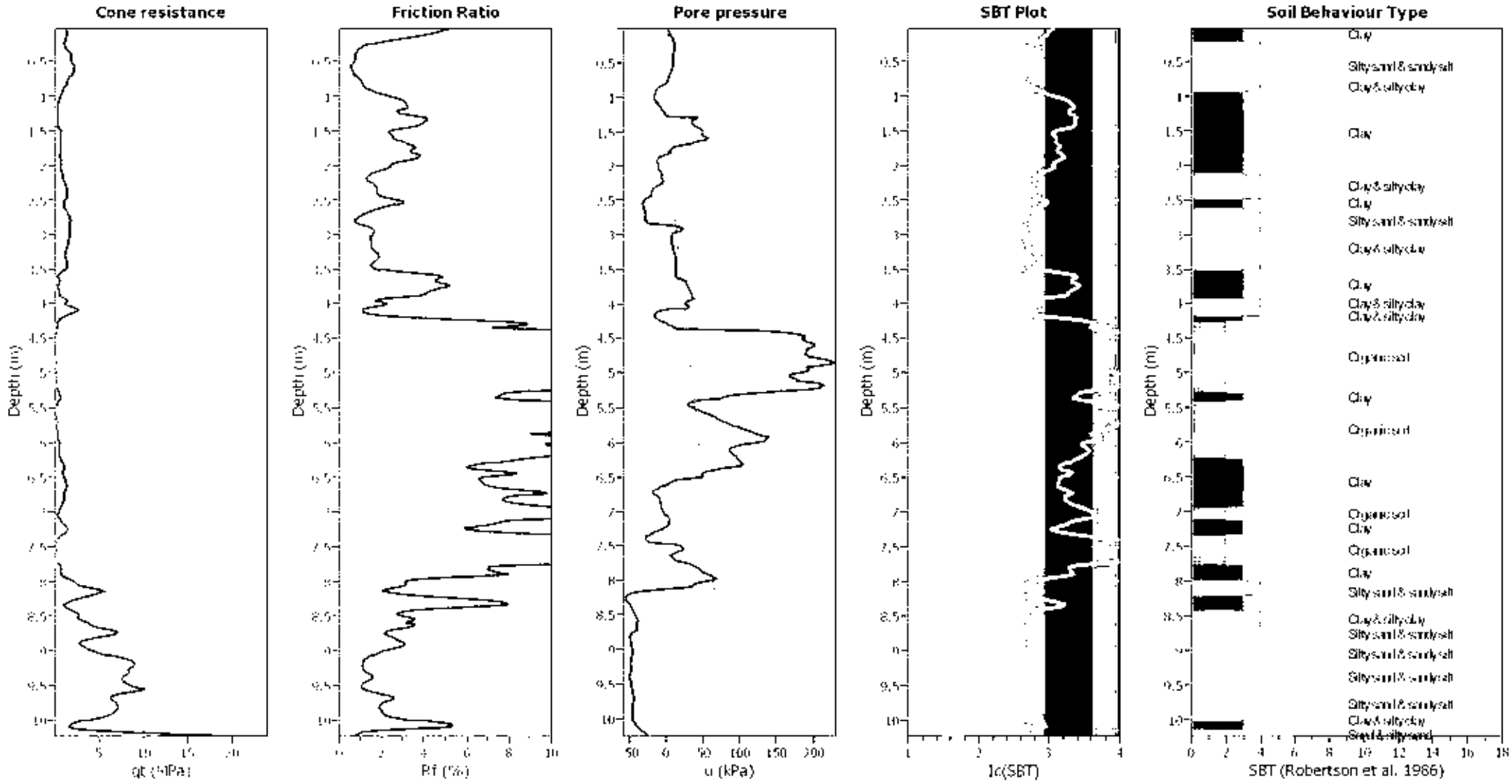
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



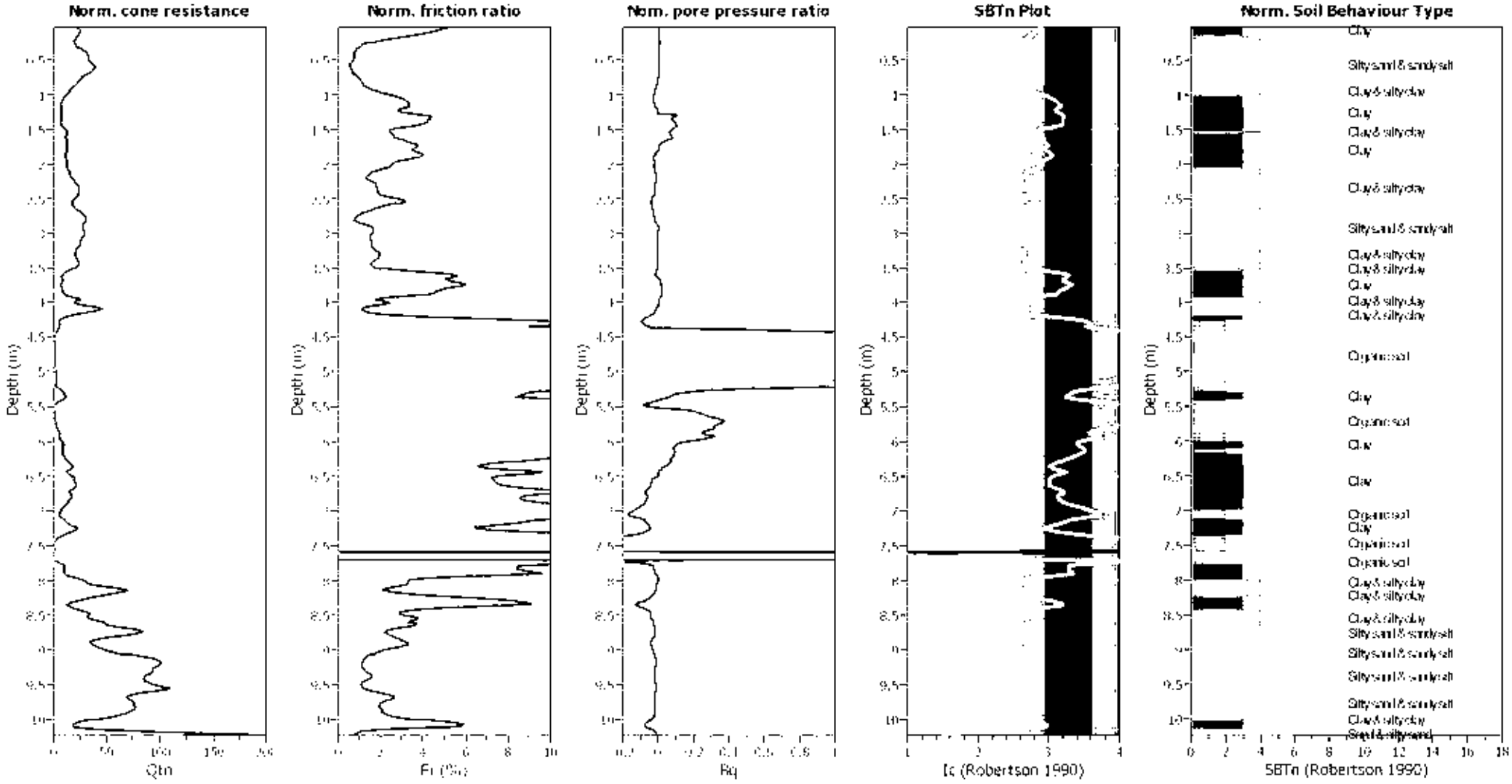
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



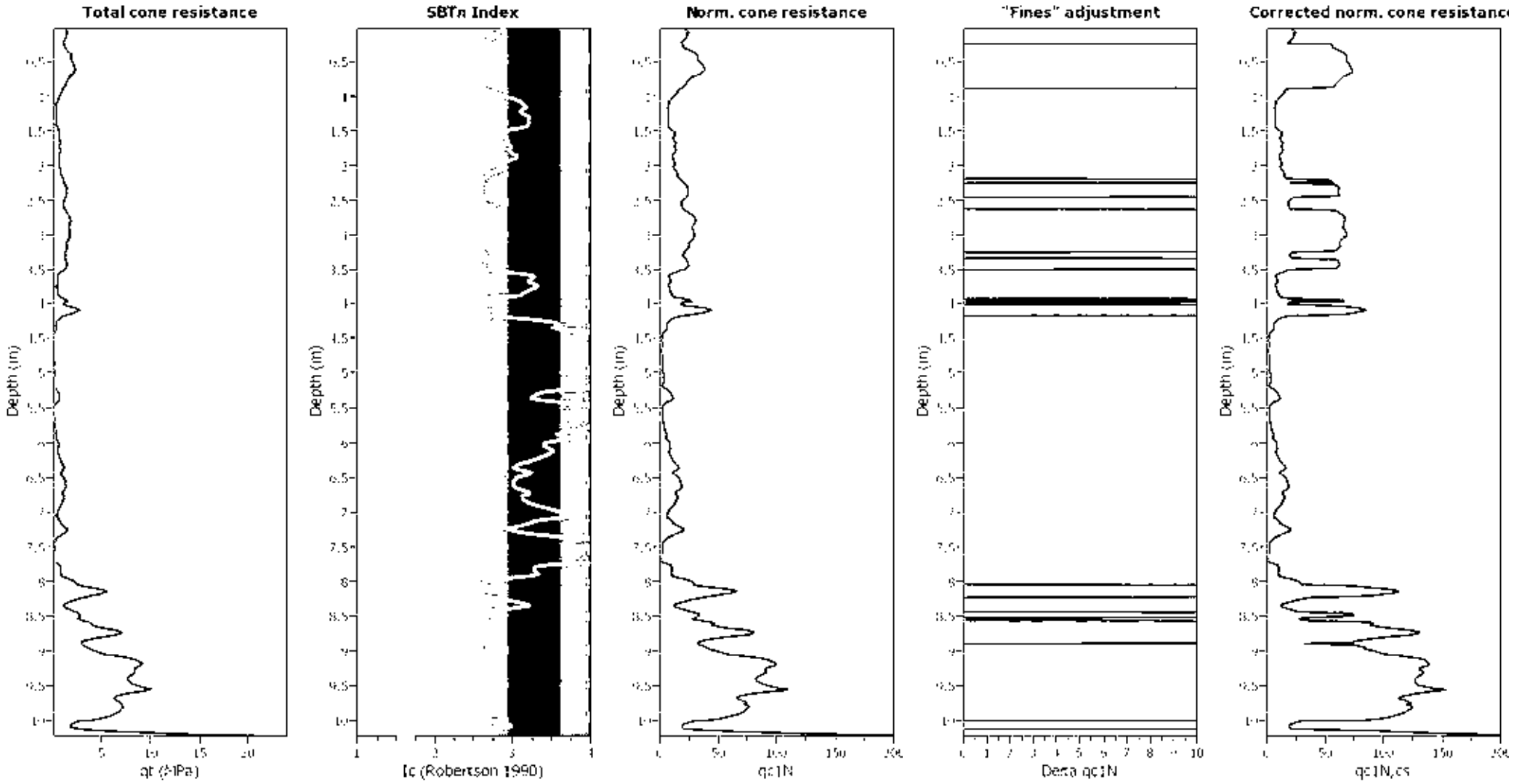
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

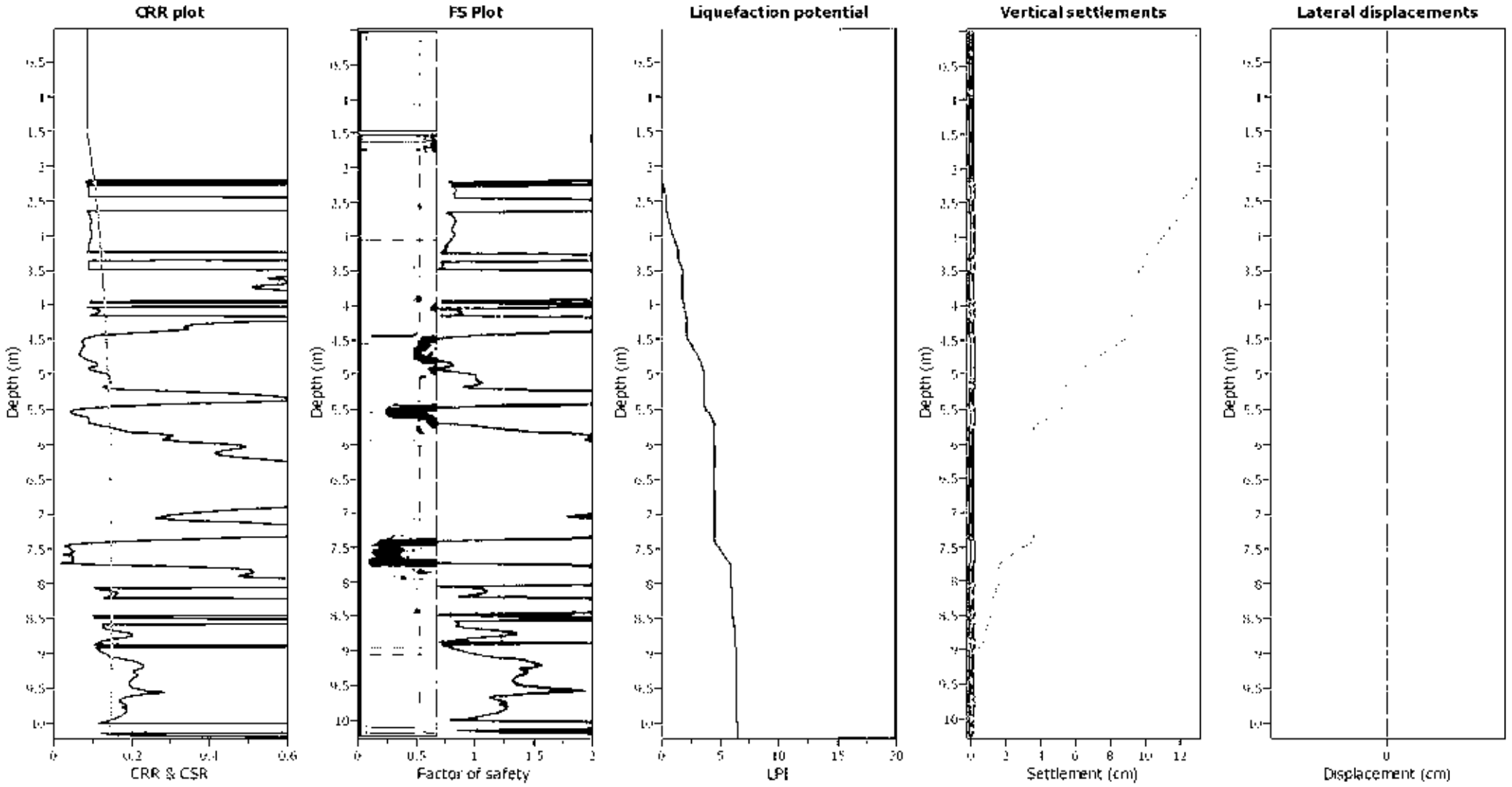
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

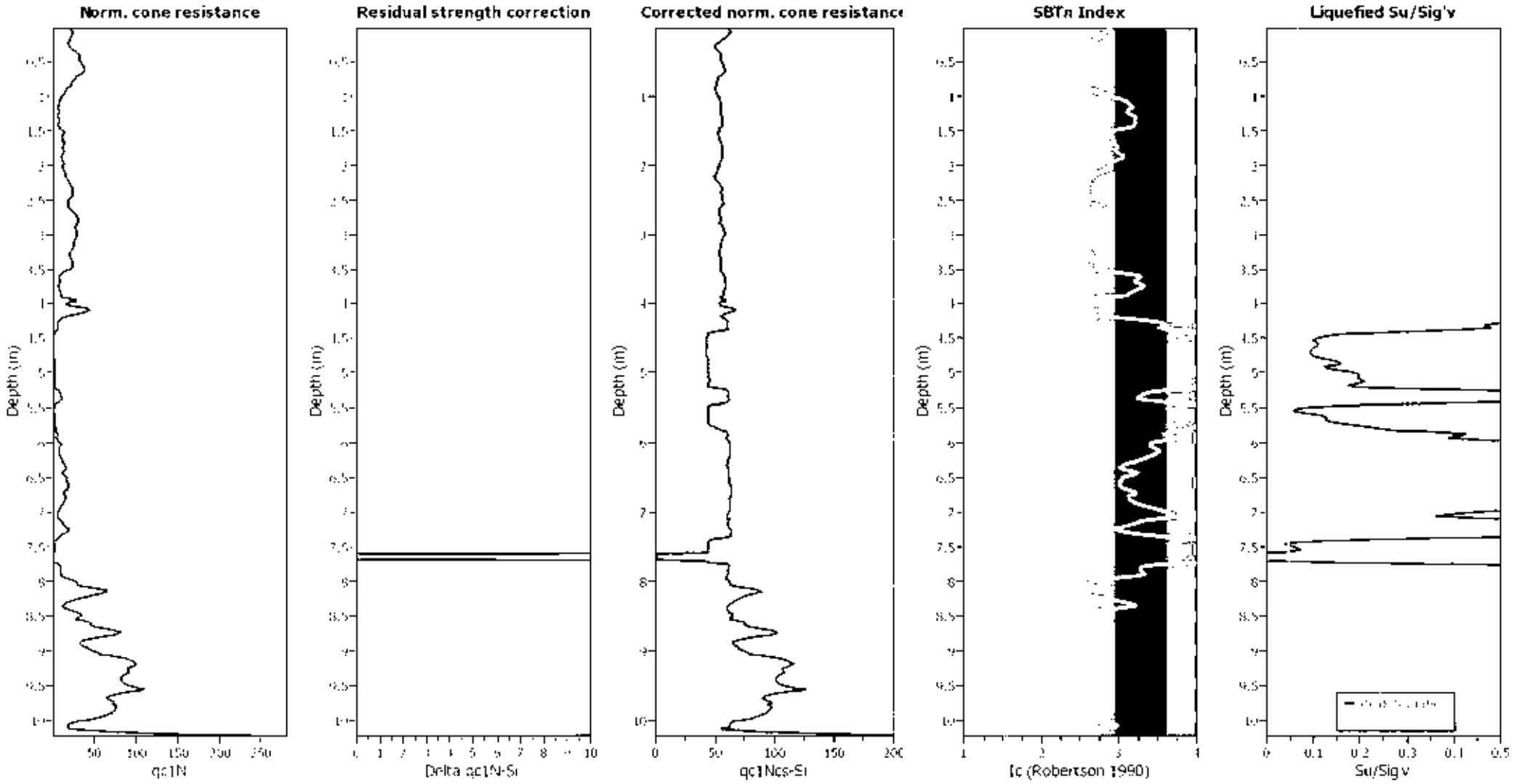
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

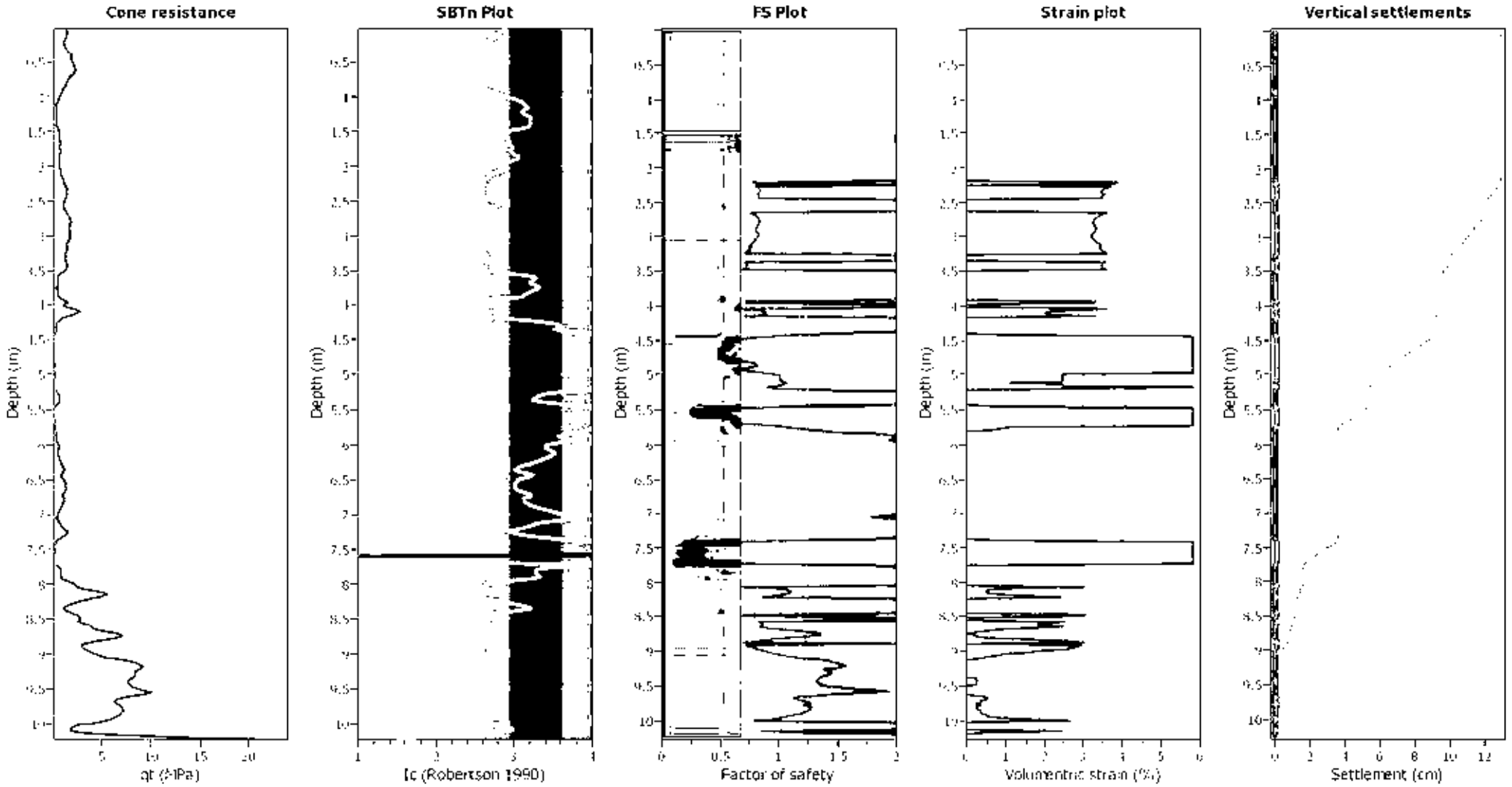
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

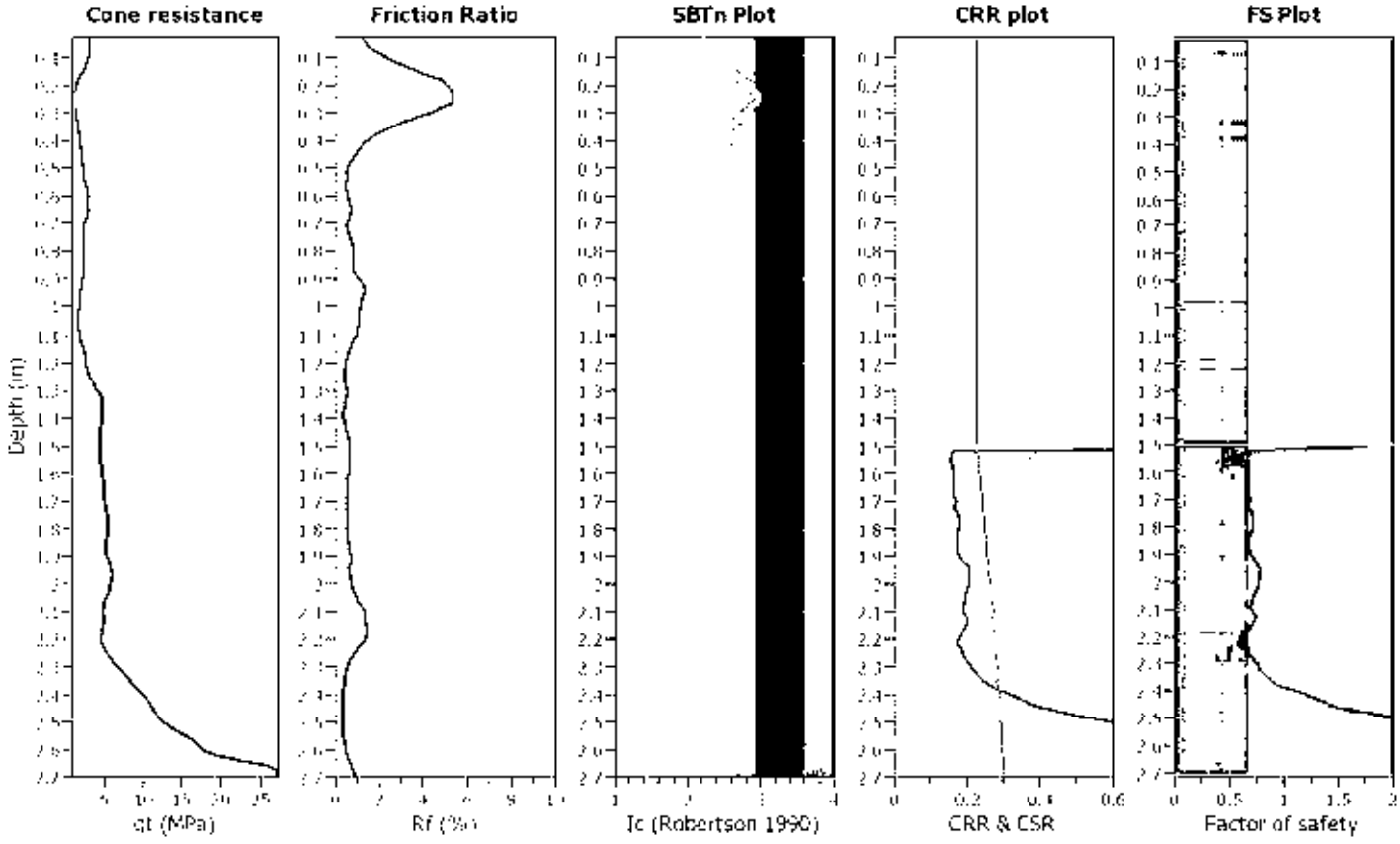
Beca Ltd
Geotechnical Engineers
www.beca.com

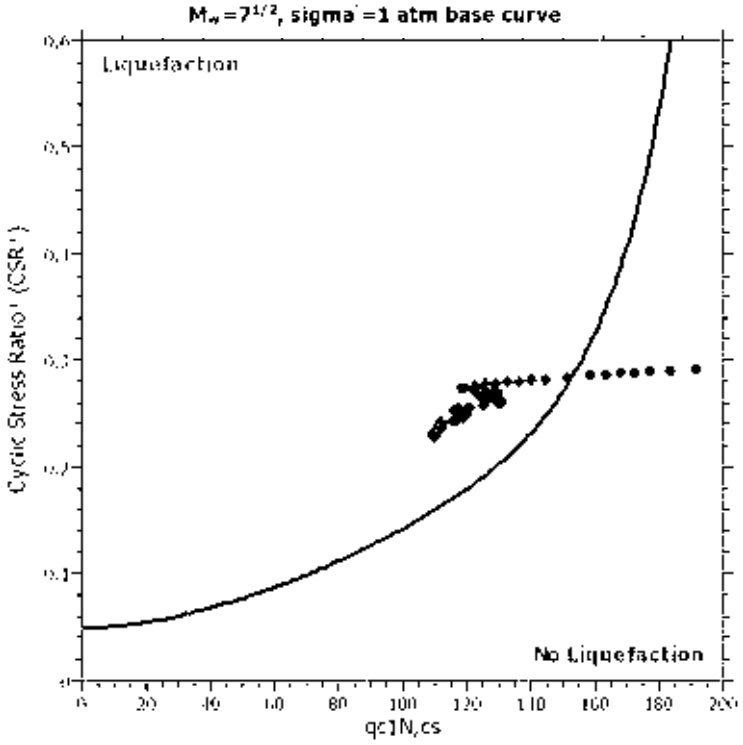
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

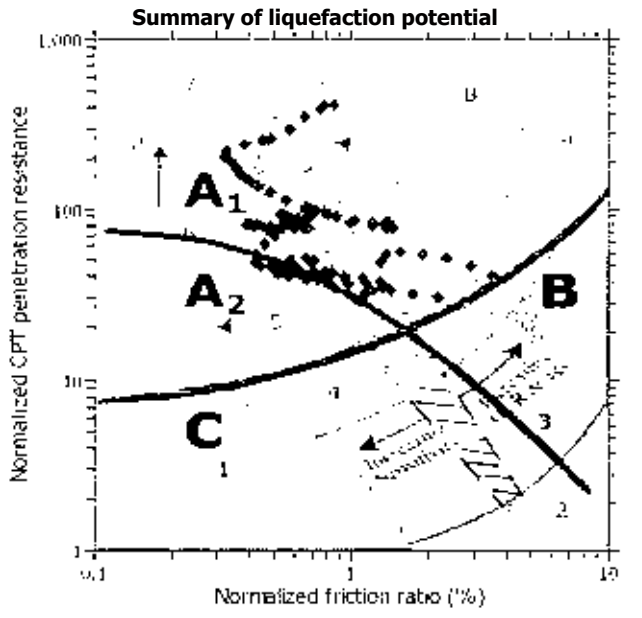
CPT file : CPT23_470SparksRd

Input parameters and analysis data

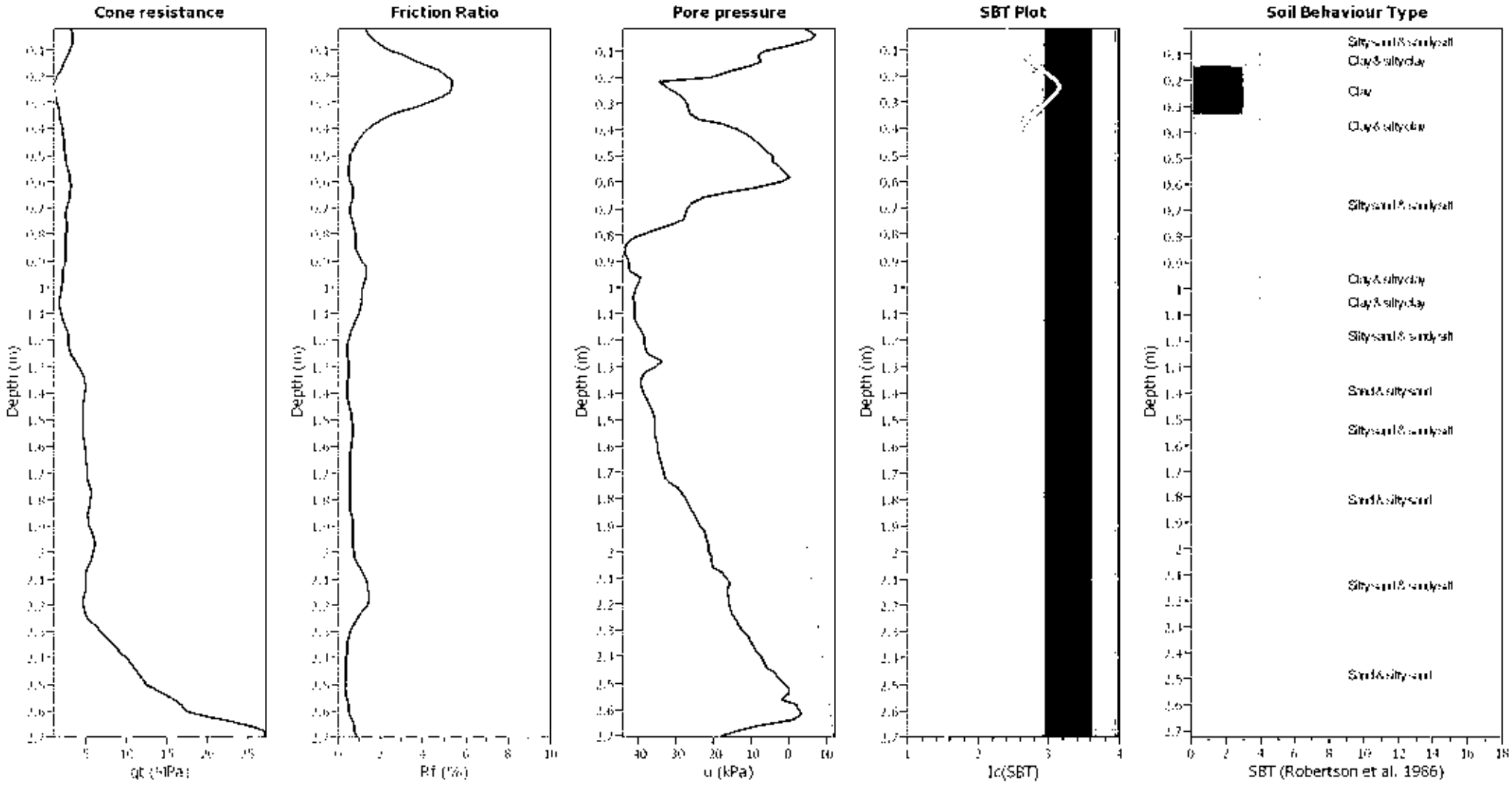
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



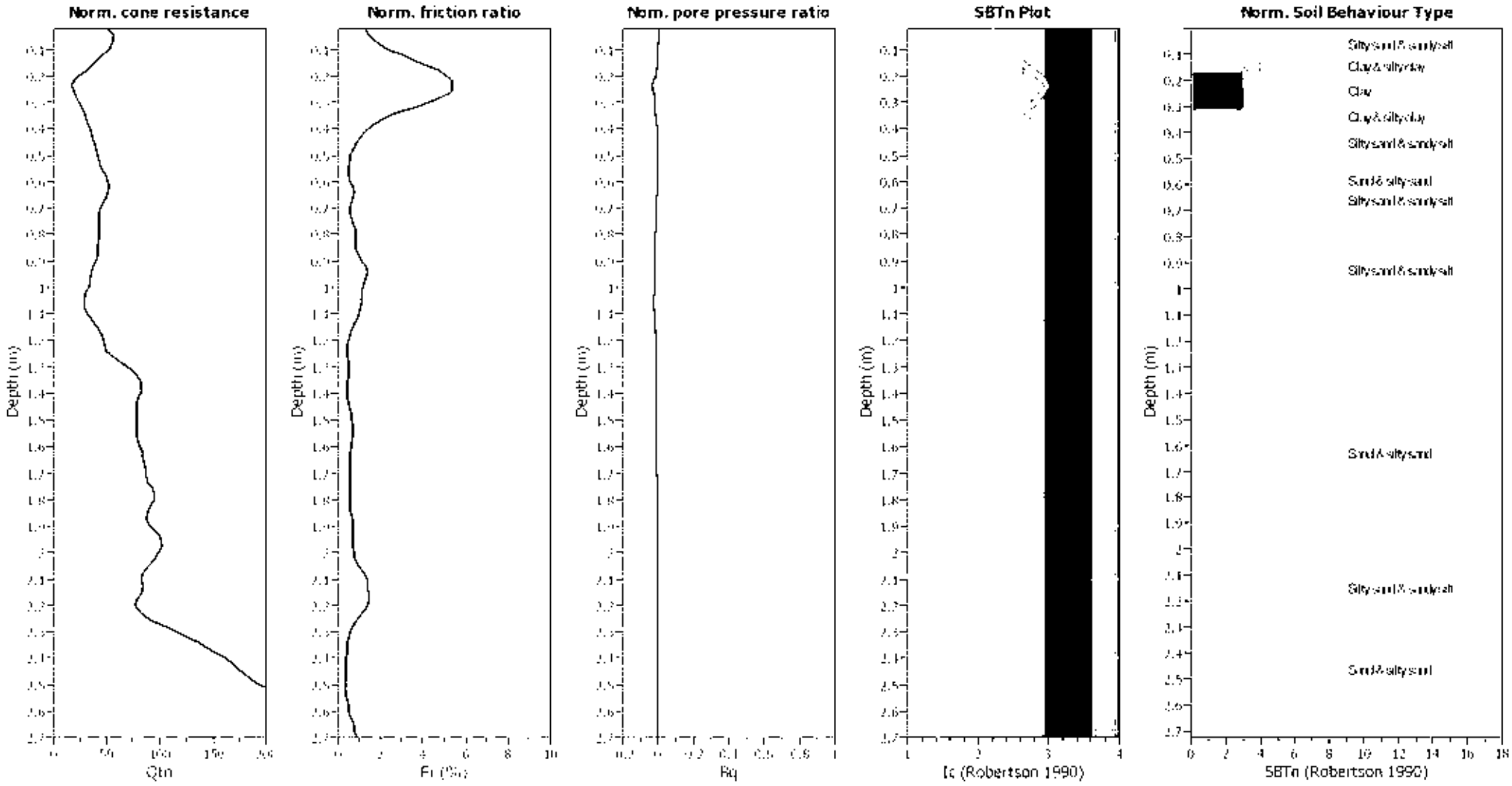
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



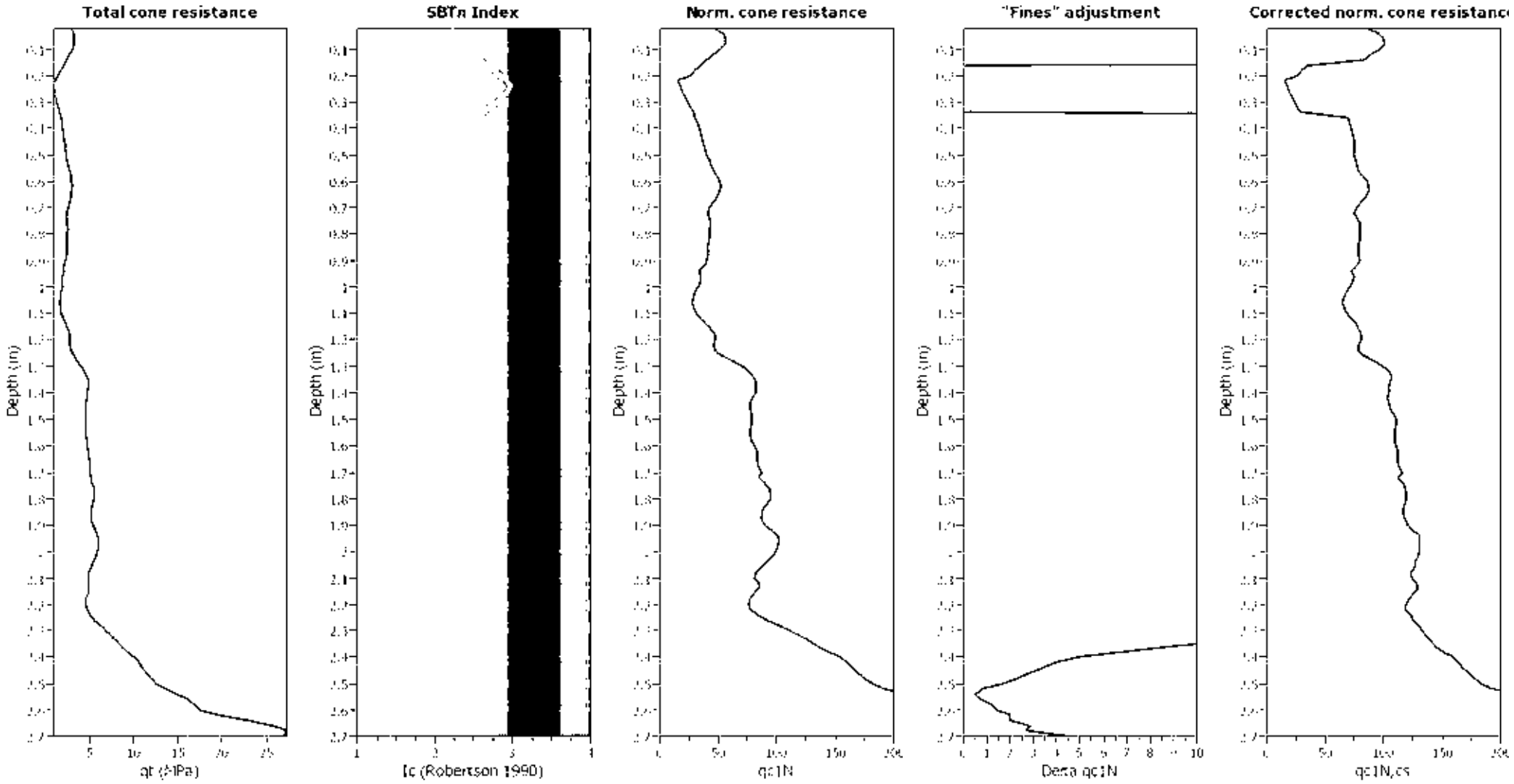
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

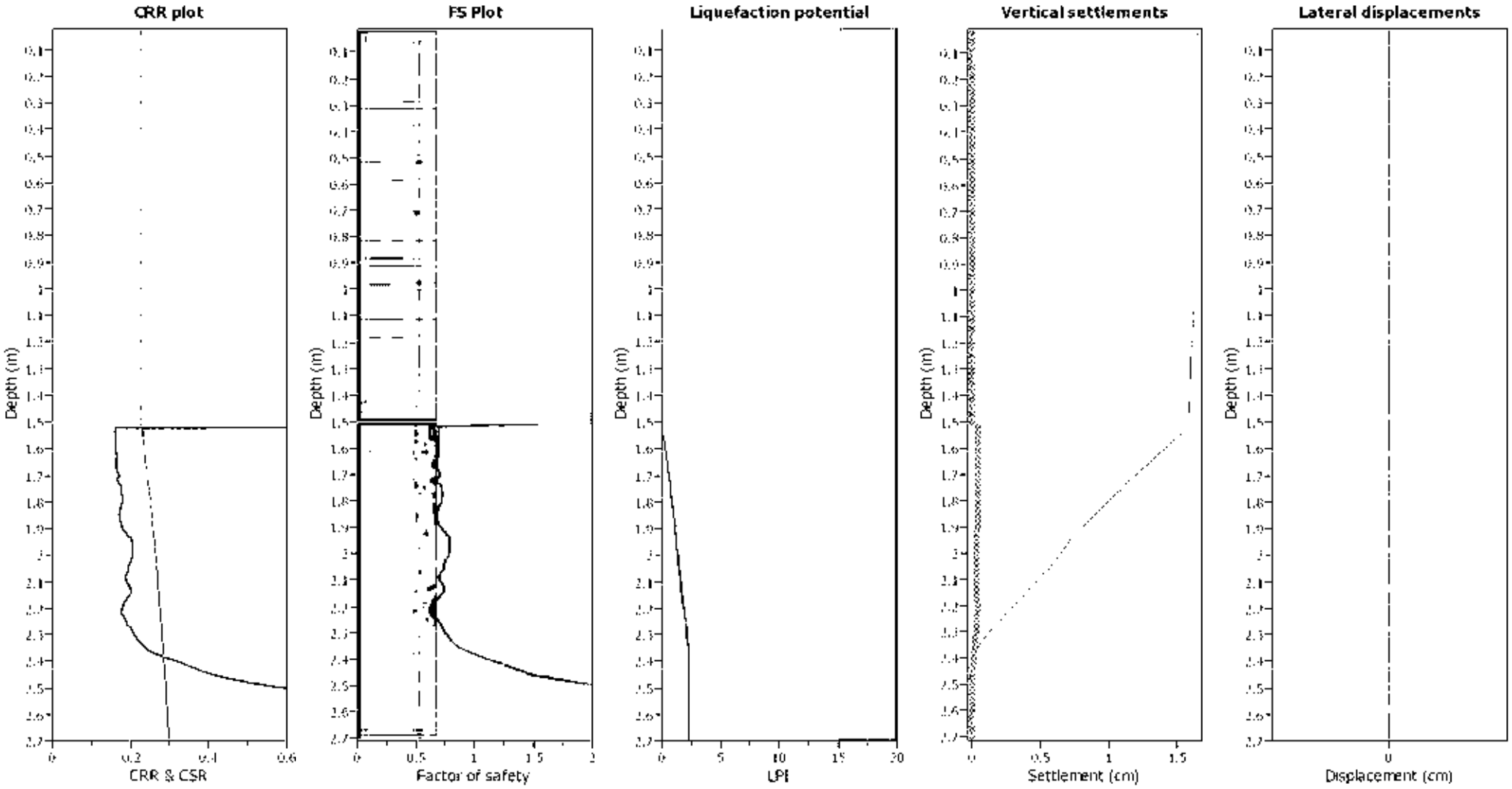
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

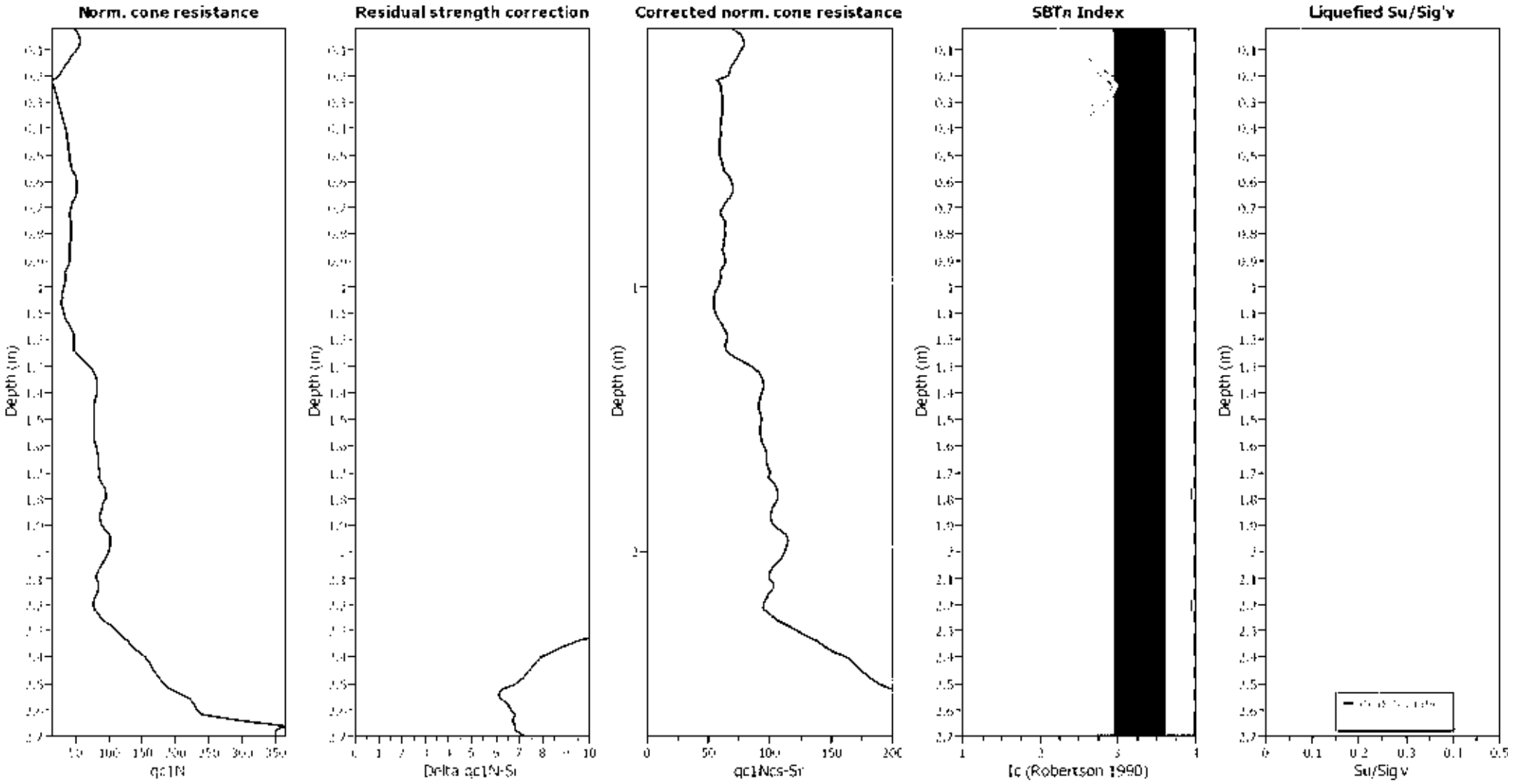
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

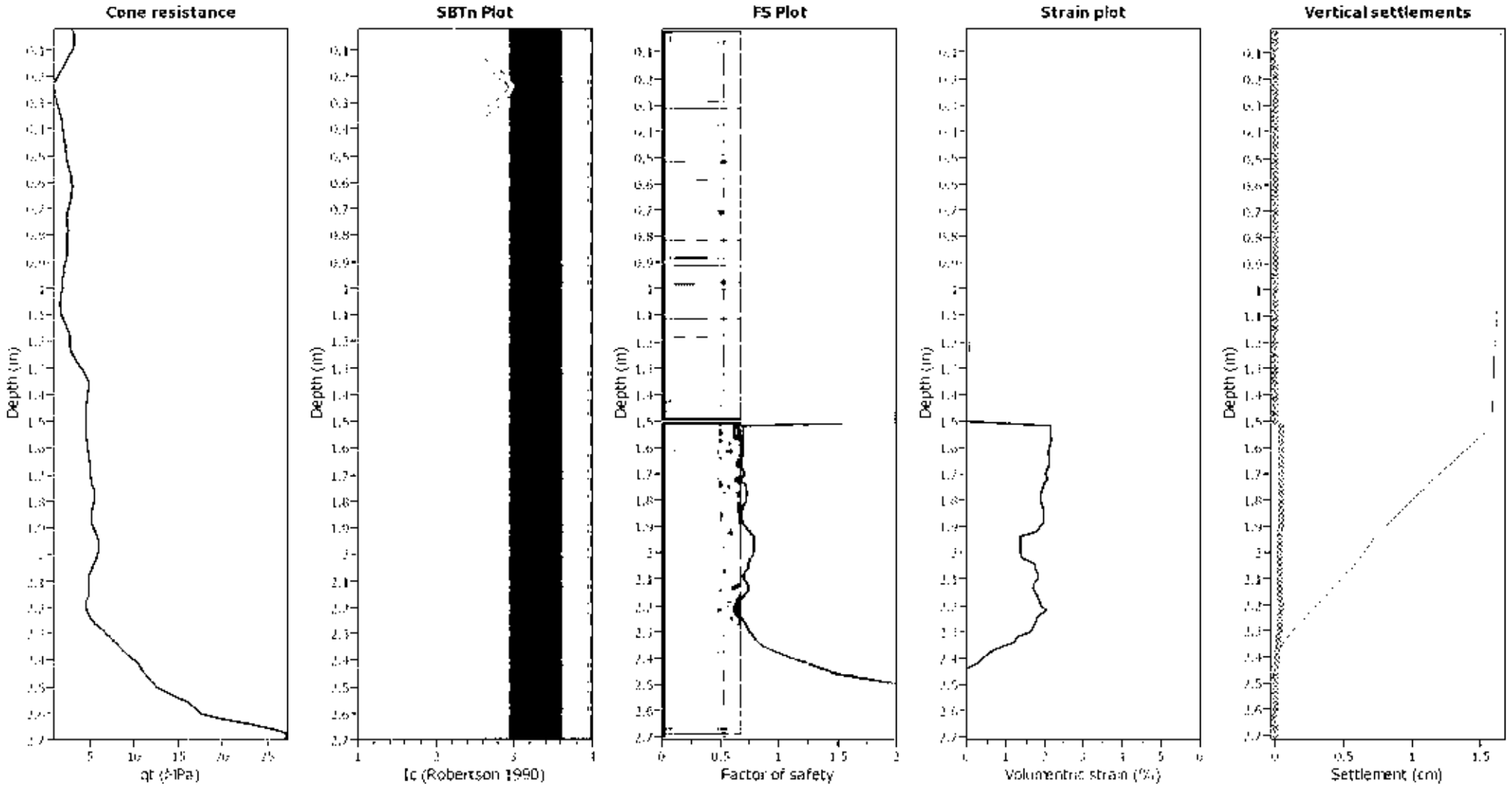
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

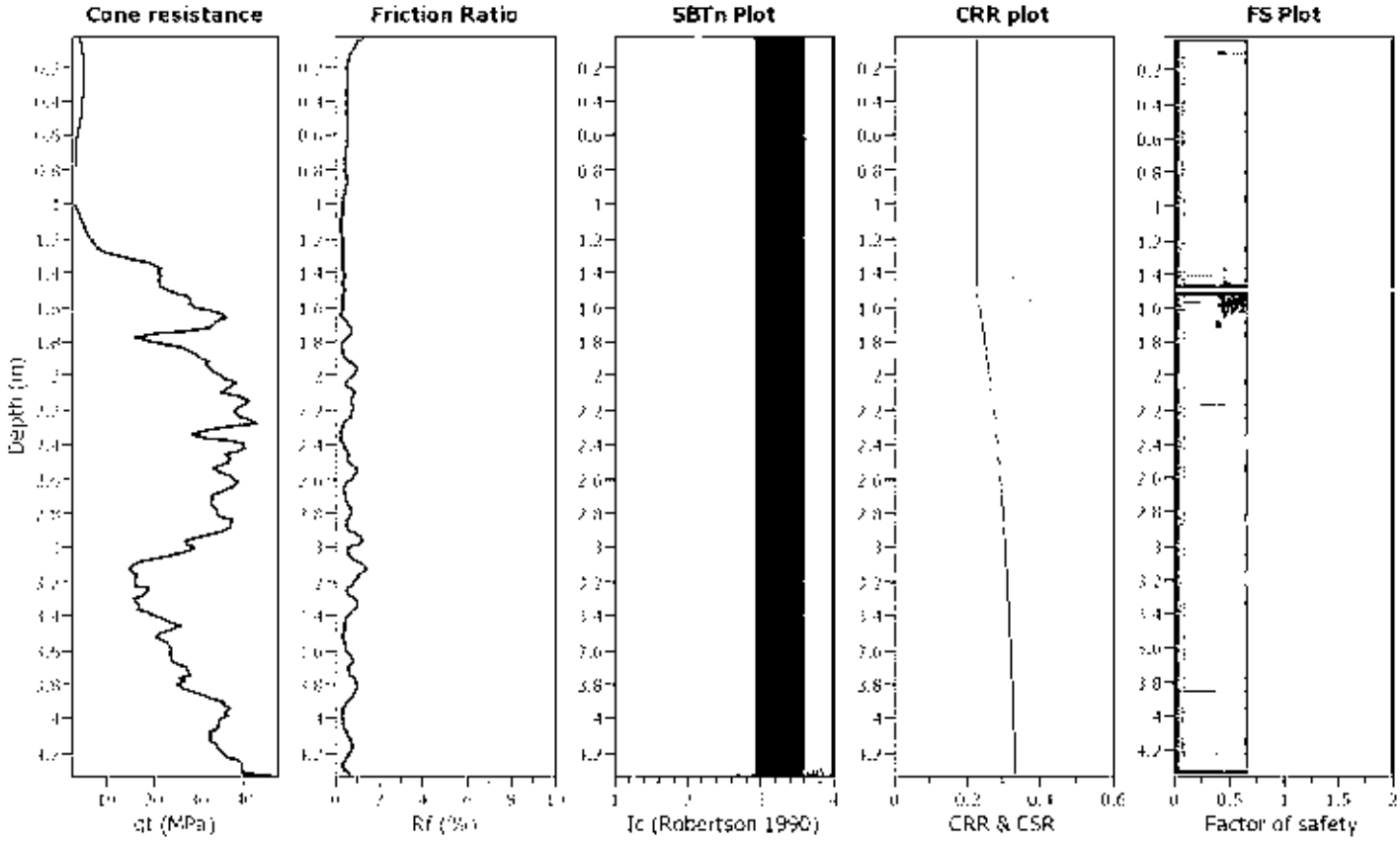
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

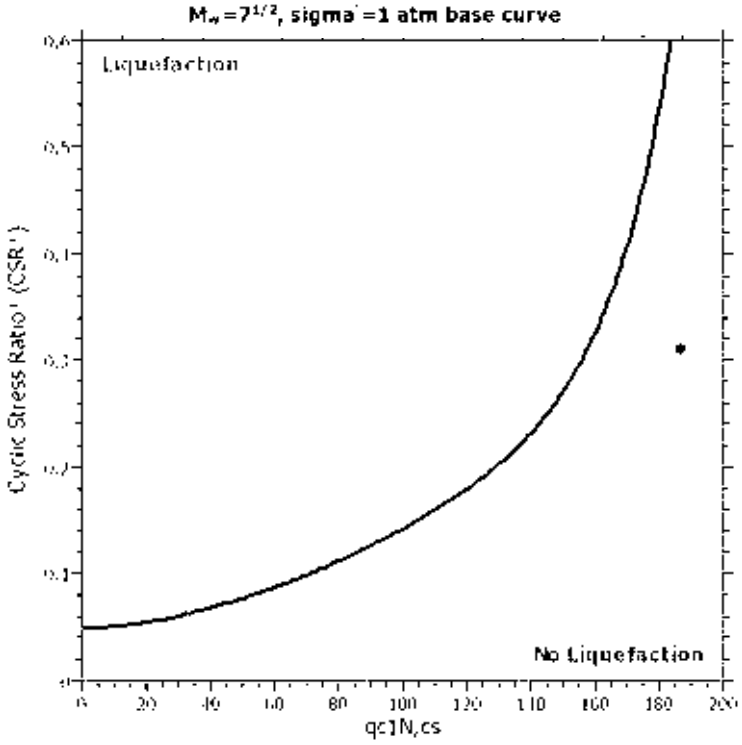
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

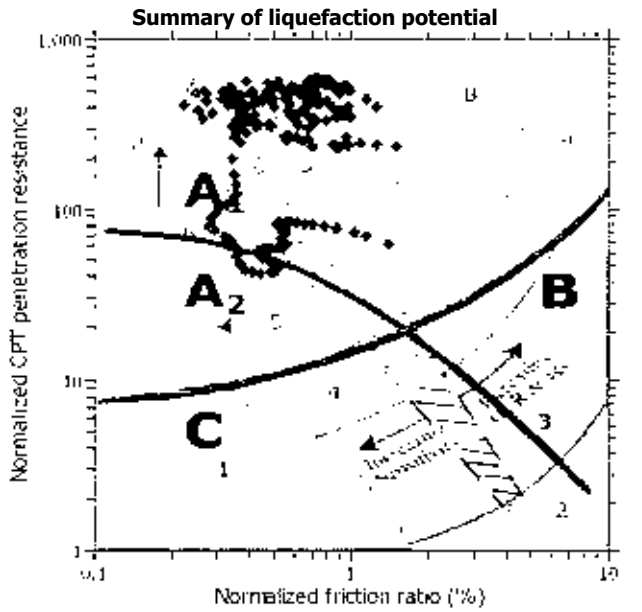
CPT file : CPT24_119SutherlandsRd

Input parameters and analysis data

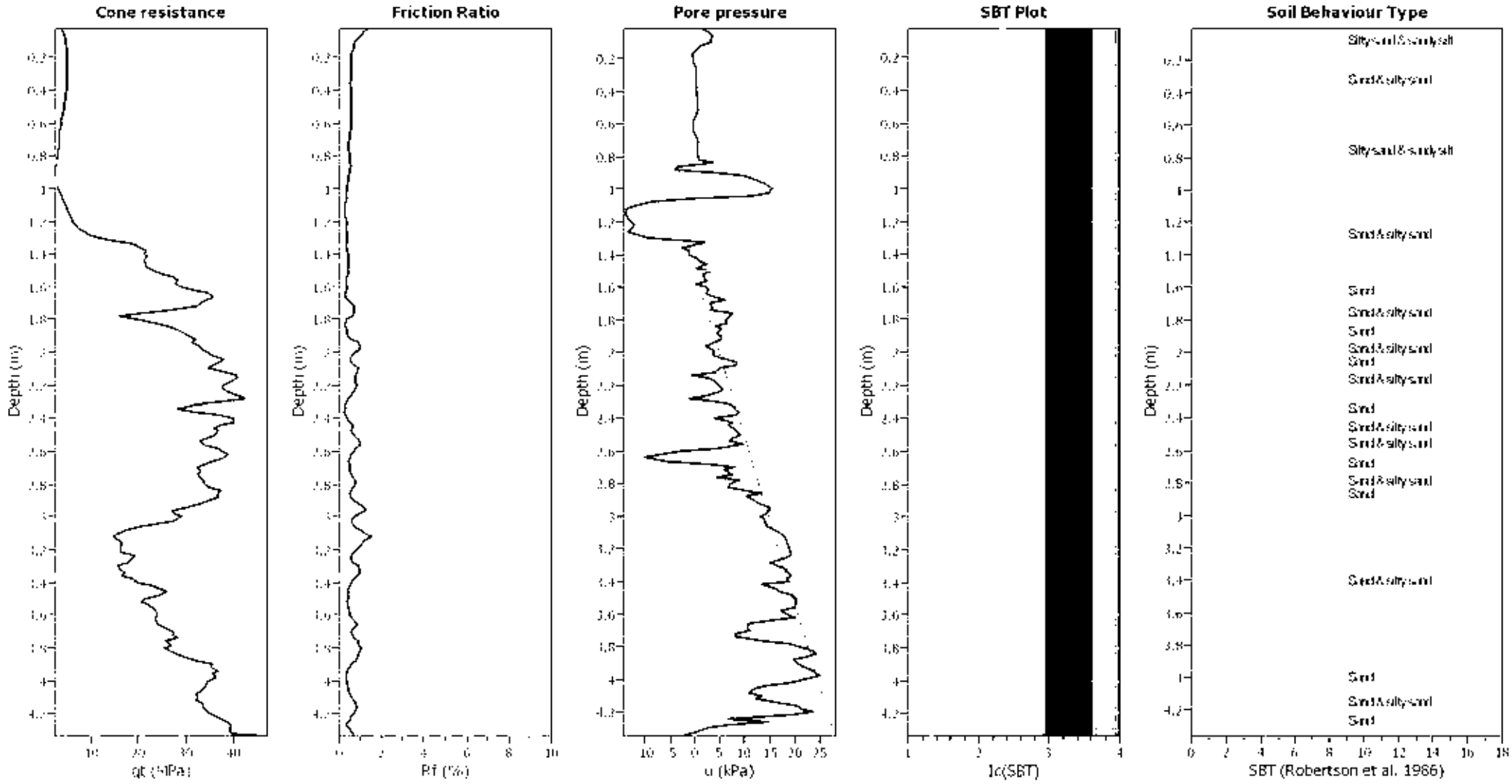
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



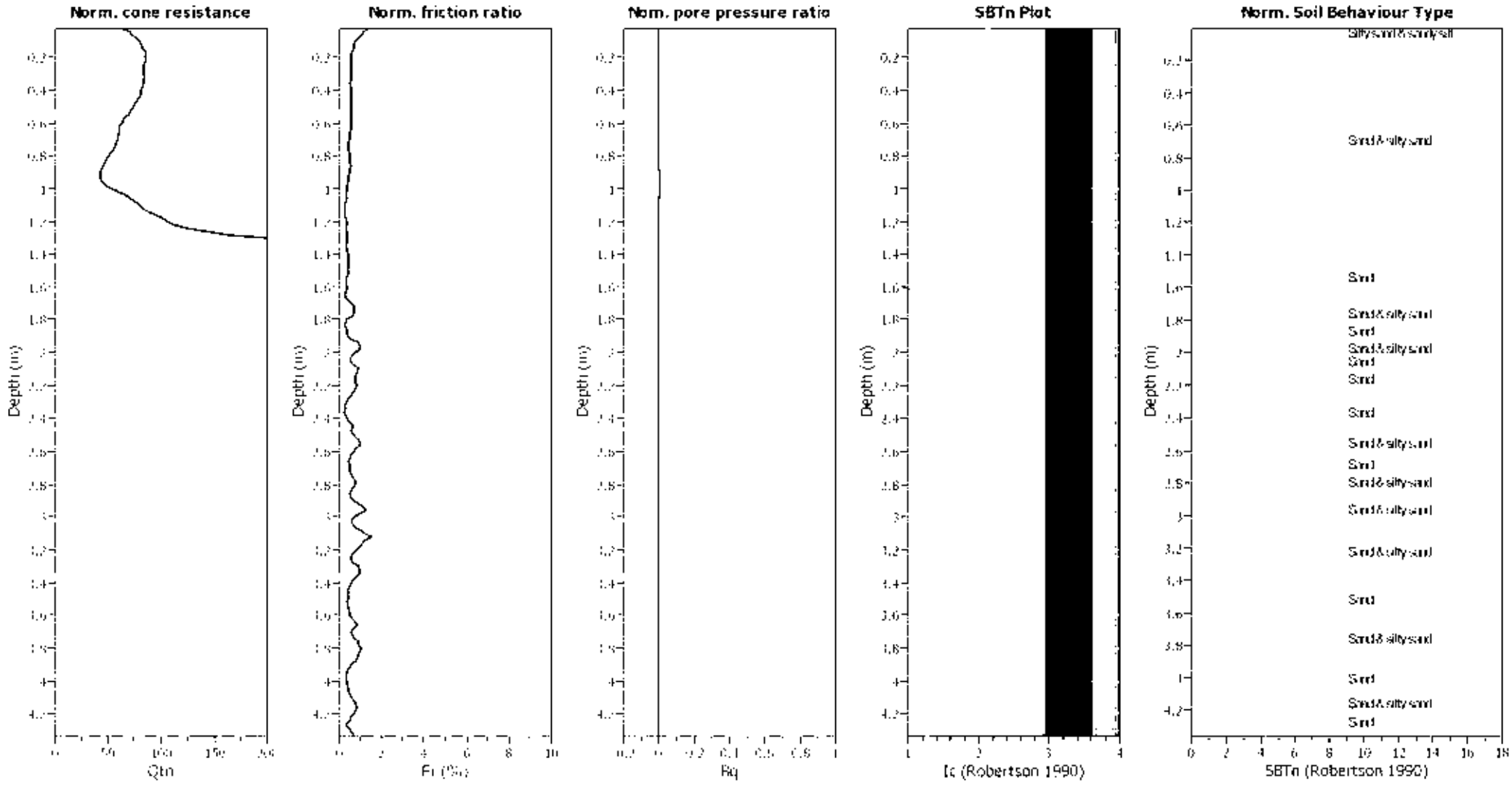
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



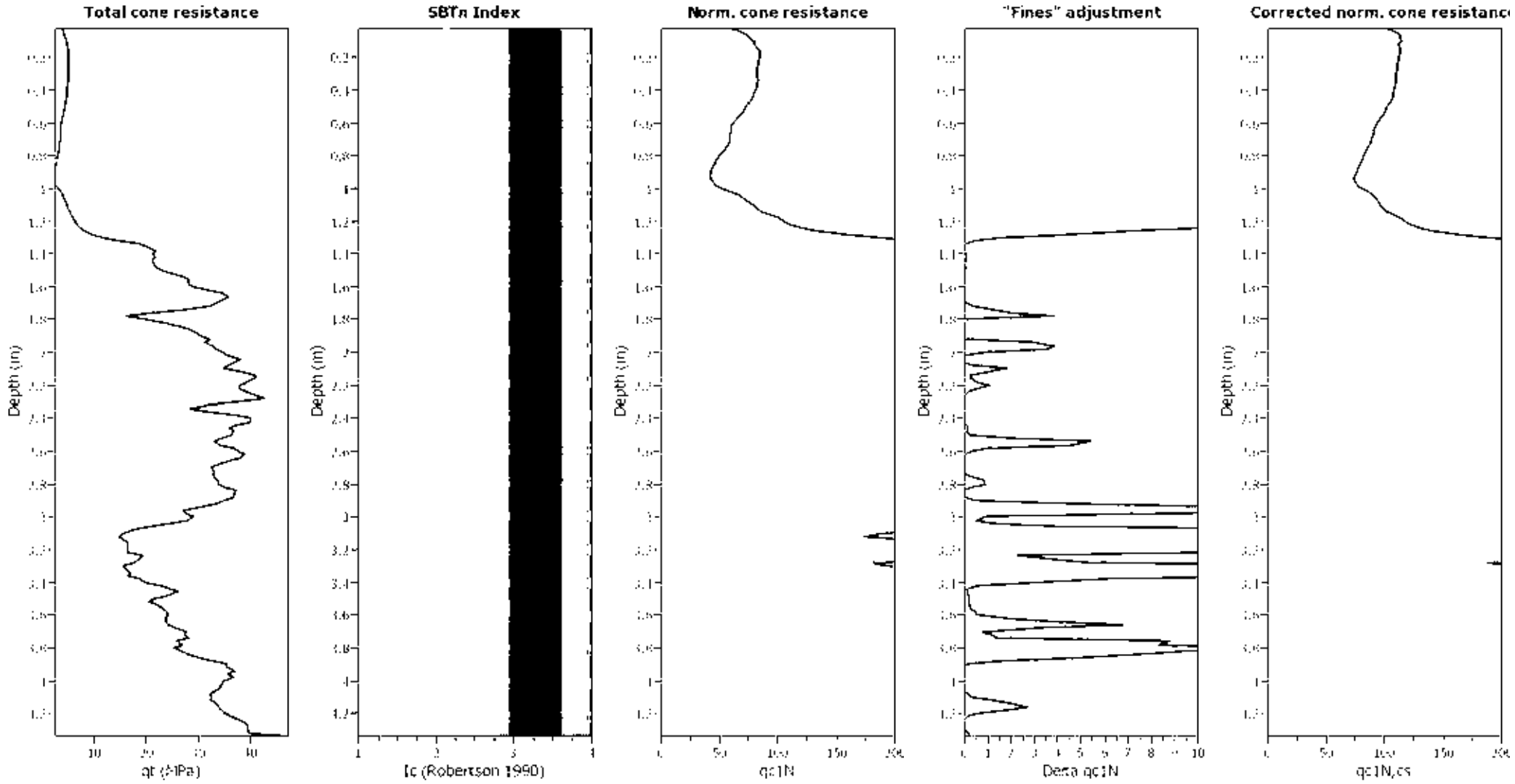
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

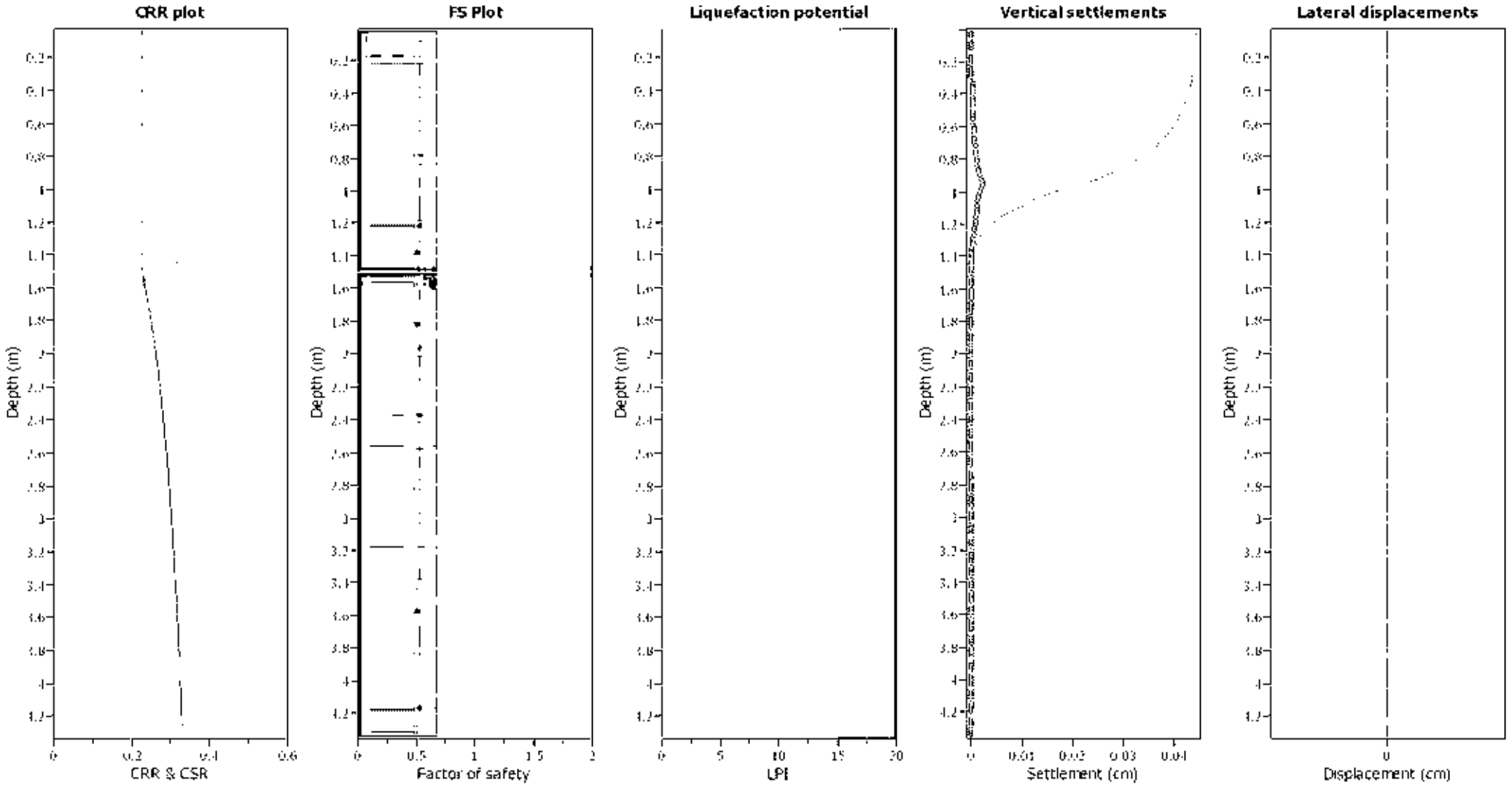
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

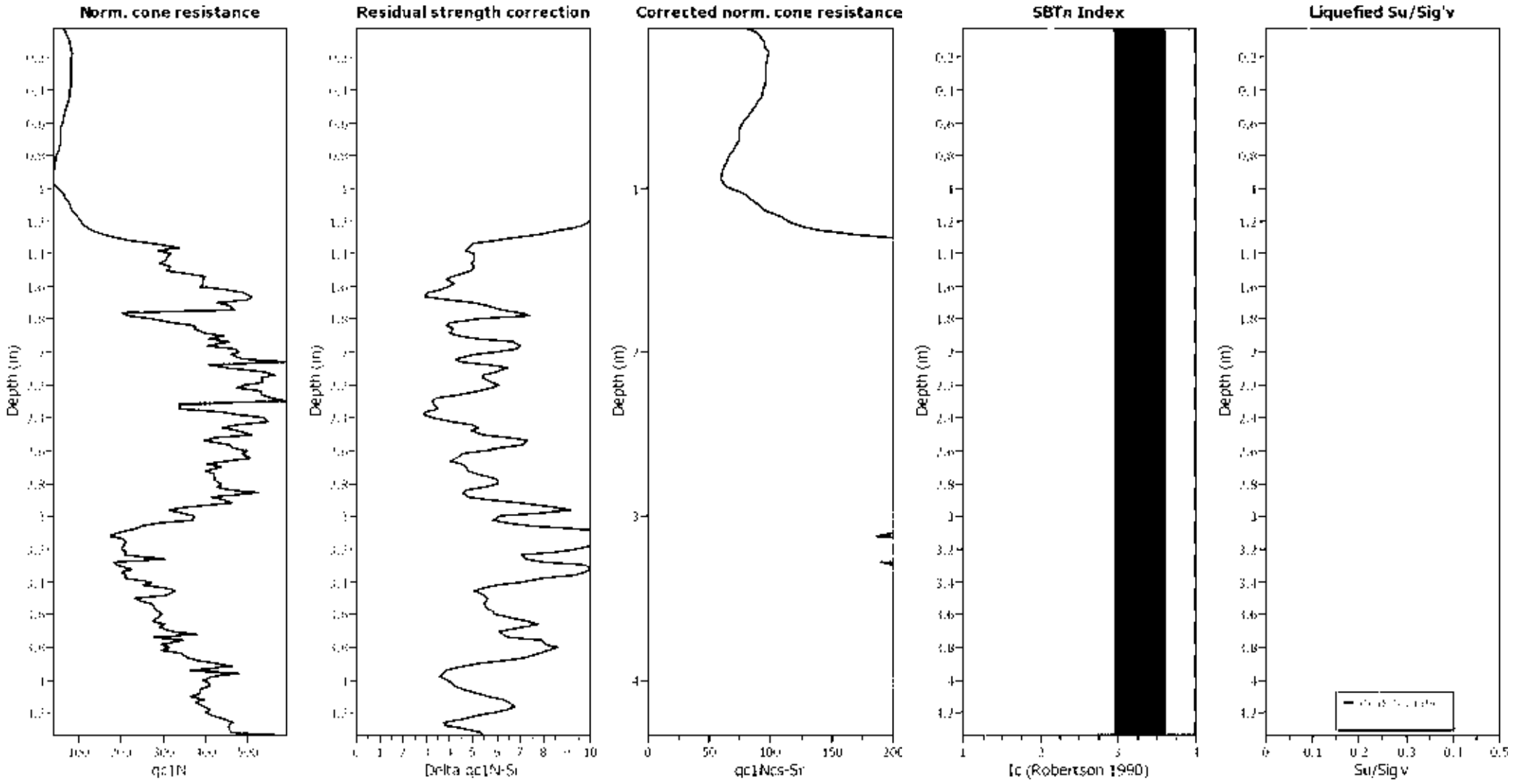
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

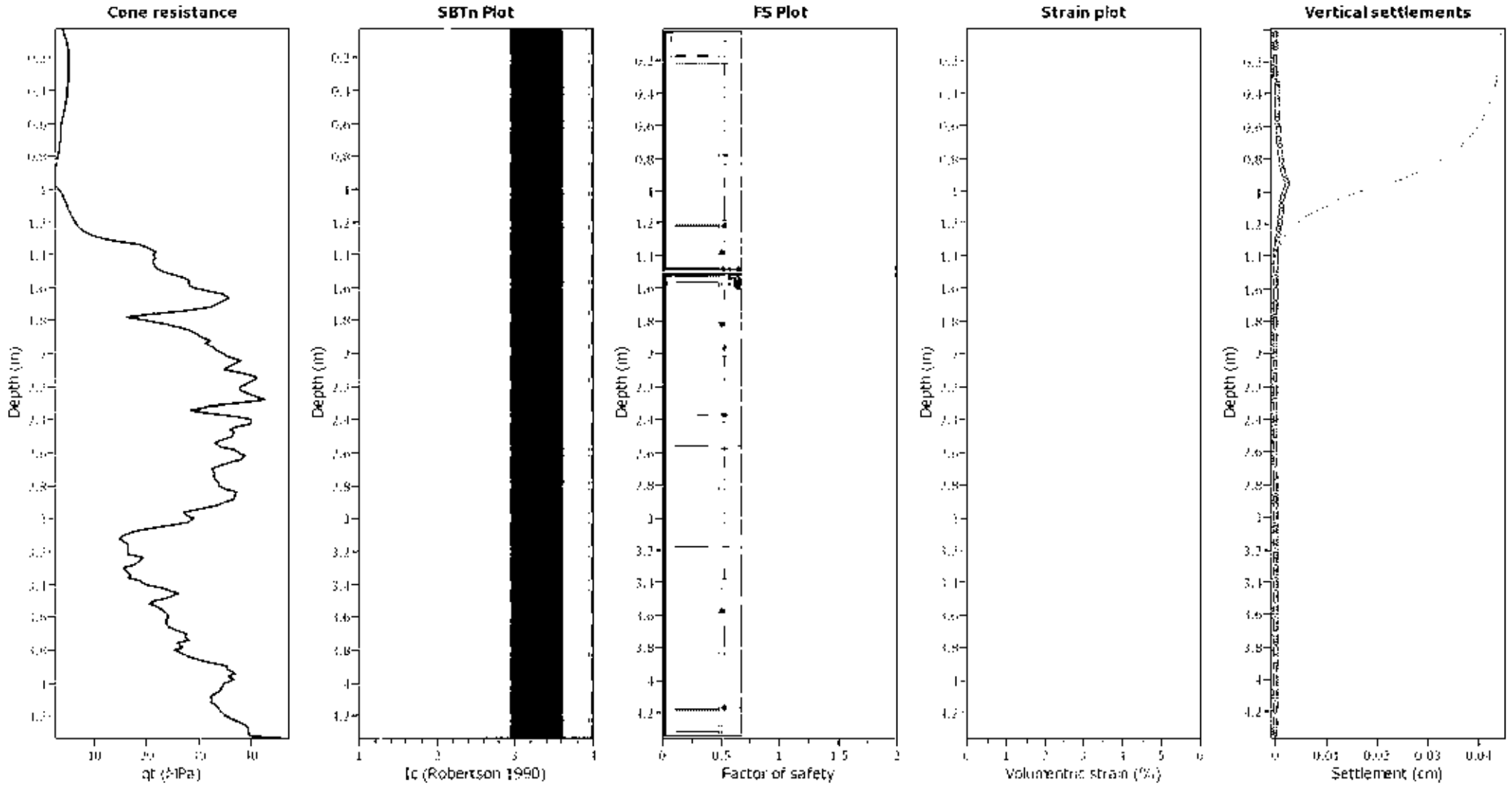
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

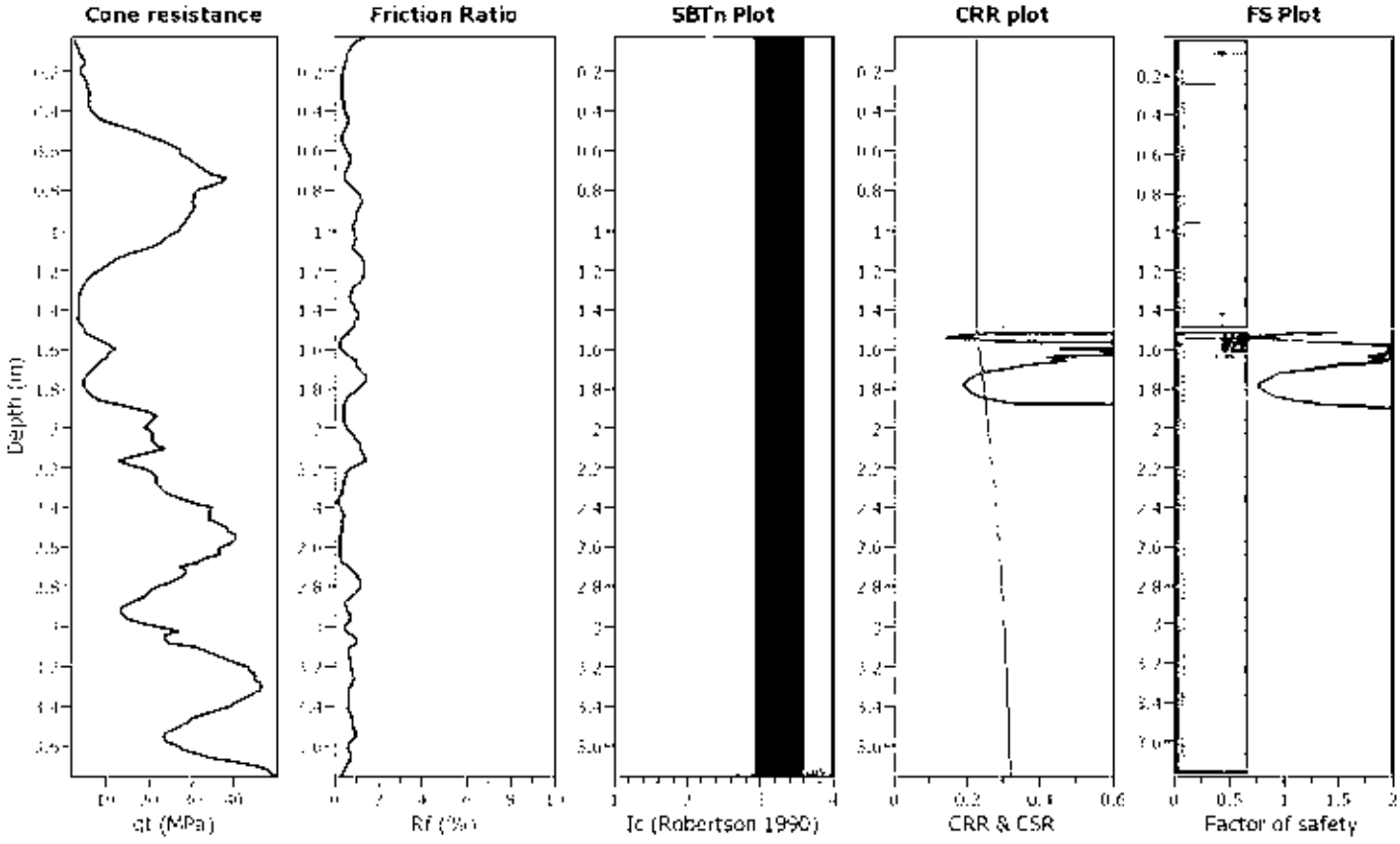
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

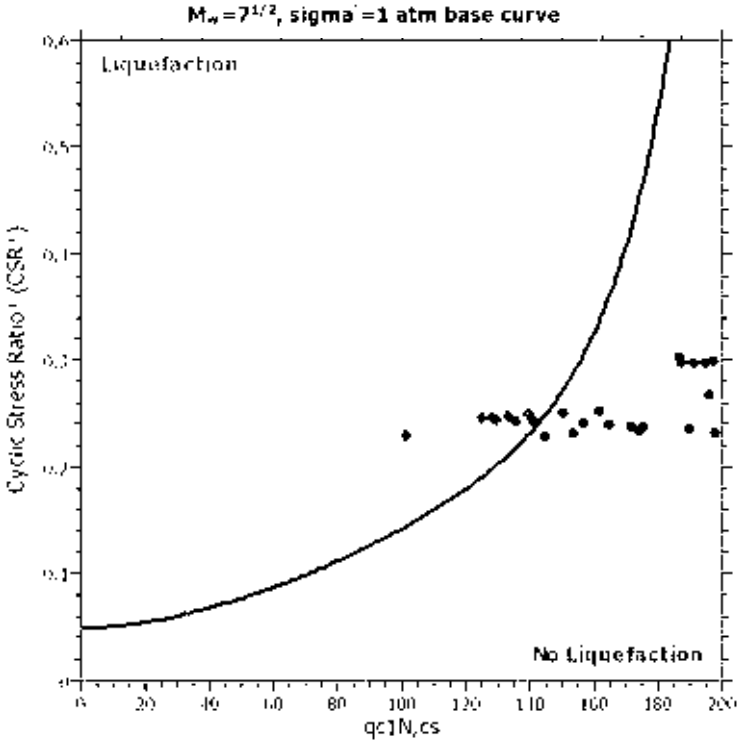
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

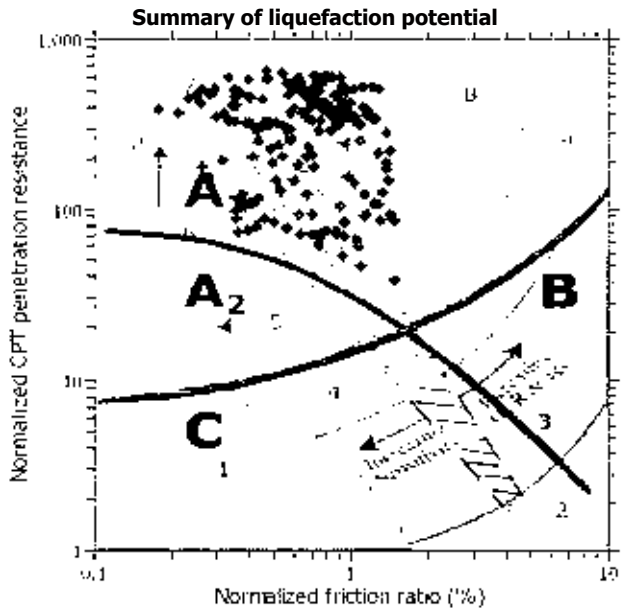
CPT file : CPT25_25KennedysBushRd

Input parameters and analysis data

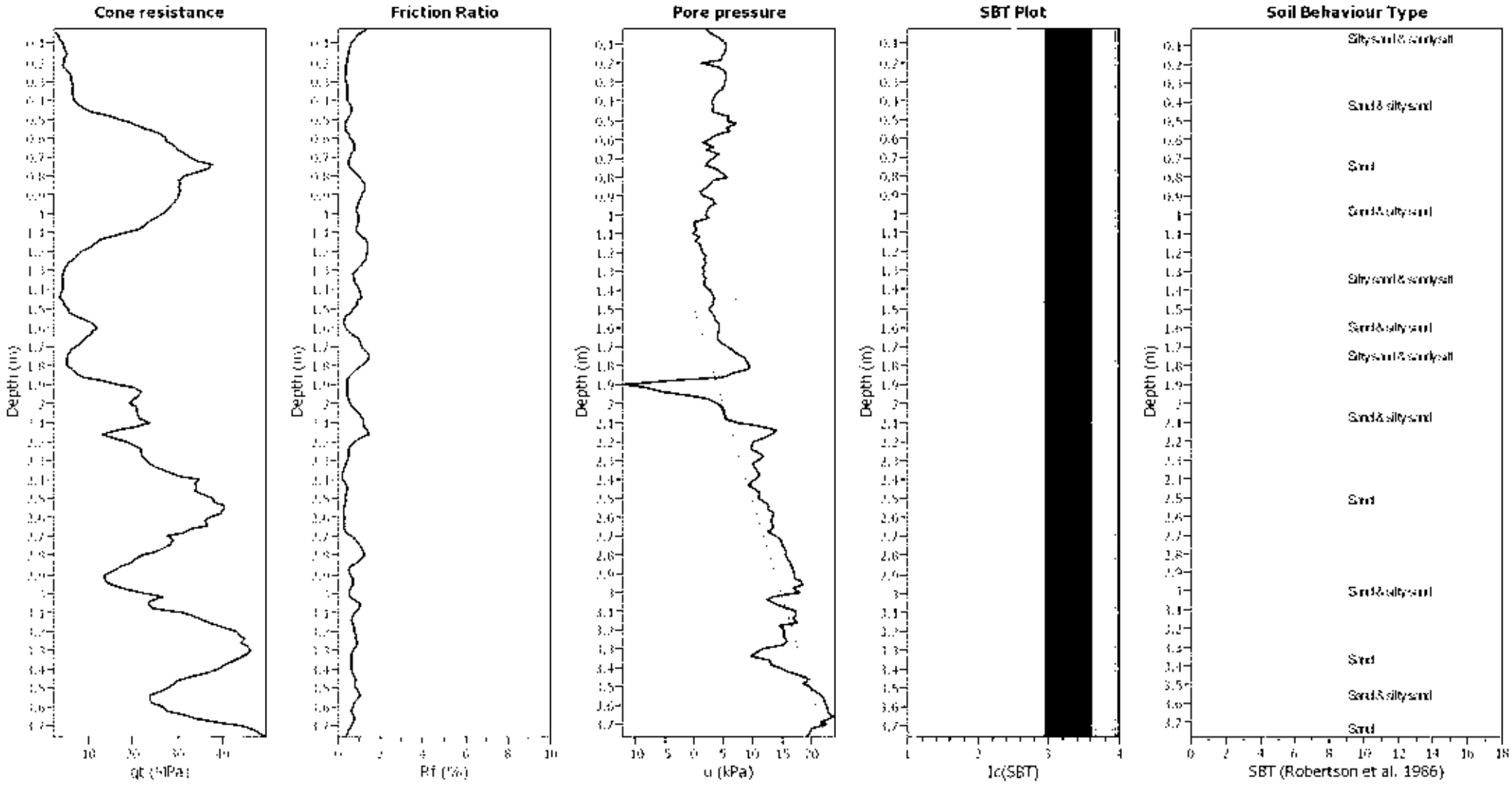
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



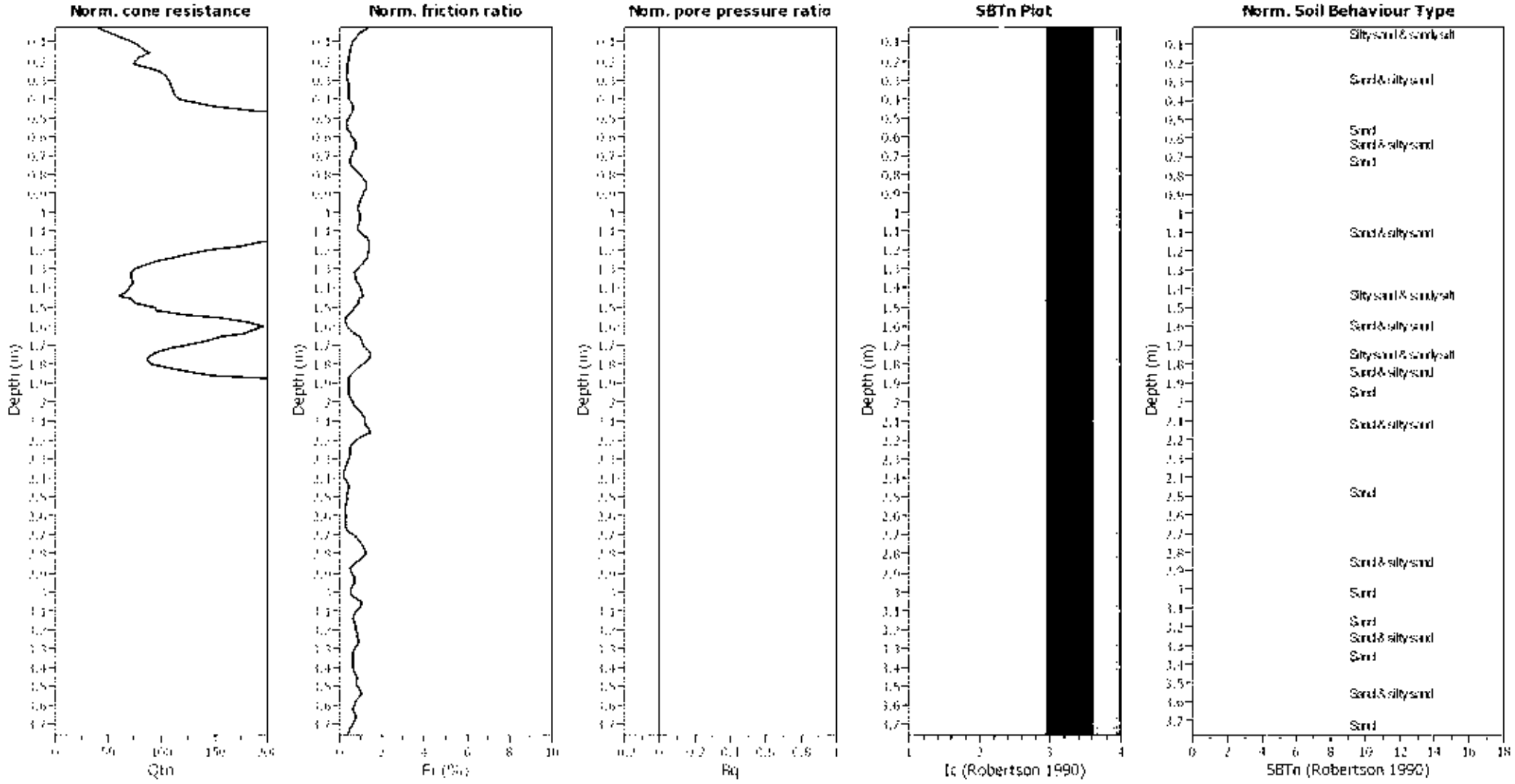
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



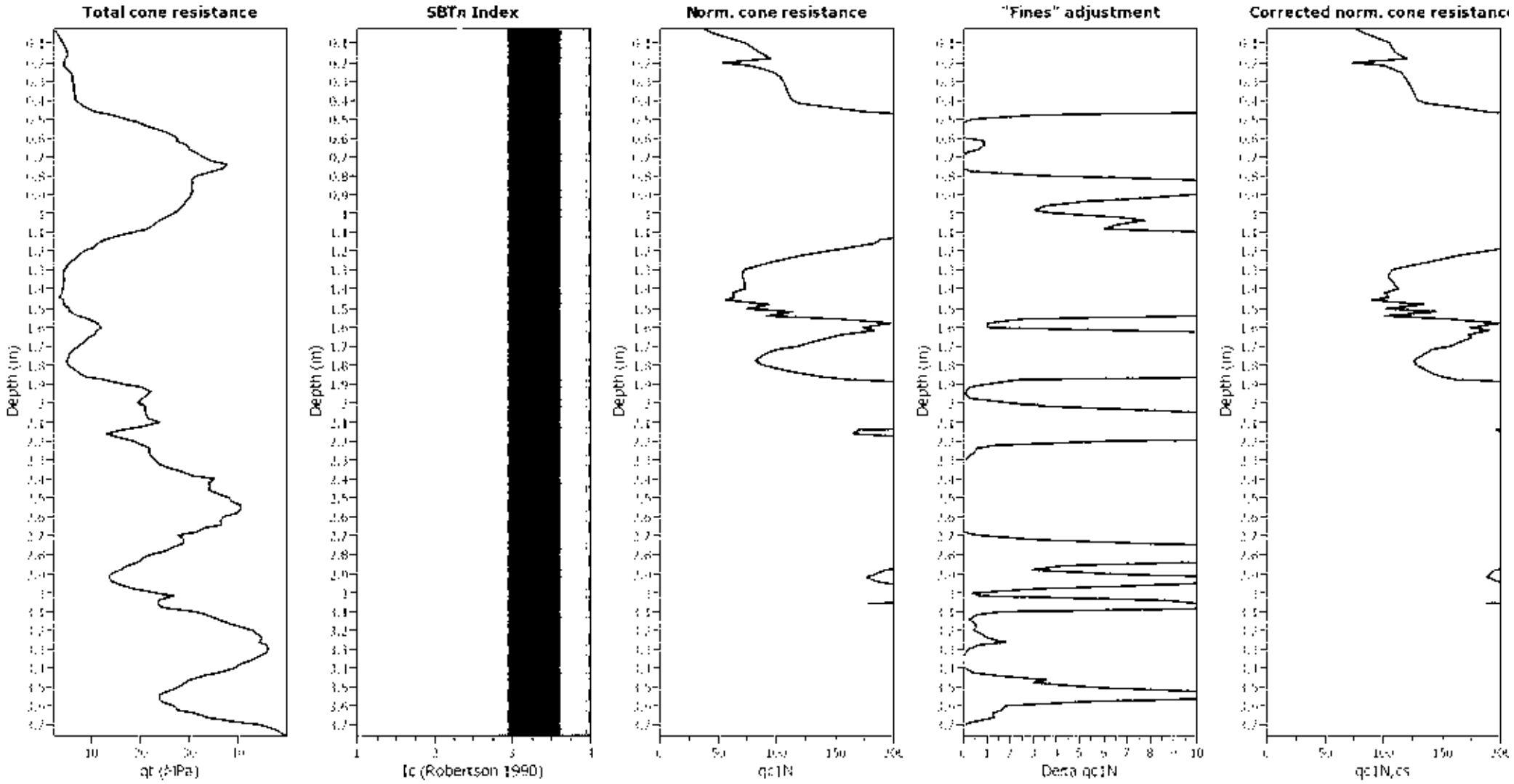
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

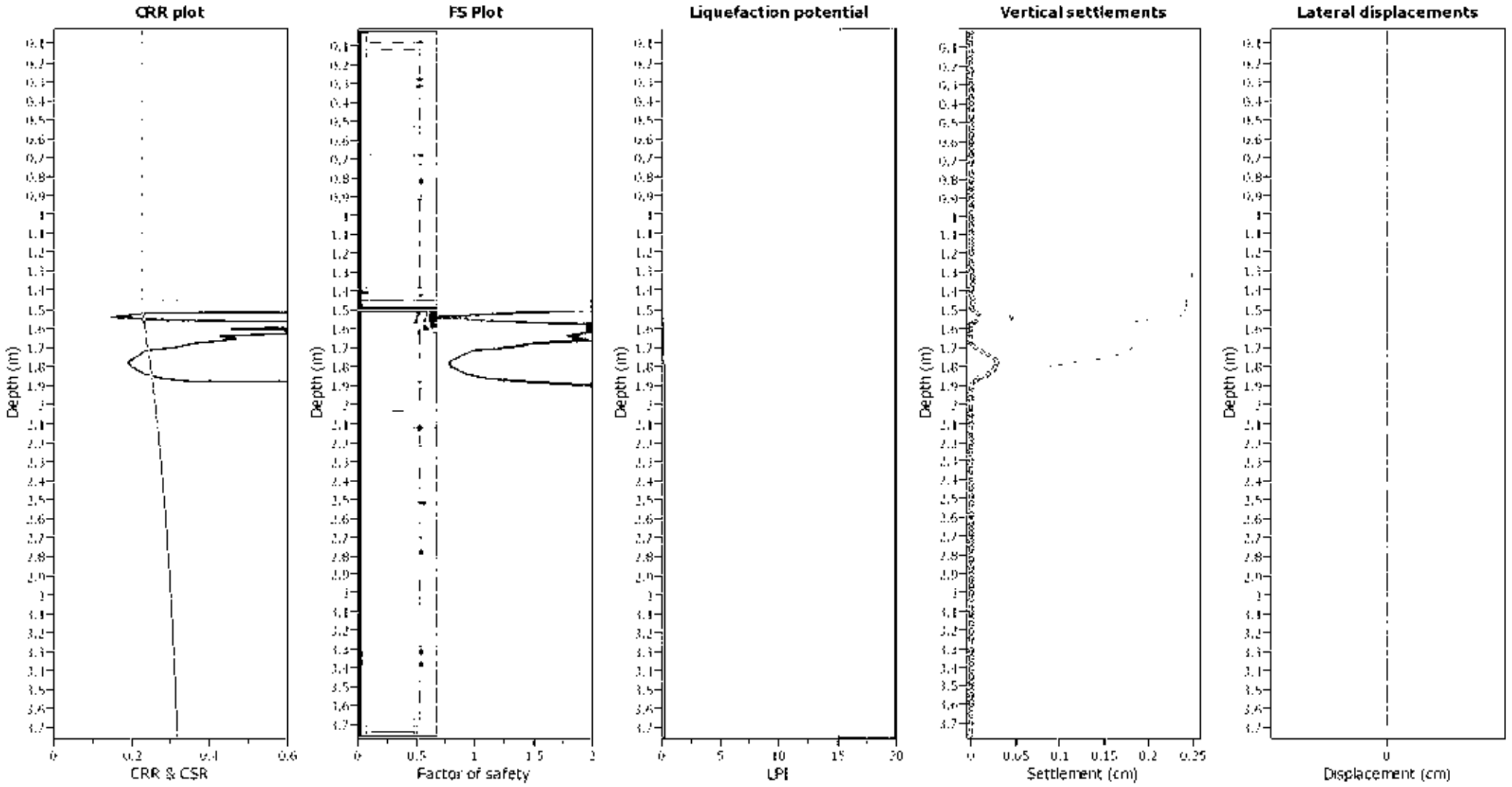
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

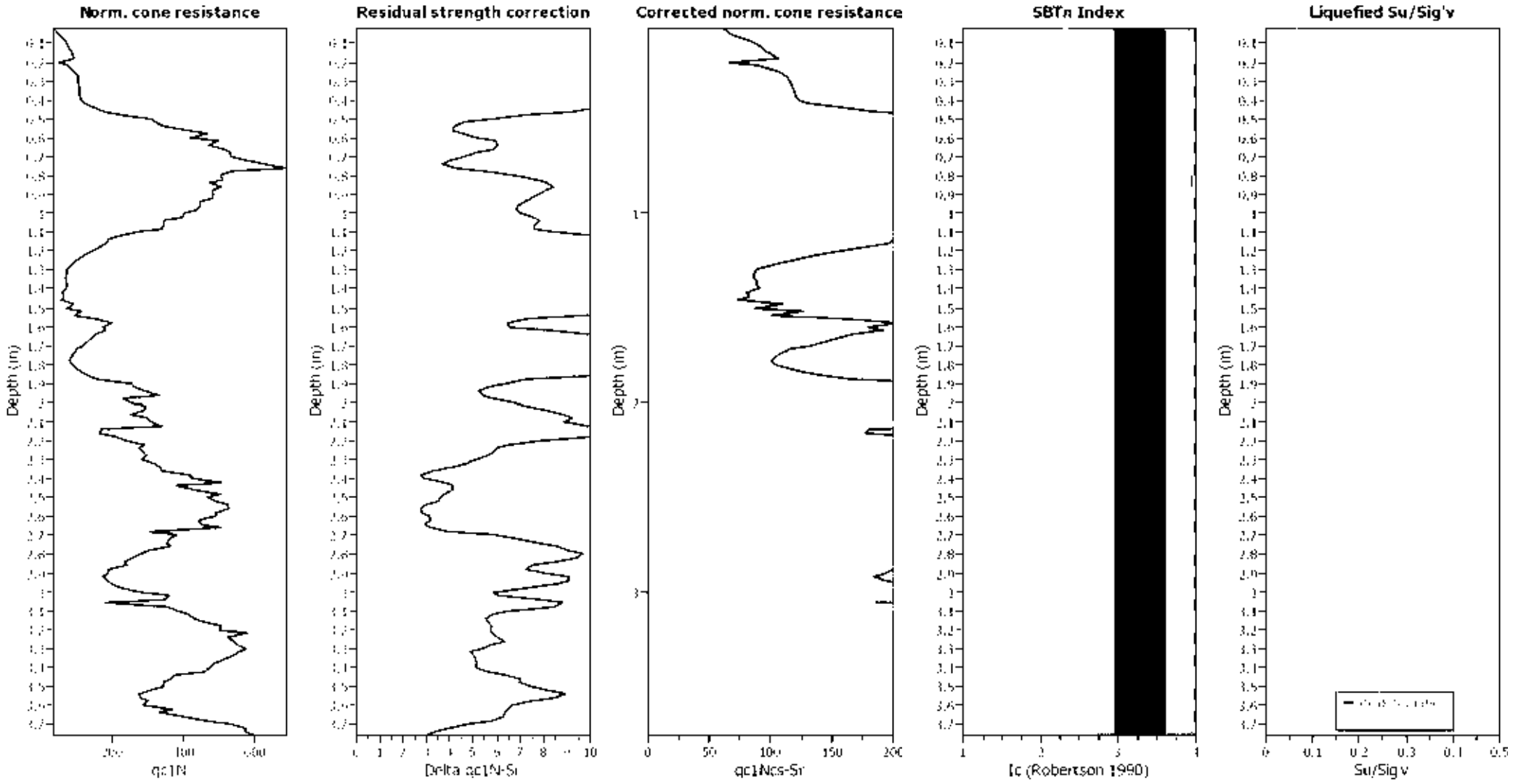
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

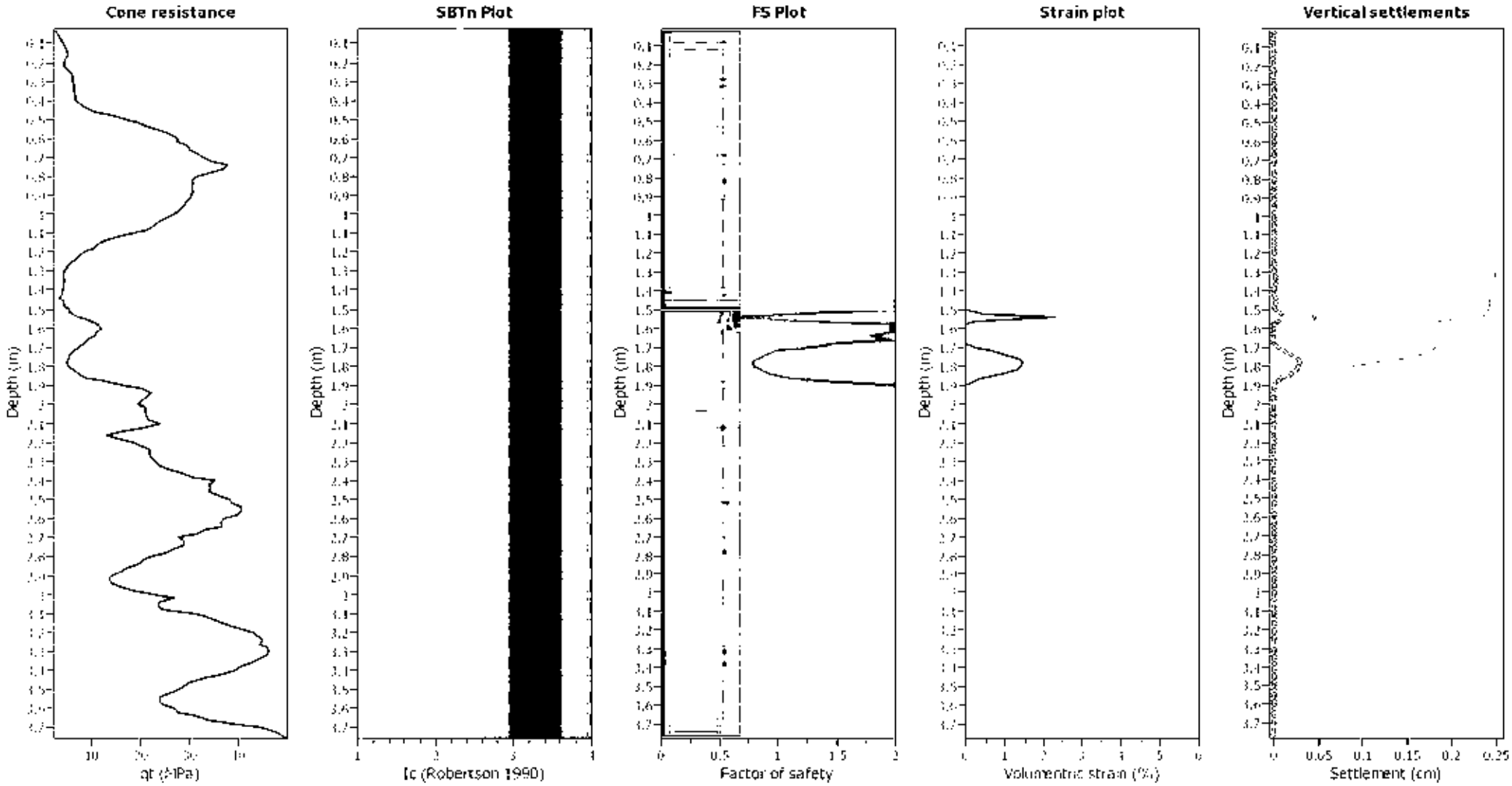
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

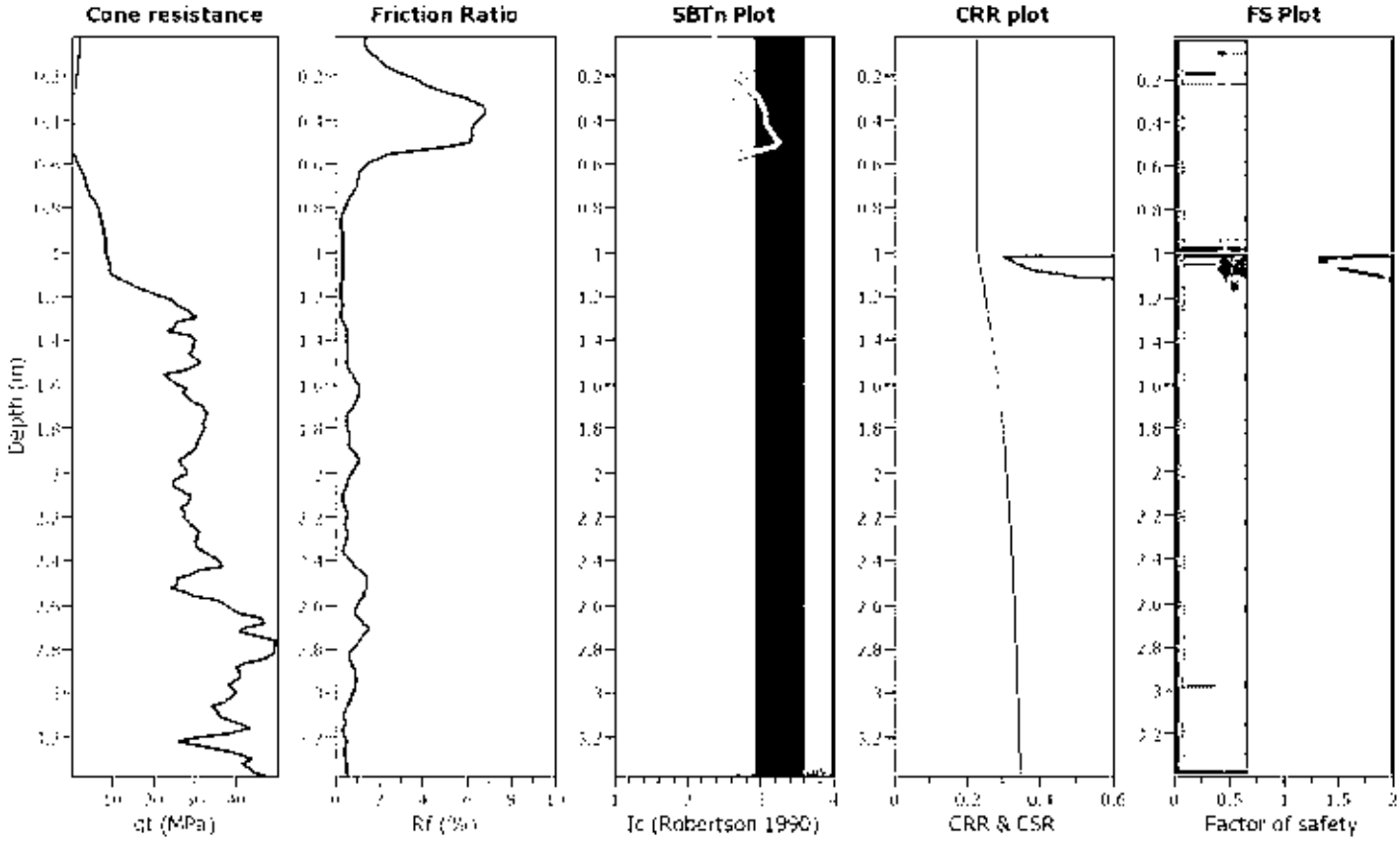
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

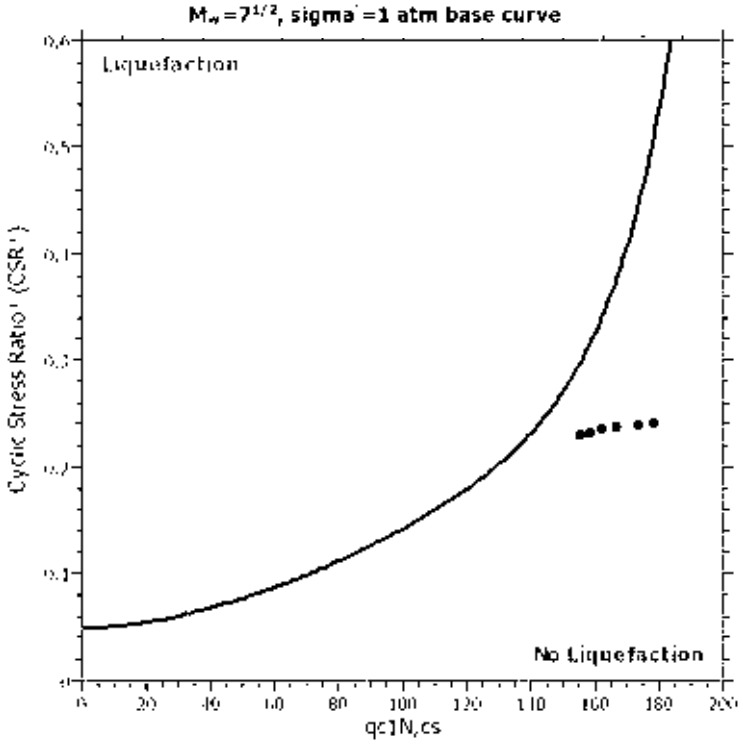
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

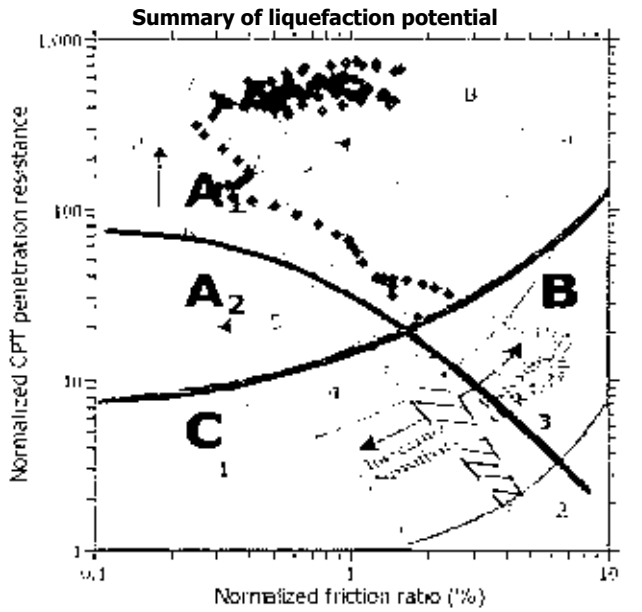
CPT file : CPT26_95SutherlandsRd

Input parameters and analysis data

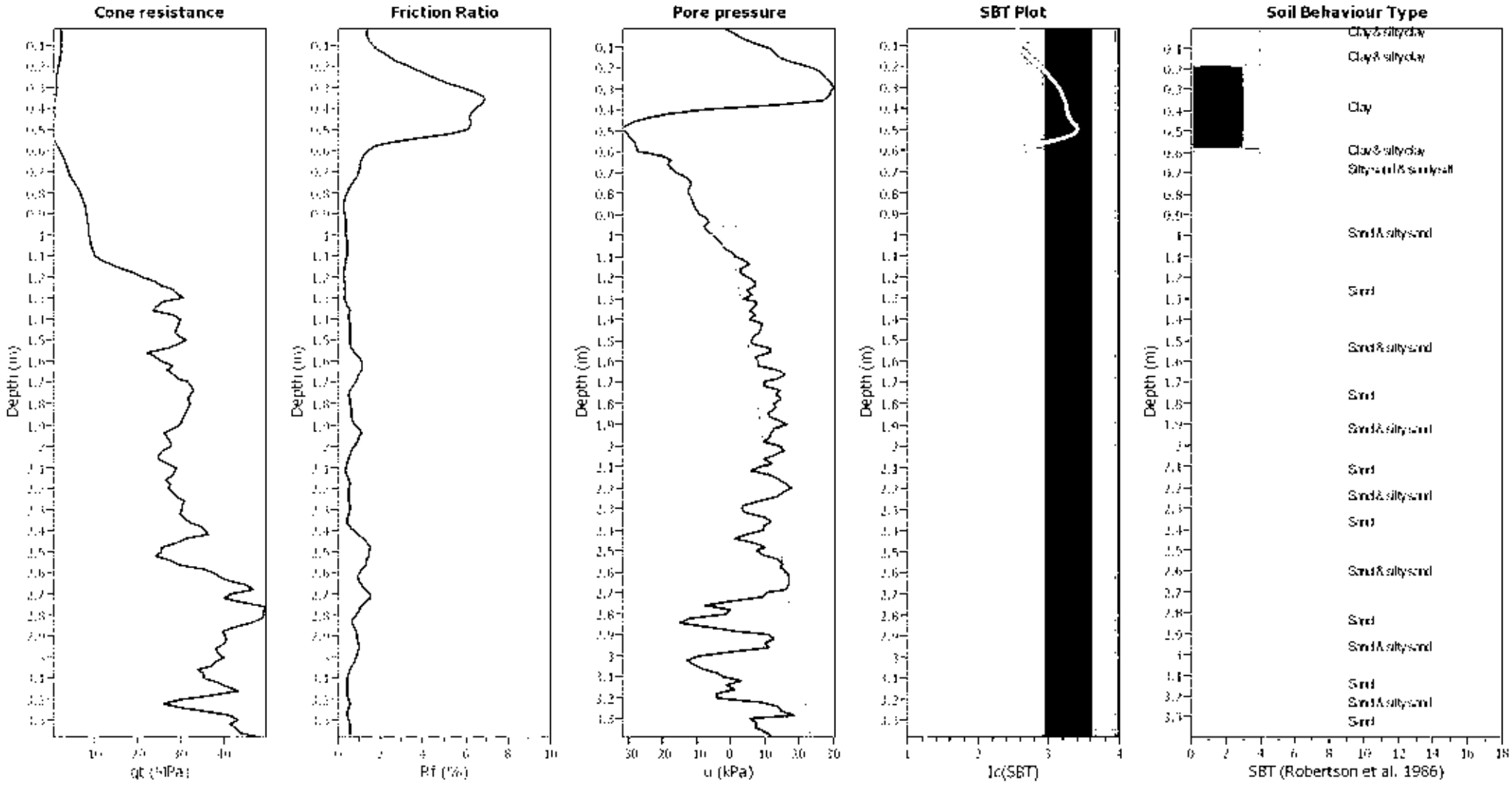
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



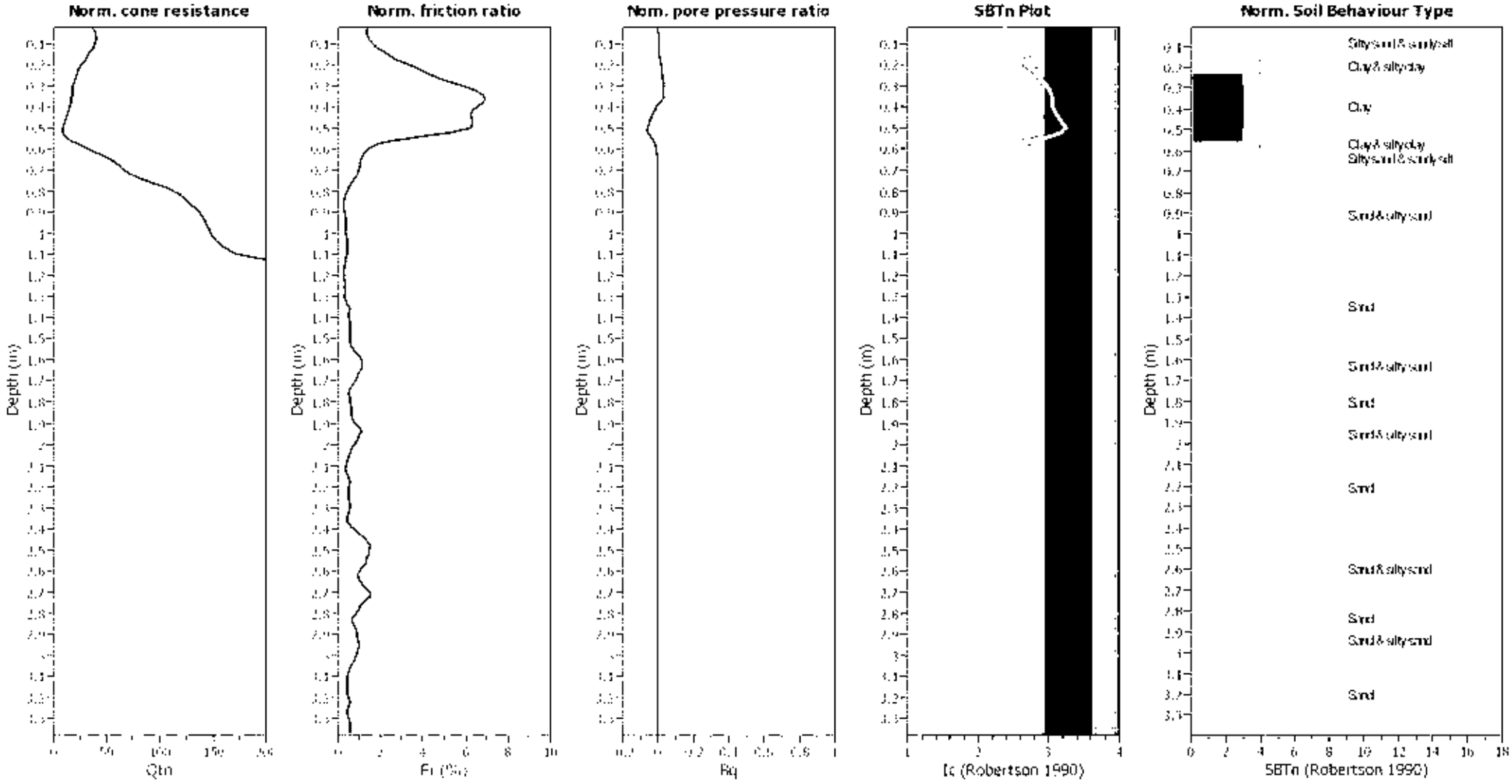
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



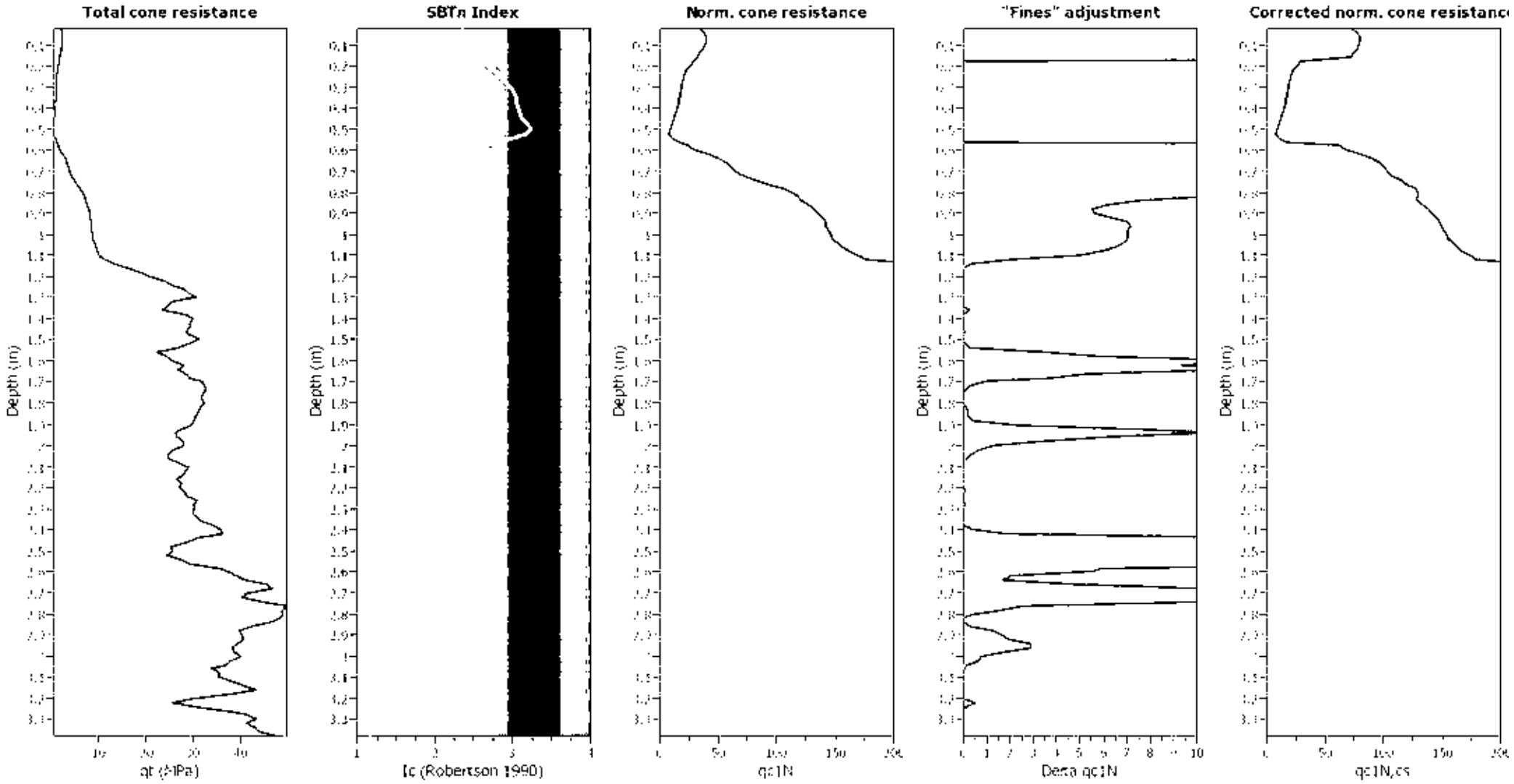
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

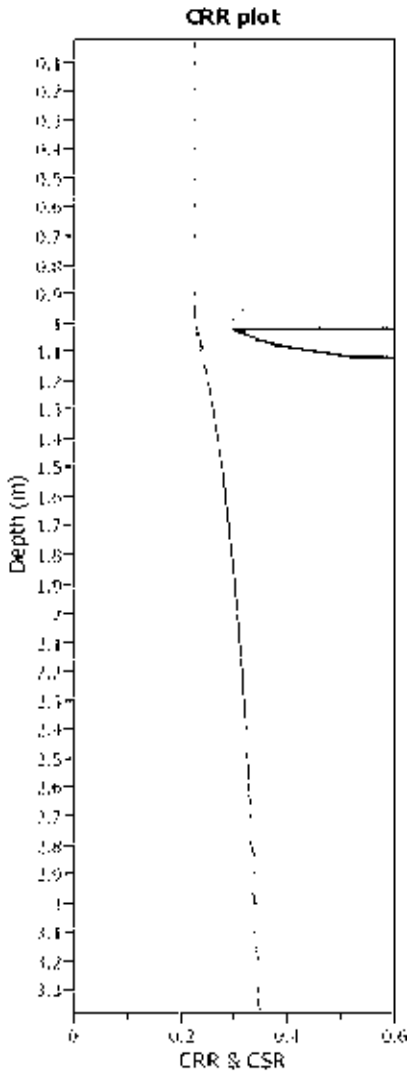
Liquefaction analysis overall plots (intermediate results)

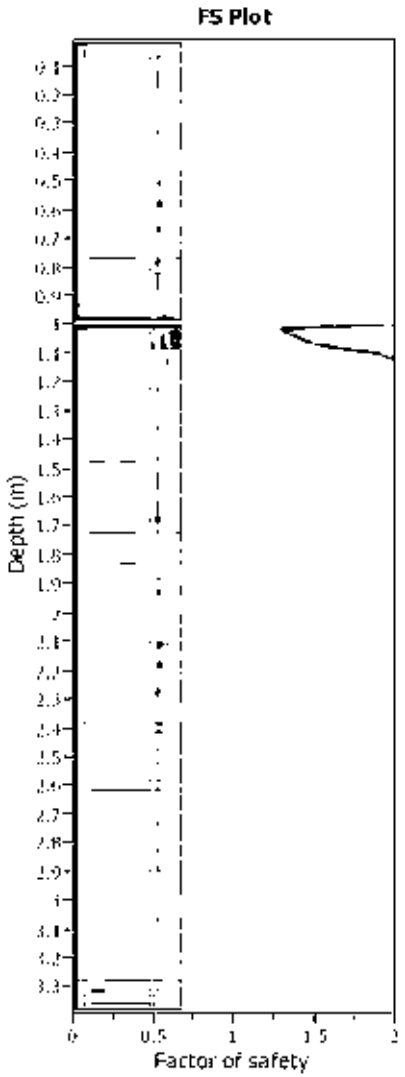


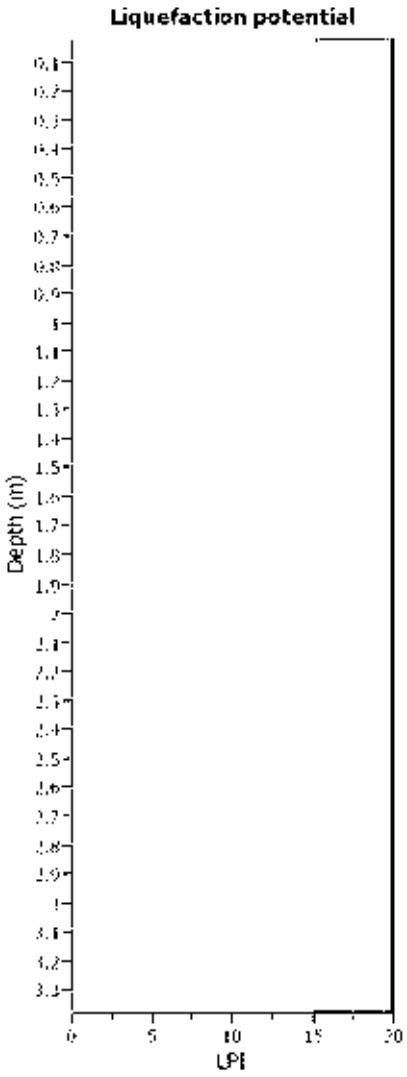
Input parameters and analysis data

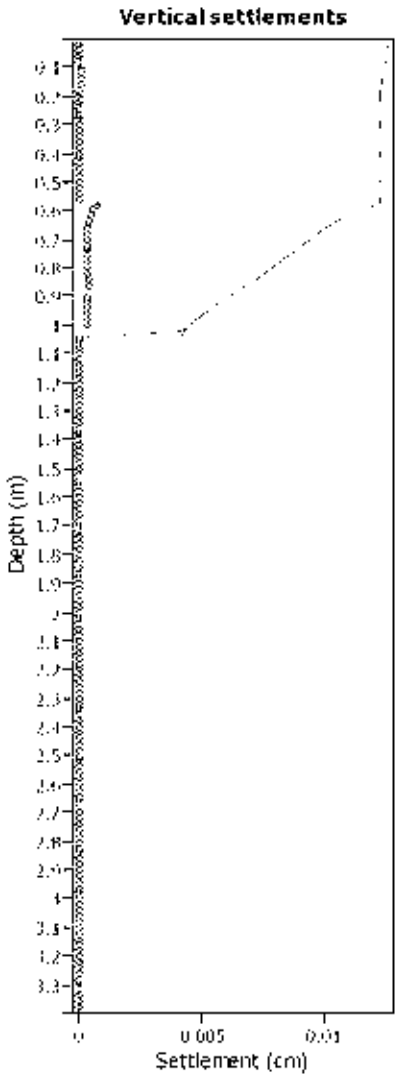
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

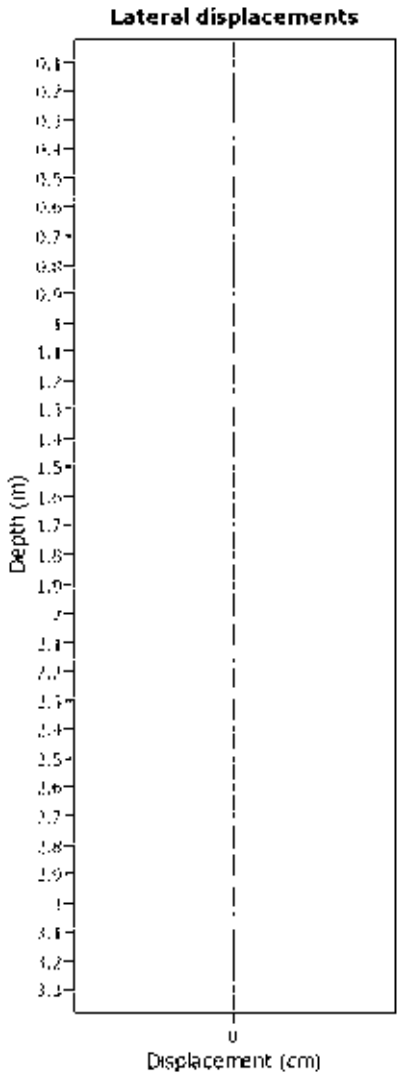
Liquefaction analysis overall plots











Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (m/s/eq):	1.00 m	Fill height:	N/A	Limit depth:	N/A

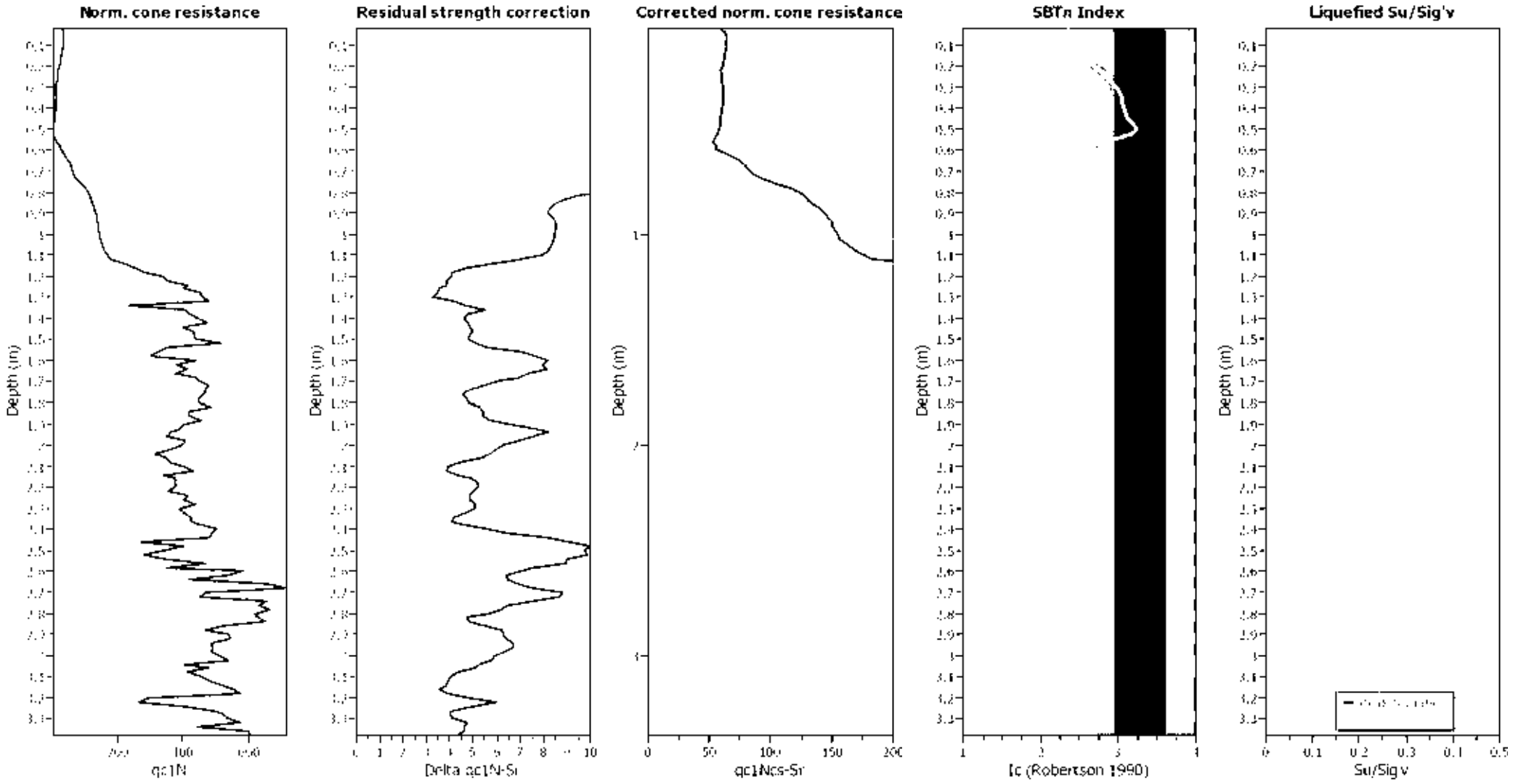
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

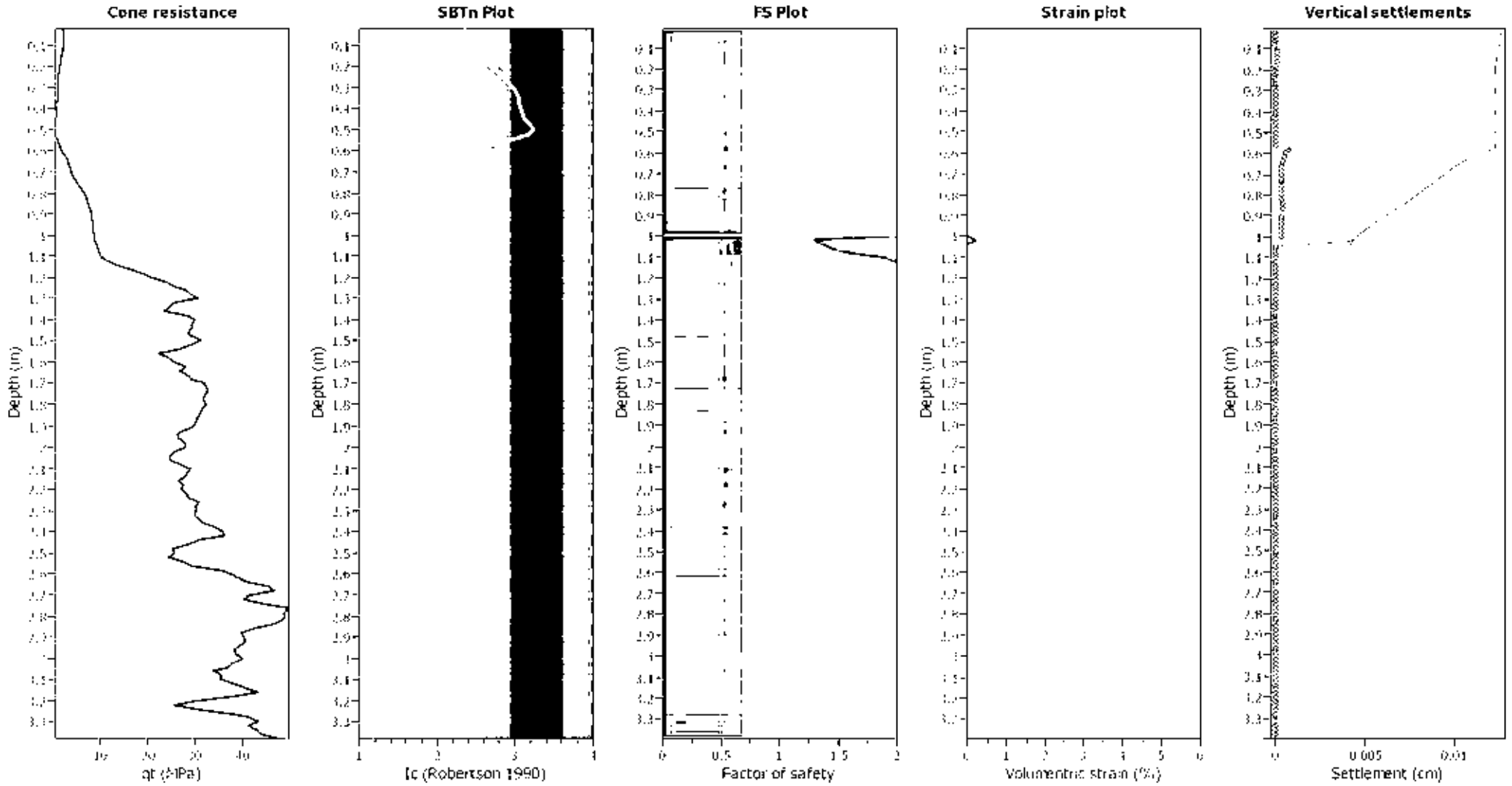
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

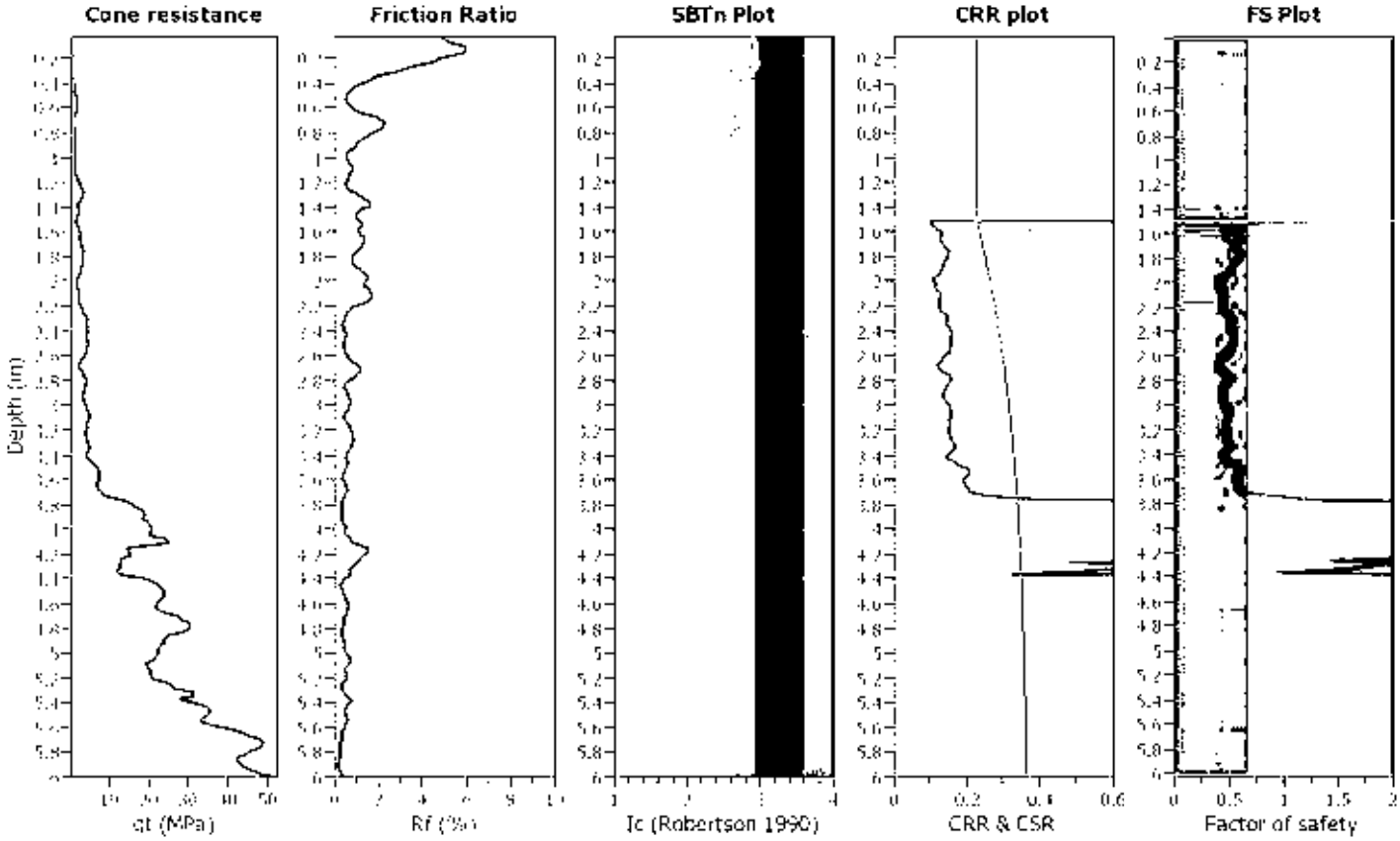
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

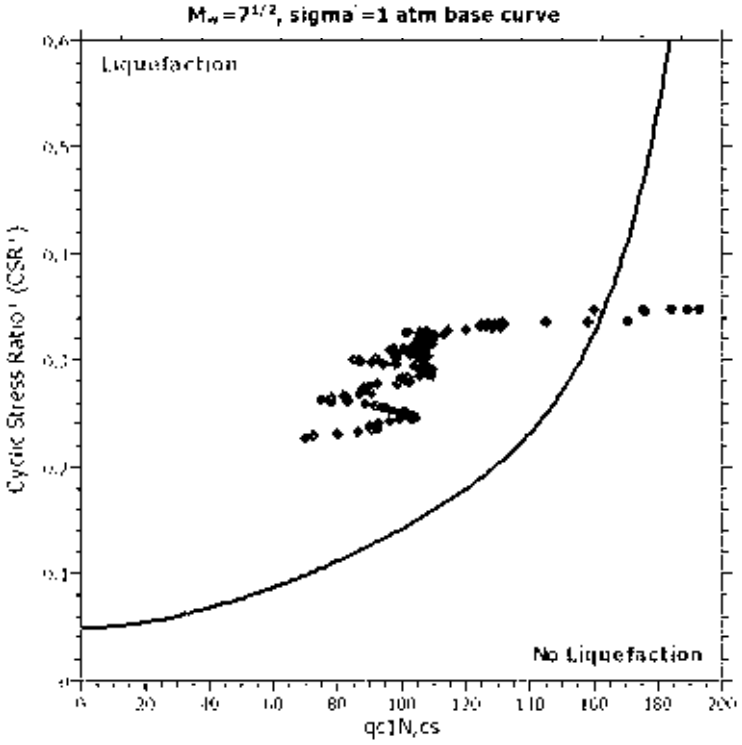
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

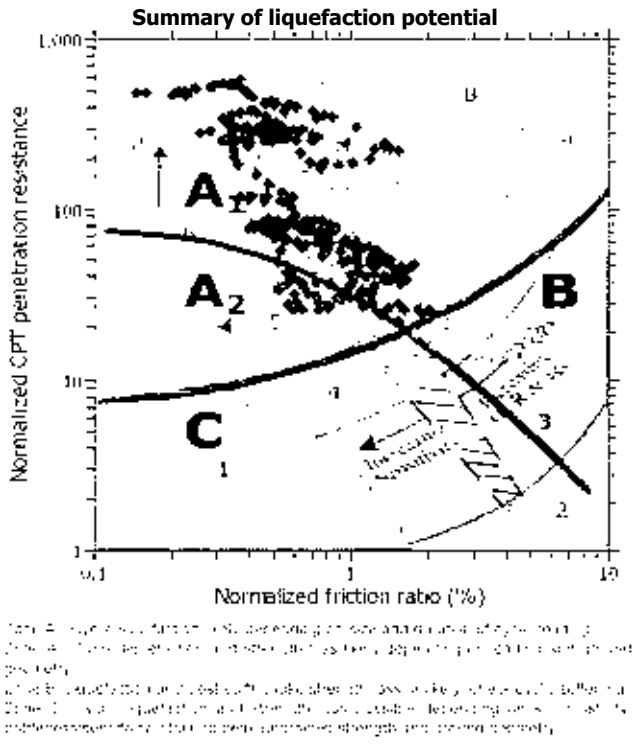
CPT file : CPT27_47KennedysBushRd

Input parameters and analysis data

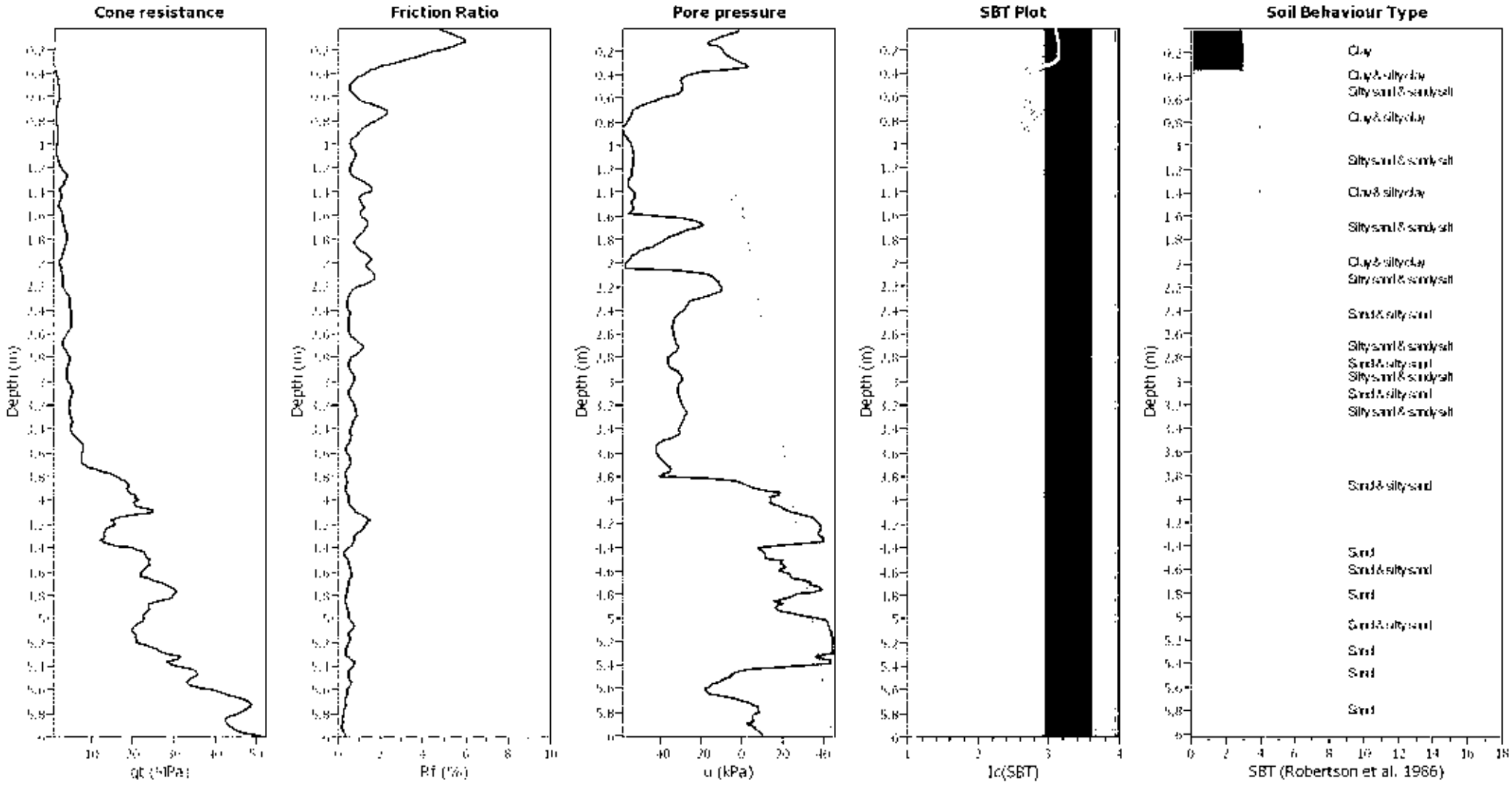
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



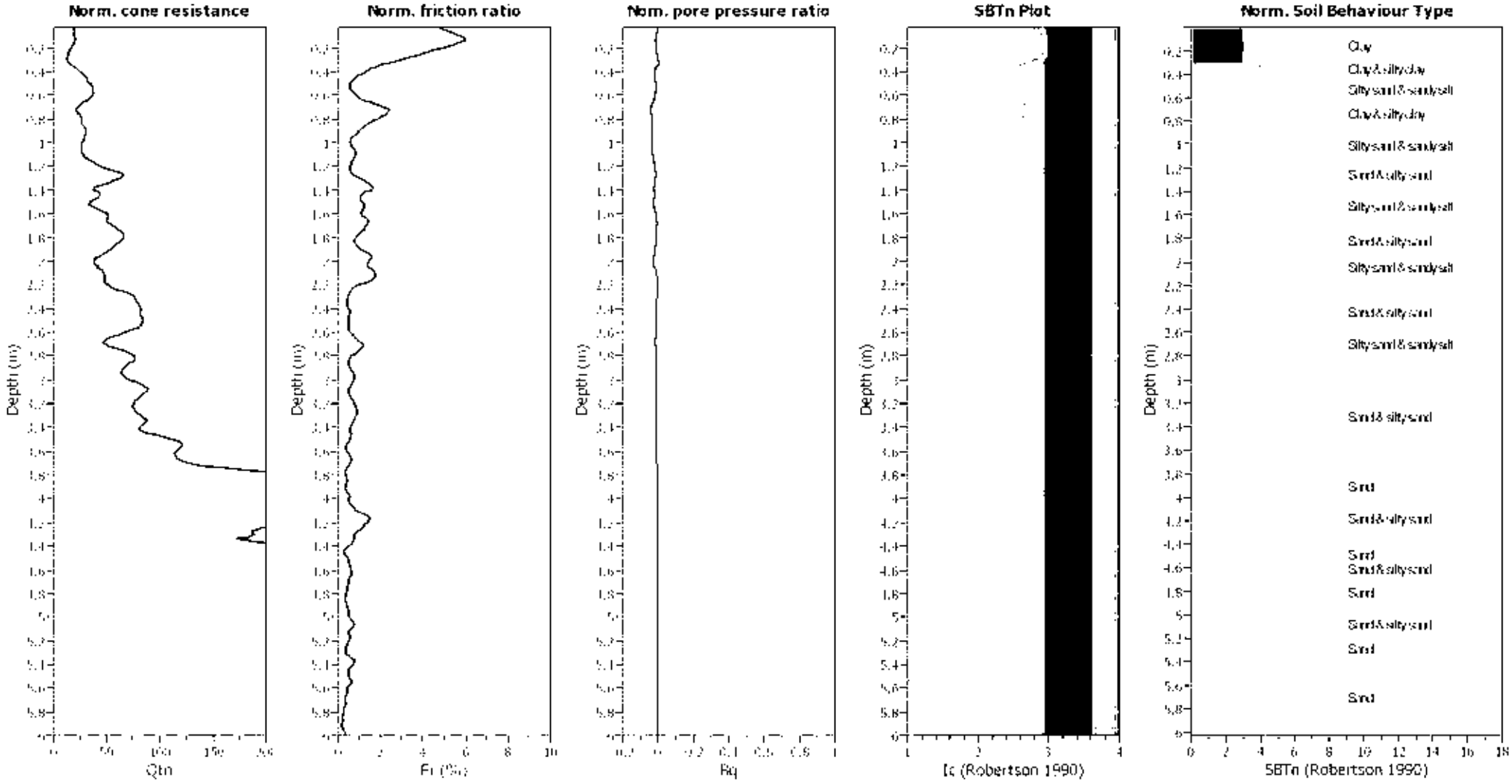
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



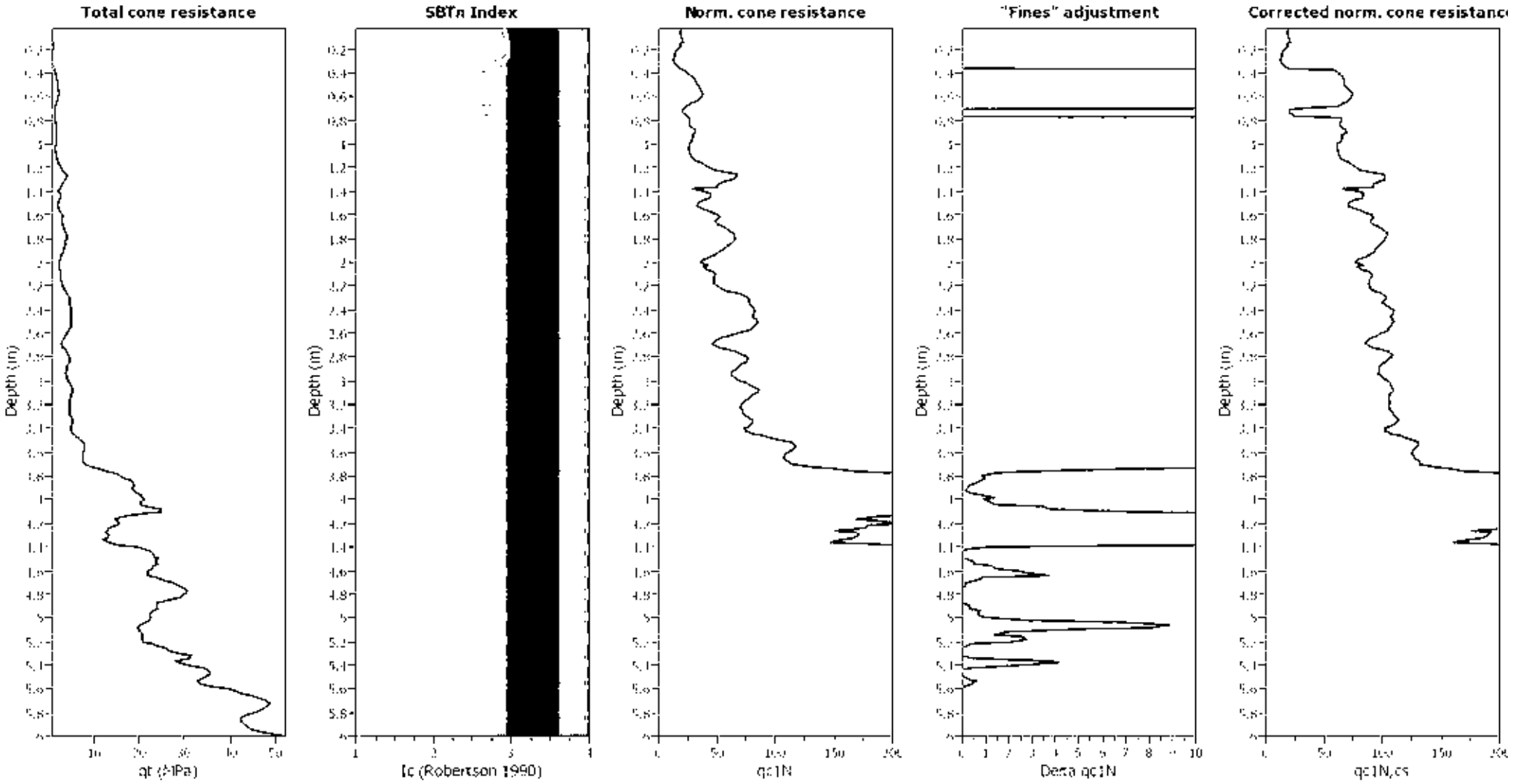
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

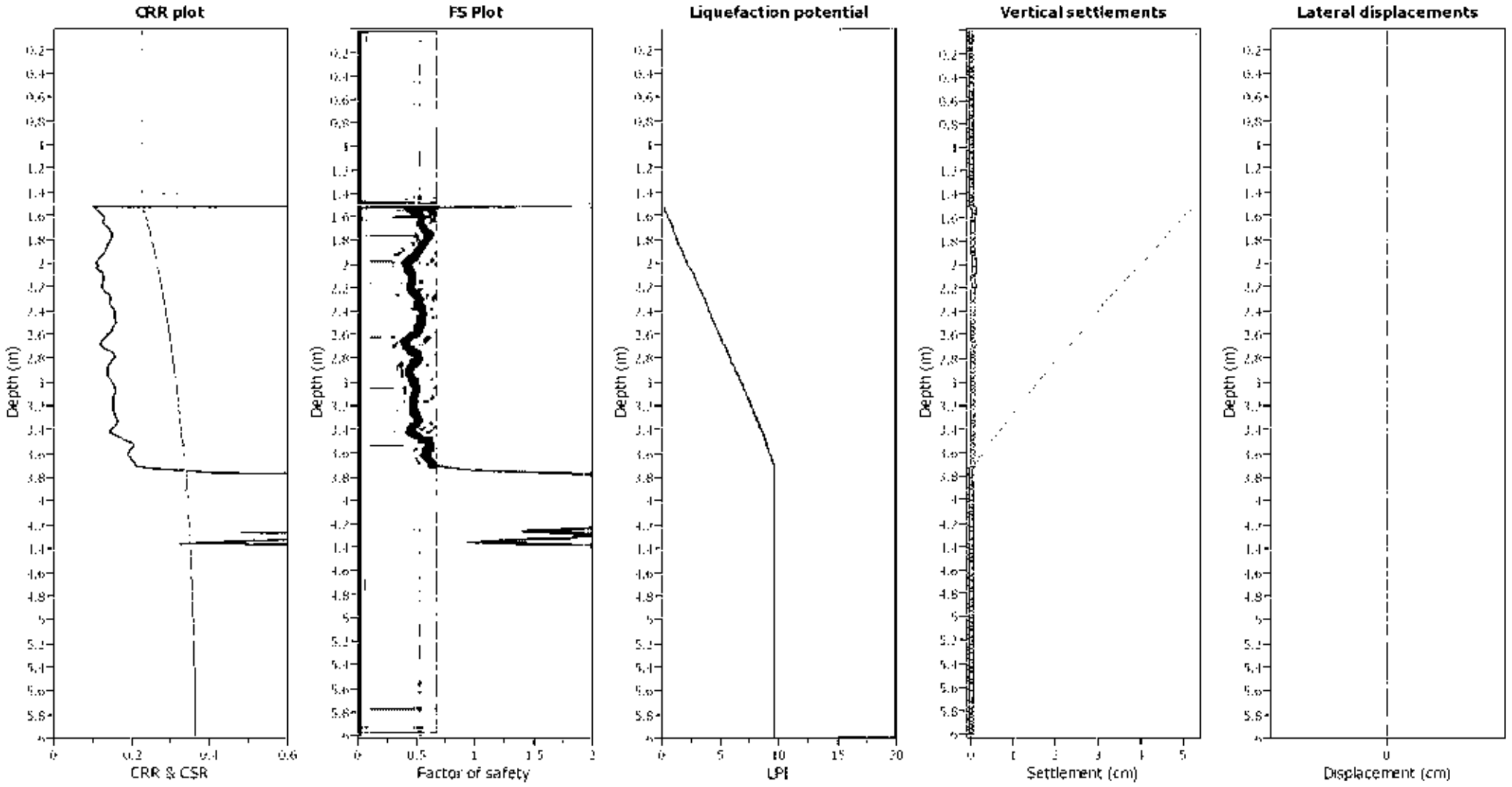
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

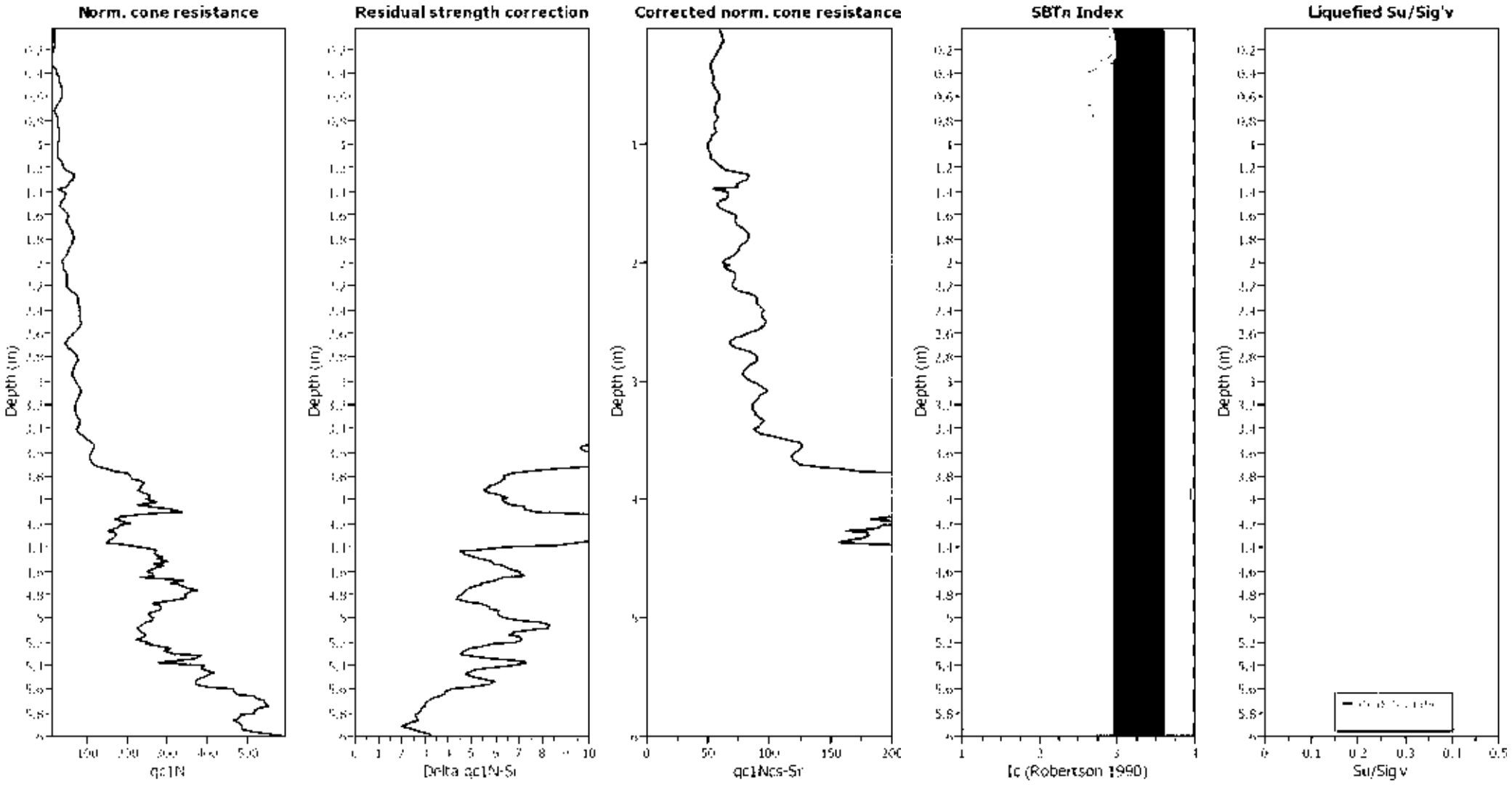
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

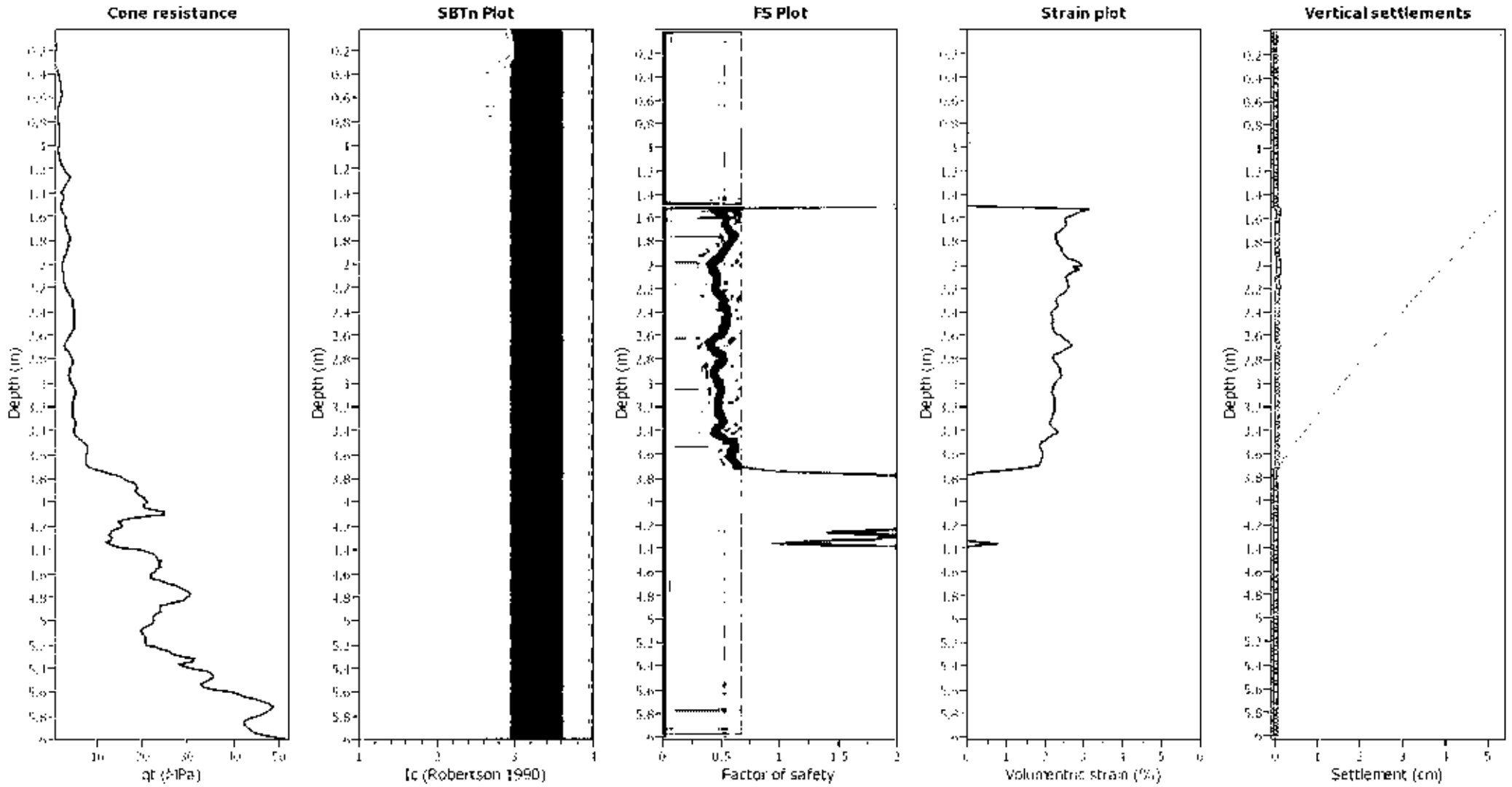
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

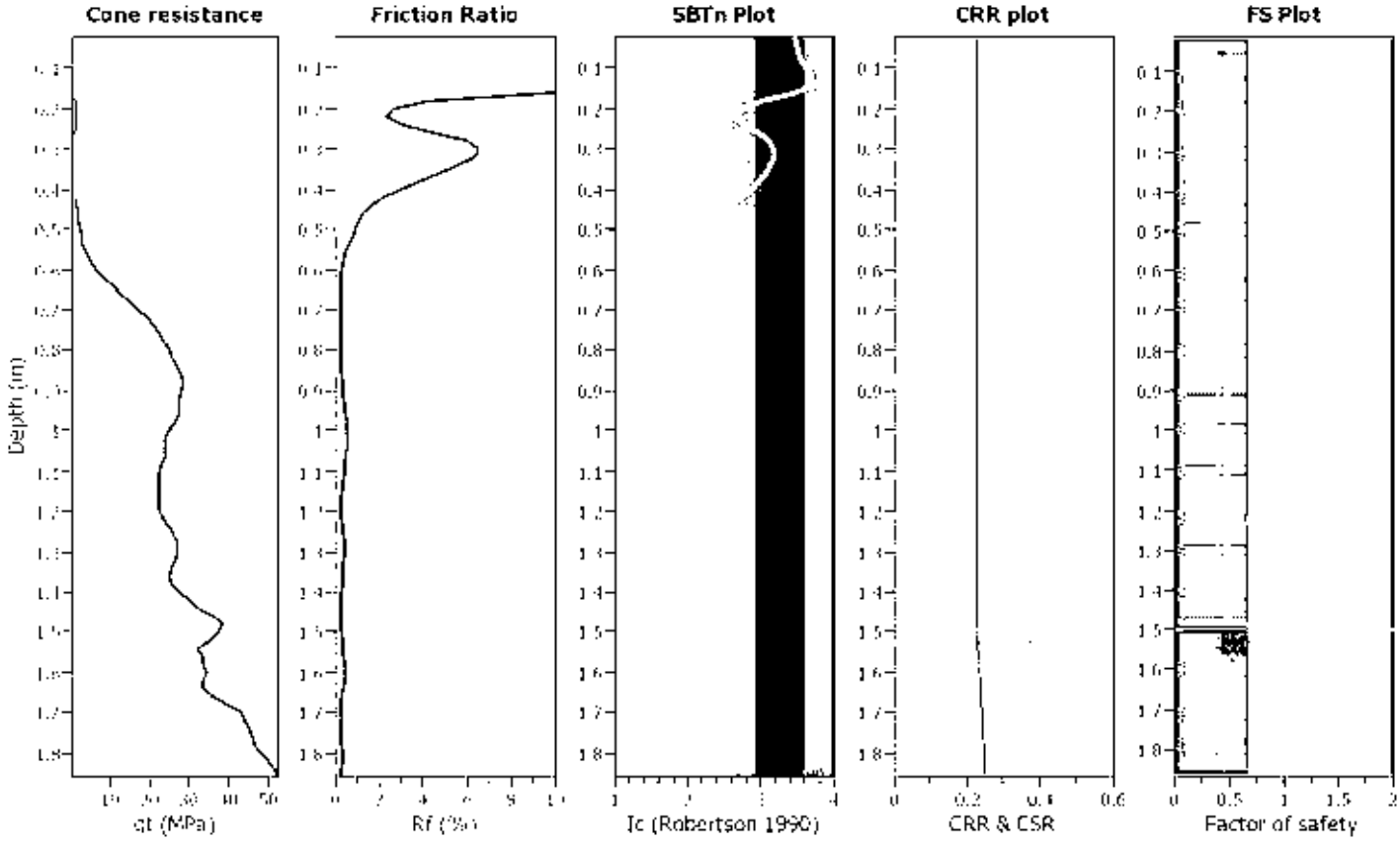
qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

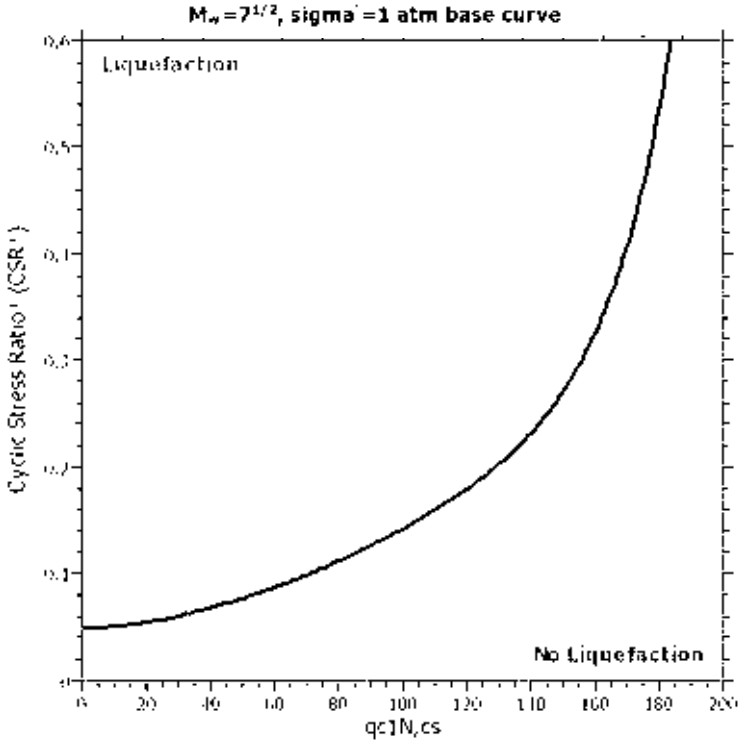
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

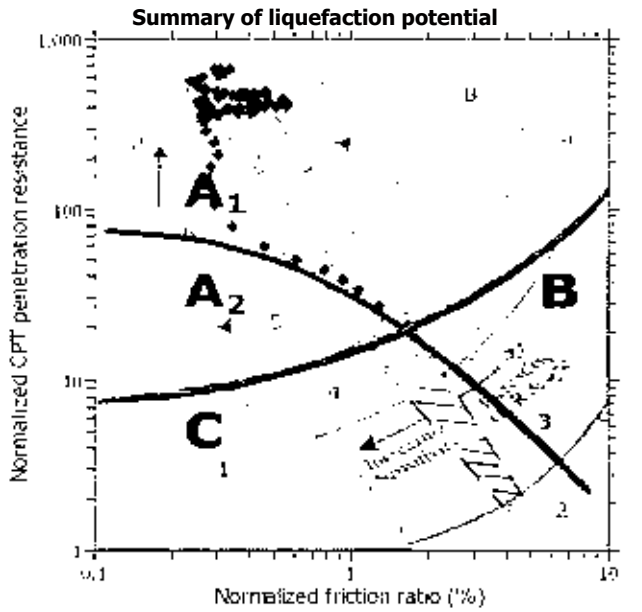
CPT file : CPT28_57SutherlandsRd

Input parameters and analysis data

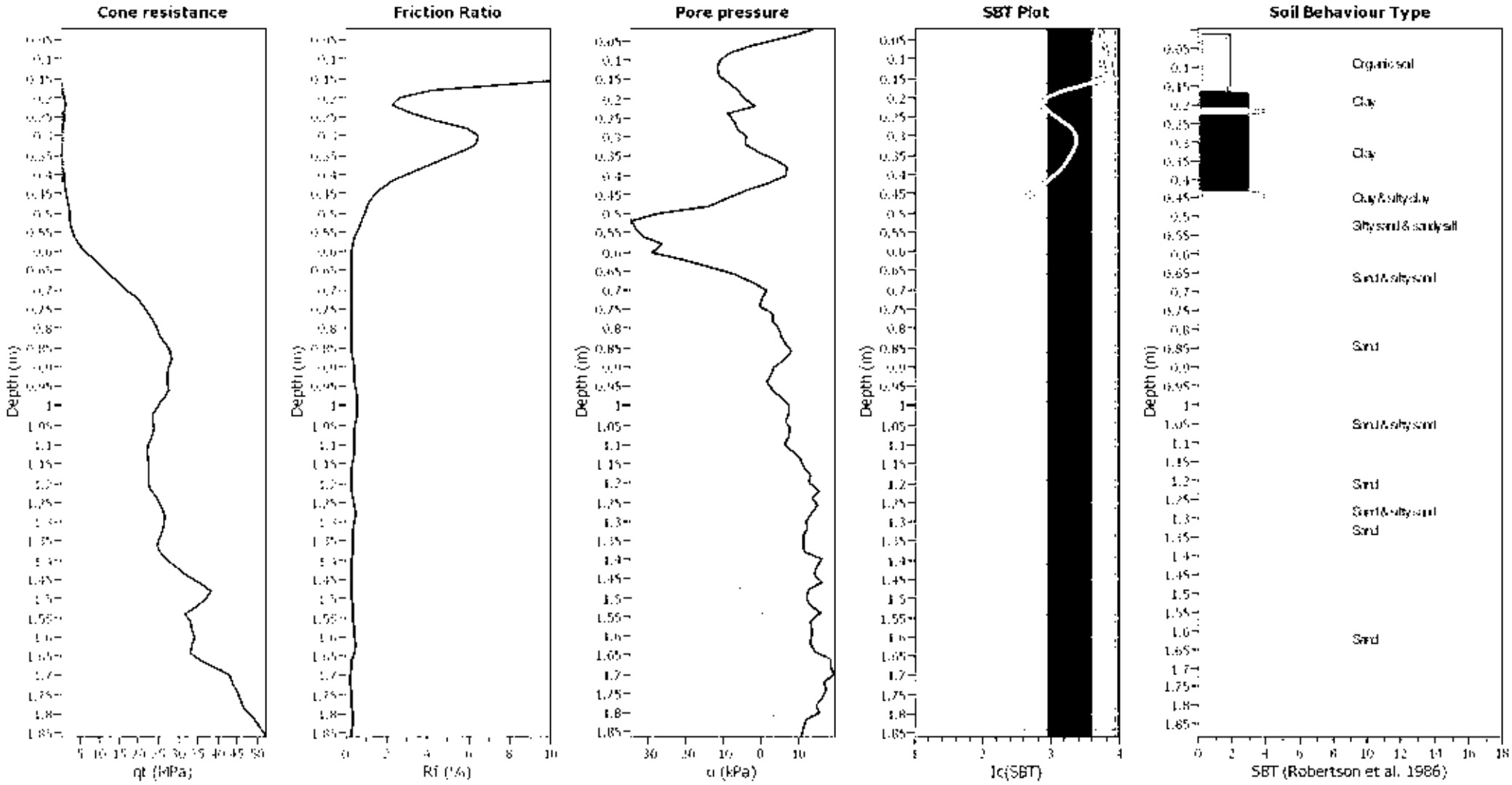
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



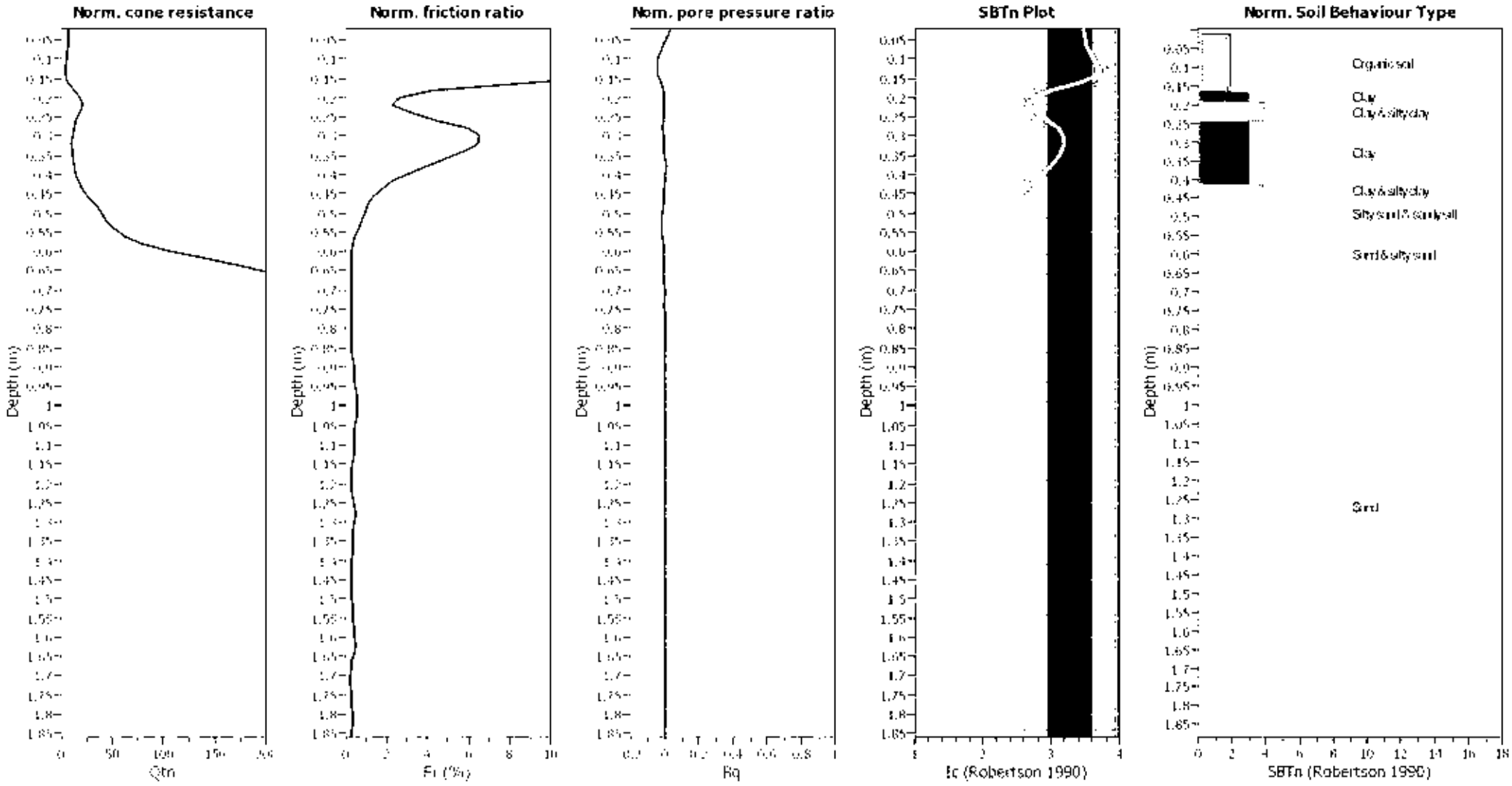
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



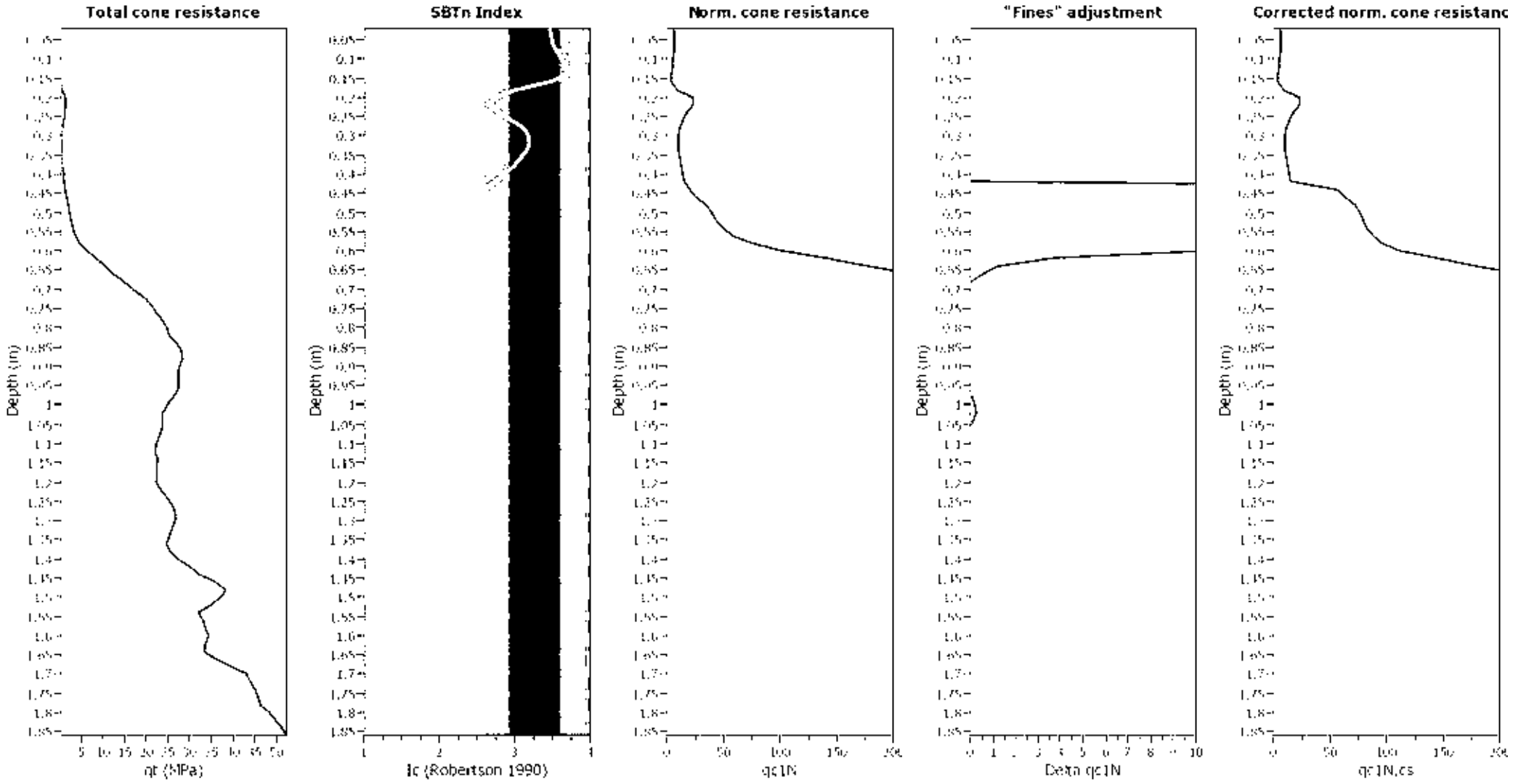
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

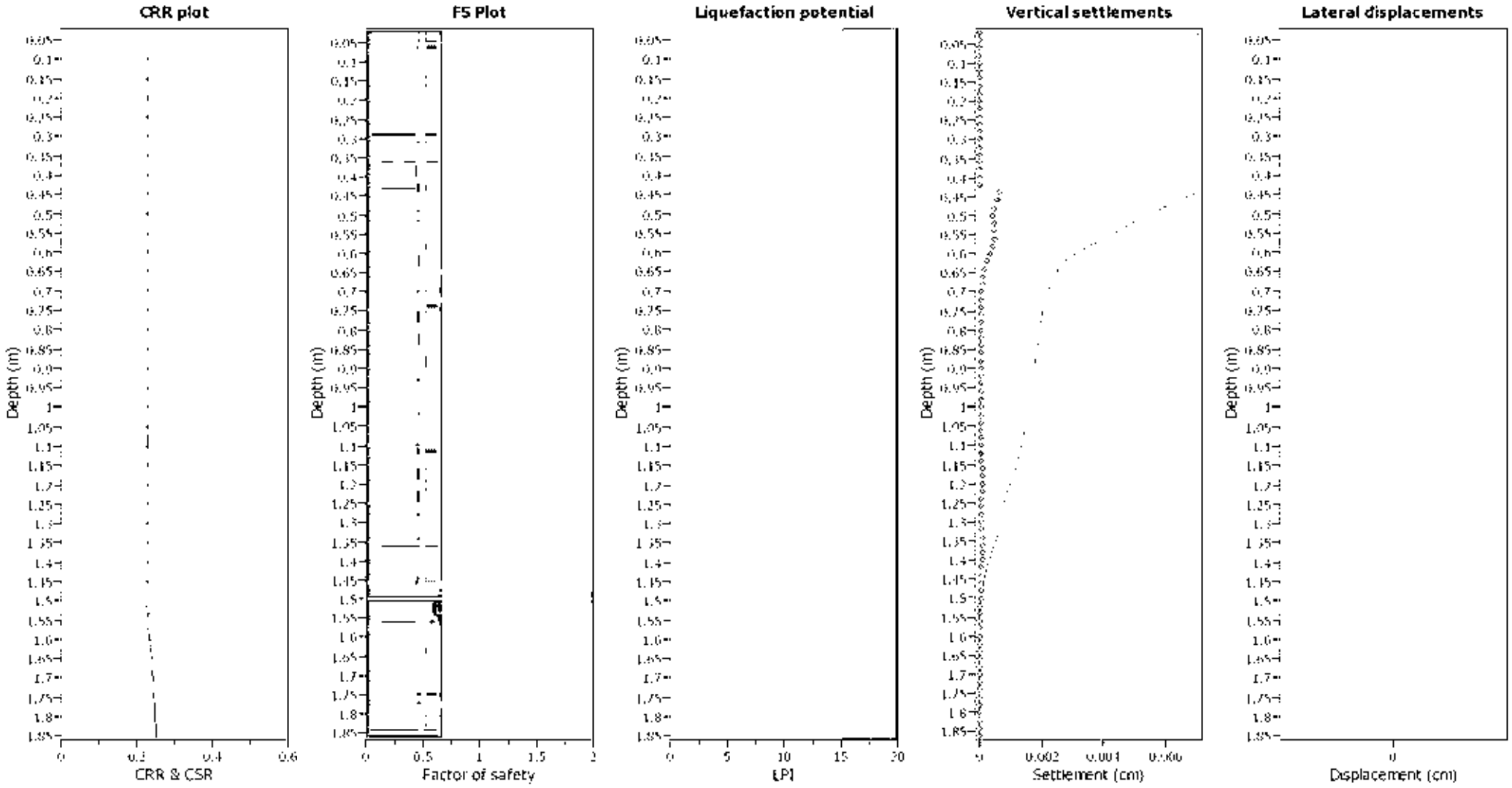
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

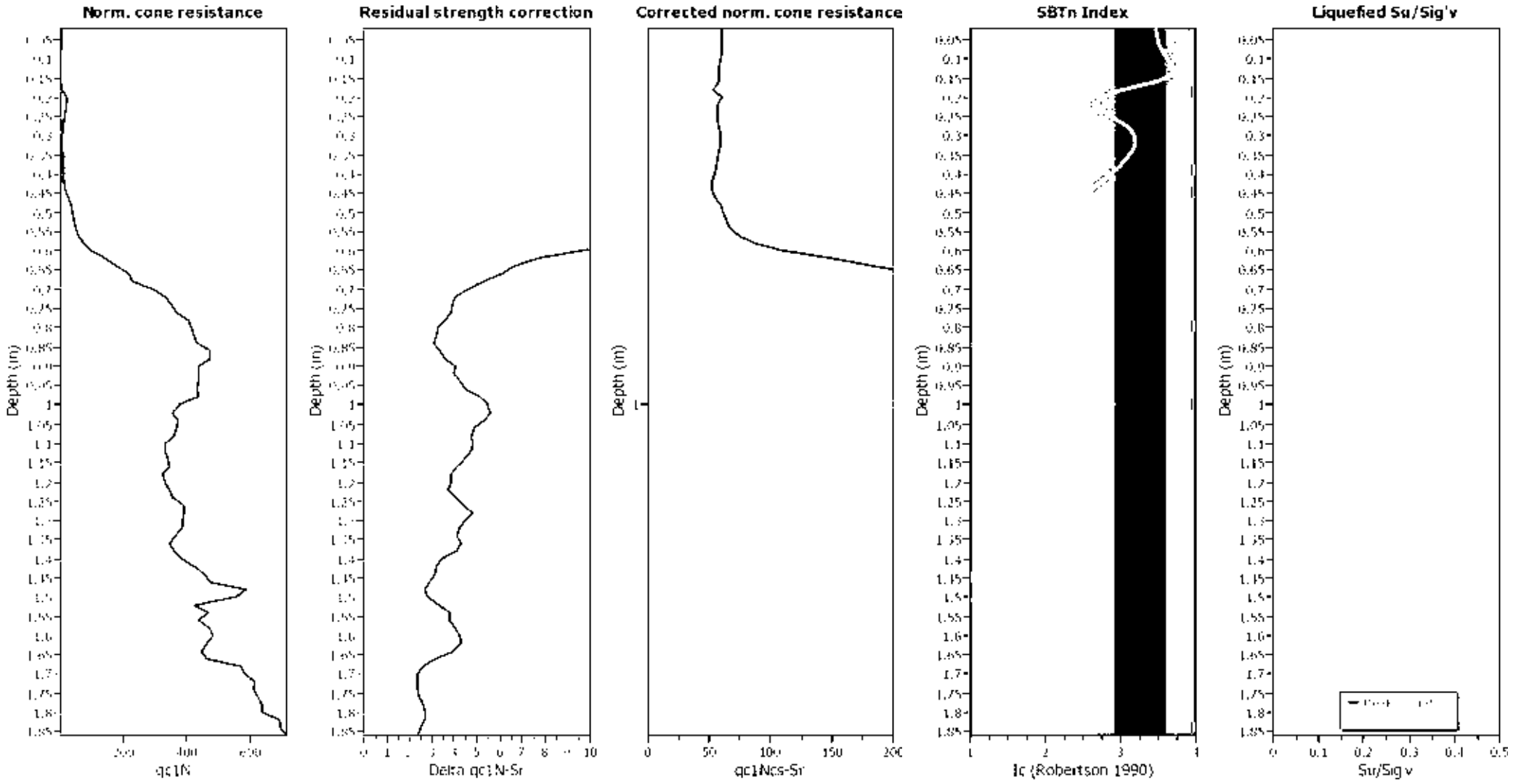
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

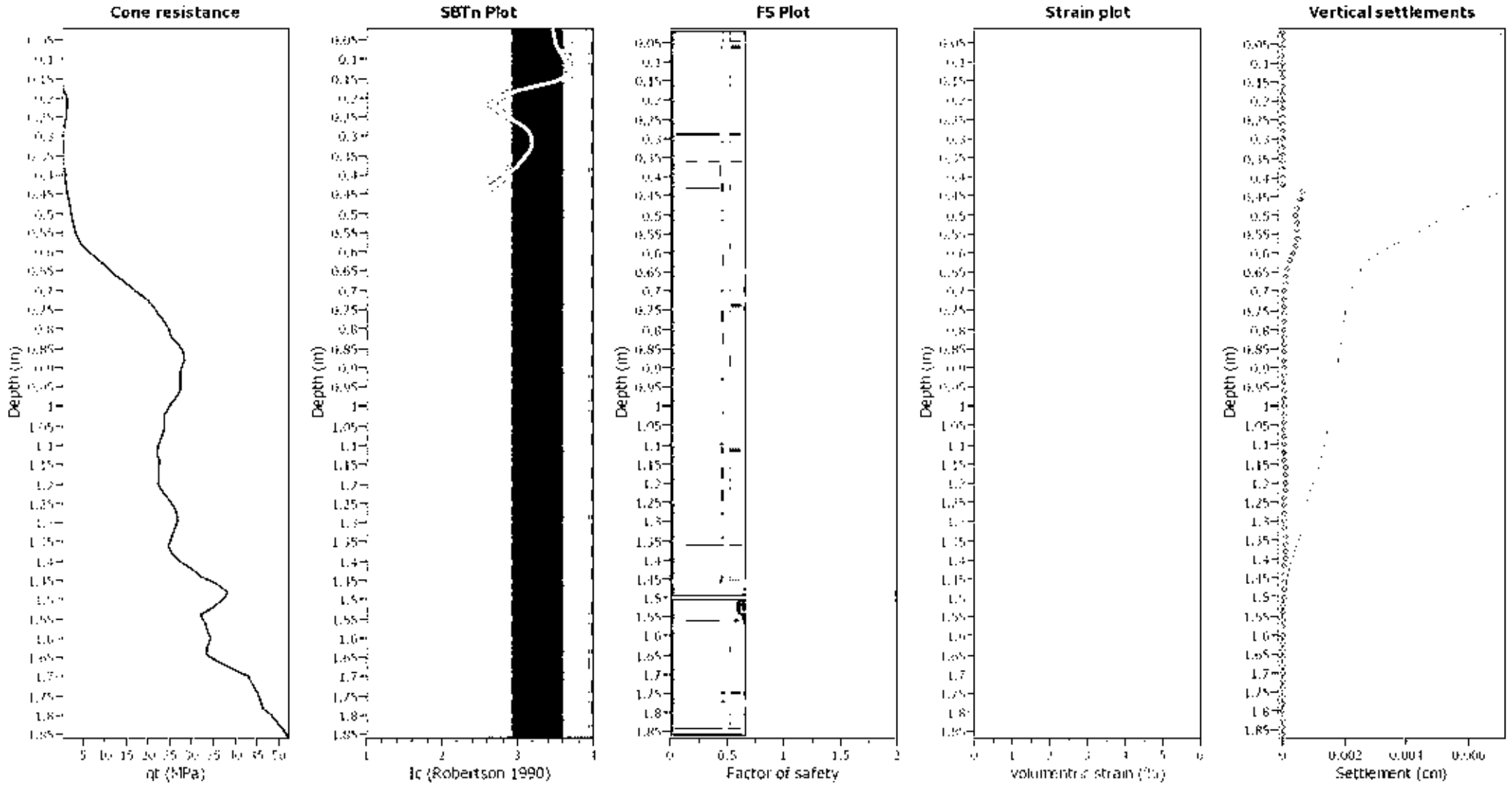
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction correction method:	I&B (2008)	Average results interval:	3	Transition detect applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

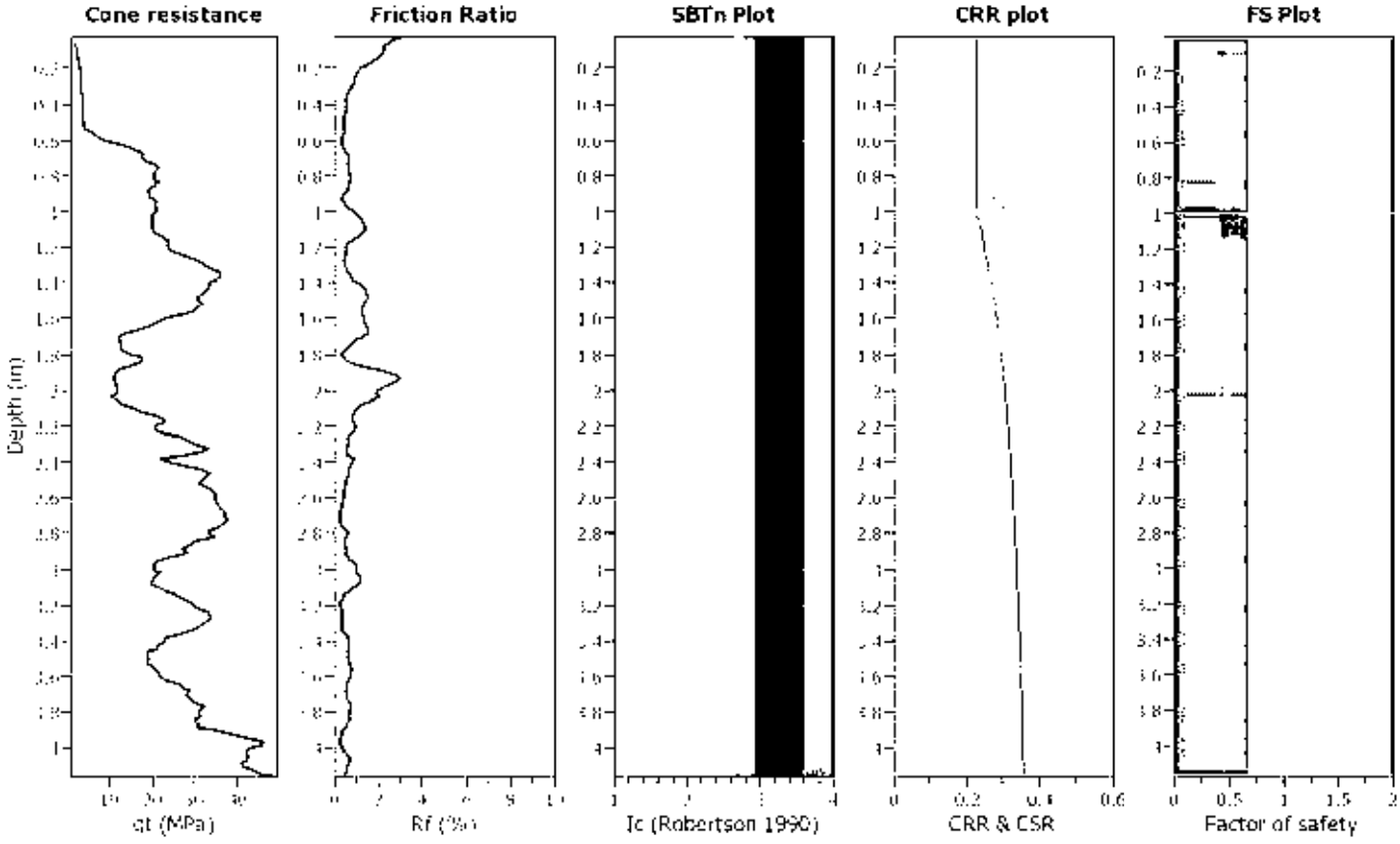
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

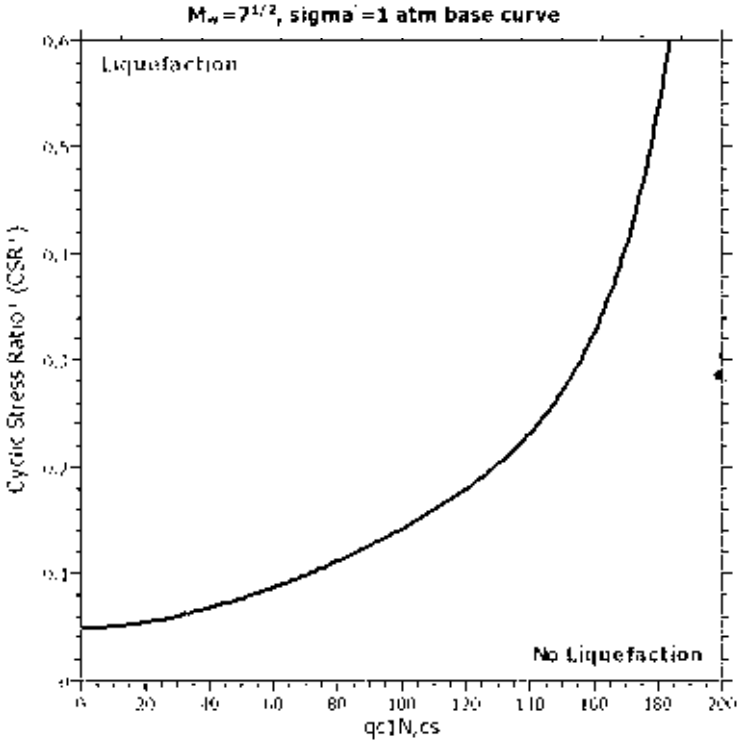
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

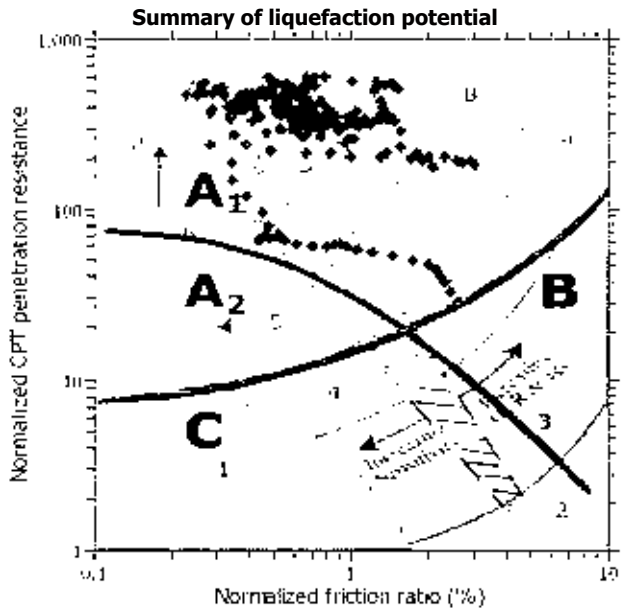
CPT file : CPT29_57SutherlandsRd

Input parameters and analysis data

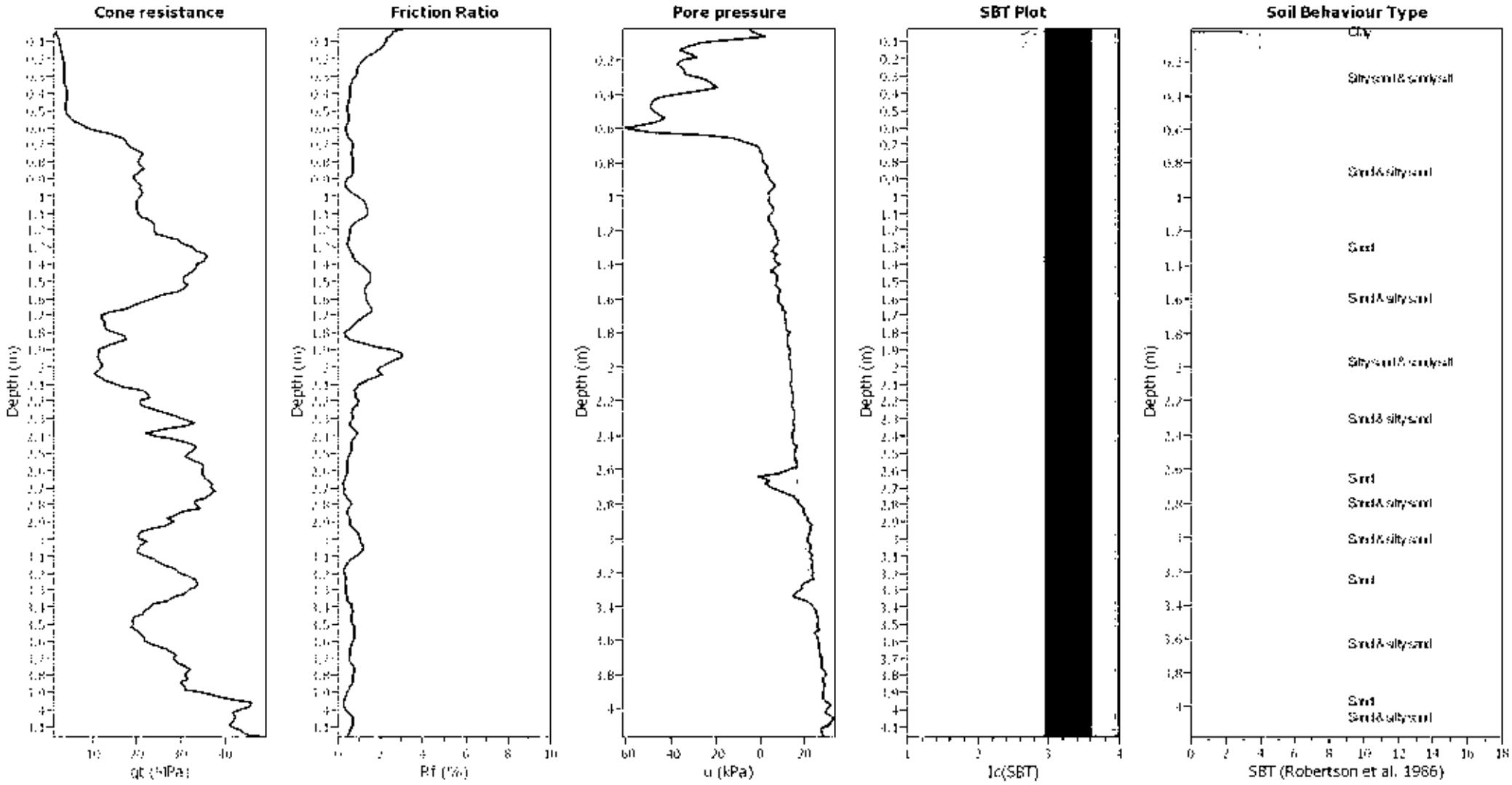
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



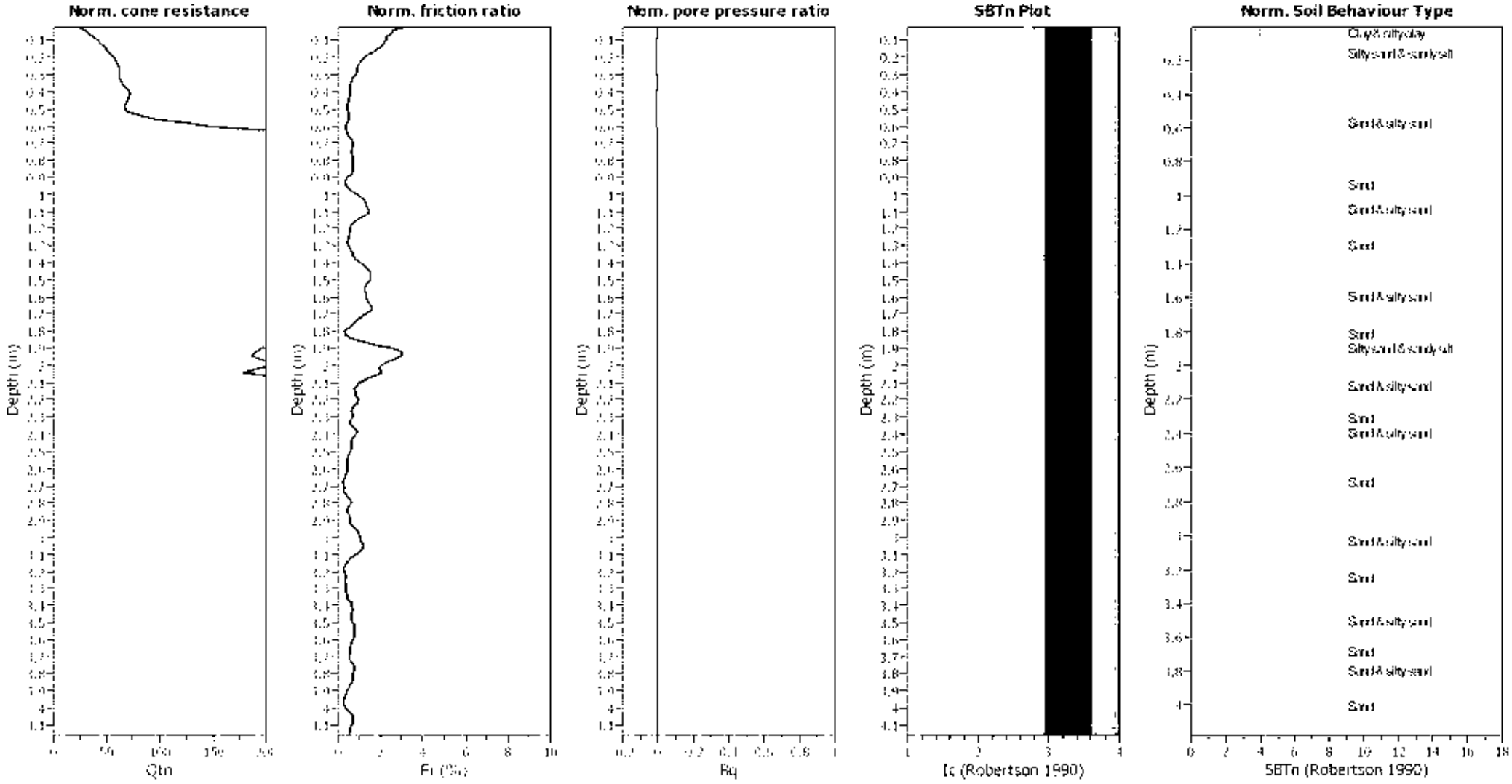
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



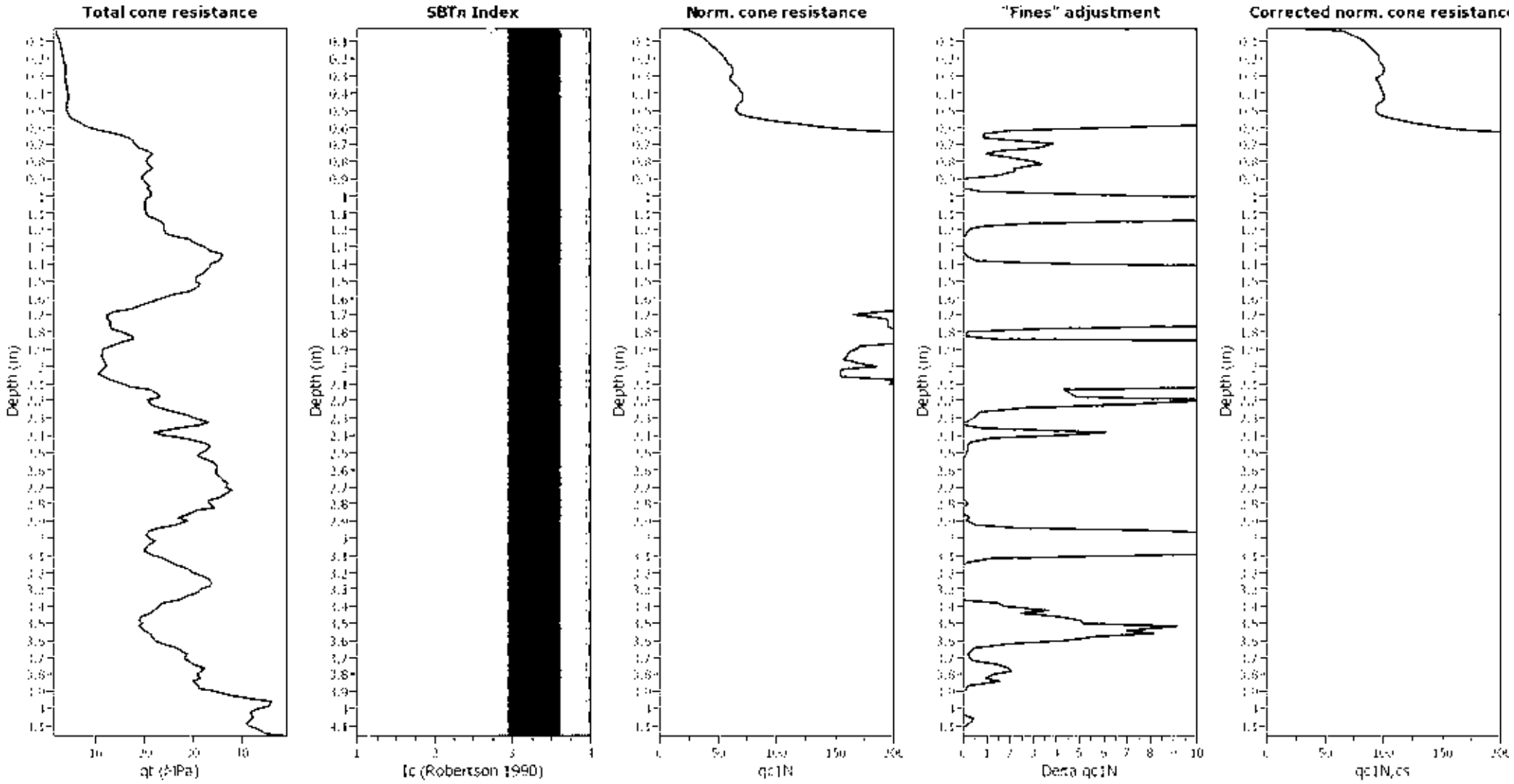
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

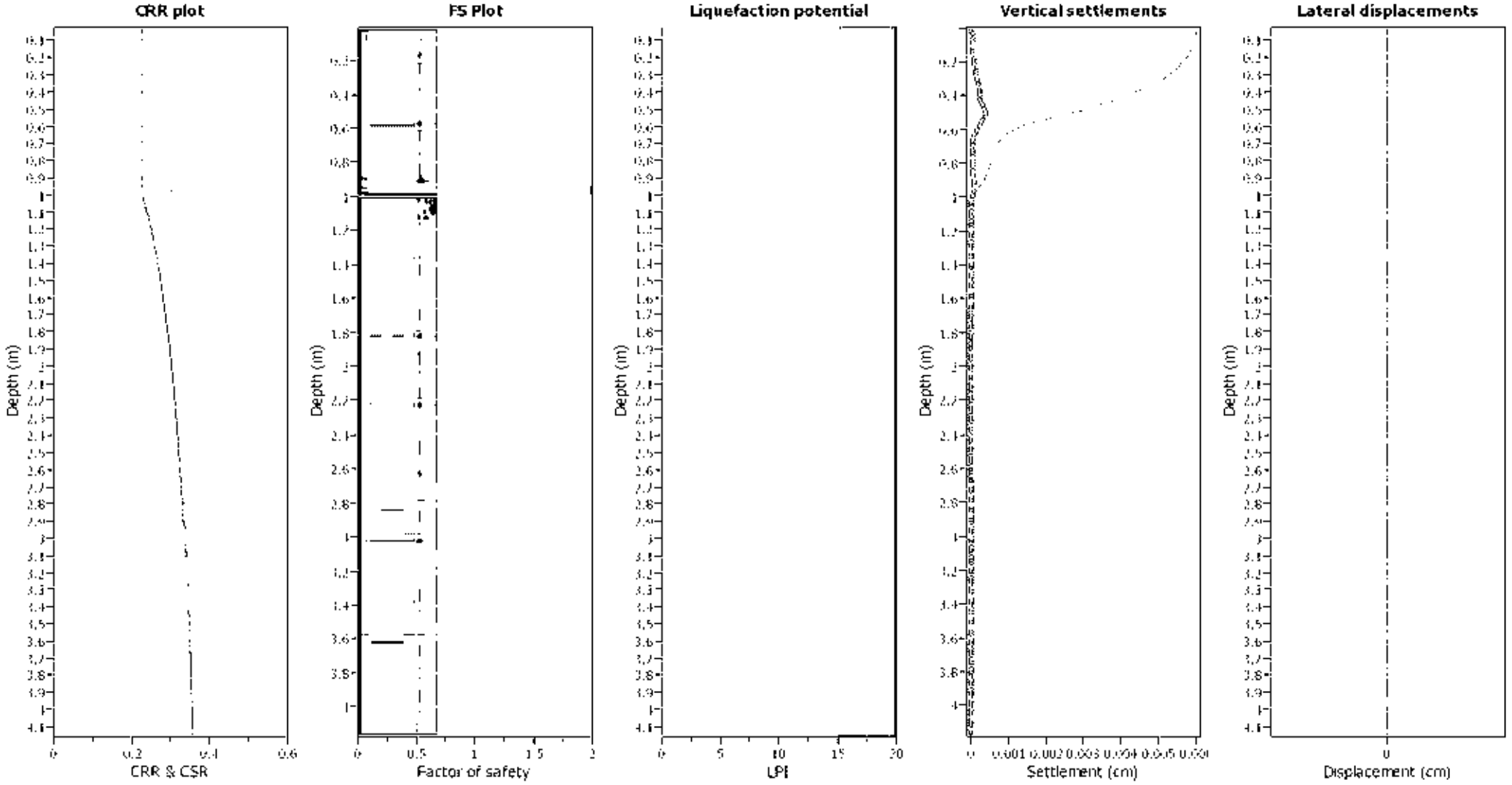
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

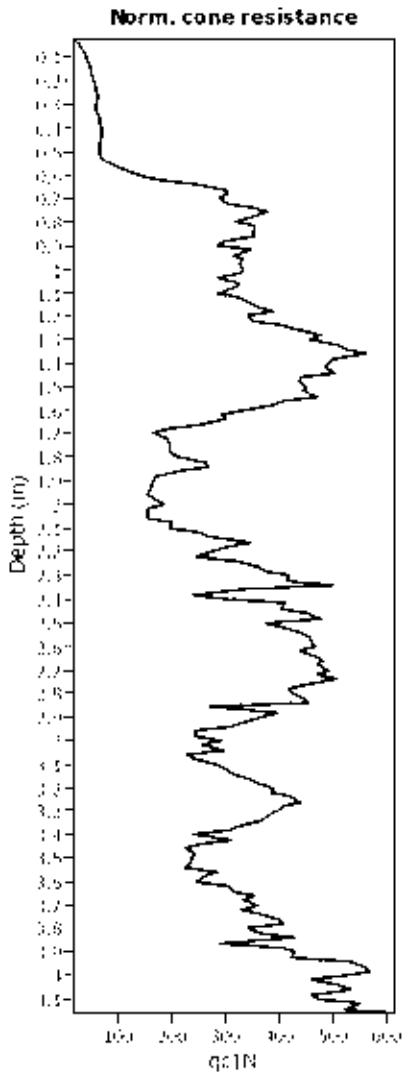
F.S. color scheme

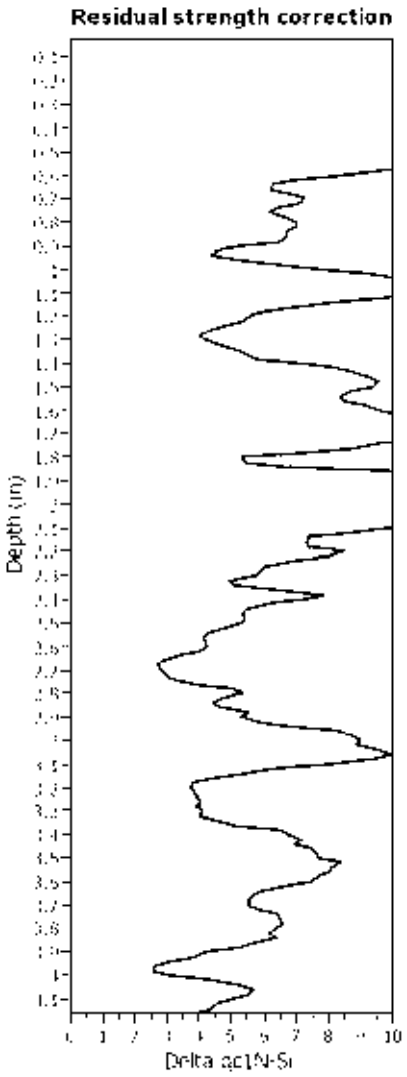
- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

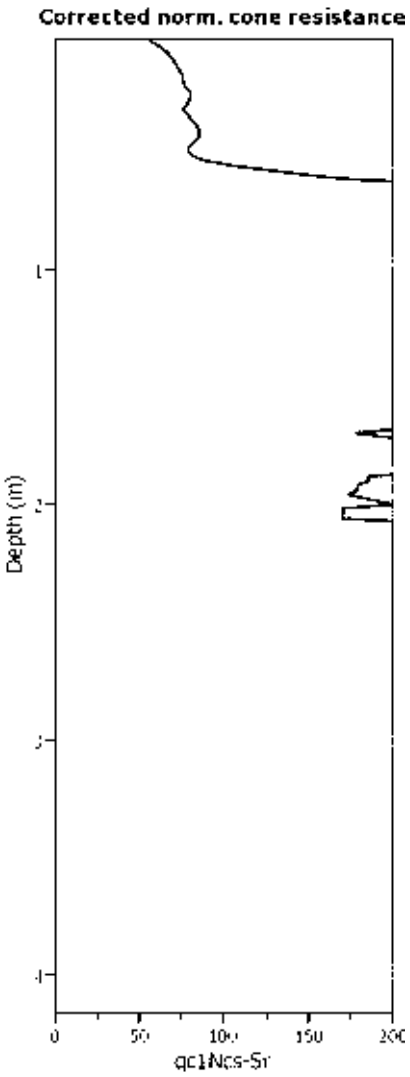
LPI color scheme

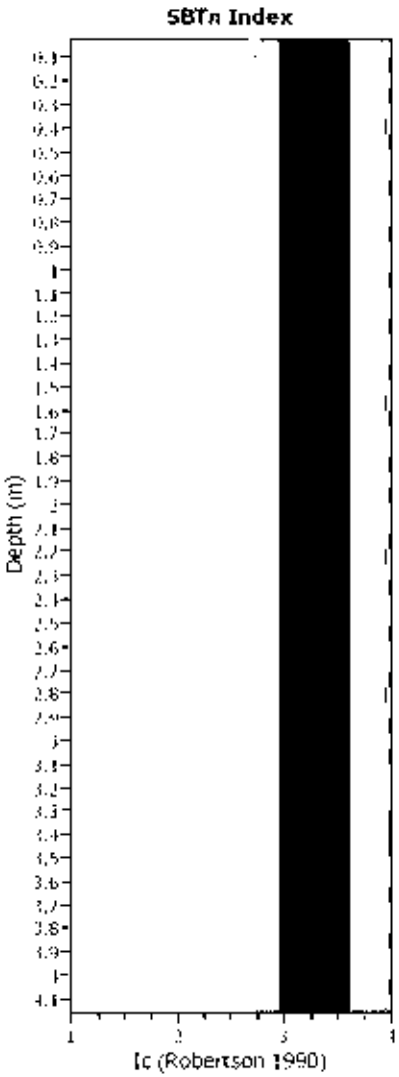
- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

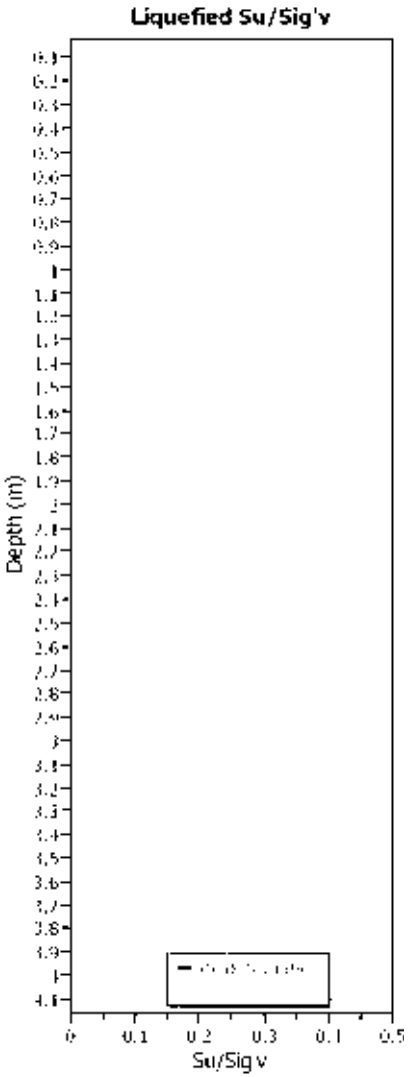
Check for strength loss plots (Idriss & Boulanger (2008))







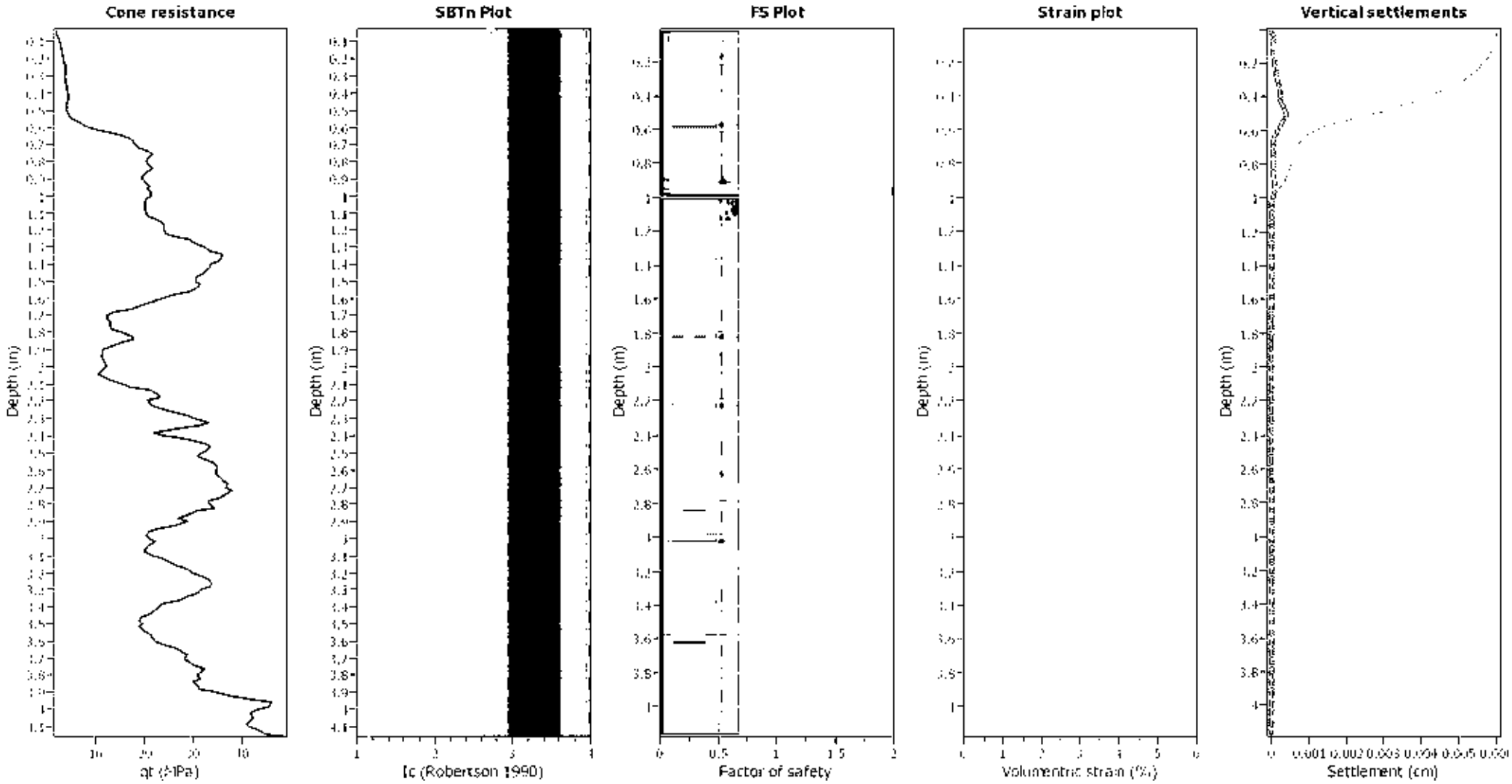




Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

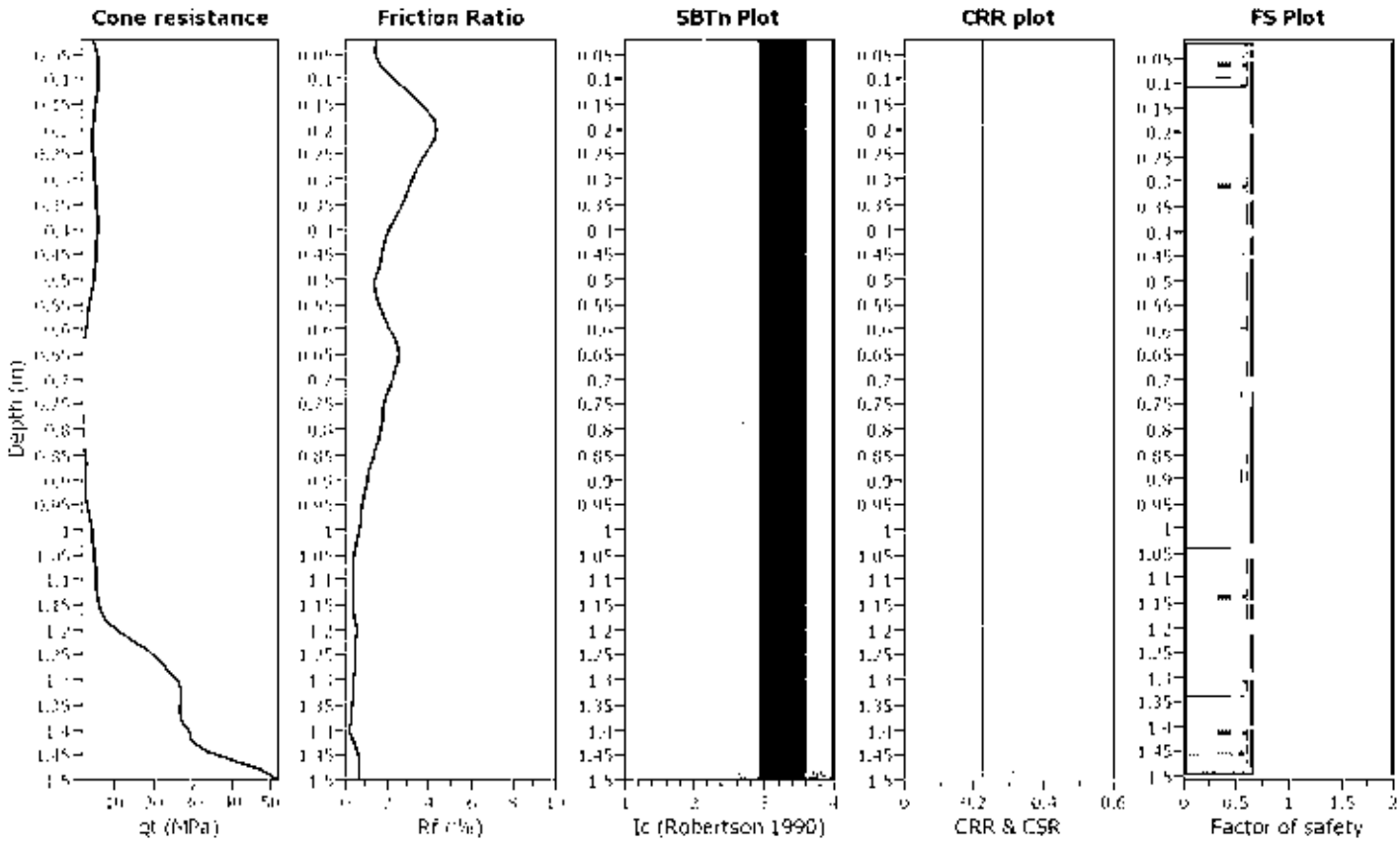
qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

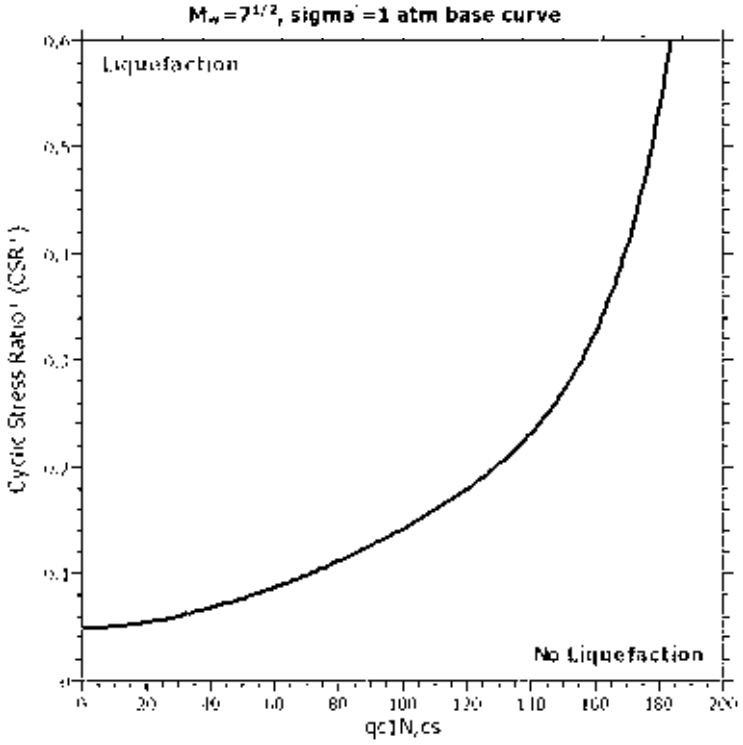
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

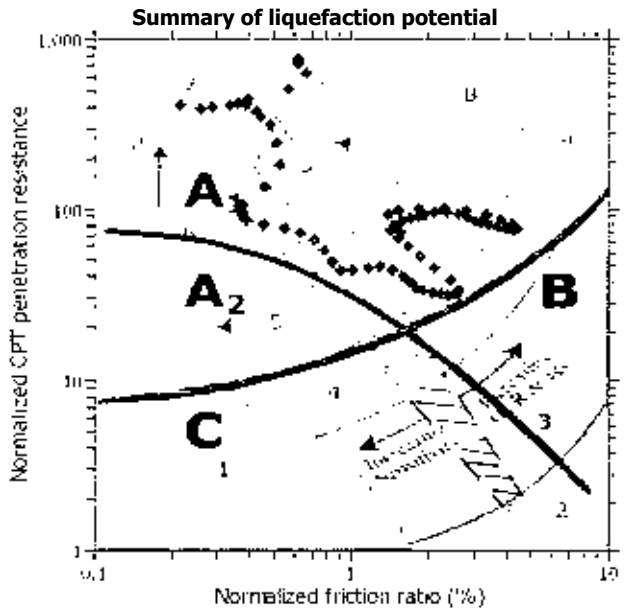
CPT file : CPT30_29rProvincialRd

Input parameters and analysis data

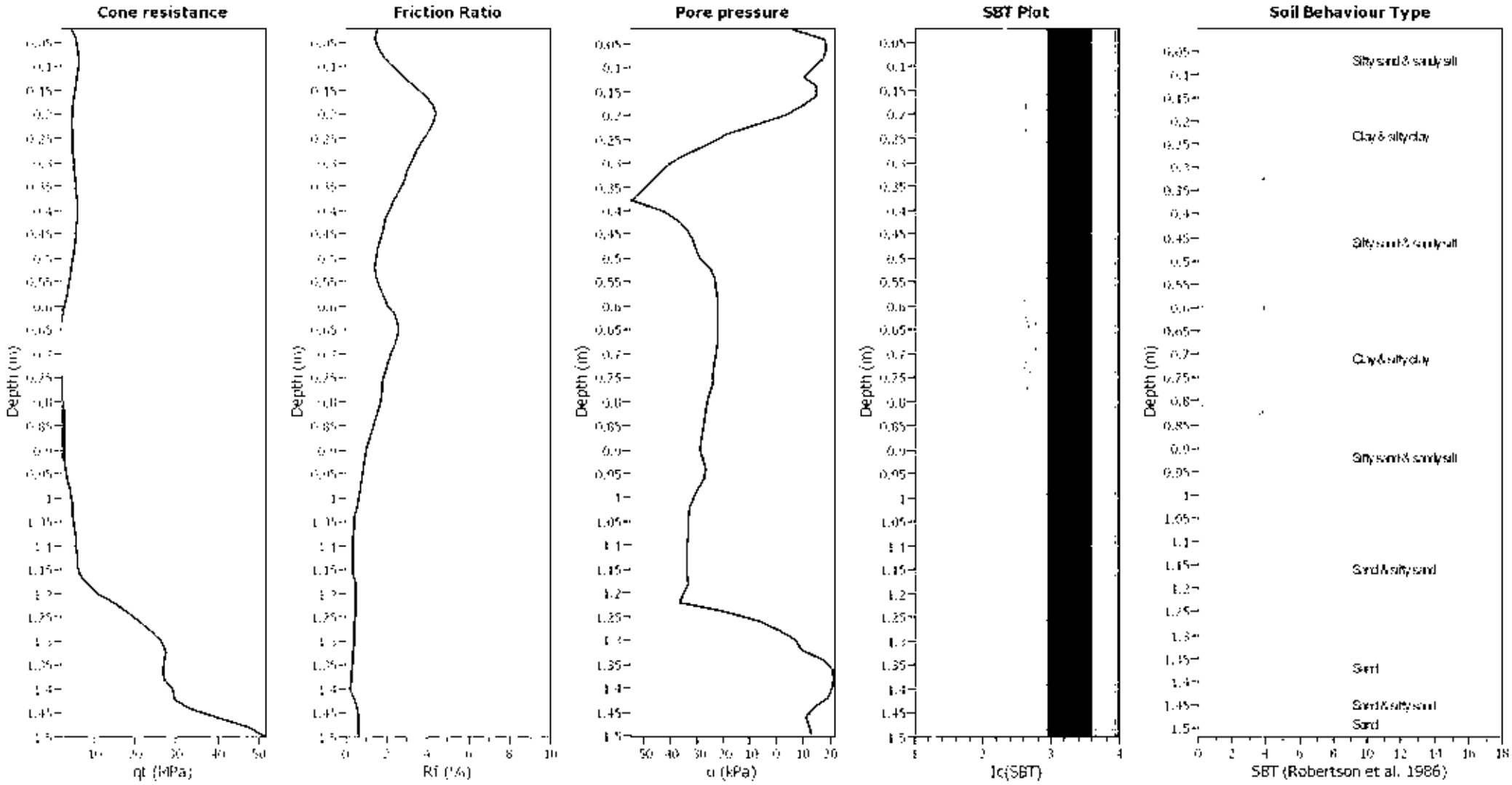
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



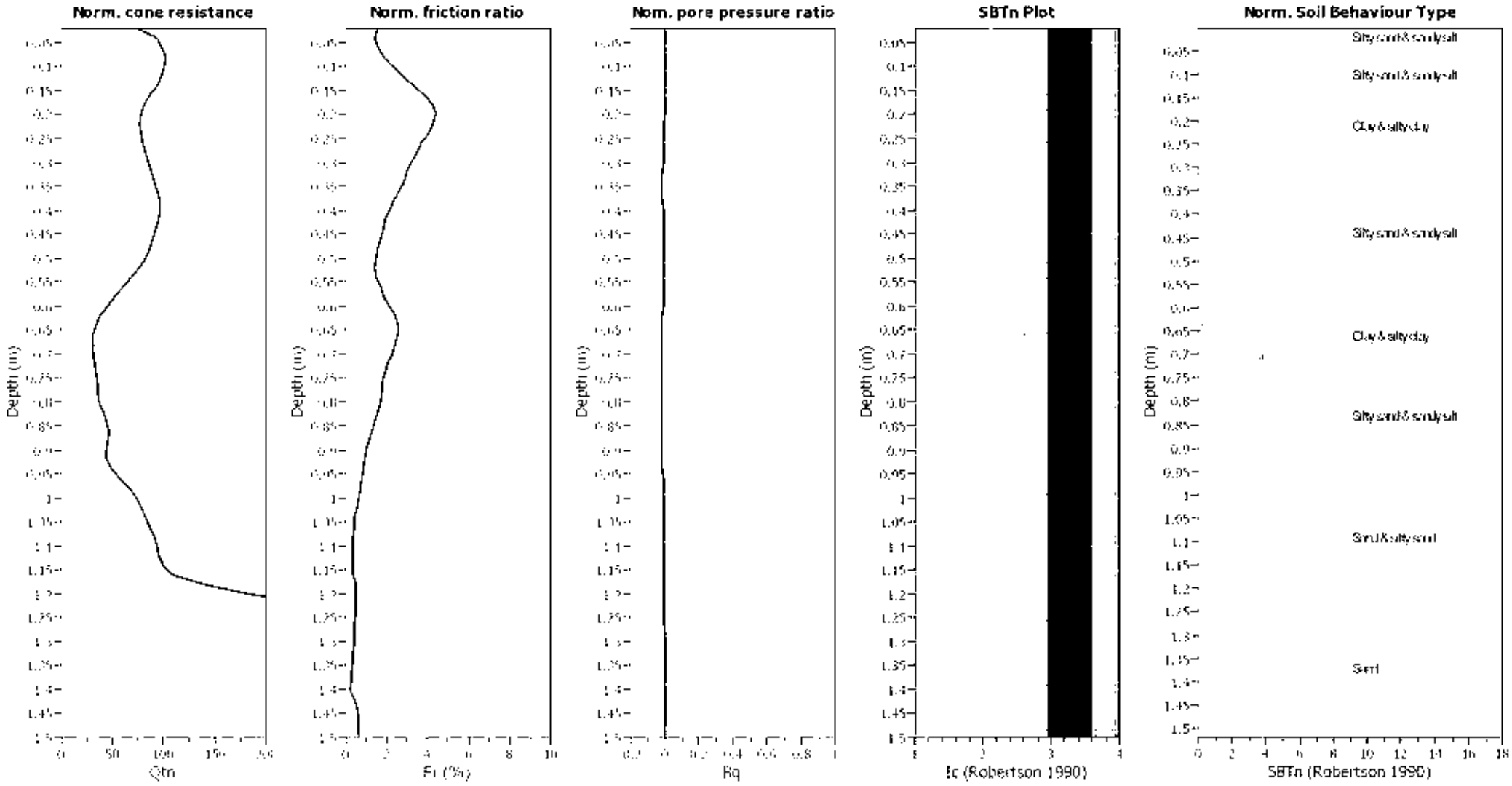
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



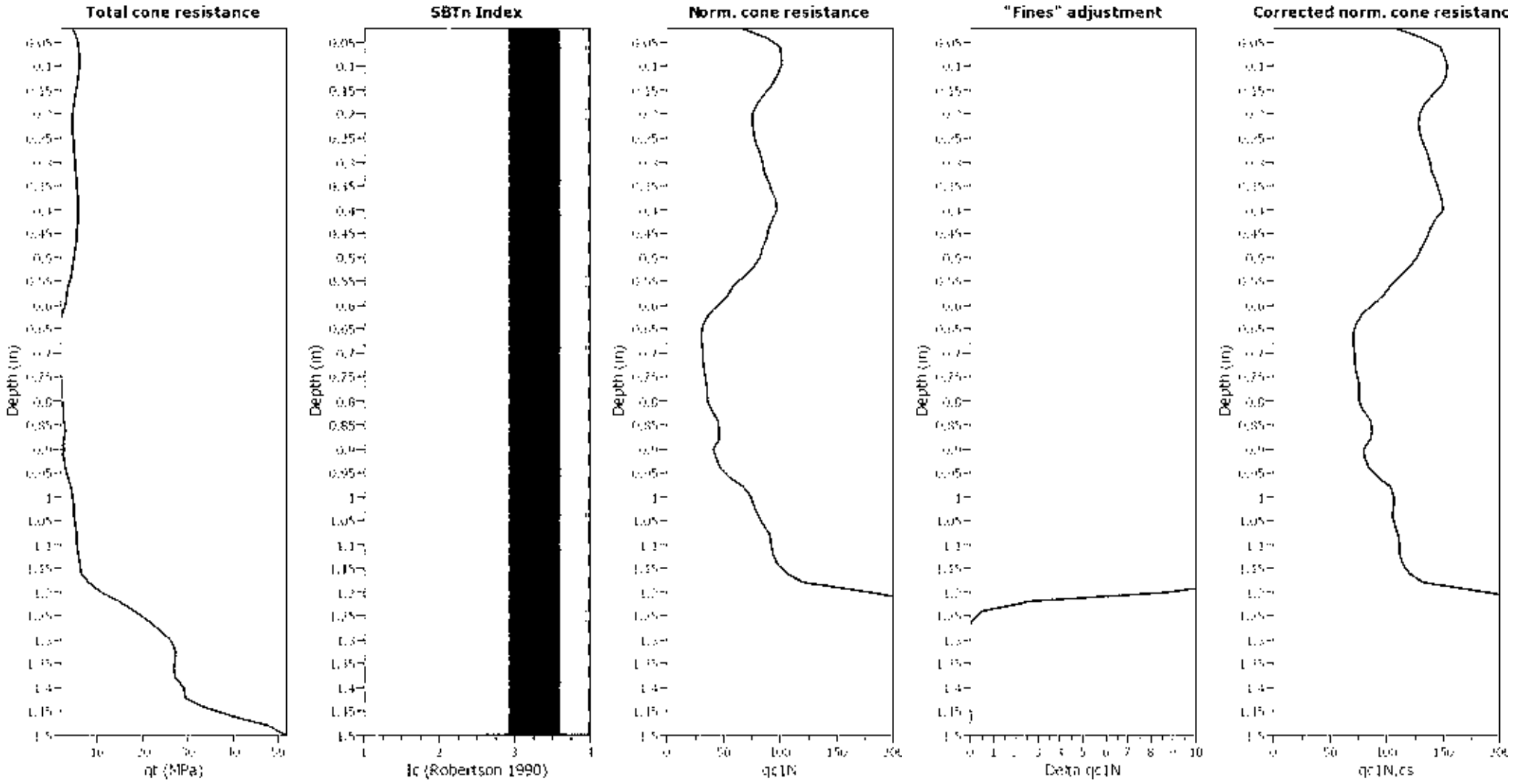
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to
- 9. Very stiff fine grained

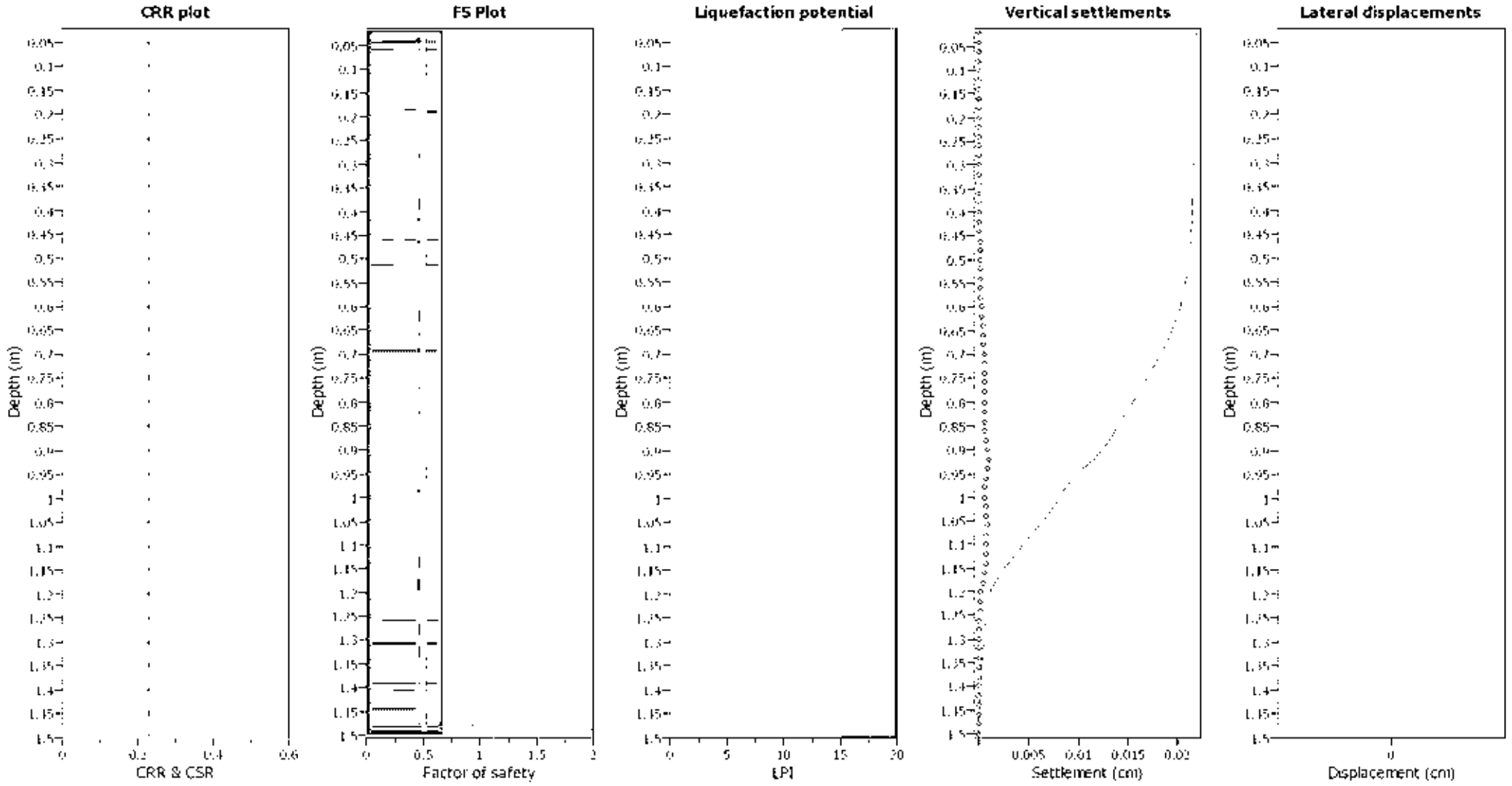
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

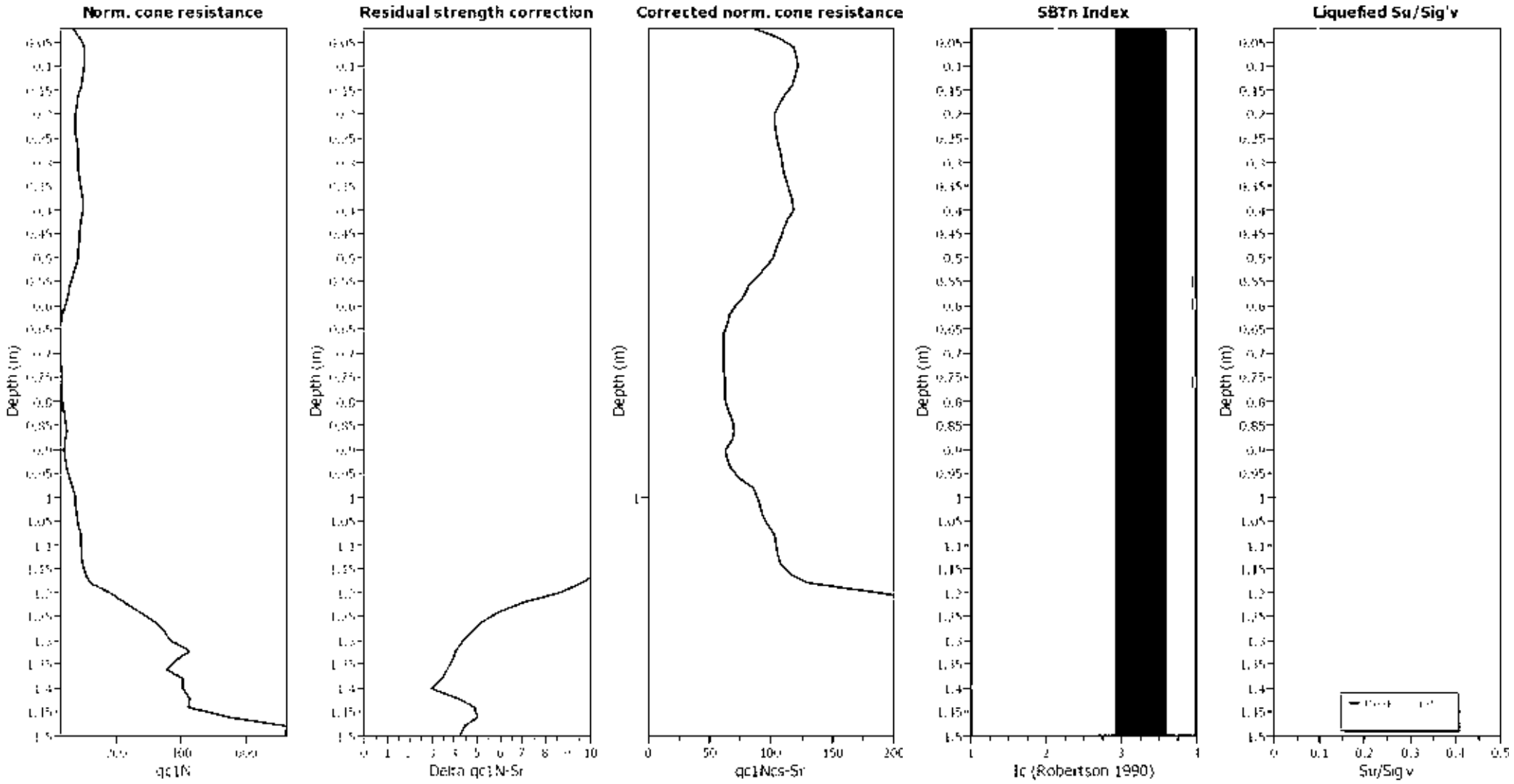
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

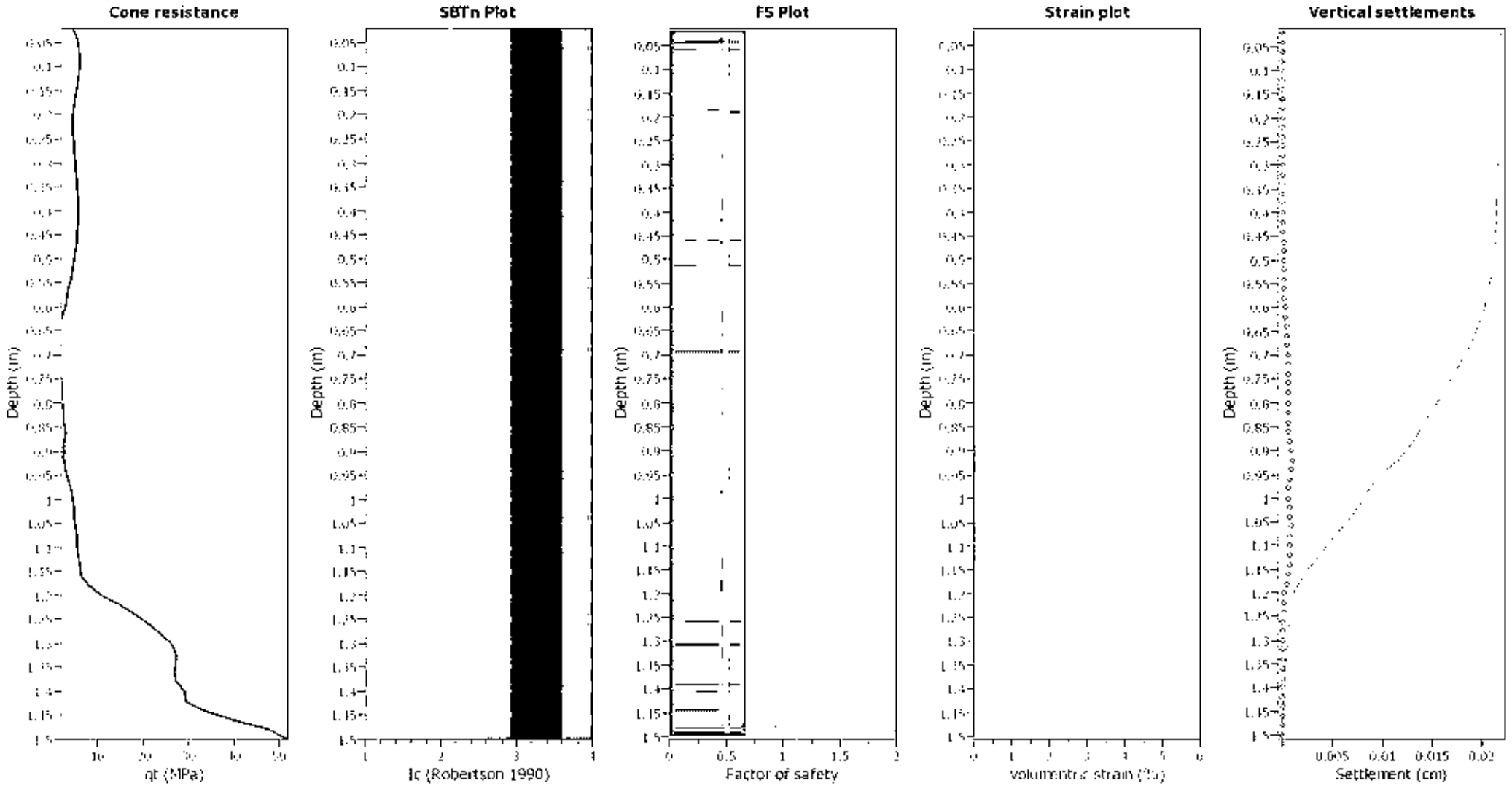
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

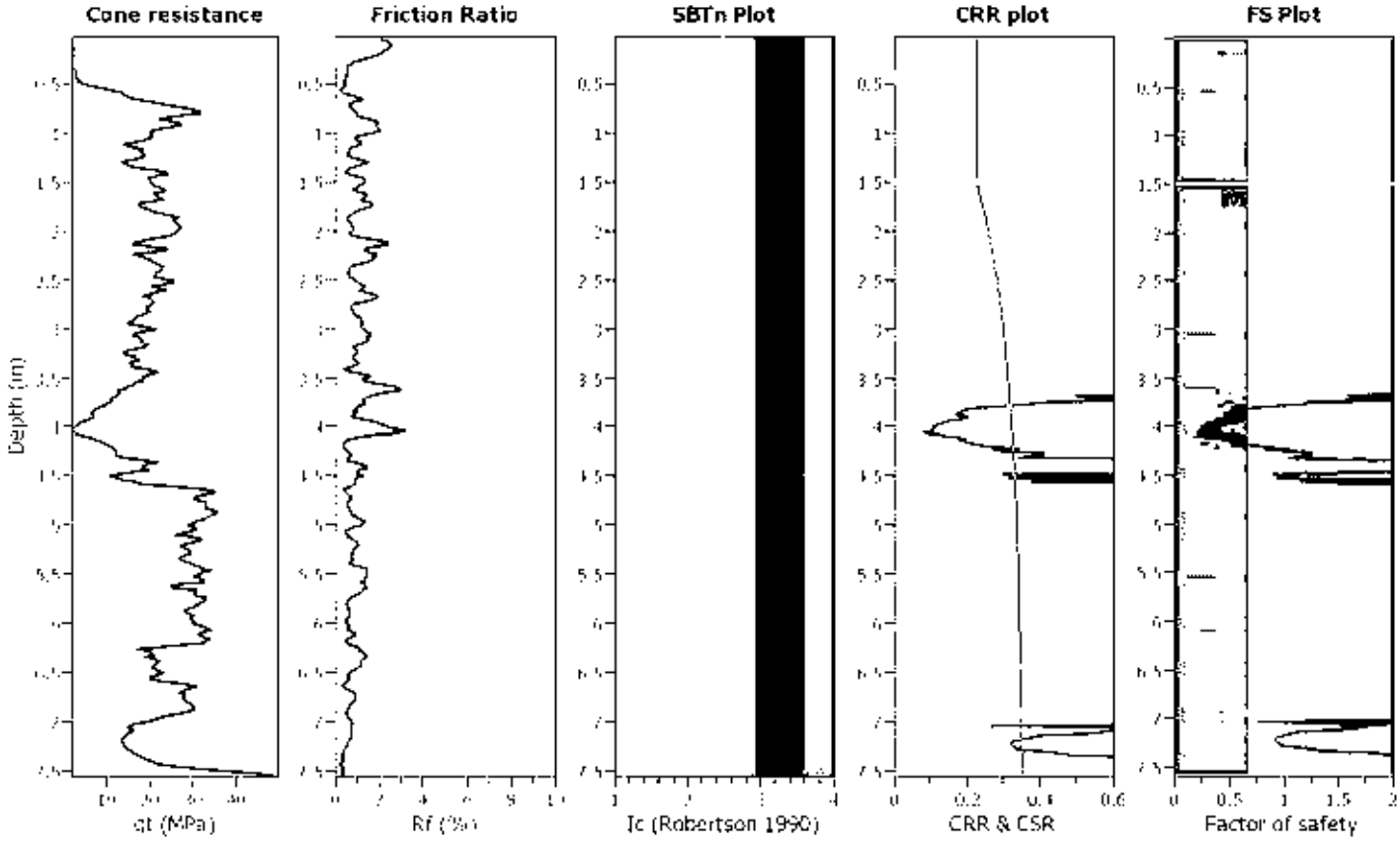
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

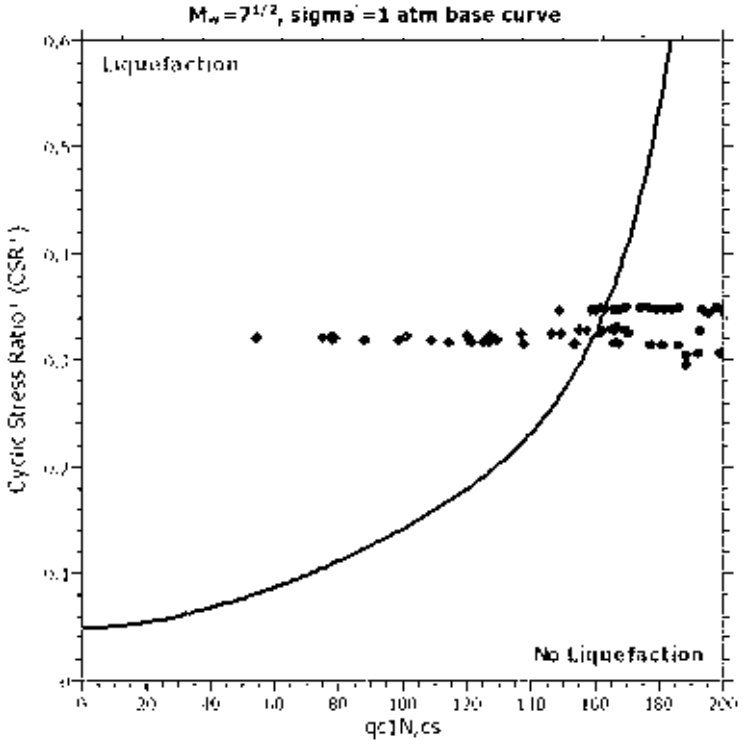
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

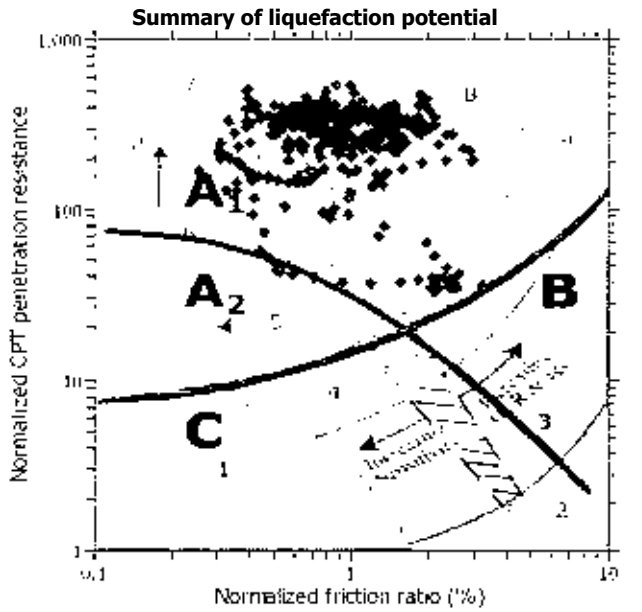
CPT file : CPT31_25KennedysBushRd

Input parameters and analysis data

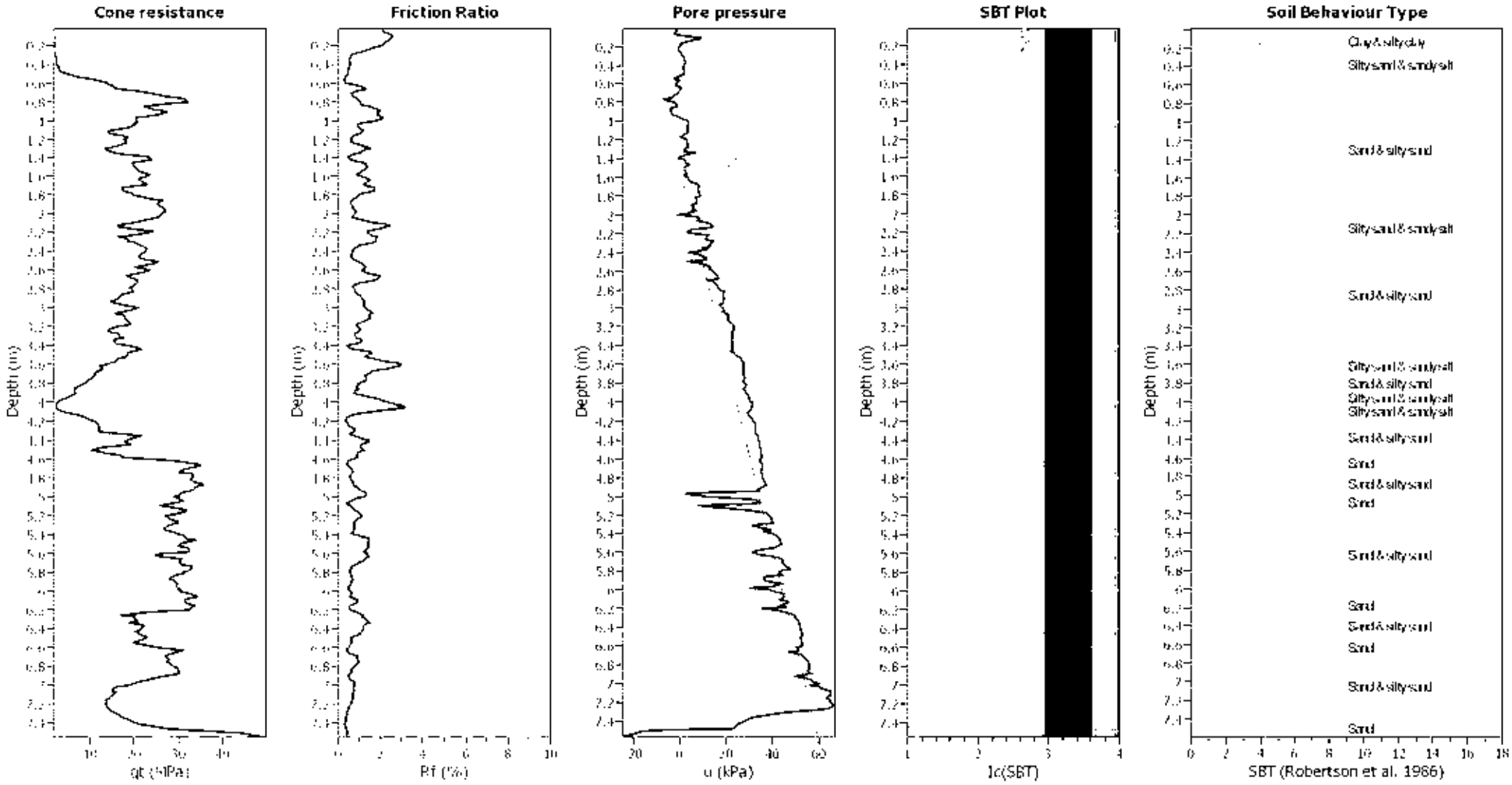
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



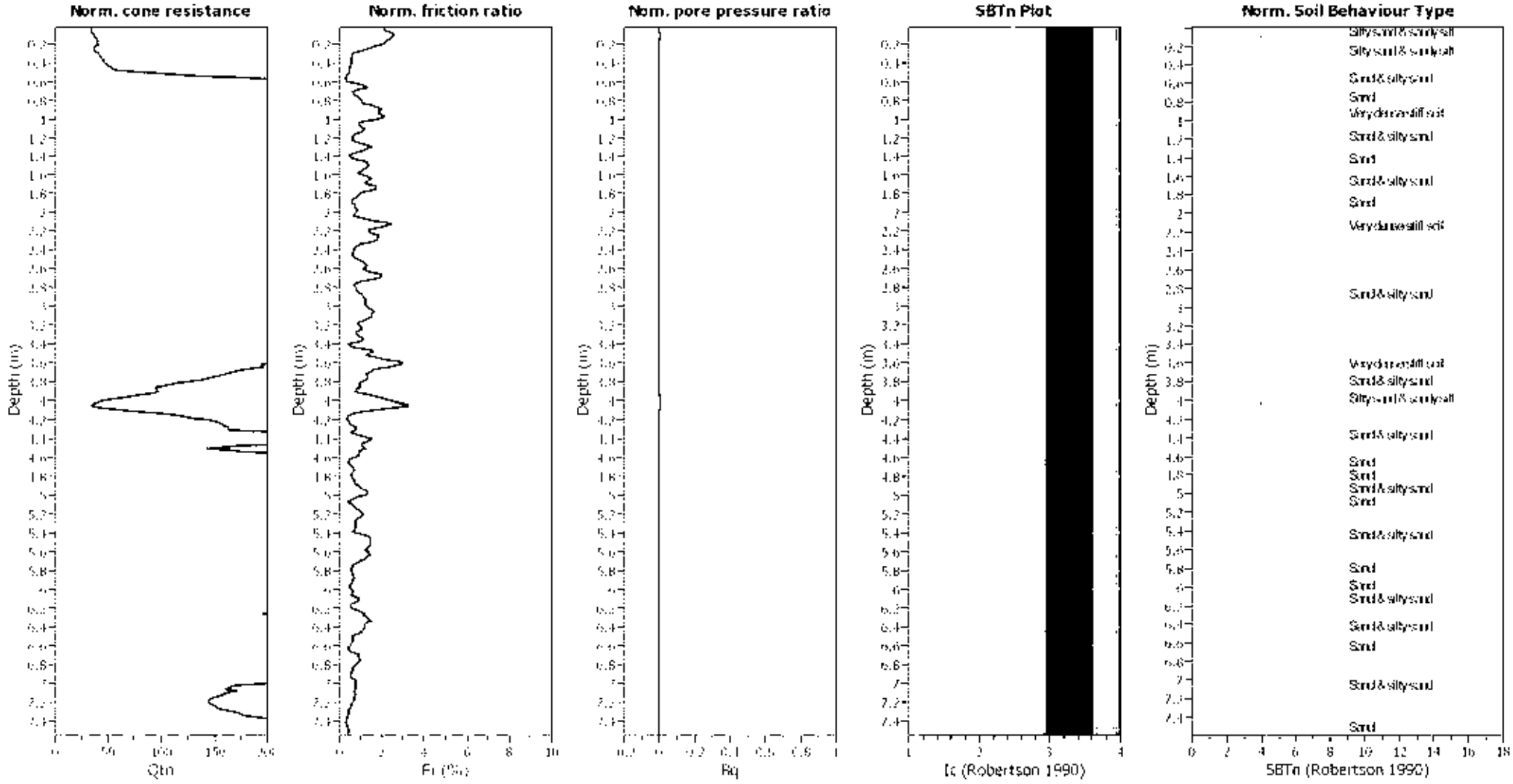
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



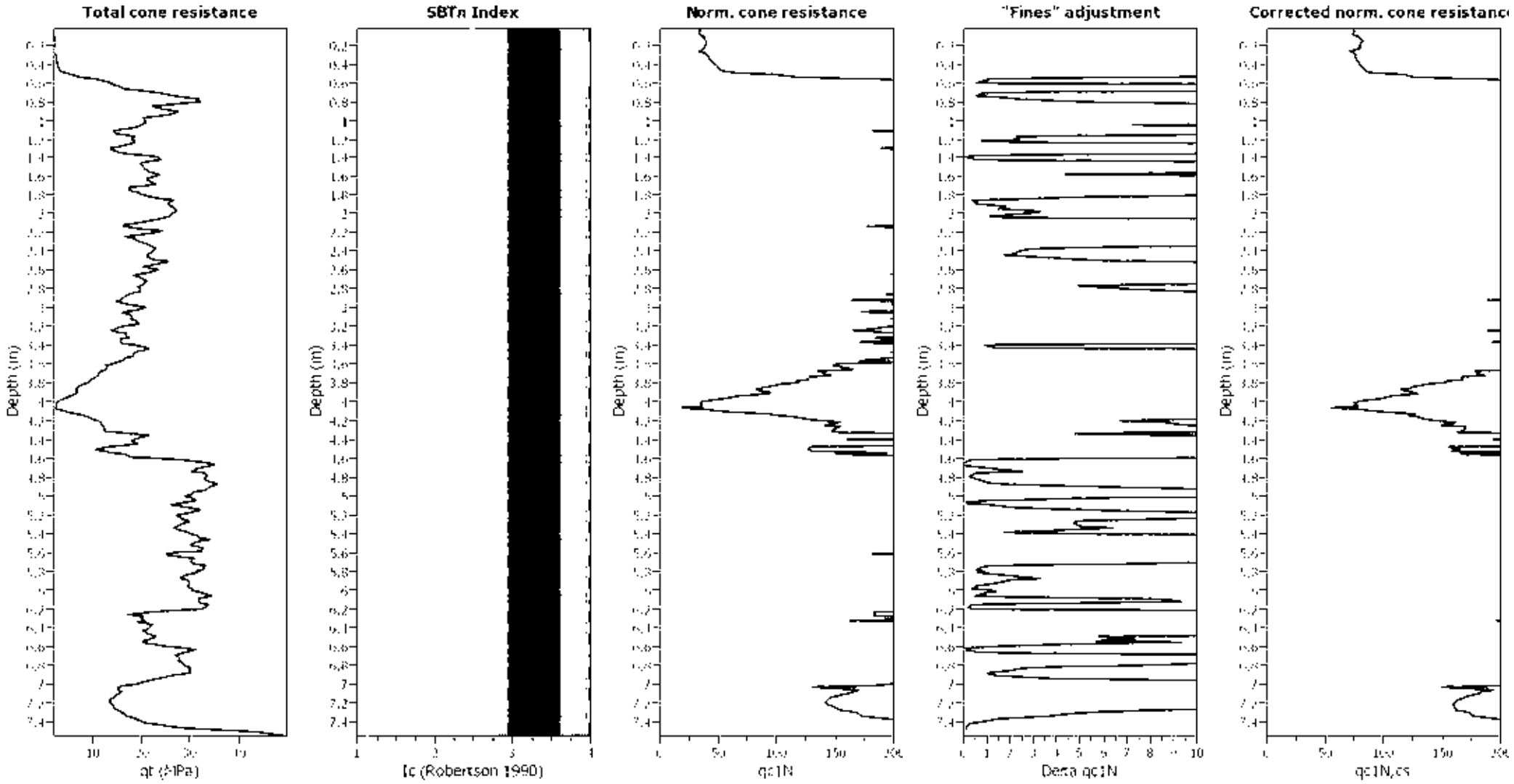
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

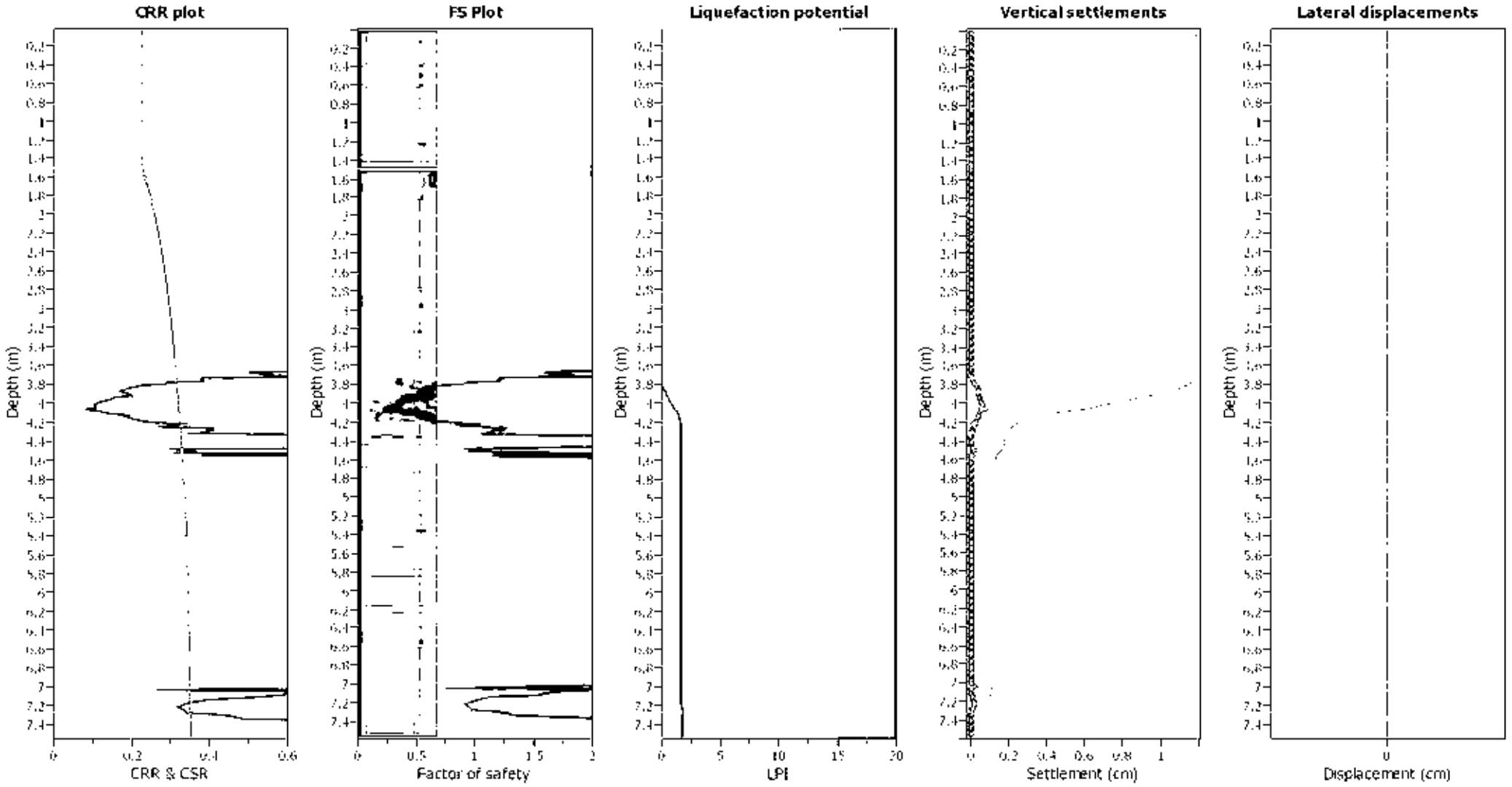
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

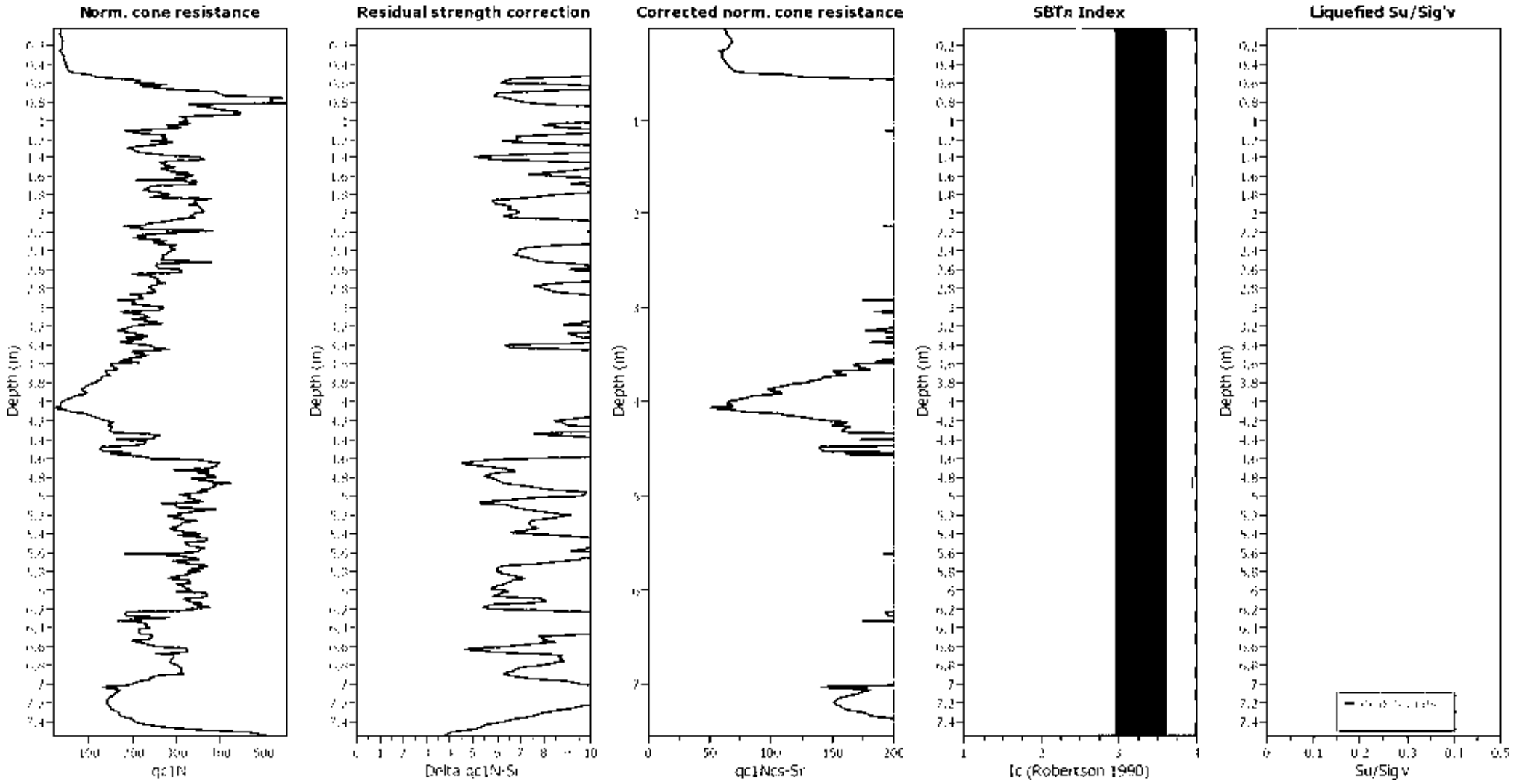
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

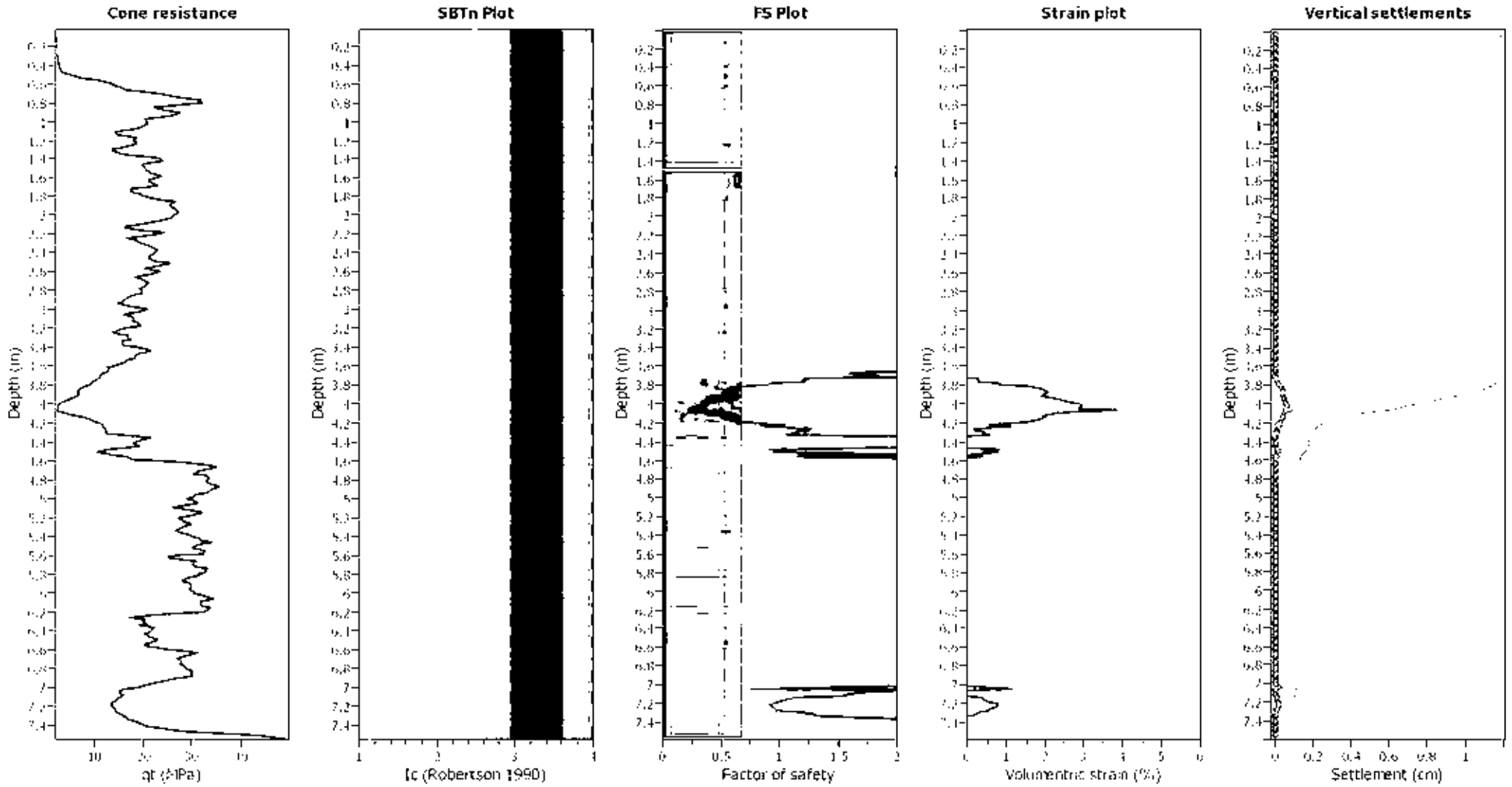
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

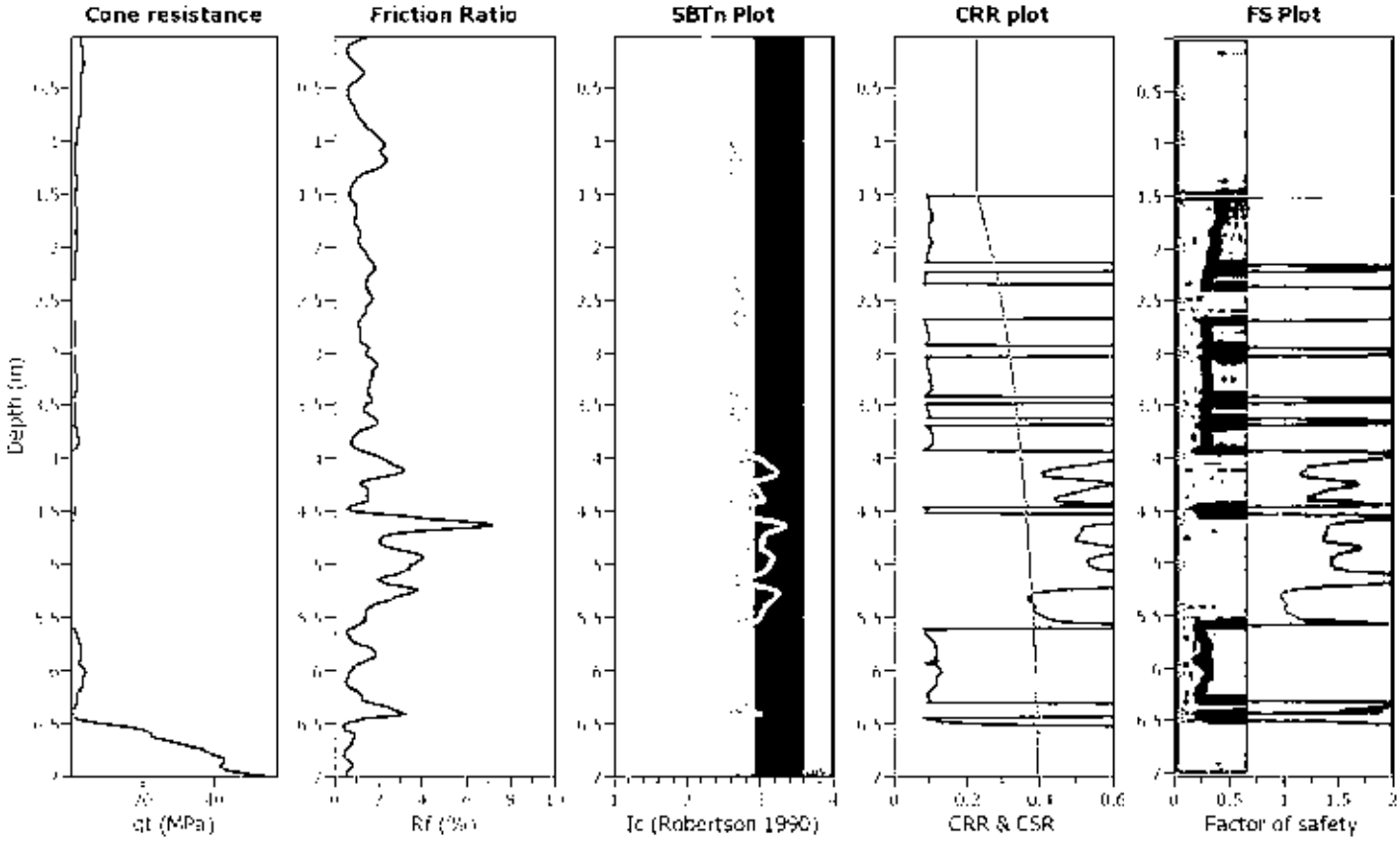
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

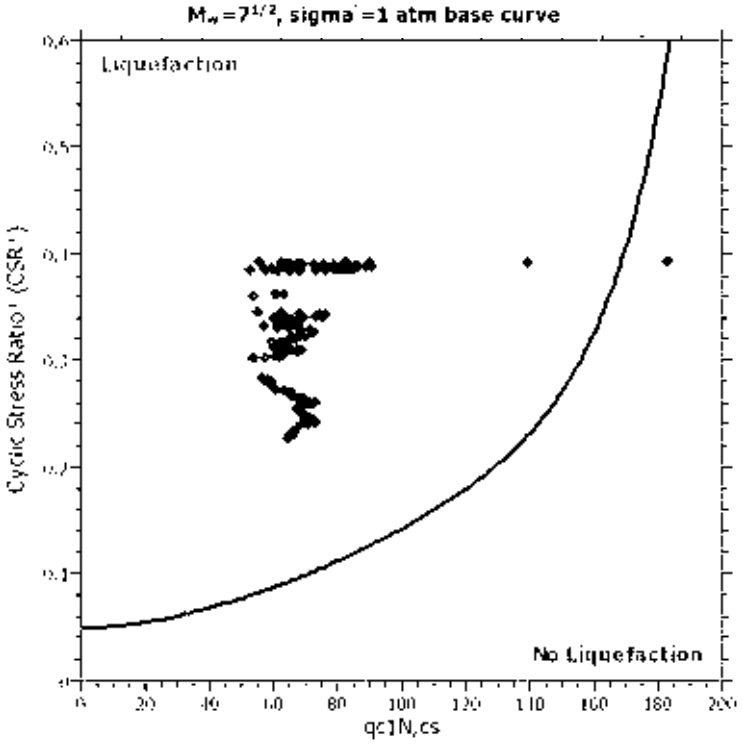
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

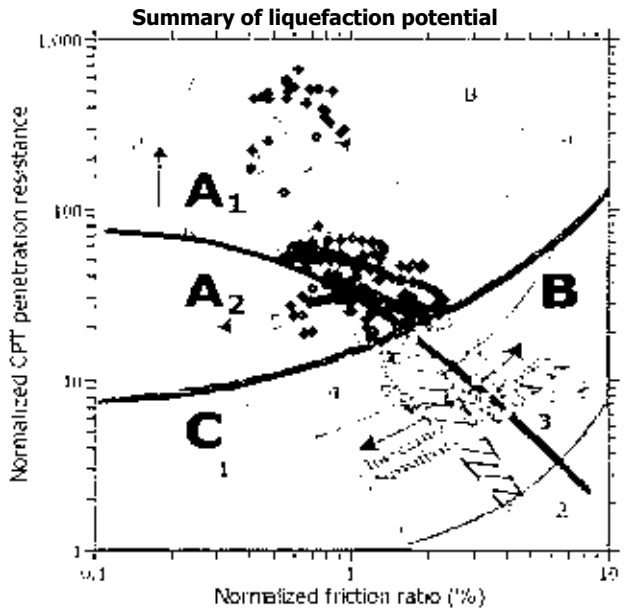
CPT file : CPT32_1SutherlandsRd

Input parameters and analysis data

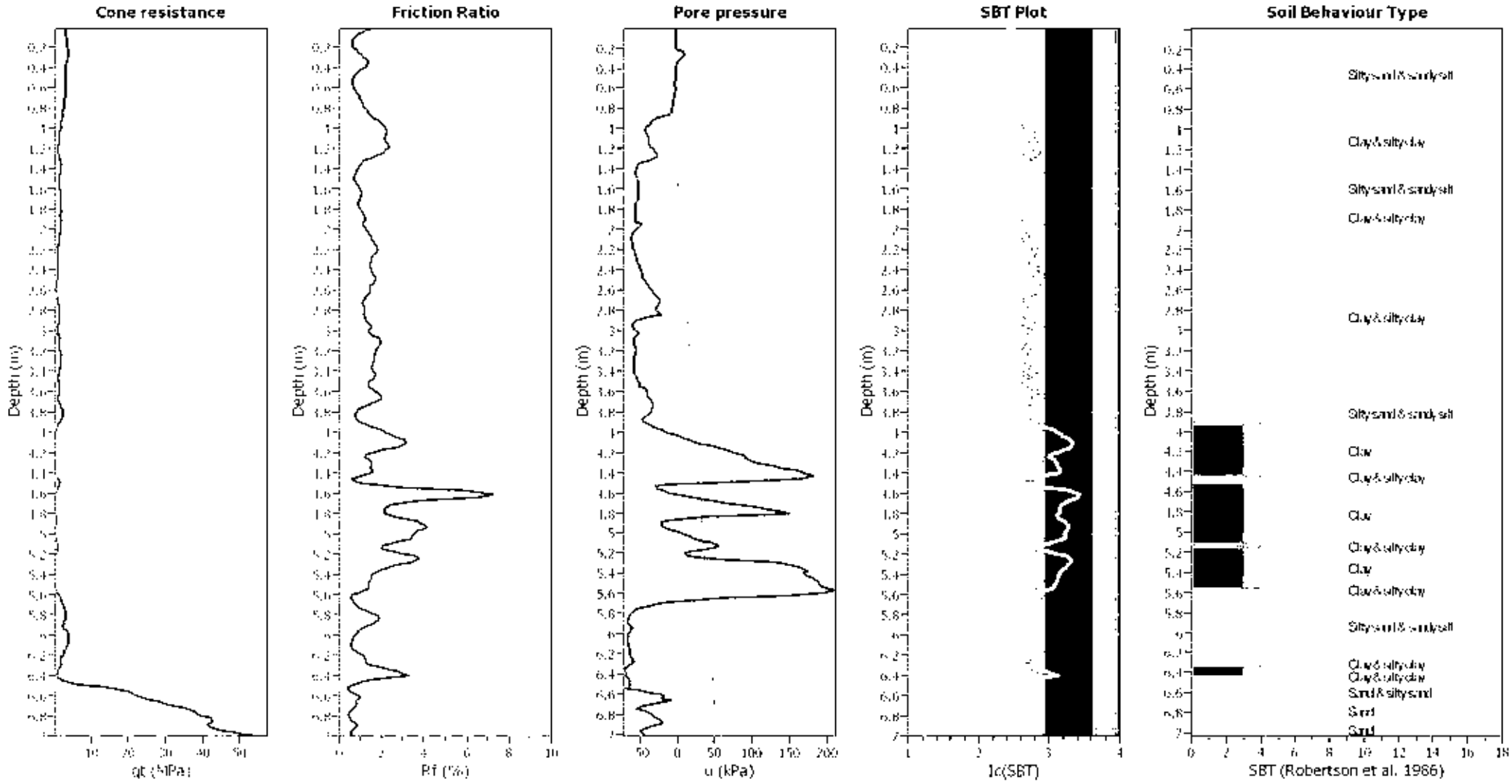
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



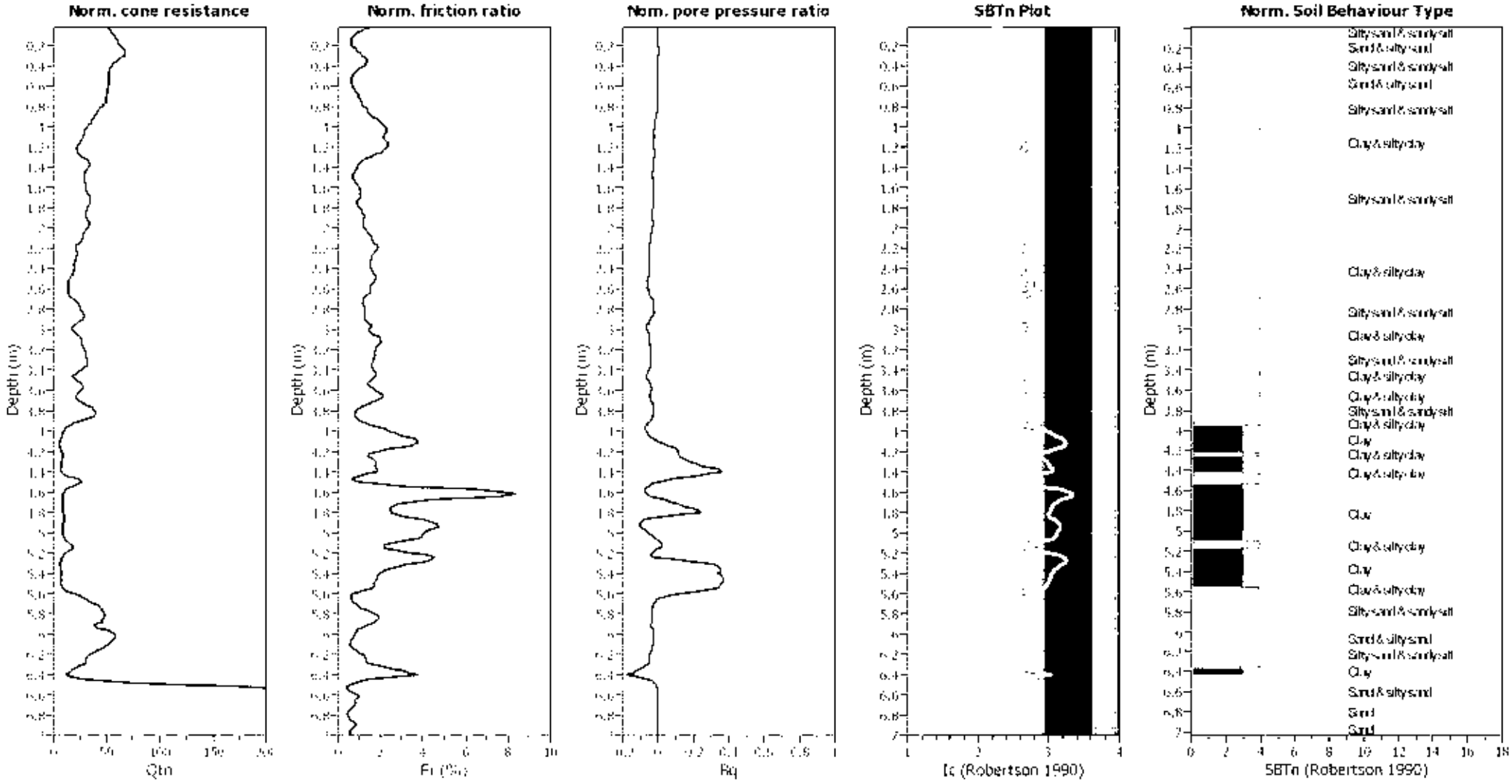
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



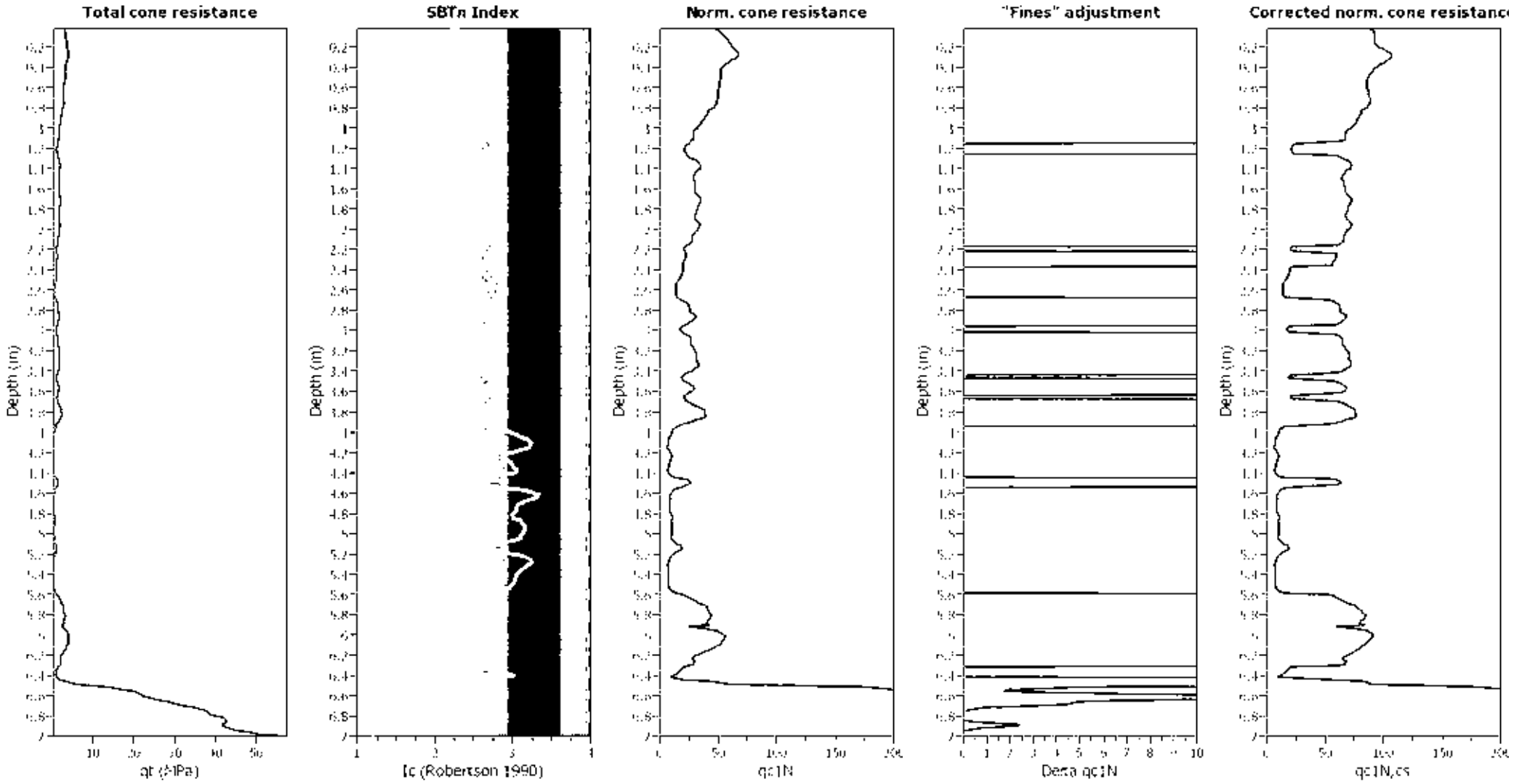
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

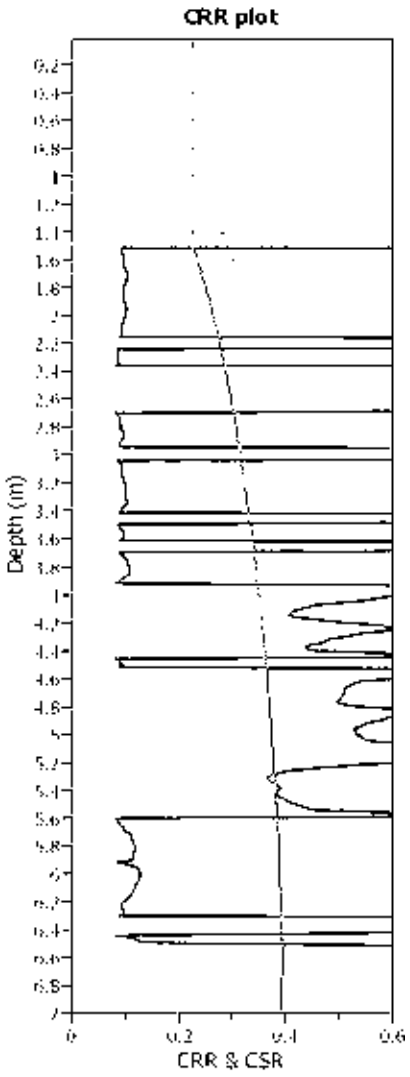
Liquefaction analysis overall plots (intermediate results)

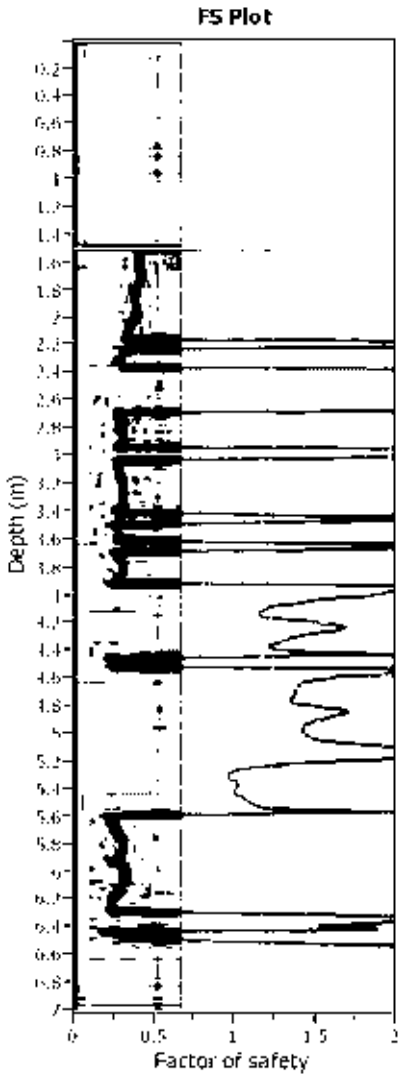


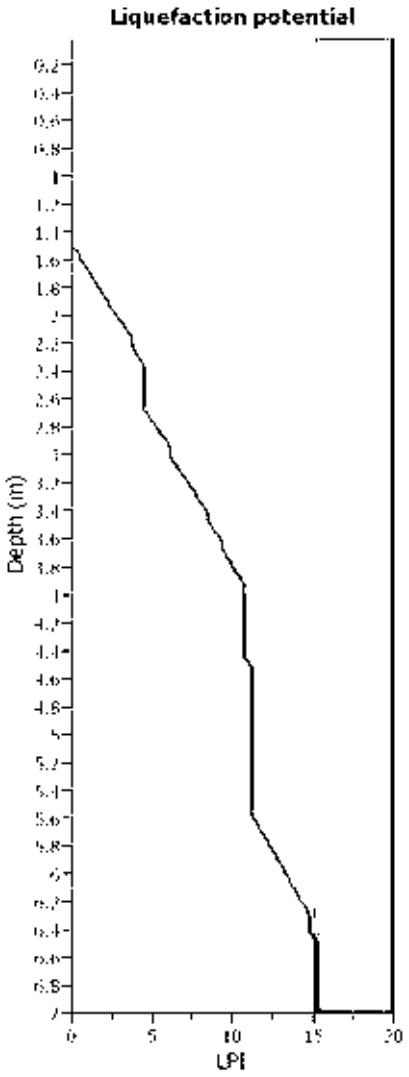
Input parameters and analysis data

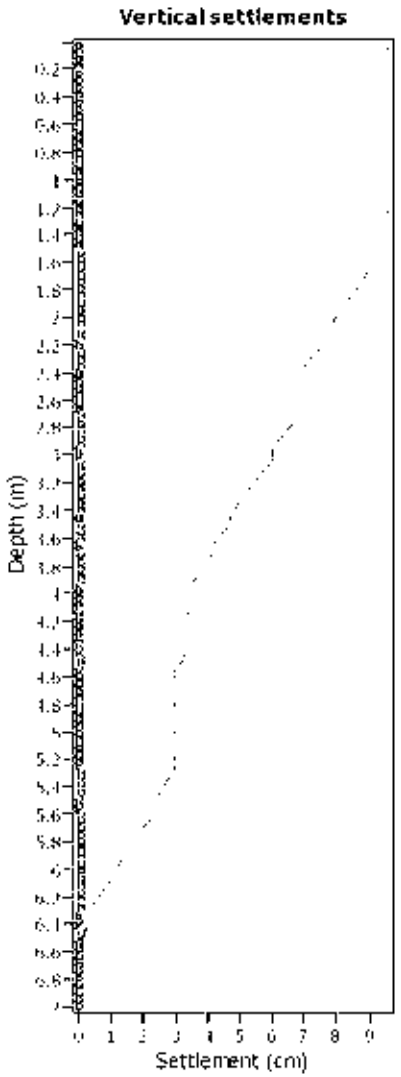
Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

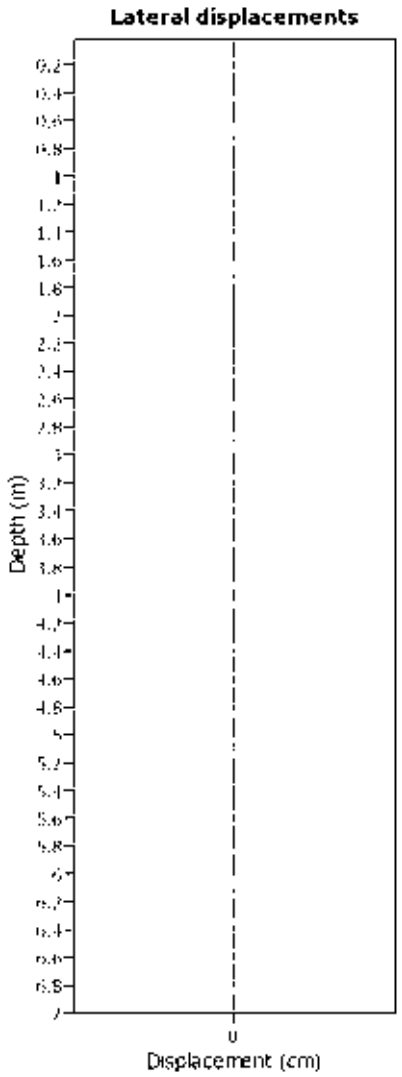
Liquefaction analysis overall plots











Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

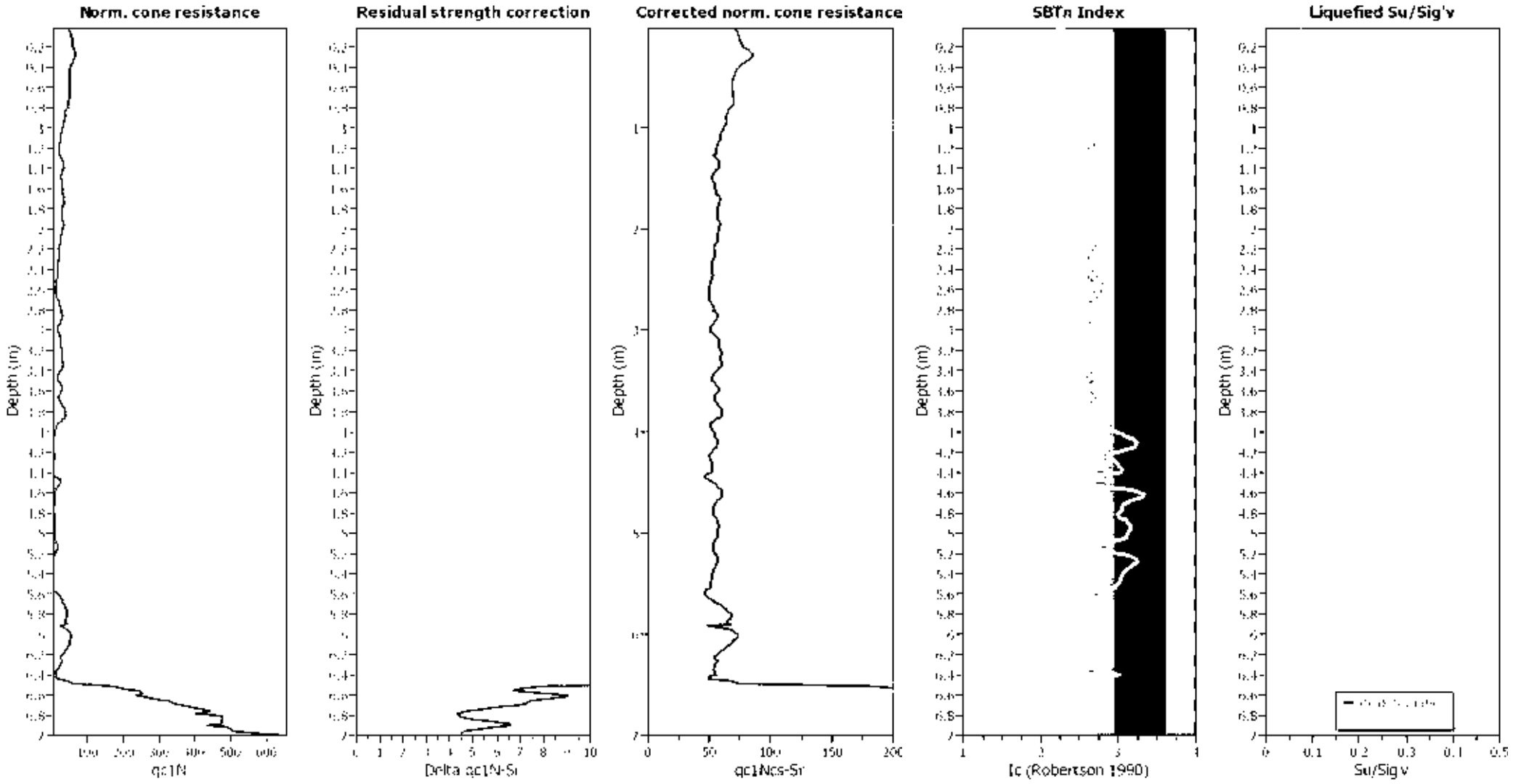
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

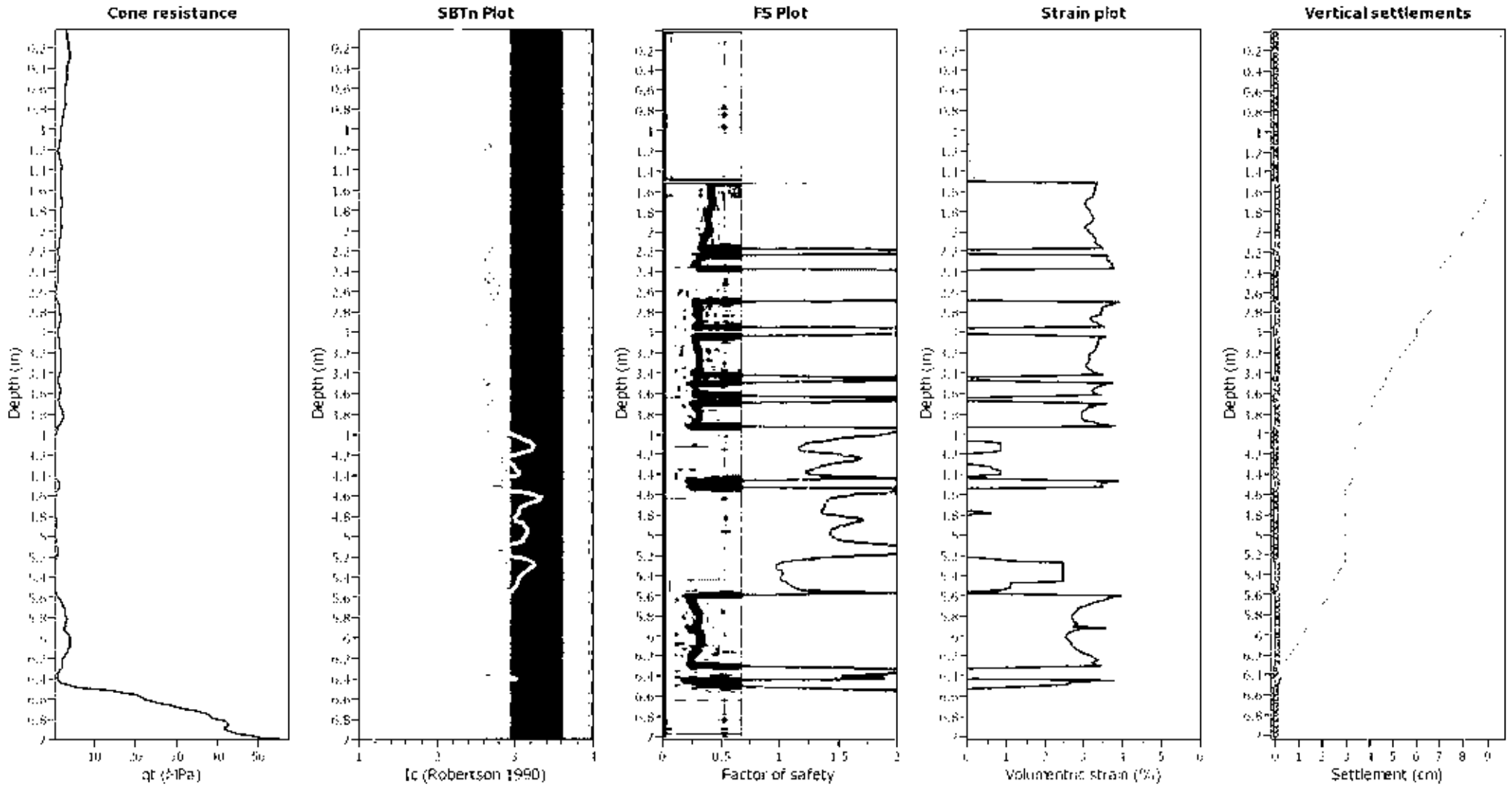
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

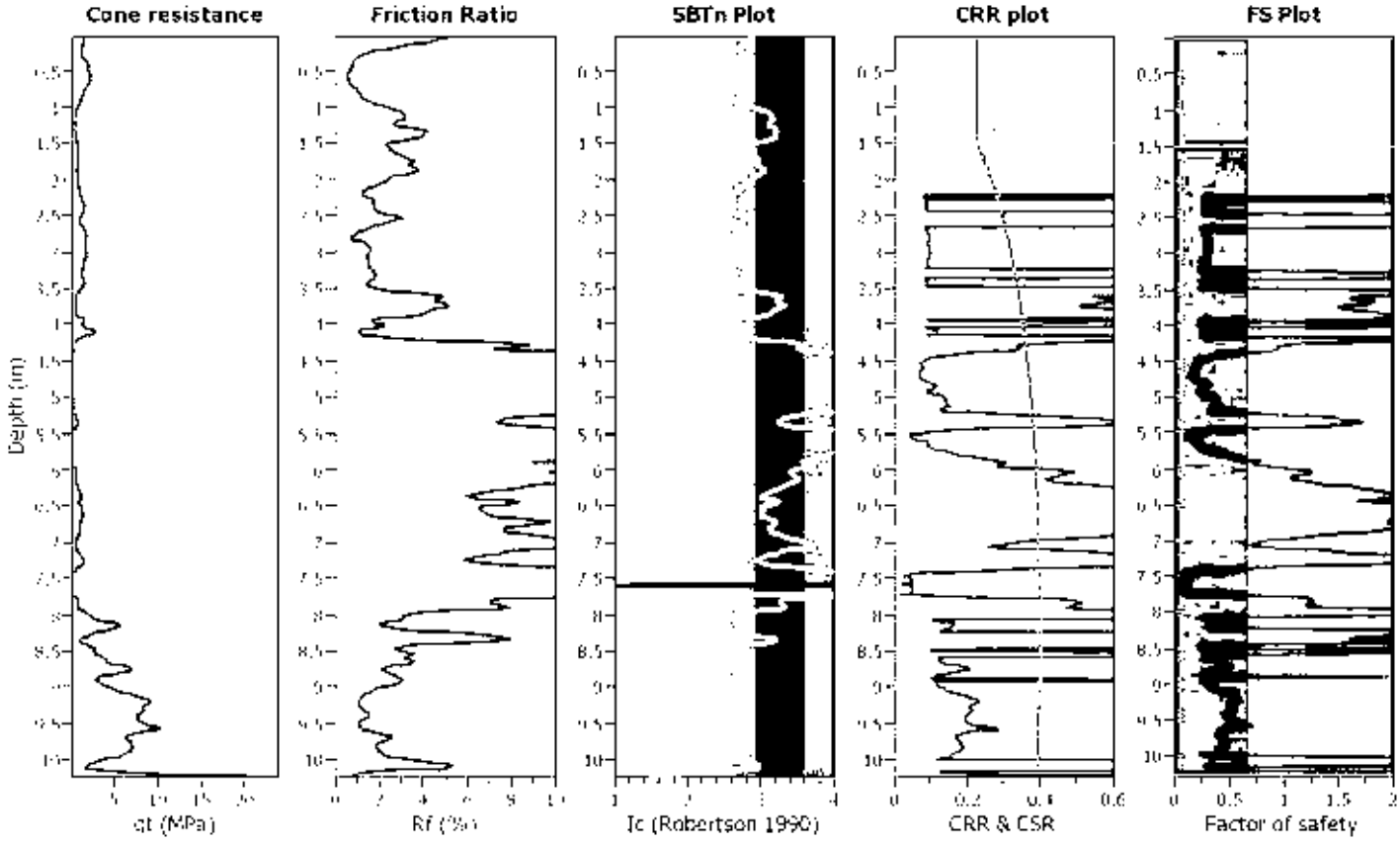
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

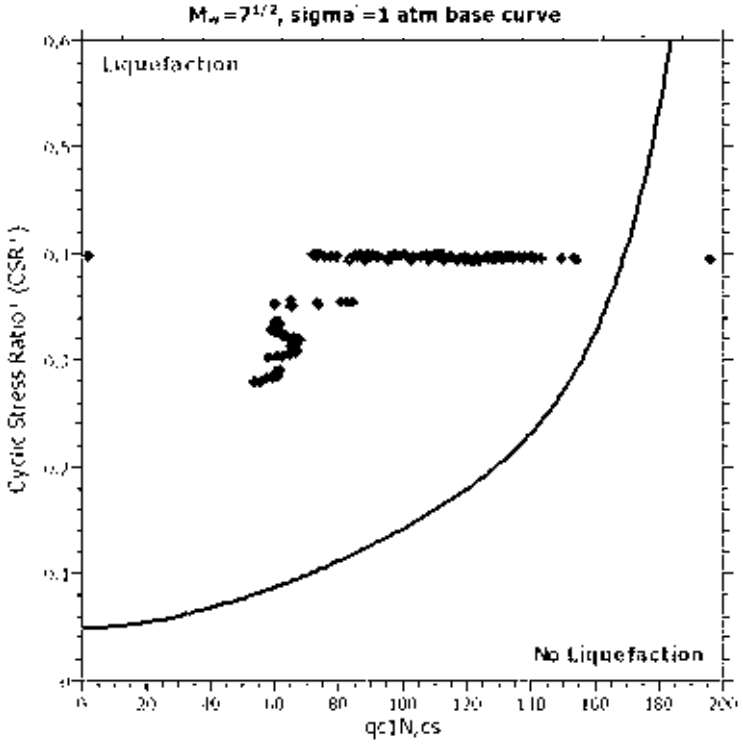
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

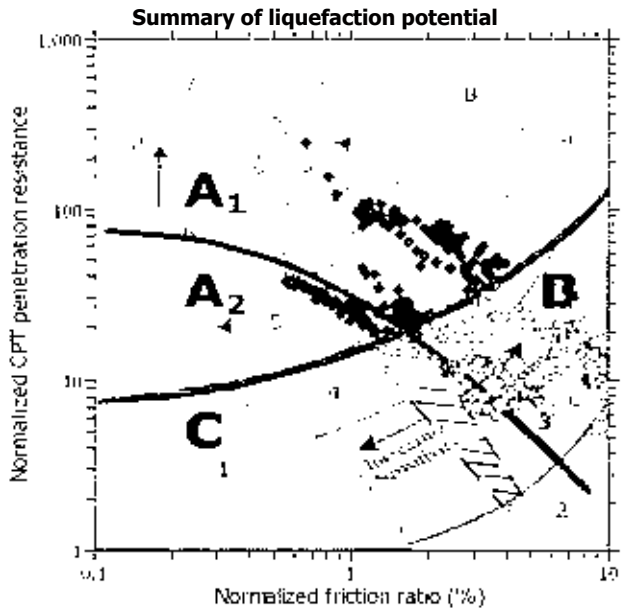
CPT file : CPT33_876CashmereRd

Input parameters and analysis data

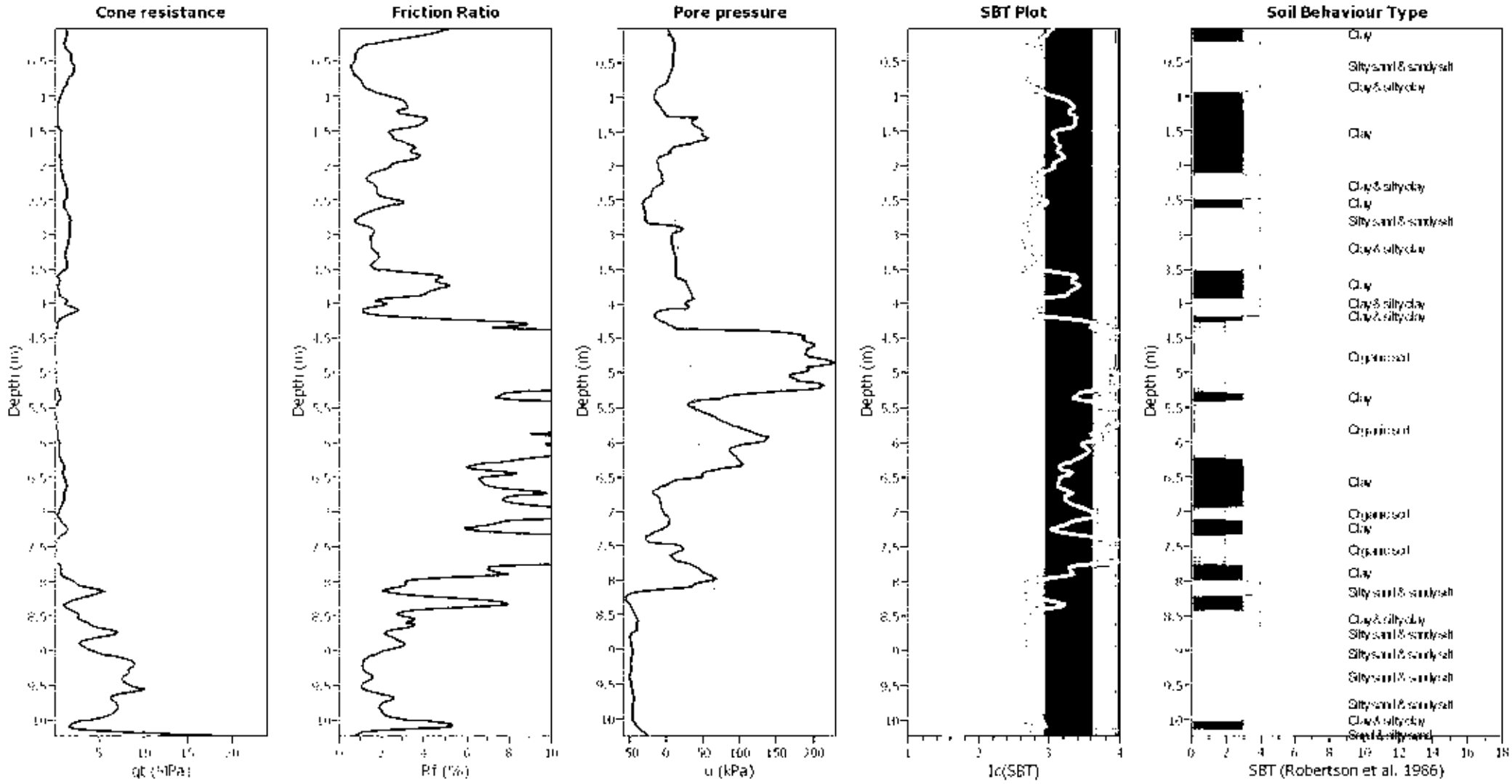
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.50 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.35	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



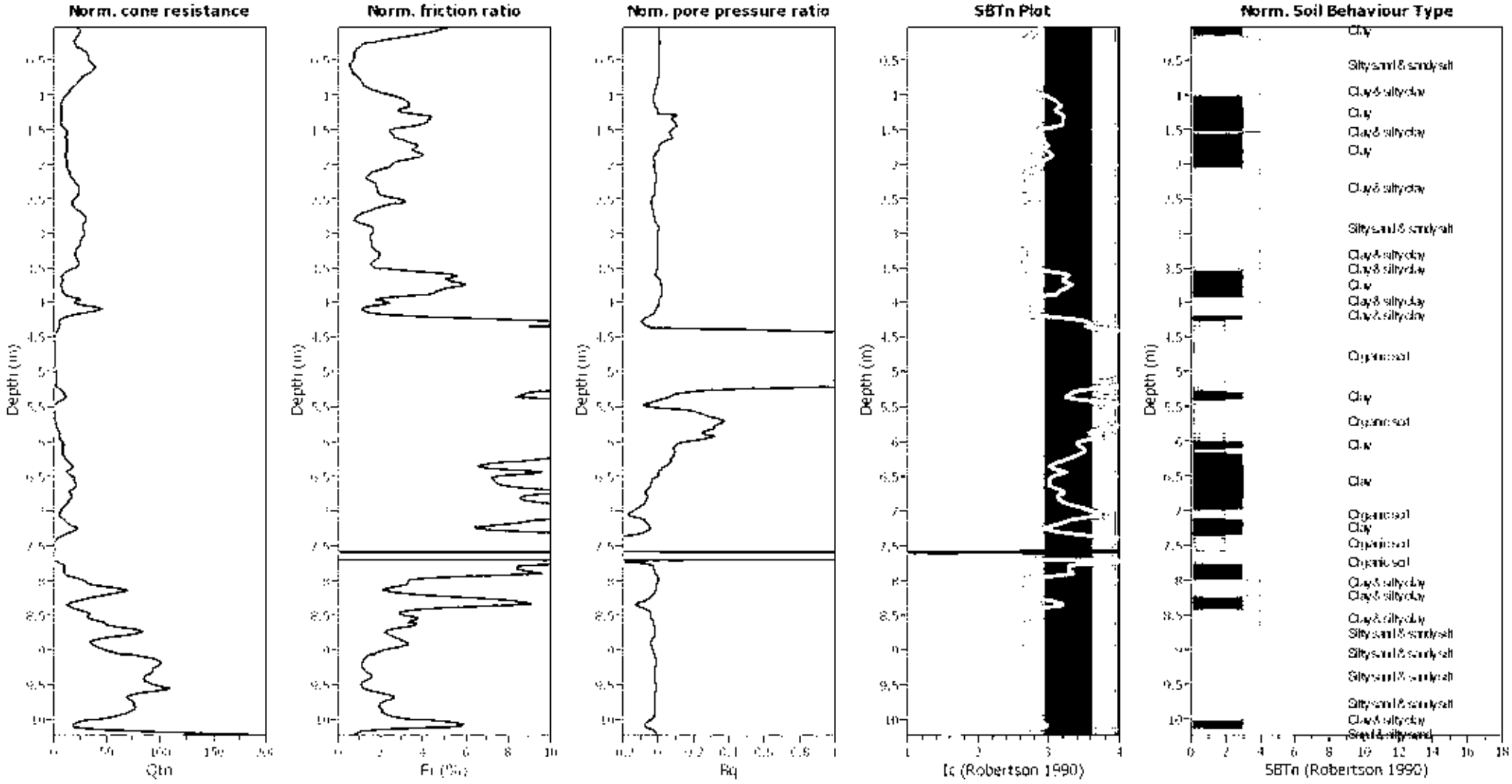
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



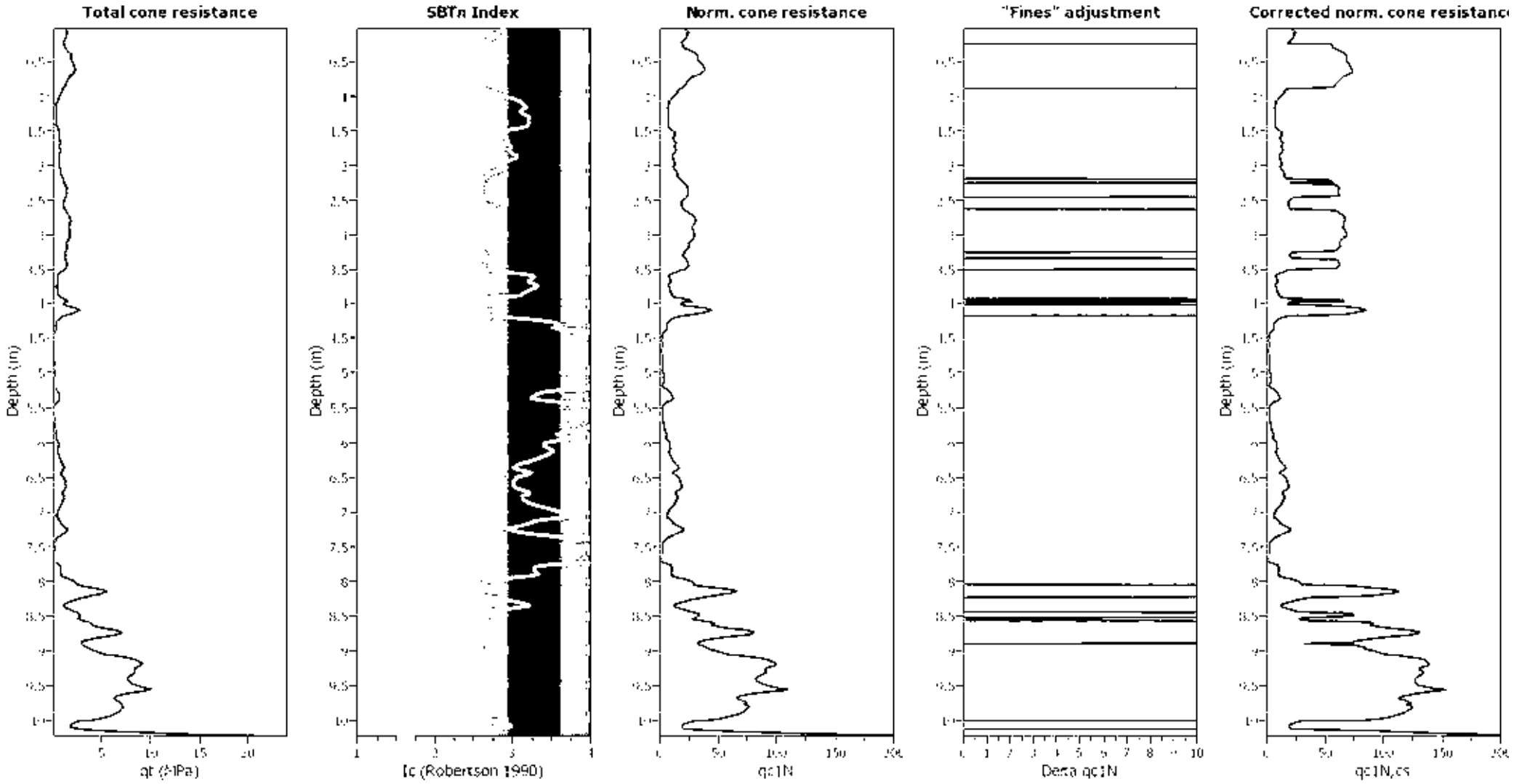
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

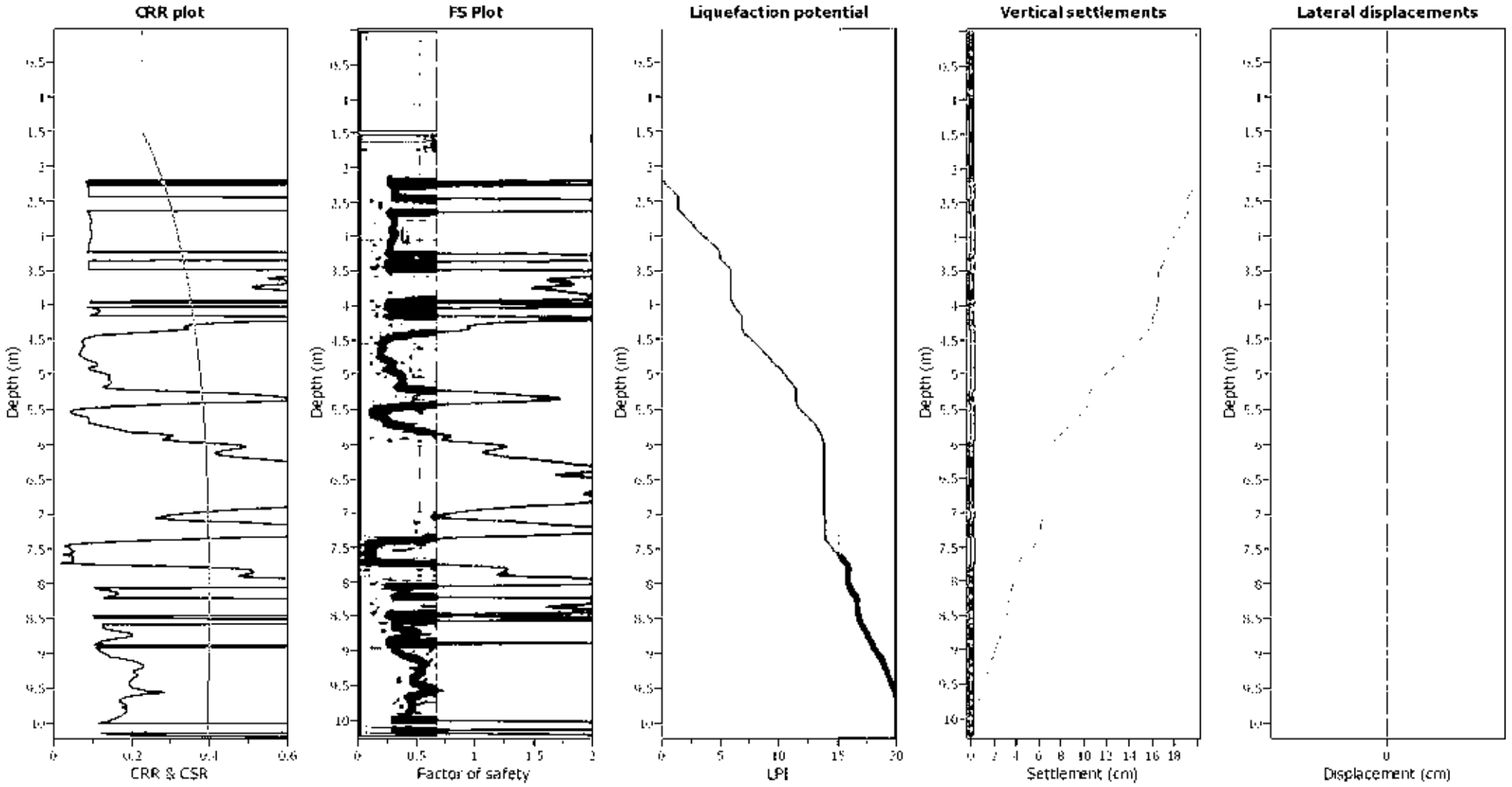
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.50 m	Fill height:	N/A	Limit depth:	N/A

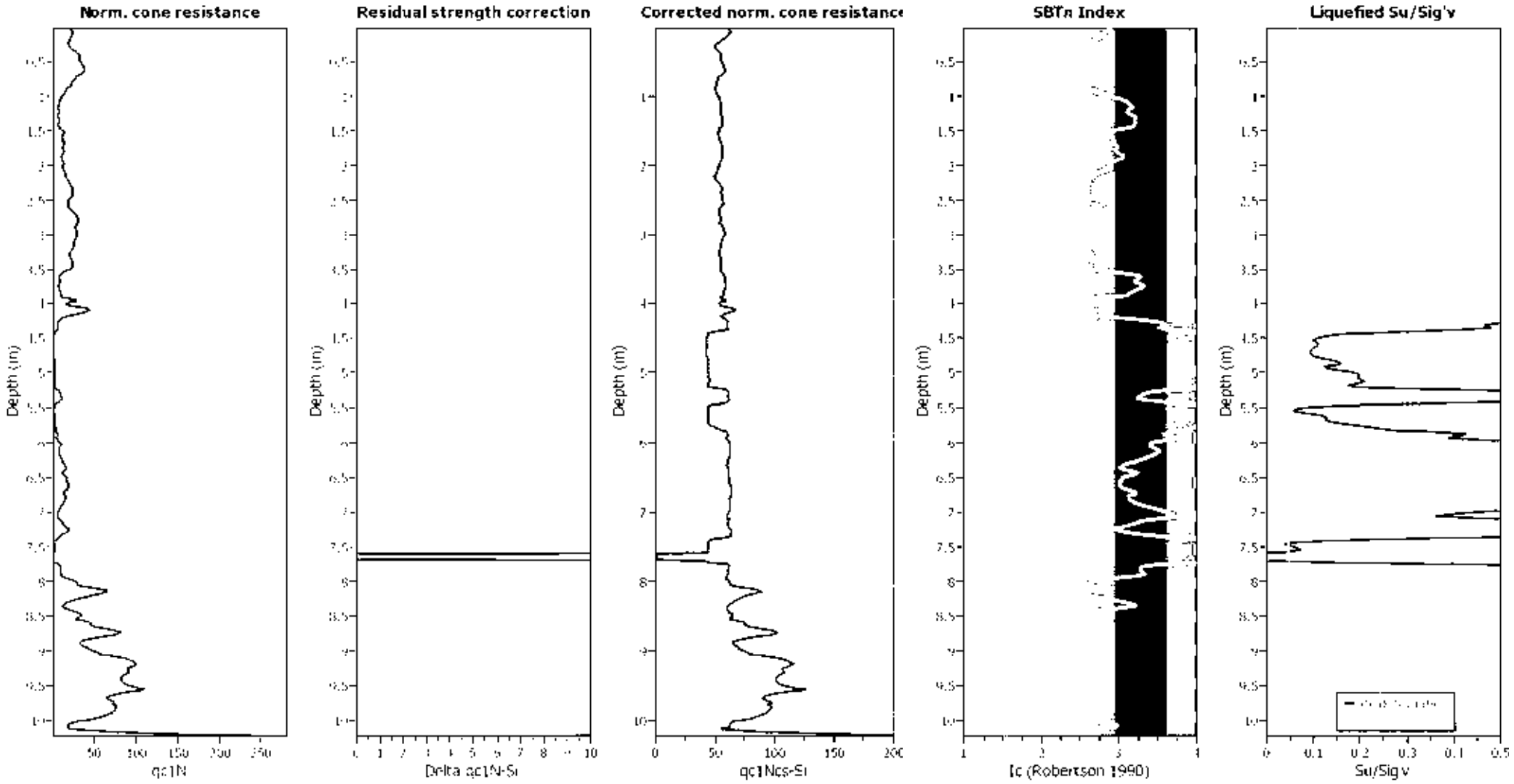
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

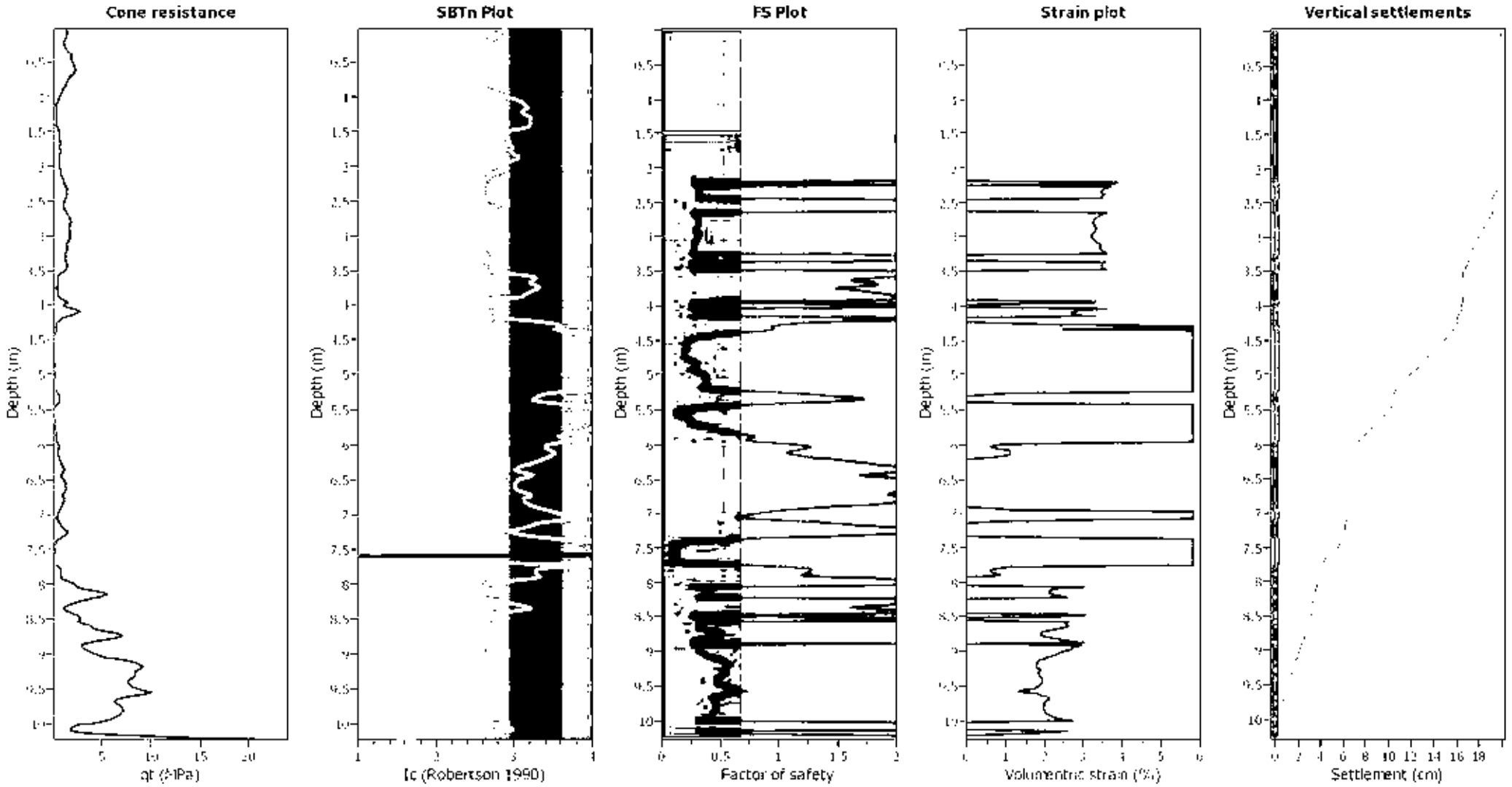
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

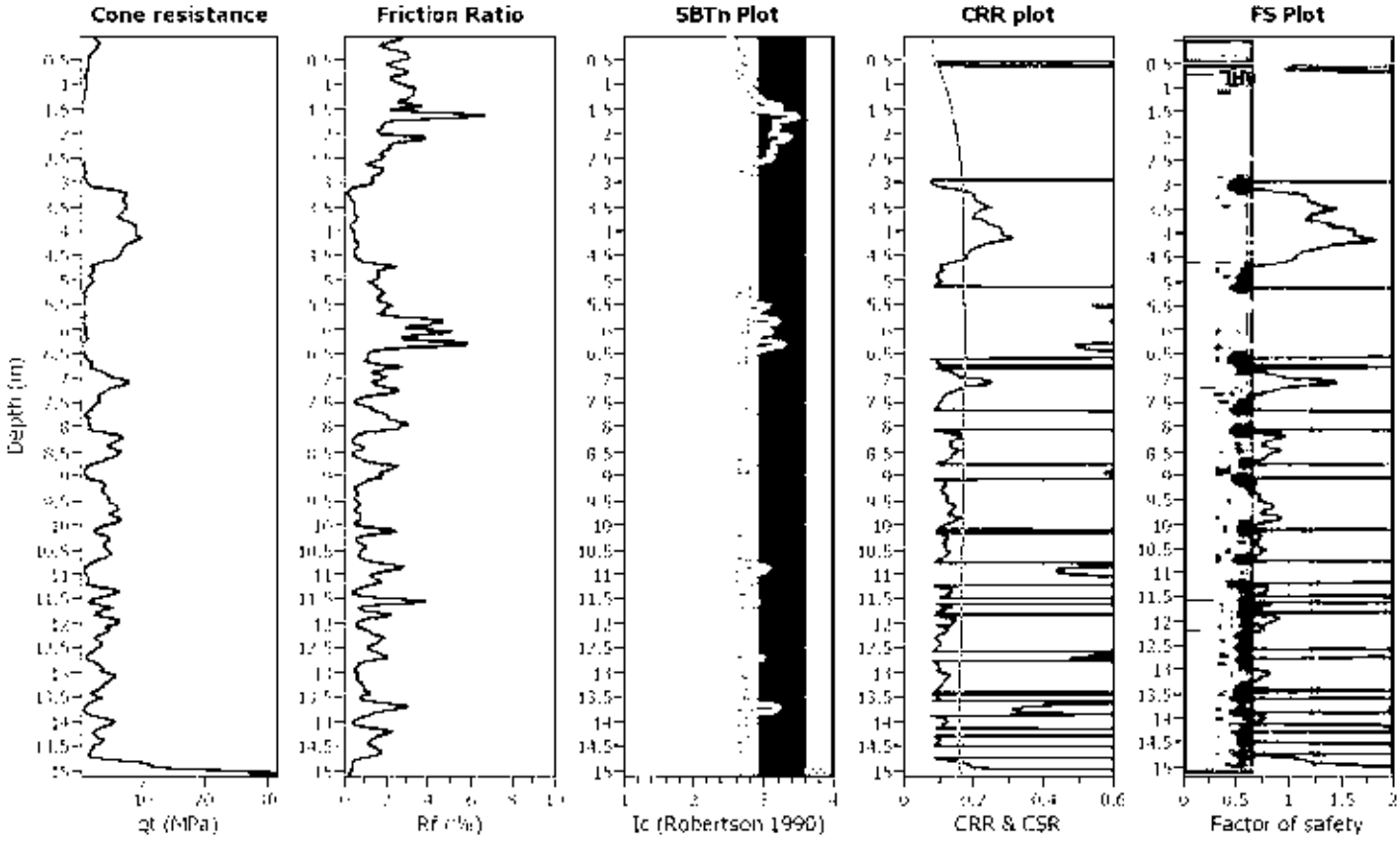
Beca Ltd
Geotechnical Engineers
www.beca.com

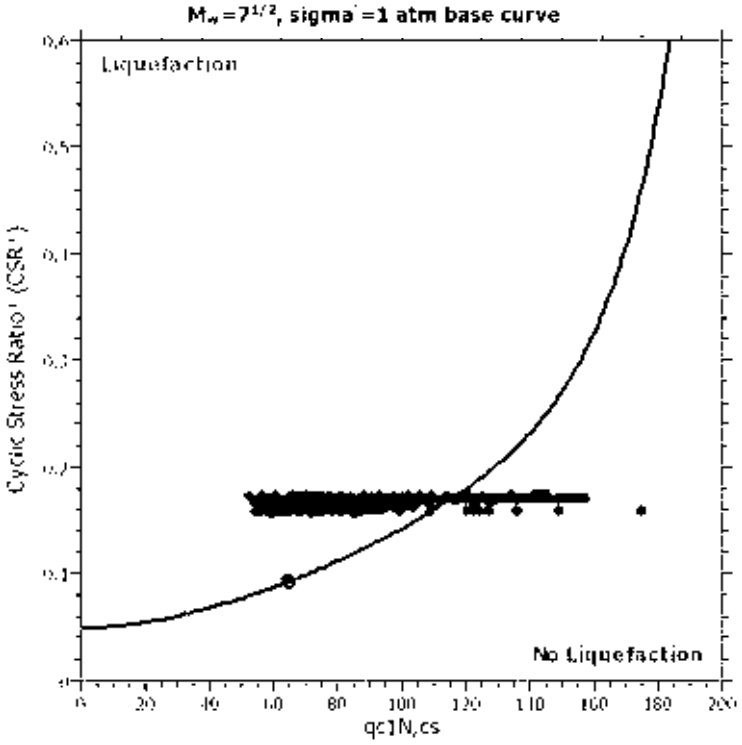
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

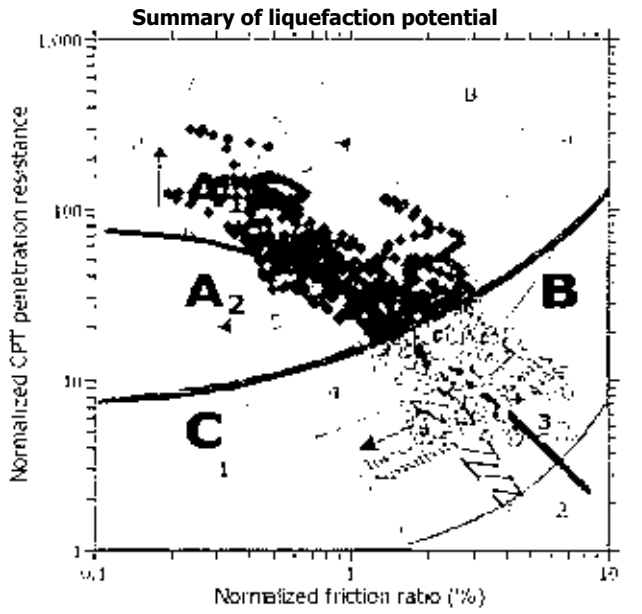
CPT file : CPT34_396SparksRd

Input parameters and analysis data

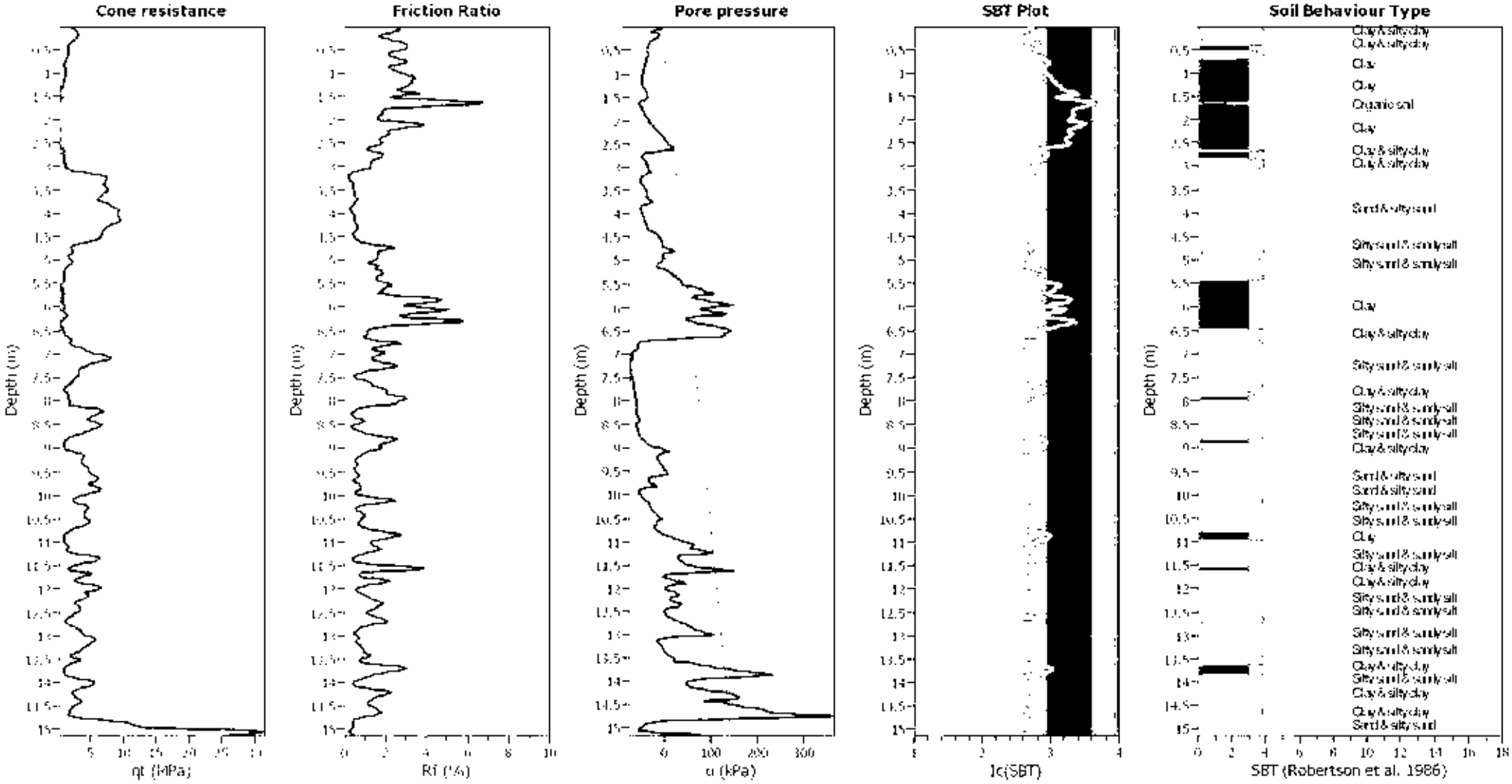
Analysis method:	I&B (2008)	G.W.T. (in-situ):	0.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	0.50 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



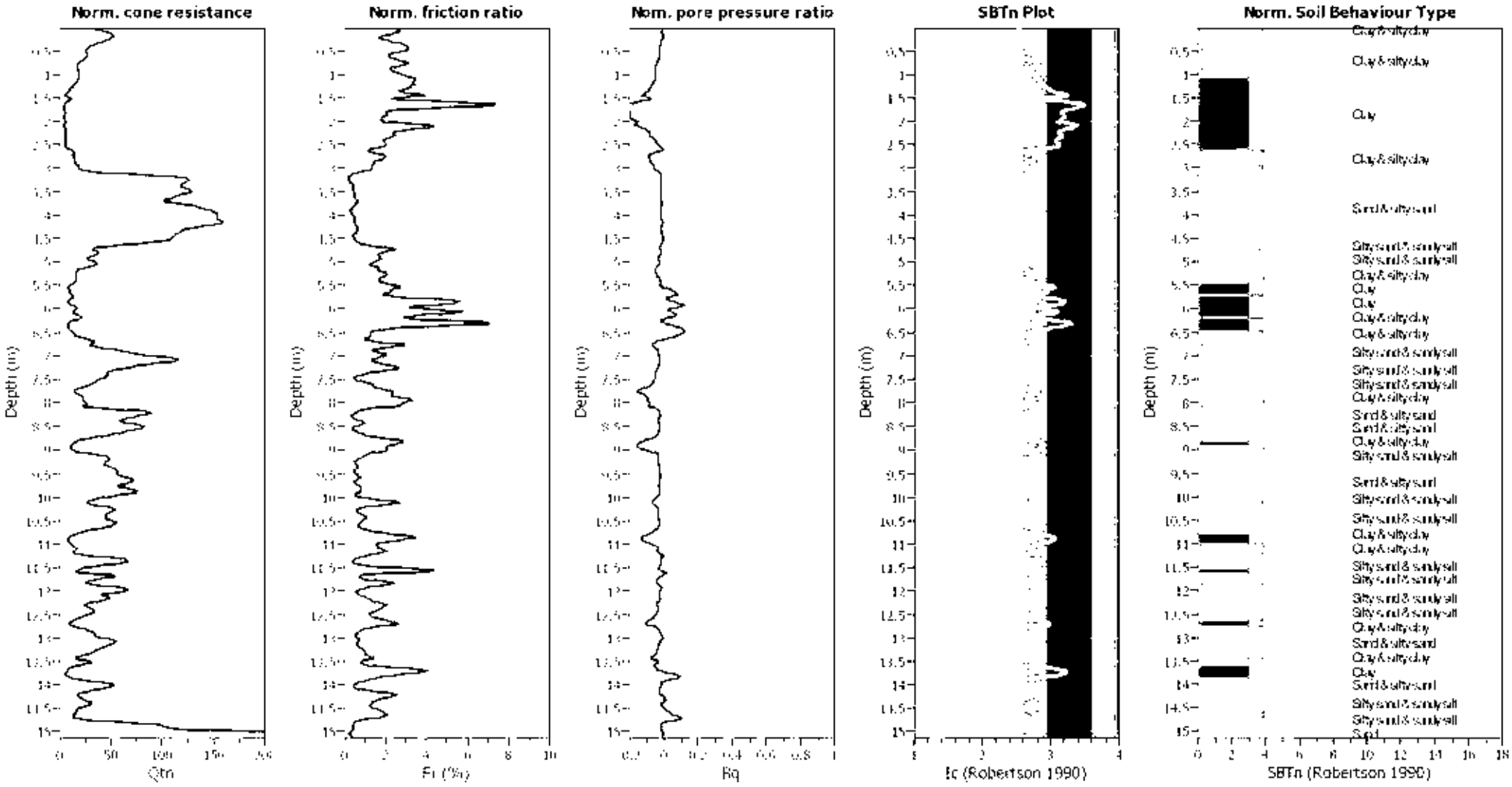
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



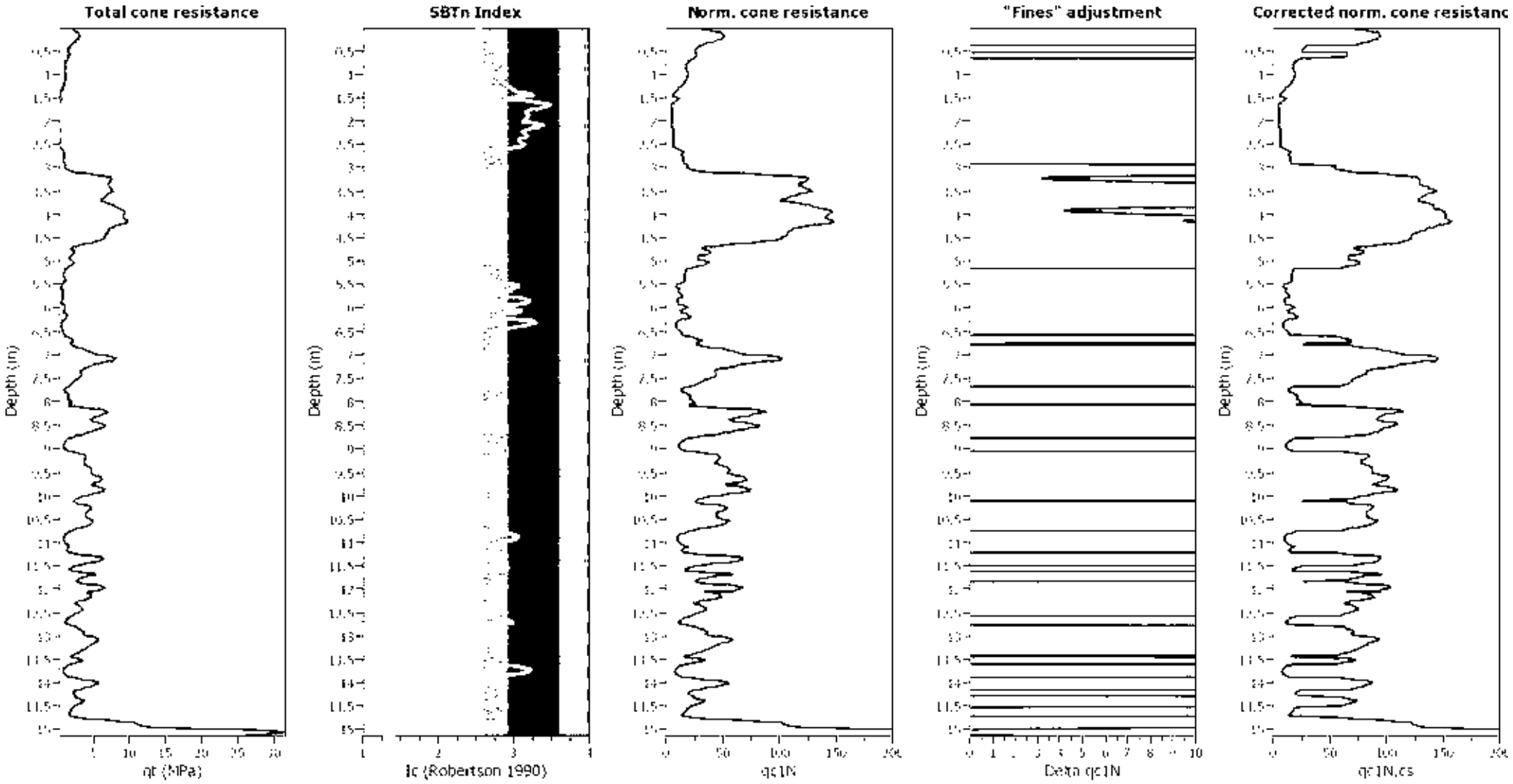
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

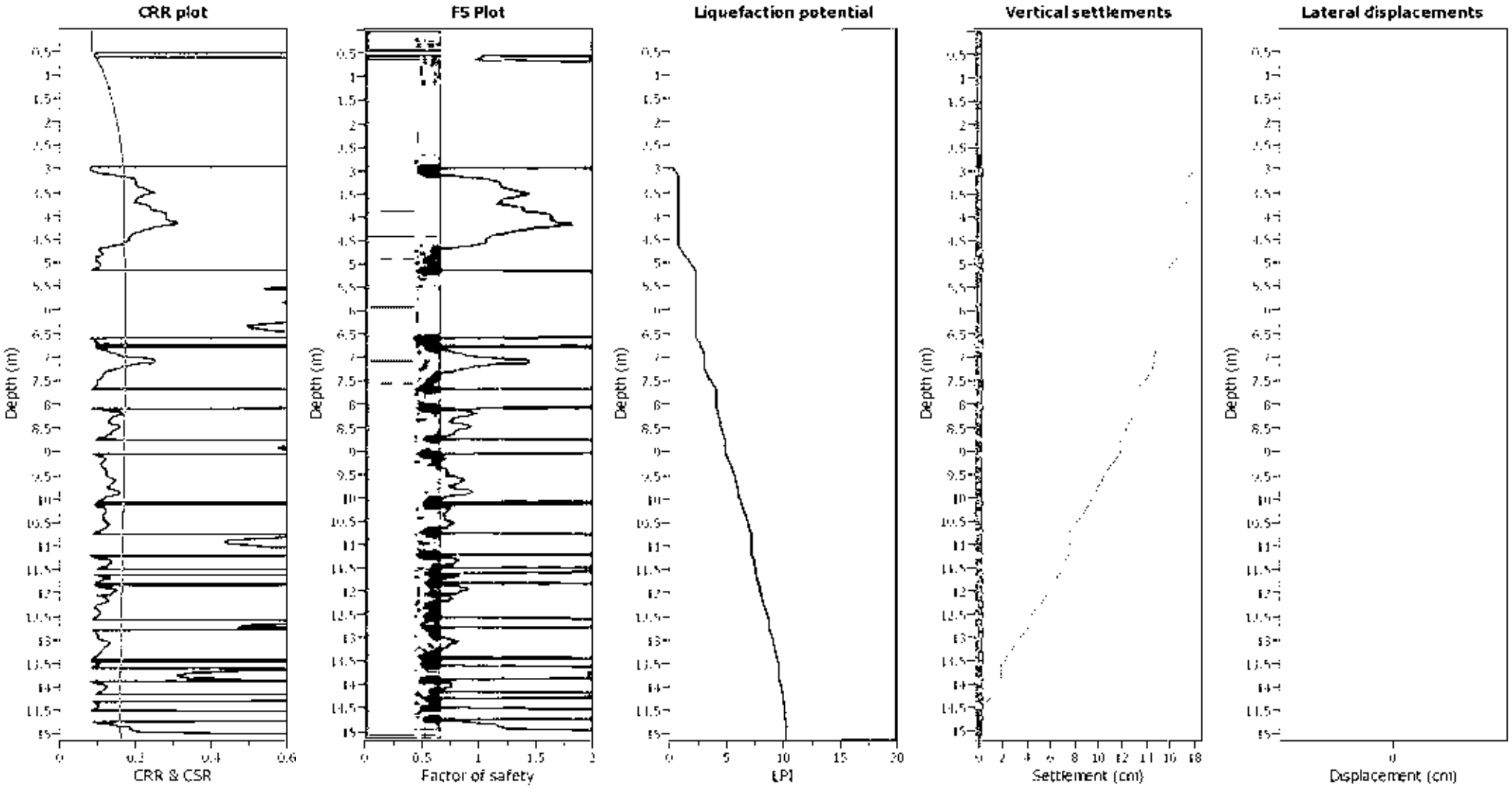
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	0.50 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	0.50 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	0.50 m	Fill height:	N/A	Limit depth:	N/A

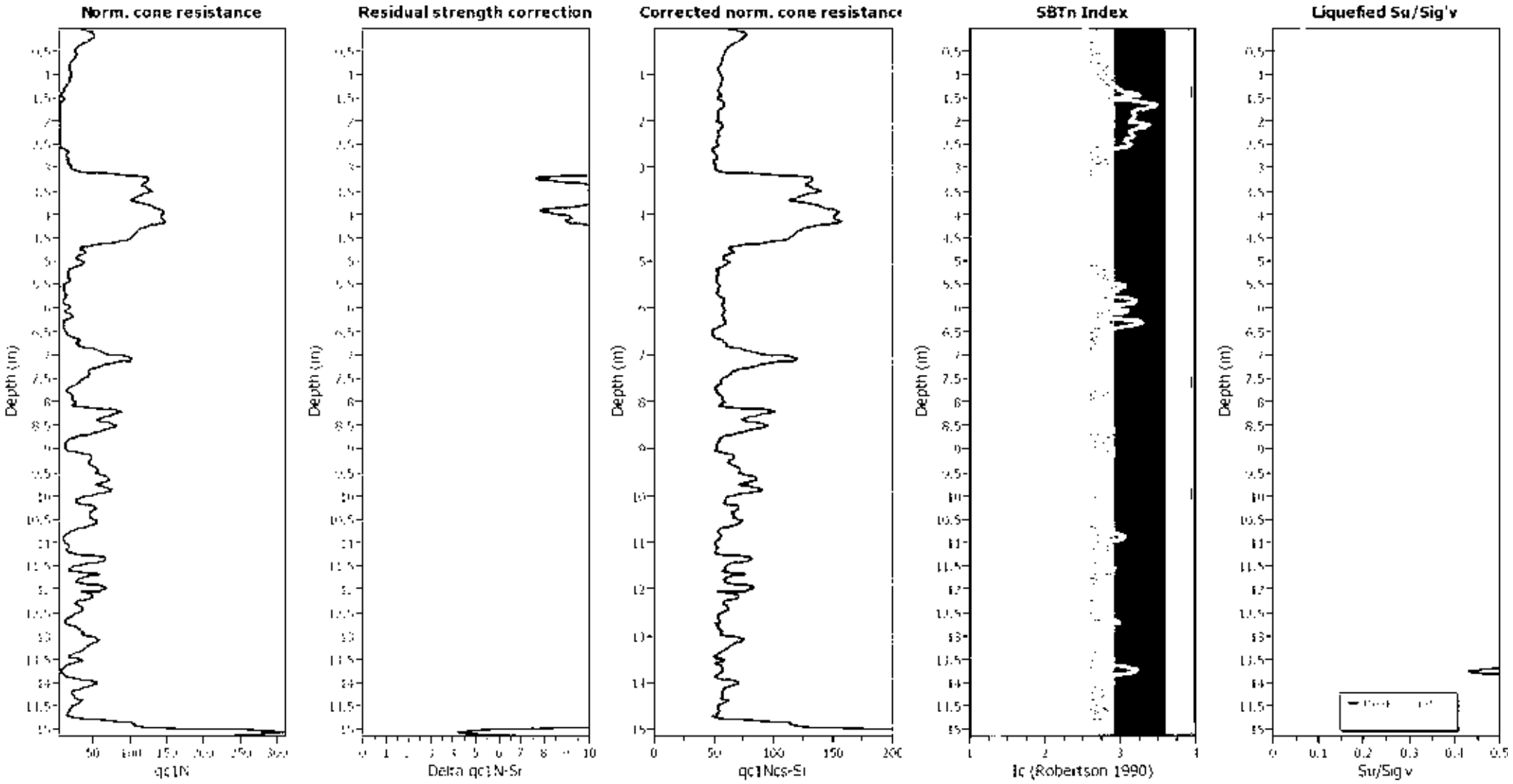
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

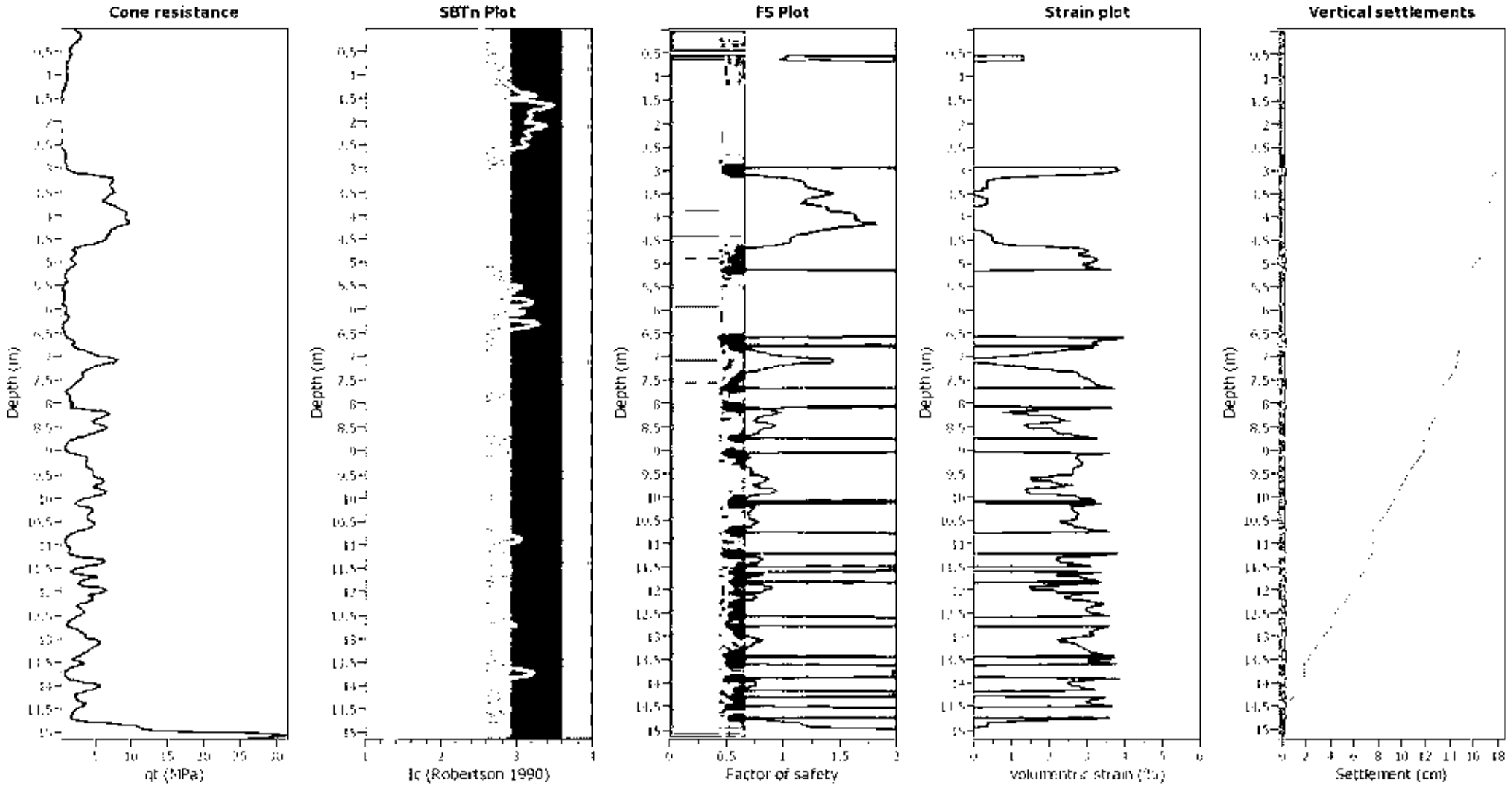
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	0.50 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.50 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

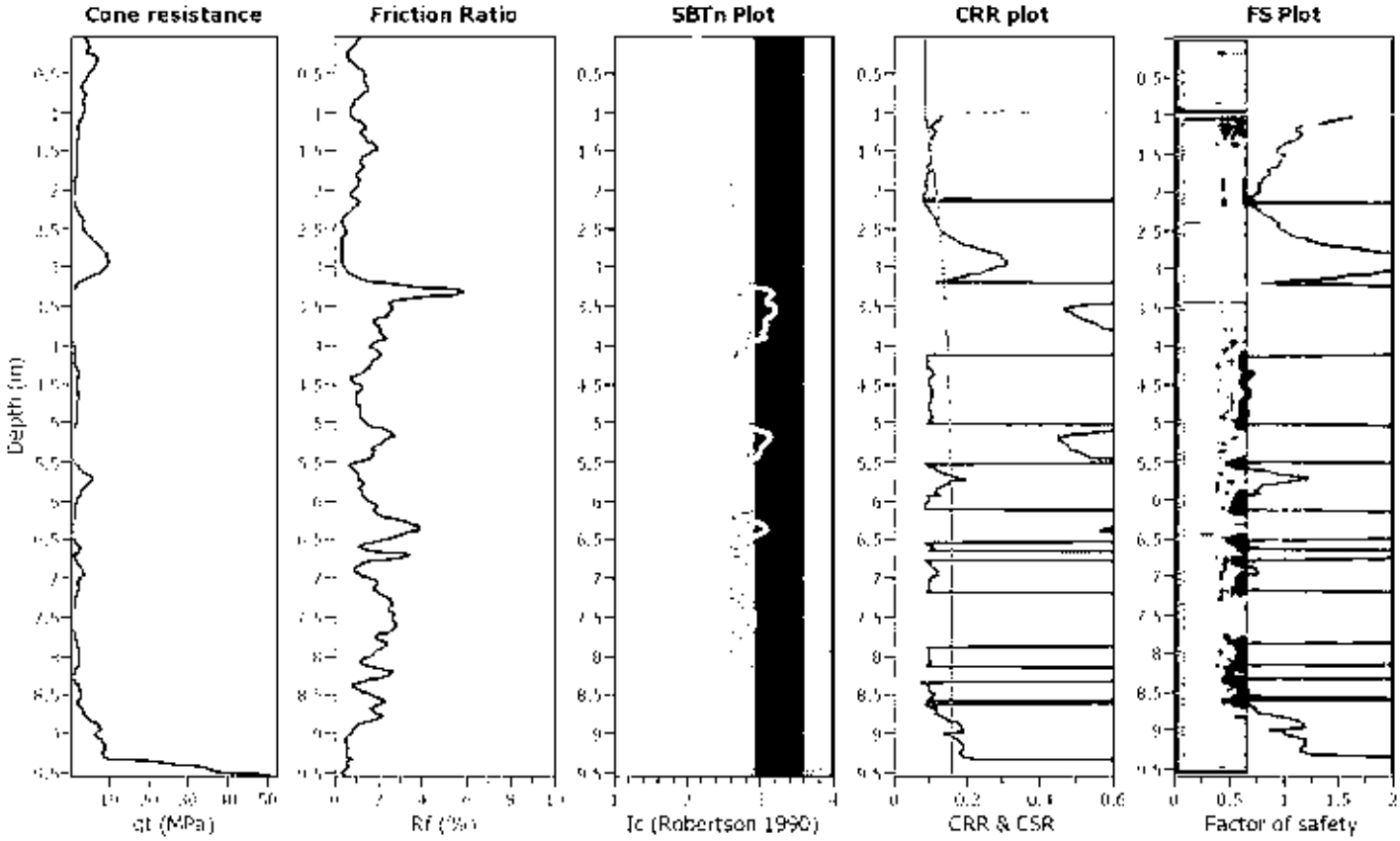
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumetric strain:	Post liquefaction volumetric strain

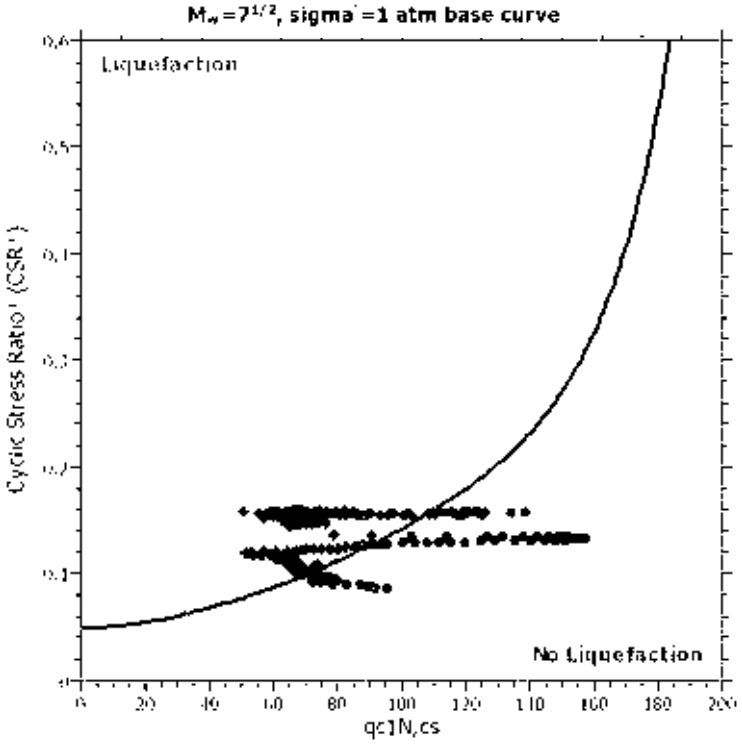
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

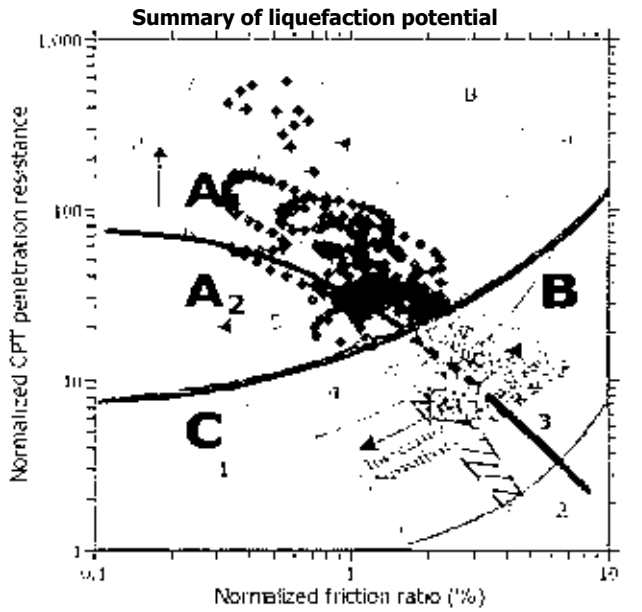
CPT file : CPT35_32SutherlandsRd

Input parameters and analysis data

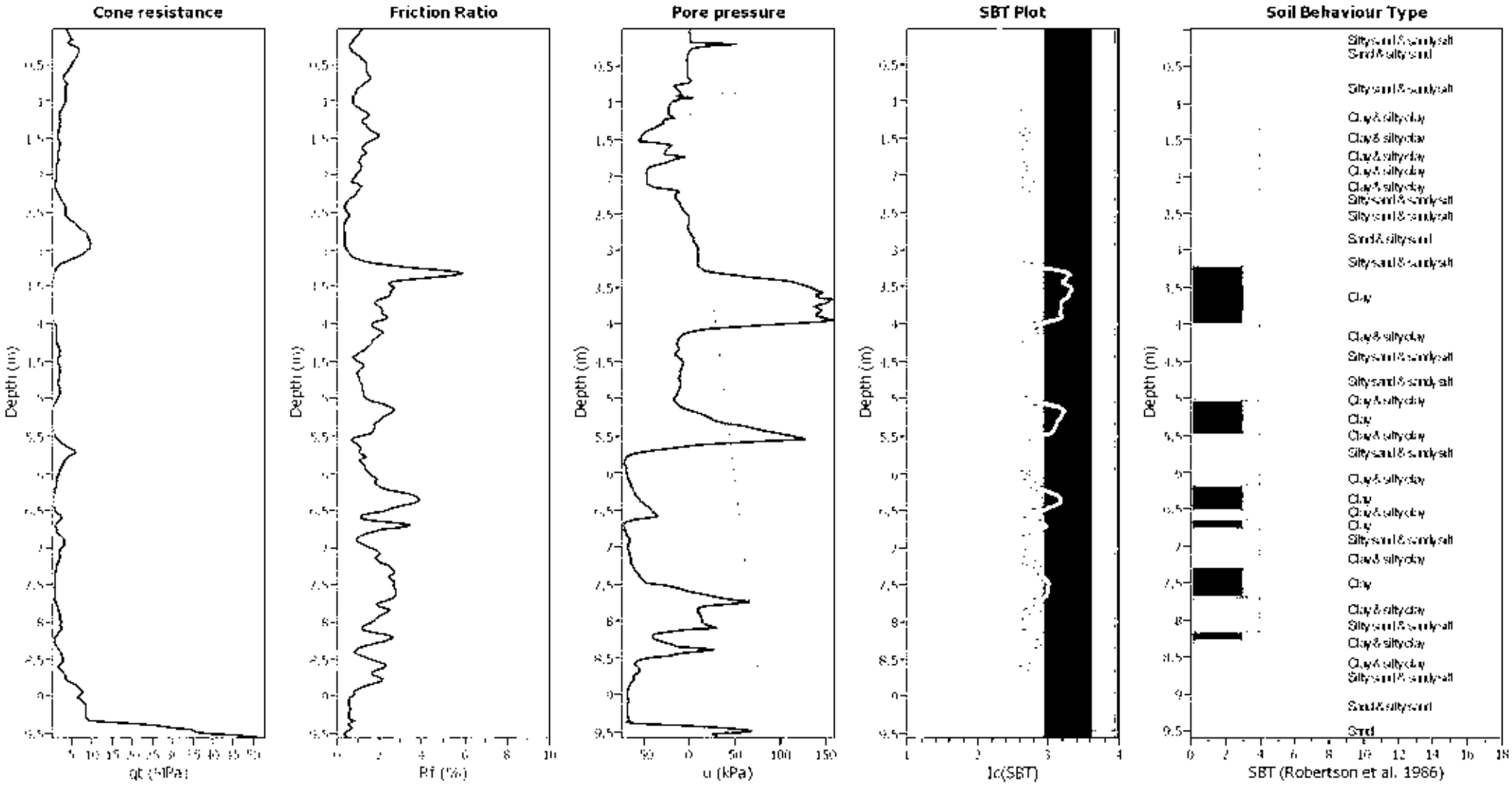
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



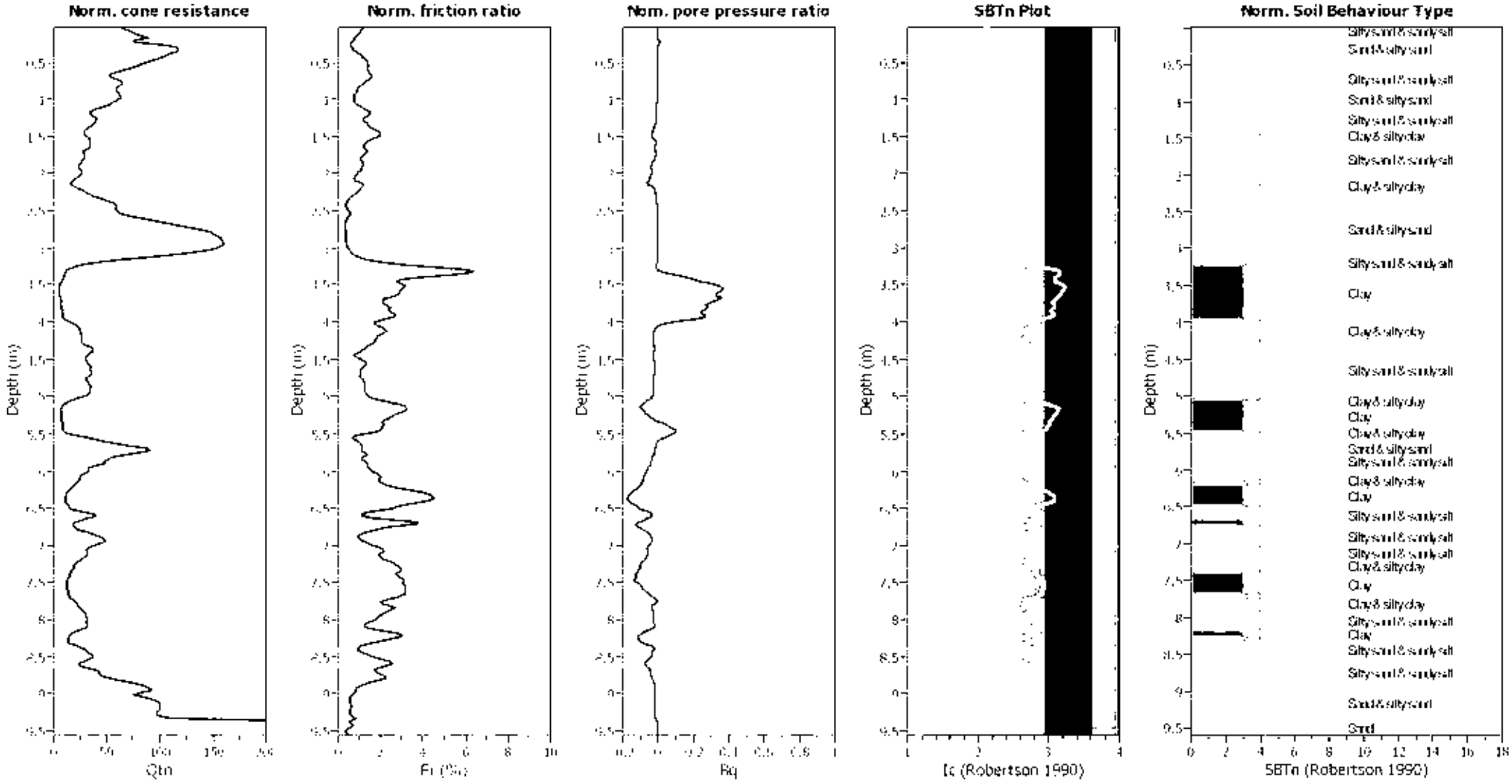
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



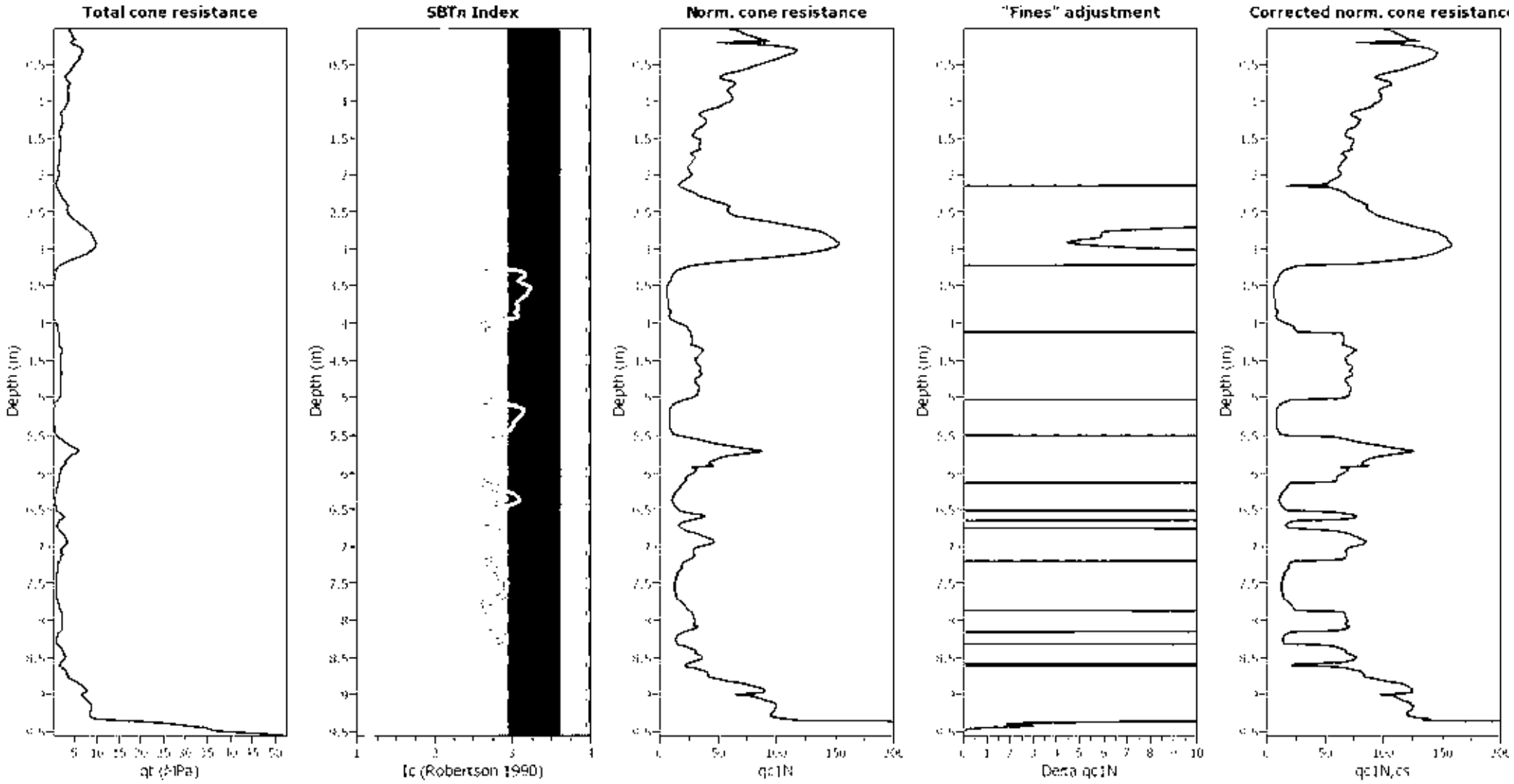
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

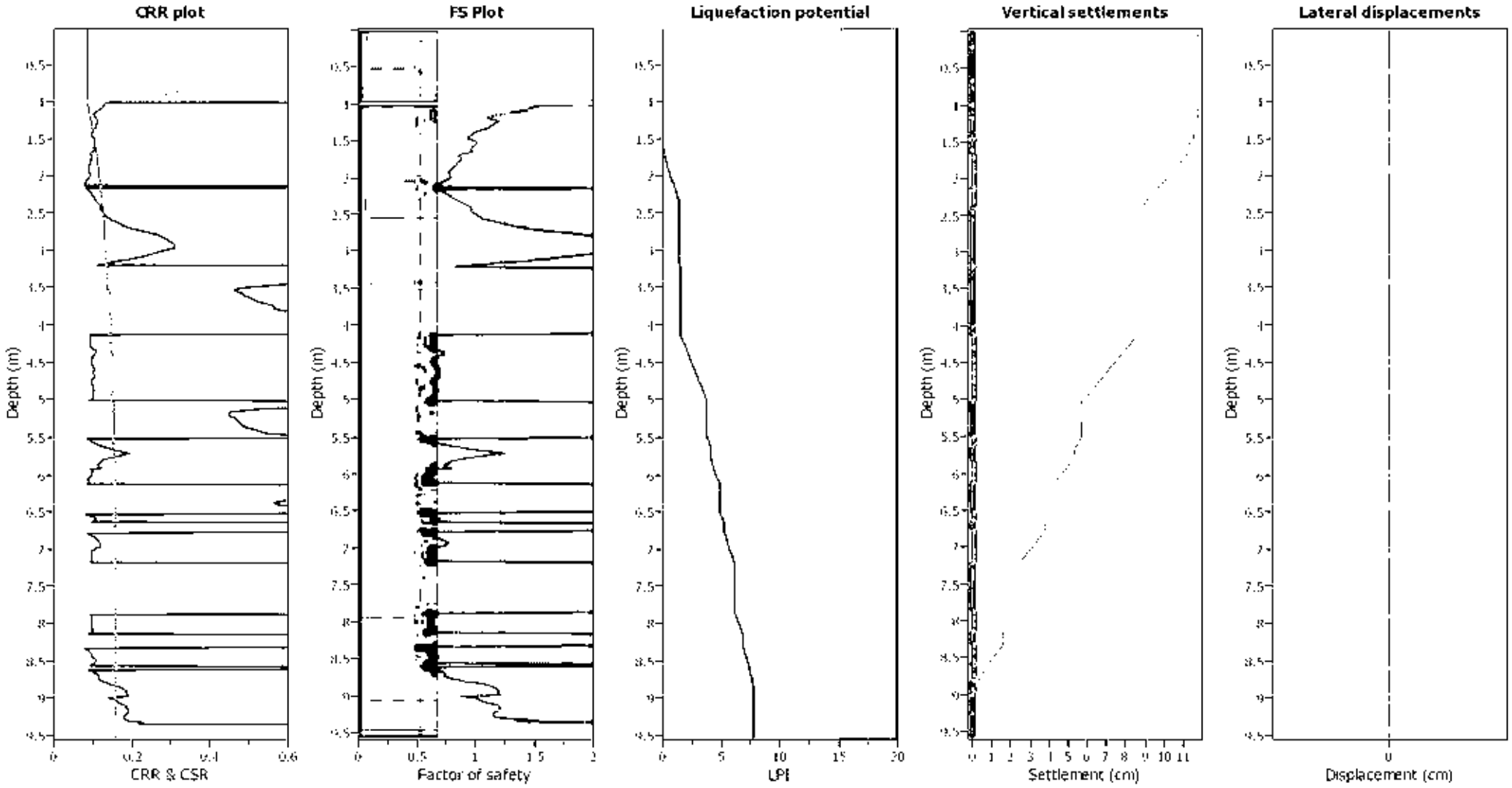
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

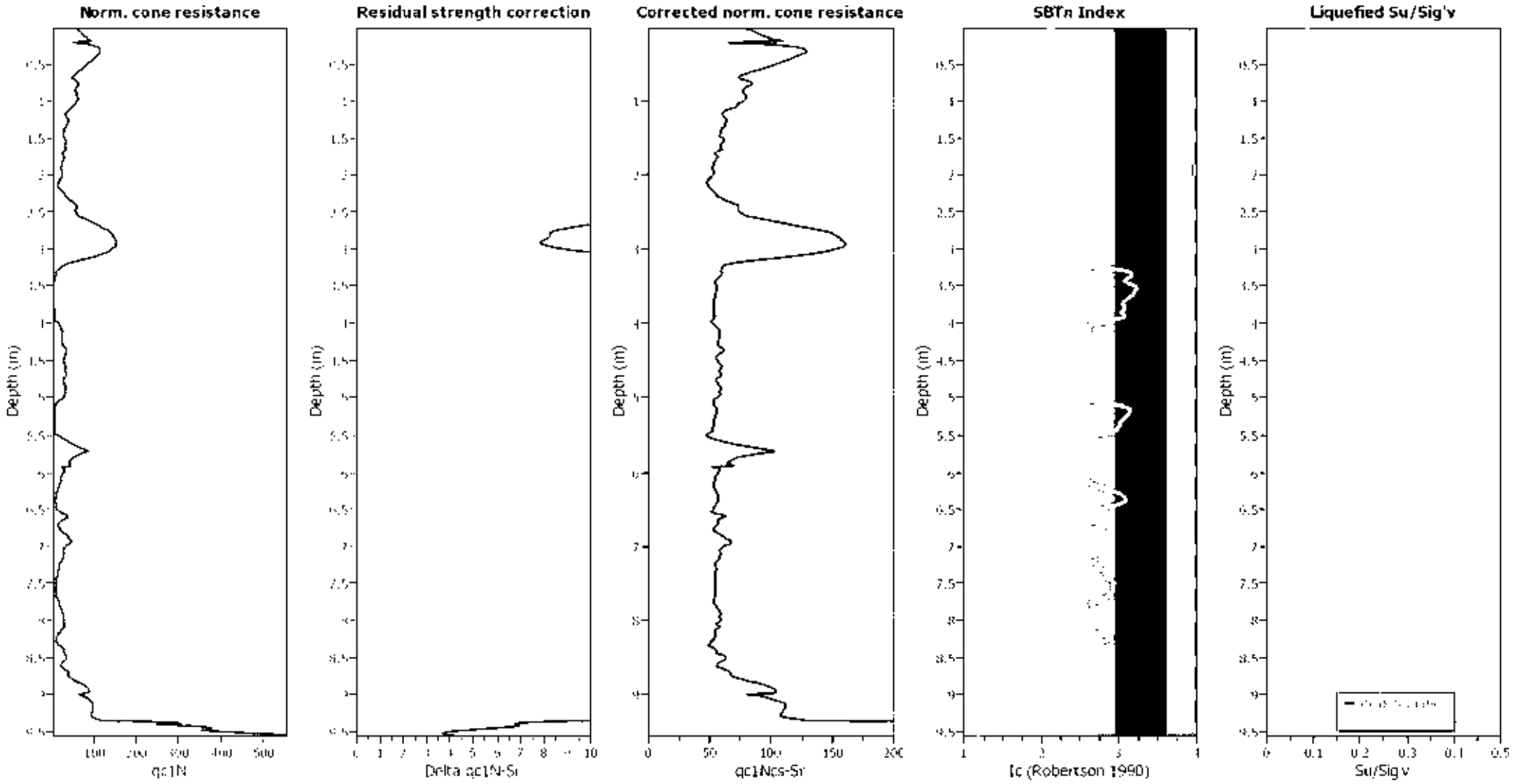
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

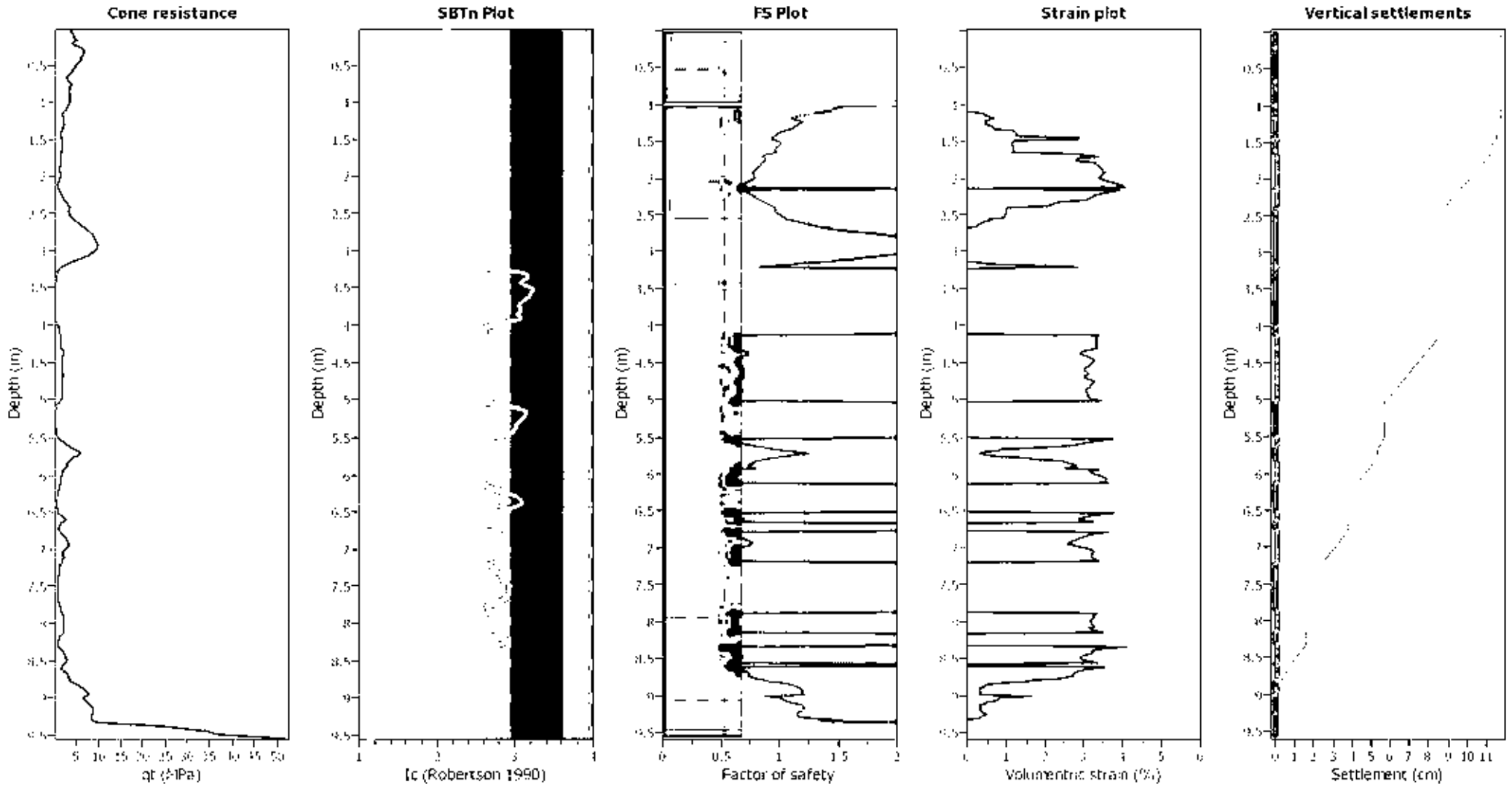
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liner correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

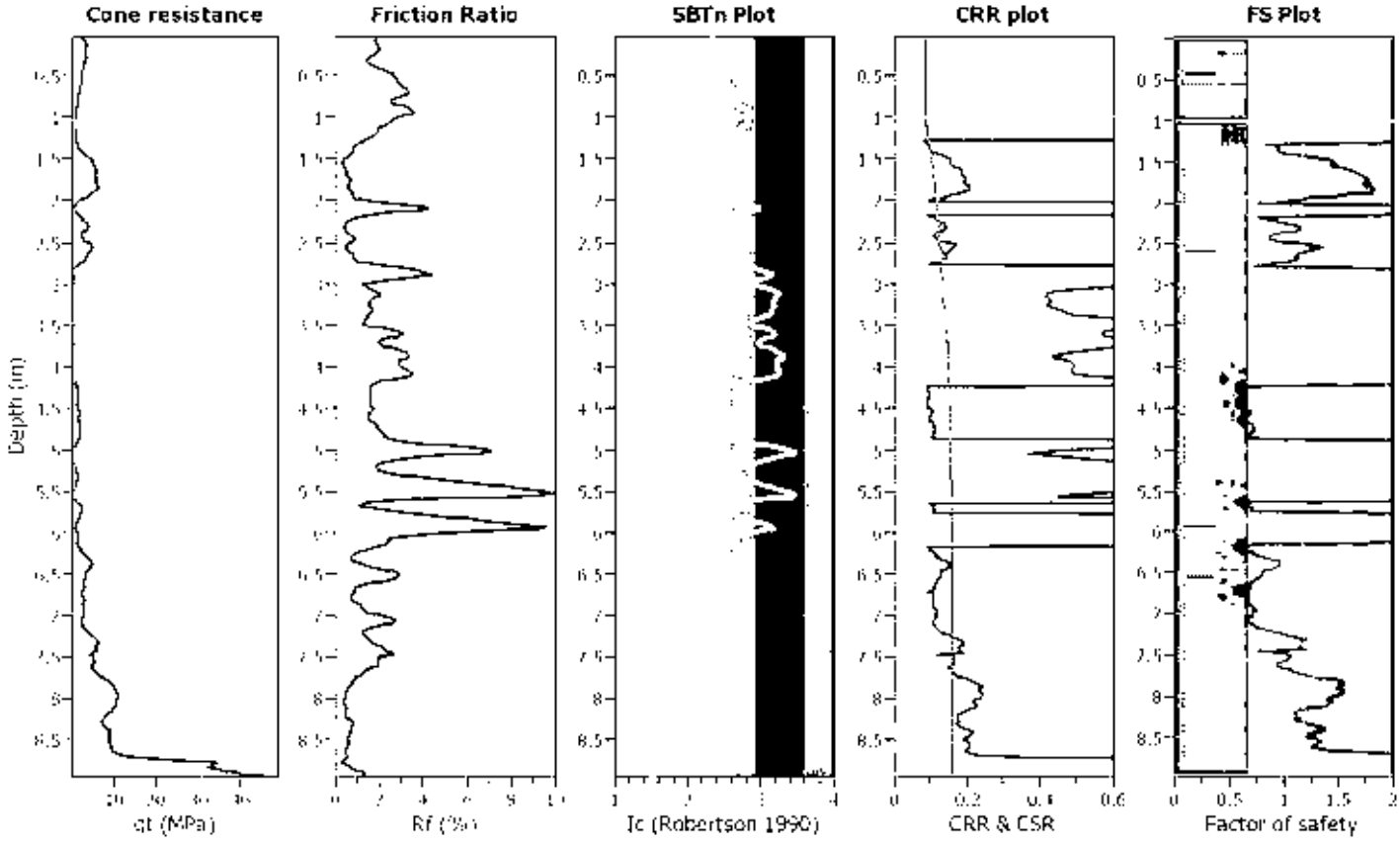
qt:	Total cone resistance (cone resistance q corrected for pore water effects)
Ic:	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

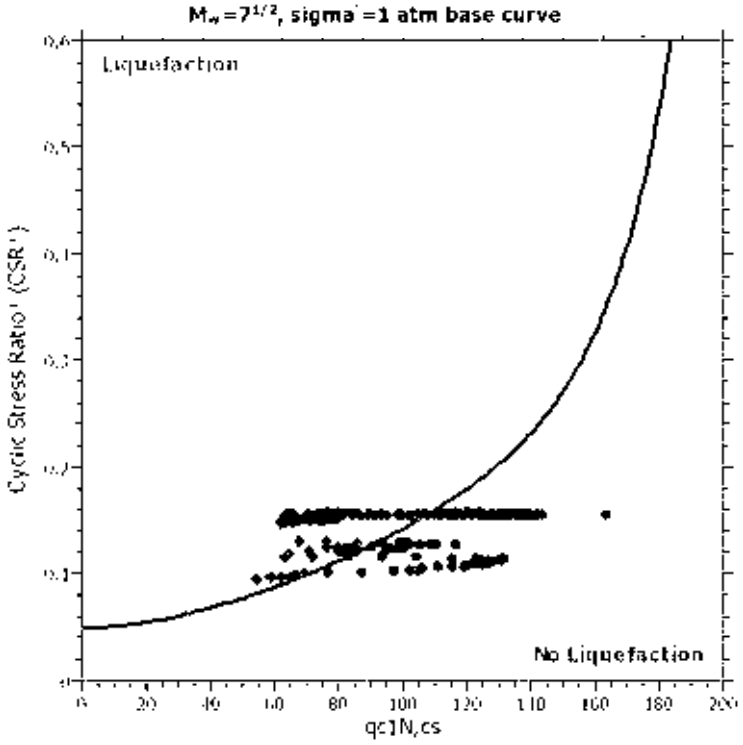
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

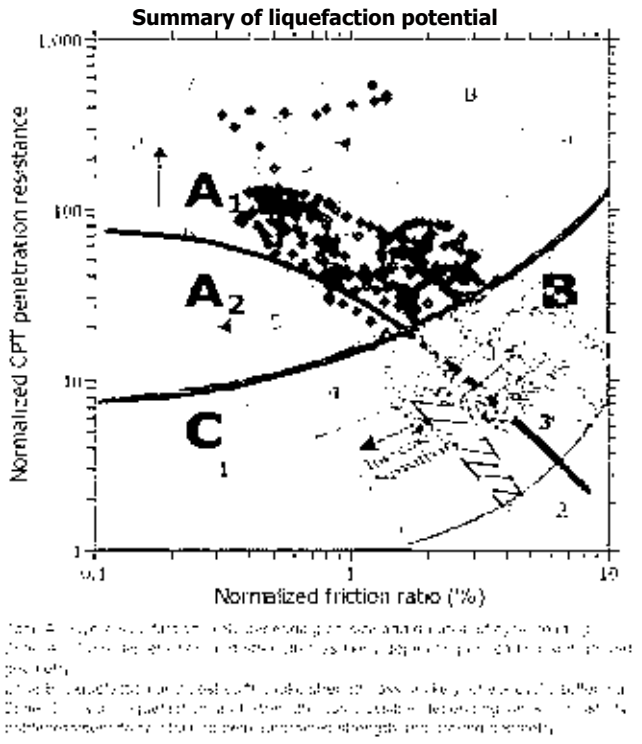
CPT file : CPT36_32SutherlandsRd

Input parameters and analysis data

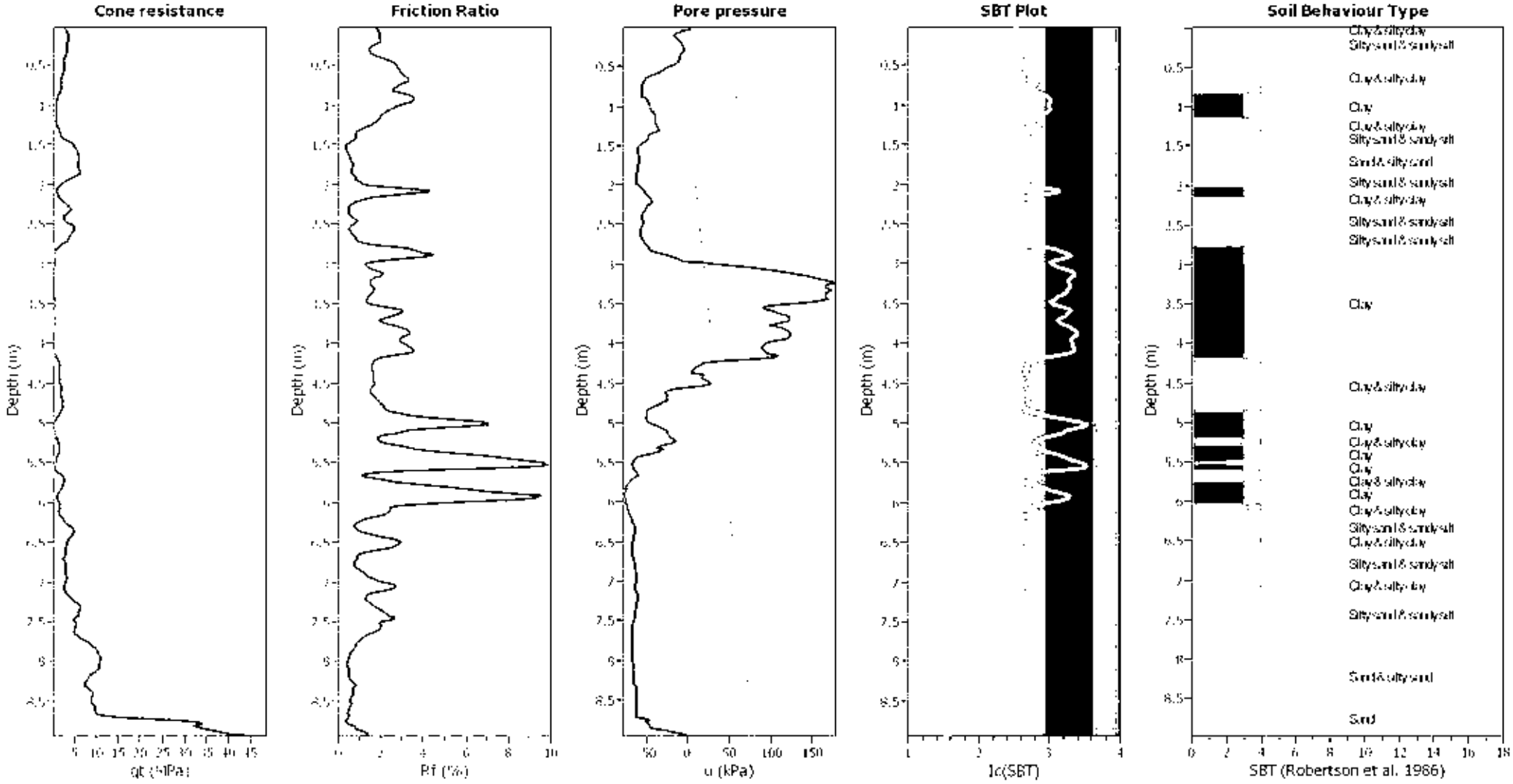
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



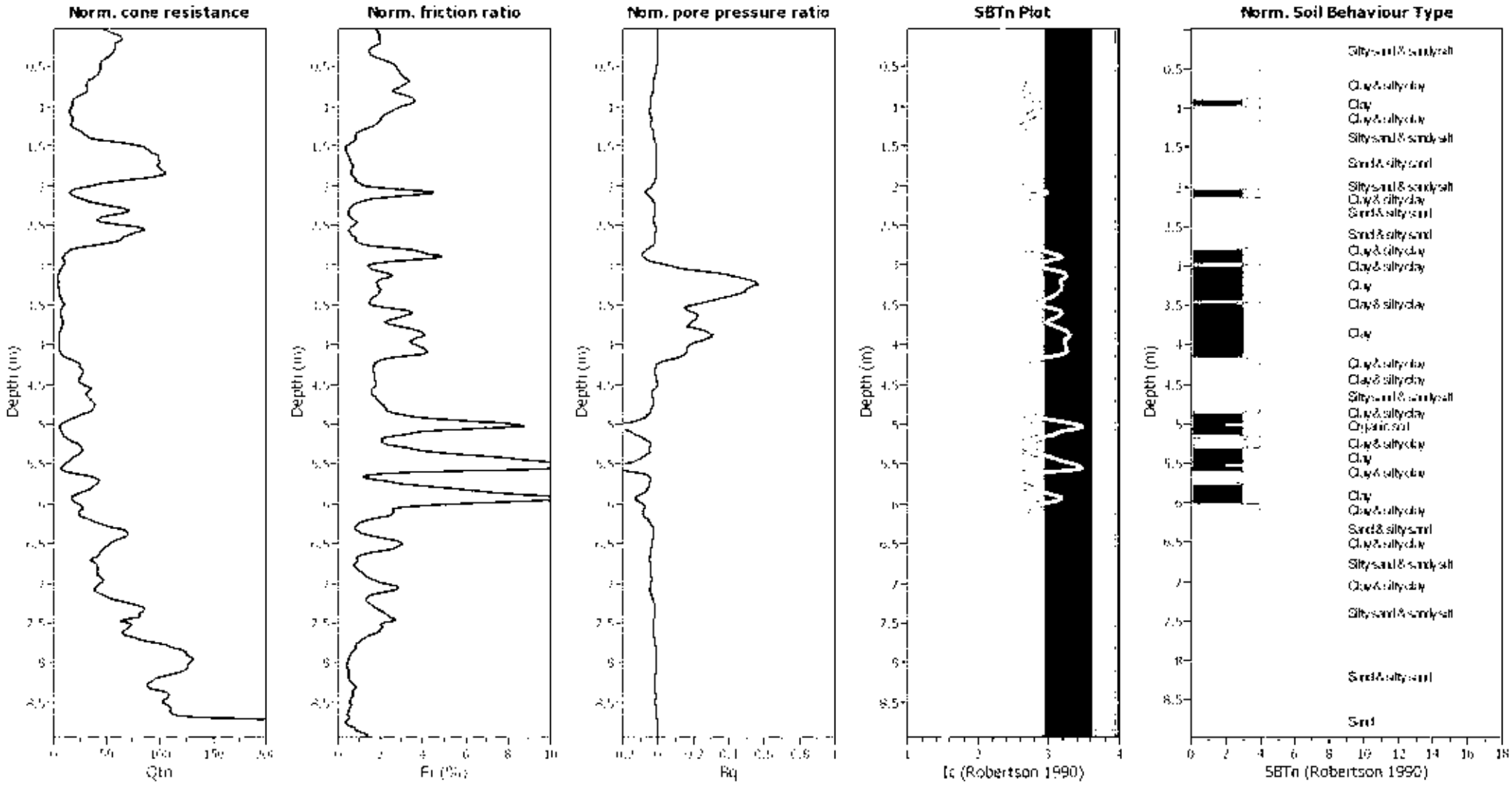
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



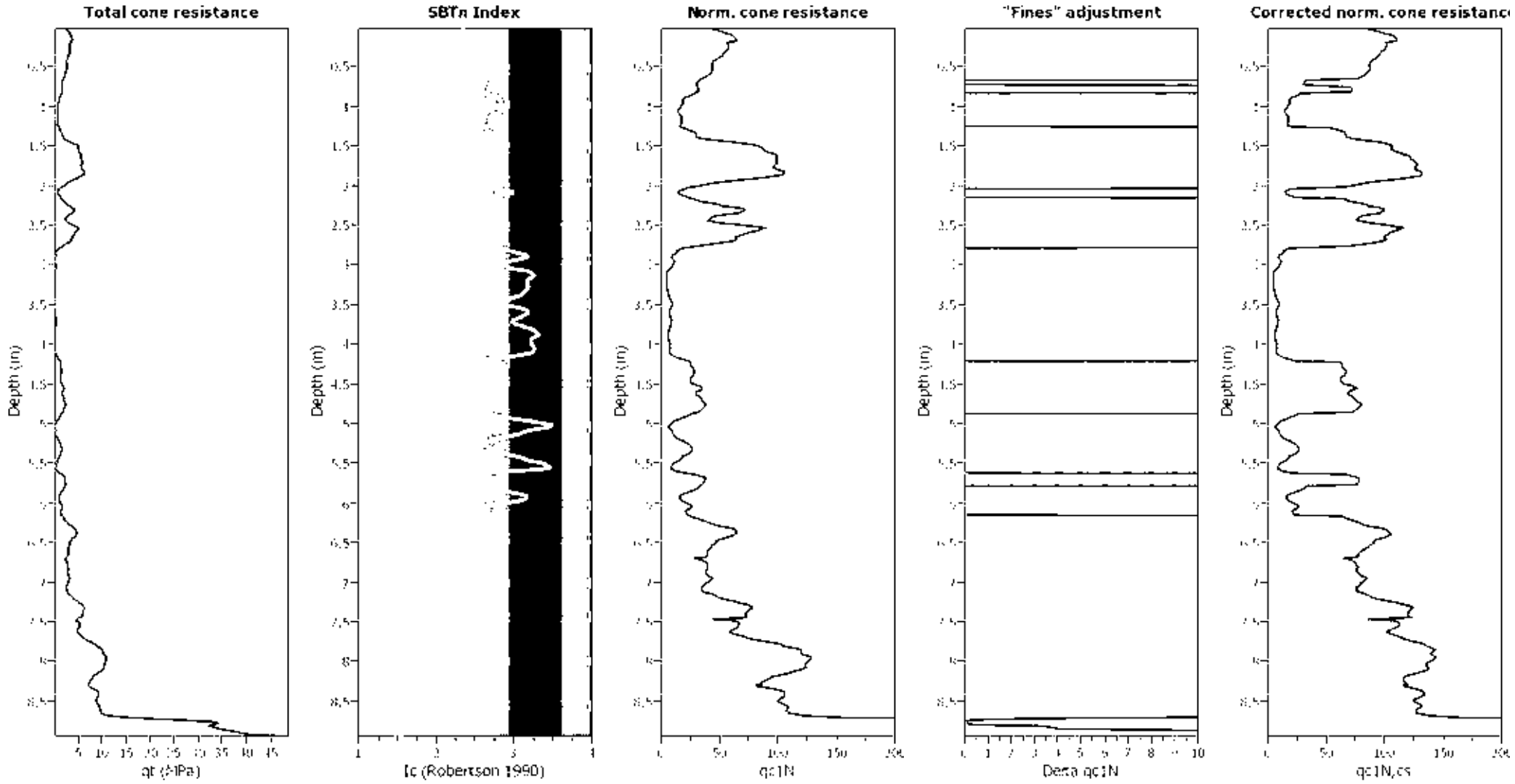
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

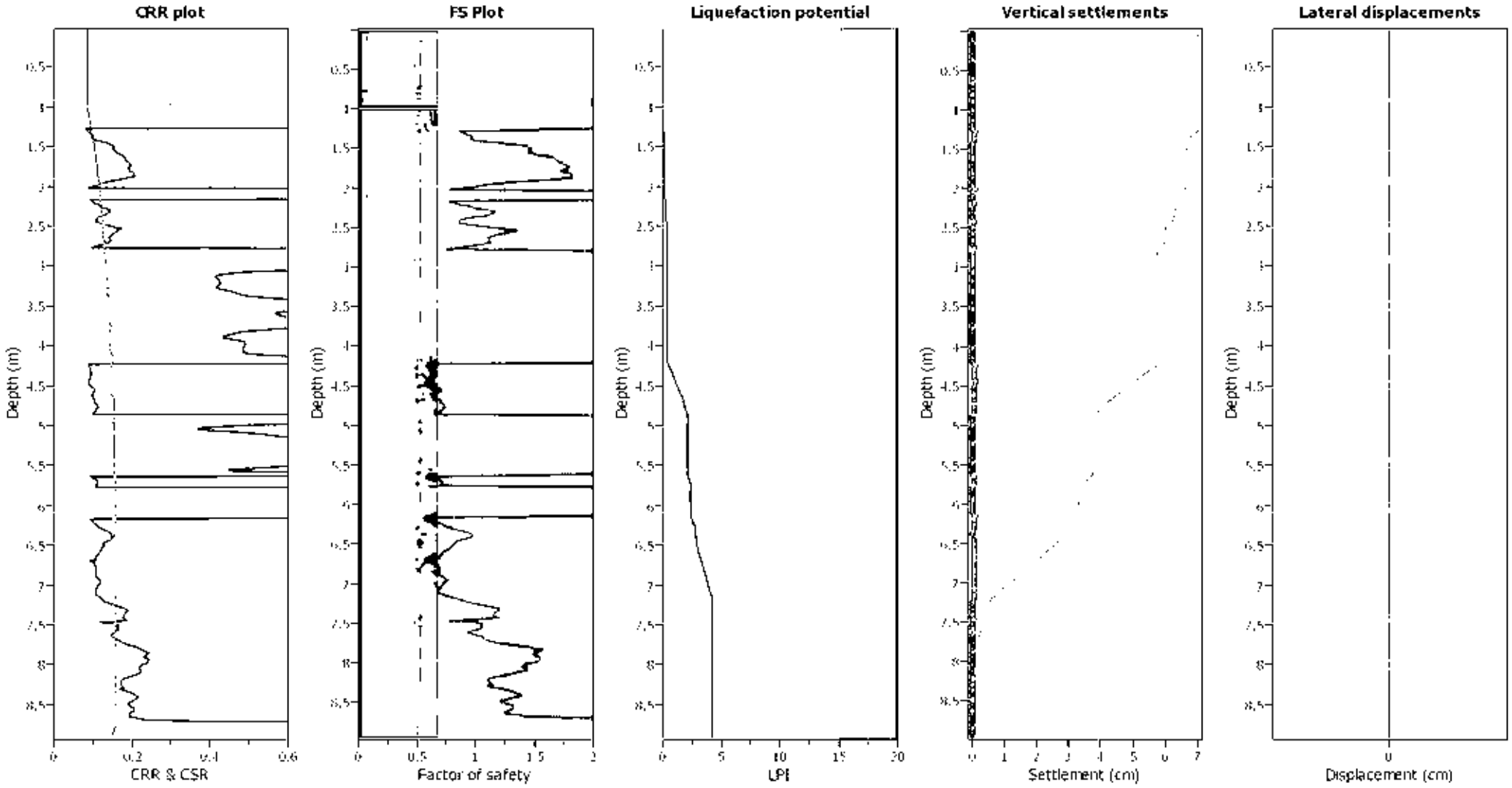
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

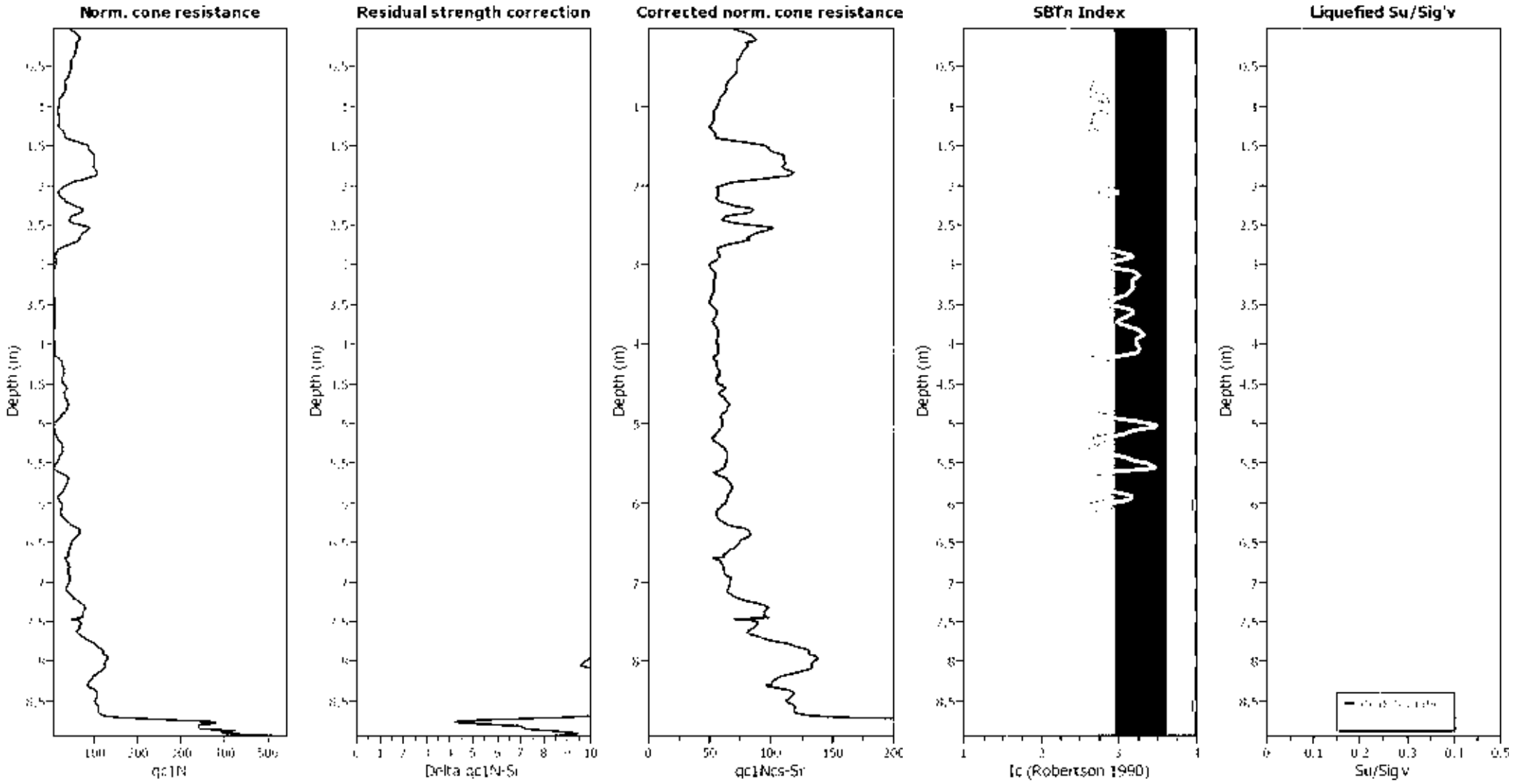
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

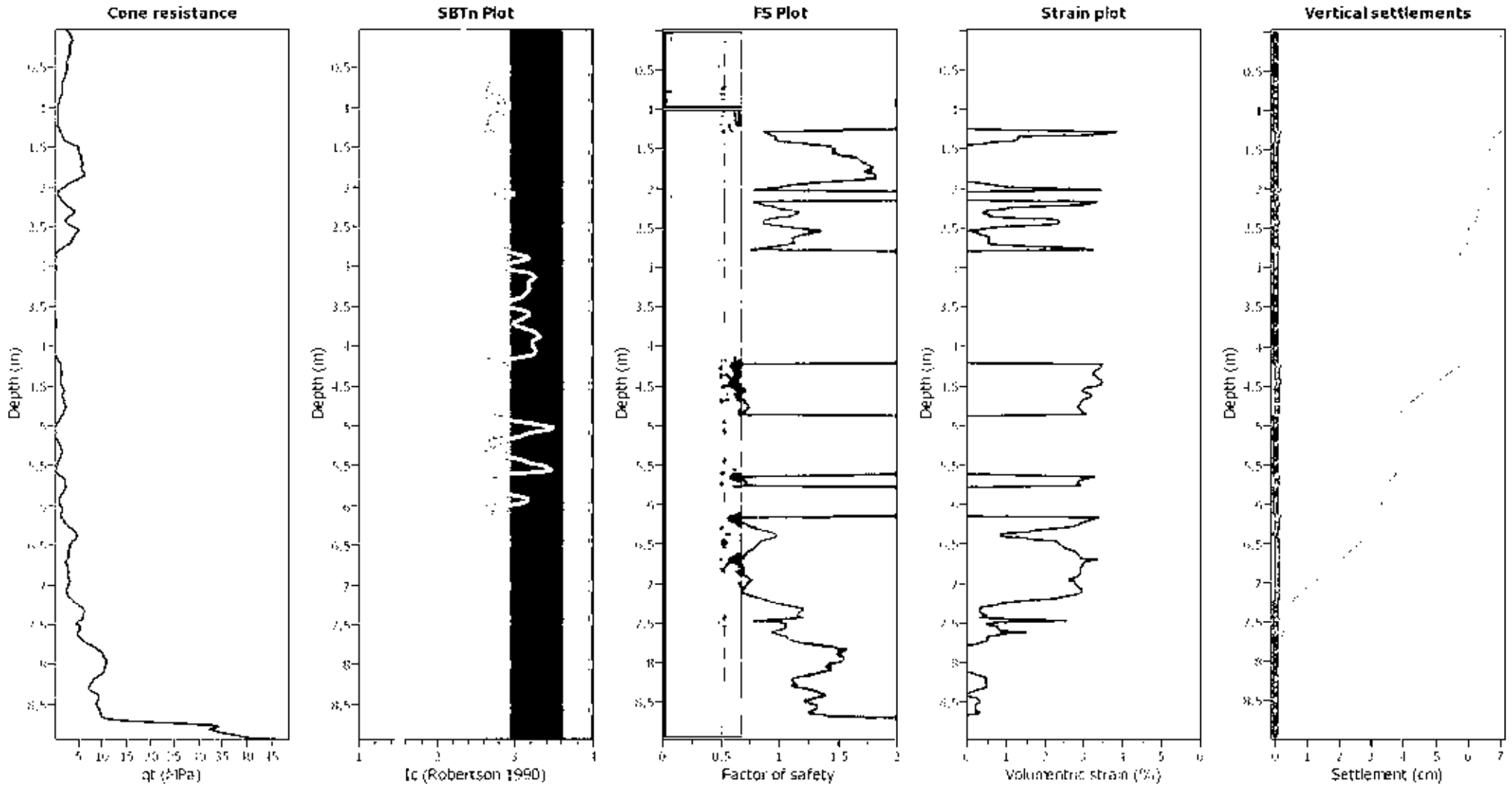
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

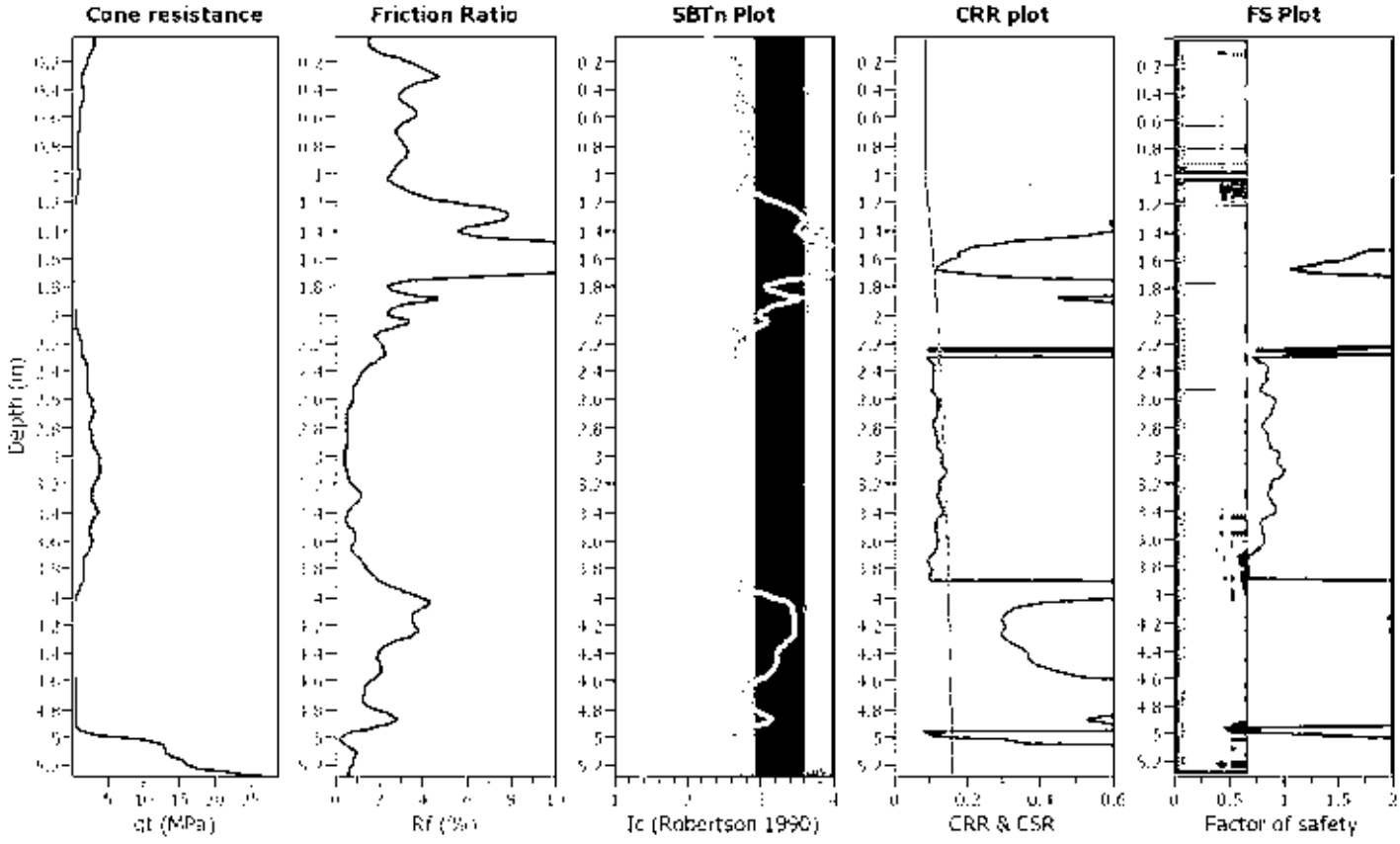
qc	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

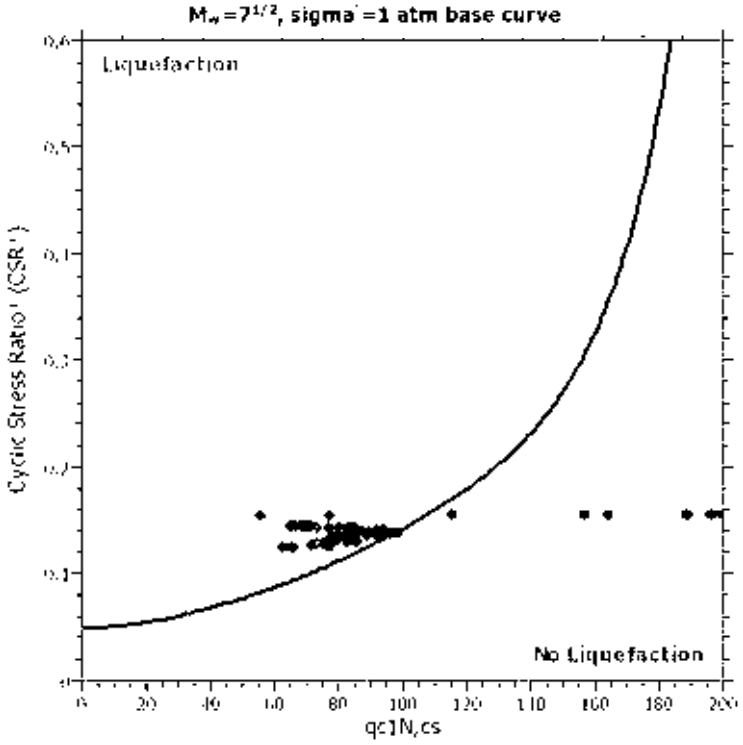
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

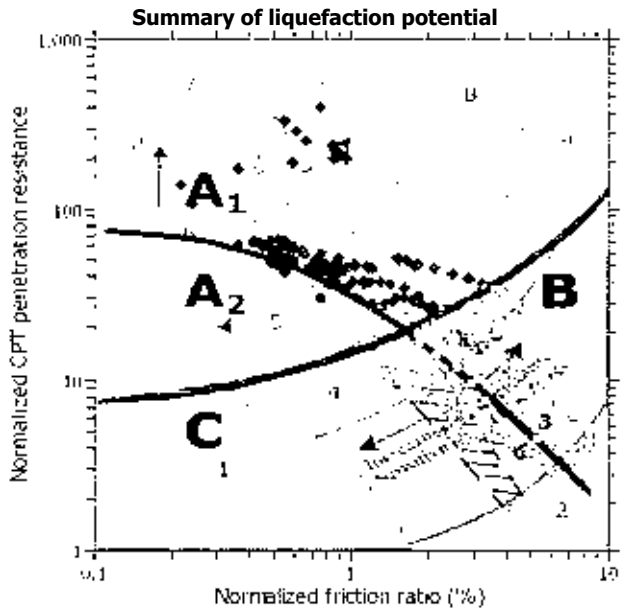
CPT file : CPT37_32SutherlandsRd

Input parameters and analysis data

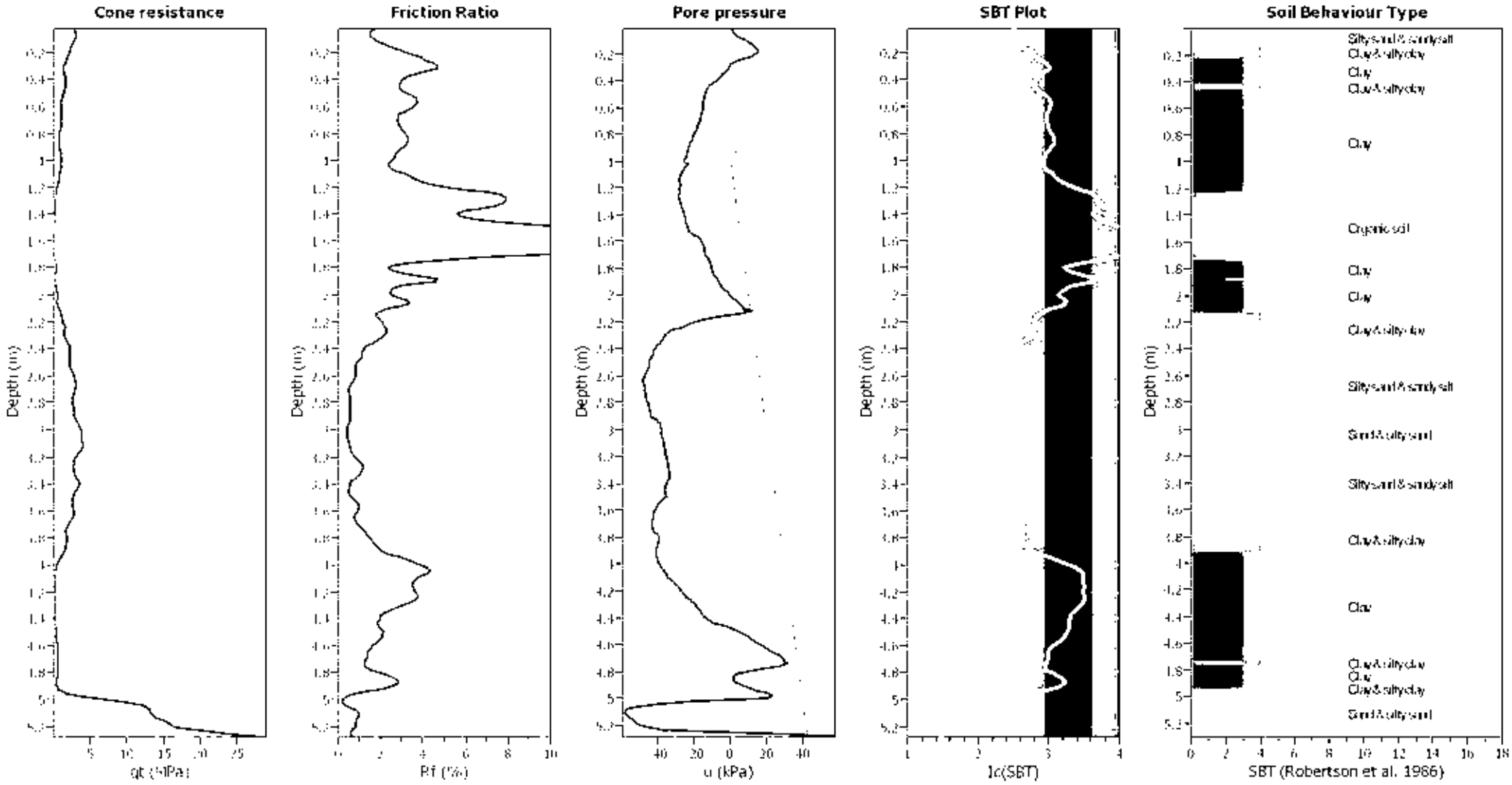
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.00 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



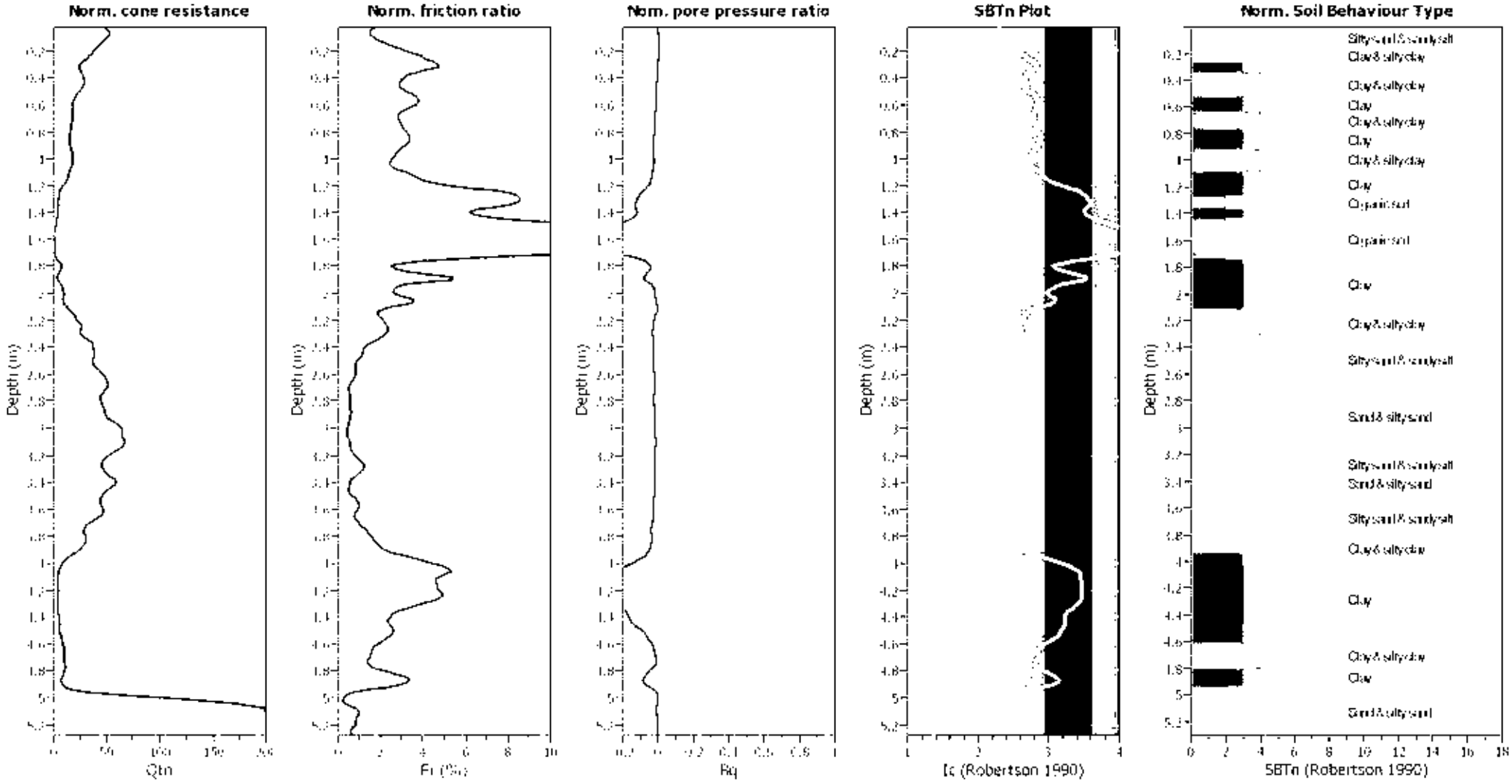
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



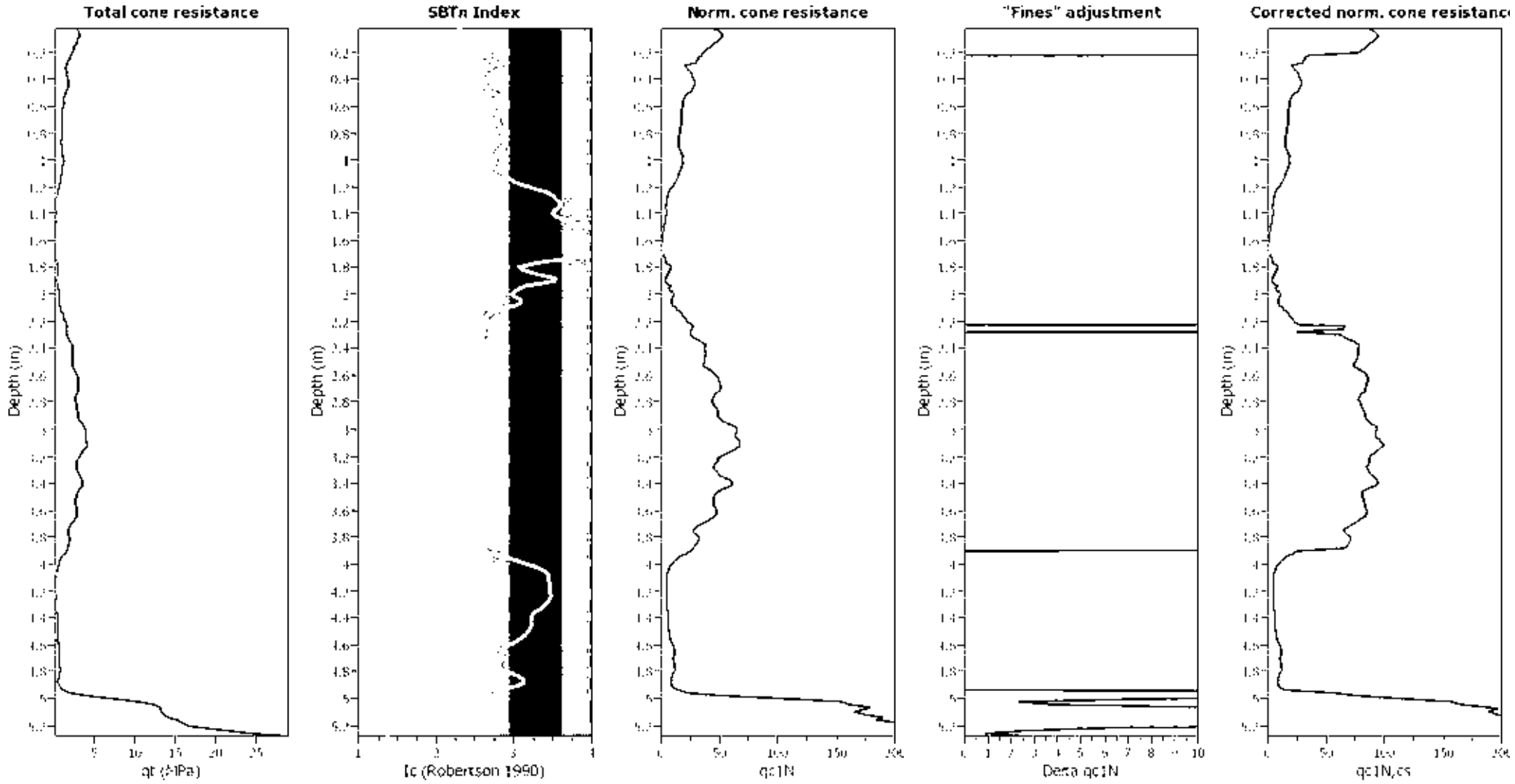
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

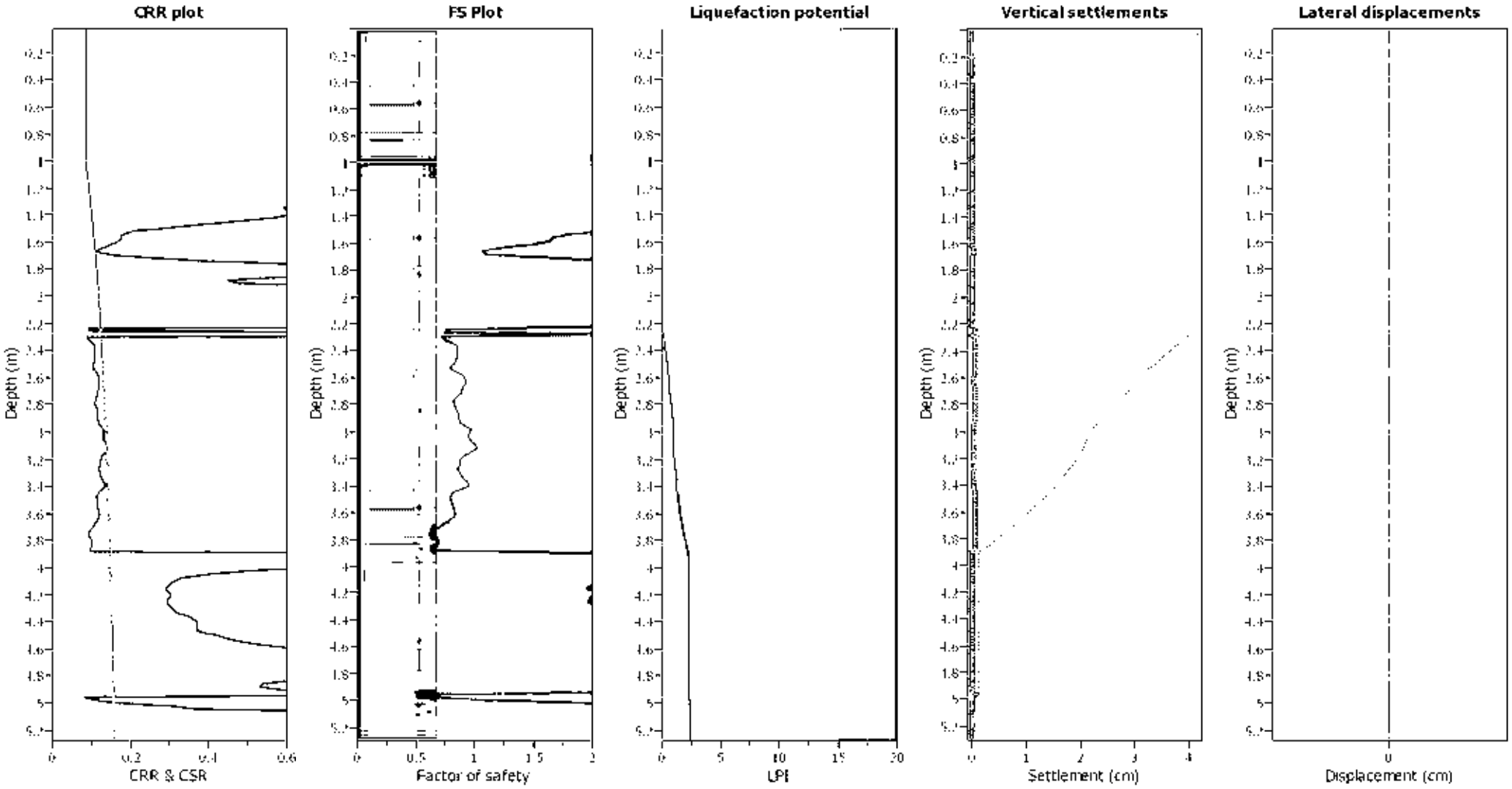
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

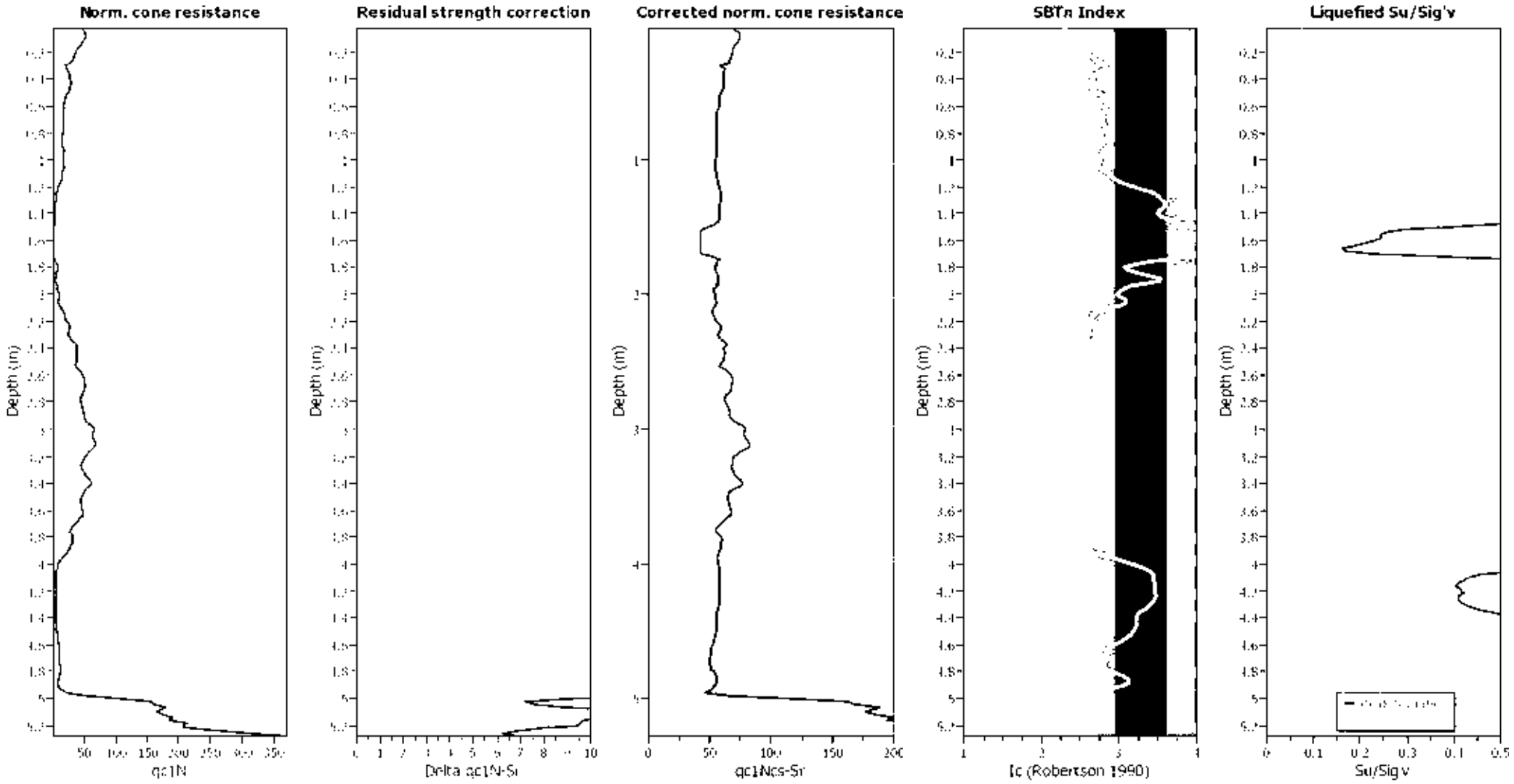
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

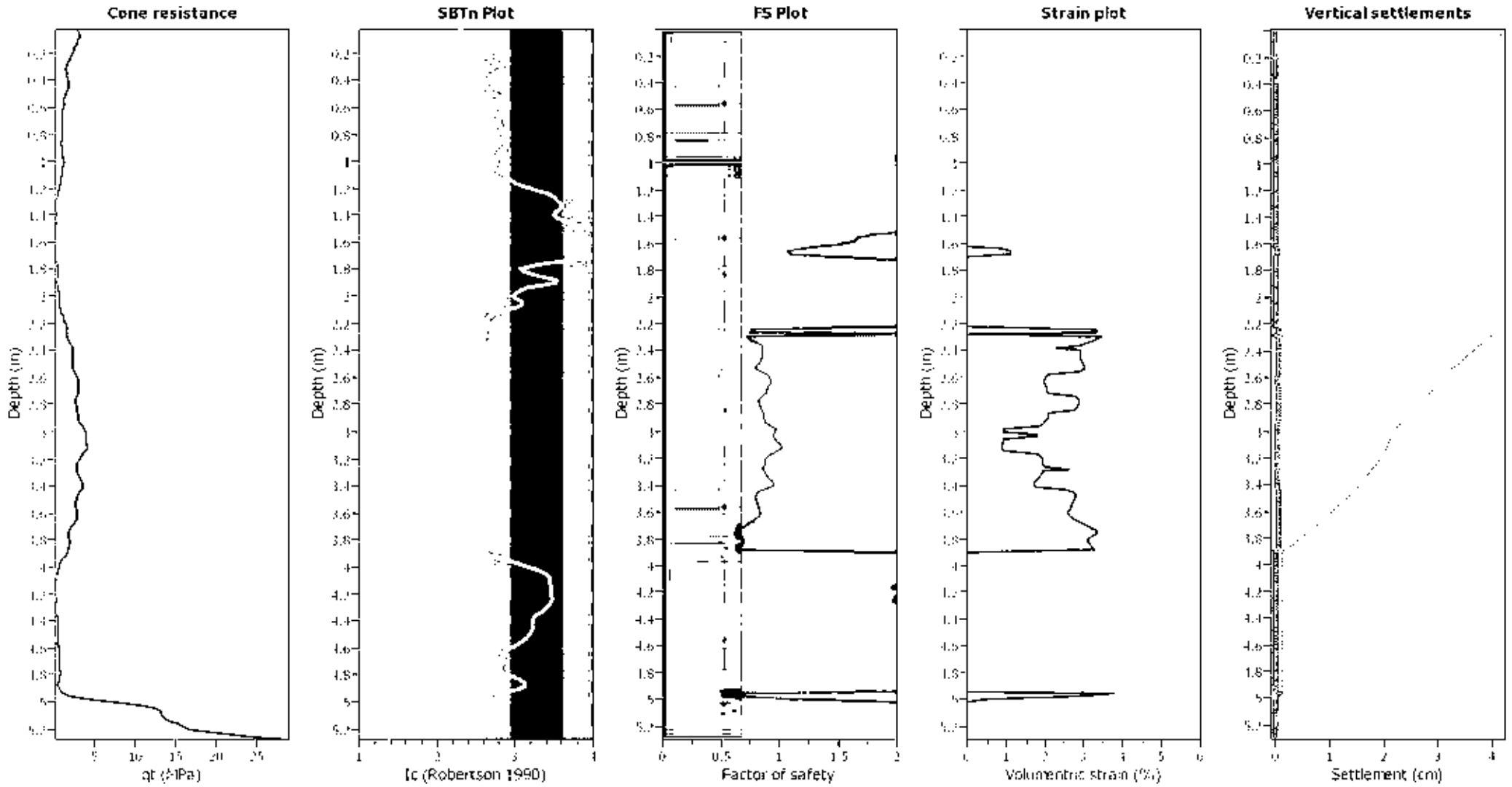
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth	N/A

Estimation of post-earthquake settlements



Abbreviations

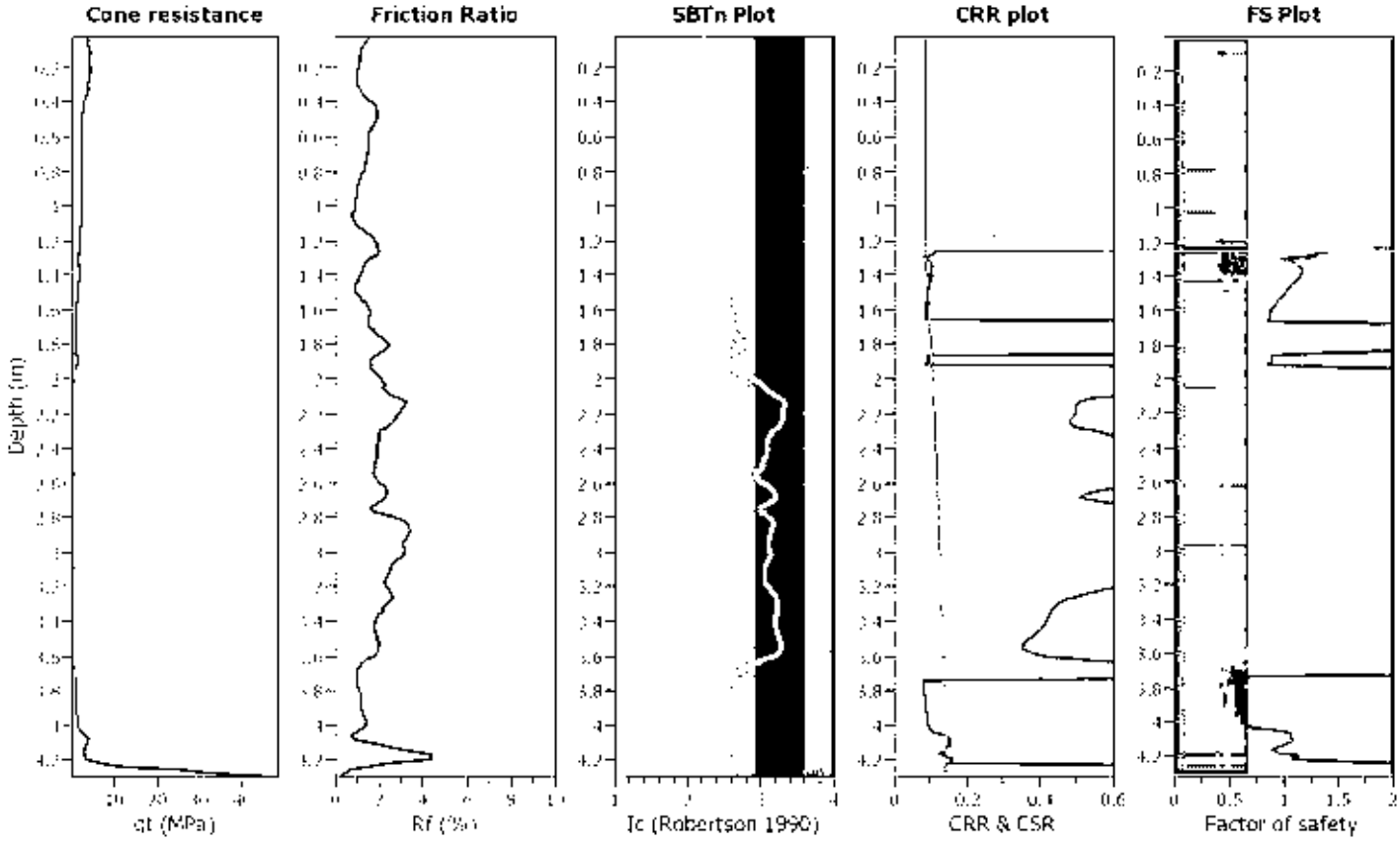
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

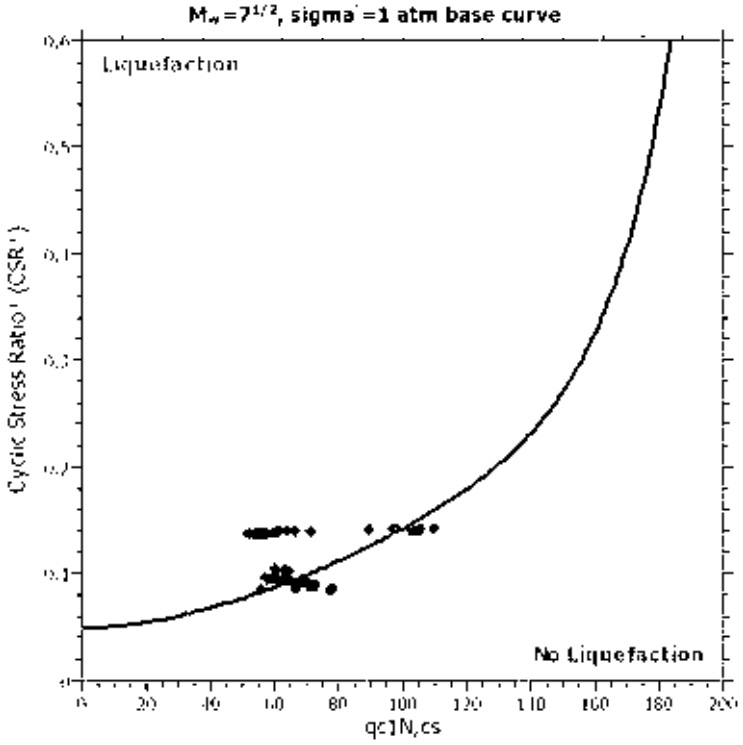
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

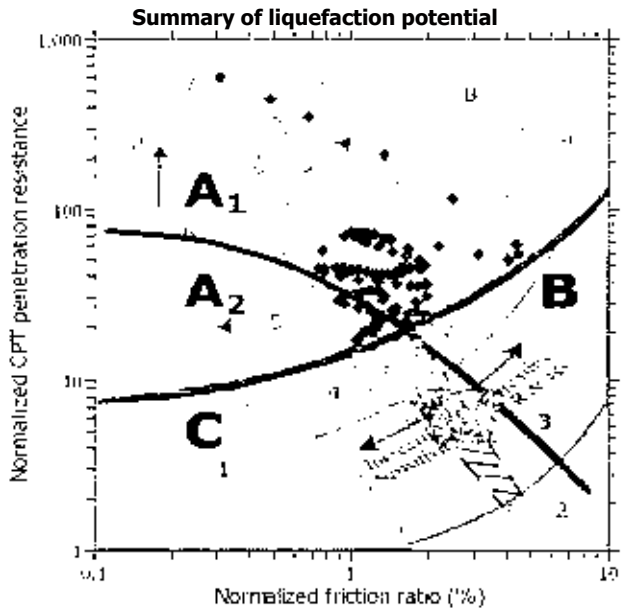
CPT file : CPT38_32SutherlandsRd

Input parameters and analysis data

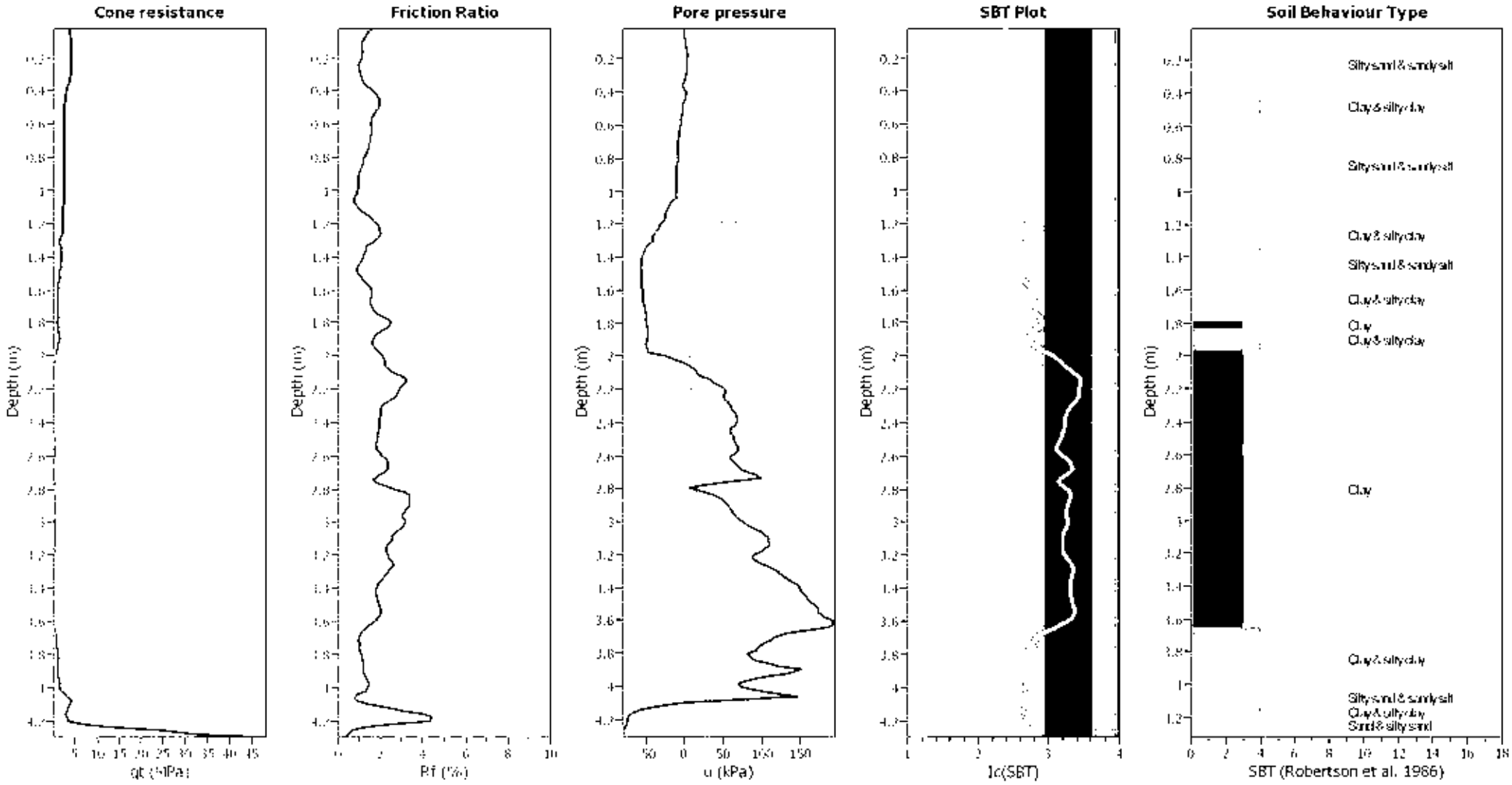
Analysis method	I&B (2008)	G.W.T. (in-situ):	1.25 m	Use fill	No	Clay like behavior applied:	Sand & Clay
Fines correction method	I&B (2008)	G.W.T. (earthq.):	1.25 m	Fill height:	N/A	Limit depth applied:	No
Points to test	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



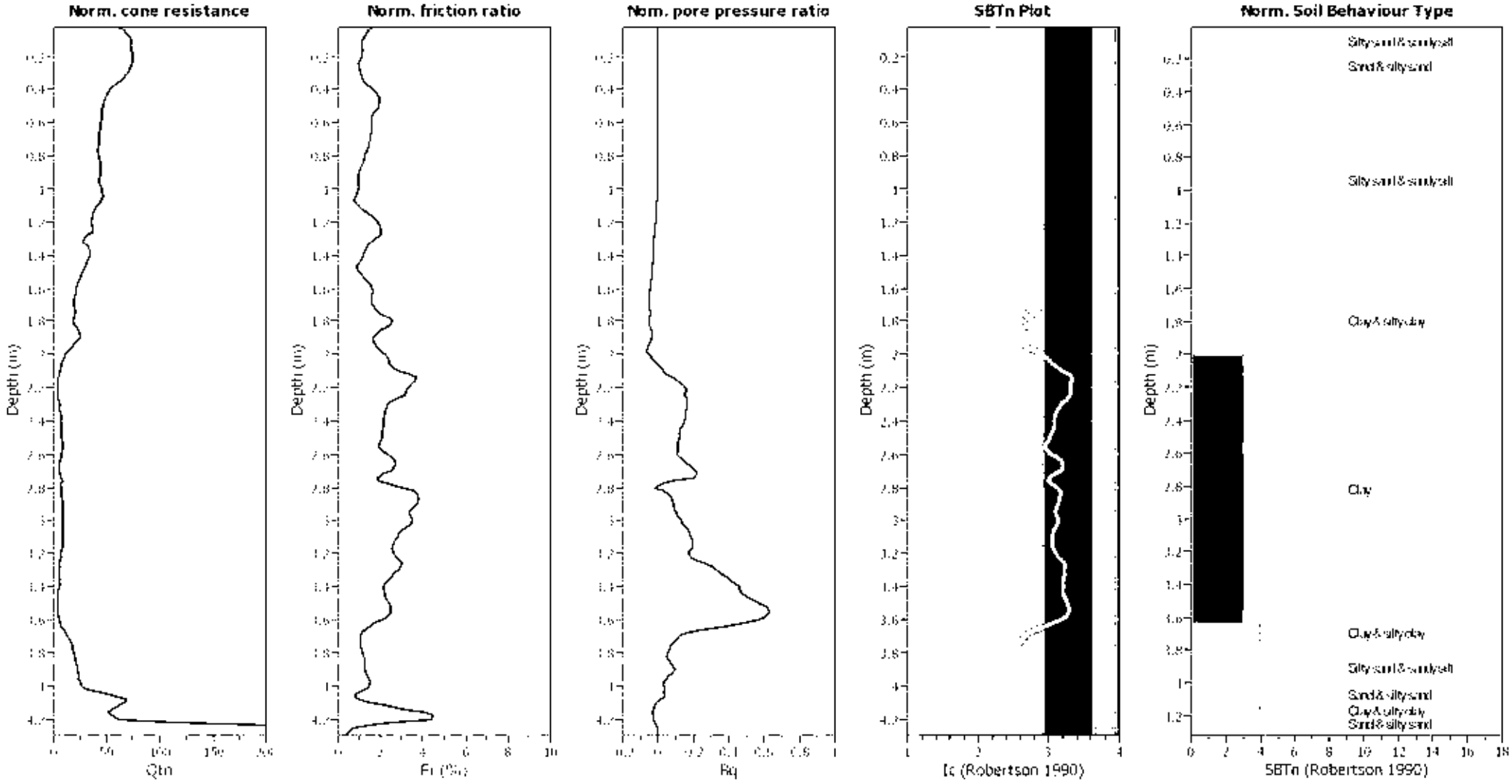
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



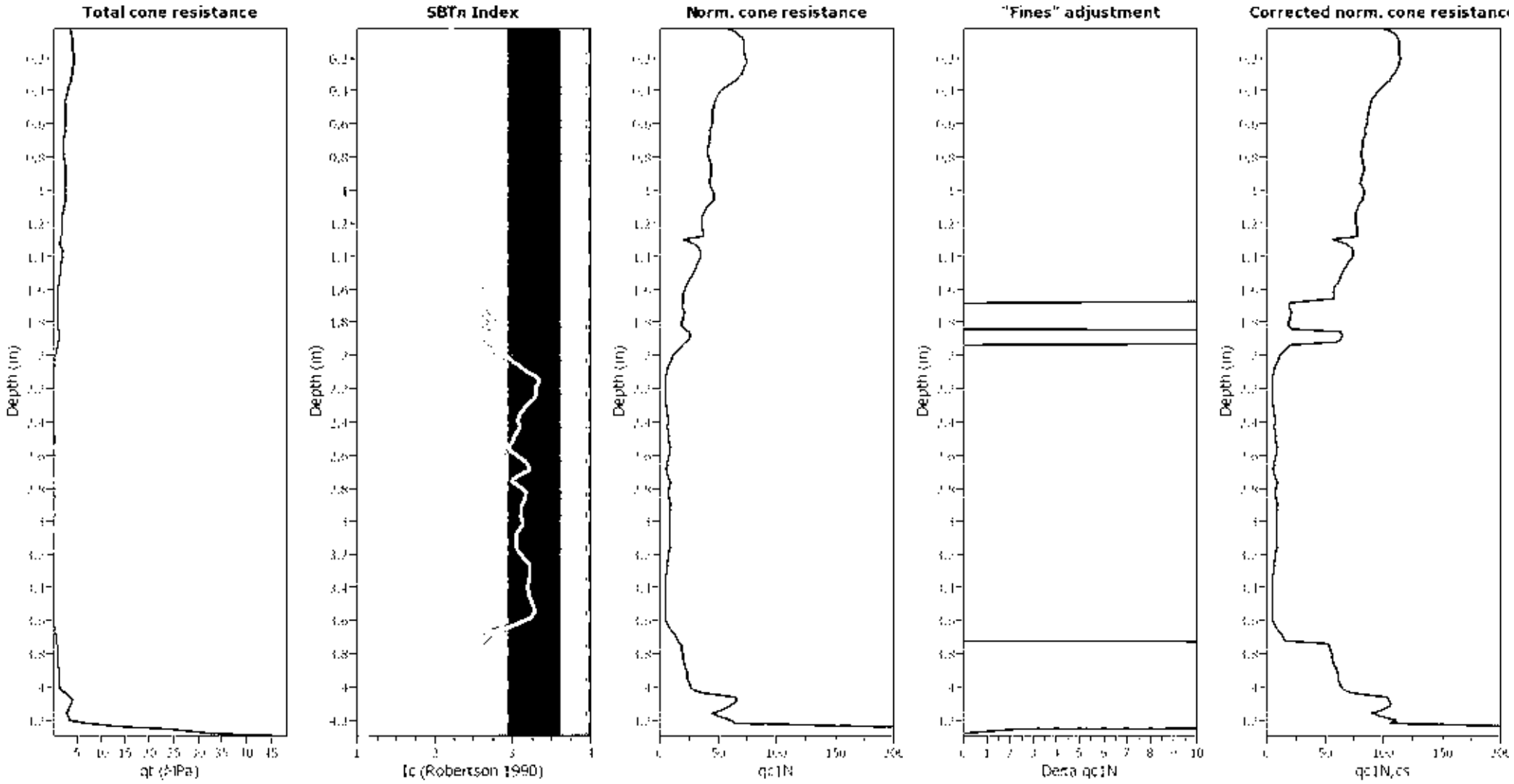
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

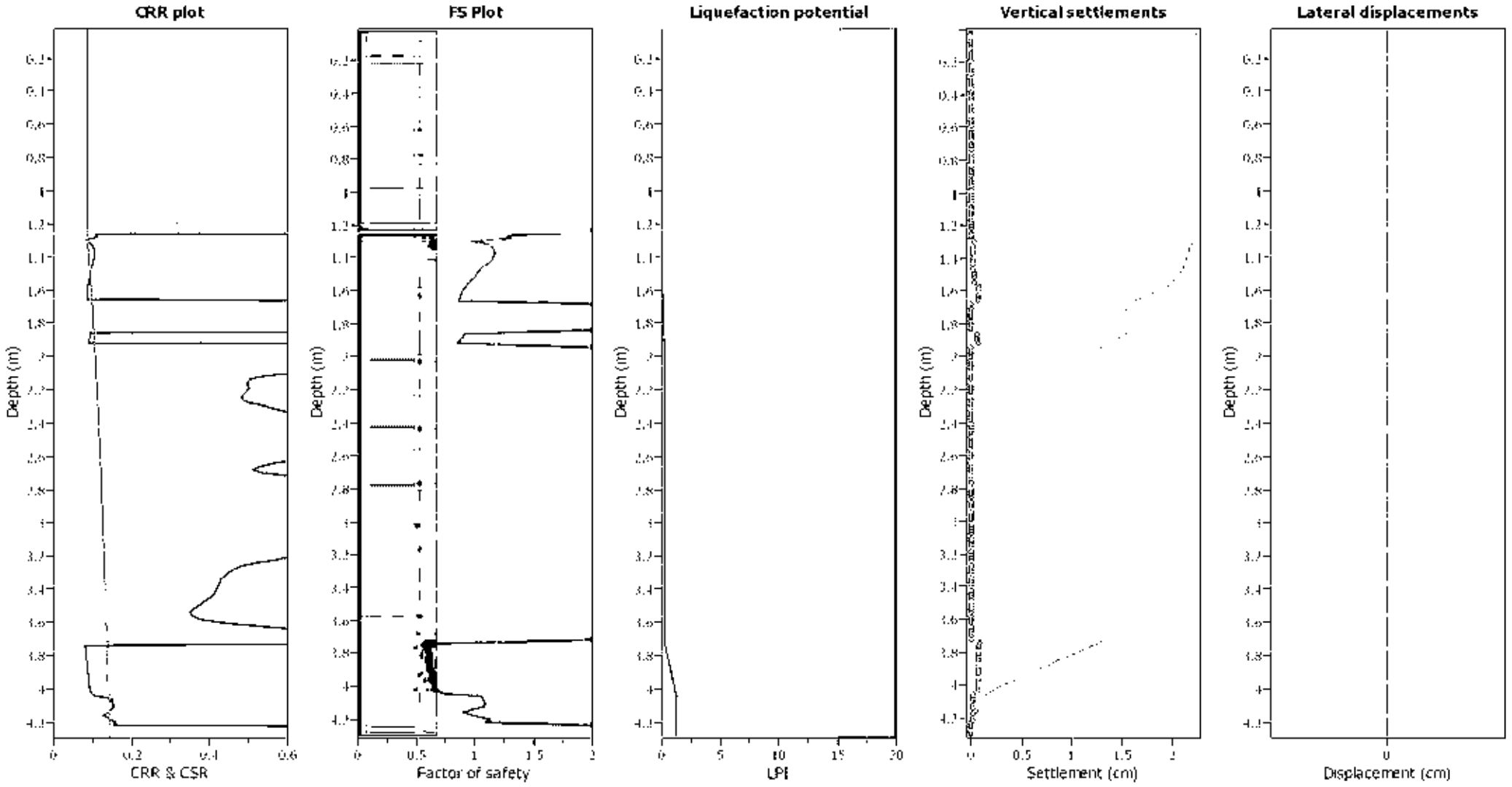
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth:	N/A

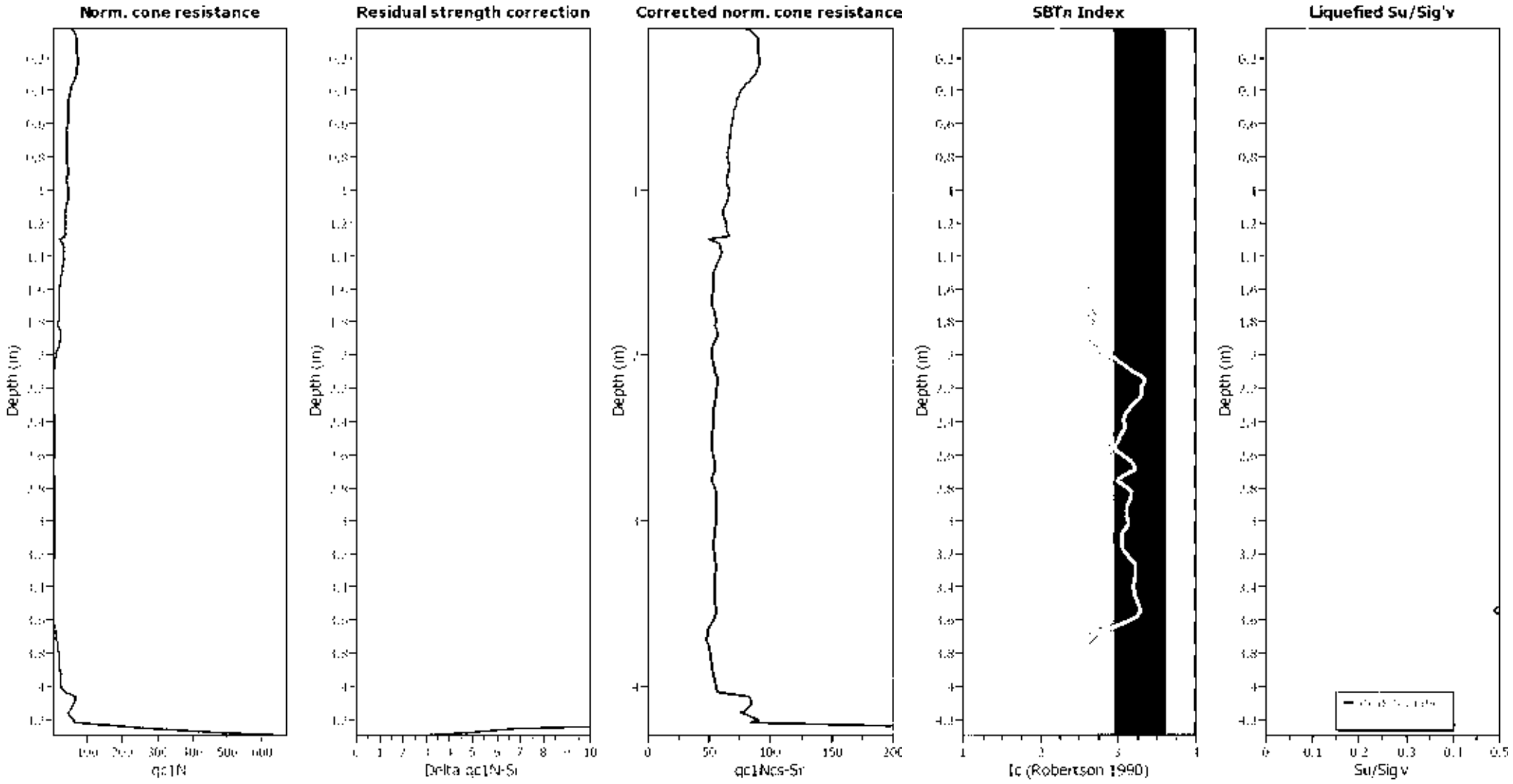
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

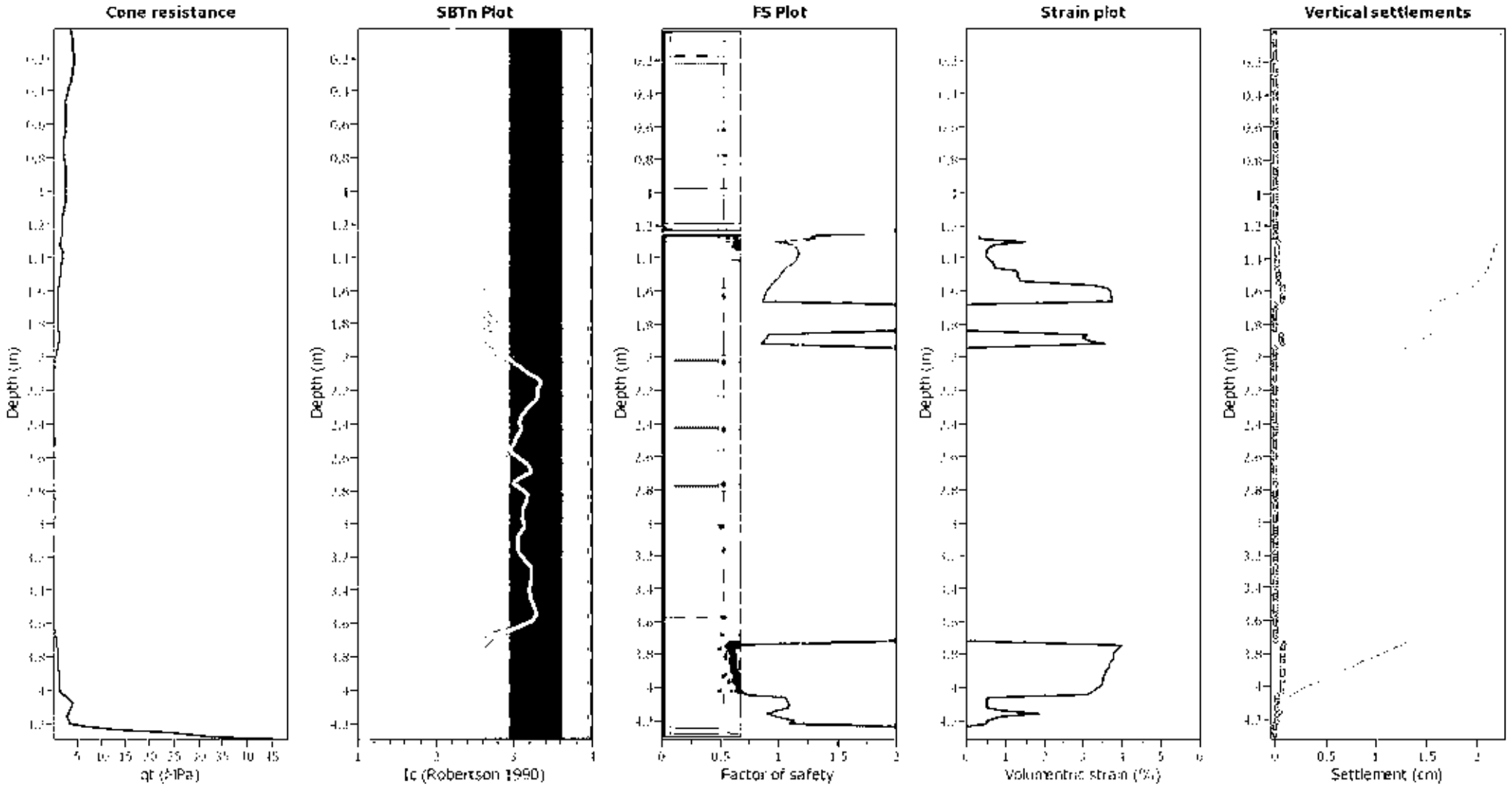
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.25 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

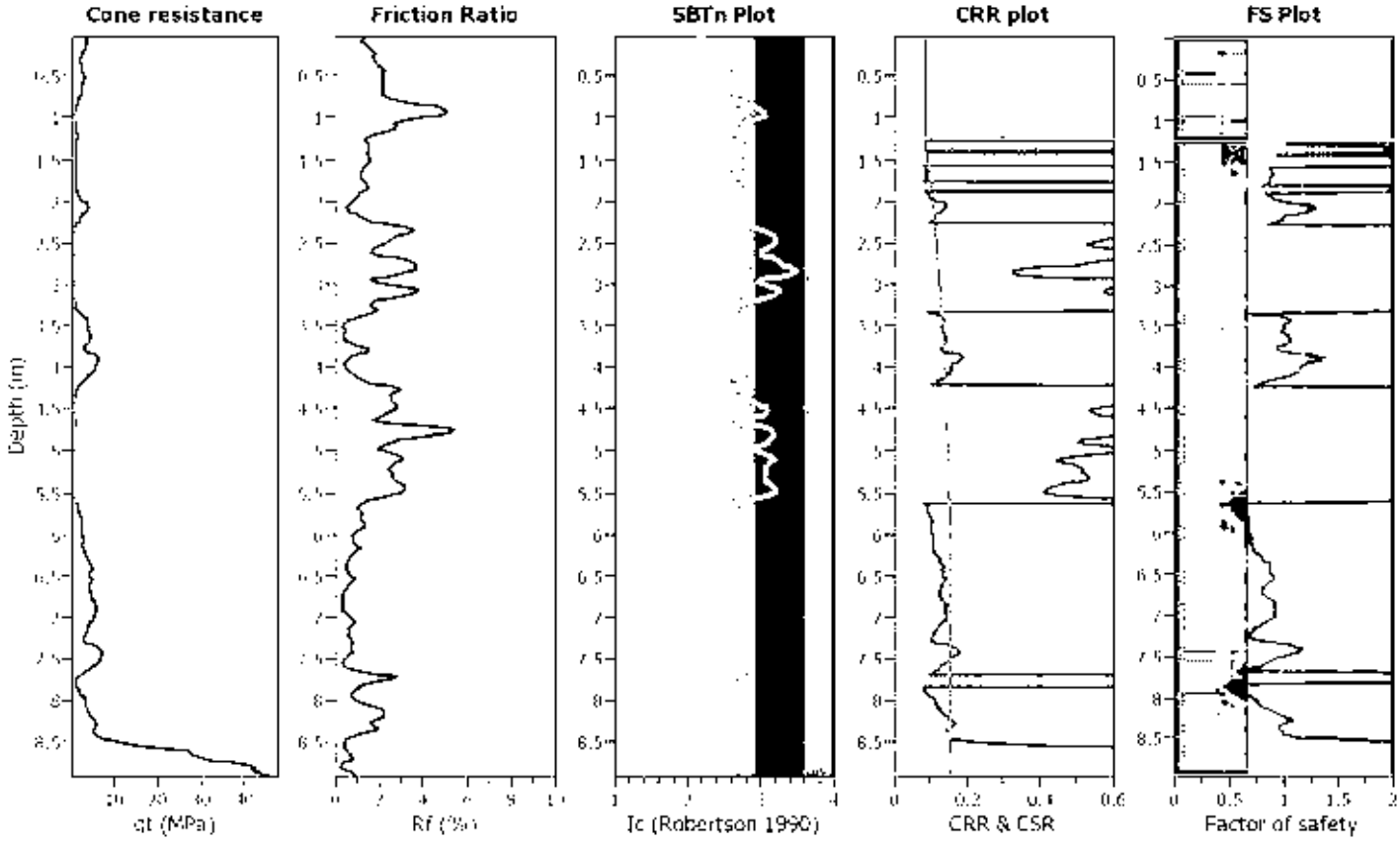
qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain

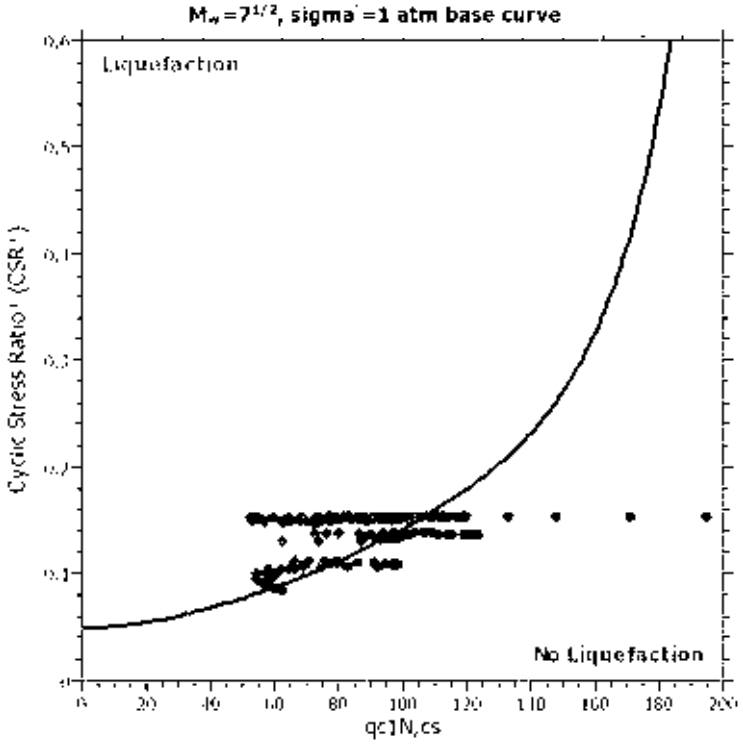
Project title : CCC Halswell ODP Geotechnical Investigation **Location : Halswell, Christchurch**

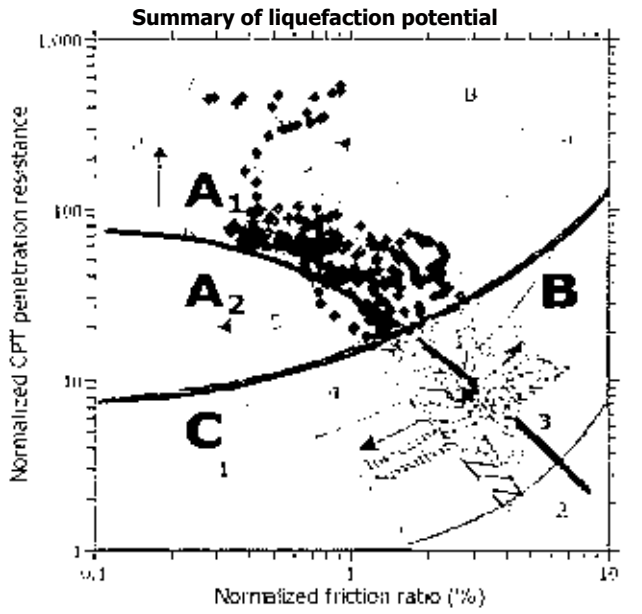
CPT file : CPT39_32SutherlandsRd

Input parameters and analysis data

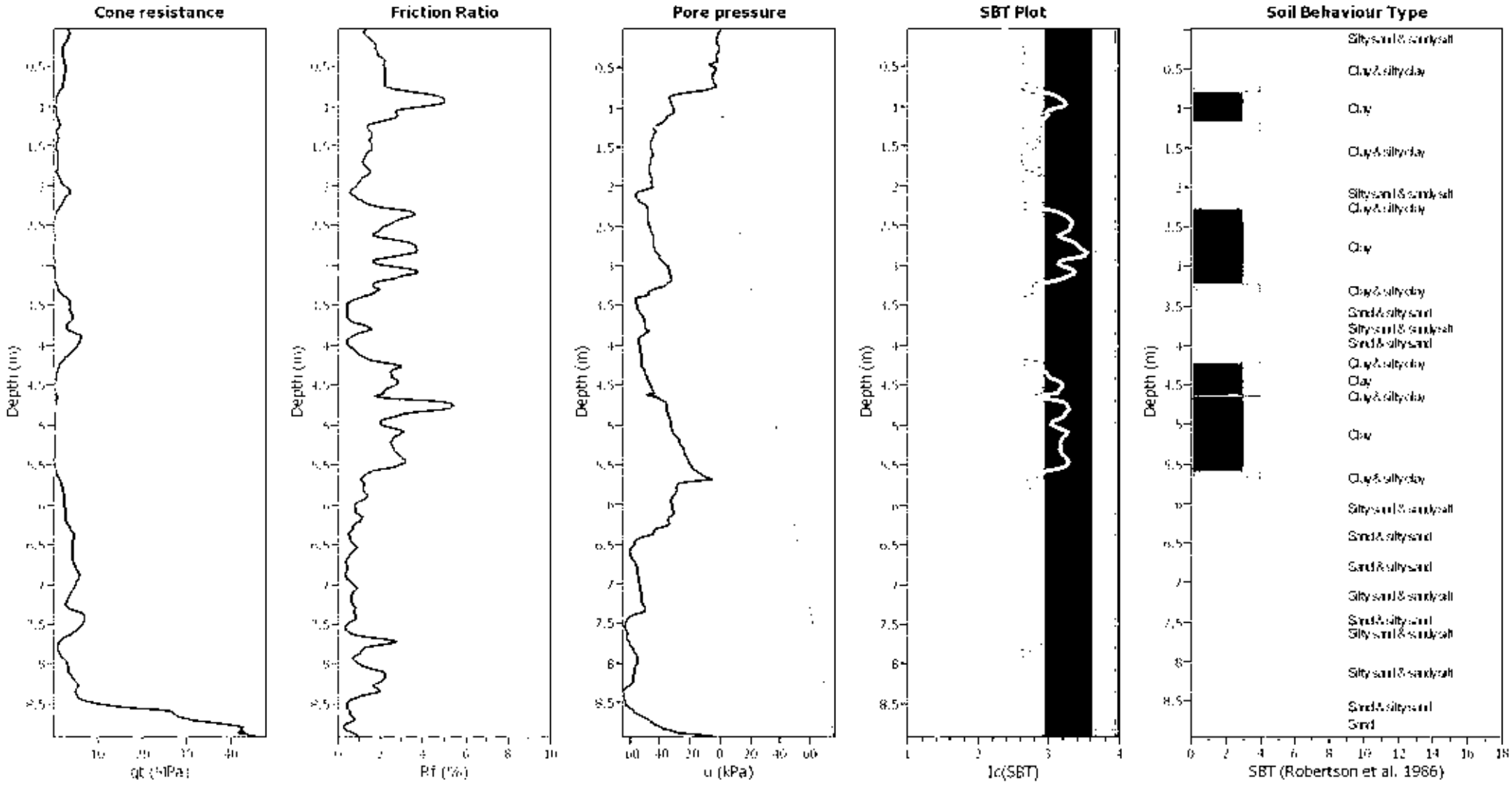
Analysis method:	I&B (2008)	G.W.T. (in-situ):	1.25 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	I&B (2008)	G.W.T. (earthq.):	1.25 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	No		
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K$_\sigma$ applied:	Yes		







CPT basic interpretation plots



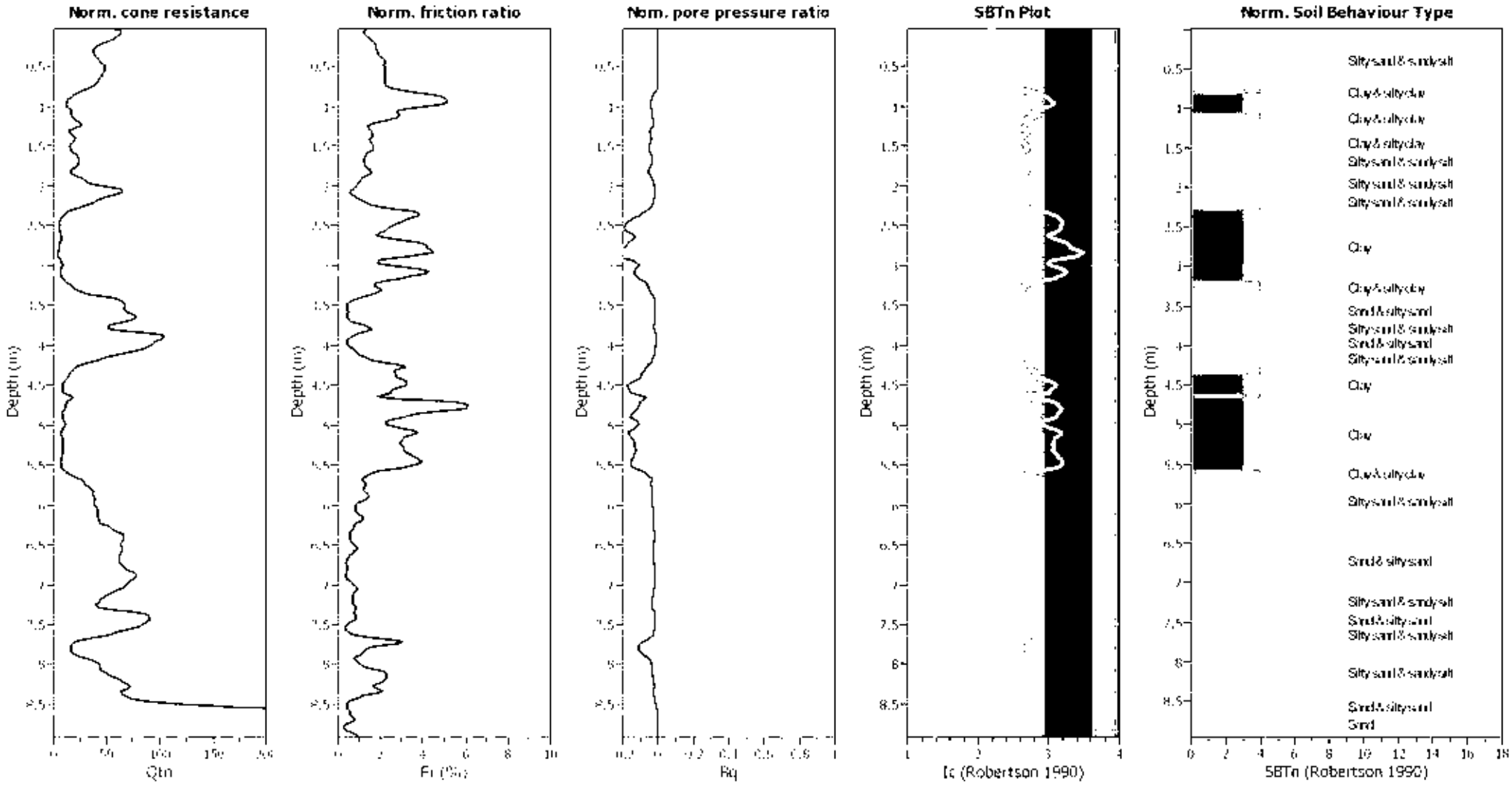
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.25 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



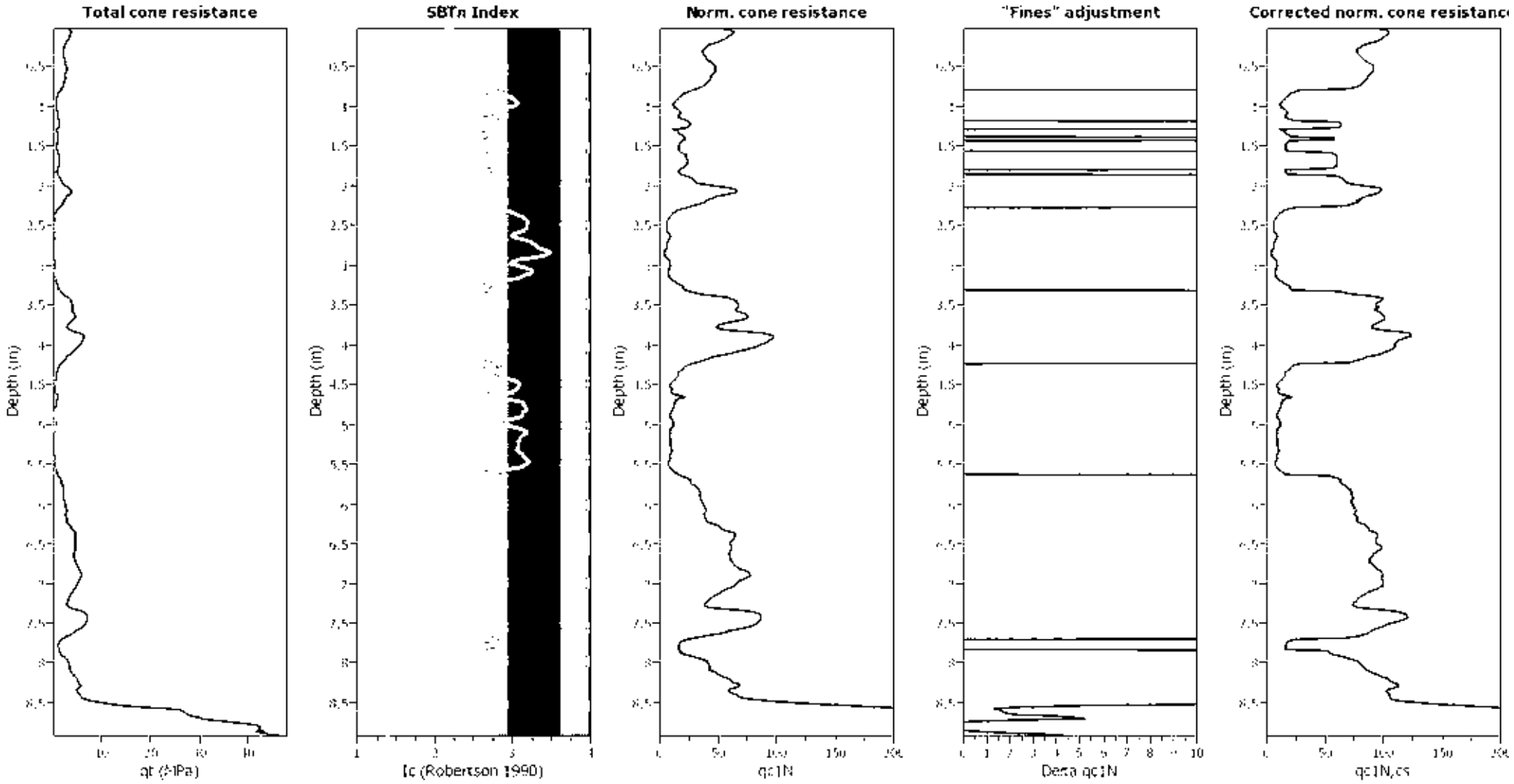
Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

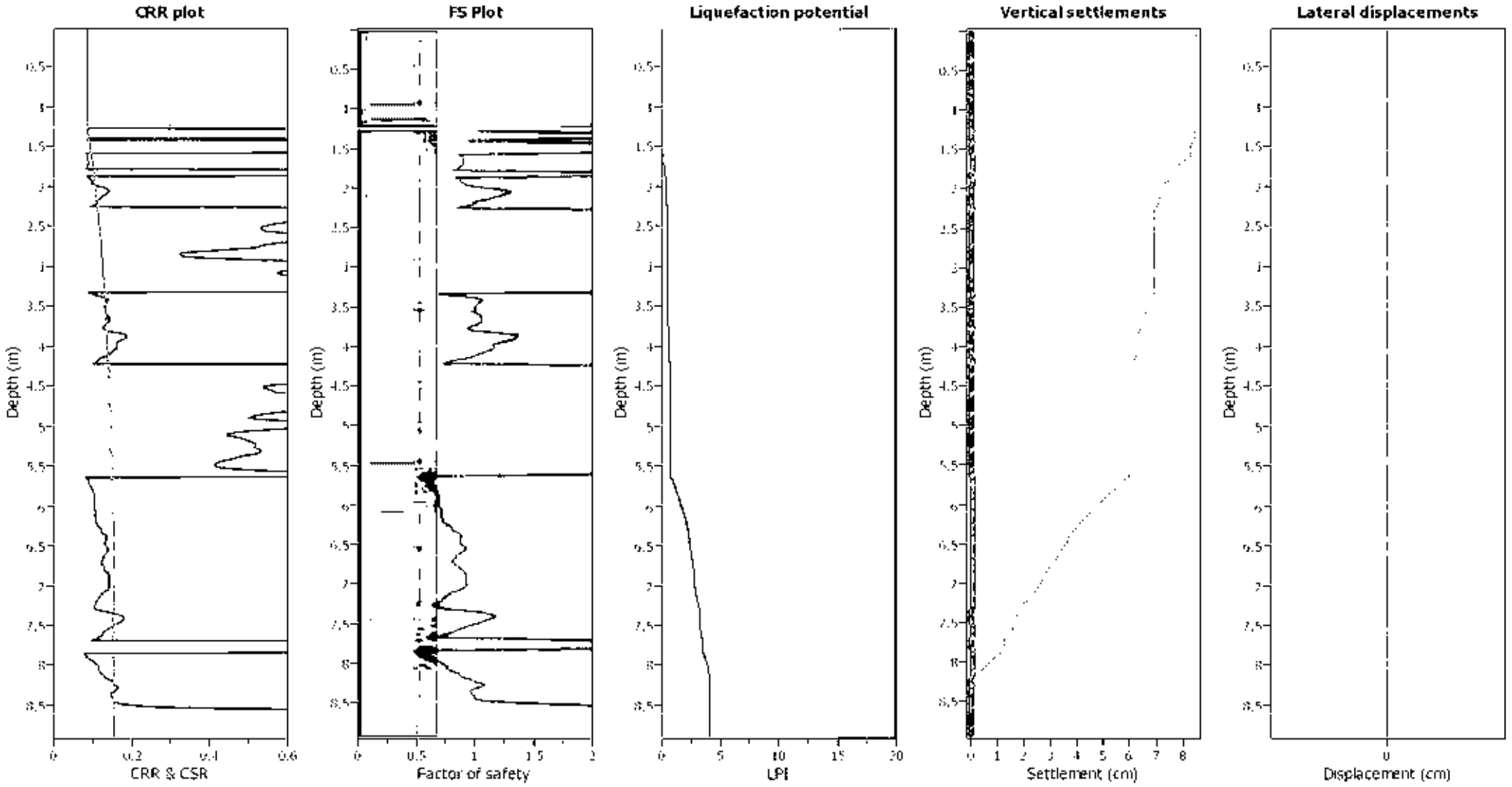
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Liquefaction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K$_\sigma$ applied:	Yes
Earthquake magnitude M$_w$:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.25 m	Fill height:	N/A	Limit depth:	N/A

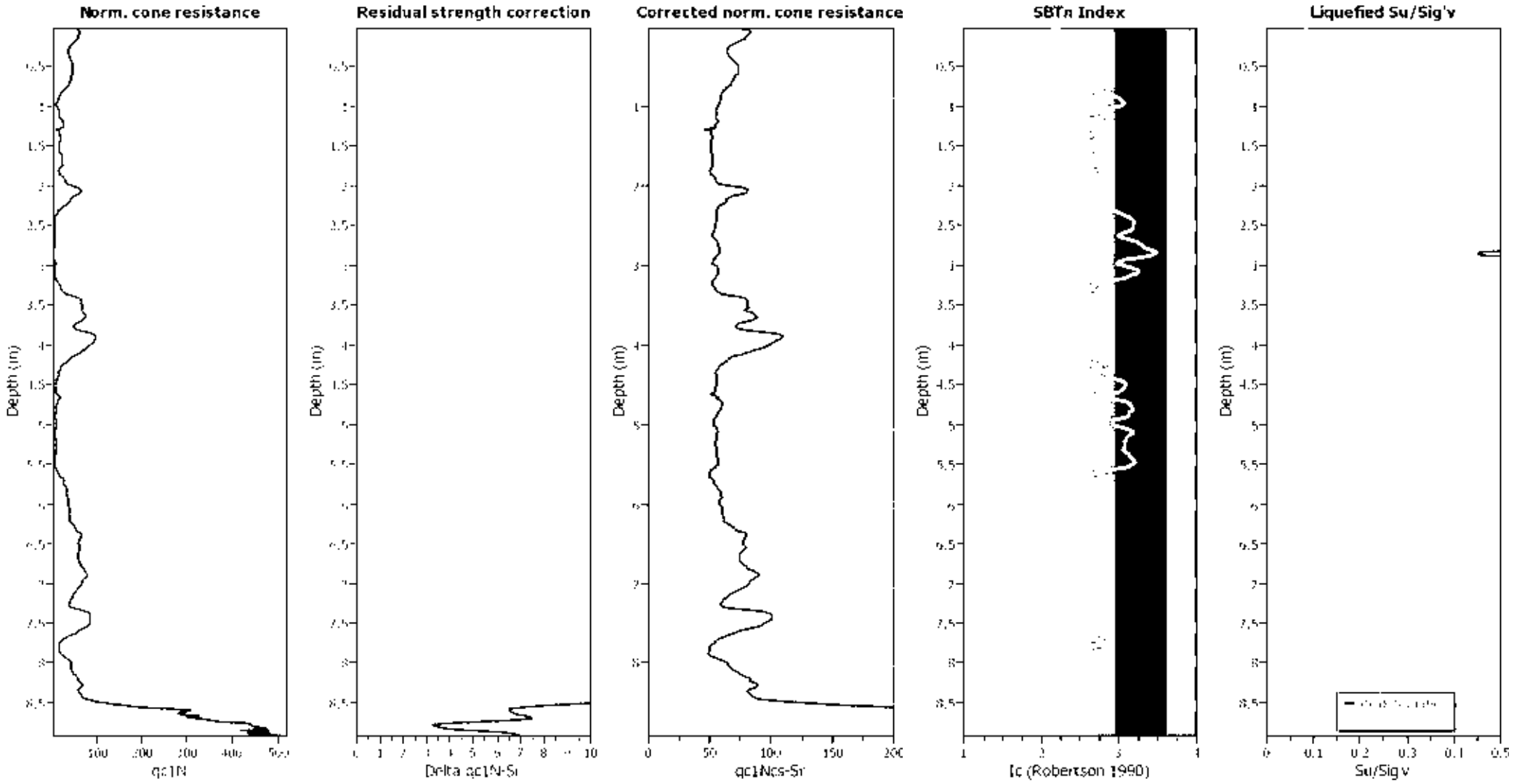
F.S. color scheme

- ☐ Almost certain it will liquefy
- ☐ Very likely to liquefy
- ☐ Liquefaction and no liquefaction are equally likely
- ☐ Unlike to liquefy
- ☐ Almost certain it will not liquefy

LPI color scheme

- ☐ Very high risk
- ☐ High risk
- ☐ Low risk

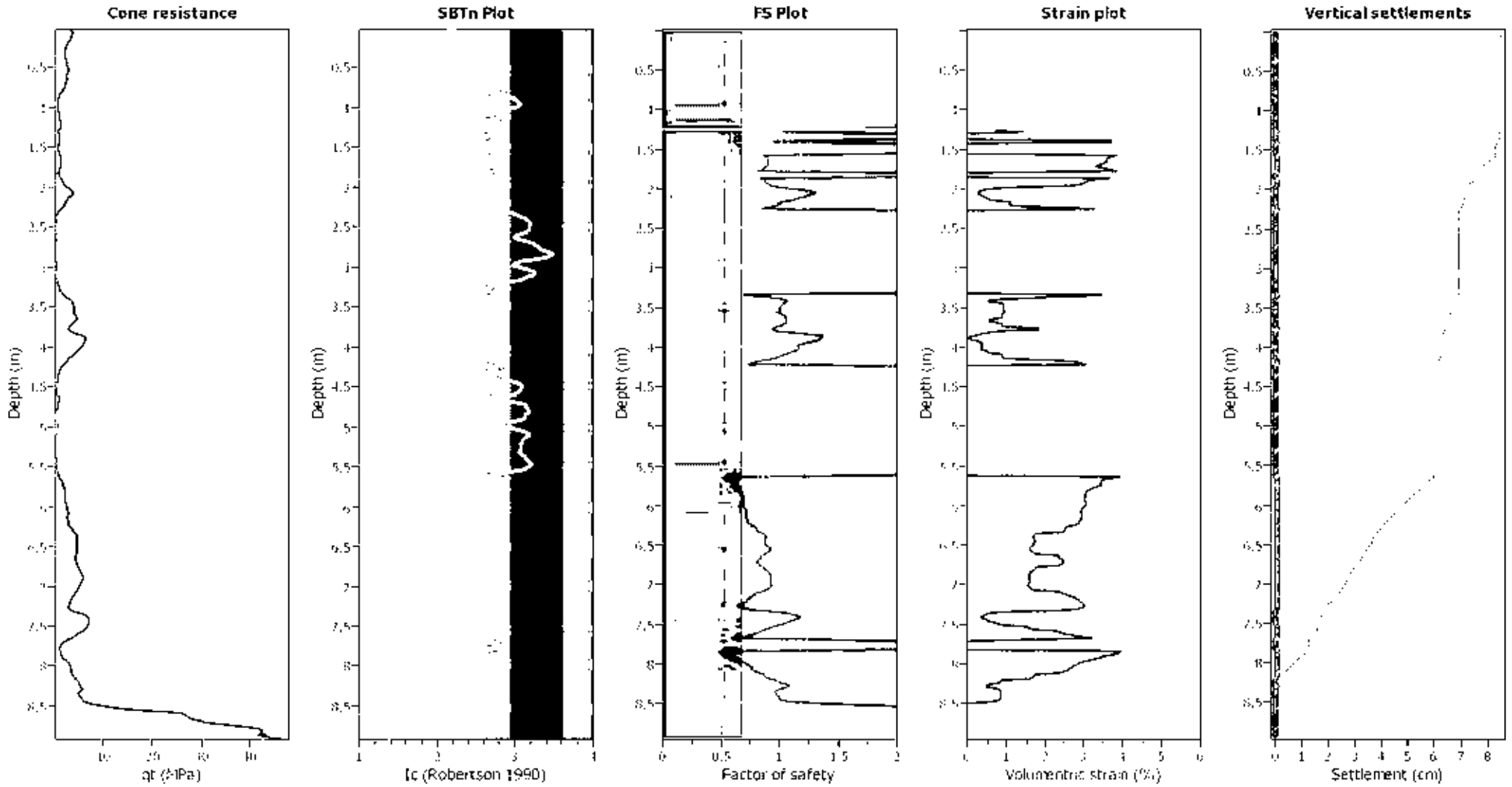
Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

Analysis method:	I&B (2008)	Depth to GWT (erthq.):	1.25 m	Fill weight:	N/A
Fines correction method:	I&B (2008)	Average results interval:	3	Transition detect. applied:	Sand & Clay
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behaviour applied:	.
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (erthq.):	1.25 m	Fill height:	N/A	Limit depth:	N/A

Estimation of post-earthquake settlements



Abbreviations

qt	Total cone resistance (cone resistance q corrected for pore water effects)
Ic	Soil Behaviour Type Index
FS	Calculated Factor of Safety against Liquefaction
Volumentric strain:	Post liquefaction volumentric strain