INDICE GENERALE

1. PREMESSA

La presente relazione è stata redatta per il progetto esecutivo inerente la ristrutturazione dell' edificio scolastico dell' istituto d'istruzione superiore "Galileo Galilei", sito in Mirandola, a seguito degli eventi sismici del 20 e del 29 maggio 2012.
L'indagine è stata effettuata mediante reperimento di materiale bibliografico conoscitivo, sopralluoghi, rilievi diretti sul sito e indagini geognostiche e sismiche.

2. INQUADRAMENTO GEOGRAFICO - AMMINISTRATIVO

L'area di intervento è ubicata in Mirandola, in via Barozzi
I principali riferimenti sono:

a. Riferimenti cartografici (fig. 2.1 - 2.2)

C.T.R.: Tavola 184 SO (1:25.000);
Sezione 184090 (1:10.000);
Elemento 184091 (1:5000).

b. Copertura aereofotogrammetrica

- Foto aeree RER 1954
- Foto aeree RER 1973-1978
- Ortofoto digitali AIMA 1996
- Ortofoto digitali Terraitaly 2000
- Ortofoto digitali QB 2003
- Ortofoto AGEA-RER 2008
- Ortofoto AGEA-RER 2011

c. Riferimenti catastali

Foglio 135, Mappale 66 - Comune di Mirandola

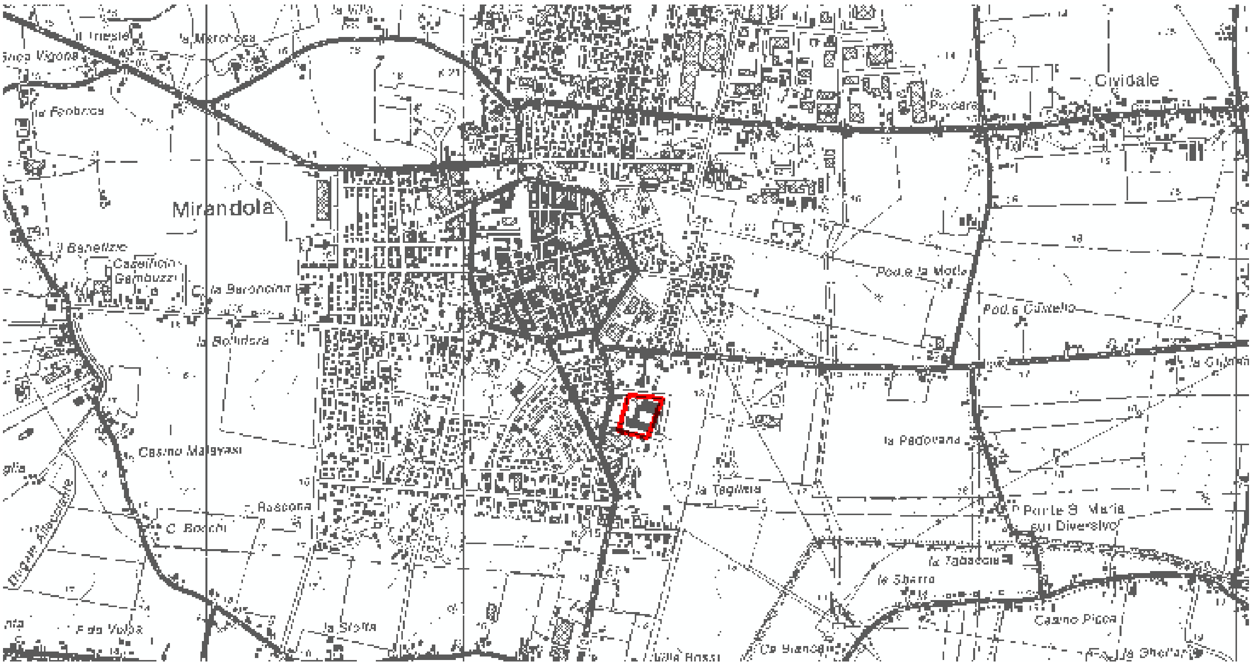


Figura 2.1: Localizzazione area di indagine su C.T.R. a scala 1:25.000.

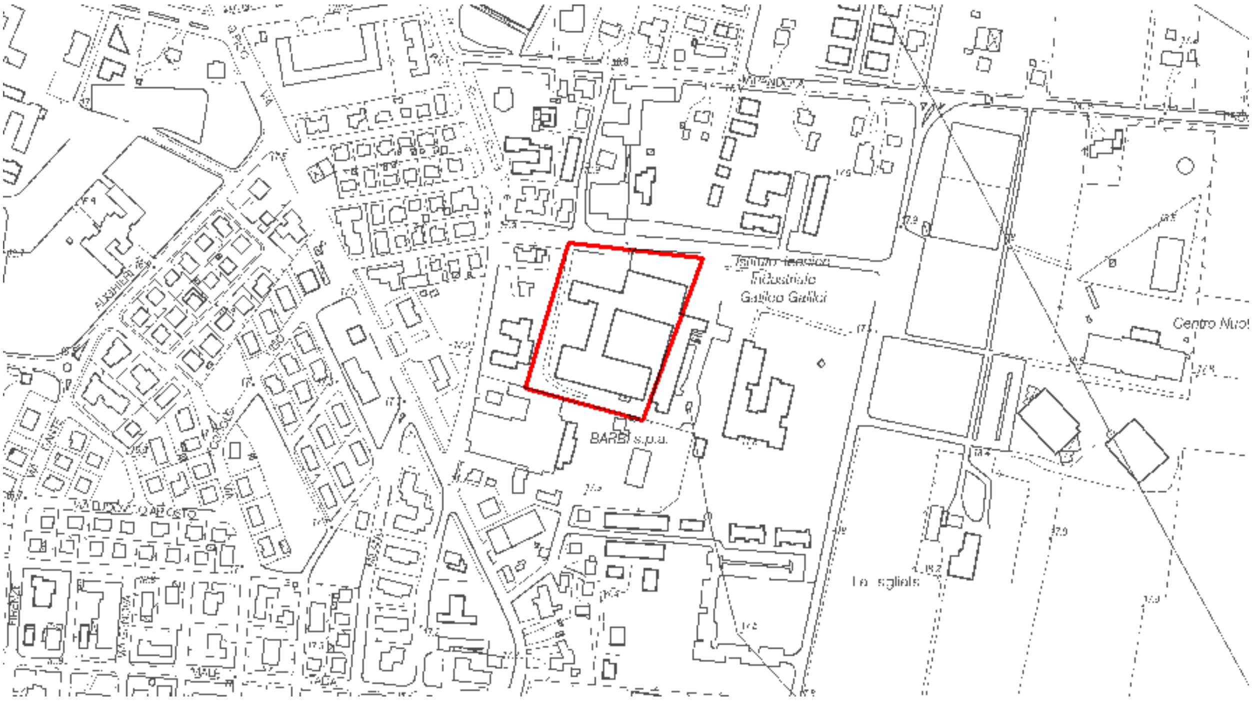


Figura 2.2: Localizzazione area di indagine su C.T.R. a scala 1:5.000.

3. INQUADRAMENTO NORMATIVO

- D.P.R. 380/2001

- Ordinanza P.C.M. n. 3274del 20.3.2003

Primi elementi in materia di criteri generali per la classificazione sismica del territorio nazionale e di normative tecniche per le costruzioni in zona sismica.

- Eurocodice 7

Progettazione geotecnica – Parte 1: Regole generali.

- Eurocodice 8

Indicazioni progettuali per la resistenza sismica delle strutture - Parte 5: Fondazioni, strutture di contenimento ed aspetti geotecnici.

- D.M. 14 Gennaio 2008

Norme Tecniche per le costruzioni.

- Circolare n. 617 del 02/02/2009

4. USO DEL SUOLO

L'area di intervento risulta compresa nella tipologia "Insediamenti di servizi (Is)". Quanto precedentemente descritto si può riscontrare nella Carta dell'Uso del Suolo della Regione Emilia-Romagna (ed. 2003) (fig. 4.1).

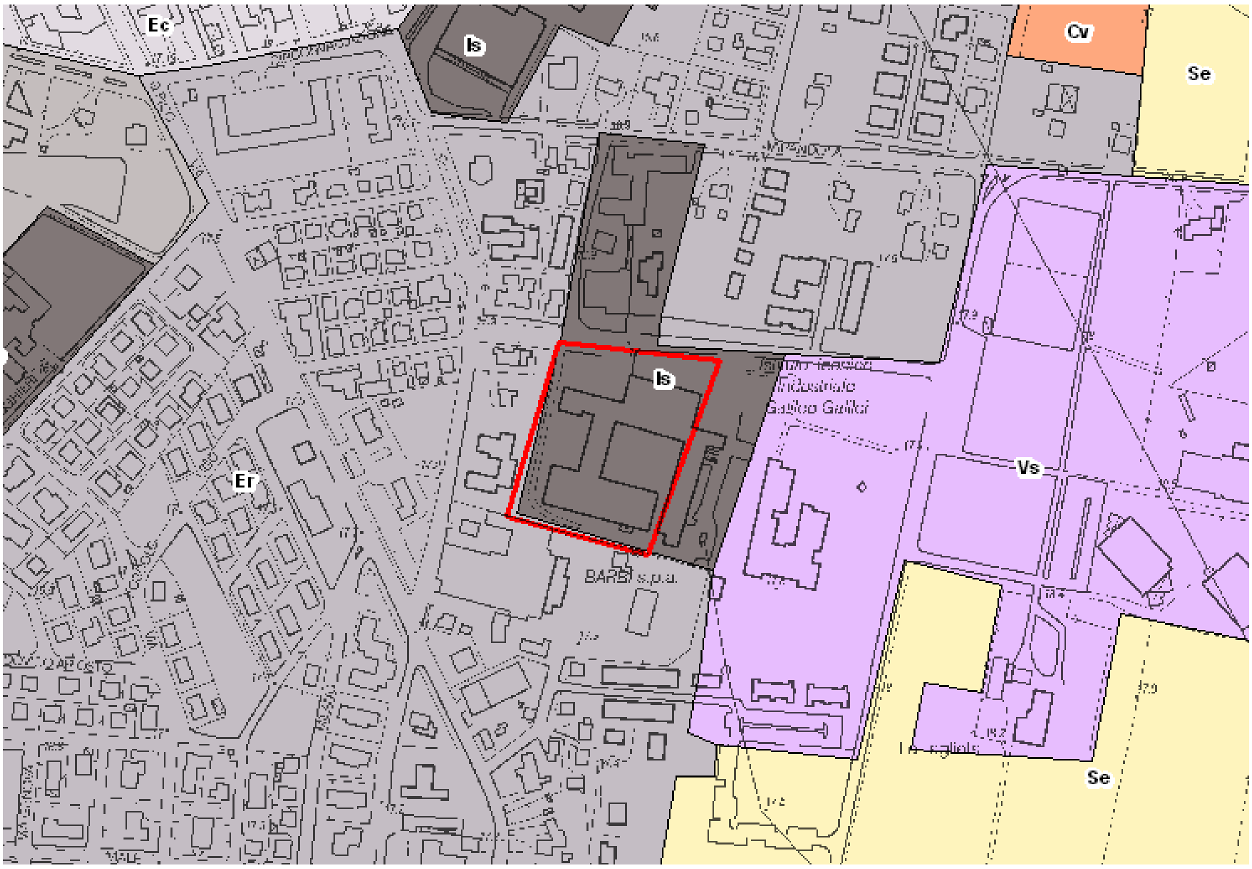


Figura 4.1: Carta Uso del suolo - Regione Emilia-Romagna ed. 2003.

5. INQUADRAMENTO GEOLOGICO E GEOMORFOLOGICO

Dal punto di vista geologico il territorio comunale di Mirandola (MO) ricade nel settore assiale della Pianura Padana "Propriamente Detta", appartenente al bacino subsidente Plio- Quaternario Padano, costituito da un ampia depressione a stile compressivo, formata negli orizzonti più recenti da depositi Pliocenici-Quaternari. I terreni Olocenici, di origine alluvionale, poggiano sul sottostante Pleistocene continentale e/o marino, strutturalmente caratterizzato da elementi sufficientemente definiti.
In termini generali ed in modo schematico possiamo individuare 3 zone e cioè:
a) "Zona delle pieghe Pedeappennniniche", dal margine collinare alla Via Emilia, costituita da una successione di sinclinali ed anticlinali, con asse a vergenza Appenninica spesso fagliate e sovrascorse sul fianco nord.
b) "Zona della Sinclinale di Bologna-Bomporto-Reggio Emilia, dove i depositi Quaternari raggiungono il loro massimo spessore per tutta la Pianura Padana.
c) "Zona della Dorsale Ferrarese", alto strutturale costituito da una serie di pieghe associate a faglie dove, in talune culminazioni, lo spessore del Quaternario si riduce a poche decine di metri.

Le conoscenze sull'assetto geologico-strutturale del Bacino Padano derivano dalle prospezioni geofisiche e perforazioni eseguite da AGIP e SPI.
Tali ricerche indicano la sostanziale presenza di due complessi sedimentari poggianti su substrato Mesozoico: il primo, inferiore, caratterizzato da formazioni Pliocenico- Pleistoceniche, essenzialmente costituite da sedimenti in facies marina, il secondo, superiore, da formazioni Oloceniche costituite da depositi clastici in facies continentale, di origine glaciale e fluviale, dovuti all'attività dei fiumi alpini e appenninici.
L'assetto geostrutturale del sottosuolo è caratterizzato da un susseguirsi di sovrasconimenti, più o meno sviluppati, talora complicati da faglie, interessanti principalmente le serie deposizionali marine mesozoiche.
Il complesso più superficiale risulta, da un punto di vista deposizionale, caratterizzato dalle alluvioni oloceniche del Fiume Po e dei suoi affluenti appenninici, in particolare il Fiume Secchia ed il Fiume Panaro; pertanto, il sottosuolo è caratterizzato, per molte decine di metri dal piano campagna e comunque per uno spessore di gran lunga superiore a quello che può essere interessato dalla diffusione del carico indotto da un qualsiasi tipo di fondazione, dalla presenza di depositi alluvionali, di cui è nota la stratigrafia attraverso i numerosi pozzi per acqua perforati nella zona; tale copertura alluvionale, di età pleistocenica ed olocenica è costituita, almeno per le prime decine di metri di profondità, da una monotona sequenza di strati con granulometria compresa tra le argille e le sabbie più grossolane.
La geologia del settore di territorio studiato è quindi caratterizzata dalla presenza di depositi attribuibili alle unità oloceniche più superficiali della potente successione quaternaria, costituiti essenzialmente da sequenze deposizionali di tipo alluvionale a tessitura estremamente variabile, che vanno dalle argille, ai limi, fino alle sabbie più o meno addensate.
In particolare si tratta di depositi distribuiti secondo alternanze di litotipi a diversa granulometria, organizzati in strati a geometria variabile, spesso lenticolare, e quindi realmente discontinui, in cui i rapporti tra le diverse litologie sono da ricondurre all'evolversi di un ambiente caratterizzato da energie di trasporto e da modalità deposizionali variabili nel tempo.
Dal punto di vista geomorfologico, il territorio in esame denota una topografia pianeggiante blandamente ondulata, con quote medie attorno ai 16÷17 metri s.l.m. e pendenze nell'ordine dello 0,5 - 1%.
Un'analisi più approfondita delle quote rilevate all'intorno del sito in oggetto, indicano chiaramente la presenza nel territorio di dossi e depressioni, quali elementi strutturali caratterizzanti il processo di

formazione alluvionale di questa porzione di pianura del Basso Modenese, nonché dell'influenza degli interventi antropici operati dall'uomo.

Il Comune di Mirandola è inserito nella pianura alluvionale entro la quale, negli ultimi 4.000-5.000 anni dell'Olocene, gli affluenti appenninici del fiume Po (particolarmente il Panaro nell'area di studio), hanno determinando l'attuale assetto morfologico ed altimetrico del territorio che, a sua volta, dipende dai movimenti tettonici, dalla subsidenza naturale e dall'intervento antropico.

I fiumi che scorrono in questa porzione di bassa pianura si trovano in uno stadio di maturità evolutiva in cui la fase deposizionale prevale su quella erosiva a causa della bassa capacità di deflusso e della esigua capacità di trasporto; questo quadro è confermato dalla presenza di meandri e di alvei pensili che hanno reso necessaria la costruzione di argini artificiali.

In assenza di argini artificiali i fiumi tendono a divagare e quando le acque di piena traboccano si verifica un deposito differenziato con la sedimentazione di elementi fini o grossolani in funzione della diversa energia cinetica della corrente. In prossimità dell'alveo il fiume tende a depositare materiali più grossolani formando dossi di tracimazione (argini naturali), oltre che ventagli e canali di esondazione in corrispondenza delle rotte; tali emergenze morfologiche si manifestano sia lungo i corsi attuali dei fiumi che in corrispondenza di alvei abbandonati (paleoalvei).

Nelle aree distali più depresse, poste tra un fiume e l'altro, l'energia cinetica della corrente diminuisce ed i depositi si fanno sempre più fini per diventare prevalentemente argillosi nelle basse dove la prolungata permanenza delle acque favorisce la sedimentazione delle particelle in sospensione; per la maggiore costipabilità dei materiali fini rispetto a quelli sabbiosi, si determina poi un aumento dei dislivelli fra i dossi dei paleoalvei e le valli, oltre che fra la rete idrografica ed il livello medio del territorio.

In questa situazione, in concomitanza con gli eventi alluvionali, è possibile che un fiume cambi il suo percorso.

Nell'area di studio abbondanti sono i paleoalvei la cui datazione ed attribuzione idrografica è stata oggetto di studio da parte di autori che si sono occupati della ricostruzione paleoidrografica della zona: Pellegrini (1969), Veggiani (1947), Castaldini e Alii (1979), Cremaschi ed Alii (1980), Gasperi e Pellegrini (1981, 1984).

I paleoalvei sono aree generalmente più elevate di qualche metro rispetto al contorno, la tessitura granulometrica risulta variabile dal franco al franco - sabbioso; sono zone di infiltrazione meteorica con percentuali variabili dal 20 - 30 % del totale.

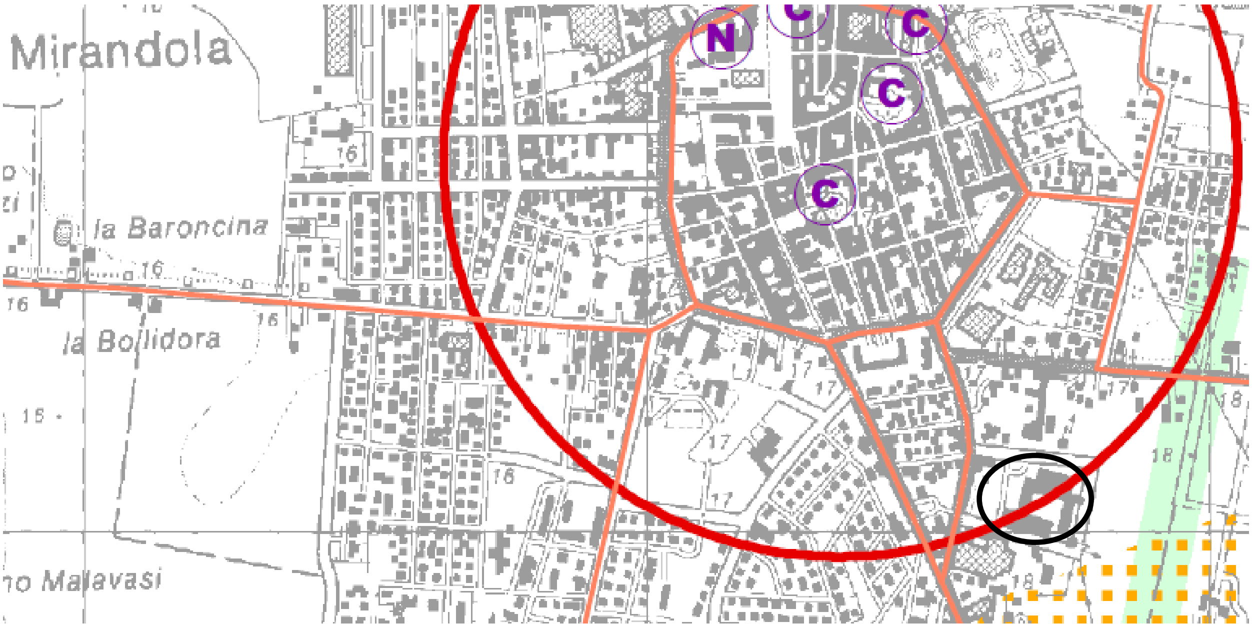
In questo meccanismo "naturale" è intervenuto l'uomo che, innalzando argini artificiali ed emungendo acqua dal sottosuolo, accelerando i processi di costipazione e di subsidenza, ha modificato la dinamica deposizionale e quindi l'assetto morfologico del territorio.

La costruzione di argini artificiali, in questa zona, si è completata nel XV secolo; a partire da questo periodo i fiumi sono stati canalizzati entro percorsi ben definiti e non hanno più avuto la possibilità di aprirsi, dopo un rotta, nuovi percorsi. Di conseguenza le alluvioni degli ultimi 500 anni hanno determinato un classamento ben preciso dei depositi per cui troviamo sedimenti più grossolani e sedimenti più fini rispettivamente nelle vicinanze e nelle zone più lontane dai percorsi attuali dei fiumi; questo spiega perchè antichi dossi corrispondenti a paleoalvei siano stati ricoperti da sedimenti più fini che hanno notevolmente uniformato la morfologia dell'area.

Altre morfologie del territorio sono le aree di bassa o valli, depressioni in cui le acque sino all'inizio del secolo scorso ristagnavano permanentemente e per un lungo periodo dell'anno e sono state bonificate in tempi recenti. Tali zone, come già descritto, hanno generalmente elevati contenuti in argilla.

Altre forme di notevole interesse sono i numerosi ventagli d'esondazione che indicano che in quel punto del fiume si è verificata una rotta non contrastata da interventi di riparazione degli argini.

Di seguito si riporta uno stralcio della **Carta della Tutela delle Risorse Paesistiche e Storico Culturali del PTCP 2009**.
La mappa riporta le caratteristiche morfologiche del sito.



6. INDAGINI REALIZZATE

Al fine di determinare le caratteristiche litologiche e geotecniche dei terreni di fondazione si è provveduto a reperire tutte le informazioni provenienti da indagini geognostiche (prove penetrometriche statiche meccaniche CPT ed elettriche CPTU) e sismiche (Cono sismico, HoliSurface e HVSR) eseguite nell'area di intervento (figura 6.1):

- n. 5 prove penetrometriche statiche meccaniche (CPT01, CPT02, CPT03, CPT04 e CPT04bis) per un totale di 184.4 m di perforazione;
- n. 1 prova penetrometrica statica elettrica CPTU01 per un totale di 30.0 m di perforazione;
- n. 3 indagini sismiche passive di microtremori (HVSR - Tr01, HVSR - Tr02 e HVSR – Tr03);
- n.4 indagine sismica attiva HoliSurface01 e HoliSurface02 (onde Rayleigh).

Le indagini geognostiche sono state eseguite dal Laboratorio di prove geotecniche in sito GEOPROGETTI S.r.l. di Medolla e dalla ditta Sub-Soil S.r.l di Quattro Castella.
Le indagini sismiche sono state eseguite dal Dott. Geol. Lorenzo Del Maschio (HVSR - Tr01, HVSR - Tr02 e HVSR – Tr03 e HoliSurface01 e HoliSurface02) e dalla ditta Sub-Soil S.r.l di Quattro Castella (Cono sismico).

Figura 6.1: Ubicazione delle indagini geognostiche e sismiche.

7. CARATTERIZZAZIONE GEOLOGICO-TECNICA DEL SITO

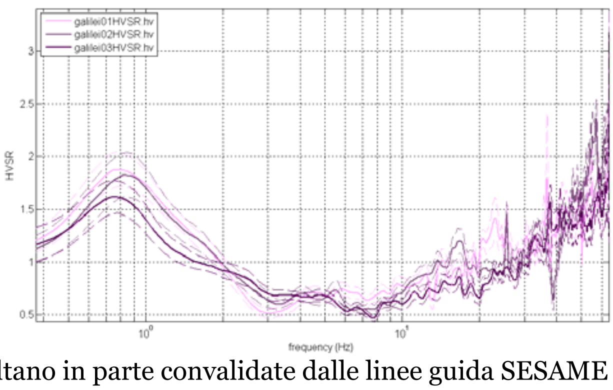
a. Indagini geofisiche

a1. I dati ottenuti

L'indagine geofisica è stata eseguita mediante sismica in foro (Cono sismico SCPTU), sismica di superficie attiva HoliSurface e passiva a stazione singola (HVSR) (Gemini2®PASI Srl) sia per la definizione del picco di risonanza dei terreni di fondazione (**f_o**) sia per la determinazione della categoria di suolo richiesta dalla normativa, mediante la ricostruzione delle **Vs_{30}**.

a2. Interpretazione delle indagini geofisiche

La campagna di prospezione geofisica è stata eseguita nel luglio 2013. Tale indagine ha consistito nelle acquisizioni di microtremori a stazione singola di tipo HVSR e nella definizione del profilo di Vs mediante analisi di tipo HoliSurface e con cono sismico SCPTU. I dati ottenuti dalla curva HVSR forniscono utili indicazioni soprattutto per quanto riguarda le frequenze di risonanza e sui fattori di amplificazione sismica dei suoli durante un terremoto mentre attraverso la tecnica HoliSurface e la sismica in foro è stato possibile definire l'andamento delle Vs con la profondità e quindi la definizione delle V_{S30} ai fini della classificazione sismica dei suoli di fondazione come previsto dal D.M. 14 gennaio 2008.
Tutte le registrazioni di superficie sono state effettuate con Gemini2®PASI Srl, che è un registratore disegnato specificatamente per le acquisizioni del rumore sismico. Si tratta di un strumento portatile tutto in uno nel quale è integrata una terna di geofoni con frequenza di risonanza pari a **2Hz** (accuratamente accoppiati meccanicamente ed elettricamente) ed un acquisitore dati 24 bit reali appositamente progettato. Collegato al computer tramite l'interfaccia USB, Gemini consente la memorizzazione e la successiva analisi dei dati direttamente sul vostro PC tramite il software dedicato in dotazione.
Dall'analisi dei risultati delle indagini geofisiche specifiche si è riscontrato che il terreno di fondazione su cui andrà realizzato l'intervento in esame, appartiene alla categoria di sottosuolo "C", ai sensi del D.M. 14/01/08.
Relativamente alle frequenze caratteristiche di sito, dal diagramma delle curve H/V, abbiamo un picco stratigrafico con le seguenti caratteristiche:



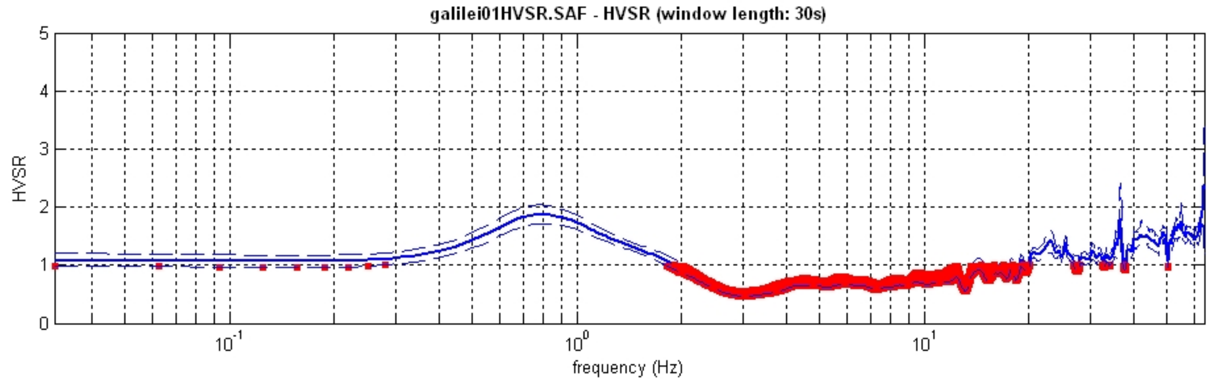
Le acquisizione HVSR, risultano in parte convalidate dalle linee guida SESAME 2005.

Si riportano di seguito i report delle indagini sismiche a stazione singola (HVSR) e dell'indagine sismica HoliSurface e cono sismico SCPTU:

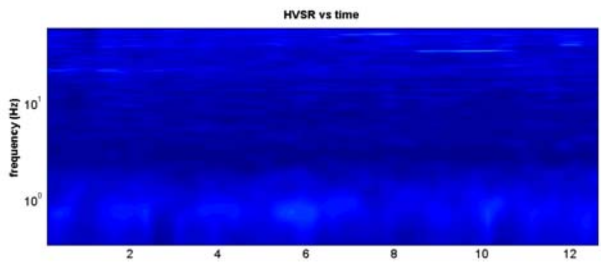
MIRANDOLA (MO), via Barozzi - HVSR TR01

Strumento: Gemini2 - PASI Srl
Inizio registrazione: 05/06/13 Fine registrazione: 05/06/13
Nomi canali: NORTH-SOUTH; EAST-WEST; UP-DOWN
Durata registrazione: 0h20'00''. Analizzato 0h13'2'' tracciato (selezione manuale)
Freq. campionamento: 128 Hz
Lunghezza finestre: 30 s
Tipo di lisciamento: Triangular window
Lisciamento: 5%

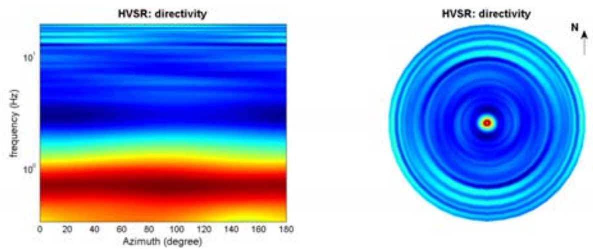
RAPPORTO SPETTRALE ORIZZONTALE SU VERTICALE



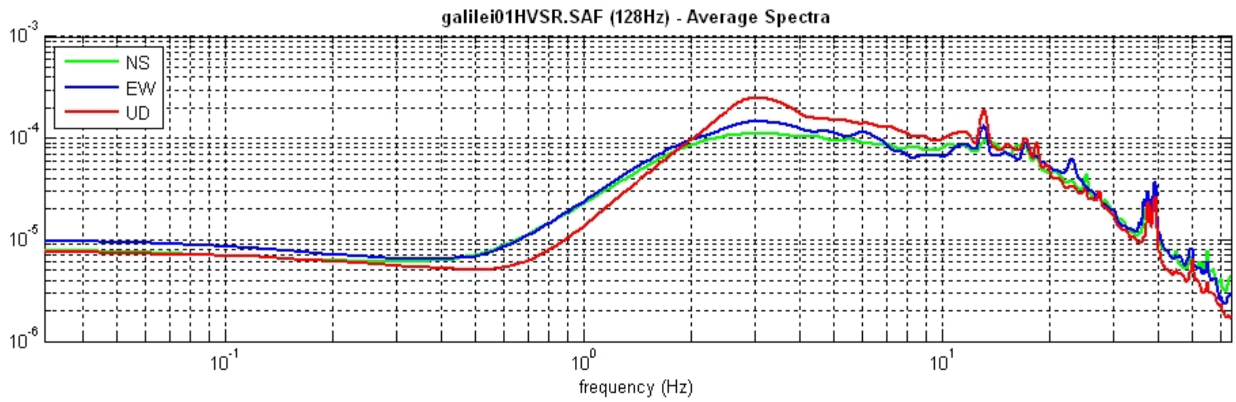
SERIE TEMPORALE H/V



DIREZIONALITA' H/V



SPETTRI DELLE SINGOLE COMPONENTI



Secondo le linee guida SESAME, 2005.

0.5-20.0 Hz frequency range
Peak frequency (Hz): 0.8 (±2.0)
Peak HVSR value: 1.9 (±0.2)

Criteri per una curva H/V affidabile [Tutti 3 dovrebbero risultare soddisfatti]			
$f_0 > 10 / L_w$	0.8 > 0.33	OK	
$n_c(f_0) > 200$	1244 > 200	OK	
$\sigma_A(f) < 2$ per $0.5f_0 < f < 2f_0$ se $f_0 > 0.5Hz$ **$\sigma_A(f) < 3$ per $0.5f_0 < f < 2f_0$ se $f_0 < 0.5Hz$**		OK	
Criteri per un picco H/V chiaro [Almeno 5 su 6 dovrebbero essere soddisfatti]			
Esiste f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Esiste f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.1 Hz	OK	
$A_0 > 2$	1.9 > 2		NO
$f_{picco}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$		OK	
$\sigma_f < \varepsilon(f_0)$	1.954 < 0.122		NO
$\sigma_A(f_0) < \theta(f_0)$	0.163 < 2	OK	

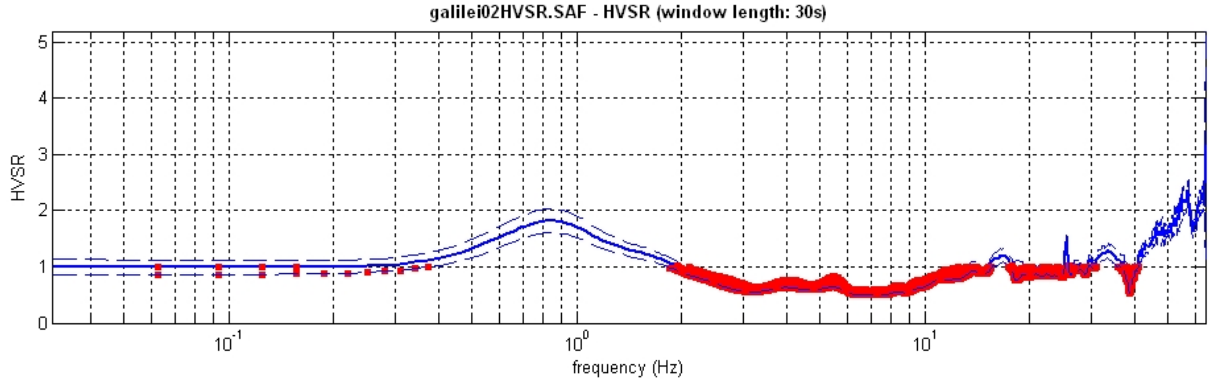
L_w	lunghezza della finestra
n_w	numero di finestre usate nell'analisi
$n_c = L_w n_w f_0$	numero di cicli significativi
f	frequenza attuale
f_0	frequenza del picco H/V
σ_f	deviazione standard della frequenza del picco H/V
$\varepsilon(f_0)$	valore di soglia per la condizione di stabilità $\sigma_f < \varepsilon(f_0)$
A_0	ampiezza della curva H/V alla frequenza f_0
$A_{H/V}(f)$	ampiezza della curva H/V alla frequenza f
f^-	frequenza tra $f_0/4$ e f_0 alla quale $A_{H/V}(f^-) < A_0/2$
f^+	frequenza tra f_0 e $4f_0$ alla quale $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	deviazione standard di $A_{H/V}(f)$, $\sigma_A(f)$ è il fattore per il quale la curva $A_{H/V}(f)$ media deve essere moltiplicata o divisa
$\sigma_{logH/V}(f)$	deviazione standard della funzione log $A_{H/V}(f)$
$\theta(f_0)$	valore di soglia per la condizione di stabilità $\sigma_A(f) < \theta(f_0)$

Valori di soglia per σ_f e $\sigma_A(f_0)$					
Intervallo di freq. [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ per $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ per $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

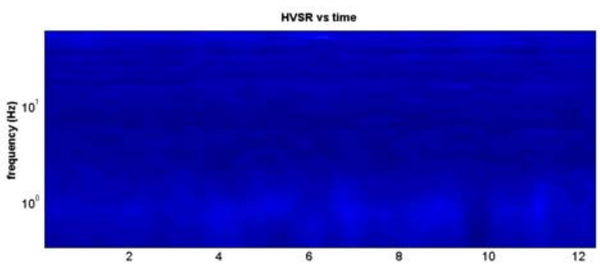
MIRANDOLA (MO), via Barozzi - HVSR TR02

Strumento: Gemini2 - PASI Srl
Inizio registrazione: 05/06/13 Fine registrazione: 05/06/13
Nomi canali: NORTH-SOUTH; EAST-WEST; UP-DOWN
Durata registrazione: 0h20'00". Analizzato 0h12'8" tracciato (selezione manuale)
Freq. campionamento: 128 Hz
Lunghezza finestre: 30 s
Tipo di lisciamento: Triangular window
Lisciamento: 5%

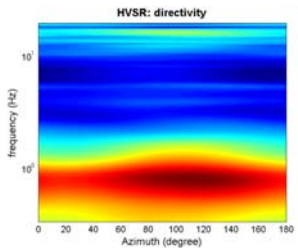
RAPPORTO SPETTRALE ORIZZONTALE SU VERTICALE

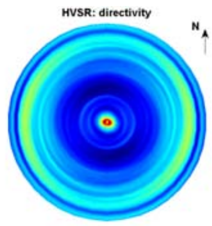


SERIE TEMPORALE H/V

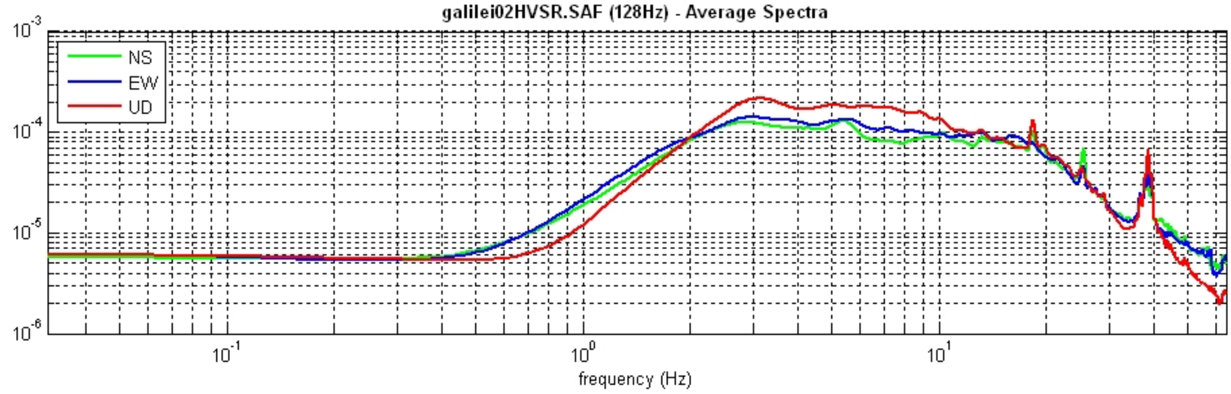


DIREZIONALITA' H/V





SPETTRI DELLE SINGOLE COMPONENTI



Secondo le linee guida SESAME, 2005.

0.5-20.0 Hz frequency range
Peak frequency (Hz): 0.9 (±4.5)
Peak HVSR value: 1.8 (±0.2)

Criteri per una curva H/V affidabile [Tutti 3 dovrebbero risultare soddisfatti]			
$f_0 > 10 / L_w$	0.9 > 0.33	OK	
$n_c(f_0) > 200$	1313 > 200	OK	
$\sigma_A(f) < 2$ per $0.5f_0 < f < 2f_0$ se $f_0 > 0.5Hz$ **$\sigma_A(f) < 3$ per $0.5f_0 < f < 2f_0$ se $f_0 < 0.5Hz$**		OK	
Criteri per un picco H/V chiaro [Almeno 5 su 6 dovrebbero essere soddisfatti]			
Esiste f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Esiste f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.2 Hz	OK	
$A_0 > 2$	1.8 > 2		NO
$f_{picco}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$		OK	
$\sigma_f < \varepsilon(f_0)$	4.490 < 0.131		NO
$\sigma_A(f_0) < \theta(f_0)$	0.212 < 2	OK	

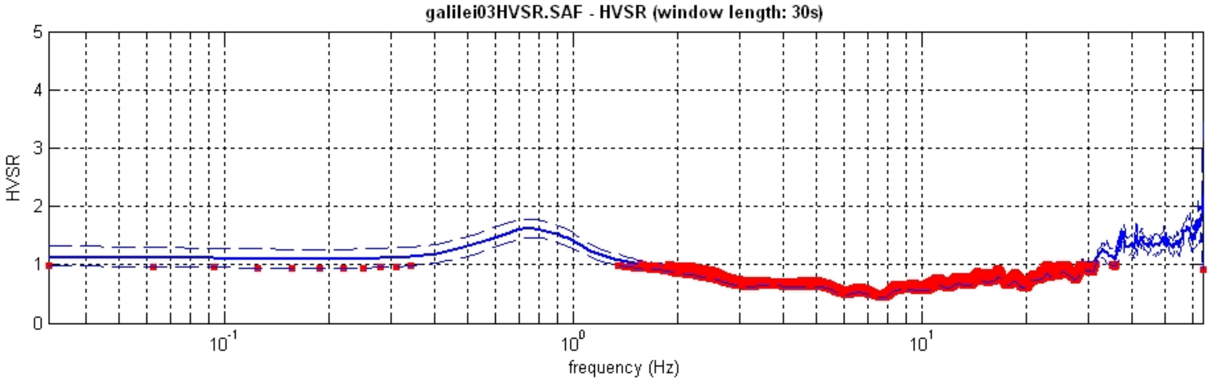
L_w	lunghezza della finestra
n_w	numero di finestre usate nell'analisi
$n_c = L_w n_w f_0$	numero di cicli significativi
f	frequenza attuale
f_0	frequenza del picco H/V
σ_f	deviazione standard della frequenza del picco H/V
$\varepsilon(f_0)$	valore di soglia per la condizione di stabilità $\sigma_f < \varepsilon(f_0)$
A_0	ampiezza della curva H/V alla frequenza f_0
$A_{H/V}(f)$	ampiezza della curva H/V alla frequenza f
f^-	frequenza tra $f_0/4$ e f_0 alla quale $A_{H/V}(f^-) < A_0/2$
f^+	frequenza tra f_0 e $4f_0$ alla quale $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	deviazione standard di $A_{H/V}(f)$, $\sigma_A(f)$ è il fattore per il quale la curva $A_{H/V}(f)$ media deve essere moltiplicata o divisa
$\sigma_{logH/V}(f)$	deviazione standard della funzione log $A_{H/V}(f)$
$\theta(f_0)$	valore di soglia per la condizione di stabilità $\sigma_A(f) < \theta(f_0)$

Valori di soglia per σ_f e $\sigma_A(f_0)$					
Intervallo di freq. [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ per $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ per $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

MIRANDOLA (MO), via Barozzi - HVSR TR03

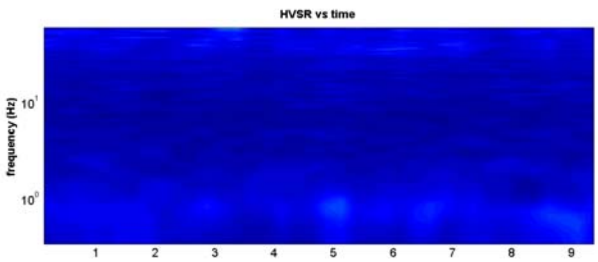
Strumento: Gemini2 - PASI Srl
Inizio registrazione: 05/06/13 Fine registrazione: 05/06/13
Nomi canali: NORTH-SOUTH; EAST-WEST; UP-DOWN
Durata registrazione: 0h20'00''. Analizzato 0h09'9'' tracciato (selezione manuale)
Freq. campionamento: 128 Hz
Lunghezza finestre: 30 s
Tipo di lisciamento: Triangular window
Lisciamento: 5%

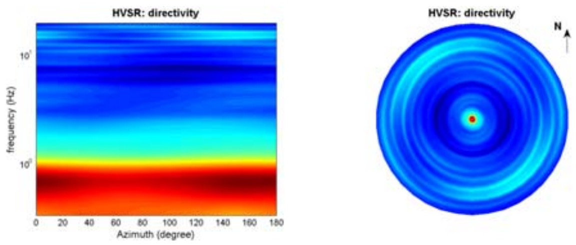
RAPPORTO SPETTRALE ORIZZONTALE SU VERTICALE



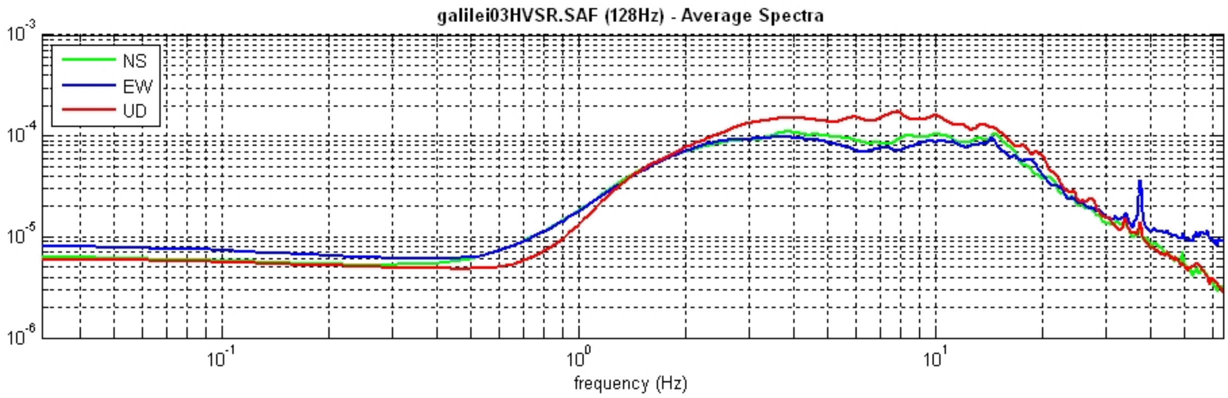
SERIE TEMPORALE H/V

DIREZIONALITA' H/V





SPETTRI DELLE SINGOLE COMPONENTI



Secondo le linee guida SESAME, 2005.

0.5-20.0 Hz frequency range
Peak frequency (Hz): 0.8 (±0.2)
Peak HVSR value: 1.6 (±0.2)

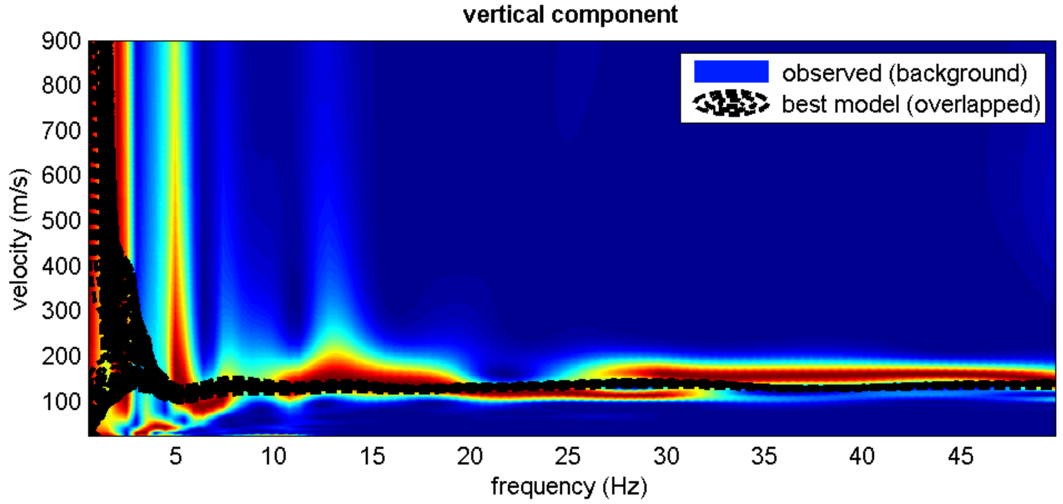
Criteri per una curva H/V affidabile [Tutti 3 dovrebbero risultare soddisfatti]			
$f_0 > 10 / L_w$	0.8 > 0.33	OK	
$n_c(f_0) > 200$	891 > 200	OK	
$\sigma_A(f) < 2$ per $0.5f_0 < f < 2f_0$ se $f_0 > 0.5Hz$ **$\sigma_A(f) < 3$ per $0.5f_0 < f < 2f_0$ se $f_0 < 0.5Hz$**		OK	
Criteri per un picco H/V chiaro [Almeno 5 su 6 dovrebbero essere soddisfatti]			
Esiste f^- in $[f_0/4, f_0]$ | $A_{H/V}(f^-) < A_0 / 2$			NO
Esiste f^+ in $[f_0, 4f_0]$ | $A_{H/V}(f^+) < A_0 / 2$	2.7 Hz	OK	
$A_0 > 2$	1.6 > 2		NO
$f_{picco}[A_{H/V}(f) \pm \sigma_A(f)] = f_0 \pm 5\%$		OK	
$\sigma_f < \varepsilon(f_0)$	0.213 < 0.127		NO
$\sigma_A(f_0) < \theta(f_0)$	0.155 < 2	OK	

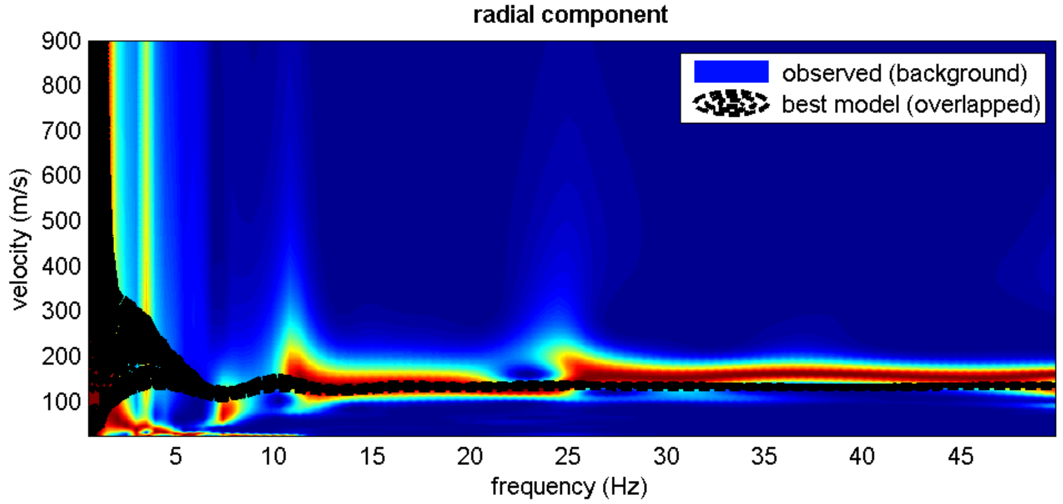
L_w	lunghezza della finestra
n_w	numero di finestre usate nell'analisi
$n_c = L_w n_w f_0$	numero di cicli significativi
f	frequenza attuale
f_0	frequenza del picco H/V
σ_f	deviazione standard della frequenza del picco H/V
$\varepsilon(f_0)$	valore di soglia per la condizione di stabilità $\sigma_f < \varepsilon(f_0)$
A_0	ampiezza della curva H/V alla frequenza f_0
$A_{H/V}(f)$	ampiezza della curva H/V alla frequenza f
f^-	frequenza tra $f_0/4$ e f_0 alla quale $A_{H/V}(f^-) < A_0/2$
f^+	frequenza tra f_0 e $4f_0$ alla quale $A_{H/V}(f^+) < A_0/2$
$\sigma_A(f)$	deviazione standard di $A_{H/V}(f)$, $\sigma_A(f)$ è il fattore per il quale la curva $A_{H/V}(f)$ media deve essere moltiplicata o divisa
$\sigma_{logH/V}(f)$	deviazione standard della funzione log $A_{H/V}(f)$
$\theta(f_0)$	valore di soglia per la condizione di stabilità $\sigma_A(f) < \theta(f_0)$

Valori di soglia per σ_f e $\sigma_A(f_0)$					
Intervallo di freq. [Hz]	< 0.2	0.2 – 0.5	0.5 – 1.0	1.0 – 2.0	> 2.0
$\varepsilon(f_0)$ [Hz]	0.25 f_0	0.2 f_0	0.15 f_0	0.10 f_0	0.05 f_0
$\theta(f_0)$ per $\sigma_A(f_0)$	3.0	2.5	2.0	1.78	1.58
log $\theta(f_0)$ per $\sigma_{logH/V}(f_0)$	0.48	0.40	0.30	0.25	0.20

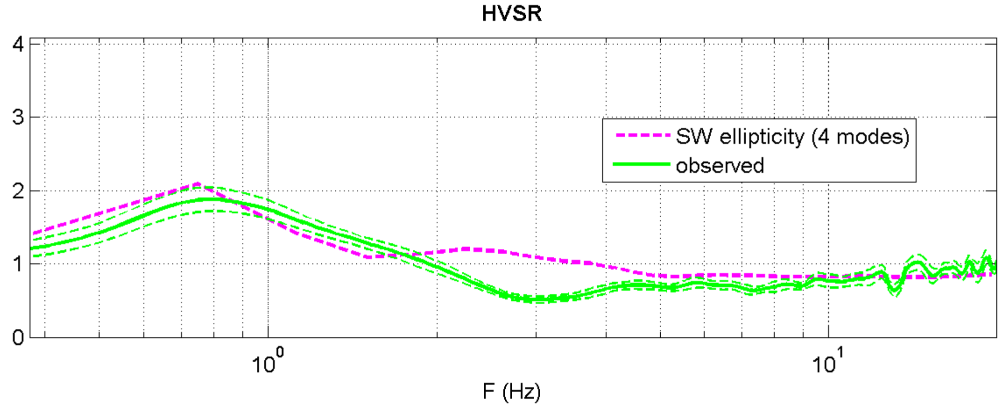
MIRANDOLA (MO), via Barozzi - HoliSurface01a
(Analisi Rayleigh + HVSR - Tr01)

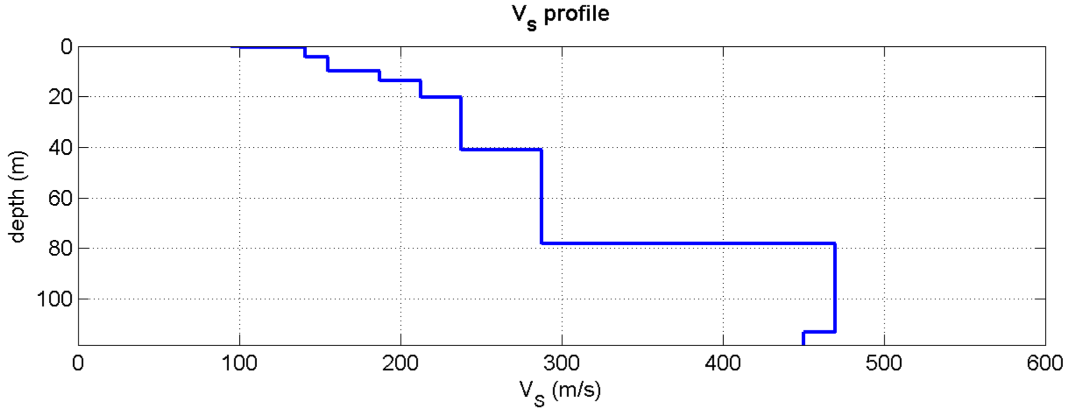
Analisi onde Rayleigh (offset 50 m e frequenza di campionamento a 1 KHz)

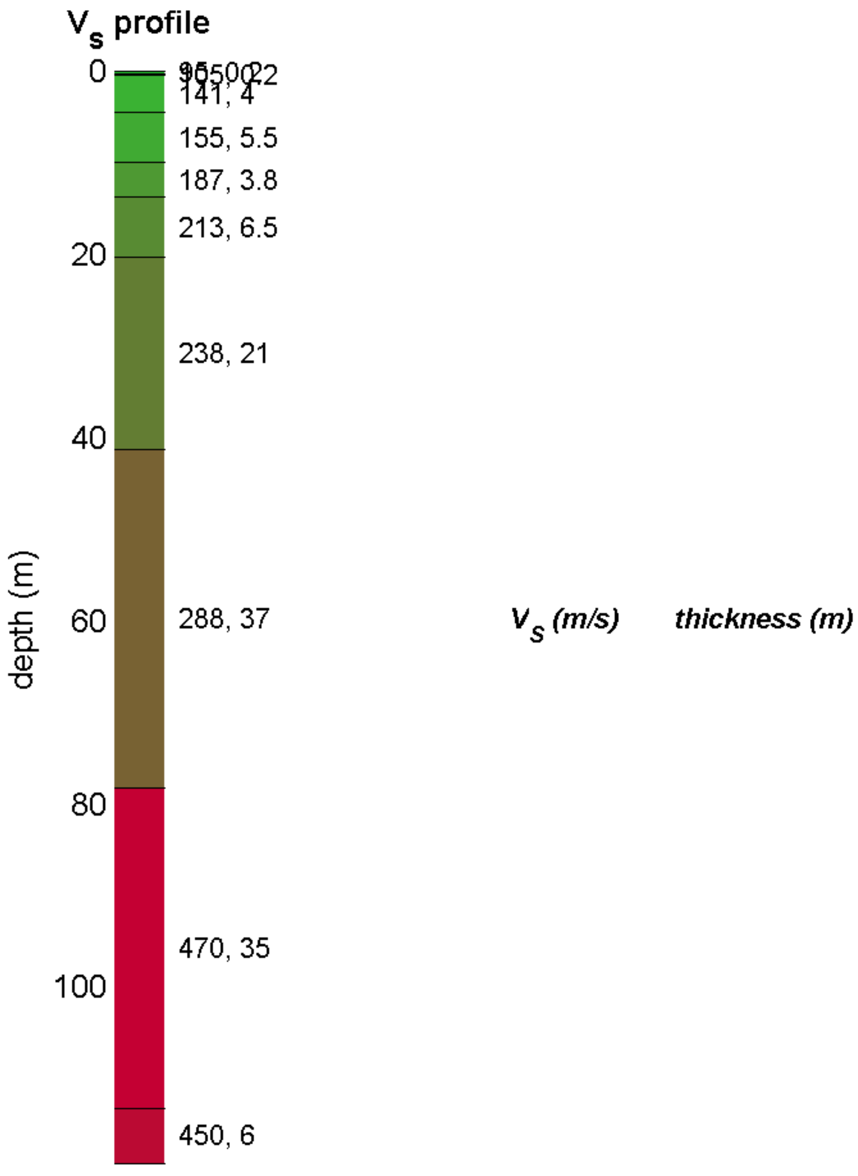




- Analisi HVSR - Tr01



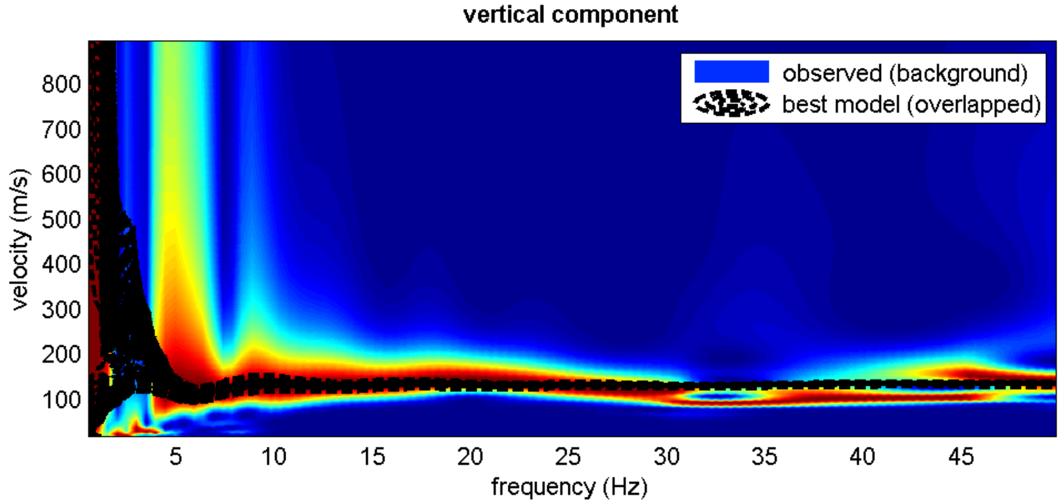

Vs profile
depth (m)
Vs (m/s)
0
20
40
60
80
100
0
100
200
300
400
500
600

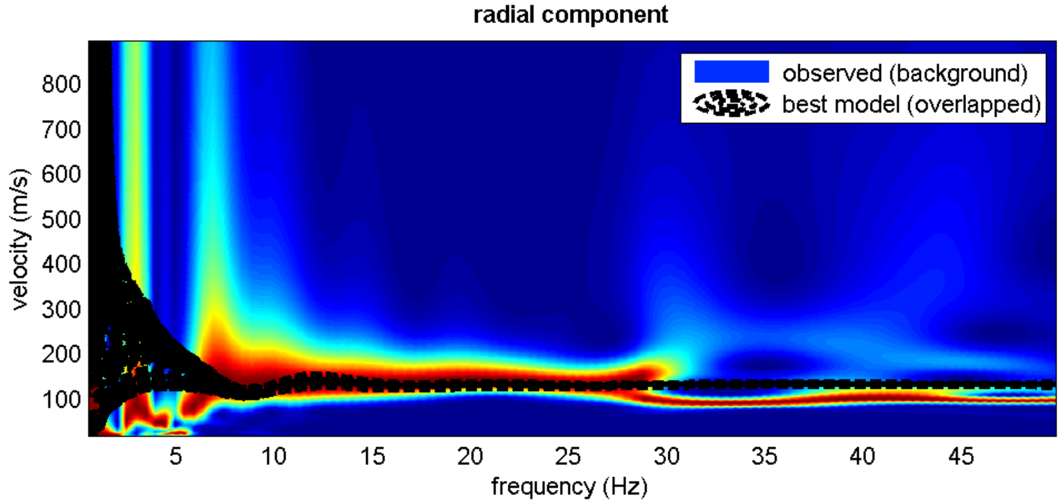

Vs profile
depth (m)
141, 4
155, 5.5
187, 3.8
213, 6.5
238, 21
288, 37
470, 35
450, 6
Vs (m/s)
thickness (m)

Vs30 (m/s): 188

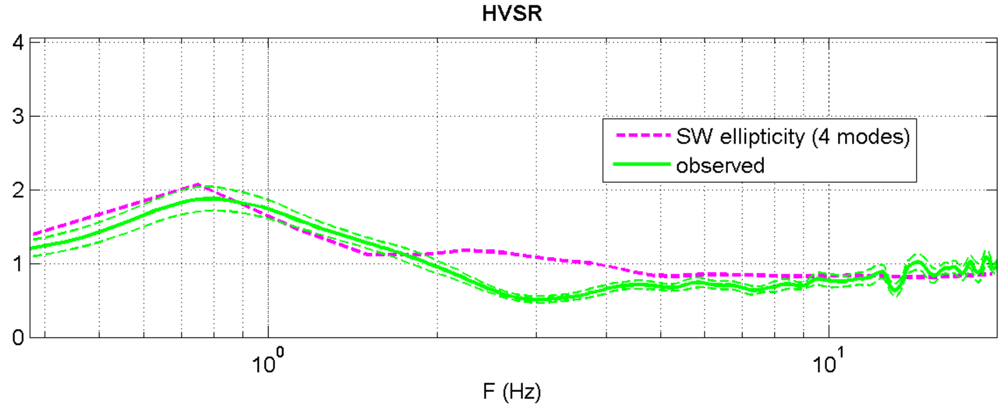
MIRANDOLA (MO), via Barozzi - HoliSurface01b
(Analisi Rayleigh + HVSR - Tr01)

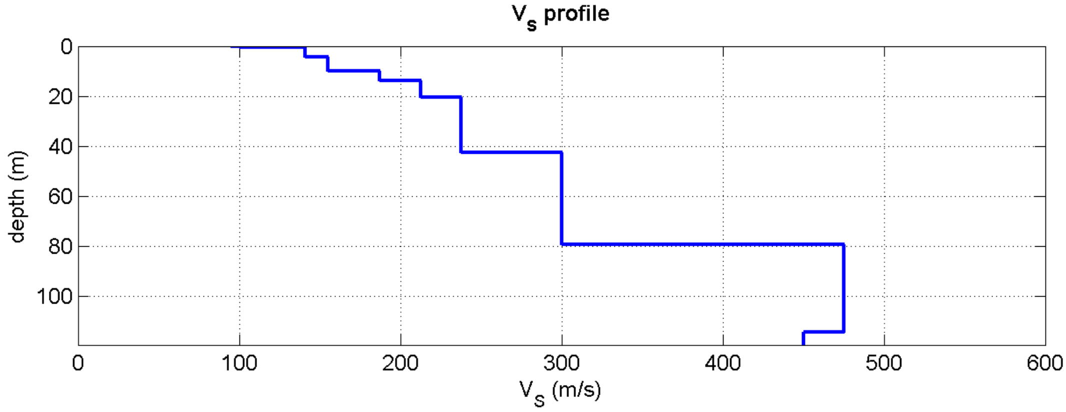
Analisi onde Rayleigh (offset 40 m e frequenza di campionamento a 1 KHz)

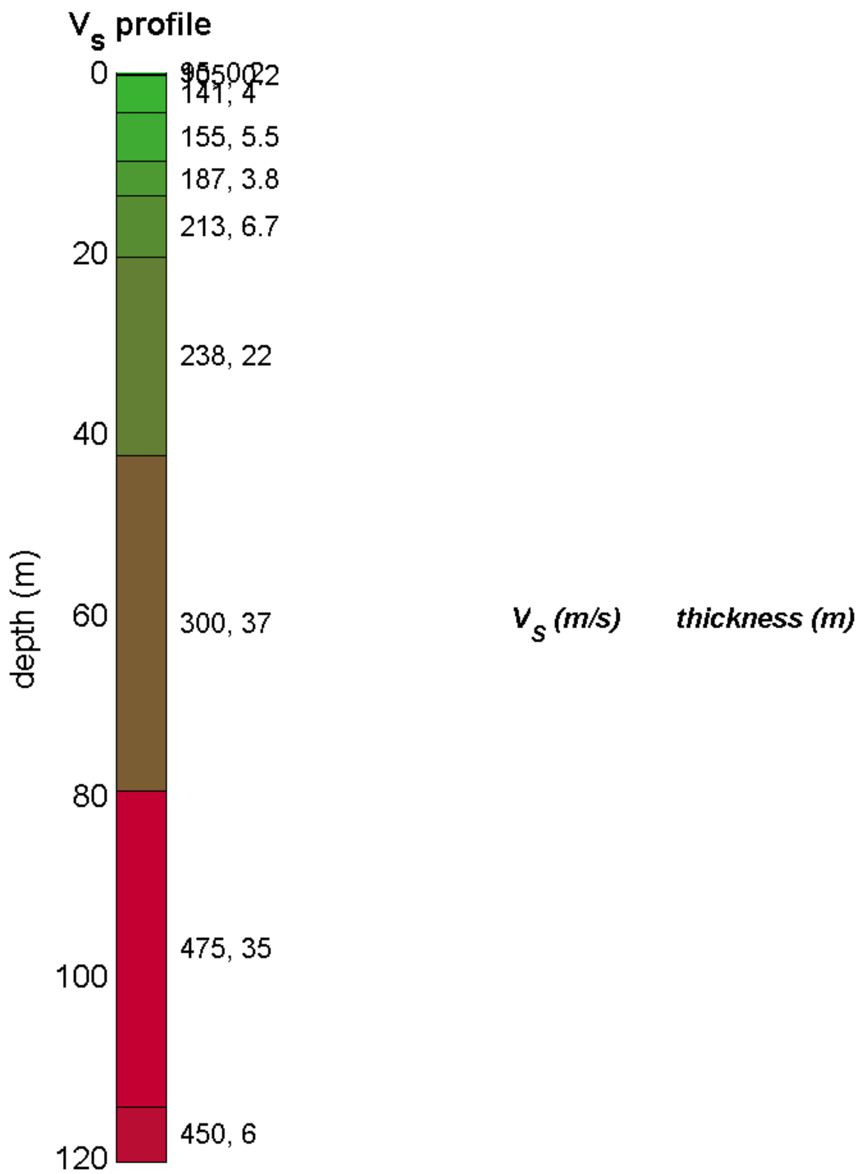




- Analisi HVSR - Tr01



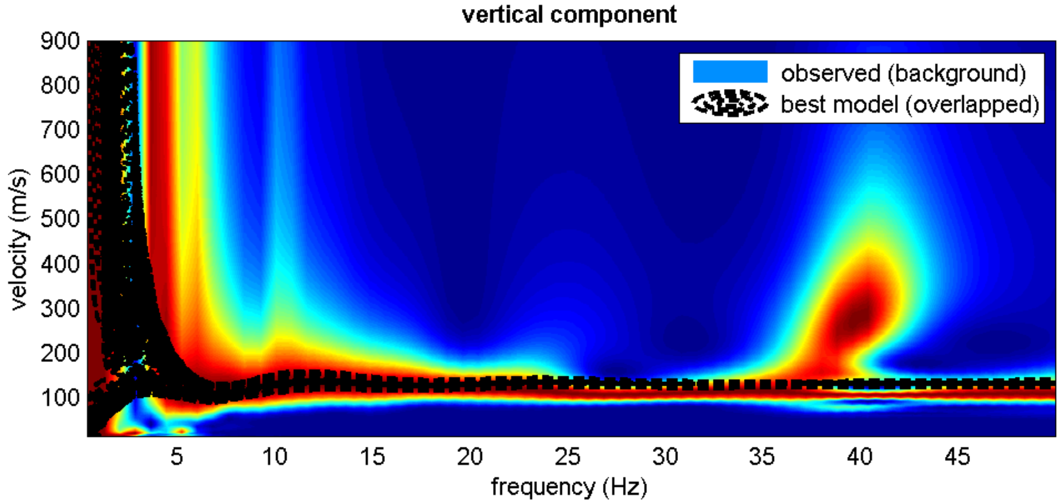

V_s profile
depth (m)
V_S (m/s)
0
20
40
60
80
100
0
100
200
300
400
500
600

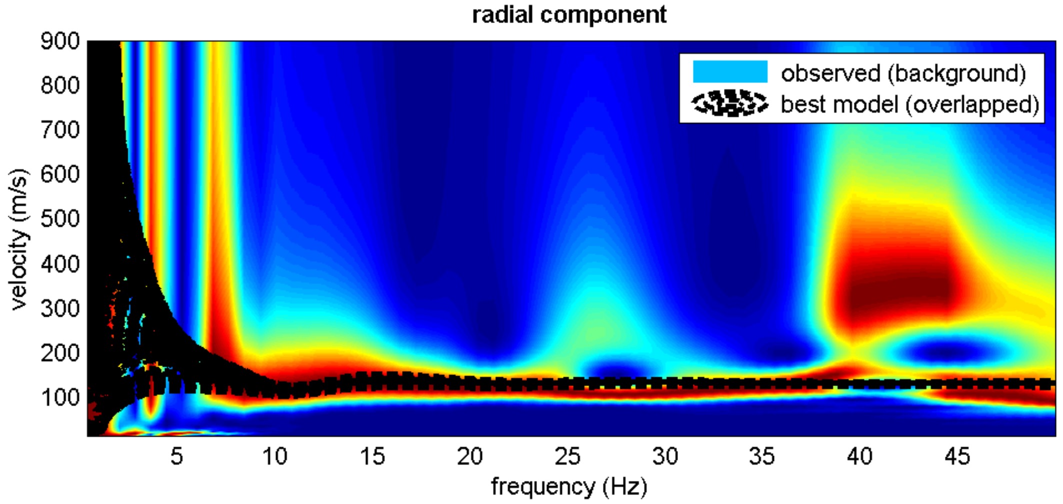

V_s profile
depth (m)
141, 4
155, 5.5
187, 3.8
213, 6.7
238, 22
300, 37
475, 35
450, 6
V_S (m/s) thickness (m)

Vs30 (m/s): 188

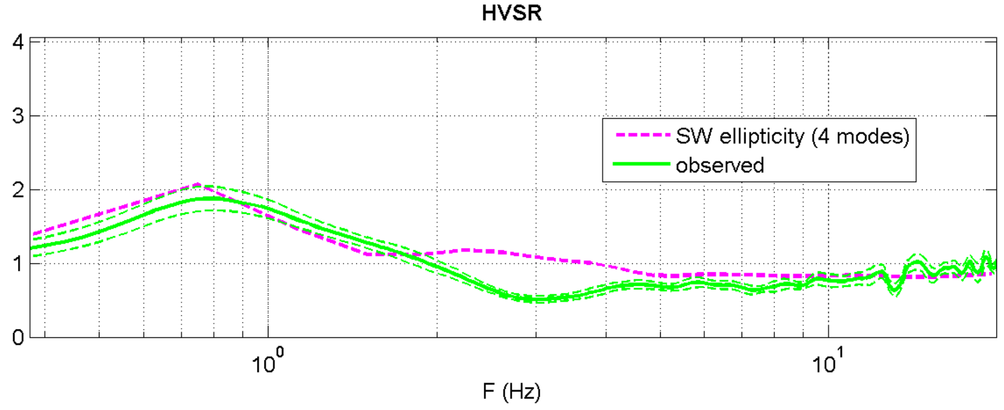
MIRANDOLA (MO), via Barozzi - HoliSurface01c
(Analisi Rayleigh + HVSR - Tr01)

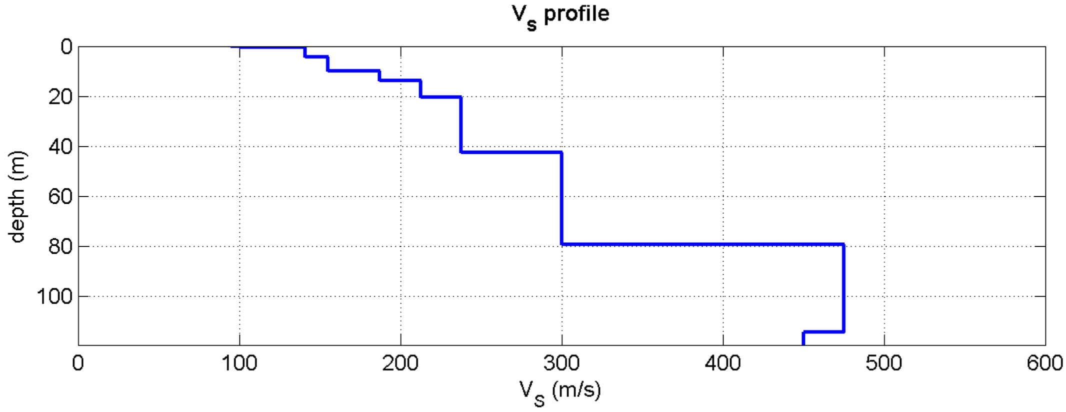
Analisi onde Rayleigh (offset 30 m e frequenza di campionamento a 1 KHz)

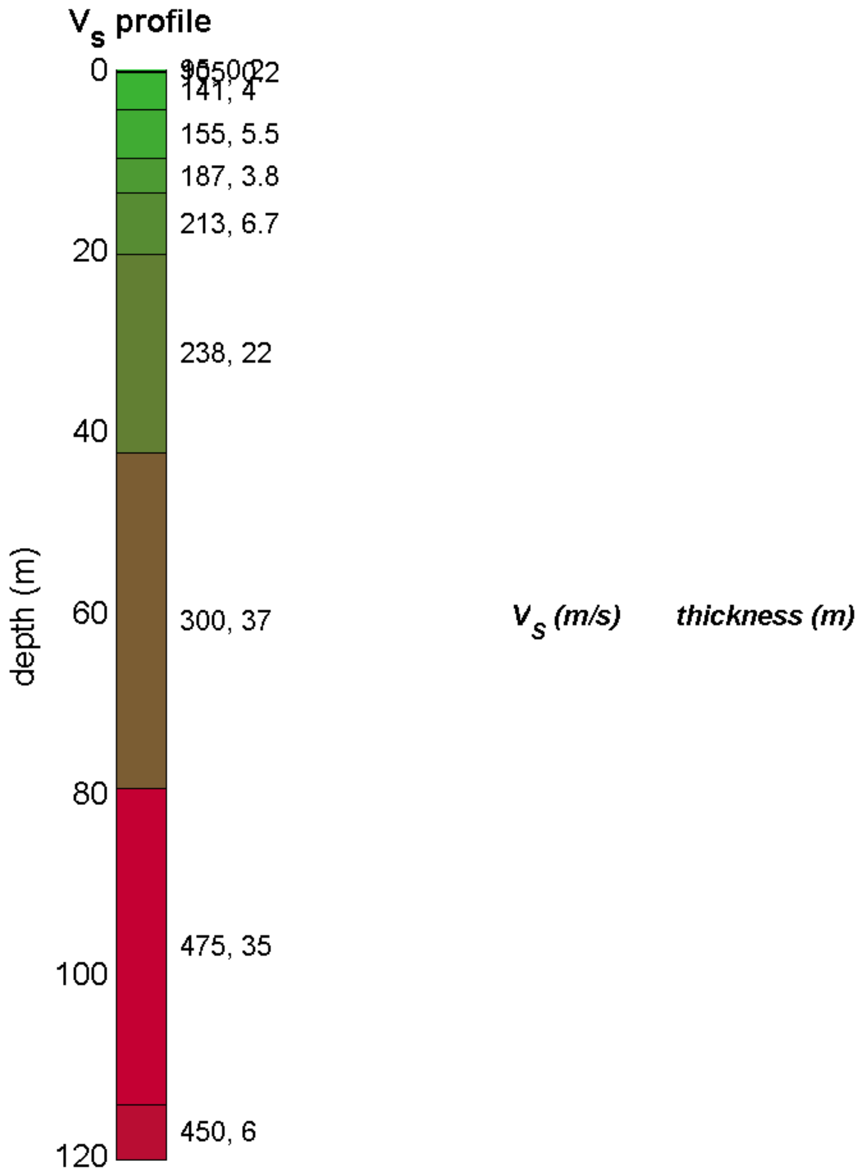




- Analisi HVSR - Tr01



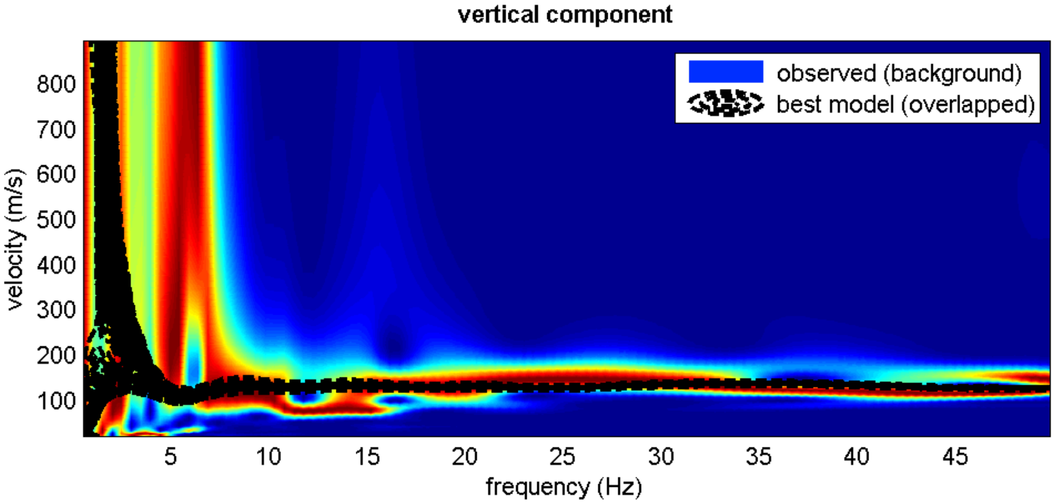

V_s profile
depth (m)
V_s (m/s)
0
20
40
60
80
100
0
100
200
300
400
500
600

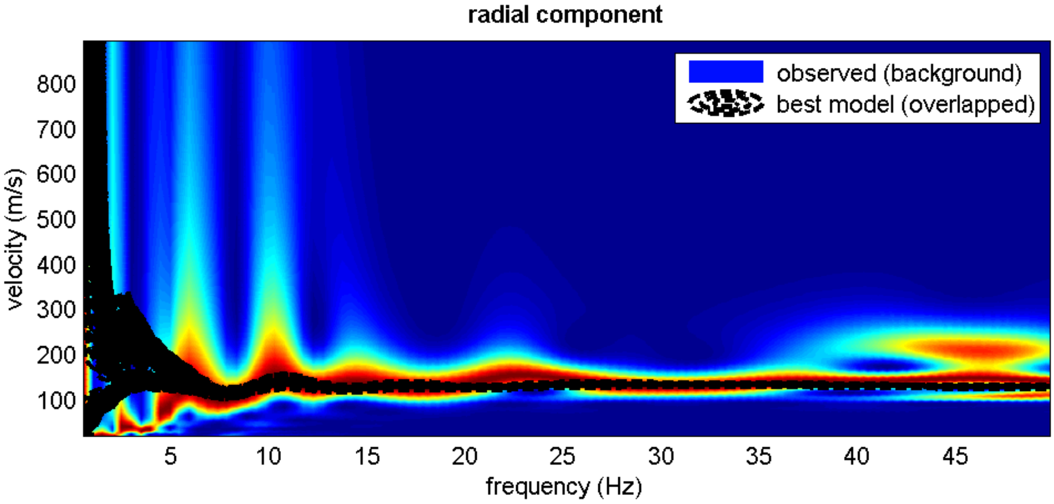

V_s profile
depth (m)
0
20
40
60
80
100
120
141, 4
155, 5.5
187, 3.8
213, 6.7
238, 22
300, 37
475, 35
450, 6
V_s (m/s)
thickness (m)

Vs30 (m/s): 188

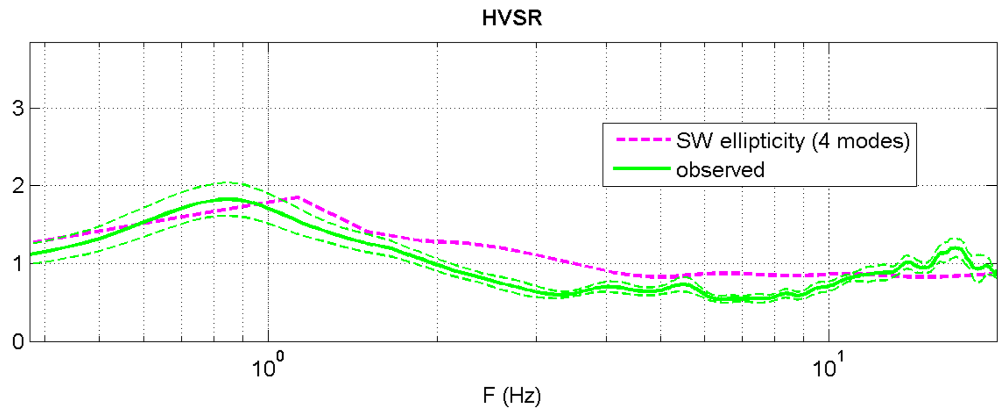
MIRANDOLA (MO), via Barozzi - HoliSurface02a
(Analisi Rayleigh + HVSR - Tr02)

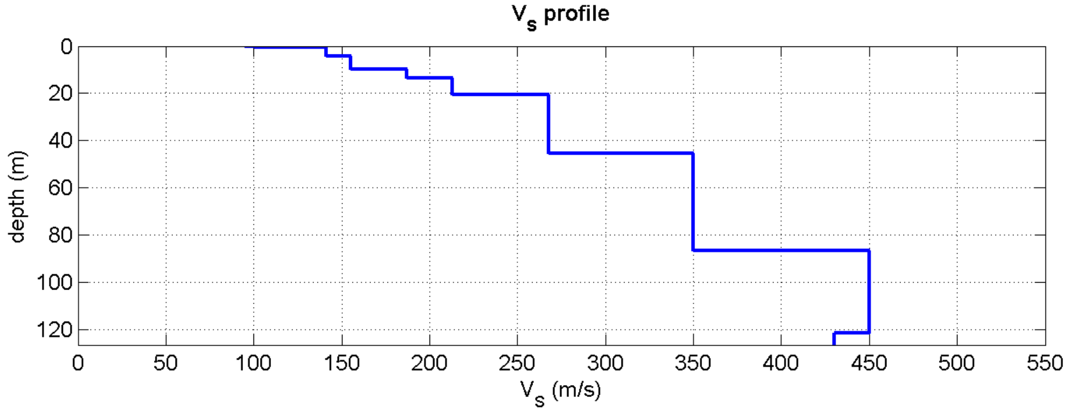
Analisi onde Rayleigh (offset 45 m e frequenza di campionamento a 1 KHz)

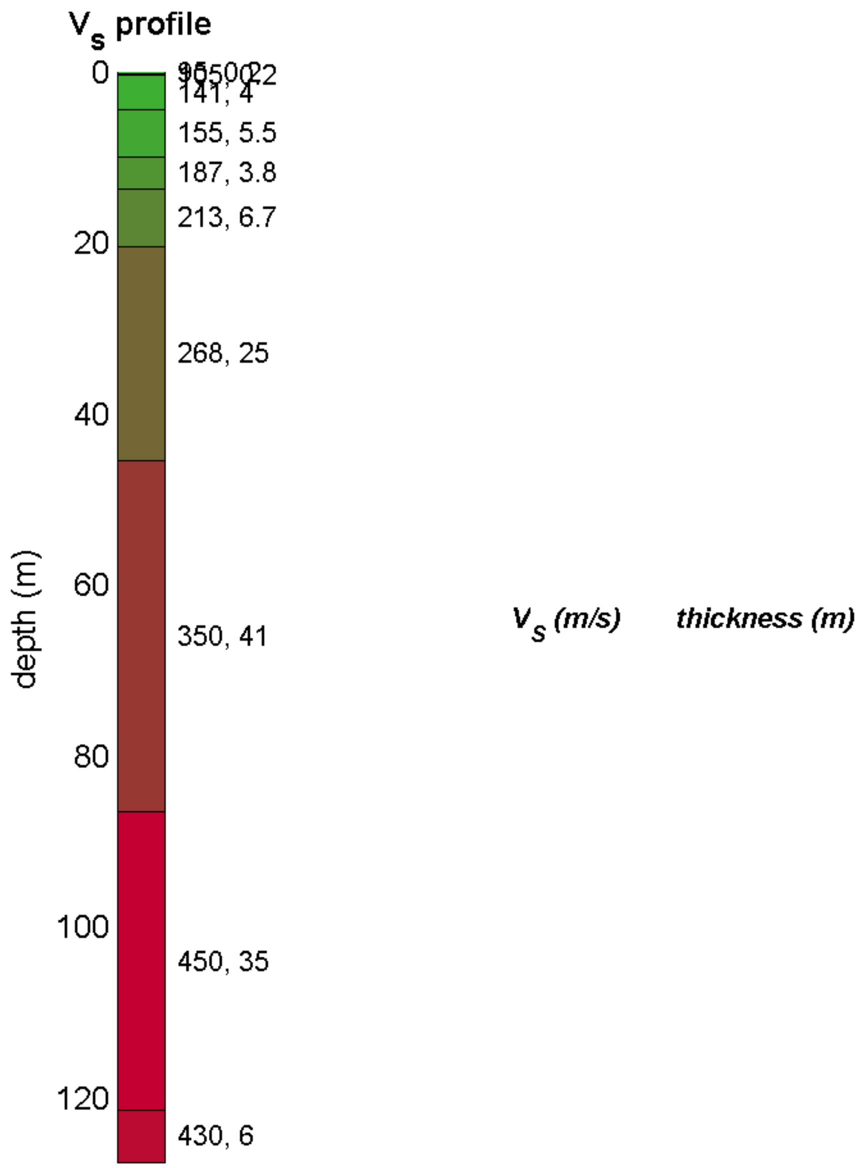




- Analisi HVSR - Tr01



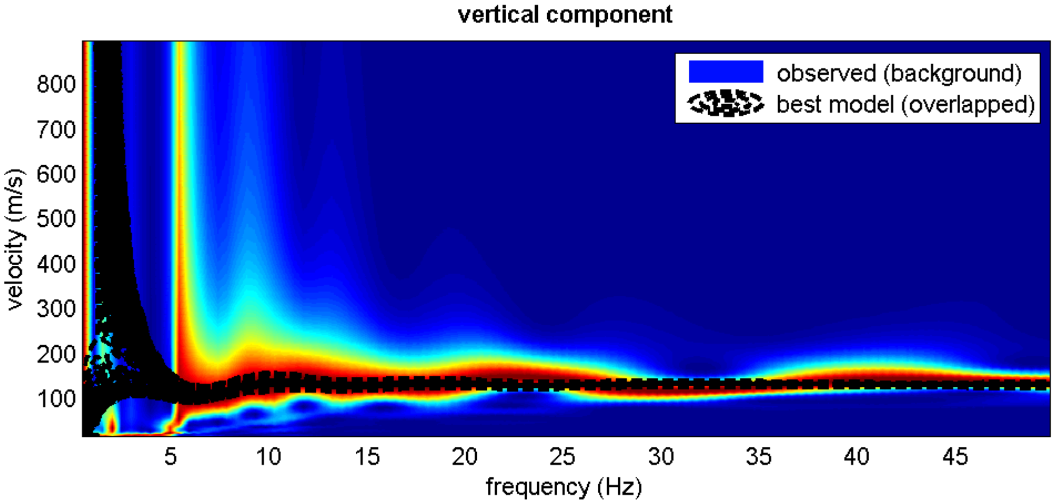

V_s profile
depth (m)
0
20
40
60
80
100
120
0
50
100
150
200
250
300
350
400
450
500
550
V_s (m/s)

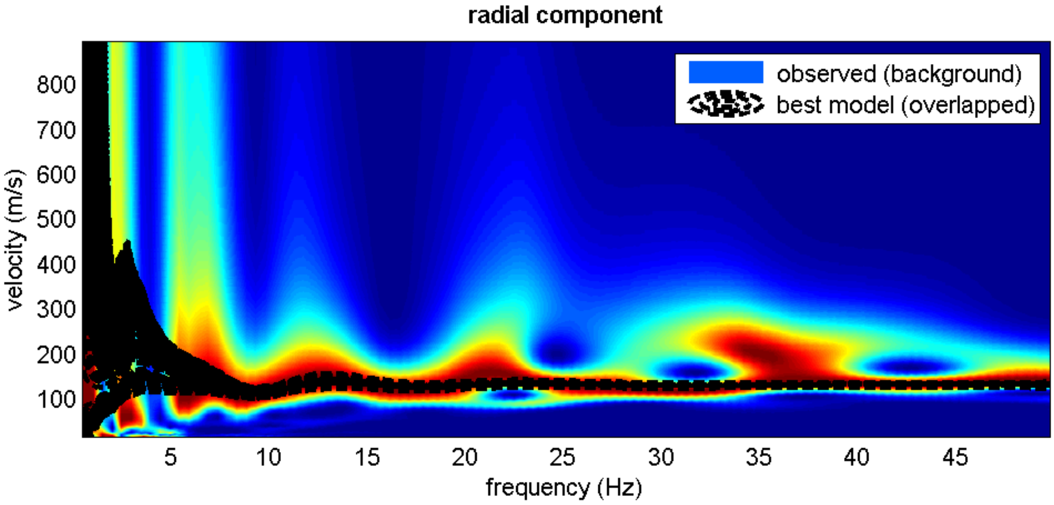

V_s profile
depth (m)
0
20
40
60
80
100
120
141, 4
155, 5.5
187, 3.8
213, 6.7
268, 25
350, 41
450, 35
430, 6
V_s (m/s) thickness (m)

Vs30 (m/s): 193

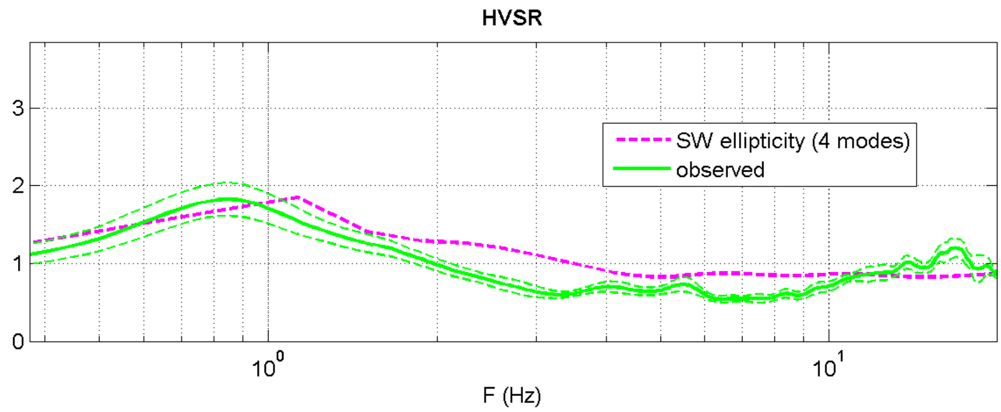
MIRANDOLA (MO), via Barozzi - HoliSurface02b
(Analisi Rayleigh + HVSR - Tr02)

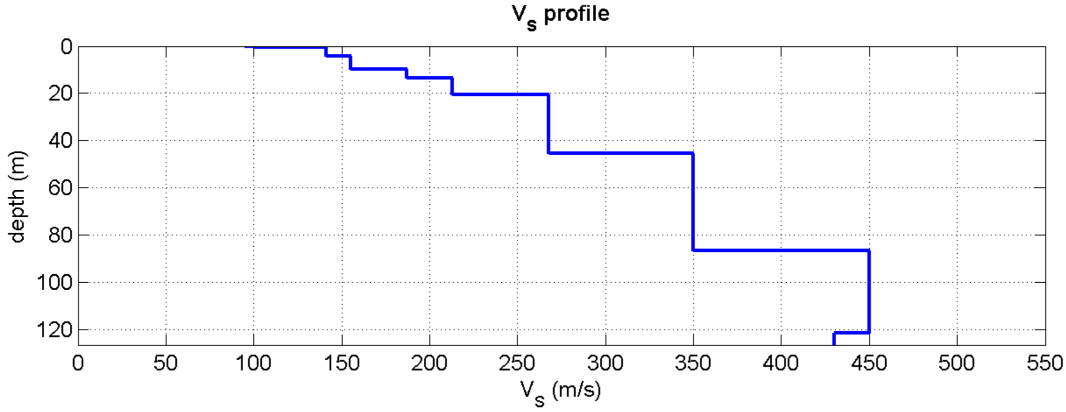
Analisi onde Rayleigh (offset 35 m e frequenza di campionamento a 1 KHz)

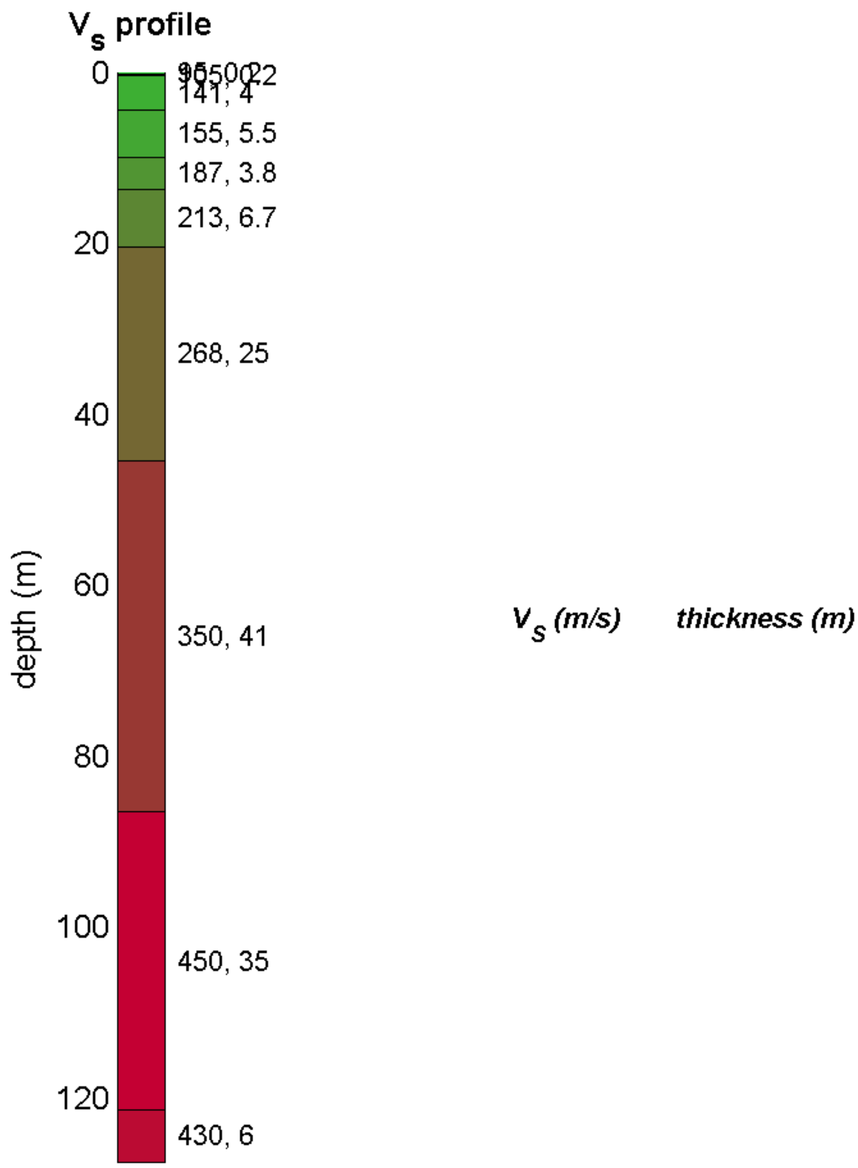




- Analisi HVSR - Tr01




Vs profile
depth (m)
Vs (m/s)
0
20
40
60
80
100
120
0
50
100
150
200
250
300
350
400
450
500
550


Vs profile
depth (m)
0
20
40
60
80
100
120
155, 5.5
187, 3.8
213, 6.7
268, 25
350, 41
450, 35
430, 6
Vs (m/s)
thickness (m)

Vs30 (m/s): 193

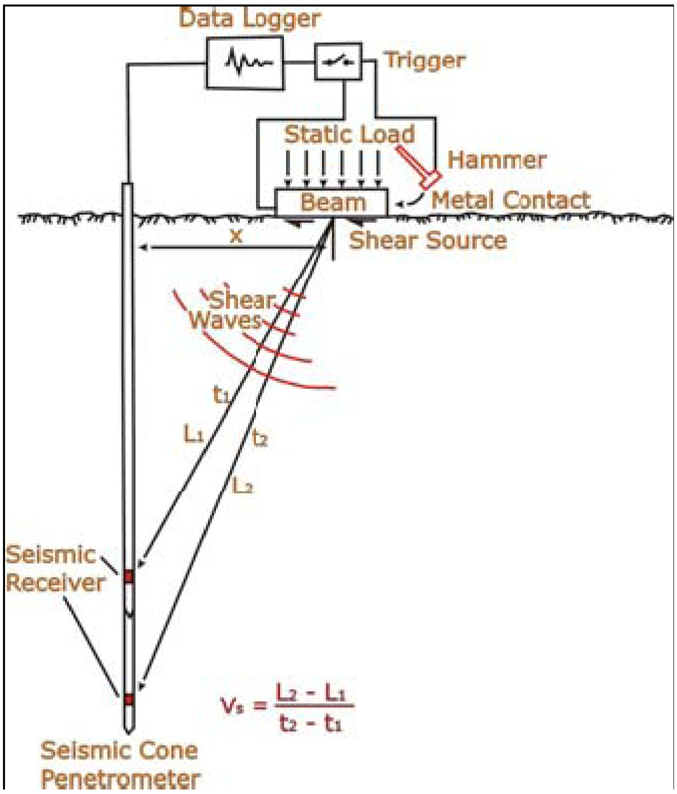
MIRANDOLA (MO), via Barozzi - Prova penetrometrica statica con piezococono sismico SCPTU

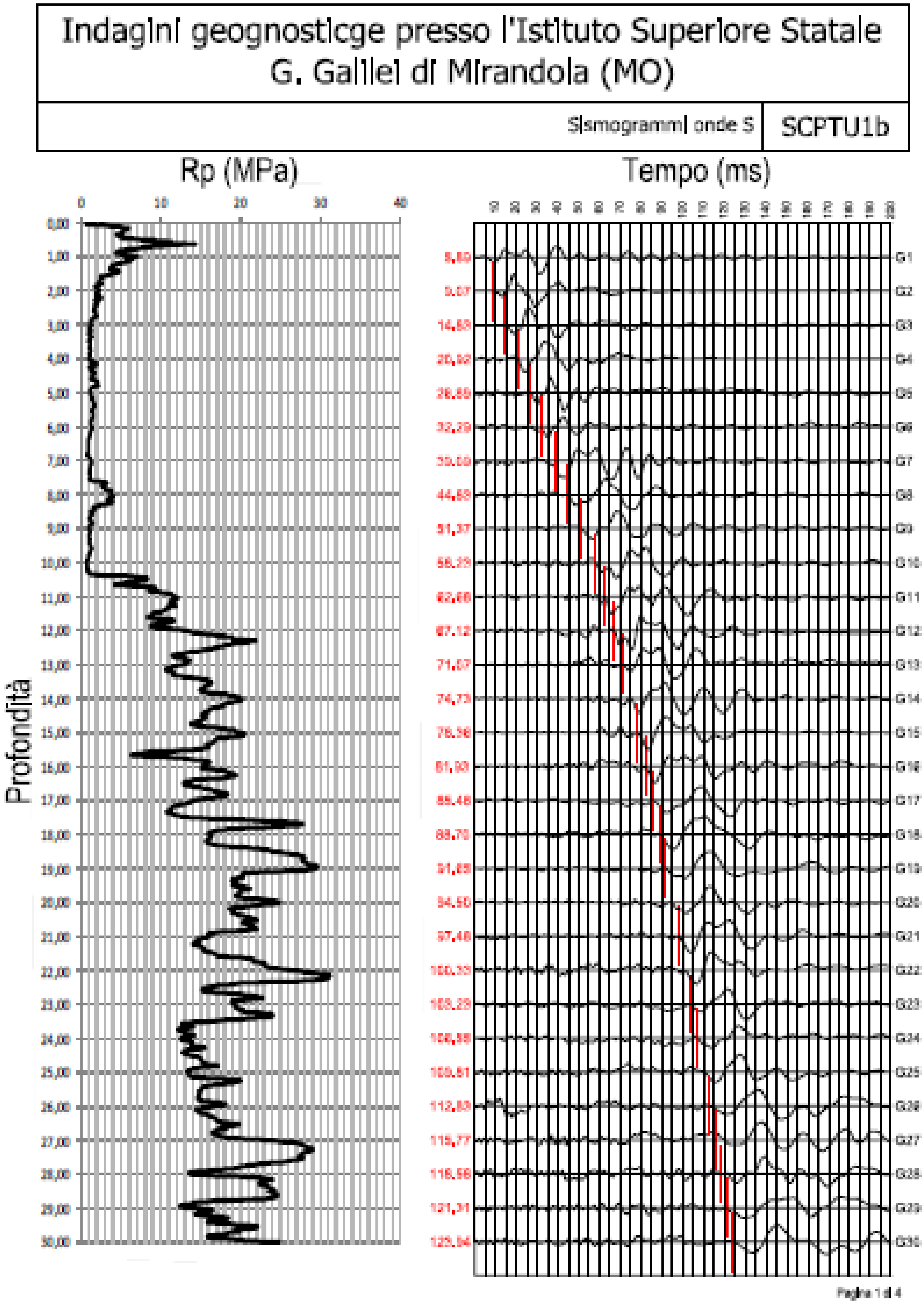
La prova penetrometrica è stata eseguita seguendo le prescrizioni riportate negli Standards ASTM D3441-86, *"Standards Tests Method for Deep Quasi-Static, Cone and Friction-Cone Penetration Tests of Soil"*.
La punta elettrica utilizzata è realizzata dalla ditta TECNOPENTA e presenta le seguenti caratteristiche:
punta conica
- diametro 35,7 mm;
- altezza nominale 30,9 mm;
- angolo d'apertura 60°;
- area nominale 1000 mm2;
- altezza: base cilindro-filtro 10 mm;
- altezza quadring 3,5 mm;

piezocono sismico
- area di punta 10,0 cm2;
- diametro 35,7 mm;
- area netta (An) 6,6;
- superficie manicotto 150,0 cm2;
- lunghezza manicotto 133,7 mm;
- area superiore manicotto 2,22 cm2;
- lunghezza totale punta elettrica 600,0 mm;
- peso complessivo 3kg.

La prova è stata eseguita secondo le procedure standard, ovvero attraverso l'infissione della punta elettrica (piezocono) a velocità costante di 2 cm/s, e registrazione dei valori della resistenza alla punta qc e dell'attrito laterale fs locale ogni 2 cm.
Tramite il piezocono, opportunamente saturato a grasso di litio prima dello svolgimento della prova, è stato possibile acquisire un terzo parametro cioè la pressione neutrale dell'acqua U del terreno attraversato.
L'inclinazione dello strumento durante l'avanzamento nel sottosuolo è determinata per mezzo di inclinometri.
L'acquisizione e la restituzione dei dati è fornita tramite un sistema analogico digitale munito di "encoder" di sincronizzazione con l'avanzamento delle aste nel terreno, di registratore grafico di Rp (resistenza alla punta), fs (resistenza laterale), u+Δu (pressione interstiziale) ed inclinazione, di registratore grafico della variazione nel tempo della pressione interstiziale per le prove di dissipazione.
Il cono sismico oltre all'acquisizione dei normali parametri di resistenza alla punta (qc), attrito laterale (fs) epressione neutra (U) permette di determinare la velocità delle onde compressionali (Vp) e di taglio (Vs) tramitel'aggiunta, nella parte sommatale della sonda, di un manicotto di 49 mm di diametro contenente un geofono triassiale.
Tale geofono è costituito da 3 accelerometri SERCEL HF-10 con frequenza naturale di 10 Hz, di cui uno disposto verticalmente e due orizzontalmente, ortogonali l'uno all'altro, secondo le tre direzioni X, Y e Z.
Per determinare la velocità di propagazione delle onde compressionali e di taglio è necessario predisporre un'appropriata sorgente di segnale sismico che deve preferenzialmente generare onde compressionali e di taglio.
Per le prime è stato utilizzato un piattello di ferro di 30 cm di diametro e posto a 1,20 m. di distanza rispetto alla verticale di prova, che viene colpito con una mazza da 10 kg perpendicolarmente al terreno.

Per le seconde, invece, è stata utilizzata una traversina di legno (dimensioni 700x250x250mm) con fissate due piastre di ferro alle terminazioni della stessa, caricata con uno stabilizzatore dell'autocarro del penetrometro. Tale traversina è posta ad una distanza di 1,20 m. dalla verticale di prova.
La velocità di propagazione delle onde di compressionali e di taglio è dato dal rapporto tra la differenza della distanza tra la sorgente ed il ricevitore e dal ritardo dell'arrivo
dell'impulso dal primo al secondo ricevitore.
Nell'elaborato riportato in allegato 2, sono riportati i sismogrammi registrati durante la generazione di onde di taglio e compressionali, i tempi di arrivo valutati con una precisione di 1x10-3 sec., la Vs relativa al tempo di percorrenza delle onde dal piano campagna sino alla profondità di indagine raggiunta (Vs m/s) e la Vs relativa al tempo di percorrenza di ogni singolo metro indagato (Vs percorrenza L).




Indagini geognosticge presso l'Istituto Superiore Statale
G. Galilei di Mirandola (MO)
Sismogrammi onde S
SCPTU1b
Rp (MPa)
Tempo (ms)
Profondità
Pagina 1 di 4

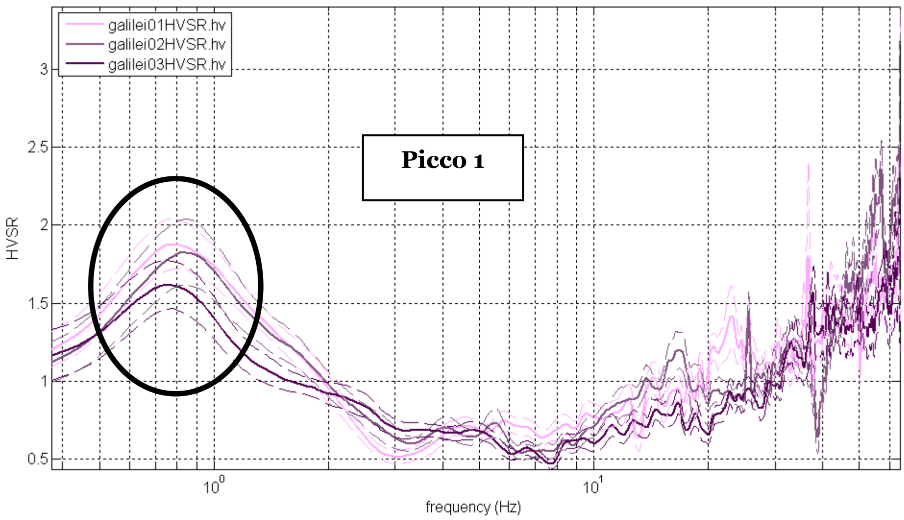
Indagini geognosticge presso l'Istituto Superiore Statale G. Galilei di Mirandola (MO)

Tabella onde S — SCPTU1b

Seismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 – L1	t2 – t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1,00	1,71	0,006	5,890	290	1,71	0,0059	290
2,00	2,37	0,009	9,075	261	0,66	0,0032	207
3,00	3,18	0,015	14,830	214	0,81	0,0058	141
4,00	4,05	0,021	20,625	193	0,87	0,0061	143
5,00	4,93	0,027	26,690	184	0,90	0,0060	151
6,00	5,86	0,032	32,265	181	0,91	0,0054	169
7,00	6,78	0,039	39,090	174	0,92	0,0068	136
8,00	7,71	0,045	44,835	172	0,93	0,0057	162
9,00	8,65	0,051	51,270	168	0,93	0,0065	143
10,00	9,58	0,058	58,230	165	0,94	0,0069	136
11,00	10,52	0,063	62,685	168	0,94	0,0045	211
12,00	11,46	0,067	67,125	171	0,94	0,0044	212
13,00	12,40	0,071	71,070	174	0,94	0,0039	238
14,00	13,30	0,075	74,725	178	0,90	0,0037	247
15,00	14,19	0,078	78,365	181	0,89	0,0036	245
16,00	15,08	0,082	81,930	184	0,89	0,0036	249
17,00	15,95	0,085	85,485	187	0,87	0,0036	246
18,00	16,85	0,089	88,705	190	0,90	0,0032	278
19,00	17,72	0,092	91,655	193	0,87	0,0030	296
20,00	18,59	0,095	94,505	197	0,87	0,0028	304
21,00	19,45	0,097	97,460	200	0,86	0,0030	290
22,00	20,31	0,100	100,335	202	0,86	0,0029	300
23,00	21,17	0,103	103,235	205	0,86	0,0029	297
24,00	22,02	0,107	106,530	207	0,84	0,0033	255
25,00	22,85	0,110	109,815	208	0,84	0,0033	257
26,00	23,74	0,113	112,830	210	0,88	0,0030	293
27,00	24,59	0,116	115,770	212	0,86	0,0029	291
28,00	25,37	0,119	118,580	214	0,78	0,0028	277
29,00	26,13	0,121	121,310	215	0,76	0,0027	278
30,00	26,86	0,124	123,945	217	0,73	0,0026	276

Vs30 = 216 m/s	Categoria di suolo C

Sul sito di studio, sono state eseguite 3 acquisizioni HVSR, 4 acquisizioni HoliSurface con Geofono 3D Pasi srl, modello Gemini2, 1 prova con cono sismico SCPTU, 5 prove penetrometriche statiche CPT, utilizzate per tarare e/o vincolare, le prove geofisiche.
Relativamente alle **frequenze caratteristiche di sito**, dal diagramma del confronto delle curve H/V, di seguito riportato, abbiamo:
Un picco stratigrafico, caratteristico, cosi caratterizzato:

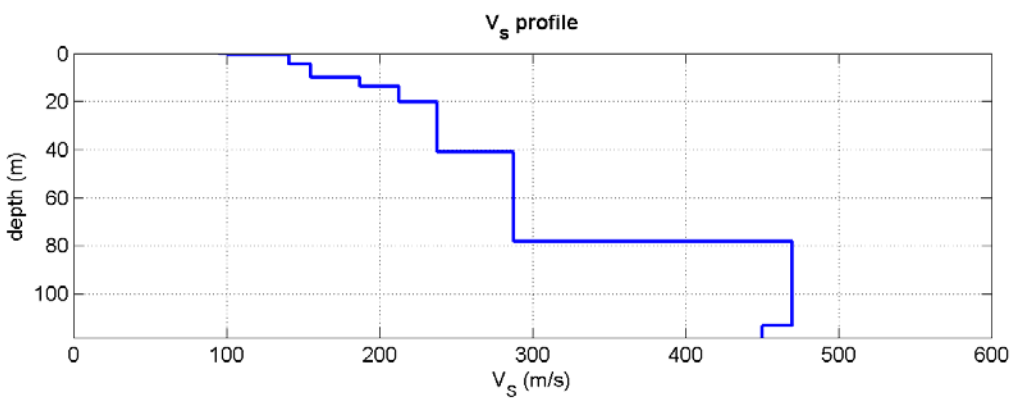


Picchi Stratigrafici	Rapporto H/V (valori medi)	Frequenza(Hz) Caratteristica (valori medi)
1	~ 1.6-1.9	~ 0.8/0.9

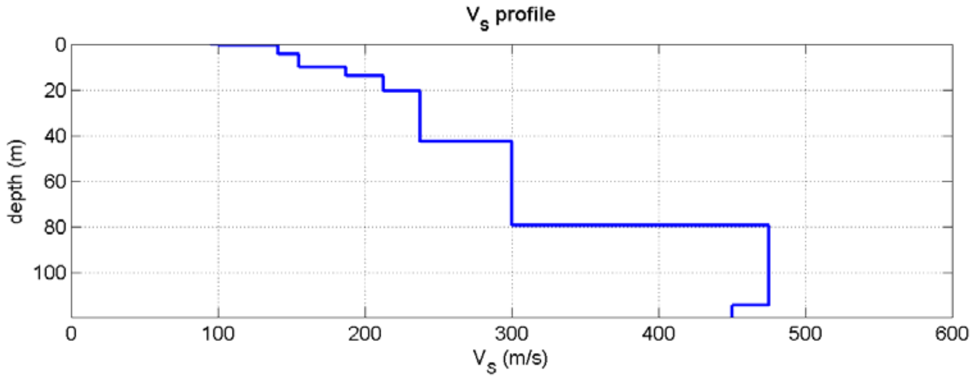
Il rapporto H/V evidenzia contrasti di impedenza non significativi (H/V < 2) in caso di moto sismico.

Relativamente al profilo di Vs con la profondità e alla determinazione della categoria di suolo richiesta dalla normativa, **mediante la ricostruzione delle Vs$_{30}$** attraverso l'analisi HoliSurface ed il Cono sismico, abbiamo che:

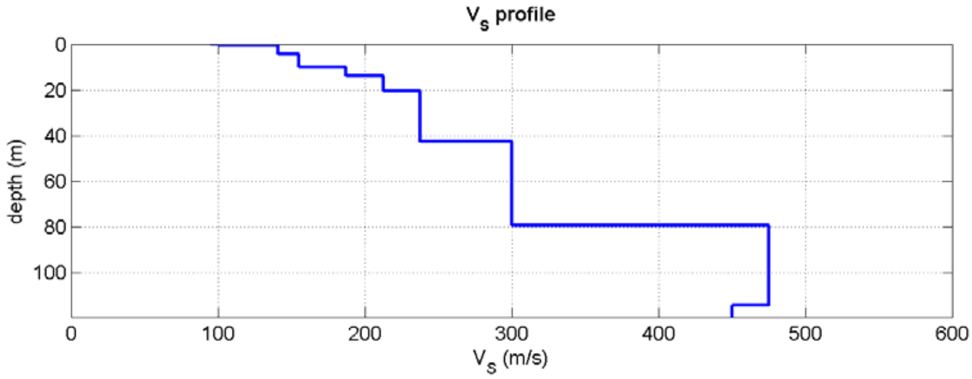
- HoliSurface01a



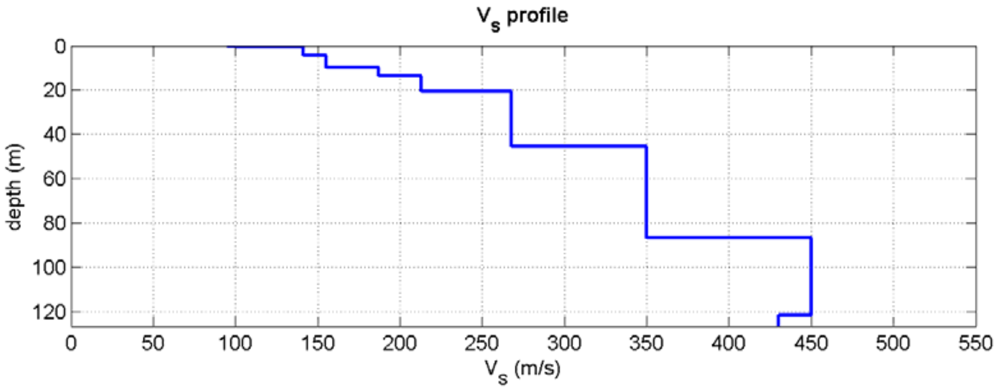
- HoliSurface01b



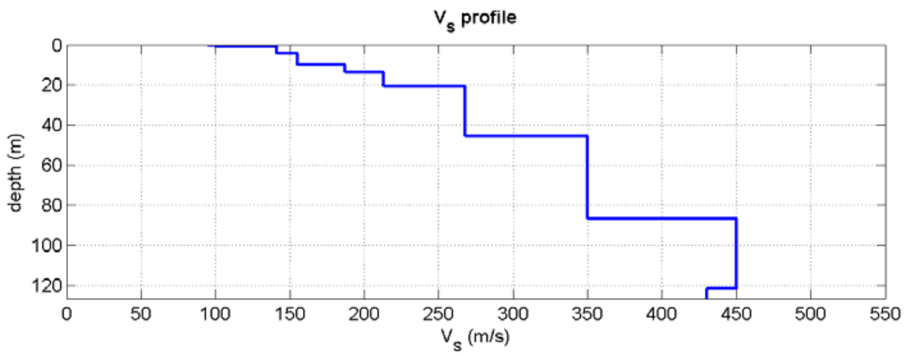
- HoliSurface01c



- HoliSurface02a



- HoliSurface02b



- Cono sismico SCPTU

Indagini geognosticge presso l'Istituto Superiore Statale G. Galilei di Mirandola (MO)

Tabella onde S — SCPTU1b

Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 – L1	t2 – t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1,00	1,71	0,006	5,890	290	1,71	0,0059	290
2,00	2,37	0,009	9,075	261	0,66	0,0032	207
3,00	3,18	0,015	14,830	214	0,81	0,0058	141
4,00	4,05	0,021	20,925	193	0,87	0,0061	142
5,00	4,95	0,027	26,880	184	0,90	0,0060	151
6,00	5,86	0,032	32,285	181	0,91	0,0054	169
7,00	6,78	0,039	39,090	174	0,92	0,0068	136
8,00	7,71	0,045	44,835	172	0,93	0,0057	162
9,00	8,65	0,051	51,270	168	0,93	0,0065	143
10,00	9,58	0,058	58,230	165	0,94	0,0069	136
11,00	10,52	0,063	62,685	168	0,94	0,0045	211
12,00	11,46	0,067	67,125	171	0,94	0,0044	212
13,00	12,40	0,071	71,070	174	0,94	0,0039	238
14,00	13,30	0,075	74,725	178	0,90	0,0037	247
15,00	14,19	0,078	78,365	181	0,89	0,0036	245
16,00	15,08	0,082	81,930	184	0,89	0,0036	249
17,00	15,96	0,085	85,485	187	0,87	0,0036	246
18,00	16,85	0,089	88,705	190	0,90	0,0032	278
19,00	17,73	0,092	91,655	193	0,87	0,0030	296
20,00	18,59	0,095	94,505	197	0,87	0,0028	304
21,00	19,45	0,097	97,480	200	0,86	0,0030	290
22,00	20,31	0,100	100,335	202	0,86	0,0029	300
23,00	21,17	0,103	103,235	205	0,86	0,0029	297
24,00	22,02	0,107	106,530	207	0,84	0,0033	255
25,00	22,85	0,110	109,815	208	0,84	0,0033	257
26,00	23,74	0,113	112,830	210	0,88	0,0030	293
27,00	24,59	0,116	115,770	212	0,86	0,0029	291
28,00	25,37	0,119	118,580	214	0,78	0,0028	277
29,00	26,13	0,121	121,310	215	0,76	0,0027	278
30,00	26,86	0,124	123,945	217	0,73	0,0026	276

Vs30 = 216 m/s	Categoria di suolo C

HoliSurface - Vs (30): 188-193 (categoria di sottosuolo "C")
Cono sismico - Vs (30): 216 (categoria di sottosuolo "C")

b. Indagini geognostiche

b1. I dati ottenuti

Le indagini geognostiche sono state eseguite dalla ditta GeoProgetti s.a.s. (Medolla, Modena).
Per l'ubicazione delle prove si veda la planimetria riportata in figura 6.1, mentre per le schede delle prove si rimanda all'allegato tecnico inserito nel presente documento.

b2. Interpretazione dei sondaggi geognostici

Dall'analisi dei valori desunti dalla prova penetrometrica statica (CPT) è stato possibile dettagliare e ricostruire la stratigrafia del sottosuolo e determinare i parametri geotecnici di riferimento dei terreni di fondazione. Le prove effettuate hanno confermato la presenza nei terreni di fondazione di materiali a granulometria prevalente molto fine (argille) con intercalazioni centimetriche di livelli limosi debolmente sabbiosi. I valori riportati nelle tabelle della prova penetrometrica statica meccanica rappresentano i valori della resistenza alla penetrazione della punta meccanica (Rp), infissa nel terreno a velocità costante (v = 2 cm / s), espressi in kg/cm^2, i valori della resistenza laterale specifica (Rl), in kg/cm^2 ed i valori del rapporto delle resistenze RP/RL (Rapporto Begemann 1965 e Rapporto Schmertmann 1978).
Nei diagrammi sono riportati i valori i valori della resistenza alla penetrazione della punta meccanica (Rp) in kg/cm^2, i valori della resistenza laterale specifica (Rl), in kg/cm^2 ed i valori del rapporto delle resistenze RP/RL.
Le elaborazioni di tali prove è stata eseguita con l'ausilio del programma di calcolo "Static Probing 2014 - rel. 365" della ditta GEOSTRU sas.
Vengono di seguito riportate le tabelle ed i grafici dei valori desunti dalla prova penetrometrica statica meccanica CPT:

PROVA CPT01

Committente: Provincia di Modena
Strumento utilizzato: PAGANI 300 kN
Prova eseguita in data: 28/05/2013
Profondità prova: 34.00 mt
Località: Mirandola

Profondità (m)	Lettura punta (Kg/cm²)	Lettura laterale (Kg/cm²)	qc (Kg/cm²)	fs (Kg/cm²)	qc/fs Begemann	fs/qcx100 (Schmertmann)
0.20	0.00	0.0	0.1	1.3	0.1	965.9
0.40	120.00	140.0	120.1	1.3	90.1	1.1
0.60	80.00	100.0	80.1	0.5	150.4	0.7
0.80	10.00	18.0	10.1	0.5	19.0	5.3
1.00	9.00	17.0	9.1	0.5	19.6	5.1
1.20	8.00	15.0	8.3	0.4	20.7	4.8
1.40	9.00	15.0	9.3	0.3	27.9	3.6
1.60	9.00	14.0	9.3	0.3	27.9	3.6
1.80	8.00	13.0	8.3	0.5	17.7	5.6
2.00	8.00	15.0	8.3	0.5	17.7	5.6
2.20	10.00	17.0	10.4	0.6	17.4	5.8
2.40	10.00	19.0	10.4	0.5	22.3	4.5
2.60	9.00	16.0	9.4	0.3	35.3	2.8
2.80	8.00	12.0	8.4	0.4	21.0	4.8
3.00	7.00	13.0	7.4	0.6	12.4	8.1
3.20	11.00	20.0	11.6	0.6	19.3	5.2

3.40	22.00	31.0	22.6	0.4	56.4	1.8
3.60	11.00	17.0	11.6	0.5	24.7	4.0
3.80	11.00	18.0	11.6	0.5	21.7	4.6
4.00	14.00	22.0	14.6	0.8	18.2	5.5
4.20	14.00	26.0	14.7	0.9	15.7	6.4
4.40	17.00	31.0	17.7	1.0	17.7	5.7
4.60	17.00	32.0	17.7	1.0	17.7	5.7
4.80	17.00	32.0	17.7	1.1	16.6	6.0
5.00	13.00	29.0	13.7	0.9	14.7	6.8
5.20	12.00	26.0	12.8	0.7	17.5	5.7
5.40	11.00	22.0	11.8	0.8	14.8	6.8
5.60	12.00	24.0	12.8	0.8	16.0	6.2
5.80	17.00	29.0	17.8	1.0	17.8	5.6
6.00	15.00	30.0	15.8	0.9	18.3	5.5
6.20	11.00	24.0	12.0	0.4	29.9	3.3
6.40	22.00	28.0	23.0	0.3	69.0	1.4
6.60	12.00	17.0	13.0	0.6	21.6	4.6
6.80	11.00	20.0	12.0	0.6	19.9	5.0
7.00	12.00	21.0	13.0	0.7	17.7	5.7
7.20	13.00	24.0	14.1	0.8	17.6	5.7
7.40	11.00	23.0	12.1	0.5	22.7	4.4
7.60	9.00	17.0	10.1	0.3	30.3	3.3
7.80	9.00	14.0	10.1	0.3	30.3	3.3
8.00	8.00	13.0	9.1	0.3	27.3	3.7
8.20	9.00	14.0	10.2	0.6	17.1	5.9
8.40	10.00	19.0	11.2	0.4	28.1	3.6
8.60	14.00	20.0	15.2	0.9	17.6	5.7
8.80	15.00	28.0	16.2	0.8	20.3	4.9
9.00	16.00	28.0	17.2	0.9	19.9	5.0
9.20	35.00	48.0	36.4	0.9	42.0	2.4
9.40	50.00	63.0	51.4	1.4	36.7	2.7
9.60	35.00	56.0	36.4	1.4	26.0	3.8
9.80	24.00	45.0	25.4	1.5	16.6	6.0
10.00	25.00	48.0	26.4	0.7	36.0	2.8
10.20	62.00	73.0	63.5	1.0	63.5	1.6
10.40	150.00	165.0	151.5	1.3	113.7	0.9
10.60	120.00	140.0	121.5	1.3	91.2	1.1
10.80	125.00	145.0	126.5	1.0	126.5	0.8
11.00	130.00	145.0	131.5	1.3	98.7	1.0
11.20	150.00	170.0	151.7	1.3	113.8	0.9
11.40	220.00	240.0	221.7	1.3	166.3	0.6
11.60	220.00	240.0	221.7	1.3	166.3	0.6
11.80	230.00	250.0	231.7	1.3	173.8	0.6
12.00	230.00	250.0	231.7	1.3	173.8	0.6
12.20	200.00	220.0	201.8	1.0	201.8	0.5
12.40	175.00	190.0	176.8	1.0	176.8	0.6
12.60	165.00	180.0	166.8	1.0	166.8	0.6
12.80	165.00	180.0	166.8	1.0	166.8	0.6
13.00	145.00	160.0	146.8	1.3	110.1	0.9
13.20	140.00	160.0	141.9	1.0	141.9	0.7
13.40	145.00	160.0	146.9	1.0	146.9	0.7
13.60	130.00	145.0	131.9	1.0	131.9	0.8
13.80	170.00	185.0	171.9	1.3	129.0	0.8
14.00	170.00	190.0	171.9	1.3	129.0	0.8
14.20	170.00	190.0	172.1	1.0	172.1	0.6
14.40	175.00	190.0	177.1	1.0	177.1	0.6
14.60	170.00	185.0	172.1	1.0	172.1	0.6
14.80	170.00	185.0	172.1	1.0	172.1	0.6
15.00	165.00	180.0	167.1	1.3	125.3	0.8
15.20	120.00	140.0	122.2	1.0	122.2	0.8

15.40	110.00	125.0	112.2	1.3	84.2	1.2
15.60	140.00	160.0	142.2	1.3	106.7	0.9
15.80	100.00	120.0	102.2	1.3	76.7	1.3
16.00	130.00	150.0	132.2	1.0	132.2	0.8
16.20	170.00	185.0	172.3	1.3	129.3	0.8
16.40	200.00	220.0	202.3	1.0	202.3	0.5
16.60	170.00	185.0	172.3	1.0	172.3	0.6
16.80	165.00	180.0	167.3	1.3	125.5	0.8
17.00	170.00	190.0	172.3	1.0	172.3	0.6
17.20	175.00	190.0	177.5	1.3	133.1	0.8
17.40	180.00	200.0	182.5	1.3	136.9	0.7
17.60	180.00	200.0	182.5	1.3	136.9	0.7
17.80	185.00	205.0	187.5	1.3	140.6	0.7
18.00	180.00	200.0	182.5	1.0	182.5	0.5
18.20	185.00	200.0	187.6	1.3	140.8	0.7
18.40	200.00	220.0	202.6	1.3	152.0	0.7
18.60	190.00	210.0	192.6	1.0	192.6	0.5
18.80	160.00	175.0	162.6	1.0	162.6	0.6
19.00	175.00	190.0	177.6	1.0	177.6	0.6
19.20	115.00	130.0	117.8	1.7	70.6	1.4
19.40	140.00	165.0	142.8	1.3	107.1	0.9
19.60	130.00	150.0	132.8	1.3	99.6	1.0
19.80	150.00	170.0	152.8	1.3	114.6	0.9
20.00	180.00	200.0	182.8	1.3	137.1	0.7
20.20	170.00	190.0	172.9	1.0	172.9	0.6
20.40	170.00	185.0	172.9	1.0	172.9	0.6
20.60	175.00	190.0	177.9	1.3	133.5	0.7
20.80	200.00	220.0	202.9	1.0	202.9	0.5
21.00	170.00	185.0	172.9	1.0	172.9	0.6
21.20	170.00	185.0	173.0	1.0	173.0	0.6
21.40	160.00	175.0	163.0	1.3	122.3	0.8
21.60	125.00	145.0	128.0	1.3	96.1	1.0
21.80	140.00	160.0	143.0	1.3	107.3	0.9
22.00	180.00	200.0	183.0	1.0	183.0	0.5
22.20	150.00	165.0	153.2	1.0	153.2	0.7
22.40	110.00	125.0	113.2	1.3	84.9	1.2
22.60	150.00	170.0	153.2	1.7	91.9	1.1
22.80	210.00	235.0	213.2	1.0	213.2	0.5
23.00	170.00	185.0	173.2	1.3	129.9	0.8
23.20	140.00	160.0	143.3	1.7	86.0	1.2
23.40	200.00	225.0	203.3	1.3	152.5	0.7
23.60	230.00	250.0	233.3	1.7	140.0	0.7
23.80	200.00	225.0	203.3	1.7	122.0	0.8
24.00	210.00	235.0	213.3	1.3	160.0	0.6
24.20	170.00	190.0	173.5	1.3	130.1	0.8
24.40	180.00	200.0	183.5	1.7	110.0	0.9
24.60	200.00	225.0	203.5	1.3	152.6	0.7
24.80	220.00	240.0	223.5	1.3	167.6	0.6
25.00	140.00	160.0	143.5	1.0	143.5	0.7
25.20	170.00	185.0	173.6	1.3	130.2	0.8
25.40	280.00	300.0	283.6	1.3	212.7	0.5
25.60	250.00	270.0	253.6	1.3	190.2	0.5
25.80	180.00	200.0	183.6	1.3	137.7	0.7
26.00	180.00	200.0	183.6	1.7	110.1	0.9
26.20	200.00	225.0	203.7	1.3	152.8	0.7
26.40	250.00	270.0	253.7	1.0	253.7	0.4
26.60	160.00	175.0	163.7	1.3	122.8	0.8
26.80	240.00	260.0	243.7	1.3	182.8	0.5
27.00	225.00	245.0	228.7	1.3	171.6	0.6
27.20	270.00	290.0	273.9	2.0	136.9	0.7

27.40	320.00	350.0	323.9	1.3	243.0	0.4
27.60	350.00	370.0	353.9	2.0	176.9	0.6
27.80	270.00	300.0	273.9	2.0	136.9	0.7
28.00	200.00	230.0	203.9	1.3	152.9	0.7
28.20	180.00	200.0	184.0	1.3	138.0	0.7
28.40	180.00	200.0	184.0	1.7	110.4	0.9
28.60	260.00	285.0	264.0	2.0	132.0	0.8
28.80	280.00	310.0	284.0	1.7	170.4	0.6
29.00	250.00	275.0	254.0	1.3	190.5	0.5
29.20	220.00	240.0	224.1	1.7	134.5	0.7
29.40	200.00	225.0	204.1	1.3	153.1	0.7
29.60	180.00	200.0	184.1	1.3	138.1	0.7
29.80	220.00	240.0	224.1	1.3	168.1	0.6
30.00	200.00	220.0	204.1	1.3	153.1	0.7
30.20	190.00	210.0	194.3	1.3	145.7	0.7
30.40	170.00	190.0	174.3	2.0	87.1	1.1
30.60	250.00	280.0	254.3	2.0	127.1	0.8
30.80	300.00	330.0	304.3	2.0	152.1	0.7
31.00	260.00	290.0	264.3	2.0	132.1	0.8
31.20	290.00	320.0	294.4	1.7	176.6	0.6
31.40	320.00	345.0	324.4	2.0	162.2	0.6
31.60	340.00	370.0	344.4	2.0	172.2	0.6
31.80	330.00	360.0	334.4	2.0	167.2	0.6
32.00	330.00	360.0	334.4	2.3	143.3	0.7
32.20	300.00	335.0	304.6	2.7	114.2	0.9
32.40	280.00	320.0	284.6	2.3	122.0	0.8
32.60	300.00	335.0	304.6	2.0	152.3	0.7
32.80	270.00	300.0	274.6	2.7	102.9	1.0
33.00	280.00	320.0	284.6	2.0	142.3	0.7
33.20	300.00	330.0	304.7	2.0	152.3	0.7
33.40	320.00	350.0	324.7	2.0	162.3	0.6
33.60	320.00	350.0	324.7	2.0	162.3	0.6
33.80	300.00	330.0	304.7	2.0	152.3	0.7
34.00	340.00	370.0	344.7	0.0		0.0

PROVA CPT02

Committente: Provincia di Modena
Strumento utilizzato: PAGANI 300 kN
Prova eseguita in data: 28/05/2013
Profondità prova: 39.40 mt
Località: Mirandola

Profondità (m)	Lettura punta (Kg/cm²)	Lettura laterale (Kg/cm²)	qc (Kg/cm²)	fs (Kg/cm²)	qc/fs Begemann	fs/qcx100 (Schmertmann)
0.20	0.00	0.0	0.1	2.0	0.1	1449.3
0.40	50.00	80.0	50.1	1.3	37.6	2.7
0.60	30.00	50.0	30.1	1.0	30.1	3.3
0.80	13.00	28.0	13.1	1.0	13.1	7.6
1.00	45.00	60.0	45.1	1.1	39.8	2.5
1.20	38.00	55.0	38.3	0.9	44.1	2.3
1.40	27.00	40.0	27.3	0.9	31.5	3.2
1.60	17.00	30.0	17.3	0.8	21.6	4.6
1.80	28.00	40.0	28.3	0.9	32.6	3.1
2.00	17.00	30.0	17.3	0.5	32.4	3.1
2.20	8.00	16.0	8.4	0.5	18.0	5.6
2.40	9.00	16.0	9.4	0.3	28.3	3.5
2.60	10.00	15.0	10.4	0.5	22.3	4.5
2.80	10.00	17.0	10.4	0.4	26.0	3.8

3.00	12.00	18.0	12.4	0.5	23.3	4.3
3.20	15.00	23.0	15.6	0.5	33.3	3.0
3.40	12.00	19.0	12.6	0.5	26.9	3.7
3.60	13.00	20.0	13.6	0.4	33.9	3.0
3.80	14.00	20.0	14.6	0.5	31.2	3.2
4.00	11.00	18.0	11.6	0.4	28.9	3.5
4.20	9.00	15.0	9.7	0.5	20.7	4.8
4.40	10.00	17.0	10.7	0.3	32.1	3.1
4.60	7.00	12.0	7.7	0.3	28.8	3.5
4.80	9.00	13.0	9.7	0.3	29.1	3.4
5.00	12.00	17.0	12.7	0.6	21.2	4.7
5.20	13.00	22.0	13.8	0.8	17.3	5.8
5.40	16.00	28.0	16.8	1.1	14.9	6.7
5.60	16.00	33.0	16.8	1.0	16.8	5.9
5.80	18.00	33.0	18.8	1.1	17.6	5.7
6.00	19.00	35.0	19.8	1.1	17.5	5.7
6.20	18.00	35.0	19.0	1.0	19.0	5.3
6.40	13.00	28.0	14.0	0.7	19.1	5.2
6.60	10.00	21.0	11.0	0.7	15.0	6.7
6.80	10.00	21.0	11.0	0.7	15.0	6.7
7.00	11.00	22.0	12.0	0.6	19.9	5.0
7.20	11.00	20.0	12.1	0.7	16.5	6.1
7.40	13.00	24.0	14.1	0.5	26.5	3.8
7.60	14.00	22.0	15.1	0.5	32.3	3.1
7.80	15.00	22.0	16.1	0.5	34.5	2.9
8.00	12.00	19.0	13.1	0.4	32.8	3.1
8.20	10.00	16.0	11.2	0.4	28.1	3.6
8.40	8.00	14.0	9.2	0.4	23.1	4.3
8.60	11.00	17.0	12.2	0.6	20.4	4.9
8.80	11.00	20.0	12.2	0.7	16.7	6.0
9.00	12.00	23.0	13.2	0.7	18.1	5.5
9.20	12.00	23.0	13.4	0.7	18.3	5.5
9.40	12.00	23.0	13.4	0.8	16.7	6.0
9.60	12.00	24.0	13.4	0.7	20.1	5.0
9.80	15.00	25.0	16.4	0.7	24.6	4.1
10.00	24.00	34.0	25.4	1.1	23.8	4.2
10.20	45.00	61.0	46.5	1.0	46.5	2.1
10.40	100.00	115.0	101.5	1.0	101.5	1.0
10.60	90.00	105.0	91.5	1.0	91.5	1.1
10.80	115.00	130.0	116.5	1.3	87.4	1.1
11.00	120.00	140.0	121.5	1.0	121.5	0.8
11.20	115.00	130.0	116.7	1.3	87.5	1.1
11.40	140.00	160.0	141.7	1.0	141.7	0.7
11.60	165.00	180.0	166.7	1.0	166.7	0.6
11.80	115.00	130.0	116.7	1.3	87.5	1.1
12.00	120.00	140.0	121.7	1.3	91.3	1.1
12.20	120.00	140.0	121.8	1.0	121.8	0.8
12.40	155.00	170.0	156.8	1.0	156.8	0.6
12.60	160.00	175.0	161.8	1.3	121.4	0.8
12.80	120.00	140.0	121.8	1.0	121.8	0.8
13.00	160.00	175.0	161.8	1.3	121.4	0.8
13.20	220.00	240.0	221.9	1.3	166.5	0.6
13.40	200.00	220.0	201.9	1.3	151.5	0.7
13.60	200.00	220.0	201.9	1.3	151.5	0.7
13.80	230.00	250.0	231.9	1.0	231.9	0.4
14.00	160.00	175.0	161.9	1.3	121.5	0.8
14.20	160.00	180.0	162.1	1.0	162.1	0.6
14.40	170.00	185.0	172.1	1.3	129.1	0.8
14.60	180.00	200.0	182.1	1.0	182.1	0.5
14.80	160.00	175.0	162.1	1.3	121.6	0.8

15.00	130.00	150.0	132.1	1.3	99.1	1.0
15.20	80.00	100.0	82.2	1.0	82.2	1.2
15.40	115.00	130.0	117.2	1.3	87.9	1.1
15.60	130.00	150.0	132.2	1.3	99.2	1.0
15.80	150.00	170.0	152.2	1.0	152.2	0.7
16.00	160.00	175.0	162.2	1.3	121.7	0.8
16.20	160.00	180.0	162.3	1.3	121.8	0.8
16.40	180.00	200.0	182.3	1.3	136.8	0.7
16.60	230.00	250.0	232.3	1.3	174.3	0.6
16.80	220.00	240.0	222.3	1.3	166.8	0.6
17.00	210.00	230.0	212.3	1.3	159.3	0.6
17.20	120.00	140.0	122.5	1.3	91.9	1.1
17.40	130.00	150.0	132.5	1.3	99.4	1.0
17.60	150.00	170.0	152.5	1.0	152.5	0.7
17.80	160.00	175.0	162.5	1.3	121.9	0.8
18.00	120.00	140.0	122.5	1.0	122.5	0.8
18.20	130.00	145.0	132.6	1.3	99.5	1.0
18.40	140.00	160.0	142.6	1.3	107.0	0.9
18.60	150.00	170.0	152.6	1.3	114.5	0.9
18.80	140.00	160.0	142.6	1.0	142.6	0.7
19.00	170.00	185.0	172.6	1.3	129.5	0.8
19.20	210.00	230.0	212.8	1.3	159.6	0.6
19.40	230.00	250.0	232.8	1.3	174.6	0.6
19.60	200.00	220.0	202.8	1.3	152.1	0.7
19.80	270.00	290.0	272.8	1.3	204.6	0.5
20.00	300.00	320.0	302.8	1.3	227.1	0.4
20.20	230.00	250.0	232.9	1.3	174.7	0.6
20.40	200.00	220.0	202.9	1.3	152.2	0.7
20.60	180.00	200.0	182.9	2.0	91.4	1.1
20.80	300.00	330.0	302.9	1.3	227.2	0.4
21.00	270.00	290.0	272.9	1.3	204.7	0.5
21.20	240.00	260.0	243.0	1.3	182.3	0.5
21.40	230.00	250.0	233.0	1.3	174.8	0.6
21.60	180.00	200.0	183.0	1.3	137.3	0.7
21.80	260.00	280.0	263.0	1.3	197.3	0.5
22.00	240.00	260.0	243.0	1.3	182.3	0.5
22.20	230.00	250.0	233.2	1.3	174.9	0.6
22.40	200.00	220.0	203.2	1.3	152.4	0.7
22.60	200.00	220.0	203.2	1.3	152.4	0.7
22.80	180.00	200.0	183.2	1.3	137.4	0.7
23.00	260.00	280.0	263.2	2.0	131.6	0.8
23.20	300.00	330.0	303.3	2.0	151.7	0.7
23.40	300.00	330.0	303.3	2.0	151.7	0.7
23.60	300.00	330.0	303.3	2.3	130.0	0.8
23.80	300.00	335.0	303.3	2.0	151.7	0.7
24.00	310.00	340.0	313.3	1.7	187.9	0.5
24.20	230.00	255.0	233.5	1.3	175.1	0.6
24.40	220.00	240.0	223.5	1.3	167.6	0.6
24.60	180.00	200.0	183.5	1.7	110.0	0.9
24.80	190.00	215.0	193.5	1.3	145.1	0.7
25.00	190.00	210.0	193.5	1.7	116.0	0.9
25.20	200.00	225.0	203.6	1.3	152.7	0.7
25.40	180.00	200.0	183.6	1.3	137.7	0.7
25.60	210.00	230.0	213.6	1.7	128.1	0.8
25.80	230.00	255.0	233.6	1.3	175.2	0.6
26.00	160.00	180.0	163.6	1.7	98.1	1.0
26.20	190.00	215.0	193.7	2.0	96.9	1.0
26.40	270.00	300.0	273.7	2.3	117.3	0.9
26.60	310.00	345.0	313.7	2.0	156.9	0.6
26.80	270.00	300.0	273.7	1.3	205.3	0.5

27.00	210.00	230.0	213.7	1.3	160.3	0.6
27.20	190.00	210.0	193.9	1.3	145.4	0.7
27.40	200.00	220.0	203.9	1.7	122.3	0.8
27.60	200.00	225.0	203.9	1.0	203.9	0.5
27.80	110.00	125.0	113.9	1.3	85.4	1.2
28.00	210.00	230.0	213.9	1.7	128.3	0.8
28.20	240.00	265.0	244.0	2.0	122.0	0.8
28.40	250.00	280.0	254.0	2.0	127.0	0.8
28.60	290.00	320.0	294.0	2.3	126.0	0.8
28.80	290.00	325.0	294.0	2.0	147.0	0.7
29.00	290.00	320.0	294.0	2.0	147.0	0.7
29.20	330.00	360.0	334.1	2.0	167.1	0.6
29.40	260.00	290.0	264.1	2.3	113.2	0.9
29.60	320.00	355.0	324.1	1.7	194.4	0.5
29.80	260.00	285.0	264.1	1.3	198.2	0.5
30.00	190.00	210.0	194.1	1.3	145.6	0.7
30.20	170.00	190.0	174.3	1.7	104.5	1.0
30.40	170.00	195.0	174.3	1.3	130.7	0.8
30.60	200.00	220.0	204.3	1.3	153.2	0.7
30.80	190.00	210.0	194.3	1.7	116.5	0.9
31.00	190.00	215.0	194.3	1.3	145.7	0.7
31.20	200.00	220.0	204.4	1.3	153.4	0.7
31.40	210.00	230.0	214.4	1.3	160.9	0.6
31.60	180.00	200.0	184.4	1.7	110.6	0.9
31.80	180.00	205.0	184.4	1.3	138.3	0.7
32.00	200.00	220.0	204.4	1.7	122.6	0.8
32.20	170.00	195.0	174.6	1.3	130.9	0.8
32.40	180.00	200.0	184.6	1.7	110.7	0.9
32.60	170.00	195.0	174.6	1.3	130.9	0.8
32.80	170.00	190.0	174.6	1.7	104.7	1.0
33.00	180.00	205.0	184.6	1.3	138.5	0.7
33.20	190.00	210.0	194.7	1.3	146.1	0.7
33.40	200.00	220.0	204.7	1.7	122.8	0.8
33.60	180.00	205.0	184.7	1.9	98.9	1.0
33.80	42.00	70.0	46.7	1.7	26.9	3.7
34.00	34.00	60.0	38.7	1.6	24.2	4.1
34.20	38.00	62.0	42.8	1.7	25.7	3.9
34.40	38.00	63.0	42.8	1.6	26.8	3.7
34.60	40.00	64.0	44.8	1.7	25.9	3.9
34.80	37.00	63.0	41.8	1.7	25.1	4.0
35.00	35.00	60.0	39.8	1.6	24.9	4.0
35.20	34.00	58.0	39.0	1.7	22.5	4.4
35.40	34.00	60.0	39.0	1.7	22.5	4.4
35.60	38.00	64.0	43.0	2.0	21.5	4.7
35.80	36.00	66.0	41.0	2.1	19.2	5.2
36.00	36.00	68.0	41.0	1.9	21.2	4.7
36.20	33.00	62.0	38.1	1.9	19.7	5.1
36.40	32.00	61.0	37.1	1.9	19.9	5.0
36.60	31.00	59.0	36.1	2.0	18.1	5.5
36.80	35.00	65.0	40.1	1.3	30.1	3.3
37.00	70.00	90.0	75.1	1.7	45.1	2.2
37.20	150.00	175.0	155.2	1.4	110.9	0.9
37.40	104.00	125.0	109.2	1.7	65.5	1.5
37.60	140.00	165.0	145.2	1.3	109.0	0.9
37.80	200.00	220.0	205.2	2.0	102.6	1.0
38.00	290.00	320.0	295.2	2.0	147.6	0.7
38.20	200.00	230.0	205.4	2.0	102.7	1.0
38.40	230.00	260.0	235.4	2.0	117.7	0.8
38.60	300.00	330.0	305.4	2.0	152.7	0.7
38.80	280.00	310.0	285.4	2.0	142.7	0.7

39.00	360.00	390.0	365.4	2.7	137.0	0.7
39.20	400.00	440.0	405.5	3.0	135.2	0.7
39.40	400.00	445.0	405.5	0.0		0.0

PROVA CPT03

Committente: Provincia di Modena
Strumento utilizzato: PAGANI 300 kN
Prova eseguita in data: 28/05/2013
Profondità prova: 33.40 mt
Località: Mirandola

Profondità (m)	Lettura punta (Kg/cm²)	Lettura laterale (Kg/cm²)	qc (Kg/cm²)	fs (Kg/cm²)	qc/fs Begemann	fs/qcx100 (Schmertmann)
0.20	0.00	0.0	0.1	1.0	0.1	724.6
0.40	30.00	45.0	30.1	0.9	32.3	3.1
0.60	25.00	39.0	25.1	0.4	62.8	1.6
0.80	6.00	12.0	6.1	0.7	9.2	10.9
1.00	10.00	20.0	10.1	0.4	25.3	3.9
1.20	18.00	24.0	18.3	0.6	30.5	3.3
1.40	23.00	32.0	23.3	0.7	34.9	2.9
1.60	19.00	29.0	19.3	1.5	13.1	7.6
1.80	30.00	52.0	30.3	0.7	45.4	2.2
2.00	13.00	23.0	13.3	0.7	18.1	5.5
2.20	11.00	22.0	11.4	0.3	42.7	2.3
2.40	16.00	20.0	16.4	0.6	27.4	3.7
2.60	12.00	21.0	12.4	0.6	20.7	4.8
2.80	11.00	20.0	11.4	0.6	19.0	5.3
3.00	11.00	20.0	11.4	0.4	28.5	3.5
3.20	9.00	15.0	9.6	0.5	20.5	4.9
3.40	13.00	20.0	13.6	0.5	25.4	3.9
3.60	11.00	19.0	11.6	0.5	21.7	4.6
3.80	12.00	20.0	12.6	0.4	31.4	3.2
4.00	17.00	23.0	17.6	0.6	29.3	3.4
4.20	10.00	19.0	10.7	0.3	32.1	3.1
4.40	21.00	26.0	21.7	0.3	81.2	1.2
4.60	10.00	14.0	10.7	0.5	20.1	5.0
4.80	12.00	20.0	12.7	0.6	21.2	4.7
5.00	16.00	25.0	16.7	0.7	25.0	4.0
5.20	25.00	35.0	25.8	1.1	22.8	4.4
5.40	23.00	40.0	23.8	1.3	18.8	5.3
5.60	20.00	39.0	20.8	1.1	19.5	5.1
5.80	21.00	37.0	21.8	1.0	21.8	4.6
6.00	21.00	36.0	21.8	1.1	20.5	4.9
6.20	17.00	33.0	18.0	1.0	18.0	5.6
6.40	12.00	27.0	13.0	0.7	17.7	5.7
6.60	11.00	22.0	12.0	0.7	16.3	6.1
6.80	12.00	23.0	13.0	0.7	17.7	5.7
7.00	13.00	24.0	14.0	0.8	17.5	5.7
7.20	11.00	23.0	12.1	0.5	25.9	3.9
7.40	19.00	26.0	20.1	0.5	43.0	2.3
7.60	12.00	19.0	13.1	0.4	32.8	3.1
7.80	12.00	18.0	13.1	0.5	28.1	3.6
8.00	9.00	16.0	10.1	0.5	21.6	4.6
8.20	8.00	15.0	9.2	0.5	19.8	5.1
8.40	11.00	18.0	12.2	0.6	20.4	4.9
8.60	12.00	21.0	13.2	0.5	24.8	4.0
8.80	10.00	18.0	11.2	0.5	24.1	4.2
9.00	10.00	17.0	11.2	0.5	21.1	4.7
9.20	12.00	20.0	13.4	0.7	20.1	5.0
9.40	13.00	23.0	14.4	0.6	24.0	4.2

9.60	15.00	24.0	16.4	0.5	30.7	3.3
9.80	11.00	19.0	12.4	0.4	31.0	3.2
10.00	20.00	26.0	21.4	1.0	21.4	4.7
10.20	85.00	100.0	86.5	0.9	92.7	1.1
10.40	82.00	96.0	83.5	0.9	96.3	1.0
10.60	85.00	98.0	86.5	1.3	64.9	1.5
10.80	80.00	100.0	81.5	1.1	76.4	1.3
11.00	89.00	105.0	90.5	1.0	90.5	1.1
11.20	95.00	110.0	96.7	1.0	96.7	1.0
11.40	115.00	130.0	116.7	1.3	87.5	1.1
11.60	120.00	140.0	121.7	1.3	91.3	1.1
11.80	150.00	170.0	151.7	1.3	113.8	0.9
12.00	150.00	170.0	151.7	1.3	113.8	0.9
12.20	150.00	170.0	151.8	1.3	113.9	0.9
12.40	120.00	140.0	121.8	1.0	121.8	0.8
12.60	85.00	100.0	86.8	1.0	86.8	1.2
12.80	100.00	115.0	101.8	1.3	76.4	1.3
13.00	100.00	120.0	101.8	0.5	218.0	0.5
13.20	98.00	105.0	99.9	1.0	99.9	1.0
13.40	115.00	130.0	116.9	1.3	87.7	1.1
13.60	140.00	160.0	141.9	1.0	141.9	0.7
13.80	170.00	185.0	171.9	1.3	129.0	0.8
14.00	170.00	190.0	171.9	1.0	171.9	0.6
14.20	160.00	175.0	162.1	1.0	162.1	0.6
14.40	170.00	185.0	172.1	1.3	129.1	0.8
14.60	220.00	240.0	222.1	1.3	166.6	0.6
14.80	220.00	240.0	222.1	1.3	166.6	0.6
15.00	150.00	170.0	152.1	1.3	114.1	0.9
15.20	100.00	120.0	102.2	1.3	76.7	1.3
15.40	80.00	100.0	82.2	1.0	82.2	1.2
15.60	170.00	185.0	172.2	1.3	129.2	0.8
15.80	150.00	170.0	152.2	1.3	114.2	0.9
16.00	170.00	190.0	172.2	1.0	172.2	0.6
16.20	160.00	175.0	162.3	1.3	121.8	0.8
16.40	150.00	170.0	152.3	1.0	152.3	0.7
16.60	170.00	185.0	172.3	1.3	129.3	0.8
16.80	150.00	170.0	152.3	1.0	152.3	0.7
17.00	175.00	190.0	177.3	1.0	177.3	0.6
17.20	180.00	195.0	182.5	1.3	136.9	0.7
17.40	155.00	175.0	157.5	1.3	118.1	0.8
17.60	170.00	190.0	172.5	1.3	129.4	0.8
17.80	120.00	140.0	122.5	1.0	122.5	0.8
18.00	115.00	130.0	117.5	1.0	117.5	0.9
18.20	160.00	175.0	162.6	1.0	162.6	0.6
18.40	175.00	190.0	177.6	1.3	133.2	0.8
18.60	180.00	200.0	182.6	1.3	137.0	0.7
18.80	200.00	220.0	202.6	1.3	152.0	0.7
19.00	250.00	270.0	252.6	1.3	189.5	0.5
19.20	280.00	300.0	282.8	1.3	212.1	0.5
19.40	280.00	300.0	282.8	1.3	212.1	0.5
19.60	240.00	260.0	242.8	1.3	182.1	0.5
19.80	250.00	270.0	252.8	1.3	189.6	0.5
20.00	220.00	240.0	222.8	1.3	167.1	0.6
20.20	180.00	200.0	182.9	1.3	137.2	0.7
20.40	180.00	200.0	182.9	1.3	137.2	0.7
20.60	150.00	170.0	152.9	1.3	114.7	0.9
20.80	170.00	190.0	172.9	1.3	129.7	0.8
21.00	190.00	210.0	192.9	1.3	144.7	0.7
21.20	200.00	220.0	203.0	1.3	152.3	0.7
21.40	220.00	240.0	223.0	1.3	167.3	0.6

21.60	180.00	200.0	183.0	2.0	91.5	1.1
21.80	200.00	230.0	203.0	1.3	152.3	0.7
22.00	200.00	220.0	203.0	1.3	152.3	0.7
22.20	180.00	200.0	183.2	1.3	137.4	0.7
22.40	180.00	200.0	183.2	1.3	137.4	0.7
22.60	180.00	200.0	183.2	1.3	137.4	0.7
22.80	180.00	200.0	183.2	1.3	137.4	0.7
23.00	200.00	220.0	203.2	1.3	152.4	0.7
23.20	240.00	260.0	243.3	2.0	121.7	0.8
23.40	270.00	300.0	273.3	1.3	205.0	0.5
23.60	250.00	270.0	253.3	1.3	190.0	0.5
23.80	200.00	220.0	203.3	1.3	152.5	0.7
24.00	180.00	200.0	183.3	1.3	137.5	0.7
24.20	170.00	190.0	173.5	1.3	130.1	0.8
24.40	200.00	220.0	203.5	1.3	152.6	0.7
24.60	210.00	230.0	213.5	1.3	160.1	0.6
24.80	180.00	200.0	183.5	1.3	137.6	0.7
25.00	170.00	190.0	173.5	1.3	130.1	0.8
25.20	170.00	190.0	173.6	1.3	130.2	0.8
25.40	190.00	210.0	193.6	1.3	145.2	0.7
25.60	200.00	220.0	203.6	1.3	152.7	0.7
25.80	210.00	230.0	213.6	1.3	160.2	0.6
26.00	250.00	270.0	253.6	1.3	190.2	0.5
26.20	270.00	290.0	273.7	1.3	205.3	0.5
26.40	280.00	300.0	283.7	1.3	212.8	0.5
26.60	280.00	300.0	283.7	1.7	170.2	0.6
26.80	320.00	345.0	323.7	2.0	161.9	0.6
27.00	300.00	330.0	303.7	1.3	227.9	0.4
27.20	280.00	300.0	283.9	1.3	213.0	0.5
27.40	250.00	270.0	253.9	1.3	190.4	0.5
27.60	280.00	300.0	283.9	2.0	141.9	0.7
27.80	300.00	330.0	303.9	1.3	228.0	0.4
28.00	270.00	290.0	273.9	1.3	205.4	0.5
28.20	280.00	300.0	284.0	1.3	213.1	0.5
28.40	250.00	270.0	254.0	2.0	127.0	0.8
28.60	300.00	330.0	304.0	1.3	228.1	0.4
28.80	280.00	300.0	284.0	1.3	213.1	0.5
29.00	240.00	260.0	244.0	1.3	183.0	0.5
29.20	250.00	270.0	254.1	1.3	190.7	0.5
29.40	250.00	270.0	254.1	1.3	190.7	0.5
29.60	280.00	300.0	284.1	1.3	213.2	0.5
29.80	190.00	210.0	194.1	1.3	145.6	0.7
30.00	200.00	220.0	204.1	1.3	153.1	0.7
30.20	220.00	240.0	224.3	1.3	168.3	0.6
30.40	220.00	240.0	224.3	1.3	168.3	0.6
30.60	230.00	250.0	234.3	1.3	175.8	0.6
30.80	250.00	270.0	254.3	1.3	190.8	0.5
31.00	250.00	270.0	254.3	1.0	254.3	0.4
31.20	260.00	275.0	264.4	2.0	132.2	0.8
31.40	270.00	300.0	274.4	2.0	137.2	0.7
31.60	300.00	330.0	304.4	1.3	228.4	0.4
31.80	280.00	300.0	284.4	2.0	142.2	0.7
32.00	270.00	300.0	274.4	2.0	137.2	0.7
32.20	300.00	330.0	304.6	2.0	152.3	0.7
32.40	300.00	330.0	304.6	1.3	228.5	0.4
32.60	280.00	300.0	284.6	1.3	213.5	0.5
32.80	330.00	350.0	334.6	2.0	167.3	0.6
33.00	300.00	330.0	304.6	1.3	228.5	0.4
33.20	350.00	370.0	354.7	2.0	177.3	0.6
33.40	370.00	400.0	374.7	0.0		0.0

PROVA CPT04

Committente: Provincia di Modena
Strumento utilizzato: PAGANI 300 kN
Prova eseguita in data: 28/05/2013
Profondità prova: 39.60 mt
Località: Mirandola

Profondità (m)	Lettura punta (Kg/cm²)	Lettura laterale (Kg/cm²)	qc (Kg/cm²)	fs (Kg/cm²)	qc/fs Begemann	fs/qcx100 (Schmertmann)
0.20	0.00	0.0	0.1	0.7	0.1	700.0
0.40	40.00	50.0	40.1	0.7	57.3	1.7
0.60	30.00	40.0	30.1	2.0	15.1	6.6
0.80	25.00	55.0	25.1	0.9	27.9	3.6
1.00	22.00	35.0	22.1	0.7	31.6	3.2
1.20	12.00	22.0	12.3	1.5	8.2	12.2
1.40	32.00	55.0	32.3	0.5	64.6	1.5
1.60	28.00	36.0	28.3	1.2	23.6	4.2
1.80	17.00	35.0	17.3	0.7	24.7	4.0
2.00	13.00	24.0	13.3	0.8	16.6	6.0
2.20	11.00	23.0	11.4	0.6	19.0	5.3
2.40	12.00	21.0	12.4	0.5	24.8	4.0
2.60	12.00	20.0	12.4	0.4	31.0	3.2
2.80	8.00	14.0	8.4	0.3	28.0	3.6
3.00	9.00	13.0	9.4	0.3	31.3	3.2
3.20	8.00	13.0	8.6	0.3	28.7	3.5
3.40	11.00	16.0	11.6	0.5	23.2	4.3
3.60	9.00	16.0	9.6	0.5	19.2	5.2
3.80	12.00	20.0	12.6	0.4	31.5	3.2
4.00	11.00	17.0	11.6	0.3	38.7	2.6
4.20	13.00	18.0	13.7	0.6	22.8	4.4
4.40	13.00	22.0	13.7	0.7	19.6	5.1
4.60	14.00	25.0	14.7	0.3	49.0	2.0
4.80	17.00	22.0	17.7	0.5	35.4	2.8
5.00	16.00	23.0	16.7	0.7	23.9	4.2
5.20	22.00	32.0	22.8	0.5	45.6	2.2
5.40	21.00	29.0	21.8	0.6	36.3	2.8
5.60	22.00	31.0	22.8	0.9	25.3	3.9
5.80	19.00	33.0	19.8	1.0	19.8	5.1
6.00	23.00	38.0	23.8	1.1	21.6	4.6
6.20	20.00	36.0	21.0	1.1	19.1	5.2
6.40	14.00	30.0	15.0	0.9	16.7	6.0
6.60	12.00	26.0	13.0	0.9	14.4	6.9
6.80	15.00	29.0	16.0	0.9	17.8	5.6
7.00	20.00	34.0	21.0	1.1	19.1	5.2
7.20	17.00	33.0	18.1	0.9	20.1	5.0
7.40	12.00	26.0	13.1	0.7	18.7	5.3
7.60	12.00	23.0	13.1	0.3	43.7	2.3
7.80	48.00	53.0	49.1	1.1	44.6	2.2
8.00	17.00	33.0	18.1	0.5	36.2	2.8
8.20	15.00	23.0	16.2	0.7	23.1	4.3
8.40	15.00	25.0	16.2	0.4	40.5	2.5
8.60	13.00	19.0	14.2	0.4	35.5	2.8
8.80	11.00	17.0	12.2	0.3	40.7	2.5
9.00	11.00	16.0	12.2	0.3	40.7	2.5
9.20	11.00	15.0	12.4	0.5	24.8	4.0
9.40	9.00	17.0	10.4	0.3	34.7	2.9
9.60	12.00	16.0	13.4	0.3	44.7	2.2
9.80	14.00	19.0	15.4	0.7	22.0	4.5
10.00	13.00	23.0	14.4	0.5	28.8	3.5
10.20	22.00	30.0	23.5	1.0	23.5	4.3

10.40	60.00	75.0	61.5	0.8	76.9	1.3
10.60	80.00	92.0	81.5	1.0	81.5	1.2
10.80	85.00	100.0	86.5	1.3	66.5	1.5
11.00	110.00	130.0	111.5	1.3	85.8	1.2
11.20	100.00	120.0	101.7	0.9	113.0	0.9
11.40	92.00	105.0	93.7	1.0	93.7	1.1
11.60	90.00	105.0	91.7	1.3	70.5	1.4
11.80	130.00	150.0	131.7	1.3	101.3	1.0
12.00	120.00	140.0	121.7	1.0	121.7	0.8
12.20	125.00	140.0	126.8	1.0	126.8	0.8
12.40	85.00	100.0	86.8	1.0	86.8	1.2
12.60	115.00	130.0	116.8	1.0	116.8	0.9
12.80	170.00	185.0	171.8	1.0	171.8	0.6
13.00	160.00	175.0	161.8	1.0	161.8	0.6
13.20	160.00	175.0	161.9	1.3	124.5	0.8
13.40	150.00	170.0	151.9	1.3	116.8	0.9
13.60	170.00	190.0	171.9	1.3	132.2	0.8
13.80	180.00	200.0	181.9	1.0	181.9	0.5
14.00	170.00	185.0	171.9	1.3	132.2	0.8
14.20	150.00	170.0	152.1	1.3	117.0	0.9
14.40	130.00	150.0	132.1	1.3	101.6	1.0
14.60	100.00	120.0	102.1	1.3	78.5	1.3
14.80	130.00	150.0	132.1	1.3	101.6	1.0
15.00	220.00	240.0	222.1	1.3	170.8	0.6
15.20	240.00	260.0	242.2	1.3	186.3	0.5
15.40	220.00	240.0	222.2	1.3	170.9	0.6
15.60	210.00	230.0	212.2	1.3	163.2	0.6
15.80	240.00	260.0	242.2	1.3	186.3	0.5
16.00	230.00	250.0	232.2	1.3	178.6	0.6
16.20	180.00	200.0	182.3	1.3	140.2	0.7
16.40	230.00	250.0	232.3	1.3	178.7	0.6
16.60	230.00	250.0	232.3	2.0	116.2	0.9
16.80	200.00	230.0	202.3	1.3	155.6	0.6
17.00	220.00	240.0	222.3	1.3	171.0	0.6
17.20	200.00	220.0	202.5	1.0	202.5	0.5
17.40	160.00	175.0	162.5	1.3	125.0	0.8
17.60	120.00	140.0	122.5	1.3	94.2	1.1
17.80	120.00	140.0	122.5	1.3	94.2	1.1
18.00	140.00	160.0	142.5	1.3	109.6	0.9
18.20	100.00	120.0	102.6	1.0	102.6	1.0
18.40	110.00	125.0	112.6	1.0	112.6	0.9
18.60	105.00	120.0	107.6	1.0	107.6	0.9
18.80	105.00	120.0	107.6	1.3	82.8	1.2
19.00	120.00	140.0	122.6	1.3	94.3	1.1
19.20	120.00	140.0	122.8	1.0	122.8	0.8
19.40	170.00	185.0	172.8	1.3	132.9	0.8
19.60	240.00	260.0	242.8	1.3	186.8	0.5
19.80	160.00	180.0	162.8	1.3	125.2	0.8
20.00	150.00	170.0	152.8	1.3	117.5	0.9
20.20	170.00	190.0	172.9	1.3	133.0	0.8
20.40	200.00	220.0	202.9	1.3	156.1	0.6
20.60	230.00	250.0	232.9	1.3	179.2	0.6
20.80	230.00	250.0	232.9	2.0	116.5	0.9
21.00	200.00	230.0	202.9	1.3	156.1	0.6
21.20	230.00	250.0	233.0	1.3	179.2	0.6
21.40	250.00	270.0	253.0	1.3	194.6	0.5
21.60	250.00	270.0	253.0	2.0	126.5	0.8
21.80	300.00	330.0	303.0	1.3	233.1	0.4
22.00	250.00	270.0	253.0	1.3	194.6	0.5
22.20	200.00	220.0	203.2	1.3	156.3	0.6

22.40	200.00	220.0	203.2	1.3	156.3	0.6
22.60	230.00	250.0	233.2	1.3	179.4	0.6
22.80	200.00	220.0	203.2	1.3	156.3	0.6
23.00	215.00	235.0	218.2	1.3	167.8	0.6
23.20	330.00	350.0	333.3	1.3	256.4	0.4
23.40	230.00	250.0	233.3	1.3	179.5	0.6
23.60	180.00	200.0	183.3	1.3	141.0	0.7
23.80	170.00	190.0	173.3	1.0	173.3	0.6
24.00	170.00	185.0	173.3	2.0	86.7	1.2
24.20	240.00	270.0	243.5	1.3	187.3	0.5
24.40	240.00	260.0	243.5	1.7	143.2	0.7
24.60	210.00	235.0	213.5	2.0	106.8	0.9
24.80	300.00	330.0	303.5	1.3	233.5	0.4
25.00	280.00	300.0	283.5	1.3	218.1	0.5
25.20	230.00	250.0	233.6	1.3	179.7	0.6
25.40	250.00	270.0	253.6	1.3	195.1	0.5
25.60	240.00	260.0	243.6	1.3	187.4	0.5
25.80	200.00	220.0	203.6	1.3	156.6	0.6
26.00	180.00	200.0	183.6	1.3	141.2	0.7
26.20	200.00	220.0	203.7	1.3	156.7	0.6
26.40	240.00	260.0	243.7	1.3	187.5	0.5
26.60	270.00	290.0	273.7	1.3	210.5	0.5
26.80	240.00	260.0	243.7	1.3	187.5	0.5
27.00	210.00	230.0	213.7	1.3	164.4	0.6
27.20	180.00	200.0	183.9	1.3	141.5	0.7
27.40	180.00	200.0	183.9	1.3	141.5	0.7
27.60	150.00	170.0	153.9	2.0	77.0	1.3
27.80	300.00	330.0	303.9	1.3	233.8	0.4
28.00	330.00	350.0	333.9	1.3	256.8	0.4
28.20	180.00	200.0	184.0	1.3	141.5	0.7
28.40	200.00	220.0	204.0	1.3	156.9	0.6
28.60	230.00	250.0	234.0	1.3	180.0	0.6
28.80	240.00	260.0	244.0	1.3	187.7	0.5
29.00	270.00	290.0	274.0	1.3	210.8	0.5
29.20	170.00	190.0	174.1	2.0	87.1	1.1
29.40	330.00	360.0	334.1	2.0	167.1	0.6
29.60	300.00	330.0	304.1	1.7	178.9	0.6
29.80	250.00	275.0	254.1	2.0	127.1	0.8
30.00	300.00	330.0	304.1	1.3	233.9	0.4
30.20	280.00	300.0	284.3	1.3	218.7	0.5
30.40	250.00	270.0	254.3	1.3	195.6	0.5
30.60	200.00	220.0	204.3	1.3	157.2	0.6
30.80	280.00	300.0	284.3	2.0	142.2	0.7
31.00	300.00	330.0	304.3	1.3	234.1	0.4
31.20	180.00	200.0	184.4	1.3	141.8	0.7
31.40	180.00	200.0	184.4	1.3	141.8	0.7
31.60	180.00	200.0	184.4	1.3	141.8	0.7
31.80	180.00	200.0	184.4	1.3	141.8	0.7
32.00	240.00	260.0	244.4	1.3	188.0	0.5
32.20	180.00	200.0	184.6	1.3	142.0	0.7
32.40	150.00	170.0	154.6	1.0	154.6	0.6
32.60	170.00	185.0	174.6	1.3	134.3	0.7
32.80	270.00	290.0	274.6	1.3	211.2	0.5
33.00	280.00	300.0	284.6	2.0	142.3	0.7
33.20	300.00	330.0	304.7	2.0	152.4	0.7
33.40	320.00	350.0	324.7	2.0	162.4	0.6
33.60	200.00	230.0	204.7	1.3	157.5	0.6
33.80	240.00	260.0	244.7	1.3	188.2	0.5
34.00	230.00	250.0	234.7	1.3	180.5	0.6
34.20	240.00	260.0	244.8	2.0	122.4	0.8

34.40	300.00	330.0	304.8	2.0	152.4	0.7
34.60	330.00	360.0	334.8	2.0	167.4	0.6
34.80	300.00	330.0	304.8	2.0	152.4	0.7
35.00	250.00	280.0	254.8	1.3	196.0	0.5
35.20	200.00	220.0	205.0	2.0	102.5	1.0
35.40	30.00	60.0	35.0	0.7	50.0	2.0
35.60	40.00	50.0	45.0	0.3	150.0	0.7
35.80	40.00	45.0	45.0	0.4	112.5	0.9
36.00	40.00	46.0	45.0	0.4	112.5	0.9
36.20	40.00	46.0	45.1	2.0	22.6	4.4
36.40	26.00	56.0	31.1	1.7	18.3	5.5
36.60	45.00	70.0	50.1	2.0	25.1	4.0
36.80	60.00	90.0	65.1	2.0	32.6	3.1
37.00	55.00	85.0	60.1	1.0	60.1	1.7
37.20	110.00	125.0	115.2	1.3	88.6	1.1
37.40	80.00	100.0	85.2	1.3	65.5	1.5
37.60	110.00	130.0	115.2	1.3	88.6	1.1
37.80	150.00	170.0	155.2	2.0	77.6	1.3
38.00	300.00	330.0	305.2	2.0	152.6	0.7
38.20	350.00	380.0	355.4	2.0	177.7	0.6
38.40	350.00	380.0	355.4	2.0	177.7	0.6
38.60	350.00	380.0	355.4	1.3	273.4	0.4
38.80	330.00	350.0	335.4	1.3	258.0	0.4
39.00	350.00	370.0	355.4	1.3	273.4	0.4
39.20	380.00	400.0	385.5	1.3	296.5	0.3
39.40	380.00	400.0	385.5	2.0	192.8	0.5
39.60	400.00	430.0	405.5	0.0		0.0

PROVA CPT04 bis

Committente: Provincia di Modena
Strumento utilizzato: PAGANI 300 kN
Prova eseguita in data: 01/08/2012
Profondità prova: 38.00 mt
Località: Mirandola

Profondità (m)	Lettura punta (Kg/cm²)	Lettura laterale (Kg/cm²)	qc (Kg/cm²)	fs (Kg/cm²)	qc/fs Begemann	fs/qcx100 (Schmertmann)
0.20	0.00	0.0	0.1	1.3	0.1	965.9
0.40	250.00	270.0	250.1	2.0	125.1	0.8
0.60	270.00	300.0	270.1	1.3	202.7	0.5
0.80	100.00	120.0	100.1	1.3	75.1	1.3
1.00	40.00	60.0	40.1	0.9	46.3	2.2
1.20	42.00	55.0	42.3	0.7	63.4	1.6
1.40	40.00	50.0	40.3	0.9	43.2	2.3
1.60	24.00	38.0	24.3	0.9	26.0	3.8
1.80	16.00	30.0	16.3	0.8	20.3	4.9
2.00	21.00	33.0	21.3	0.7	31.9	3.1
2.20	50.00	60.0	50.4	1.3	37.8	2.6
2.40	80.00	100.0	80.4	1.5	54.8	1.8
2.60	30.00	52.0	30.4	1.3	22.8	4.4
2.80	18.00	38.0	18.4	0.7	27.6	3.6
3.00	20.00	30.0	20.4	0.8	25.5	3.9
3.20	21.00	33.0	21.6	0.8	26.9	3.7
3.40	12.00	24.0	12.6	0.7	17.1	5.8
3.60	14.00	25.0	14.6	0.5	27.3	3.7
3.80	22.00	30.0	22.6	0.7	33.8	3.0
4.00	10.00	20.0	10.6	0.6	17.6	5.7
4.20	14.00	23.0	14.7	0.7	20.0	5.0
4.40	13.00	24.0	13.7	0.6	22.8	4.4
4.60	17.00	26.0	17.7	0.7	24.1	4.1

4.80	19.00	30.0	19.7	1.1	17.4	5.8
5.00	20.00	37.0	20.7	1.1	19.4	5.2
5.20	19.00	35.0	19.8	0.9	21.3	4.7
5.40	21.00	35.0	21.8	1.2	18.2	5.5
5.60	20.00	38.0	20.8	0.8	26.0	3.8
5.80	18.00	30.0	18.8	0.7	25.7	3.9
6.00	17.00	28.0	17.8	0.9	20.6	4.9
6.20	17.00	30.0	18.0	0.9	20.7	4.8
6.40	19.00	32.0	20.0	1.1	17.6	5.7
6.60	18.00	35.0	19.0	1.0	19.0	5.3
6.80	15.00	30.0	16.0	0.5	34.2	2.9
7.00	20.00	27.0	21.0	0.5	39.3	2.5
7.20	19.00	27.0	20.1	0.3	75.3	1.3
7.40	17.00	21.0	18.1	0.5	38.8	2.6
7.60	11.00	18.0	12.1	0.3	45.3	2.2
7.80	8.00	12.0	9.1	0.3	34.1	2.9
8.00	8.00	12.0	9.1	0.4	22.8	4.4
8.20	10.00	16.0	11.2	0.6	18.7	5.3
8.40	11.00	20.0	12.2	0.7	18.4	5.4
8.60	10.00	20.0	11.2	0.6	18.7	5.3
8.80	14.00	23.0	15.2	0.6	25.4	3.9
9.00	15.00	24.0	16.2	0.7	24.4	4.1
9.20	10.00	20.0	11.4	0.7	15.5	6.4
9.40	14.00	25.0	15.4	0.9	17.7	5.6
9.60	15.00	28.0	16.4	0.7	24.6	4.1
9.80	75.00	85.0	76.4	1.0	76.4	1.3
10.00	100.00	115.0	101.4	1.0	101.4	1.0
10.20	115.00	130.0	116.5	1.0	116.5	0.9
10.40	105.00	120.0	106.5	1.0	106.5	0.9
10.60	100.00	115.0	101.5	1.0	101.5	1.0
10.80	95.00	110.0	96.5	1.0	96.5	1.0
11.00	100.00	115.0	101.5	1.0	101.5	1.0
11.20	115.00	130.0	116.7	1.3	87.5	1.1
11.40	105.00	125.0	106.7	1.3	80.0	1.2
11.60	120.00	140.0	121.7	1.3	91.3	1.1
11.80	180.00	200.0	181.7	1.3	136.3	0.7
12.00	180.00	200.0	181.7	1.3	136.3	0.7
12.20	180.00	200.0	181.8	1.0	181.8	0.6
12.40	150.00	165.0	151.8	1.0	151.8	0.7
12.60	140.00	155.0	141.8	1.0	141.8	0.7
12.80	150.00	165.0	151.8	1.3	113.9	0.9
13.00	180.00	200.0	181.8	1.3	136.4	0.7
13.20	200.00	220.0	201.9	1.3	151.5	0.7
13.40	200.00	220.0	201.9	1.3	151.5	0.7
13.60	180.00	200.0	181.9	1.0	181.9	0.5
13.80	160.00	175.0	161.9	1.0	161.9	0.6
14.00	170.00	185.0	171.9	1.0	171.9	0.6
14.20	175.00	190.0	177.1	1.0	177.1	0.6
14.40	175.00	190.0	177.1	1.0	177.1	0.6
14.60	150.00	165.0	152.1	1.3	114.1	0.9
14.80	150.00	170.0	152.1	1.3	114.1	0.9
15.00	140.00	160.0	142.1	1.3	106.6	0.9
15.20	200.00	220.0	202.2	1.3	151.7	0.7
15.40	240.00	260.0	242.2	1.0	242.2	0.4
15.60	175.00	190.0	177.2	1.3	132.9	0.8
15.80	180.00	200.0	182.2	1.0	182.2	0.5
16.00	150.00	165.0	152.2	1.0	152.2	0.7
16.20	130.00	145.0	132.3	1.0	132.3	0.8
16.40	150.00	165.0	152.3	1.3	114.3	0.9
16.60	180.00	200.0	182.3	1.3	136.8	0.7

16.80	180.00	200.0	182.3	1.3	136.8	0.7
17.00	120.00	140.0	122.3	1.0	122.3	0.8
17.20	110.00	125.0	112.5	1.0	112.5	0.9
17.40	115.00	130.0	117.5	1.0	117.5	0.9
17.60	115.00	130.0	117.5	1.3	88.1	1.1
17.80	120.00	140.0	122.5	1.3	91.9	1.1
18.00	120.00	140.0	122.5	1.0	122.5	0.8
18.20	150.00	165.0	152.6	1.0	152.6	0.7
18.40	175.00	190.0	177.6	1.0	177.6	0.6
18.60	150.00	165.0	152.6	1.0	152.6	0.7
18.80	165.00	180.0	167.6	1.3	125.7	0.8
19.00	170.00	190.0	172.6	1.0	172.6	0.6
19.20	165.00	180.0	167.8	1.0	167.8	0.6
19.40	150.00	165.0	152.8	1.0	152.8	0.7
19.60	150.00	165.0	152.8	1.0	152.8	0.7
19.80	175.00	190.0	177.8	1.7	106.6	0.9
20.00	250.00	275.0	252.8	1.3	189.6	0.5
20.20	220.00	240.0	222.9	1.7	133.7	0.7
20.40	270.00	295.0	272.9	1.0	272.9	0.4
20.60	150.00	165.0	152.9	1.3	114.7	0.9
20.80	230.00	250.0	232.9	1.3	174.7	0.6
21.00	200.00	220.0	202.9	1.3	152.2	0.7
21.20	220.00	240.0	223.0	1.3	167.3	0.6
21.40	215.00	235.0	218.0	1.7	130.8	0.8
21.60	230.00	255.0	233.0	1.7	139.8	0.7
21.80	240.00	265.0	243.0	1.3	182.3	0.5
22.00	230.00	250.0	233.0	1.3	174.8	0.6
22.20	230.00	250.0	233.2	1.7	139.9	0.7
22.40	220.00	245.0	223.2	1.3	167.4	0.6
22.60	220.00	240.0	223.2	1.7	133.9	0.7
22.80	230.00	255.0	233.2	1.7	139.9	0.7
23.00	230.00	255.0	233.2	1.3	174.9	0.6
23.20	180.00	200.0	183.3	2.0	91.7	1.1
23.40	280.00	310.0	283.3	1.3	212.5	0.5
23.60	200.00	220.0	203.3	1.3	152.5	0.7
23.80	180.00	200.0	183.3	1.0	183.3	0.5
24.00	150.00	165.0	153.3	1.0	153.3	0.7
24.20	140.00	155.0	143.5	1.3	107.6	0.9
24.40	120.00	140.0	123.5	1.0	123.5	0.8
24.60	150.00	165.0	153.5	1.7	92.1	1.1
24.80	230.00	255.0	233.5	1.3	175.1	0.6
25.00	220.00	240.0	223.5	1.3	167.6	0.6
25.20	230.00	250.0	233.6	1.3	175.2	0.6
25.40	200.00	220.0	203.6	1.0	203.6	0.5
25.60	140.00	155.0	143.6	1.3	107.7	0.9
25.80	160.00	180.0	163.6	1.3	122.7	0.8
26.00	230.00	250.0	233.6	1.7	140.1	0.7
26.20	250.00	275.0	253.7	1.7	152.2	0.7
26.40	230.00	255.0	233.7	1.3	175.3	0.6
26.60	200.00	220.0	203.7	1.3	152.8	0.7
26.80	170.00	190.0	173.7	1.0	173.7	0.6
27.00	140.00	155.0	143.7	1.0	143.7	0.7
27.20	170.00	185.0	173.9	1.0	173.9	0.6
27.40	150.00	165.0	153.9	1.3	115.4	0.9
27.60	200.00	220.0	203.9	1.0	203.9	0.5
27.80	145.00	160.0	148.9	1.0	148.9	0.7
28.00	165.00	180.0	168.9	1.7	101.3	1.0
28.20	250.00	275.0	254.0	1.3	190.5	0.5
28.40	180.00	200.0	184.0	1.3	138.0	0.7
28.60	180.00	200.0	184.0	1.3	138.0	0.7

28.80	170.00	190.0	174.0	1.3	130.5	0.8
29.00	180.00	200.0	184.0	1.7	110.4	0.9
29.20	250.00	275.0	254.1	1.7	152.5	0.7
29.40	250.00	275.0	254.1	1.3	190.7	0.5
29.60	240.00	260.0	244.1	1.7	146.5	0.7
29.80	250.00	275.0	254.1	1.7	152.5	0.7
30.00	250.00	275.0	254.1	1.3	190.7	0.5
30.20	240.00	260.0	244.3	1.3	183.3	0.5
30.40	260.00	280.0	264.3	1.3	198.3	0.5
30.60	280.00	300.0	284.3	1.3	213.3	0.5
30.80	280.00	300.0	284.3	1.3	213.3	0.5
31.00	140.00	160.0	144.3	0.7	216.3	0.5
31.20	55.00	65.0	59.4	1.7	34.3	2.9
31.40	32.00	58.0	36.4	1.9	18.8	5.3
31.60	33.00	62.0	37.4	1.8	20.8	4.8
31.80	33.00	60.0	37.4	1.9	20.0	5.0
32.00	35.00	63.0	39.4	1.9	21.1	4.7
32.20	34.00	62.0	38.6	2.0	19.3	5.2
32.40	30.00	60.0	34.6	2.0	17.3	5.8
32.60	32.00	62.0	36.6	1.9	18.9	5.3
32.80	29.00	58.0	33.6	1.8	18.6	5.4
33.00	25.00	52.0	29.6	2.0	14.8	6.8
33.20	28.00	58.0	32.7	2.1	15.8	6.3
33.40	31.00	62.0	35.7	1.6	22.3	4.5
33.60	48.00	72.0	52.7	1.2	43.9	2.3
33.80	40.00	58.0	44.7	1.2	37.2	2.7
34.00	38.00	56.0	42.7	1.2	35.6	2.8
34.20	28.00	46.0	32.8	1.1	30.8	3.3
34.40	24.00	40.0	28.8	1.3	22.8	4.4
34.60	25.00	44.0	29.8	1.3	22.4	4.5
34.80	80.00	100.0	84.8	1.9	45.4	2.2
35.00	32.00	60.0	36.8	1.9	19.7	5.1
35.20	44.00	72.0	49.0	1.3	36.7	2.7
35.40	65.00	85.0	70.0	1.3	52.5	1.9
35.60	250.00	270.0	255.0	1.3	191.3	0.5
35.80	250.00	270.0	255.0	1.3	191.3	0.5
36.00	250.00	270.0	255.0	1.3	191.3	0.5
36.20	180.00	200.0	185.1	1.7	111.0	0.9
36.40	250.00	275.0	255.1	1.3	191.4	0.5
36.60	280.00	300.0	285.1	1.3	213.9	0.5
36.80	250.00	270.0	255.1	1.3	191.4	0.5
37.00	260.00	280.0	265.1	1.3	198.9	0.5
37.20	250.00	270.0	255.2	1.3	191.5	0.5
37.40	200.00	220.0	205.2	1.3	154.0	0.6
37.60	240.00	260.0	245.2	1.0	245.2	0.4
37.80	230.00	245.0	235.2	1.7	141.1	0.7
38.00	250.00	275.0	255.2	0.0		0.0

La natura litologica dei terreni oggetto della prova penetrometrica è dedotta dall'analisi dei diagrammi penetrometrici mediante "Guide for estimating soil type from dutch friction-cone ratio" (after Schmertmann, 1969), Raccomandazioni A.G.I. 1977.
Le sequenze stratigrafiche desunte dall'analisi delle prove penetrometriche evidenzia i seguenti livelli litologici:

0.20 - 2.00/2.60 m Limo argilloso con sabbia fine mediamente consistente (A);
2.00/2.60 - 10.00 m Argille e argille limose a media-bassa consistenza (B);

10.00 - 19.00 m Sabbie da mediamente addensate ad addensate (C);
19.00 - 34.00/35.00 m Sabbie addensate (D);
31.20/35.00 - 37.00 m Argille e argille limose consistenti (E);
37.00 - 39.60 m Sabbie addensate (D).

riportano in allegato le stratigrafie desunte dalle prove penetrometriche.

Dall'analisi delle prove penetrometriche, attraverso le formule empiriche della geotecnica classica sono stati desunti i parametri geotecnici dei materiali:

STIMA PARAMETRI GEOTECNICI CPT01

TERRENI COESIVI

Coesione non drenata (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Lunne & Eide	Sunda Relazione Sperimentale	Lunne T.- Kleven A. 1981	Kjekstad. 1978 - Lunne, Robertson and Powell 1977	Lunne, Robertson and Powell 1977	Terzaghi
Strato 1	0.20	0.1	1.3	0.00	0.01	0.01	0.00	0.00	0.01
Strato 4	0.80	10.1	0.5	0.48	0.74	0.66	0.59	0.52	0.51
Strato 5	2.00	8.4	0.4	0.39	0.61	0.54	0.48	0.43	0.42
Strato 6	2.20	10.4	0.6	0.48	0.74	0.67	0.59	0.53	0.52
Strato 7	2.40	10.4	0.5	0.48	0.74	0.67	0.59	0.53	0.52
Strato 8	2.60	9.4	0.3	0.43	0.67	0.60	0.53	0.47	0.47
Strato 9	2.80	8.4	0.4	0.39	0.60	0.53	0.47	0.42	0.42
Strato 10	3.00	7.4	0.6	0.34	0.52	0.46	0.40	0.36	0.37
Strato 11	3.20	11.6	0.6	0.54	0.80	0.74	0.65	0.58	0.58
Strato 13	3.60	11.6	0.5	0.54	0.80	0.73	0.64	0.58	0.58
Strato 14	4.20	12.2	0.8	0.56	0.83	0.77	0.68	0.60	0.61
Strato 15	4.80	17.7	1.0	0.83	1.15	1.12	0.99	0.89	0.89
Strato 16	5.00	13.7	0.9	0.63	0.91	0.85	0.75	0.67	0.68
Strato 17	5.20	12.8	0.7	0.59	0.85	0.79	0.70	0.62	0.64
Strato 18	5.40	11.8	0.8	0.54	0.79	0.72	0.64	0.57	0.59
Strato 19	5.60	12.8	0.8	0.59	0.85	0.79	0.69	0.62	0.64
Strato 20	5.80	17.8	1.0	0.83	1.14	1.12	0.98	0.88	0.89
Strato 21	6.00	15.8	0.9	0.73	1.02	0.98	0.86	0.77	0.79
Strato 22	6.20	12.0	0.4	0.54	0.79	0.72	0.64	0.57	0.60
Strato 24	7.40	12.3	0.7	0.56	0.80	0.73	0.65	0.58	0.62
Strato 25	7.80	10.1	0.3	0.45	0.64	0.58	0.51	0.46	0.51
Strato 26	8.00	9.1	0.3	0.40	0.57	0.51	0.45	0.40	0.46
Strato 27	8.20	10.2	0.6	0.45	0.64	0.58	0.51	0.46	0.51
Strato 28	8.40	11.2	0.4	0.50	0.71	0.64	0.57	0.51	0.56
Strato 29	9.00	15.5	0.8	0.70	0.97	0.93	0.82	0.73	0.78
Strato 30	9.40	35.2	1.1	1.65	1.94	2.23	1.97	1.76	1.76
Strato 31	9.60	36.4	1.4	1.71	1.98	2.31	2.04	1.82	1.82
Strato 32	9.80	25.4	1.5	1.18	1.49	1.57	1.39	1.24	1.27
Strato 33	10.00	26.4	0.7	1.22	1.54	1.64	1.44	1.29	1.32

Modulo Edometrico (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Mitchell & Gardner (1975)	Metodo generale del modulo edometrico	Buismann	Buismann Sanglerat
Strato 1	0.20	0.1	1.3	0.80	0.66	1.50	0.30

Strato 4	0.80	10.1	0.5	50.50	43.75	60.60	30.30
Strato 5	2.00	8.4	0.4	42.00	39.61	50.40	25.20
Strato 6	2.20	10.4	0.6	52.00	44.35	62.40	31.20
Strato 7	2.40	10.4	0.5	52.00	44.35	62.40	31.20
Strato 8	2.60	9.4	0.3	47.00	42.20	56.40	28.20
Strato 9	2.80	8.4	0.4	42.00	39.61	50.40	25.20
Strato 10	3.00	7.4	0.6	37.00	36.56	44.40	22.20
Strato 11	3.20	11.6	0.6	58.00	46.32	69.60	34.80
Strato 13	3.60	11.6	0.5	58.00	46.32	69.60	34.80
Strato 14	4.20	12.2	0.8	61.00	47.07	73.20	36.60
Strato 15	4.80	17.7	1.0	88.50	46.33	106.20	53.10
Strato 16	5.00	13.7	0.9	68.50	48.22	82.20	41.10
Strato 17	5.20	12.8	0.7	64.00	47.65	76.80	38.40
Strato 18	5.40	11.8	0.8	59.00	46.59	70.80	35.40
Strato 19	5.60	12.8	0.8	64.00	47.65	76.80	38.40
Strato 20	5.80	17.8	1.0	89.00	46.19	106.80	53.40
Strato 21	6.00	15.8	0.9	79.00	48.13	94.80	47.40
Strato 22	6.20	12.0	0.4	60.00	46.84	72.00	36.00
Strato 24	7.40	12.3	0.7	61.50	47.18	73.80	36.90
Strato 25	7.80	10.1	0.3	50.50	43.75	60.60	30.30
Strato 26	8.00	9.1	0.3	45.50	41.47	54.60	27.30
Strato 27	8.20	10.2	0.6	51.00	43.95	61.20	30.60
Strato 28	8.40	11.2	0.4	56.00	45.74	67.20	33.60
Strato 29	9.00	15.5	0.8	77.50	48.27	93.00	46.50
Strato 30	9.40	35.2	1.1	88.00	70.40	105.60	105.60
Strato 31	9.60	36.4	1.4	91.00	72.80	109.20	109.20
Strato 32	9.80	25.4	1.5	63.50	50.80	76.20	76.20
Strato 33	10.00	26.4	0.7	66.00	52.80	79.20	79.20

Modulo di deformazione non drenato Eu (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Cancelli 1980	Ladd 1977 (30)
Strato 1	0.20	0.1	1.3	3.15	0.30
Strato 4	0.80	10.1	0.5	373.91	15.30
Strato 5	2.00	8.4	0.4	305.40	12.60
Strato 6	2.20	10.4	0.6	376.01	15.60
Strato 7	2.40	10.4	0.5	375.34	15.60
Strato 8	2.60	9.4	0.3	337.20	14.10
Strato 9	2.80	8.4	0.4	299.10	12.60
Strato 10	3.00	7.4	0.6	261.00	11.10
Strato 11	3.20	11.6	0.6	417.86	17.40
Strato 13	3.60	11.6	0.5	416.51	17.40
Strato 14	4.20	12.2	0.8	437.66	18.30
Strato 15	4.80	17.7	1.0	641.89	26.70
Strato 16	5.00	13.7	0.9	490.54	20.40
Strato 17	5.20	12.8	0.7	456.11	19.20
Strato 18	5.40	11.8	0.8	417.94	17.70
Strato 19	5.60	12.8	0.8	454.76	19.20
Strato 20	5.80	17.8	1.0	641.59	26.70
Strato 21	6.00	15.8	0.9	565.91	23.70
Strato 22	6.20	12.0	0.4	422.74	18.00
Strato 24	7.40	12.3	0.7	431.29	18.60
Strato 25	7.80	10.1	0.3	346.50	15.30
Strato 26	8.00	9.1	0.3	308.10	13.80
Strato 27	8.20	10.2	0.6	348.75	15.30
Strato 28	8.40	11.2	0.4	385.61	16.80
Strato 29	9.00	15.5	0.8	545.51	23.40
Strato 30	9.40	35.2	1.1	1282.43	52.80
Strato 31	9.60	36.4	1.4	1326.19	54.60
Strato 32	9.80	25.4	1.5	912.90	38.10

Strato 33	10.00	26.4	0.7	949.65	39.60

TERRENI INCOERENTI

Densità relativa (%)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Baldi 1978 - Schmertmann 1976	Schmertmann	Harman	Lancellotta 1983	Jamiolkowski 1985
Strato 2	0.40	120.1	1.3	100	100	100	100	100
Strato 3	0.60	80.1	0.5	93.65	100	100	94.71	100
Strato 8	2.60	9.4	0.3	11.43	8.33	12.32	11.79	21.89
Strato 12	3.40	22.6	0.4	34.2	36.34	38.81	34.76	39.05
Strato 22	6.20	12.0	0.4	< 5	< 5	6.82	10.52	5
Strato 23	6.40	23.0	0.3	28.3	24.88	28.59	28.81	20.53
Strato 25	7.80	10.1	0.3	< 5	< 5	5	5	5
Strato 28	8.40	11.2	0.4	< 5	< 5	5	5.21	5
Strato 30	9.40	35.2	1.1	36.19	32.48	36.08	36.76	21.77
Strato 31	9.60	36.4	1.4	36.68	32.84	36.45	37.26	21.7
Strato 33	10.00	26.4	0.7	27	20.03	24.48	27.5	11.23
Strato 34	10.20	63.5	1.0	51.69	51.69	54.22	52.4	35.79
Strato 35	34.00	194.6	1.4	73.01	72.78	74.91	73.9	44.53

Angolo di resistenza al taglio (°)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Durgunouglu-Mitchell 1973	Caquot	Koppejan	De Beer	Schmertmann	Robertson & Campanella 1983	Herminier	Meyerhof 1951
Strato 2	0.40	120.1	1.3	45	45	45	42.77	42	45	15	45
Strato 3	0.60	80.1	0.5	45	43.43	41.12	38.17	42	45	36.73	45
Strato 8	2.60	9.4	0.3	29.19	25.36	22.14	20.83	29.17	32	22.57	21.22
Strato 12	3.40	22.6	0.4	32.72	28.96	25.92	24.28	33.09	36.54	24.33	27.15
Strato 22	6.20	12.0	0.4	27.76	23.71	20.41	19.25	28.7	29.74	22.14	22.39
Strato 23	6.40	23.0	0.3	30.78	26.81	23.67	22.23	31.48	33.89	23.18	27.33
Strato 25	7.80	10.1	0.3	26.18	22.02	18.63	17.63	28.7	26.79	21.8	21.53
Strato 28	8.40	11.2	0.4	26.39	22.21	18.84	17.81	28.7	27.16	21.84	22.03
Strato 30	9.40	35.2	1.1	31.48	27.45	24.34	22.84	32.55	34.7	23.52	32.8
Strato 31	9.60	36.4	1.4	31.5	27.46	24.35	22.85	32.6	34.71	23.52	33.34
Strato 33	10.00	26.4	0.7	29.78	25.67	22.47	21.13	30.8	32.41	22.76	28.85
Strato 34	10.20	63.5	1.0	33.92	29.94	26.95	25.23	35.24	37.7	25.12	45
Strato 35	34.00	194.6	1.4	35.96	31.83	28.94	27.04	38.19	39.83	26.95	45

Modulo di Young (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Schmertmann	Robertson & Campanella (1983)	ISOPT-1 1988 Ey(50)
Strato 2	0.40	120.1	1.3	300.25	240.20	480.40
Strato 3	0.60	80.1	0.5	200.25	160.20	320.40
Strato 8	2.60	9.4	0.3	23.50	18.80	141.00
Strato 12	3.40	22.6	0.4	56.50	45.20	263.05
Strato 22	6.20	12.0	0.4	30.00	24.00	184.80
Strato 23	6.40	23.0	0.3	57.50	46.00	299.33
Strato 25	7.80	10.1	0.3	25.25	20.20	155.54
Strato 28	8.40	11.2	0.4	28.00	22.40	172.48
Strato 30	9.40	35.2	1.1	88.00	70.40	426.00
Strato 31	9.60	36.4	1.4	91.00	72.80	438.95
Strato 33	10.00	26.4	0.7	66.00	52.80	358.94
Strato 34	10.20	63.5	1.0	158.75	127.00	622.12
Strato 35	34.00	194.6	1.4	486.50	389.20	1414.04

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TERRENI COESIVI

Coesione non drenata (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Lunne & Eide	Sunda Relazione Sperimentale	Lunne T.-Kleven A. 1981	Kjekstad. 1978 - Lunne, Robertson and Powell 1977	Lunne, Robertson and Powell 1977	Terzaghi
Strato 1	0.20	0.1	2.0	0.00	0.01	0.01	0.00	0.00	0.01
Strato 2	0.40	50.1	1.3	2.42	2.56	3.34	2.94	2.63	2.50
Strato 3	0.60	30.1	1.0	1.45	1.82	2.00	1.77	1.58	1.51
Strato 4	0.80	13.1	1.0	0.63	0.93	0.86	0.76	0.68	0.66
Strato 5	1.40	29.9	1.0	1.43	1.80	1.98	1.75	1.56	1.49
Strato 6	1.60	17.3	0.8	0.82	1.16	1.13	1.00	0.89	0.86
Strato 7	1.80	28.3	0.9	1.35	1.72	1.86	1.64	1.47	1.41
Strato 8	2.00	17.3	0.5	0.82	1.16	1.13	1.00	0.89	0.86
Strato 9	2.20	8.4	0.5	0.39	0.60	0.53	0.47	0.42	0.42
Strato 10	2.40	9.4	0.3	0.43	0.67	0.60	0.53	0.47	0.47
Strato 11	2.80	10.4	0.4	0.48	0.73	0.66	0.58	0.52	0.52
Strato 12	3.00	12.4	0.5	0.58	0.85	0.79	0.70	0.62	0.62
Strato 13	4.00	12.5	0.4	0.58	0.85	0.79	0.70	0.62	0.62
Strato 14	4.20	9.7	0.5	0.44	0.66	0.59	0.52	0.47	0.48
Strato 15	4.80	8.2	0.3	0.37	0.55	0.49	0.43	0.39	0.41
Strato 16	5.20	12.6	0.7	0.58	0.84	0.78	0.69	0.61	0.63
Strato 17	6.20	17.4	1.1	0.81	1.12	1.09	0.96	0.86	0.87
Strato 18	6.40	14.0	0.7	0.64	0.91	0.85	0.75	0.67	0.70
Strato 19	6.80	11.0	0.7	0.49	0.71	0.65	0.57	0.51	0.55
Strato 20	7.20	12.0	0.7	0.54	0.77	0.71	0.63	0.56	0.60
Strato 21	7.60	14.0	0.5	0.63	0.89	0.84	0.74	0.66	0.70
Strato 22	7.80	16.1	0.5	0.73	1.01	0.98	0.86	0.77	0.81
Strato 23	8.20	11.1	0.4	0.49	0.70	0.64	0.56	0.50	0.56
Strato 24	8.40	9.2	0.4	0.40	0.57	0.51	0.45	0.40	0.46
Strato 25	9.60	12.6	0.7	0.56	0.78	0.73	0.64	0.57	0.63
Strato 26	10.00	15.6	0.9	0.70	0.96	0.92	0.81	0.72	0.78
Strato 27	10.20	46.5	1.0	2.19	2.35	2.97	2.62	2.35	2.33
Strato 33	36.40	40.0	1.8	1.76	1.84	2.20	1.95	1.74	2.00
Strato 34	36.60	36.1	2.0	1.56	1.66	1.92	1.70	1.52	1.80
Strato 35	37.00	37.3	1.5	1.62	1.70	2.00	1.76	1.58	1.86

Modulo Edometrico (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Mitchell & Gardner (1975)	Metodo generale del modulo edometrico	Buismann	Buismann Sanglerat
Strato 1	0.20	0.1	2.0	0.80	0.66	1.50	0.30
Strato 2	0.40	50.1	1.3	125.25	100.20	150.30	75.15
Strato 3	0.60	30.1	1.0	75.25	60.20	90.30	90.30
Strato 4	0.80	13.1	1.0	65.50	47.88	78.60	39.30
Strato 5	1.40	29.9	1.0	74.75	59.80	89.70	89.70
Strato 6	1.60	17.3	0.8	86.50	46.85	103.80	51.90
Strato 7	1.80	28.3	0.9	70.75	56.60	84.90	84.90
Strato 8	2.00	17.3	0.5	86.50	46.85	103.80	51.90
Strato 9	2.20	8.4	0.5	42.00	39.61	50.40	25.20
Strato 10	2.40	9.4	0.3	47.00	42.20	56.40	28.20
Strato 11	2.80	10.4	0.4	52.00	44.35	62.40	31.20
Strato 12	3.00	12.4	0.5	62.00	47.28	74.40	37.20
Strato 13	4.00	12.5	0.4	62.50	47.38	75.00	37.50
Strato 14	4.20	9.7	0.5	48.50	42.89	58.20	29.10

Strato 15	4.80	8.2	0.3	41.00	39.04	49.20	24.60
Strato 16	5.20	12.6	0.7	63.00	47.48	75.60	37.80
Strato 17	6.20	17.4	1.1	87.00	46.72	104.40	52.20
Strato 18	6.40	14.0	0.7	70.00	48.33	84.00	42.00
Strato 19	6.80	11.0	0.7	55.00	45.42	66.00	33.00
Strato 20	7.20	12.0	0.7	60.00	46.84	72.00	36.00
Strato 21	7.60	14.0	0.5	70.00	48.33	84.00	42.00
Strato 22	7.80	16.1	0.5	80.50	47.95	96.60	48.30
Strato 23	8.20	11.1	0.4	55.50	45.58	66.60	33.30
Strato 24	8.40	9.2	0.4	46.00	41.72	55.20	27.60
Strato 25	9.60	12.6	0.7	63.00	47.48	75.60	37.80
Strato 26	10.00	15.6	0.9	78.00	48.22	93.60	46.80
Strato 27	10.20	46.5	1.0	116.25	93.00	139.50	69.75
Strato 33	36.40	40.0	1.8	100.00	80.00	120.00	120.00
Strato 34	36.60	36.1	2.0	90.25	72.20	108.30	108.30
Strato 35	37.00	37.3	1.5	93.25	74.60	111.90	111.90

Modulo di deformazione non drenato Eu (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Cancelli 1980	Ladd 1977 (30)
Strato 1	0.20	0.1	2.0	3.15	0.30
Strato 2	0.40	50.1	1.3	1876.76	75.00
Strato 3	0.60	30.1	1.0	1125.23	45.30
Strato 4	0.80	13.1	1.0	486.26	19.80
Strato 5	1.40	29.9	1.0	1113.19	44.70
Strato 6	1.60	17.3	0.8	637.61	25.80
Strato 7	1.80	28.3	0.9	1048.65	42.30
Strato 8	2.00	17.3	0.5	634.69	25.80
Strato 9	2.20	8.4	0.5	299.92	12.60
Strato 10	2.40	9.4	0.3	336.82	14.10
Strato 11	2.80	10.4	0.4	373.35	15.60
Strato 12	3.00	12.4	0.5	447.34	18.60
Strato 13	4.00	12.5	0.4	449.06	18.60
Strato 14	4.20	9.7	0.5	342.07	14.40
Strato 15	4.80	8.2	0.3	284.62	12.30
Strato 16	5.20	12.6	0.7	448.05	18.90
Strato 17	6.20	17.4	1.1	625.50	26.10
Strato 18	6.40	14.0	0.7	495.79	21.00
Strato 19	6.80	11.0	0.7	382.28	16.50
Strato 20	7.20	12.0	0.7	418.43	18.00
Strato 21	7.60	14.0	0.5	492.07	21.00
Strato 22	7.80	16.1	0.5	569.81	24.30
Strato 23	8.20	11.1	0.4	381.30	16.80
Strato 24	8.40	9.2	0.4	309.07	13.80
Strato 25	9.60	12.6	0.7	434.25	18.90
Strato 26	10.00	15.6	0.9	543.98	23.40
Strato 27	10.20	46.5	1.0	1701.56	69.90
Strato 33	36.40	40.0	1.8	1364.03	60.00
Strato 34	36.60	36.1	2.0	1211.59	54.00
Strato 35	37.00	37.3	1.5	1255.35	55.80

TERRENI INCOERENTI
Densità relativa (%)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Baldi 1978 - Schmertmann 1976	Schmertmann	Harman	Lancellotta 1983	Jamiolkowski 1985
Strato 2	0.40	50.1	1.3	87.99	100	100	89.01	100
Strato 3	0.60	30.1	1.0	65.37	90.41	87.62	66.19	100
Strato 5	1.40	29.9	1.0	53.42	67.91	67.49	54.14	76.73
Strato 7	1.80	28.3	0.9	45.51	53.89	54.86	46.17	62.36

Strato 8	2.00	17.3	0.5	29.96	32.92	35.31	30.49	45.1
Strato 10	2.40	9.4	0.3	11.08	7.67	11.74	11.45	22.52
Strato 13	4.00	12.5	0.4	15.95	11.97	16.05	16.35	18.94
Strato 15	4.80	8.2	0.3	< 5	< 5	5	5	5
Strato 21	7.60	14.0	0.5	< 5	< 5	7.58	12.23	5
Strato 22	7.80	16.1	0.5	< 5	6.59	11.65	15.8	5
Strato 23	8.20	11.1	0.4	< 5	< 5	5	5	5
Strato 26	10.00	15.6	0.9	< 5	< 5	6.01	12.18	5
Strato 27	10.20	46.5	1.0	42.45	39.56	42.86	43.08	26.41
Strato 28	10.40	101.5	1.0	64.38	67.63	69.24	65.19	48.18
Strato 29	10.60	91.5	1.0	61.2	63.39	65.28	61.99	44.65
Strato 30	15.00	145.1	1.2	71.75	75.44	76.8	72.63	51.99
Strato 31	15.20	82.2	1.0	53.44	50.55	53.62	54.16	30.82
Strato 32	33.60	204.0	1.5	72.84	71.64	73.97	73.73	42.8
Strato 33	36.40	40.0	1.8	< 5	< 5	9.54	22	5
Strato 35	37.00	37.3	1.5	< 5	< 5	5.86	19.23	5
Strato 36	39.40	214.2	1.8	67.96	61.57	65.04	68.81	31.03

Angolo di resistenza al taglio (°)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Durgunoglu-Mitchell 1973	Caquot	Koppejan	De Beer	Schmertmann	Robertson & Campanella 1983	Herminier	Meyerhof 1951
Strato 2	0.40	50.1	1.3	45	43.78	41.5	38.51	42	45	34.24	39.49
Strato 3	0.60	30.1	1.0	41.38	38.41	35.86	33.36	40.66	45	38.13	30.51
Strato 5	1.40	29.9	1.0	37.63	34.28	31.51	29.39	37.51	42.41	30.03	30.43
Strato 7	1.80	28.3	0.9	35.35	31.79	28.9	27	35.54	39.79	26.77	29.71
Strato 8	2.00	17.3	0.5	32.5	28.8	25.76	24.14	32.61	36.36	24.23	24.77
Strato 10	2.40	9.4	0.3	29.08	25.24	22.02	20.72	29.07	31.83	22.55	21.22
Strato 13	4.00	12.5	0.4	29.42	25.52	22.32	20.99	29.68	32.21	22.65	22.61
Strato 15	4.80	8.2	0.3	26.72	22.69	19.34	18.27	28.7	28.04	21.9	20.68
Strato 21	7.60	14.0	0.5	27.65	23.54	20.23	19.08	28.7	29.5	22.12	23.29
Strato 22	7.80	16.1	0.5	28.19	24.08	20.8	19.6	28.92	30.25	22.26	24.23
Strato 23	8.20	11.1	0.4	26.27	22.09	18.71	17.69	28.7	26.92	21.83	21.98
Strato 26	10.00	15.6	0.9	27.18	22.98	19.65	18.55	28.7	28.58	22.01	24
Strato 27	10.20	46.5	1.0	32.3	28.26	25.19	23.62	33.54	35.7	23.97	37.88
Strato 28	10.40	101.5	1.0	35.96	32.04	29.16	27.24	37.47	40.06	27.15	45
Strato 29	10.60	91.5	1.0	35.39	31.44	28.53	26.67	36.87	39.41	26.5	45
Strato 30	15.00	145.1	1.2	36.8	32.84	30	28.01	38.56	40.92	28.14	45
Strato 31	15.20	82.2	1.0	33.38	29.27	26.25	24.58	35.08	36.91	24.65	45
Strato 32	33.60	204.0	1.5	35.71	31.53	28.63	26.75	38.03	39.5	26.64	45
Strato 33	36.40	40.0	1.8	26.31	21.71	18.31	17.33	28.7	26.2	21.85	34.96
Strato 35	37.00	37.3	1.5	25.74	21.1	17.67	16.74	28.7	25.03	21.76	33.75
Strato 36	39.40	214.2	1.8	33.96	29.59	26.58	24.89	36.62	37.29	24.92	45

Modulo di Young (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Schmertmann	Robertson & Campanella (1983)	ISOPT-1 1988 Ey(50)
Strato 2	0.40	50.1	1.3	125.25	100.20	200.40
Strato 3	0.60	30.1	1.0	75.25	60.20	155.04
Strato 5	1.40	29.9	1.0	74.75	59.80	234.74
Strato 7	1.80	28.3	0.9	70.75	56.60	269.79
Strato 8	2.00	17.3	0.5	43.25	34.60	208.46
Strato 10	2.40	9.4	0.3	23.50	18.80	141.75
Strato 13	4.00	12.5	0.4	31.25	25.00	182.04
Strato 15	4.80	8.2	0.3	20.50	16.40	126.28
Strato 21	7.60	14.0	0.5	35.00	28.00	215.60
Strato 22	7.80	16.1	0.5	40.25	32.20	244.87
Strato 23	8.20	11.1	0.4	27.75	22.20	170.94

Strato 26	10.00	15.6	0.9	39.00	31.20	240.24
Strato 27	10.20	46.5	1.0	116.25	93.00	523.26
Strato 28	10.40	101.5	1.0	253.75	203.00	800.27
Strato 29	10.60	91.5	1.0	228.75	183.00	767.98
Strato 30	15.00	145.1	1.2	362.75	290.20	1008.04
Strato 31	15.20	82.2	1.0	205.50	164.40	816.57
Strato 32	33.60	204.0	1.5	510.00	408.00	1510.25
Strato 33	36.40	40.0	1.8	100.00	80.00	616.00
Strato 35	37.00	37.3	1.5	93.25	74.60	574.42
Strato 36	39.40	214.2	1.8	535.50	428.40	1844.60

STIMA PARAMETRI GEOTECNICI CPT03

TERRENI COESIVI

Coesione non drenata (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Lunne & Eide	Sunda Relazione Sperimentale	Lunne T.-Kleven A. 1981	Kjekstad. 1978 - Lunne, Robertson and Powell 1977	Lunne, Robertson and Powell 1977	Terzaghi
Strato 1	0.20	0.1	1.0	0.00	0.01	0.01	0.00	0.00	0.01
Strato 2	0.40	30.1	0.9	1.45	1.82	2.00	1.77	1.58	1.51
Strato 4	0.80	6.1	0.7	0.29	0.46	0.40	0.35	0.31	0.30
Strato 5	1.00	10.1	0.4	0.48	0.74	0.66	0.58	0.52	0.51
Strato 6	1.20	18.3	0.6	0.87	1.23	1.21	1.06	0.95	0.91
Strato 7	1.40	23.3	0.7	1.11	1.49	1.54	1.36	1.21	1.16
Strato 8	1.60	19.3	1.5	0.92	1.28	1.27	1.12	1.00	0.96
Strato 9	1.80	30.3	0.7	1.45	1.81	2.00	1.76	1.58	1.51
Strato 10	2.00	13.3	0.7	0.62	0.92	0.86	0.76	0.68	0.67
Strato 11	2.20	11.4	0.3	0.53	0.80	0.73	0.65	0.58	0.57
Strato 12	2.40	16.4	0.6	0.77	1.10	1.06	0.94	0.84	0.82
Strato 13	2.80	11.3	0.6	0.52	0.79	0.72	0.64	0.57	0.57
Strato 14	3.00	11.4	0.4	0.53	0.79	0.72	0.64	0.57	0.57
Strato 15	3.20	9.6	0.5	0.44	0.67	0.60	0.53	0.47	0.48
Strato 16	3.60	11.4	0.5	0.53	0.78	0.72	0.63	0.57	0.57
Strato 17	4.20	10.8	0.4	0.50	0.74	0.67	0.59	0.53	0.54
Strato 19	4.80	10.5	0.6	0.48	0.71	0.64	0.57	0.51	0.52
Strato 20	5.20	15.9	0.9	0.74	1.04	1.00	0.88	0.79	0.79
Strato 21	6.20	19.8	1.1	0.92	1.25	1.25	1.10	0.98	0.99
Strato 22	7.00	12.4	0.7	0.56	0.80	0.74	0.65	0.59	0.62
Strato 23	7.20	12.1	0.5	0.54	0.78	0.72	0.63	0.57	0.61
Strato 24	7.40	20.1	0.5	0.93	1.25	1.25	1.10	0.98	1.01
Strato 25	7.80	13.1	0.4	0.59	0.83	0.78	0.68	0.61	0.66
Strato 26	8.20	9.2	0.5	0.40	0.57	0.51	0.45	0.40	0.46
Strato 27	8.60	12.2	0.6	0.54	0.77	0.71	0.62	0.56	0.61
Strato 28	8.80	11.2	0.5	0.49	0.70	0.64	0.56	0.50	0.56
Strato 29	9.40	11.8	0.6	0.52	0.73	0.67	0.59	0.53	0.59
Strato 30	9.80	12.1	0.5	0.53	0.74	0.68	0.60	0.54	0.61
Strato 31	10.00	21.4	1.0	0.98	1.28	1.30	1.15	1.03	1.07

Modulo Edometrico (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Mitchell & Gardner (1975)	Metodo generale del modulo edometrico	Buismann	Buismann Sanglerat
Strato 1	0.20	0.1	1.0	0.80	0.66	1.50	0.30
Strato 2	0.40	30.1	0.9	75.25	60.20	90.30	90.30
Strato 4	0.80	6.1	0.7	48.80	31.93	91.50	18.30

Strato 5	1.00	10.1	0.4	50.50	43.75	60.60	30.30
Strato 6	1.20	18.3	0.6	91.50	45.43	109.80	54.90
Strato 7	1.40	23.3	0.7	58.25	46.60	69.90	69.90
Strato 8	1.60	19.3	1.5	96.50	43.56	115.80	57.90
Strato 9	1.80	30.3	0.7	75.75	60.60	90.90	90.90
Strato 10	2.00	13.3	0.7	66.50	48.01	79.80	39.90
Strato 11	2.20	11.4	0.3	57.00	46.04	68.40	34.20
Strato 12	2.40	16.4	0.6	82.00	47.74	98.40	49.20
Strato 13	2.80	11.3	0.6	56.50	45.89	67.80	33.90
Strato 14	3.00	11.4	0.4	57.00	46.04	68.40	34.20
Strato 15	3.20	9.6	0.5	48.00	42.67	57.60	28.80
Strato 16	3.60	11.4	0.5	57.00	46.04	68.40	34.20
Strato 17	4.20	10.8	0.4	54.00	45.08	64.80	32.40
Strato 19	4.80	10.5	0.6	52.50	44.54	63.00	31.50
Strato 20	5.20	15.9	0.9	79.50	48.08	95.40	47.70
Strato 21	6.20	19.8	1.1	99.00	42.45	118.80	59.40
Strato 22	7.00	12.4	0.7	62.00	47.28	74.40	37.20
Strato 23	7.20	12.1	0.5	60.50	46.96	72.60	36.30
Strato 24	7.40	20.1	0.5	100.50	41.73	60.30	60.30
Strato 25	7.80	13.1	0.4	65.50	47.88	78.60	39.30
Strato 26	8.20	9.2	0.5	46.00	41.72	55.20	27.60
Strato 27	8.60	12.2	0.6	61.00	47.07	73.20	36.60
Strato 28	8.80	11.2	0.5	56.00	45.74	67.20	33.60
Strato 29	9.40	11.8	0.6	59.00	46.59	70.80	35.40
Strato 30	9.80	12.1	0.5	60.50	46.96	72.60	36.30
Strato 31	10.00	21.4	1.0	53.50	42.80	64.20	64.20

Modulo di deformazione non drenato Eu (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Cancelli 1980	Ladd 1977 (30)
Strato 1	0.20	0.1	1.0	3.15	0.30
Strato 2	0.40	30.1	0.9	1126.80	45.30
Strato 4	0.80	6.1	0.7	223.95	9.00
Strato 5	1.00	10.1	0.4	372.56	15.30
Strato 6	1.20	18.3	0.6	678.60	27.30
Strato 7	1.40	23.3	0.7	864.60	34.80
Strato 8	1.60	19.3	1.5	713.10	28.80
Strato 9	1.80	30.3	0.7	1124.10	45.30
Strato 10	2.00	13.3	0.7	485.14	20.10
Strato 11	2.20	11.4	0.3	412.84	17.10
Strato 12	2.40	16.4	0.6	599.66	24.60
Strato 13	2.80	11.3	0.6	407.40	17.10
Strato 14	3.00	11.4	0.4	410.14	17.10
Strato 15	3.20	9.6	0.5	342.00	14.40
Strato 16	3.60	11.4	0.5	408.52	17.10
Strato 17	4.20	10.8	0.4	384.34	16.20
Strato 19	4.80	10.5	0.6	370.72	15.60
Strato 20	5.20	15.9	0.9	571.80	23.70
Strato 21	6.20	19.8	1.1	715.42	29.70
Strato 22	7.00	12.4	0.7	434.70	18.60
Strato 23	7.20	12.1	0.5	421.76	18.30
Strato 24	7.40	20.1	0.5	721.05	30.30
Strato 25	7.80	13.1	0.4	457.50	19.80
Strato 26	8.20	9.2	0.5	309.97	13.80
Strato 27	8.60	12.2	0.6	421.20	18.30
Strato 28	8.80	11.2	0.5	382.69	16.80
Strato 29	9.40	11.8	0.6	403.84	17.70
Strato 30	9.80	12.1	0.5	413.40	18.30
Strato 31	10.00	21.4	1.0	761.10	32.10

TERRENI INCOERENTI
Densità relativa (%)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Baldi 1978 - Schmertmann 1976	Schmertmann	Harman	Lancellotta 1983	Jamiolkowski 1985
Strato 2	0.40	30.1	0.9	73.78	100	100	74.68	100
Strato 3	0.60	25.1	0.4	60.67	84.63	82.16	61.45	96.36
Strato 6	1.20	18.3	0.6	40.21	51.35	51.89	40.82	64.17
Strato 7	1.40	23.3	0.7	44.53	55.38	55.88	45.18	65.96
Strato 9	1.80	30.3	0.7	47.97	57.36	58.08	48.65	65.36
Strato 11	2.20	11.4	0.3	17.51	16.53	19.98	17.93	31.23
Strato 12	2.40	16.4	0.6	27.21	28.63	31.39	27.71	39.06
Strato 14	3.00	11.4	0.4	15.11	11.98	15.91	15.51	22.02
Strato 17	4.20	10.8	0.4	11.1	5.32	9.87	11.47	12.08
Strato 18	4.40	21.7	0.3	30.04	29.16	32.32	30.56	29.28
Strato 20	5.20	15.9	0.9	19.7	14.95	19.11	20.14	15.98
Strato 24	7.40	20.1	0.5	22.23	15.71	20.17	22.69	11.61
Strato 25	7.80	13.1	0.4	< 5	< 5	5	9.97	5
Strato 30	9.80	12.1	0.5	< 5	< 5	5	5.13	5
Strato 32	11.00	83.5	1.0	58.67	60.18	62.26	59.44	42.11
Strato 33	12.40	117.7	1.2	67.08	70.2	71.78	67.92	48.78
Strato 34	12.60	86.8	1.0	57.57	57.44	59.87	58.33	38.09
Strato 35	15.20	130.1	1.2	67.68	69.62	71.42	68.53	46.54
Strato 36	15.40	82.2	1.0	53.37	50.42	53.5	54.09	30.55
Strato 37	33.40	219.2	1.4	74.95	74.4	76.55	75.86	44.93

Angolo di resistenza al taglio (°)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Durgunoglu-Mitchell 1973	Caquot	Koppejan	De Beer	Schmertmann	Robertson & Campanella 1983	Herminier	Meyerhof 1951
Strato 2	0.40	30.1	0.9	44.05	41.35	38.94	36.18	42	45	42.63	30.51
Strato 3	0.60	25.1	0.4	40.66	37.67	35.08	32.65	39.85	45	36.44	28.27
Strato 6	1.20	18.3	0.6	35.51	32.1	29.23	27.3	35.19	40.13	27	25.22
Strato 7	1.40	23.3	0.7	35.86	32.41	29.55	27.6	35.75	40.46	27.42	27.46
Strato 9	1.80	30.3	0.7	35.85	32.31	29.44	27.5	36.03	40.35	27.36	30.6
Strato 11	2.20	11.4	0.3	30.31	26.53	23.37	21.95	30.31	33.53	23.02	22.12
Strato 12	2.40	16.4	0.6	31.85	28.11	25.03	23.47	32.01	35.52	23.81	24.36
Strato 14	3.00	11.4	0.4	29.55	25.69	22.49	21.15	29.68	32.43	22.7	22.12
Strato 17	4.20	10.8	0.4	28.5	24.56	21.3	20.06	28.74	30.91	22.34	21.85
Strato 18	4.40	21.7	0.3	31.57	27.71	24.61	23.08	32.08	35.02	23.6	26.74
Strato 20	5.20	15.9	0.9	29.6	25.64	22.44	21.1	30.09	32.37	22.71	24.14
Strato 24	7.40	20.1	0.5	29.42	25.36	22.15	20.84	30.2	32	22.64	26.02
Strato 25	7.80	13.1	0.4	27.22	23.08	19.75	18.65	28.7	28.76	22.02	22.88
Strato 30	9.80	12.1	0.5	26.04	21.8	18.41	17.42	28.7	26.38	21.79	22.43
Strato 32	11.00	83.5	1.0	34.98	31.02	28.08	26.26	36.43	38.93	26.07	45
Strato 33	12.40	117.7	1.2	36.2	32.25	29.38	27.44	37.83	40.29	27.4	45
Strato 34	12.60	86.8	1.0	34.46	30.44	27.48	25.71	36.04	38.28	25.56	45
Strato 35	15.20	130.1	1.2	35.97	31.96	29.08	27.17	37.75	39.98	27.08	45
Strato 36	15.40	82.2	1.0	33.36	29.24	26.22	24.56	35.06	36.88	24.63	45
Strato 37	33.40	219.2	1.4	36.08	31.91	29.03	27.12	38.42	39.92	27.05	45

Modulo di Young (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Schmertmann	Robertson & Campanella (1983)	ISOPT-1 1988 Ey(50)
Strato 2	0.40	30.1	0.9	75.25	60.20	120.40
Strato 3	0.60	25.1	0.4	62.75	50.20	146.69
Strato 6	1.20	18.3	0.6	45.75	36.60	180.04
Strato 7	1.40	23.3	0.7	58.25	46.60	217.96

Strato 9	1.80	30.3	0.7	75.75	60.60	276.24
Strato 11	2.20	11.4	0.3	28.50	22.80	159.79
Strato 12	2.40	16.4	0.6	41.00	32.80	206.06
Strato 14	3.00	11.4	0.4	28.50	22.80	166.01
Strato 17	4.20	10.8	0.4	27.00	21.60	165.91
Strato 18	4.40	21.7	0.3	54.25	43.40	271.27
Strato 20	5.20	15.9	0.9	39.75	31.80	225.88
Strato 24	7.40	20.1	0.5	50.25	40.20	283.71
Strato 25	7.80	13.1	0.4	32.75	26.20	201.74
Strato 30	9.80	12.1	0.5	30.25	24.20	186.34
Strato 32	11.00	83.5	1.0	208.75	167.00	733.00
Strato 33	12.40	117.7	1.2	294.25	235.40	891.70
Strato 34	12.60	86.8	1.0	217.00	173.60	790.51
Strato 35	15.20	130.1	1.2	325.25	260.20	994.69
Strato 36	15.40	82.2	1.0	205.50	164.40	817.86
Strato 37	33.40	219.2	1.4	548.00	438.40	1550.18

STIMA PARAMETRI GEOTECNICI CPT04

TERRENI COESIVI

Coesione non drenata (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Lunne & Eide	Sunda Relazione Sperimentale	Lunne T.-Kleven A. 1981	Kjekstad. 1978 - Lunne, Robertson and Powell 1977	Lunne, Robertson and Powell 1977	Terzaghi
Strato 1	0.20	0.1	0.7	0.00	0.01	0.01	0.00	0.00	0.01
Strato 3	1.20	17.1	1.3	0.82	1.16	1.13	1.00	0.89	0.86
Strato 5	3.80	10.5	0.5	0.49	0.74	0.67	0.59	0.53	0.52
Strato 6	4.00	11.6	0.3	0.53	0.79	0.72	0.64	0.57	0.58
Strato 7	4.40	13.7	0.7	0.63	0.92	0.86	0.76	0.68	0.68
Strato 9	4.80	17.7	0.5	0.82	1.15	1.12	0.99	0.88	0.89
Strato 10	5.00	16.7	0.7	0.78	1.09	1.05	0.93	0.83	0.84
Strato 11	5.40	21.7	0.6	1.02	1.36	1.38	1.22	1.09	1.09
Strato 12	7.40	16.4	1.0	0.75	1.05	1.01	0.89	0.80	0.82
Strato 13	8.00	11.6	0.6	0.52	0.74	0.68	0.60	0.53	0.58
Strato 14	8.20	16.2	0.7	0.74	1.02	0.98	0.86	0.77	0.81
Strato 15	9.00	12.3	0.4	0.55	0.77	0.71	0.63	0.56	0.62
Strato 16	9.40	10.2	0.4	0.44	0.62	0.56	0.50	0.44	0.51
Strato 17	9.60	13.4	0.3	0.60	0.83	0.77	0.68	0.61	0.67
Strato 18	10.20	13.9	0.7	0.62	0.85	0.80	0.71	0.63	0.69
Strato 20	36.60	34.5	1.9	1.49	1.59	1.82	1.61	1.44	1.72
Strato 21	36.80	65.1	2.0	2.96	2.66	3.86	3.40	3.04	3.25

Modulo Edometrico (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Mitchell & Gardner (1975)	Metodo generale del modulo edometrico	Buisman	Buismann Sanglerat
Strato 1	0.20	0.1	0.7	0.80	0.66	1.50	0.30
Strato 3	1.20	17.1	1.3	85.50	47.08	102.60	51.30
Strato 5	3.80	10.5	0.5	52.50	44.54	63.00	31.50
Strato 6	4.00	11.6	0.3	58.00	46.32	69.60	34.80
Strato 7	4.40	13.7	0.7	68.50	48.22	82.20	41.10
Strato 9	4.80	17.7	0.5	88.50	46.33	106.20	53.10
Strato 10	5.00	16.7	0.7	83.50	47.48	100.20	50.10
Strato 11	5.40	21.7	0.6	54.25	43.40	65.10	65.10
Strato 12	7.40	16.4	1.0	82.00	47.74	98.40	49.20

Strato 13	8.00	11.6	0.6	58.00	46.32	69.60	34.80
Strato 14	8.20	16.2	0.7	81.00	47.89	97.20	48.60
Strato 15	9.00	12.3	0.4	61.50	47.18	73.80	36.90
Strato 16	9.40	10.2	0.4	51.00	43.95	61.20	30.60
Strato 17	9.60	13.4	0.3	67.00	48.07	80.40	40.20
Strato 18	10.20	13.9	0.7	69.50	48.30	83.40	41.70
Strato 20	36.60	34.5	1.9	86.25	69.00	103.50	103.50
Strato 21	36.80	65.1	2.0	162.75	130.20	195.30	97.65

Modulo di deformazione non drenato Eu (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Cancelli 1980	Ladd 1977 (30)
Strato 1	0.20	0.1	0.7	3.15	0.30
Strato 3	1.20	17.1	1.3	635.63	25.80
Strato 5	3.80	10.5	0.5	377.40	15.60
Strato 6	4.00	11.6	0.3	414.26	17.40
Strato 7	4.40	13.7	0.7	492.00	20.40
Strato 9	4.80	17.7	0.5	640.39	26.70
Strato 10	5.00	16.7	0.7	602.21	25.20
Strato 11	5.40	21.7	0.6	788.63	32.70
Strato 12	7.40	16.4	1.0	585.75	24.60
Strato 13	8.00	11.6	0.6	401.25	17.40
Strato 14	8.20	16.2	0.7	572.29	24.30
Strato 15	9.00	12.3	0.4	424.35	18.60
Strato 16	9.40	10.2	0.4	343.57	15.30
Strato 17	9.60	13.4	0.3	462.56	20.10
Strato 18	10.20	13.9	0.7	479.96	20.70
Strato 20	36.60	34.5	1.9	1153.46	51.60
Strato 21	36.80	65.1	2.0	2299.28	97.50

TERRENI INCOERENTI

Densità relativa (%)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Baldi 1978 - Schmertmann 1976	Schmertmann	Harman	Lancellotta 1983	Jamiolkowski 1985
Strato 2	0.40	40.1	0.7	82.21	100	100	83.18	100
Strato 4	1.40	32.3	0.5	53.53	66.79	66.61	54.25	74.74
Strato 5	3.80	10.5	0.5	13.63	10.59	14.53	14.02	22.78
Strato 6	4.00	11.6	0.3	13.08	7.84	12.24	13.46	14.05
Strato 8	4.60	14.7	0.3	18.51	14.05	18.17	18.94	16.78
Strato 9	4.80	17.7	0.5	23.4	20.1	23.89	23.87	20.89
Strato 11	5.40	21.7	0.6	28.16	25.6	29.14	28.67	23.77
Strato 12	7.40	16.4	1.0	18.04	11.26	15.86	18.46	9.76
Strato 13	8.00	11.6	0.6	< 5	< 5	5	6.48	5
Strato 15	9.00	12.3	0.4	< 5	< 5	5	6.89	5
Strato 17	9.60	13.4	0.3	< 5	< 5	5	8.21	5
Strato 19	36.00	189.8	1.3	71.56	70.45	72.79	72.43	42.36
Strato 20	36.60	34.5	1.9	< 5	< 5	5	17.31	5
Strato 21	36.80	65.1	2.0	< 5	19.23	25.23	35.34	5
Strato 22	39.60	214.3	1.4	68.08	61.77	65.23	68.92	31.15

Angolo di resistenza al taglio (°)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Durgunoglu-Mitchell 1973	Caquot	Koppejan	De Beer	Schmertmann	Robertson & Campanella 1983	Herminier	Meyerhof 1951
Strato 2	0.40	40.1	0.7	45	42.87	40.54	37.64	42	45	40.09	35
Strato 4	1.40	32.3	0.5	37.34	33.93	31.15	29.06	37.35	42.06	29.52	31.5
Strato 5	3.80	10.5	0.5	29.42	25.58	22.38	21.04	29.48	32.29	22.66	21.71
Strato 6	4.00	11.6	0.3	28.83	24.9	21.66	20.39	29.1	31.37	22.44	22.21

Strato 8	4.60	14.7	0.3	29.56	25.62	22.41	21.08	29.97	32.33	22.69	23.6
Strato 9	4.80	17.7	0.5	30.32	26.4	23.24	21.83	30.81	33.36	22.99	24.95
Strato 11	5.40	21.7	0.6	30.97	27.05	23.92	22.45	31.58	34.19	23.29	26.74
Strato 12	7.40	16.4	1.0	28.95	24.91	21.67	20.4	29.58	31.39	22.48	24.36
Strato 13	8.00	11.6	0.6	26.64	22.48	19.12	18.07	28.7	27.66	21.89	22.21
Strato 15	9.00	12.3	0.4	26.52	22.33	18.96	17.92	28.7	27.37	21.87	22.52
Strato 17	9.60	13.4	0.3	26.57	22.36	18.99	17.95	28.7	27.43	21.89	23.02
Strato 19	36.00	189.8	1.3	35.61	31.44	28.53	26.67	37.86	39.4	26.54	45
Strato 20	36.60	34.5	1.9	25.46	20.82	17.37	16.47	28.7	24.48	21.72	32.49
Strato 21	36.80	65.1	2.0	28.45	23.91	20.62	19.44	30.69	30.02	22.31	45
Strato 22	39.60	214.3	1.4	34	29.62	26.62	24.92	36.65	37.33	24.95	45

Modulo di Young (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Schmertmann	Robertson & Campanella (1983)	ISOPT-1 1988 Ey(50)
Strato 2	0.40	40.1	0.7	100.25	80.20	160.40
Strato 4	1.40	32.3	0.5	80.75	64.60	257.92
Strato 5	3.80	10.5	0.5	26.25	21.00	154.66
Strato 6	4.00	11.6	0.3	29.00	23.20	174.69
Strato 8	4.60	14.7	0.3	36.75	29.40	210.42
Strato 9	4.80	17.7	0.5	44.25	35.40	240.51
Strato 11	5.40	21.7	0.6	54.25	43.40	280.54
Strato 12	7.40	16.4	1.0	41.00	32.80	240.24
Strato 13	8.00	11.6	0.6	29.00	23.20	178.64
Strato 15	9.00	12.3	0.4	30.75	24.60	189.42
Strato 17	9.60	13.4	0.3	33.50	26.80	206.36
Strato 19	36.00	189.8	1.3	474.50	379.60	1432.23
Strato 20	36.60	34.5	1.9	86.25	69.00	531.30
Strato 21	36.80	65.1	2.0	162.75	130.20	891.38
Strato 22	39.60	214.3	1.4	535.75	428.60	1840.32

STIMA PARAMETRI GEOTECNICI CPT04 bis

TERRENI COESIVI

Coesione non drenata (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Lunne & Eide	Sunda Relazione Sperimentale	Lunne T.-Kleven A. 1981	Kjekstad. 1978 - Lunne, Robertson and Powell 1977	Lunne, Robertson and Powell 1977	Terzaghi
Strato 1	0.20	0.1	1.3	0.00	0.01	0.01	0.00	0.00	0.01
Strato 3	1.00	40.1	0.9	1.93	2.22	2.66	2.35	2.10	2.00
Strato 5	1.40	40.3	0.9	1.93	2.22	2.67	2.36	2.11	2.01
Strato 6	1.60	24.3	0.9	1.16	1.53	1.60	1.41	1.26	1.21
Strato 7	1.80	16.3	0.8	0.77	1.11	1.06	0.94	0.84	0.81
Strato 8	2.00	21.3	0.7	1.01	1.38	1.40	1.23	1.10	1.06
Strato 9	2.20	50.4	1.3	2.42	2.56	3.33	2.94	2.63	2.52
Strato 11	3.20	18.9	0.9	0.89	1.24	1.22	1.08	0.97	0.94
Strato 12	3.40	12.6	0.7	0.58	0.86	0.80	0.70	0.63	0.63
Strato 13	3.60	14.6	0.5	0.68	0.98	0.93	0.82	0.73	0.73
Strato 14	3.80	22.6	0.7	1.06	1.42	1.46	1.29	1.15	1.13
Strato 15	4.40	11.3	0.6	0.52	0.77	0.70	0.62	0.55	0.57
Strato 16	4.60	17.7	0.7	0.82	1.15	1.12	0.99	0.89	0.89
Strato 17	5.00	19.6	1.1	0.91	1.25	1.24	1.10	0.98	0.98
Strato 18	5.20	19.8	0.9	0.92	1.26	1.25	1.11	0.99	0.99
Strato 19	5.40	21.8	1.2	1.02	1.36	1.38	1.22	1.09	1.09
Strato 20	5.80	18.7	0.8	0.87	1.19	1.17	1.04	0.93	0.94

Strato 21	6.20	17.8	0.9	0.82	1.13	1.11	0.98	0.87	0.89
Strato 22	6.60	18.9	1.1	0.87	1.19	1.18	1.04	0.93	0.94
Strato 23	7.00	15.6	0.5	0.71	0.99	0.95	0.84	0.75	0.78
Strato 25	7.60	11.6	0.4	0.52	0.74	0.68	0.60	0.53	0.58
Strato 26	7.80	9.1	0.3	0.39	0.57	0.51	0.45	0.40	0.46
Strato 27	8.00	9.1	0.4	0.39	0.57	0.50	0.44	0.40	0.46
Strato 28	8.60	11.1	0.6	0.49	0.69	0.63	0.56	0.50	0.56
Strato 29	8.80	15.2	0.6	0.68	0.95	0.90	0.79	0.71	0.76
Strato 30	9.00	16.2	0.7	0.73	1.00	0.96	0.85	0.76	0.81
Strato 31	9.20	11.4	0.7	0.50	0.70	0.64	0.57	0.51	0.57
Strato 32	9.40	15.4	0.9	0.69	0.95	0.91	0.80	0.72	0.77
Strato 33	9.60	16.4	0.7	0.74	1.01	0.97	0.86	0.77	0.82
Strato 36	31.20	59.4	1.7	2.71	2.55	3.55	3.13	2.80	2.97
Strato 37	31.40	36.4	1.9	1.60	1.73	2.01	1.78	1.59	1.82
Strato 38	32.20	37.5	1.9	1.65	1.77	2.08	1.83	1.64	1.88
Strato 39	33.20	31.7	2.0	1.37	1.50	1.68	1.48	1.33	1.59
Strato 40	33.40	35.7	1.6	1.56	1.68	1.94	1.71	1.53	1.79
Strato 41	34.20	37.4	1.2	1.64	1.74	2.04	1.80	1.61	1.87
Strato 42	34.60	28.7	1.3	1.21	1.34	1.46	1.28	1.15	1.44
Strato 43	34.80	84.8	1.9	3.92	3.15	5.19	4.58	4.10	4.24
Strato 44	35.00	36.8	1.9	1.60	1.70	1.99	1.76	1.57	1.84
Strato 45	35.20	49.0	1.3	2.19	2.17	2.80	2.47	2.21	2.45

Modulo Edometrico (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Mitchell & Gardner (1975)	Metodo generale del modulo edometrico	Buisman	Buisman Sanglerat
Strato 1	0.20	0.1	1.3	0.80	0.66	1.50	0.30
Strato 3	1.00	40.1	0.9	100.25	80.20	120.30	120.30
Strato 5	1.40	40.3	0.9	100.75	80.60	120.90	120.90
Strato 6	1.60	24.3	0.9	60.75	48.60	72.90	72.90
Strato 7	1.80	16.3	0.8	81.50	47.82	97.80	48.90
Strato 8	2.00	21.3	0.7	53.25	42.60	63.90	63.90
Strato 9	2.20	50.4	1.3	126.00	100.80	151.20	75.60
Strato 11	3.20	18.9	0.9	94.50	44.36	113.40	56.70
Strato 12	3.40	12.6	0.7	63.00	47.48	75.60	37.80
Strato 13	3.60	14.6	0.5	73.00	48.43	87.60	43.80
Strato 14	3.80	22.6	0.7	56.50	45.20	67.80	67.80
Strato 15	4.40	11.3	0.6	56.50	45.89	67.80	33.90
Strato 16	4.60	17.7	0.7	88.50	46.33	106.20	53.10
Strato 17	5.00	19.6	1.1	98.00	42.91	117.60	58.80
Strato 18	5.20	19.8	0.9	99.00	42.45	118.80	59.40
Strato 19	5.40	21.8	1.2	54.50	43.60	65.40	65.40
Strato 20	5.80	18.7	0.8	93.50	44.73	112.20	56.10
Strato 21	6.20	17.8	0.9	89.00	46.19	106.80	53.40
Strato 22	6.60	18.9	1.1	94.50	44.36	113.40	56.70
Strato 23	7.00	15.6	0.5	78.00	48.22	93.60	46.80
Strato 25	7.60	11.6	0.4	58.00	46.32	69.60	34.80
Strato 26	7.80	9.1	0.3	45.50	41.47	54.60	27.30
Strato 27	8.00	9.1	0.4	45.50	41.47	54.60	27.30
Strato 28	8.60	11.1	0.6	55.50	45.58	66.60	33.30
Strato 29	8.80	15.2	0.6	76.00	48.36	91.20	45.60
Strato 30	9.00	16.2	0.7	81.00	47.89	97.20	48.60
Strato 31	9.20	11.4	0.7	57.00	46.04	68.40	34.20
Strato 32	9.40	15.4	0.9	77.00	48.30	92.40	46.20
Strato 33	9.60	16.4	0.7	82.00	47.74	98.40	49.20
Strato 36	31.20	59.4	1.7	148.50	118.80	178.20	89.10
Strato 37	31.40	36.4	1.9	91.00	72.80	109.20	109.20
Strato 38	32.20	37.5	1.9	93.75	75.00	112.50	112.50

Strato 39	33.20	31.7	2.0	79.25	63.40	95.10	95.10
Strato 40	33.40	35.7	1.6	89.25	71.40	107.10	107.10
Strato 41	34.20	37.4	1.2	93.50	74.80	112.20	112.20
Strato 42	34.60	28.7	1.3	71.75	57.40	86.10	86.10
Strato 43	34.80	84.8	1.9	212.00	169.60	254.40	127.20
Strato 44	35.00	36.8	1.9	92.00	73.60	110.40	110.40
Strato 45	35.20	49.0	1.3	122.50	98.00	147.00	73.50

Modulo di deformazione non drenato Eu (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Cancelli 1980	Ladd 1977 (30)
Strato 1	0.20	0.1	1.3	3.15	0.30
Strato 3	1.00	40.1	0.9	1497.26	60.00
Strato 5	1.40	40.3	0.9	1501.76	60.30
Strato 6	1.60	24.3	0.9	900.22	36.30
Strato 7	1.80	16.3	0.8	598.76	24.30
Strato 8	2.00	21.3	0.7	784.80	31.80
Strato 9	2.20	50.4	1.3	1874.89	75.60
Strato 11	3.20	18.9	0.9	691.05	28.20
Strato 12	3.40	12.6	0.7	452.96	18.90
Strato 13	3.60	14.6	0.5	527.29	21.90
Strato 14	3.80	22.6	0.7	826.58	33.90
Strato 15	4.40	11.3	0.6	401.44	17.10
Strato 16	4.60	17.7	0.7	640.09	26.70
Strato 17	5.00	19.6	1.1	710.25	29.40
Strato 18	5.20	19.8	0.9	716.62	29.70
Strato 19	5.40	21.8	1.2	790.87	32.70
Strato 20	5.80	18.7	0.8	673.50	28.20
Strato 21	6.20	17.8	0.9	638.32	26.70
Strato 22	6.60	18.9	1.1	678.15	28.20
Strato 23	7.00	15.6	0.5	552.90	23.40
Strato 25	7.60	11.6	0.4	400.80	17.40
Strato 26	7.80	9.1	0.3	306.07	13.80
Strato 27	8.00	9.1	0.4	305.47	13.80
Strato 28	8.60	11.1	0.6	379.16	16.80
Strato 29	8.80	15.2	0.6	531.56	22.80
Strato 30	9.00	16.2	0.7	568.39	24.30
Strato 31	9.20	11.4	0.7	387.71	17.10
Strato 32	9.40	15.4	0.9	537.04	23.10
Strato 33	9.60	16.4	0.7	573.86	24.60
Strato 36	31.20	59.4	1.7	2105.40	89.10
Strato 37	31.40	36.4	1.9	1242.04	54.60
Strato 38	32.20	37.5	1.9	1281.22	56.40
Strato 39	33.20	31.7	2.0	1060.01	47.70
Strato 40	33.40	35.7	1.6	1207.54	53.70
Strato 41	34.20	37.4	1.2	1269.23	56.10
Strato 42	34.60	28.7	1.3	940.58	43.20
Strato 43	34.80	84.8	1.9	3043.12	127.20
Strato 44	35.00	36.8	1.9	1242.26	55.20
Strato 45	35.20	49.0	1.3	1698.94	73.50

TERRENI INCOERENT I

Densità relativa (%)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Baldi 1978 - Schmertmann 1976	Schmertmann	Harman	Lancellotta 1983	Jamiolkowski 1985
Strato 2	0.80	134.8	1.6	100	100	100	100	100
Strato 3	1.00	40.1	0.9	64.85	84.5	82.8	65.67	91.38
Strato 4	1.20	42.3	0.7	63.41	80.86	79.64	64.22	86.94
Strato 5	1.40	40.3	0.9	59.59	74.46	73.83	60.37	80.62

Strato 6	1.60	24.3	0.9	43.08	51.9	52.84	43.71	61.82
Strato 8	2.00	21.3	0.7	35.99	40.75	42.65	36.57	51.3
Strato 9	2.20	50.4	1.3	59.33	70.12	70.32	60.11	72.99
Strato 10	2.40	80.4	1.5	71.92	85.91	85.2	72.8	83.72
Strato 11	3.20	18.9	0.9	29.21	29.97	32.82	29.73	36.56
Strato 13	3.60	14.6	0.5	19.98	16.95	20.76	20.43	22.8
Strato 14	3.80	22.6	0.7	31.91	32.01	34.93	32.45	33.75
Strato 16	4.60	17.7	0.7	23.22	19.76	23.58	23.69	21.28
Strato 20	5.80	18.7	0.8	22.52	17.48	21.64	22.98	16.49
Strato 23	7.00	15.6	0.5	15.29	6.93	11.91	15.69	5.72
Strato 24	7.20	20.1	0.3	22.02	15.31	19.81	22.48	11.75
Strato 25	7.60	11.6	0.4	< 5	< 5	5	6.29	5
Strato 26	7.80	9.1	0.3	< 5	< 5	5	5	5
Strato 29	8.80	15.2	0.6	< 5	< 5	6.68	12.37	5
Strato 33	9.60	16.4	0.7	< 5	< 5	7.66	13.57	5
Strato 34	9.80	76.4	1.0	56.69	57.97	60.14	57.44	41.39
Strato 35	31.00	176.1	1.3	70.87	70.45	72.66	71.74	43.59
Strato 36	31.20	59.4	1.7	< 5	19.93	25.71	34.87	5
Strato 38	32.20	37.5	1.9	< 5	< 5	9.34	21.35	5
Strato 40	33.40	35.7	1.6	< 5	< 5	6.49	19.25	5
Strato 41	34.20	37.4	1.2	< 5	< 5	7.71	20.36	5
Strato 42	34.60	28.7	1.3	< 5	< 5	5	12.51	5
Strato 43	34.80	84.8	1.9	42.81	29.89	35.2	43.44	7.11
Strato 44	35.00	36.8	1.9	< 5	< 5	6.36	19.42	5
Strato 45	35.20	49.0	1.3	< 5	9.48	16.06	27.54	5
Strato 46	35.40	70.0	1.3	< 5	22.39	28.18	37.69	5
Strato 47	38.00	235.4	1.3	71.05	65.79	68.97	71.92	34.75

Angolo di resistenza al taglio (°)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Durgunoglu-Mitchell 1973	Caquot	Koppejan	De Beer	Schmertmann	Robertson & Campanella 1983	Herminier	Meyerhof 1951
Strato 2	0.80	134.8	1.6	45	45	43.78	40.6	42	45	15	45
Strato 3	1.00	40.1	0.9	40.01	36.81	34.17	31.82	39.83	44.87	34.77	35
Strato 4	1.20	42.3	0.7	39.33	36.04	33.37	31.09	39.32	44.14	33.24	35.99
Strato 5	1.40	40.3	0.9	38.33	34.95	32.22	30.04	38.42	43.08	31.21	35.09
Strato 6	1.60	24.3	0.9	35.22	31.7	28.8	26.91	35.27	39.69	26.64	27.91
Strato 8	2.00	21.3	0.7	33.53	29.88	26.89	25.17	33.71	37.63	24.99	26.56
Strato 9	2.20	50.4	1.3	37.31	33.75	30.96	28.89	37.82	41.87	29.34	39.63
Strato 10	2.40	80.4	1.5	39.33	35.83	33.14	30.88	40.03	43.93	32.92	45
Strato 11	3.20	18.9	0.9	31.89	28.1	25.02	23.46	32.2	35.51	23.81	25.49
Strato 13	3.60	14.6	0.5	30.05	26.16	22.99	21.6	30.37	33.05	22.89	23.56
Strato 14	3.80	22.6	0.7	31.99	28.16	25.08	23.52	32.48	35.58	23.85	27.15
Strato 16	4.60	17.7	0.7	30.27	26.34	23.17	21.77	30.77	33.28	22.97	24.95
Strato 20	5.80	18.7	0.8	29.81	25.82	22.63	21.27	30.45	32.6	22.79	25.4
Strato 23	7.00	15.6	0.5	28.29	24.2	20.92	19.72	28.97	30.42	22.29	24
Strato 24	7.20	20.1	0.3	29.35	25.29	22.07	20.76	30.14	31.9	22.62	26.02
Strato 25	7.60	11.6	0.4	26.58	22.41	19.05	18.01	28.7	27.53	21.89	22.21
Strato 26	7.80	9.1	0.3	25.29	21.07	17.64	16.72	28.7	24.98	21.66	21.09
Strato 29	8.80	15.2	0.6	27.35	23.18	19.85	18.74	28.7	28.93	22.05	23.82
Strato 33	9.60	16.4	0.7	27.41	23.22	19.89	18.77	28.7	29	22.07	24.36
Strato 34	9.80	76.4	1.0	34.72	30.77	27.82	26.02	36.12	38.65	25.83	45
Strato 35	31.00	176.1	1.3	35.71	31.57	28.67	26.8	37.86	39.55	26.68	45
Strato 36	31.20	59.4	1.7	28.69	24.2	20.93	19.72	30.79	30.43	22.38	43.67
Strato 38	32.20	37.5	1.9	26.38	21.8	18.41	17.42	28.7	26.39	21.86	33.84
Strato 40	33.40	35.7	1.6	25.92	21.32	17.9	16.96	28.7	25.46	21.79	33.03
Strato 41	34.20	37.4	1.2	26.08	21.47	18.06	17.1	28.7	25.76	21.81	33.79
Strato 42	34.60	28.7	1.3	24.73	20.07	16.59	15.76	28.7	23	21.62	29.89
Strato 43	34.80	84.8	1.9	29.89	25.4	22.19	20.87	32.18	32.05	22.75	45

Strato 44	35.00	36.8	1.9	25.85	21.23	17.81	16.87	28.7	25.29	21.78	33.52
Strato 45	35.20	49.0	1.3	27.2	22.62	19.27	18.2	29.33	27.92	22.02	39
Strato 46	35.40	70.0	1.3	28.89	24.36	21.1	19.88	31.13	30.65	22.43	45
Strato 47	38.00	235.4	1.3	34.54	30.2	27.22	25.47	37.21	38	25.4	45

Modulo di Young (Kg/cm²)

	Prof. Strato (m)	qc (Kg/cm²)	fs (Kg/cm²)	Schmertmann	Robertson & Campanella (1983)	ISOPT-1 1988 Ey(50)
Strato 2	0.80	134.8	1.6	337.00	269.60	539.20
Strato 3	1.00	40.1	0.9	100.25	80.20	234.99
Strato 4	1.20	42.3	0.7	105.75	84.60	266.35
Strato 5	1.40	40.3	0.9	100.75	80.60	284.71
Strato 6	1.60	24.3	0.9	60.75	48.60	237.46
Strato 8	2.00	21.3	0.7	53.25	42.60	236.64
Strato 9	2.20	50.4	1.3	126.00	100.80	382.31
Strato 10	2.40	80.4	1.5	201.00	160.80	457.54
Strato 11	3.20	18.9	0.9	47.25	37.80	234.43
Strato 13	3.60	14.6	0.5	36.50	29.20	203.90
Strato 14	3.80	22.6	0.7	56.50	45.20	274.79
Strato 16	4.60	17.7	0.7	44.25	35.40	241.23
Strato 20	5.80	18.7	0.8	46.75	37.40	259.97
Strato 23	7.00	15.6	0.5	39.00	31.20	236.63
Strato 24	7.20	20.1	0.3	50.25	40.20	284.67
Strato 25	7.60	11.6	0.4	29.00	23.20	178.64
Strato 26	7.80	9.1	0.3	22.75	18.20	140.14
Strato 29	8.80	15.2	0.6	38.00	30.40	234.08
Strato 33	9.60	16.4	0.7	41.00	32.80	252.56
Strato 34	9.80	76.4	1.0	191.00	152.80	690.93
Strato 35	31.00	176.1	1.3	440.25	352.20	1328.85
Strato 36	31.20	59.4	1.7	148.50	118.80	808.34
Strato 38	32.20	37.5	1.9	93.75	75.00	577.50
Strato 40	33.40	35.7	1.6	89.25	71.40	549.78
Strato 41	34.20	37.4	1.2	93.50	74.80	575.96
Strato 42	34.60	28.7	1.3	71.75	57.40	441.98
Strato 43	34.80	84.8	1.9	212.00	169.60	1052.64
Strato 44	35.00	36.8	1.9	92.00	73.60	566.72
Strato 45	35.20	49.0	1.3	122.50	98.00	728.26
Strato 46	35.40	70.0	1.3	175.00	140.00	931.92
Strato 47	38.00	235.4	1.3	588.50	470.80	1907.96

Infine sulla base delle indicazioni emerse dall'analisi delle prove penetrometriche statiche e sulla base delle litologie presenti si è provveduto a caratterizzare e parametrizzare, dal punto di vista geotecnico, i terreni di fondazione.
In virtù delle considerazioni sopra esposte risulta che i parametrici geotecnici caratteristici per i materiali presenti sono i seguenti:

- In termini di parametri di resistenza:

Profondità dal p.c. (m)	**Unità Formazionale e Litotecnica**	γ'_d **(kN/m³)**	γ'_w **(KN/m³)**	**c'k(kPa)**	ϕ'_k**(°)**	**Cuk(kPa)**
0.20 - 2.00/2.60	**Limo argilloso con sabbia fine mediamente consistente (A)**	**14.5**	**18**	**2**	**22**	**/**

2.00/2.60 - 10.00	**Argille e argille limose a media-bassa consistenza (B)**	**14**	**17.5**	**4**	**18**	**/**
10.00 - 19.00	**Sabbie da mediamente addensate ad addensate (C)**	**18**	**20**	**0**	**27**	**/**
19.00 - 31.20/35.00	**Sabbie addensate (D)**	**19**	**20**	**0**	**30**	**/**
31.20/35.00 - 37.00	**Argille e argille limose consistenti (E)**	**17.5**	**19.5**	**5**	**22**	**/**
37.00 - 39.60	**Sabbie addensate (D)**	**19**	**20**	**0**	**30**	**/**

- In termini di parametri di deformabilità:

Profondità dal p.c. (m)	**Unità Formazionale e Litotecnica**	γ'_d **(kN/m³)**	γ'_w **(KN/m³)**	**Coeff. di Poisson (ν)**	**Modulo Elastico E' (kPa)**	**Modulo Edometrico E_d (kPa)**
0.20 - 2.00/2.60	**Limo argilloso con sabbia fine mediamente consistente (A)**	**14.5**	**18**	**0.42**	**/**	**4000**
2.00/2.60 - 10.00	**Argille e argille limose a media-bassa consistenza (B)**	**14**	**17.5**	**0.42**	**/**	**3000**
10.00 - 19.00	**Sabbie da mediamente addensate ad addensate (C)**	**18**	**20**	**0.37**	**30000**	**/**
19.00 - 31.20/35.00	**Sabbie addensate (D)**	**19**	**20**	**0.35**	**40000**	**/**
31.20/35.00 - 37.00	**Argille e argille limose consistenti (E)**	**17.5**	**19.5**	**0.40**	**/**	**10000**
37.00 - 39.60	**Sabbie addensate (D)**	**19**	**20**	**0.35**	**40000**	**/**

8. CALCOLO DELLE RESISTENZE DI PROGETTO

Per ogni SLU si deve verificare che l'effetto delle azioni di progetto (E_d = Domanda) sia non superiore alla Resistenza di progetto (R_d = Capacità)

$$E_d \leq R_d$$

dove:

$$E_d = E\left\{\gamma_F F_k; \frac{X_k}{\gamma_M}; a_d\right\} \qquad \text{e} \qquad R_d = \frac{1}{\gamma_R} R\left\{\gamma_F F_k; \frac{X_k}{\gamma_M}; a_d\right\}$$

con l'introduzione dei coefficienti di sicurezza parziali, specializzati e differenziati, nella definizione sia della domanda sia della capacità e rispettivamente:

γ_F : riguardo alle azioni
γ_M : riguardo ai materiali
γ_R: riguardo alla capacità

Gli approcci progettuali da seguire sono i seguenti:

- Approccio 1:
Combinazione 1 – (A1+M1+R1) - STR
Combinazione 2 – (A2+M2+R2) - GEO

- Approccio 2:
Combinazione – (A1+M1+R3) - STR+GEO

La verifica di stabilità globale deve essere effettuata secondo l'Approccio 1 - Combinazione 2 – (A2+M2+R2) mentre le rimanenti verifiche devono essere effettuate seguendo almeno uno dei due approcci.

Gli stati limiti ultimi nelle fondazioni superficiali si riferiscono allo sviluppo di meccanismi di collasso che mobilitano la resistenza ultima del terreno (GEO) o la resistenza ultima degli elementi strutturali (STR)"
Le verifiche agli stati limiti ultimi nelle fondazioni superficiali devono essere effettuate nei confronti dei seguenti stati limite:

- SLU di tipo geotecnico (GEO)
  - Collasso per carico limite terreno-fondazione
  - Collasso per slittamento sul piano di posa
  - Stabilità globale nel caso di fondazioni posizionate su o in prossimità di pendii.

- SLU di tipo strutturale (STR)
  - Raggiungimento della resistenza strutturale

I valori di A1, A2, M1, M2, R1, R2 ed R3 si determinano in base alle seguenti tabelle:

Tabella 6.2.I – *Coefficienti parziali per le azioni o per l'effetto delle azioni.*

CARICHI	EFFETTO	Coefficiente Parziale γ_F (o γ_E)	EQU	(A1) STR	(A2) GEO
Permanenti	Favorevole	γ_{G1}	0,9	1,0	1,0
	Sfavorevole		1,1	1,3	1,0
Permanenti non strutturali (1)	Favorevole	γ_{G2}	0,0	0,0	0,0
	Sfavorevole		1,5	1,5	1,3
Variabili	Favorevole	γ_{Qi}	0,0	0,0	0,0
	Sfavorevole		1,5	1,5	1,3

(1) Nel caso in cui i carichi permanenti non strutturali (ad es. i carichi permanenti portati) siano compiutamente definiti, si potranno adottare gli stessi coefficienti validi per le azioni permanenti.

Tabella 6.2.II – *Coefficienti parziali per i parametri geotecnici del terreno*

PARAMETRO	GRANDEZZA ALLA QUALE APPLICARE IL COEFFICIENTE PARZIALE	COEFFICIENTE PARZIALE γ_M	(M1)	(M2)
Tangente dell'angolo di resistenza al taglio	$\tan \varphi'_k$	$\gamma_{\varphi'}$	1,0	1,25
Coesione efficace	c'_k	$\gamma_{c'}$	1,0	1,25
Resistenza non drenata	c_{uk}	γ_{cu}	1,0	1,4
Peso dell'unità di volume	γ	γ_γ	1,0	1,0

Tabella 6.4.I - *Coefficienti parziali γ_R per le verifiche agli stati limite ultimi di fondazioni superficiali.*

VERIFICA	COEFFICIENTE PARZIALE (R1)	COEFFICIENTE PARZIALE (R2)	COEFFICIENTE PARZIALE (R3)
Capacità portante	γ_R = 1,0	γ_R = 1,8	γ_R = 2,3
Scorrimento	γ_R = 1,0	γ_R = 1,1	γ_R = 1,1

Dal capitolo 7 si evince che i parametri caratteristici dei terreni di fondazione sono i seguenti:

Profondità dal p.c. (m)	Unità Formazionale e Litotecnica	γ'_d (kN/m³)	γ'_w (KN/m³)	c'k(kPa)	ϕ'_k(°)	Cuk(kPa)
0.20 – 2.00/2.60	Limo argilloso con sabbia fine mediamente consistente (A)	14.5	18	2	22	/
2.00/2.60 – 10.00	Argille e argille limose a media-bassa consistenza (B)	14	17.5	4	18	/
10.00 – 19.00	Sabbie da mediamente addensate ad addensate (C)	18	20	0	27	/
19.00 – 31.20/35.00	Sabbie addensate (D)	19	20	0	30	/
31.20/35.00 – 37.00	Argille e argille limose consistenti (E)	17.5	19.5	5	22	/
37.00 – 39.60	Sabbie addensate (D)	19	20	0	30	/

Profondità dal p.c. (m)	Unità Formazionale e Litotecnica	γ'_d (kN/m³)	γ'_w (KN/m³)	Coeff. di Poisson (ν)	Modulo Elastico E' (kPa)	Modulo Edometrico Ed (kPa)
0.20 – 2.00/2.60	Limo argilloso con sabbia fine mediamente consistente (A)	14.5	18	0.42	/	4000
2.00/2.60 – 10.00	Argille e argille limose a media-bassa consistenza (B)	14	17.5	0.42	/	3000
10.00 – 19.00	Sabbie da mediamente addensate ad addensate (C)	18	20	0.37	30000	/
19.00 – 31.20/35.00	Sabbie addensate (D)	19	20	0.35	40000	/
31.20/35.00 – 37.00	Argille e argille limose consistenti (E)	17.5	19.5	0.40	/	10000
37.00 – 39.60	Sabbie addensate (D)	19	20	0.35	40000	/

Si è proceduto alla determinazione dei valori teorici del carico limite ultimo Qult (SLU) con l'ausilio del programma di calcolo "Loadcap 2014 - rel. 664" della ditta GEOSTRU sas.
Per la determinazione dei valori teorici del carico limite ultimo (Qult) e delle resistenze di progetto (Rd) sono stati considerati entrambi gli approcci in condizioni drenate. (ipotesi di platea di fondazione di 16 m x 51 m con spessore 0.3 posto a 1.8 m dal p.c.):

DATI GENERALI

==

Azione sismica	NTC 2008
Larghezza fondazione	16.0 m
Lunghezza fondazione	51.0 m
Profondità piano di posa	2.0 m
Profondità falda	2.0

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SISMA

==

Accelerazione massima (ag/g)	0.241
Effetto sismico secondo	NTC(C7.11.5.3.1)
Fattore di struttura [q]	2
Periodo fondamentale vibrazione [T]	0.8
Coefficiente intensità sismico terreno [Khk]	0.0579
Coefficiente intensità sismico struttura [Khi]	0.2008

==

Coefficienti sismici [N.T.C.]

==

Dati generali

Tipo opera:	2 - Opere ordinarie
Classe d'uso:	Classe III
Vita nominale:	50.0 [anni]
Vita di riferimento:	75.0 [anni]

Parametri sismici su sito di riferimento

Categoria sottosuolo:	C
Categoria topografica:	T1

S.L. Stato limite	TR Tempo ritorno [anni]	ag [m/s²]	F0 [-]	TC* [sec]
S.L.O.	45.0	0.44	2.53	0.27
S.L.D.	75.0	0.57	2.49	0.28
S.L.V.	712.0	1.64	2.56	0.27
S.L.C.	1462.0	2.2	2.5	0.28

Coefficienti sismici orizzontali e verticali

Opera: Stabilità dei pendii e Fondazioni

S.L. Stato limite	amax [m/s²]	beta [-]	kh [-]	kv [sec]
S.L.O.	0.66	0.2	0.0135	0.0067
S.L.D.	0.855	0.2	0.0174	0.0087
S.L.V.	2.3667	0.24	0.0579	0.029
S.L.C.	2.9996	0.28	0.0857	0.0428

STRATIGRAFIA TERRENO

Corr: Parametri con fattore di correzione (TERZAGHI)

DH: Spessore strato; Gam: Peso unità di volume; Gams:Peso unità di volume saturo; Fi: Angolo di attrito; Ficorr: Angolo di attrito corretto secondo Terzaghi; c: Coesione; c Corr: Coesione corretta secondo Terzaghi; Ey: Modulo Elastico; Ed: Modulo Edometrico; Ni: Poisson; Cv: Coeff. consolidaz. primaria; Cs: Coeff. consolidazione secondaria; cu: Coesione non drenata

DH [m]	Gam [kN/m³]	Gams [kN/m³]	Fi [°]	Fi Corr. [°]	c [kN/m²]	c Corr. [kN/m²]	cu [kN/m²]	Ey [kN/m²]	Ed [kN/m²]	Ni	Cv [cmq/s]	Cs
2.0	14.5	18.0	22.0	22	2.0	2.0	0.0	0.0	4000.0	0.0	0.0	0.0
8.0	14.0	17.5	17.0	18	4.0	4.0	0.0	0.0	3000.0	0.0	0.0	0.0
9.0	18.0	20.0	27.0	27	0.0	0.0	0.0	30000.0	0.0	0.0	0.0	0.0
12.2	19.0	20.0	30.0	30	0.0	0.0	0.0	40000.0	0.0	0.0	0.0	0.0
5.8	17.5	19.5	22.0	22	5.0	5.0	0.0	0.0	10000.0	0.0	0.0	0.0

APPROCCIO 1 - GEO

Carichi di progetto agenti sulla fondazione

Nr.	Nome combinazione	Pressione normale di progetto [kN/m²]	N [kN]	Mx [kN·m]	My [kN·m]	Hx [kN]	Hy [kN]	Tipo
1	A1+M1+R1	0.00	0.00	0.00	0.00	0.00	0.00	Progetto
2	A2+M2+R2	0.00	0.00	0.00	0.00	0.00	0.00	Progetto
3	Sisma	0.00	0.00	0.00	0.00	0.00	0.00	Progetto
4	S.L.E.	0.00	0.00	0.00	0.00	0.00	0.00	Servizio
5	S.L.D.	0.00	0.00	0.00	0.00	0.00	0.00	Servizio

Sisma + Coeff. parziali parametri geotecnici terreno + Resistenze

Nr	Correzione Sismica	Tangente angolo di resistenza al taglio	Coesione efficace	Coesione non drenata	Peso Unità volume in fondazione	Peso unità volume copertura	Coef. Rid. Capacità portante verticale	Coef.Rid.Capacità portante orizzontale
1	No	1	1	1	1	1	1	1
2	No	1.25	1.25	1.4	1	1	1.8	1.1
3	Si	1.25	1.25	1.4	1	1	1.8	1.1
4	No	1	1	1	1	1	1	1
5	No	1	1	1	1	1	1	1

COEFFICIENTE DI SOTTOFONDAZIONE BOWLES (1982)
Costante di Winkler 6402.96 kN/m³

A2+M2+R2

Autore: TERZAGHI (1955) (Condizione drenata)
==
Fattore [Nq] 4.26
Fattore [Nc] 12.53
Fattore [Ng] 2.4
Fattore forma [Sc] 1.0
Fattore forma [Sg] 1.0
Fattore correzione sismico inerziale [zq] 1.0
Fattore correzione sismico inerziale [zg] 1.0
Fattore correzione sismico inerziale [zc] 1.0
==
Carico limite 302.28 kN/m²
Resistenza di progetto 167.93 kN/m²
==

Autore: VESIC (1975) (Condizione drenata)
==
Fattore [Nq] 3.78
Fattore [Nc] 10.71
Fattore [Ng] 2.49
Fattore forma [Sc] 1.1
Fattore profondità [Dc] 1.05
Fattore inclinazione carichi [Ic] 1.0
Fattore inclinazione pendio [Gc] 1.0
Fattore inclinazione base [Bc] 1.0

Fattore forma [Sq]	1.07
Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.89
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	1.0
Fattore correzione sismico inerziale [zc]	1.0

==
Carico limite	289.35 kN/m²
Resistenza di progetto	160.75 kN/m²

==

Autore: Brinch - Hansen 1970   (Condizione drenata)
==
Fattore [Nq]	3.78
Fattore [Nc]	10.71
Fattore [Ng]	1.45
Fattore forma [Sc]	1.1
Fattore profondità [Dc]	1.05
Fattore inclinazione carichi [Ic]	1.0
Fattore inclinazione pendio [Gc]	1.0
Fattore inclinazione base [Bc]	1.0
Fattore forma [Sq]	1.07
Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.92
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	1.0
Fattore correzione sismico inerziale [zc]	1.0

==
Carico limite	238.11 kN/m²
Resistenza di progetto	132.28 kN/m²

==

Sisma

Autore: TERZAGHI (1955)   (Condizione drenata)

Fattore [Nq]	4.26
Fattore [Nc]	12.53
Fattore [Ng]	2.4
Fattore forma [Sc]	1.0
Fattore forma [Sg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	0.42
Fattore correzione sismico inerziale [zc]	1.0
Carico limite	221.63 kN/m²
Resistenza di progetto	123.13 kN/m²

Autore: VESIC (1975)   (Condizione drenata)

Fattore [Nq]	3.78
Fattore [Nc]	10.71
Fattore [Ng]	2.49
Fattore forma [Sc]	1.1
Fattore profondità [Dc]	1.05
Fattore inclinazione carichi [Ic]	1.0
Fattore inclinazione pendio [Gc]	1.0
Fattore inclinazione base [Bc]	1.0
Fattore forma [Sq]	1.07
Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.89
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	0.42
Fattore correzione sismico inerziale [zc]	1.0
Carico limite	215.37 kN/m²
Resistenza di progetto	119.65 kN/m²

Autore: Brinch - Hansen 1970   (Condizione drenata)

Fattore [Nq]	3.78
Fattore [Nc]	10.71
Fattore [Ng]	1.45
Fattore forma [Sc]	1.1
Fattore profondità [Dc]	1.05
Fattore inclinazione carichi [Ic]	1.0
Fattore inclinazione pendio [Gc]	1.0
Fattore inclinazione base [Bc]	1.0

Fattore forma [Sq]	1.07
Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.92
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	0.42
Fattore correzione sismico inerziale [zc]	1.0

===

Carico limite	193.68 kN/m²
Resistenza di progetto	107.6 kN/m²

===

APPROCCIO 2 - GEO

Carichi di progetto agenti sulla fondazione

Nr.	Nome combinazione	Pressione normale di progetto [kN/m²]	N [kN]	Mx [kN·m]	My [kN·m]	Hx [kN]	Hy [kN]	Tipo
1	A1+M1+R3	0.00	0.00	0.00	0.00	0.00	0.00	Progetto
2	Sisma	0.00	0.00	0.00	0.00	0.00	0.00	Progetto
3	S.L.E.	0.00	0.00	0.00	0.00	0.00	0.00	Servizio
4	S.L.D.	0.00	0.00	0.00	0.00	0.00	0.00	Servizio

Sisma + Coeff. parziali parametri geotecnici terreno + Resistenze

Nr	Correzione Sismica	Tangente angolo di resistenza al taglio	Coesione efficace	Coesione non drenata	Peso Unità volume in fondazione	Peso unità volume copertura	Coef. Rid. Capacità portante verticale	Coef.Rid.Capacità portante orizzontale
1	No	1	1	1	1	1	2.3	1.1
2	Si	1	1	1	1	1	2.3	1.1
3	No	1	1	1	1	1	1	1
4	No	1	1	1	1	1	1	1

COEFFICIENTE DI SOTTOFONDAZIONE BOWLES (1982)
Costante di Winkler 11080.04 kN/m³

A1+M1+R3

Autore: TERZAGHI (1955) (Condizione drenata)
==
Fattore [Nq] 6.04
Fattore [Nc] 15.52
Fattore [Ng] 3.87
Fattore forma [Sc] 1.0
Fattore forma [Sg] 1.0
Fattore correzione sismico inerziale [zq] 1.0
Fattore correzione sismico inerziale [zg] 1.0
Fattore correzione sismico inerziale [zc] 1.0
==
Carico limite 460.46 kN/m²
Resistenza di progetto 200.2 kN/m²
==

Autore: VESIC (1975) (Condizione drenata)
==
Fattore [Nq] 5.26
Fattore [Nc] 13.1
Fattore [Ng] 4.07
Fattore forma [Sc] 1.11
Fattore profondità [Dc] 1.05
Fattore inclinazione carichi [Ic] 1.0
Fattore inclinazione pendio [Gc] 1.0
Fattore inclinazione base [Bc] 1.0
Fattore forma [Sq] 1.09
Fattore profondità [Dq] 1.04
Fattore inclinazione carichi [Iq] 1.0

Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.89
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	1.0
Fattore correzione sismico inerziale [zc]	1.0

==

Carico limite	442.92 kN/m²
Resistenza di progetto	192.58 kN/m²

==

Autore: Brinch - Hansen 1970 (Condizione drenata)

==

Fattore [Nq]	5.26
Fattore [Nc]	13.1
Fattore [Ng]	2.77
Fattore forma [Sc]	1.11
Fattore profondità [Dc]	1.05
Fattore inclinazione carichi [Ic]	1.0
Fattore inclinazione pendio [Gc]	1.0
Fattore inclinazione base [Bc]	1.0
Fattore forma [Sq]	1.09
Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.92
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	1.0
Fattore correzione sismico inerziale [zc]	1.0

==

Carico limite	379.79 kN/m²
Resistenza di progetto	165.13 kN/m²

==

Sisma

Autore: TERZAGHI (1955) (Condizione drenata)

Fattore [Nq]	6.04
Fattore [Nc]	15.52
Fattore [Ng]	3.87
Fattore forma [Sc]	1.0
Fattore forma [Sg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	0.43
Fattore correzione sismico inerziale [zc]	1.0
Carico limite	333.08 kN/m²
Resistenza di progetto	144.82 kN/m²

Autore: VESIC (1975) (Condizione drenata)

Fattore [Nq]	5.26
Fattore [Nc]	13.1
Fattore [Ng]	4.07
Fattore forma [Sc]	1.11
Fattore profondità [Dc]	1.05
Fattore inclinazione carichi [Ic]	1.0
Fattore inclinazione pendio [Gc]	1.0
Fattore inclinazione base [Bc]	1.0
Fattore forma [Sq]	1.09
Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.89
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	0.43
Fattore correzione sismico inerziale [zc]	1.0
Carico limite	324.17 kN/m²
Resistenza di progetto	140.95 kN/m²

Autore: Brinch - Hansen 1970 (Condizione drenata)

Fattore [Nq]	5.26
Fattore [Nc]	13.1
Fattore [Ng]	2.77
Fattore forma [Sc]	1.11
Fattore profondità [Dc]	1.05
Fattore inclinazione carichi [Ic]	1.0
Fattore inclinazione pendio [Gc]	1.0
Fattore inclinazione base [Bc]	1.0
Fattore forma [Sq]	1.09

Fattore profondità [Dq]	1.04
Fattore inclinazione carichi [Iq]	1.0
Fattore inclinazione pendio [Gq]	1.0
Fattore inclinazione base [Bq]	1.0
Fattore forma [Sg]	0.92
Fattore profondità [Dg]	1.0
Fattore inclinazione carichi [Ig]	1.0
Fattore inclinazione pendio [Gg]	1.0
Fattore inclinazione base [Bg]	1.0
Fattore correzione sismico inerziale [zq]	1.0
Fattore correzione sismico inerziale [zg]	0.43
Fattore correzione sismico inerziale [zc]	1.0

==

Carico limite	296.42 kN/m²
Resistenza di progetto	128.88 kN/m²

==

Pertanto riassumendo i valori delle resistenze di progetto sono

Resistenze di progetto - Rd (SLU) - Approccio 1

Autore	Approccio 1 Comb 2 - A2+M2+R2 (kN/m²)	Approccio 1 Comb 2 - Sisma (kN/m²)
Terzaghi	**167.93**	**123.13**
Vesic	**160.75**	**119.65**
Brich - Hansen	**132.28**	**107.6**

Resistenze di progetto - Rd (SLU) - Approccio 2

Autore	Approccio 2 Comb - A1+M1+R3 (kN/m²)	Approccio 2 Comb – Sisma (kN/m²)
Terzaghi	**200.2**	**144.82**
Vesic	**192.58**	**140.95**
Brich - Hansen	**165.13**	**128.88**

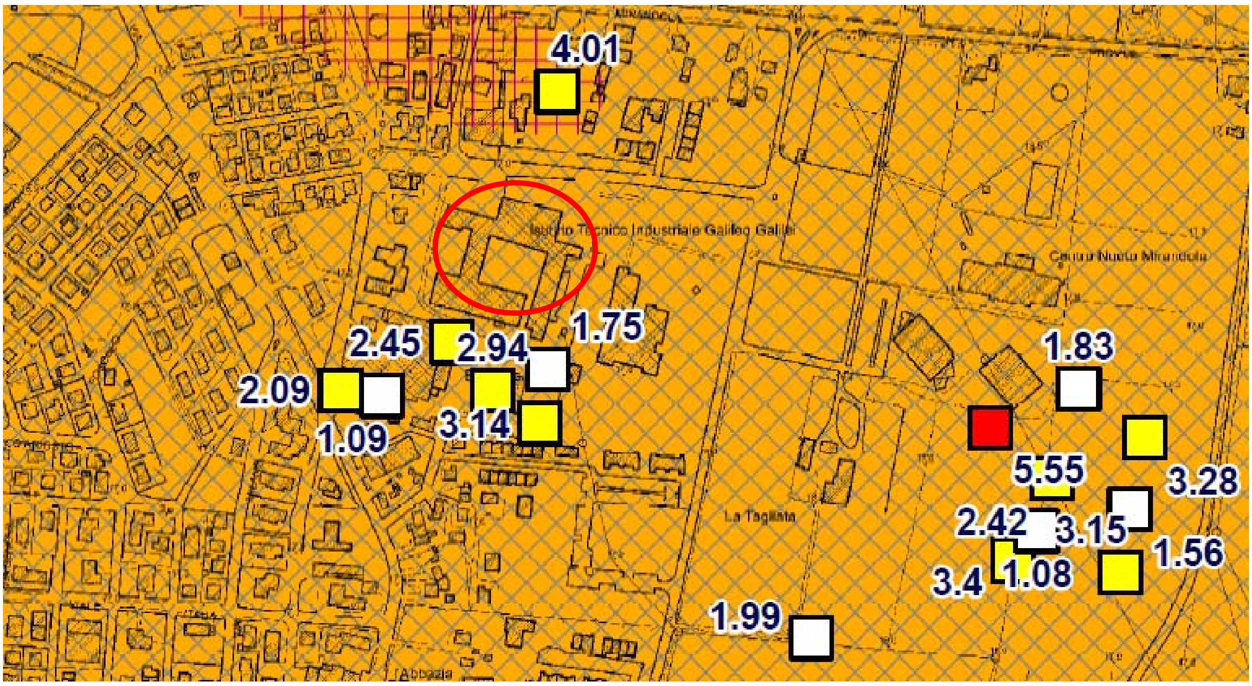
9. VERIFICA A LIQUEFAZIONE

La Regione Emilia-Romagna, ai sensi dell'ordinanza n.70/2012 del commissario delegato per la ricostruzione a seguito dei terremoti del 20 e 29 maggio, ha pubblicato in data 16/10/2013 le "**Mappe delle Microzone Omogenee in Prospettiva Sismica dei 17 Comuni con IMCS ≥ 6 (MOPS)", tra cui quella del Comune di Mirandola.**

L'area in oggetto dell'intervento ricade in zona "**LQ2** - Zona suscettibile di amplificazione e liquefazione". Occorre pertanto valutare il coefficiente di amplificazione e verificare la presenza di condizioni predisponenti la liquefazione; **ai fini della progettazione (NTC 08) nelle aree in cui è confermata la presenza di condizioni predisponenti la liquefazione (categoria di sottosuolo "S2")** <u>non è ammessa la definizione dell'azione sismica tramite l'approccio semplificato descritto al punto 3.2.2 delle suddette norme.</u>

Substrato a profondità < 120 m
Presenza di terreni suscettibili di liquefazione già nei primi 10 m dal piano campagna

Substrato a profondità < 120 m
Presenza di terreni suscettibili di liquefazione tra 10 e 20 m dal piano campagna



Pertanto è stata effettuata la verifica a liquefazione utilizzando i metodi di Robertson (2009) e di Idriss e Boulanger (2008).
La verifica è stata effettuata con Software CLiq v 1.7 della Geologismiki Geotechnical Engineers - Serrai (Grecia) sulle 5 verticali CPT effettuate.
In considerazione del fatto che l'"Indice del potenziale di liquefazione (**I_L**)" è definito dalla seguente relazione:

$$I_L = \int_0^{20} F(z)w(z)dz$$

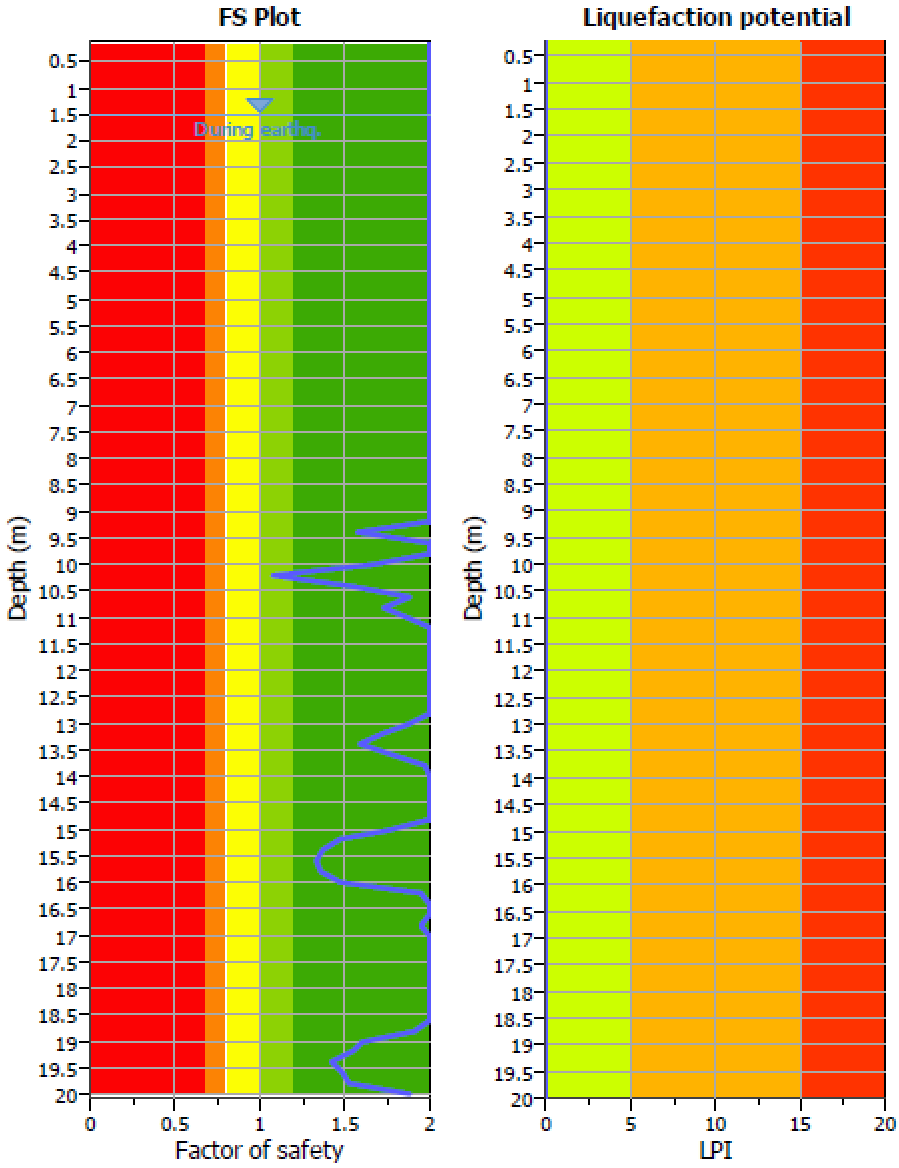
Dove:

- $I_L = 0$ il rischio di liquefazione è molto basso
- $0 < I_L \leq 2$ il rischio di liquefazione è basso
- $2 \leq I_L < 5$ il rischio di liquefazione è basso
- $5 \leq I_L < 15$ il rischio di liquefazione è elevato
- $I_L \geq 15$ il rischio di liquefazione è estremamente elevato

In allegato sono riportati i risultati completi della verifica a liquefazione.

CPT01

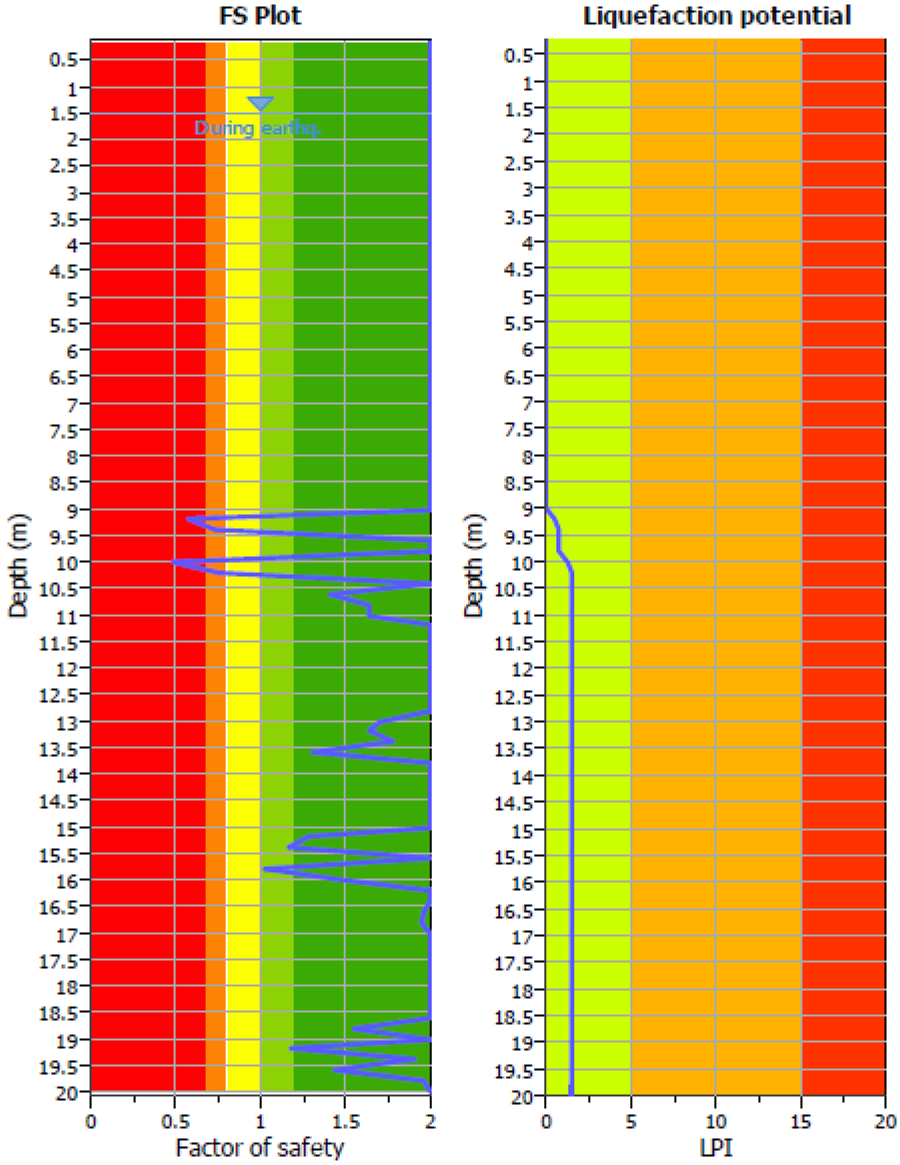
- Metodo di Robertson (2009)



Abbiamo che i livelli risultano essere liquefacibili con $I_L = 0.00$

Pertanto la verifica a liquefazione, condotta secondo il metodo di Robertson (2009), evidenzia un rischio di liquefazione "molto basso".

- Metodo di Boulanger e Idriss (2008)

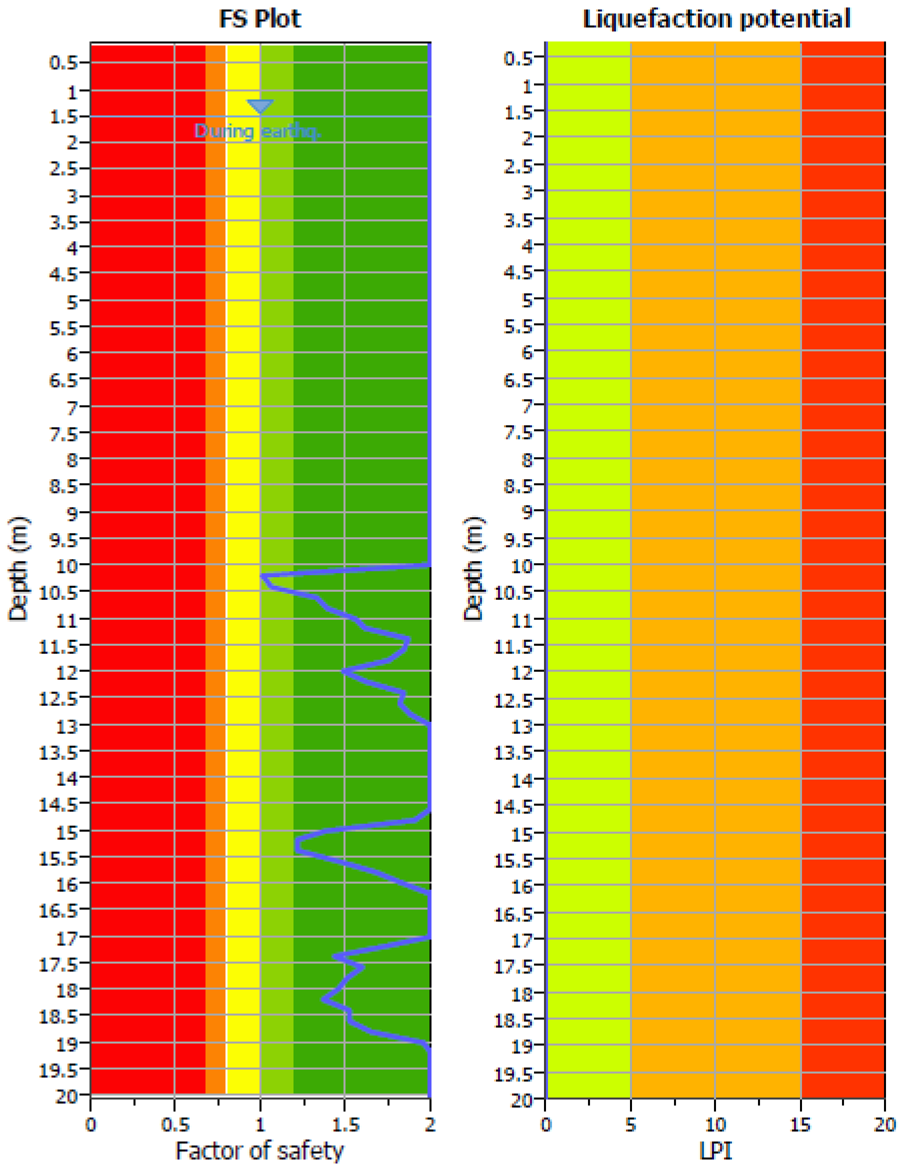


Abbiamo che i livelli risultano essere liquefacibili con $I_L = 1.50$

Pertanto la verifica a liquefazione, condotta secondo il metodo di Boulanger e Idriss (2008), evidenzia un rischio di liquefazione "basso".

CPT02

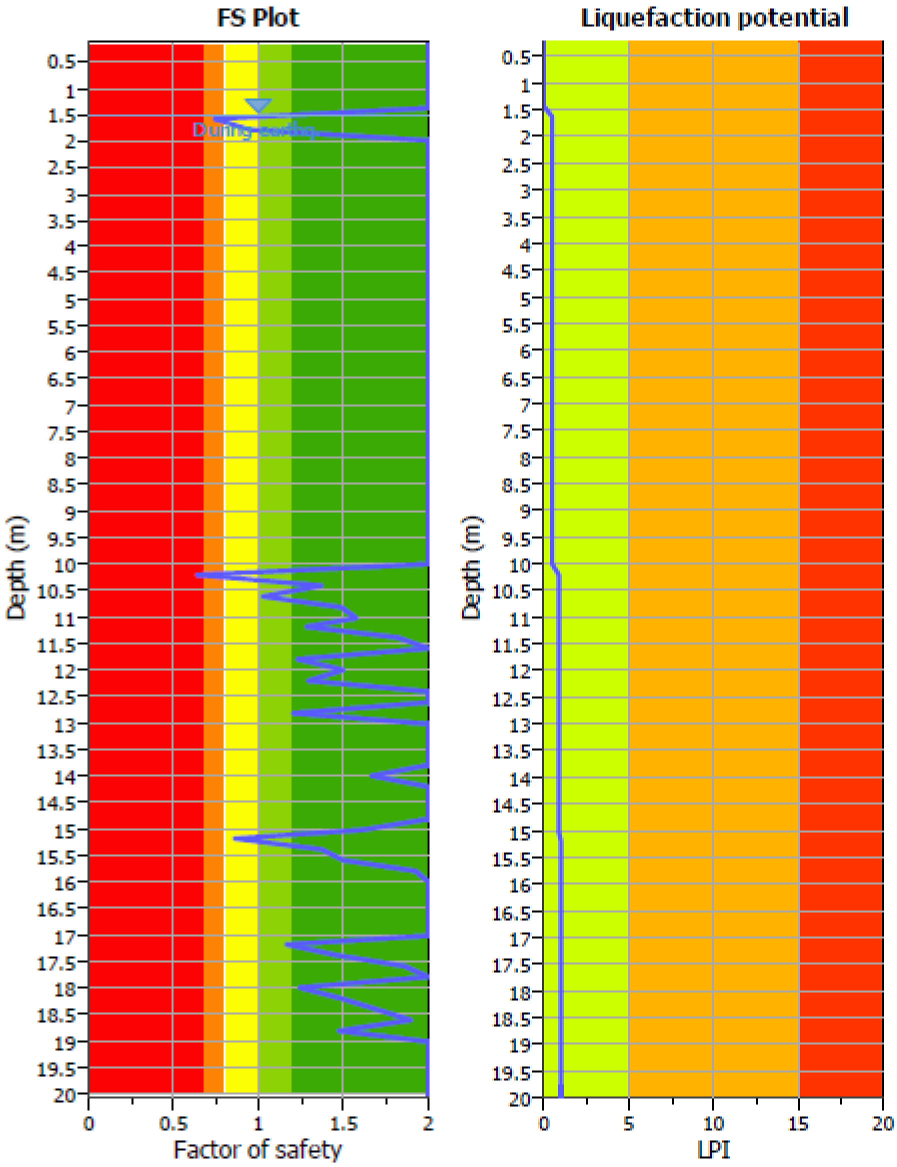
- Metodo di Robertson (2009)



Abbiamo che i livelli risultano essere liquefacibili con $I_L = 0.00$

Pertanto la verifica a liquefazione, condotta secondo il metodo di Robertson (2009), evidenzia un rischio di liquefazione "molto basso".

- Metodo di Boulanger e Idriss (2008)

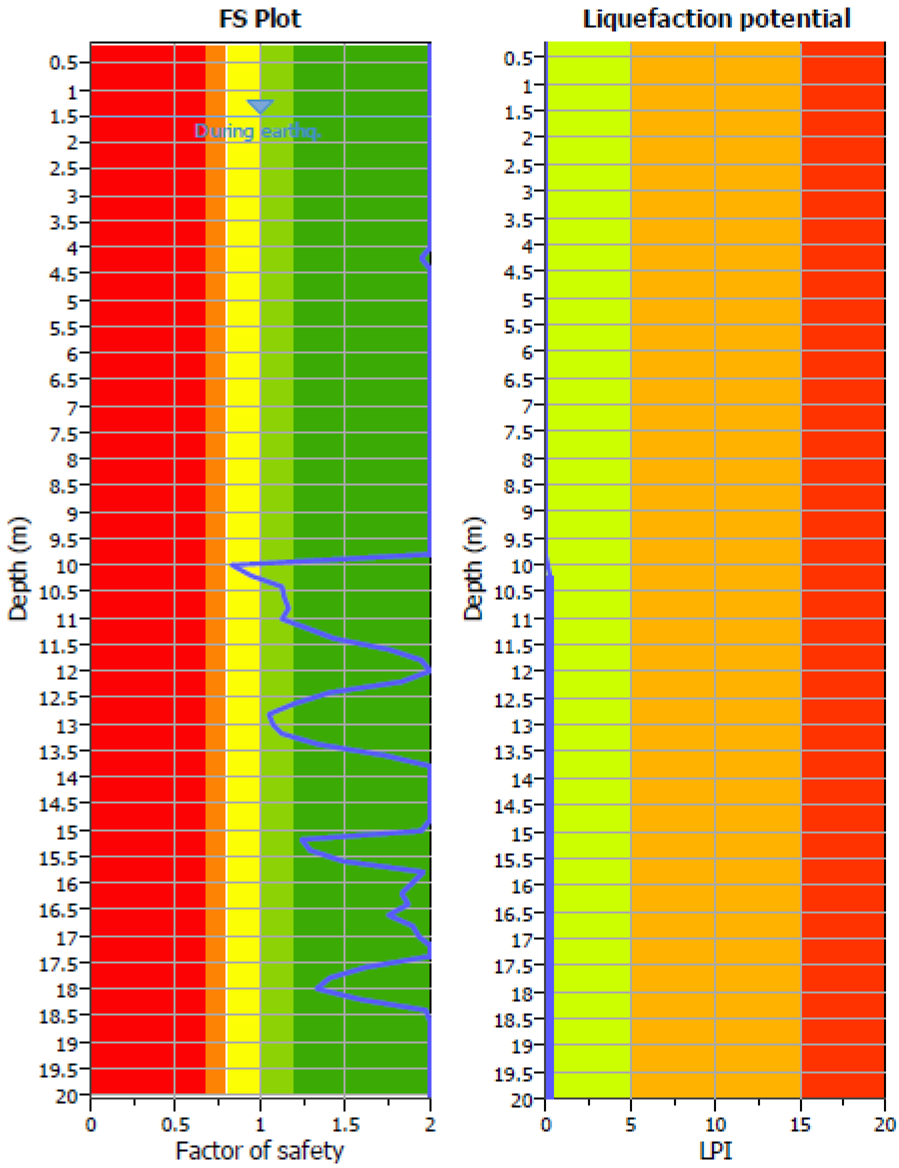


Abbiamo che i livelli risultano essere liquefacibili con I_L = 1.00

Pertanto la verifica a liquefazione, condotta secondo il metodo di Boulanger e Idriss (2008), evidenzia un rischio di liquefazione "basso".

CPT03

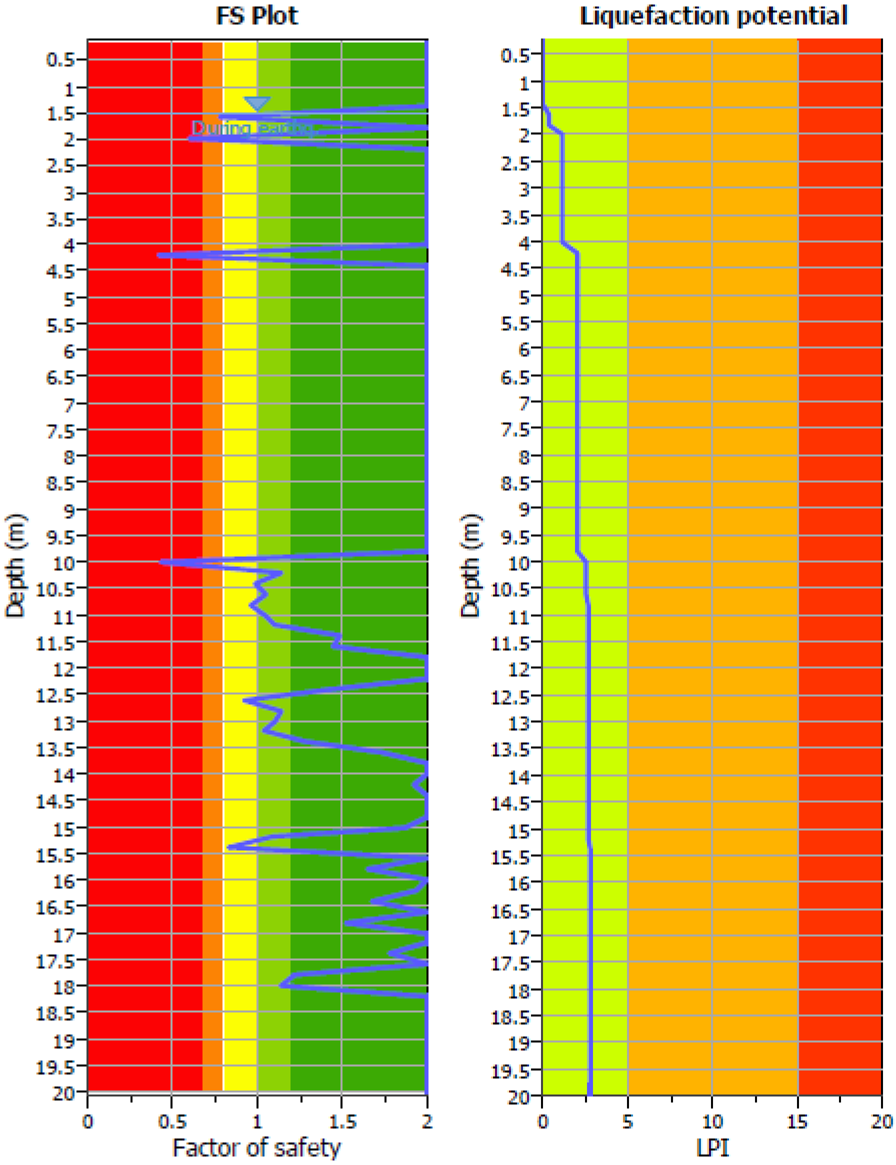
- Metodo di Robertson (2009)



Abbiamo che i livelli risultano essere liquefacibili con I_L = 0.21

Pertanto la verifica a liquefazione, condotta secondo il metodo di Robertson (2009), evidenzia un rischio di liquefazione "basso".

- Metodo di Boulanger e Idriss (2008)

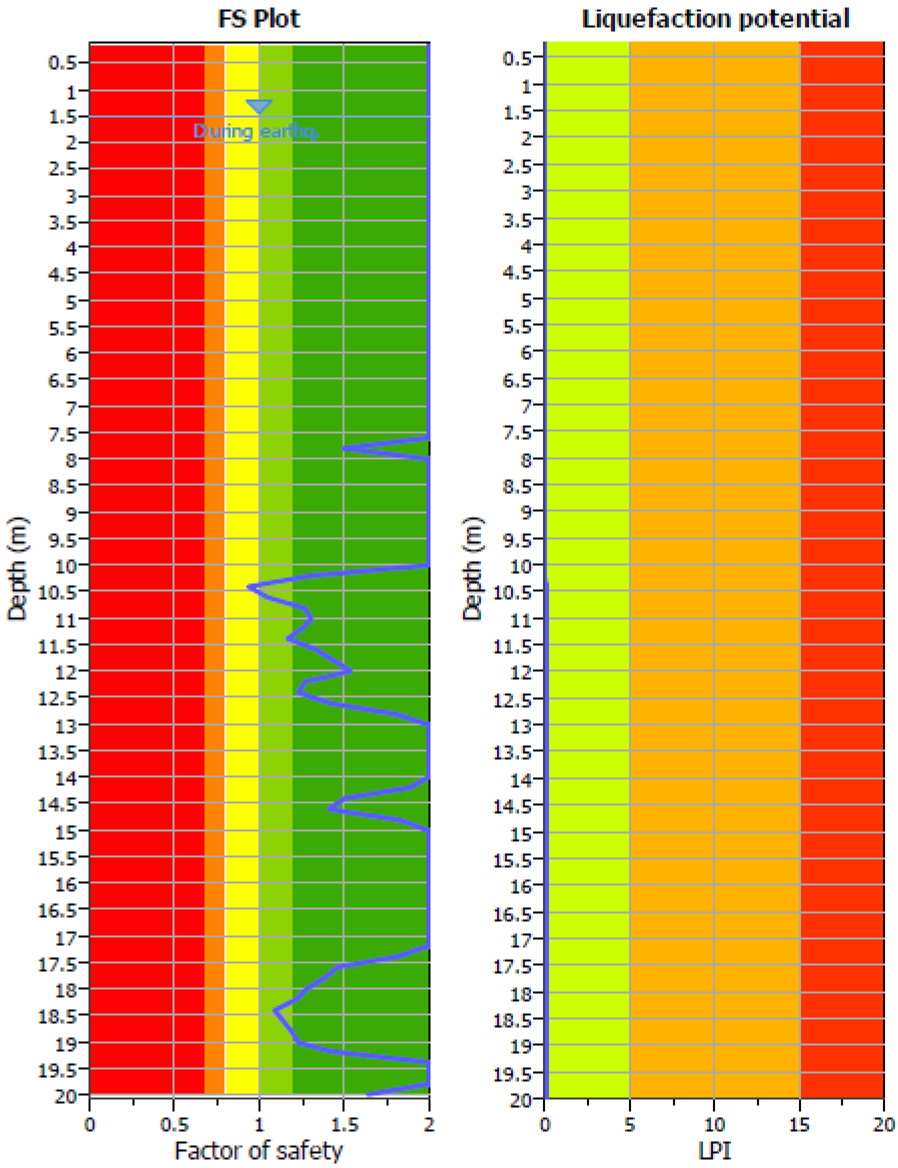


Abbiamo che i livelli risultano essere liquefacibili con I_L = 2.75

Pertanto la verifica a liquefazione, condotta secondo il metodo di Boulanger e Idriss (2008), evidenzia un rischio di liquefazione "moderato".

CPT04

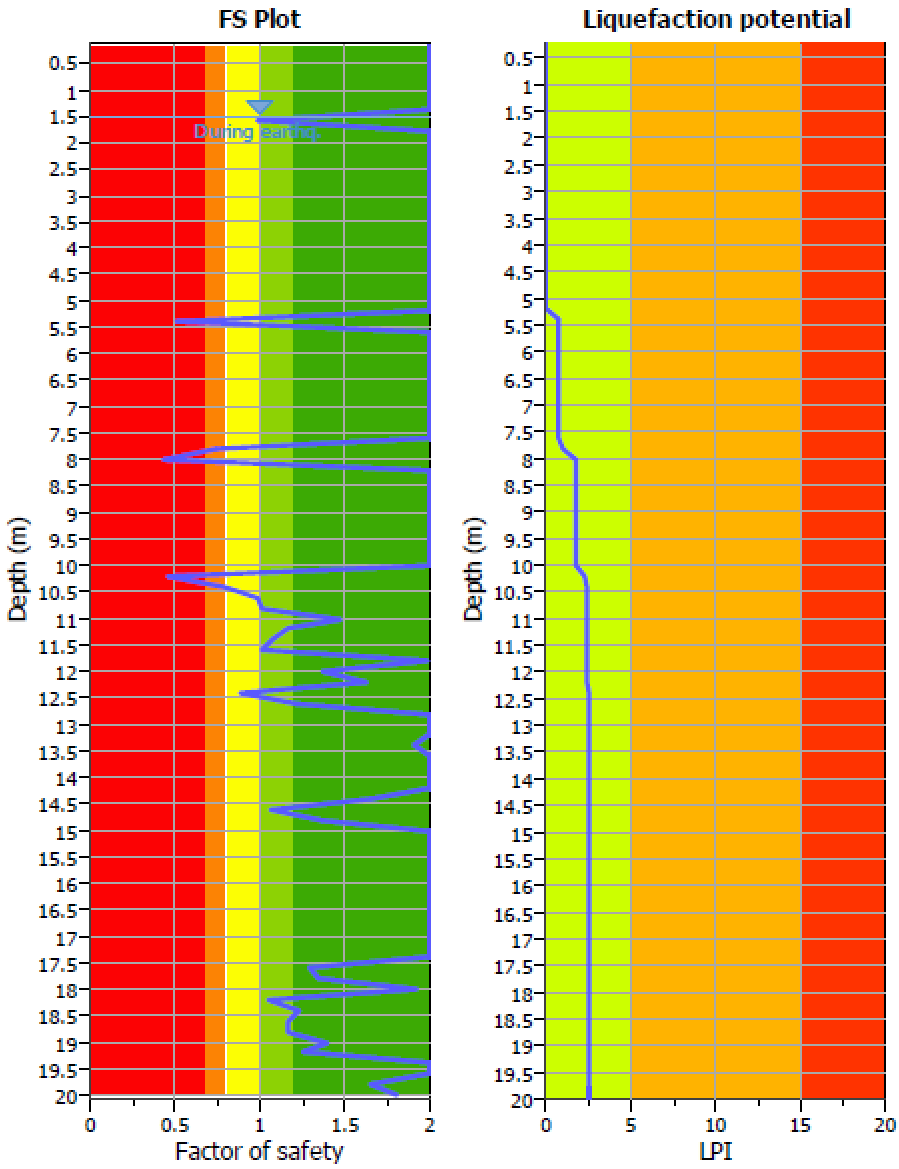
- Metodo di Robertson (2009)



Abbiamo che i livelli risultano essere liquefacibili con $I_L = 0.07$

Pertanto la verifica a liquefazione, condotta secondo il metodo di Robertson (2009), evidenzia un rischio di liquefazione "basso".

- Metodo di Boulanger e Idriss (2008)

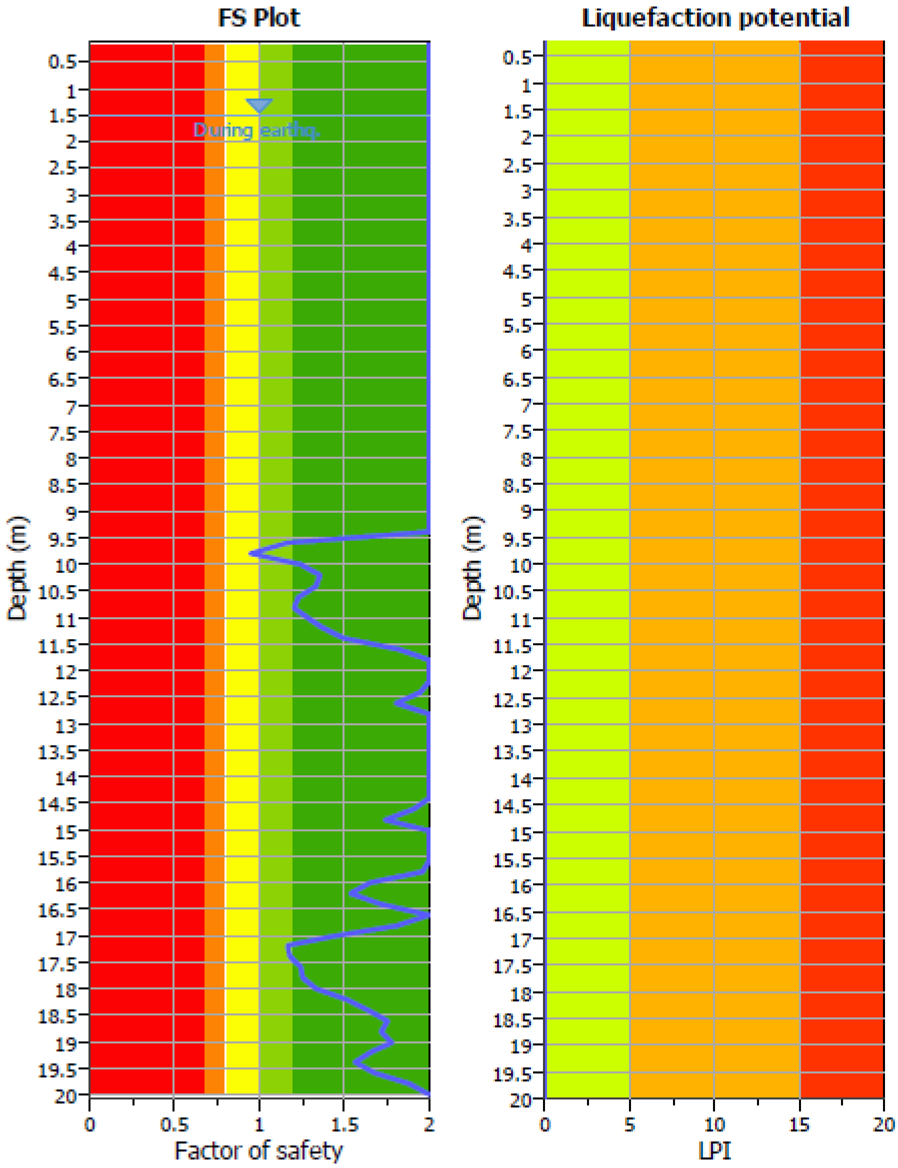


Abbiamo che i livelli risultano essere liquefacibili con I_L = 2.56

Pertanto la verifica a liquefazione, condotta secondo il metodo di Boulanger e Idriss (2008), evidenzia un rischio di liquefazione "moderato".

<u>CPT04 bis</u>

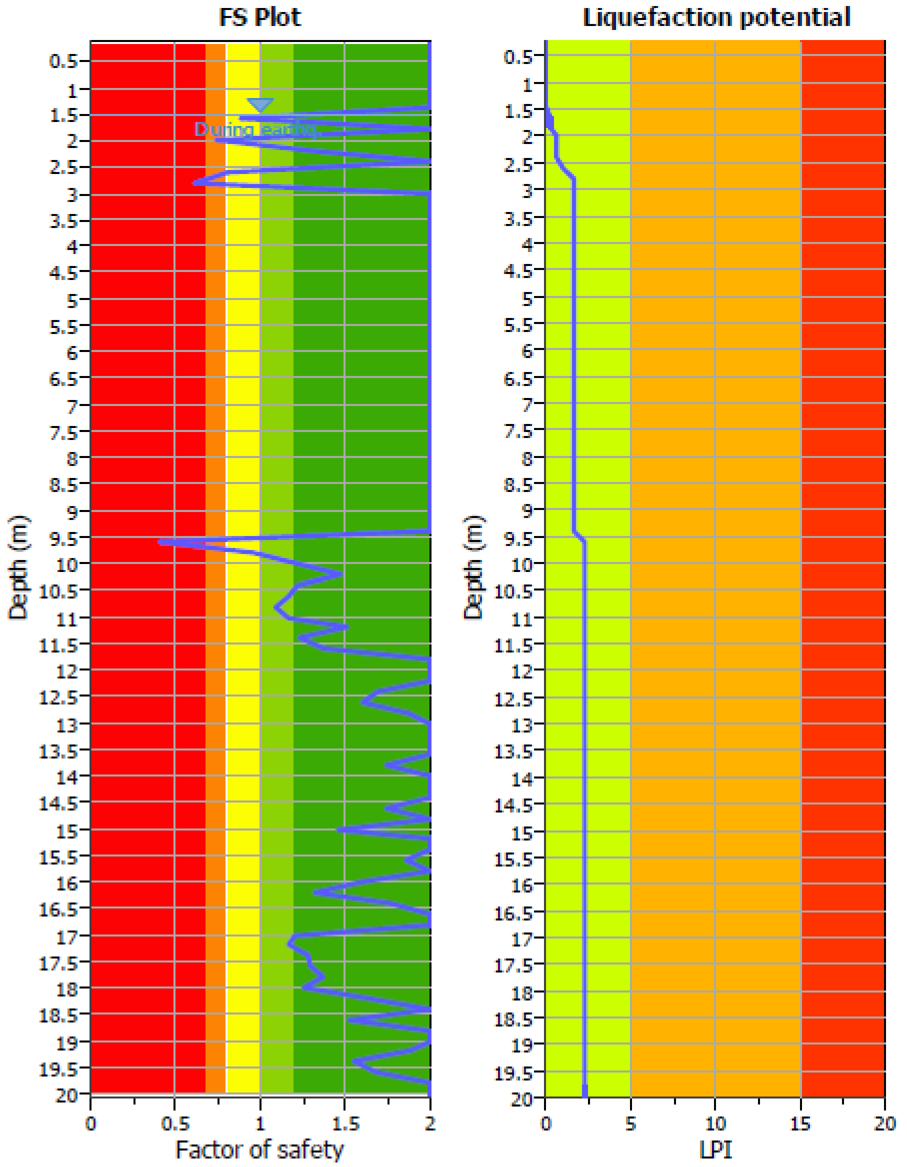
- Metodo di Robertson (2009)



Abbiamo che i livelli risultano essere liquefacibili con $I_L = 0.06$

Pertanto la verifica a liquefazione, condotta secondo il metodo di Robertson (2009), evidenzia un rischio di liquefazione "basso".

- Metodo di Boulanger e Idriss (2008)

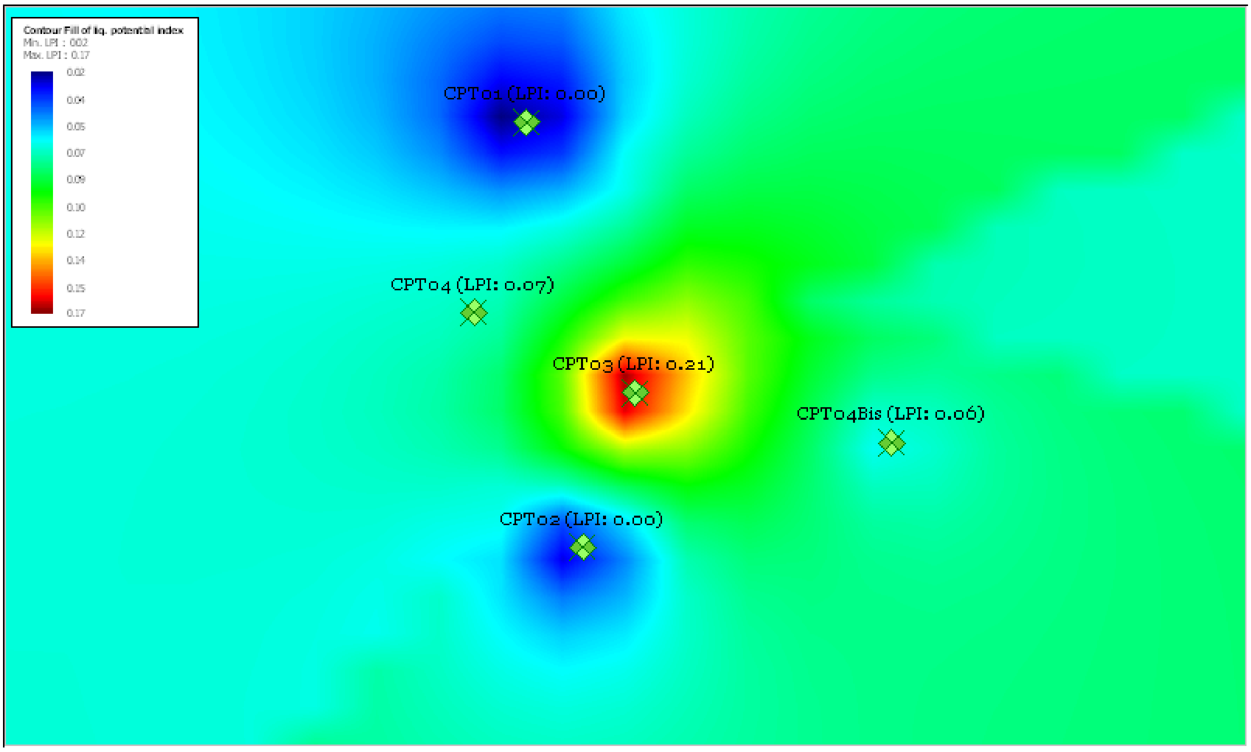


Abbiamo che i livelli risultano essere liquefacibili con $I_L = 2.31$

Pertanto la verifica a liquefazione, condotta secondo il metodo di Boulanger e Idriss (2008), evidenzia un rischio di liquefazione "moderato".

Riassumendo si può concludere che la verifica a liquefazione, condotta secondo i metodi sopra descritti, evidenziano un rischio di liquefazione "da molto basso a moderato".

Metodo di ROBERTSON (2009)
CPT01 I_L = 0.00
CPT02 I_L = 0.00
CPT03 I_L = 0.21
CPT04 I_L = 0.07
CPT04 bis I_L = 0.06



Metodo di BOULANGER E IDRISS (2008)

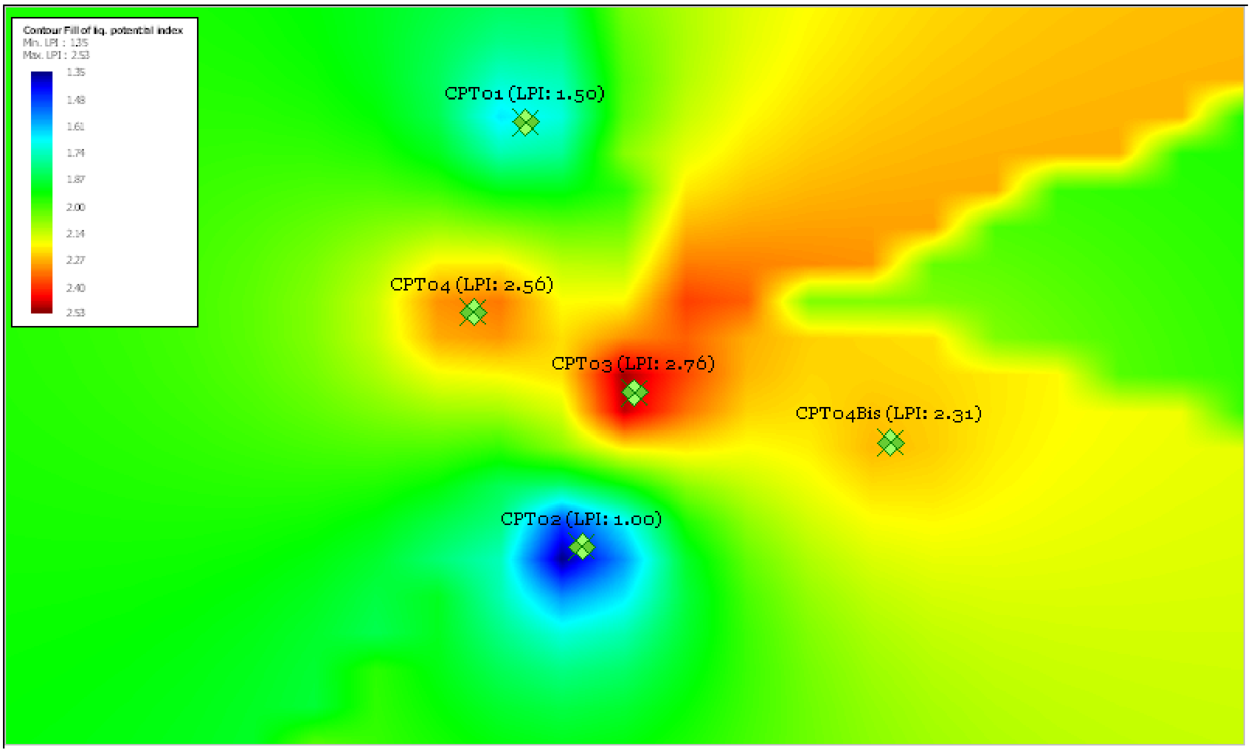
CPT01 I_L = 1.50

CPT02 I_L = 1.00

CPT03 I_L = 2.75

CPT04 I_L = 2.56

CPT04 bis I_L = 2.31



10. PERICOLOSITA' SISMICA DI BASE E LOCALE

a. Sismicità delle aree di interesse

Allo stato attuale la normativa di riferimento in materia sismica risulta essere il D.M. 14 gennaio 2008 recante "norme tecniche per le costruzioni", entrata in vigore a partire dal 1 luglio 2009.
La classificazione sismica dei comuni della regione Emilia-Romagna introdotta ai sensi del punto 3 dell'Allegato 1 dell'Ordinanza del Presidente del Consiglio dei Ministri n. 3274 del 20 maggio 2003, prevede che il territorio nazionale sia suddiviso in quattro zone sismiche, caratterizzate da quattro diversi valori di accelerazione (a_g).
Nell'Ordinanza del Presidente del Consiglio dei Ministri n. 3519 del 28 aprile 2006 "Criteri generali per l'individuazione delle zone sismiche e per la formulazione degli elenchi delle medesime zone" all'allegato 1.A" sono individuate quattro zone sismiche orizzontale massima convenzionale su suolo di tipo A, ai quali ancorare lo spettro di risposta elastico.
Ciascuna zona è individuata mediante valori di accelerazione massima al suolo a_g, con probabilità di superamento del 10% in 50 anni, riferiti a suoli rigidi caratterizzati da $Vs_{30} > 800\ m/s$ secondo lo schema seguente. I valori di accelerazione delle quattro zone sismiche sono maggiormente specificati rispetto all' Ordinanza del Presidente del Consiglio dei Ministri n. 3274 secondo la schema di seguito proposto (tabella 10.1):

Tabella 10.1: Valori di accelerazione al suolo a_g

Zona	Accelerazione con probabilità di superamento pari al 10% in 50 anni (a_g) – OPCM 3519	Accelerazione orizzontale massima convenzionale di ancoraggio dello spettro di risposta elastico (a_g) – OPCM 3472
1	$0.25 < a_g \leq 0.35\ g$	$0.35\ g$
2	$0.15 < a_g \leq 0.25\ g$	$0.25\ g$
3	$0.05 < a_g \leq 0.15\ g$	$0.15\ g$
4	$\leq 0.05\ g$	$0.05\ g$

Di seguito si riportano le classificazioni della sismicità dei comuni interessati dagli interventi in base alle vecchie normative e ovviamente anche in base alla nuova e vigente classificazione proposta dall'OPCM 3274/2003 e s.m.i (tabella 10.2).

Tabella 10.2: Classificazione della sismicità del comune e valore dell'accelerazione al suolo a_g

Comune	Classificazione sismica (Decreti fino al 1984)	Classificazione sismica OPCM 3274/2003	a_g
Mirandola	n.c.	3	$0.15\ g$

b. Sismicità storica delle aree di intervento

In Pianura Padana la superficie di base del Sistema Emiliano Romagnolo (0.45 Ma) è la più recente superficie di discordanza angolare in scala regionale.
La geometria di questa superficie è articolata in zone più o meno depresse. In particolare sono evidenti gli alti di Mirandola – San Possidonio e Finale Emilia (tra Reggio Emilia e Ferrara), di San Bartolomeo in Bosco (a sud di Ferrara) e di Bondeno-Casaglia-Occhiobello (a nord-ovest di Ferrara), dove la base del SERS è a una profondità inferiore a 100 m s.l.m. Queste zone di alto (dove si trova l'area di studio) ricadono tutte sul culmine della dorsale ferrarese, permettendo di ipotizzare un'attività tardo – pleistocenica di questa struttura.
Lo studio in dettaglio delle strutture sepolte della Pianura Padana è possibile soprattutto grazie all'interpretazione di profili sismici.
I terreni più recenti che registrano diffuse deformazioni alla mesoscala sono le Sabbie di Imola e il Sistema Emiliano-Romagnolo inferiore (SERI) di età compresa tra 0.8 e 0.45 Ma; risulta dunque evidente, anche da osservazioni di campagna, che gran parte del margine appenninico-padano e del sottosuolo padano-adriatico sono stati interessati da deformazioni più recenti di 0.45 Ma.
Nell'area di studio la SERS è indicata a una profondità prossima a 100 m. Dall'analisi delle prove eseguite con sismica passiva HVRS risulta che fino alla profondità di circa 100-120 m si registrano aumenti graduali delle velocità di propagazione delle onde sismiche fino 400 m/s. La profondità di circa 100-120 m da p.c. può essere considerata come la quota del bedrock sismico.

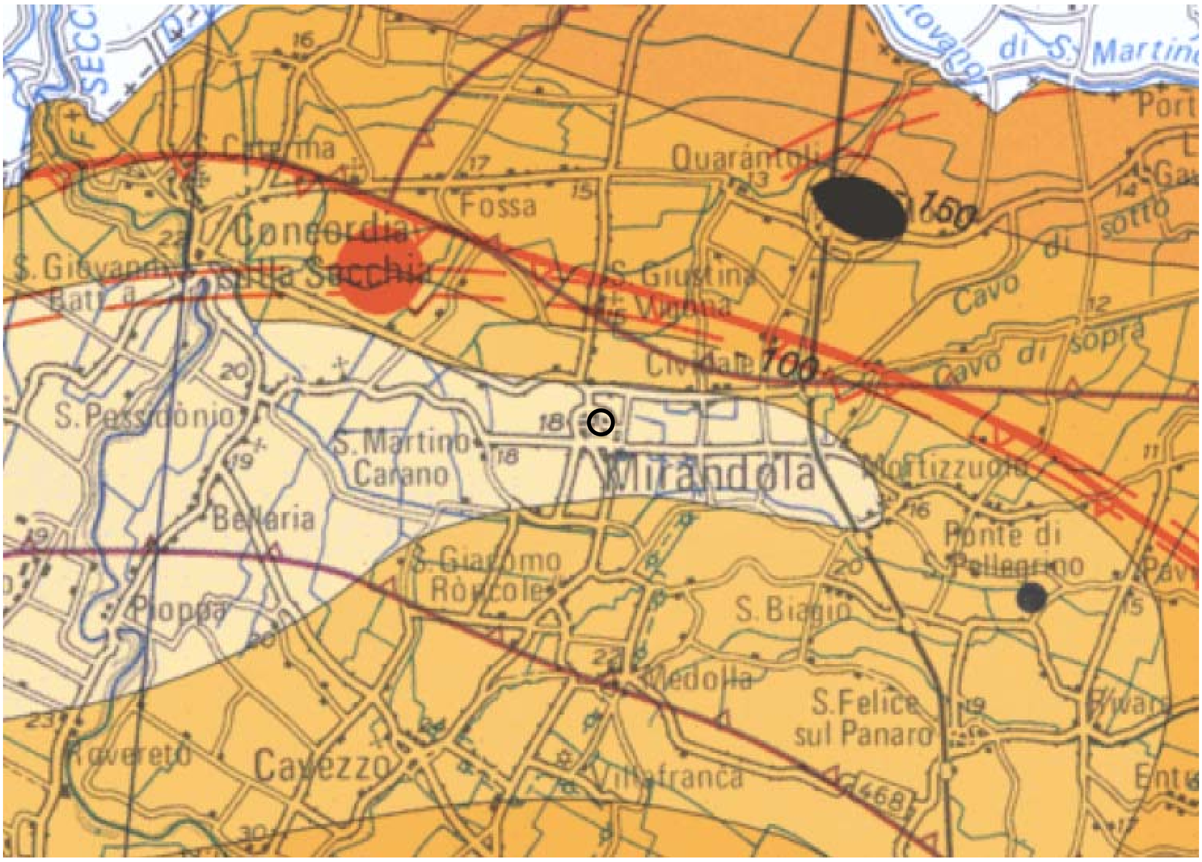


Figura 10.1: Carta della Sismotettonica redatta dalla Regione Emilia Romagna (2004).

Tali dati vengono validati anche dal rapporto presentato nel 31° convegno nazionale GNGTS tenutosi a Potenza dal 20-22 novembre 2012.
In particolare si riportano i risultati ottenuti dall'Università di Siena "PRIME INDAGINI DI SISMICA PASSIVA NELLE AREE EMILIANE INTERESSATE DALLA SEQUENZA SISMICA DEL MAGGIO-GIUGNO 2012" del Prof. Albarello.
In particolar modo si riportano i risultati delle analisi congiunta HVSR e onde di dispersione Rayleigh che sono serviti ad individuare l'interfaccia risonante.
Campagna di Misura

Mirandola	M6	0,9	3,5			B1		3
	M7	0,9	4,6			B1	A7	3
	S6	1	4,7			B1	A7	3
	S7	1	6,1			B1	A7	3
Finale Emilia	R9	0,8	2,9	0,3	2,5 *	B1		1
	R10	0,7	3,3	0,3	3,2 *	B1		1
	R11	0,8	2,7	0,4	2,1 *	B1		1
	R12	0,8	2,5 *	0,3	2,4	B1		1
	R13	0,7	4	0,3	2,5	B1		1
	R14	0,9	3,9	0,3	3	B1		1
	R15	0,7	3,6	0,2	2,5 *	B1		1

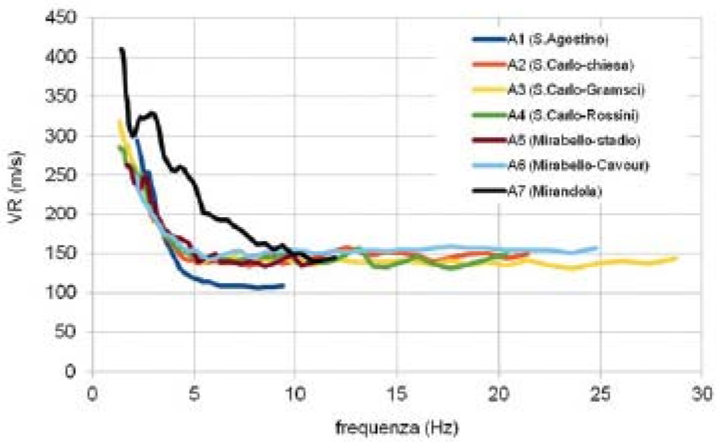


Fig. 1 - Curve di dispersione effettive delle onde di Rayleigh ottenute dalle sette antenne sismiche realizzate nelle località indicate nella legenda.

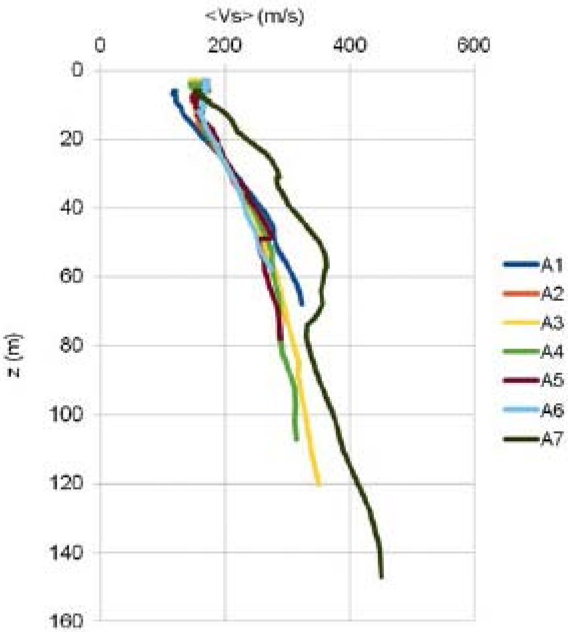


Fig. 2 - Andamento approssimato delle V_S medie in funzione della profondità. Il grafico è stato realizzato assumendo una profondità di penetrazione pari alla metà della lunghezza d'onda corrispondente alle diverse frequenze.

Sintesi dei risultati

Tab. 2 - Corrispondenze indicative fra frequenza di picco della curva HVSR e profondità stimata della relativa interfaccia risonante.

Località	f_0 (Hz)	H (m)
Mirandola	0,9-1	100-120
Finale Emilia 1	0,7-0,9	150-260
Finale Emilia 2	0,7-0,9	120-180

Nella tabella 10.3 sono riportati i dati storici del comune di Medolla, definiti nel Gruppo di lavoro CPTI (2011) Catalogo Parametrico dei Terremoti Italiani, versione 2011 (CPTI11), INGV, Bologna con aggiornamento DBMI11 (dicembre 2011) reperibile all'indirizzo web http://emidius.mi.ingv.it/DBMI11/

Storia sismica di Mirandola
[44.887, 11.065]

Numero di eventi: 43

Effetti	In occasione del terremoto del:				
I[MCS]	**Data**	**Ax**	**Np**	**Io**	**Mw**
F	1505 01 03 02:00	Bolognese	31	8	5.57 ±0.25
NR	1547 02 10 13:20	Reggio Emilia	13	7	5.14 ±0.34
3	1742 01 27 11:20	Livorno	16	6	4.90 ±0.32
3	1743 02 20 16:30	Basso Ionio	77	9	7.13 ±0.19
6	1796 10 22 04:00	Emilia orientale	27	7	5.61 ±0.36
F	1832 03 13 03:30	Reggiano	98	7-8	5.53 ±0.18
3	1885 02 26 20:48	SCANDIANO	78	6	5.19 ±0.15
5	1887 02 23 05:2	Liguria occidentale	1516		6.97 ±0.15
4	1889 03 08 02:5	Bolognese	38	5	4.73 ±0.22
6	1891 06 07 01:0	Valle d'Illasi	403	8-9	5.86 ±0.06
4	1894 11 27 05:07	FRANCIACORTA	183	6	5.07 ±0.10
4	1895 04 14 22:17	Slovenia	296	8	6.23 ±0.08
4	1901 10 30 14:4	Salò	190	8	5.70 ±0.10
3	1907 04 25 04:52	Veronese	122	6	4.91 ±0.15
3	1908 06 28 03:1	Finale Emilia	15	5	4.27 ±0.53
5	1909 01 13 00:45	BASSA PADANA	799	6-7	5.53 ±0.09
5	1910 03 22 23:29	Bassa modenese	15	5	4.30 ±0.34
2	1911 02 19 07:18	Romagna meridionale	181	7	5.28 ±0.11
3	1913 11 25 20:55	Val di Taro	73	4-5	4.84 ±0.20
6	1914 10 27 09:2	Garfagnana	618	7	5.76 ±0.09
3	1916 05 17 12:4	Alto Adriatico	132		5.95 ±0.14
3	1916 08 16 07:06	Alto Adriatico	257		6.14 ±0.14

4	1919 06 29 15:0	Mugello	566	10 6.29 ±0.09
4	1920 09 07 05:5	Garfagnana	756	10 6.48 ±0.09
2	1923 06 28 15:1	FORMIGINE	22	6 4.88 ±0.24
5	1929 04 19 04:1	Bolognese	82	
4	1929 04 22 08:2	Bolognese	41	
NF	1930 10 30 07:1	SENIGALLIA	263	8 5.81 ±0.09
4-5	1963 04 05 13:4	Finale Emilia	6	4-5 4.09 ±0.34
5-6	1970 11 02 08:4	Bassa modenese	3	4-5 4.09 ±0.34
6	1971 07 15 01:3	Parmense	229	8 5.64 ±0.09
5	1978 12 25 22:5	Bassa mantovana	28	5 4.22 ±0.22
3-4	1980 12 23 12:0	Piacentino	38	6-7 4.60 ±0.09
4	1983 11 09 16:2	Parmense	850	6-7 5.06 ±0.09
NF	1984 04 29 05:0	GUBBIO/VALFABBRICA	709	7 5.65 ±0.09
3	1986 12 06 17:0	BONDENO	604	6 4.61 ±0.10
6	1987 05 02 20:4	Reggiano	802	6 4.74 ±0.09
3	1988 03 15 12:0	Reggiano	160	6 4.66 ±0.12
5	1996 10 15 09:5	Correggio	135	7 5.41 ±0.09
NF	1998 02 21 02:2	Reggiano	104	5 4.34 ±0.17
3	2000 06 18 07:4	Parmense	300	5-6 4.43 ±0.09
NF	2002 11 13 10:4	Franciacorta	770	5-6 4.29 ±0.09
4	2003 09 14 21:4	Appennino bolognese	133	6 5.29 ±0.09

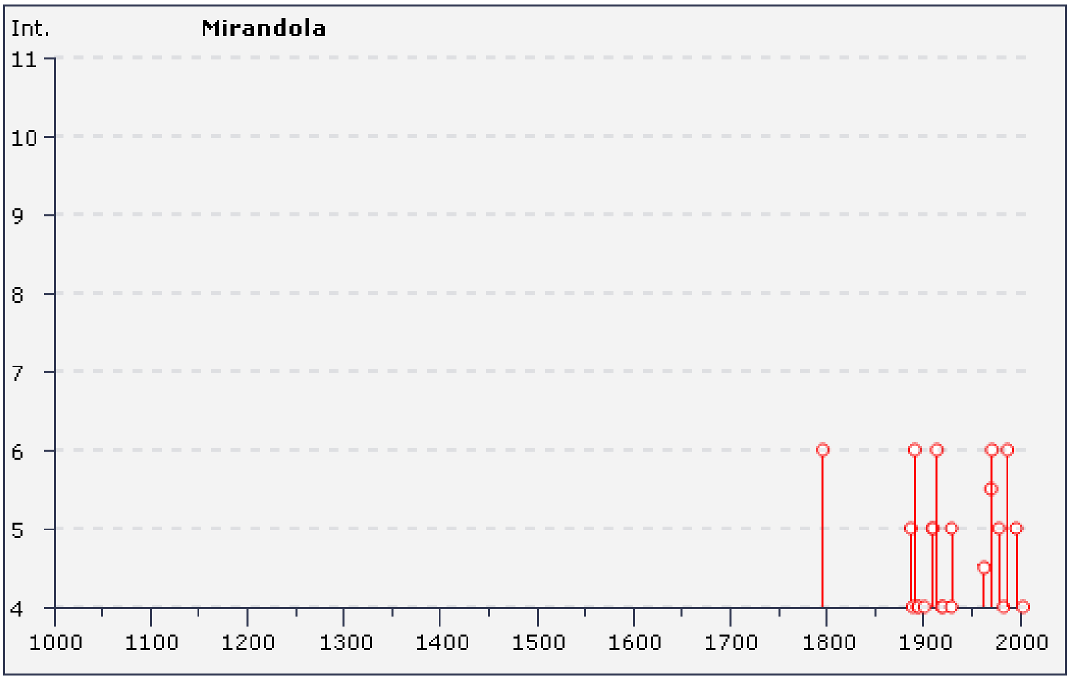


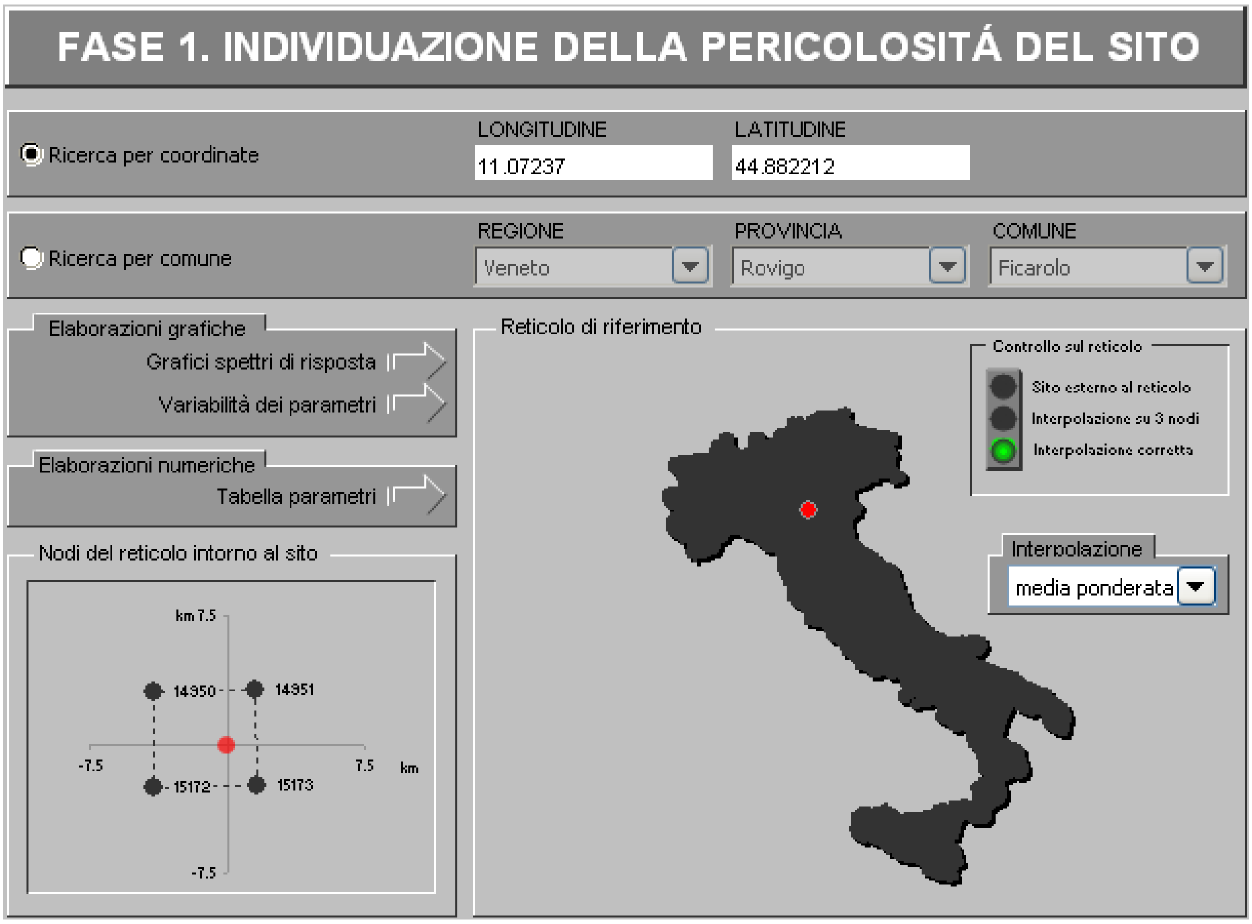
Tabella 10.3: Storia sismica del comune di Mirandola (MO).

La sismicità storica non tiene conto della recente crisi sismica verificatasi la mattina del 20 Maggio 2012 con un terremoto di magnitudo locale pari a 5.9 con epicentro Finale Emilia e la mattina del 29 Maggio con terremoto di magnitudo locale pari a 5.8 ed epicentro fra i Comuni di Medolla e Cavezzo.

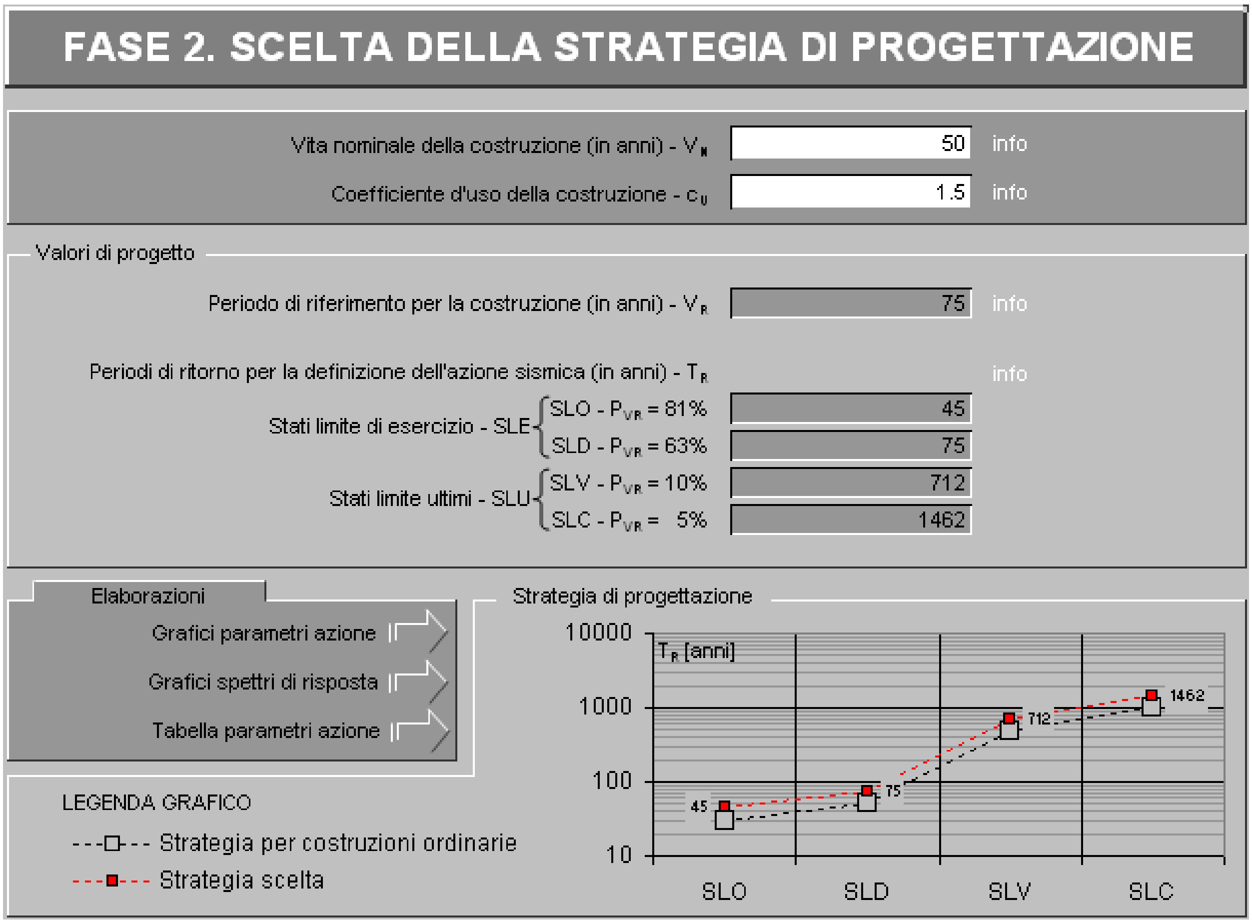
c. Individuazione della pericolosità sismica del sito

Di seguito si riportano i dati salienti per la definizione della pericolosità sismica del sito che sono stati inseriti nel foglio di calcolo "Spetti NTC v. 1.03" scaricabile dal sito del Consiglio Superiore dei Lavori Pubblici (http://www.infrastrutture.gov.it/consuplp/).

FASE 1 - Individuazione della pericolosità del sito



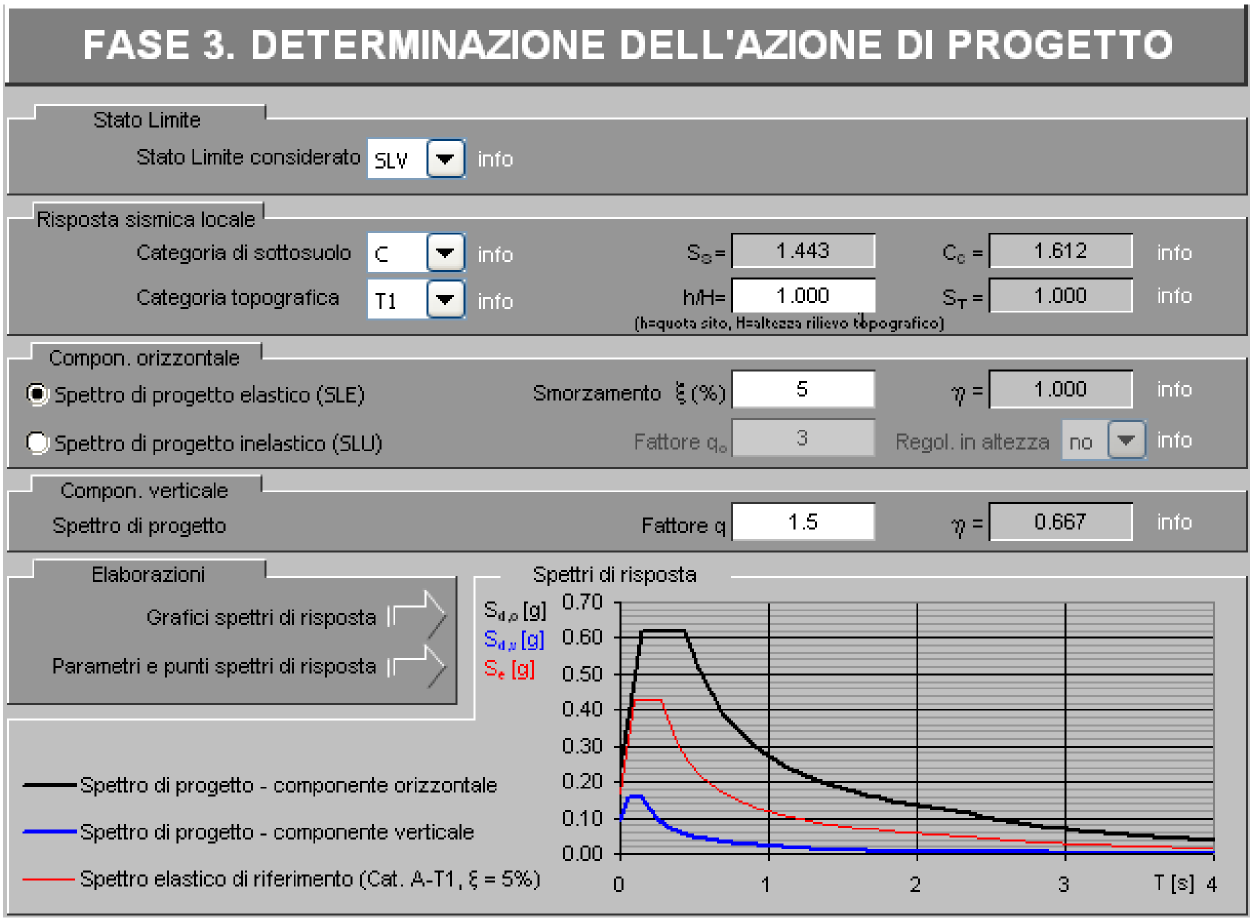
<u>FASE 2 - Scelta della strategia di progettazione</u>



STATO LIMITE	T_R [anni]	a_g [g]	F_o [-]	T_C^* [s]
SLO	45	0.045	2.527	0.265
SLD	75	0.059	2.493	0.275
SLV	712	0.167	2.560	0.273
SLC	1462	0.224	2.497	0.282

Tabella 10.4: Valori dei parametri a_g, F_0, T_c* per i periodi di ritorno T_R associati a ciascuno Stato Limite.

FASE 3 – Determinazione dell'azione di progetto



Si riporta di seguito il rapporto presentato nel 31° convegno nazionale GNGTS tenutosi a potenza dal 20-22 novembre 2012 "Il terremoto emiliano del 2012: analisi delle registrazioni accelerometriche e confronto con le azioni sismiche previste nelle NTC2008" del Prof. Mucciarelli.
Le accelerazioni registrate al sito dalla stazione accelerometrica RAN di Mirandola (MRN) dell'INGV durante l'evento sismico del 20-29 maggio sono state le seguenti:

Tab. 1 - Valori di PGA, PGV, PGD e IH per ciascuna componente della stazione RAN di Mirandola (MRN) per gli eventi del 20.05.2012 e del 29.05.2012.

EVENTO	Dist. Epicentrale	Componente	PGA (g)	PGV (cm/sec)	PGD (cm)	I_H (cm)
5.9 Ml 20.05.2012	17 km	N - S E - O VERT.	0.29 0.28 0.32	40.00 32.43 5.65	10.71 6.28 1.26	129 84 17
5.8 Ml 29.05.2012	2 km	N - S E - O VERT.	0.29 0.23 0.87	40.07 23.62 22.71	19.77 9.21 5.70	135 70 31

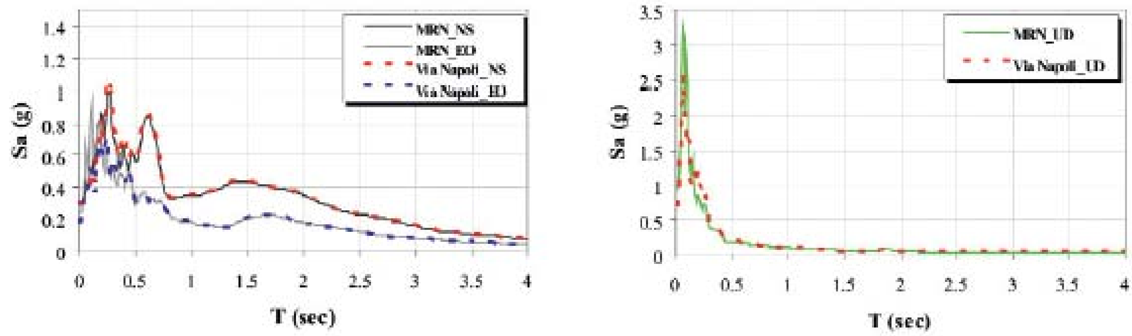


Fig. 1 - Confronto in pseudoaccelerazione spettrale tra le registrazioni dell'evento del 29.05.2012 (5.8 Ml) disponibili per le stazioni MRN-RAN e di via Napoli.

Sulla base di quanto registrato durante l'evento sismico è stato fatto il confronto tra gli spettri di risposta registrati alla stazione di Mirandola MRN con quelli utilizzati dalla normativa vigente NTC08 per categorie di sottosuolo di tipo C e D e per due differenti tempi di ritorno (Tr 475 e Tr 975 anni):

Tab. 2 - Valori di PGA, PGV, PGD ed IH per ciascuna componente delle stazioni temporanee installate a Mirandola dopo l'evento principale. Registrazione dell'evento 5.8 Ml del 29.05.2012.

COD. STAZIONE	Dist. Epicentrale	Componente	PGA (g)	PGV (cm/sec)	PGD (cm)	I_{H_RAN} (cm)
Staz. temporanea VIA NAPOLI	2 km	N - S E - O VERT.	0.30 0.18 0.71	40.44 24.27 20.93	19.94 8.92 5.79	136 69 32
Staz. temporanea OSPEDALE	2 km	N - S E - O VERT.	0.30 0.15 0.52	48.72 19.25 16.01	21.76 5.18 4.95	117 59 29

Tab. 3 - Confronto in termini di PGA ed Intensità di Housner tra le azioni registrate e quelle attese (NTC-2008) per le stazioni (fisse e temporanee) installate a Mirandola riferito agli eventi del 20.05.2012 (sopra) e 29.05.2012 (sotto). In rosso sono evidenziati i casi in cui i valori di norma (sia per 475 che per 2475 anni) sottostimano i valori ottenuti dalle registrazioni strumentali, in blu quelli per i quali i valori di norma sono maggiori di quelli registrati.

59 Ml 20.05.2012		SITO		NORMA NTC-2008							
				TR=475		TR=2475		%Δ(TR=475)		%Δ(TR=2475)	
ID-Stazione	Comp.	PGA	IH	PGA	IH	PGA	IH	PGA	IH	PGA	IH
MRN-RAN ENEL	N - S	0.29	129	0.21	64	0.35	110	-39%	-101%	+17%	-17%
	E - O	0.28	84					-34%	-31%	+20%	+24%
	VERT.	0.32	17	0.07	4	0.19	11	-360%	-325%	-68%	-54%

5.8 Ml 20.05.2012		SITO		NORMA NTC-2008							
				TR=475		TR=2475		%Δ(TR=475)		%Δ(TR=2475)	
ID-Stazione	Comp.	PGA	IH	PGA	IH	PGA	IH	PGA	IH	PGA	IH
MRN-RAN ENEL	N - S	0.29	135	0.21	64	0.35	110	-38%	-111%	17%	-23%
	E - O	0.23	70					-10%	-9%	34%	36%
	VERT.	0.87	31	0.07	4	0.19	11	-1143%	-675%	-358%	-182%
staz. temporanea VIA NAPOLI	N - S	0.30	136	0.21	64	0.35	110	-43%	-113%	14%	-24%
	E - O	0.18	69					14%	-8%	49%	37%
	VERT.	0.71	32	0.07	4	0.19	11	-914%	-700%	-274%	-191%
staz. temporanea OSPEDALE	N - S	0.30	117	0.21	64	0.35	110	-43%	-83%	14%	-6%
	E - O	0.15	59					29%	8%	57%	46%
	VERT.	0.52	29	0.07	4	0.19	11	-643%	-625%	-174%	-164%

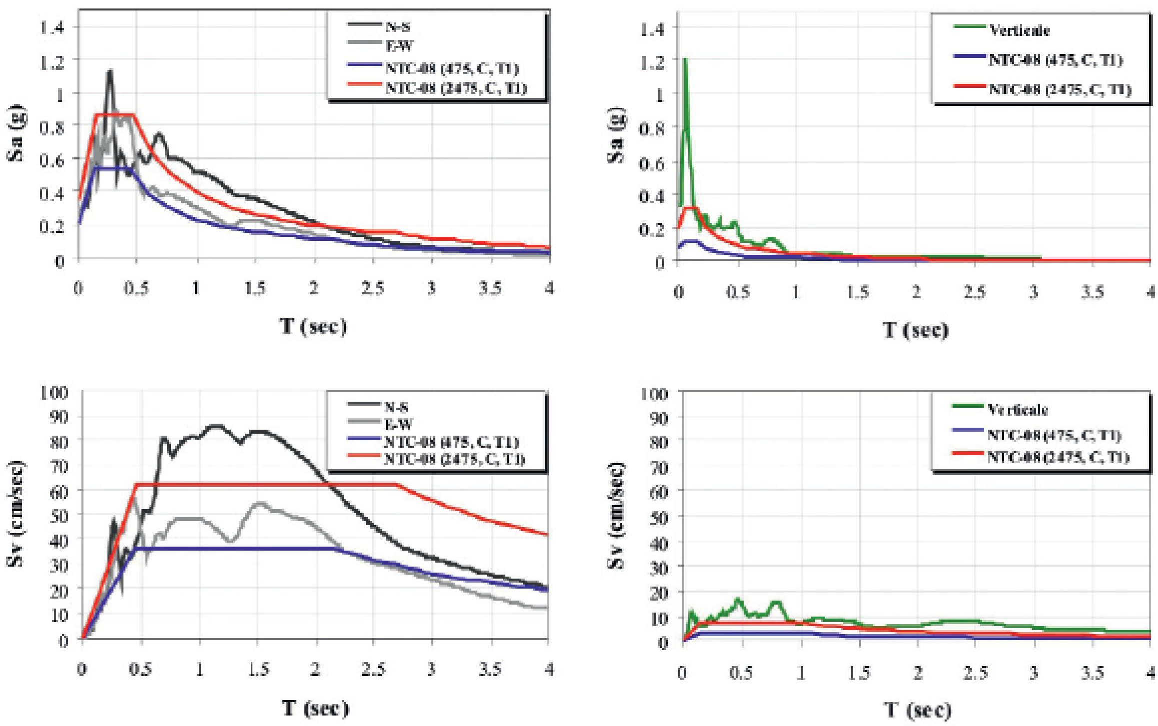


Fig. 2 - Confronto in pseudoaccelerazione (sopra) e pseudovelocità (sotto) tra l'azione registrata, nel piano (N-S, E-W) e sulla componente verticale dell'evento del 20.05.2012 alla stazione RAN di Mirandola (MRN) e quella attesa dalla norma NTC-2008 per suolo C, categoria topografica T1 e periodi di ritorno dell'azione di 475 e 2475 anni).

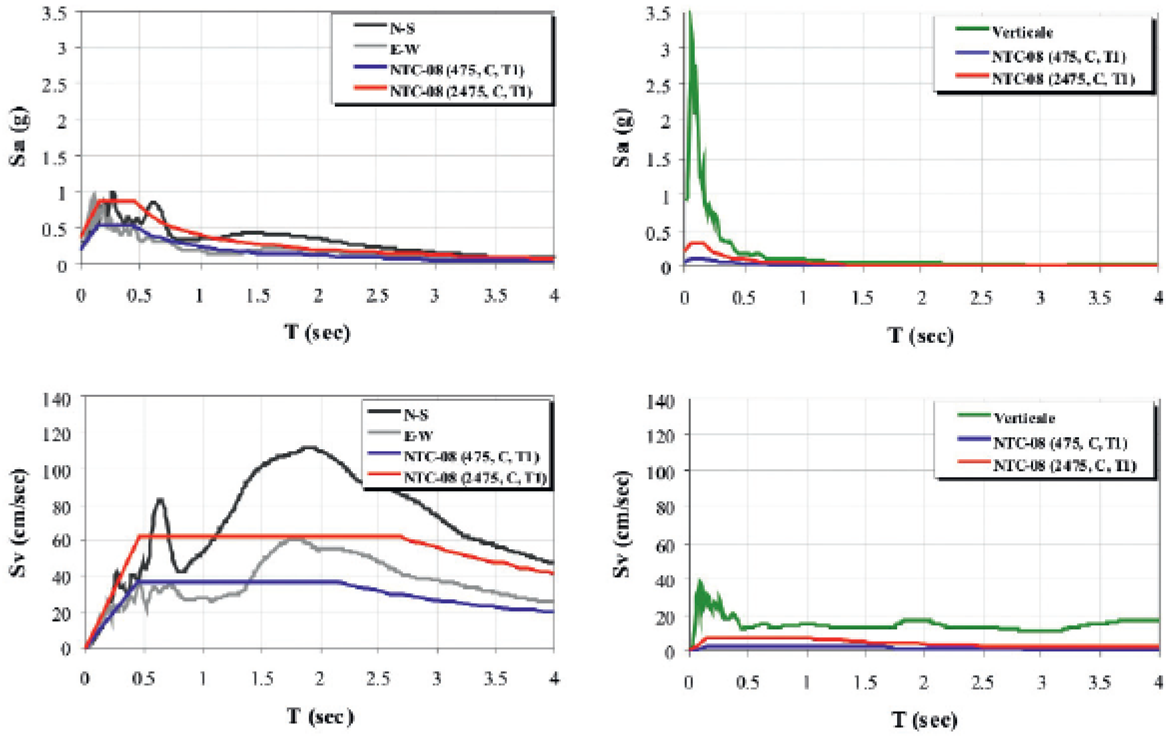


Fig. 3 - Confronto in pseudoaccelerazione (sopra) e pseudovelocità (sotto) tra l'azione registrata, nel piano (N-S, E-W) e sulla componente verticale dell'evento del 29.05.2012 alla stazione RAN di Mirandola (MRN) e quella attesa dalla norma NTC-2008 per suolo C, categoria topografica T1 e periodi di ritorno dell'azione di 475 e 2475 anni.

Si riportano di seguito i parametri del terremoto, al sito di studio, come risulta dalle mappe di scuotimento dell'INGV (http://shakemap.rm.ingv.it/shake) per gli eventi sismici del 20 Maggio 2012, del 29 Maggio 2012 e del 03 giugno 2012.

Ivalori desunti dalle mappe di accelerazione sismica sono i seguenti:
Pga value = (di g)
Pgv value = (cm/s)
Psa value = (di g)
con
Psa 0.3 = spectral acceleration at 0.3 s period, 5% damping.
Psa 1.0 = spectral acceleration at 1.0 s period, 5% damping.
Psa 3.0 = spectral acceleration at 3.0 s period, 5% damping.

EVENTO del 20 maggio 2012 M=5.9 - sito via Barozzi
PGA = 0.28g
PGV = 46 cm/s
PSA 0.3 sec = 0.88g
PSA 1.0 sec = 0.52g
PSA 3.0 sec = 0.06g

EVENTO del 29 maggio 2012 M=5.8 - sito via Barozzi
PGA = 0.28g
PGV = 44 cm/s
PSA 0.3 sec = 0.72g
PSA 1.0 sec = 0.32g
PSA 3.0 sec = 0.10g

EVENTO del 03 giugno 2012 M=5.1 - sito via Barozzi
PGA = 0.08g
PGV = 4 cm/s
PSA 0.3 sec = 0.16g
PSA 1.0 sec = 0.02g
PSA 3.0 sec = 0.02g

NTC 2008 - sito via Barozzi
PGA = 0.241g.
PSA 0.3 sec = 0.62g
PSA 1.0 sec = 0.27g
PSA 3.0 sec = 0.07g

11. CONSIDERAZIONI CONCLUSIVE

Lo studio condotto ha permesso di delineare i principali aspetti geologici significativi ai fini dei lavori di ristrutturazione dell' edificio scolastico dell' istituto d'istruzione superiore "Galileo Galilei", sito in Mirandola, a seguito degli eventi sismici del 20 e del 29 maggio 2012.

Il quadro di questi aspetti ha portato alle seguenti considerazioni di fattibilità:

1. Dal punto di vista sismico risulta che il comune di Mirandola, è stato dichiarato sismico e iscritto nella Zona 3 della OPCM 3274/2003 e s.m.i;
2. Il terreno di fondazione del fabbricato in oggetto appartiene alla categoria di suolo **"C"**, ai sensi del D.M. 14/01/2008;
3. Al fine di determinare le caratteristiche litologiche e geotecniche dei terreni di fondazione si è provveduto ad effettuare sul lotto in esame le seguenti indagini geognostiche e sismiche:
    - n. 5 prove penetrometriche statiche meccaniche (CPT01, CPT02, CPT03, CPT04 e CPT04bis) per un totale di 184.4 m di perforazione;
    - n. 1 prova penetrometrica statica elettrica CPTU01 per un totale di 30.0 m di perforazione;
    - n. 3 indagini sismiche passive di microtremori (HVSR - Tr01, HVSR - Tr02 e HVSR - Tr03);
    - n.4 indagine sismica attiva HoliSurface01 e HoliSurface02 (onde Rayleigh).
4. La natura litologica dei terreni oggetto delle prove penetrometriche è dedotta dall'analisi dei diagrammi penetrometrici mediante "Guide for estimating soil type from dutch friction-cone ratio" (after Schmertmann, 1969), Raccomandazioni A.G.I. 1977.
   Le sequenze stratigrafiche desunte dall'analisi delle prove penetrometriche evidenzia i seguenti livelli litologici:

   0.20 - 2.00/2.60 m Limo argilloso con sabbia fine mediamente consistente (A);
   2.00/2.60 - 10.00 m Argille e argille limose a media-bassa consistenza (B);
   10.00 - 19.00 m Sabbie da mediamente addensate ad addensate (C);
   19.00 - 34.00/35.00 m Sabbie addensate (D);
   31.20/35.00 - 37.00 m Argille e argille limose consistenti (E);
   37.00 - 39.60 m Sabbie addensate (D).

   La falda, in fase di indagine, è stata rinvenuta alla profondità di 2.00 m dal piano campagna.

5. I parametrici geotecnici caratteristici per i materiali presenti sono i seguenti:

In termini di parametri di resistenza:

Profondità dal p.c. (m)	Unità Formazionale e Litotecnica	γ'_d (kN/m³)	γ'_w (KN/m³)	c'k(kPa)	ϕ'_k(°)	C_{uk}(kPa)
0.20 - 2.00/2.60	Limo argilloso con sabbia fine mediamente consistente (A)	14.5	18	2	22	/

2.00/2.60 - 10.00	**Argille e argille limose a media-bassa consistenza (B)**	**14**	**17.5**	**4**	**18**	/
10.00 - 19.00	**Sabbie da mediamente addensate ad addensate (C)**	**18**	**20**	**0**	**27**	/
19.00 - 31.20/35.00	**Sabbie addensate (D)**	**19**	**20**	**0**	**30**	/
31.20/35.00 - 37.00	**Argille e argille limose consistenti (E)**	**17.5**	**19.5**	**5**	**22**	/
37.00 - 39.60	**Sabbie addensate (D)**	**19**	**20**	**0**	**30**	/

In termini di parametri di deformabilità:

Profondità dal p.c. (m)	**Unità Formazionale e Litotecnica**	γ'_d **(kN/m³)**	γ'_w **(KN/m³)**	**Coeff. di Poisson (ν)**	**Modulo Elastico E' (kPa)**	**Modulo Edometrico E_d (kPa)**
0.20 - 2.00/2.60	**Limo argilloso con sabbia fine mediamente consistente (A)**	**14.5**	**18**	**0.42**	/	**4000**
2.00/2.60 - 10.00	**Argille e argille limose a media-bassa consistenza (B)**	**14**	**17.5**	**0.42**	/	**3000**
10.00 - 19.00	**Sabbie da mediamente addensate ad addensate (C)**	**18**	**20**	**0.37**	**30000**	/
19.00 - 31.20/35.00	**Sabbie addensate (D)**	**19**	**20**	**0.35**	**40000**	/
31.20/35.00 - 37.00	**Argille e argille limose consistenti (E)**	**17.5**	**19.5**	**0.40**	/	**10000**
37.00 - 39.60	**Sabbie addensate (D)**	**19**	**20**	**0.35**	**40000**	/

6. A seguito delle osservazioni compiute, si ricava che le resistenze di progetto risultano secondo gli approcci della normativa:

Resistenze di progetto - Rd (SLU) - Approccio 1

Autore	Approccio 1	Approccio 1
	Comb 2 - A2+M2+R2 (kN/m²)	Comb 2 - Sisma (kN/m²)
Terzaghi	**152.9**	**109.68**
Vesic	**144.55**	**106.05**
Brich - Hansen	**116.43**	**94.28**

Resistenze di progetto - Rd (SLU) - Approccio 2

Autore	Approccio 2 Comb - A1+M1+R3 (kN/m^2)	Approccio 2 Comb – Sisma (kN/m^2)
Terzaghi	**178.28**	**126.36**
Vesic	**170.0**	**122.65**
Brich - Hansen	**142.94**	**110.89**

7. **La verifica a liquefazione, condotta secondo il metodo empirico di Robertson e Wride (1997), evidenzia un rischio di liquefazione "nullo".**

   La Regione Emilia-Romagna, ai sensi dell'ordinanza n.70/2012 del commissario delegato per la ricostruzione a seguito dei terremoti del 20 e 29 maggio, ha pubblicato in data 03/01/2013 le "**Mappe delle Microzone Omogenee in Prospettiva Sismica dei 17 Comuni con IMCS ≥ 6 (MOPS)", tra cui quella del Comune di Mirandola.**
   L'area in oggetto dell'intervento ricade in zona "**L -** Zona potenzialmente suscettibile di liquefazione". Occorre pertanto valutare il coefficiente di amplificazione e verificare la presenza di condizioni predisponenti la liquefazione; **ai fini della progettazione (NTC 08) nelle aree in cui è confermata la presenza di condizioni predisponenti la liquefazione (categoria di sottosuolo "S2")** <u>non è ammessa la definizione dell'azione sismica tramite l'approccio semplificato descritto al punto 3.2.2 delle suddette norme.</u>

Modena, settembre 2013.

Dott. Geol. Lorenzo Del Maschio
(A.P. n° 1725 Ordine dei Geologi della Regione Lazio)

12. ALLEGATI

- Certificati in originale delle indagini geognostiche fornite dalla ditta Geoprogetti S.r.l
- Interpretazioni stratigrafiche desunte dalle indagini geognostiche
- Stima dei parametri geotecnici desunti dalle indagini geognostiche
- Certificati in originale delle indagini geognostiche fornite dalla ditta Subsoil S.r.l.
- Validazione codice di calcolo

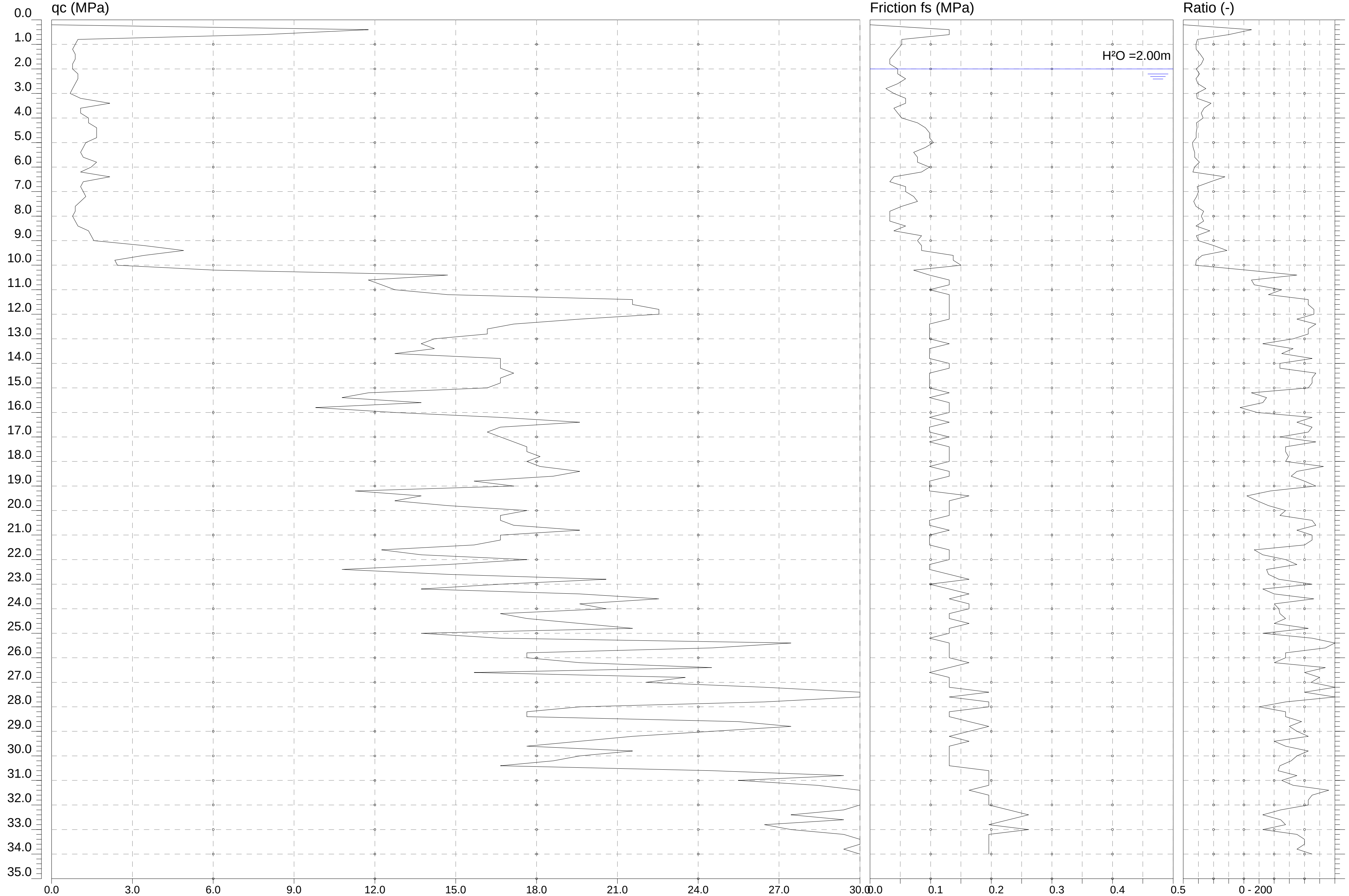
GEOPROGETTI SRL
Laboratorio di prove geotecniche in sito
Decreto di concessione n. 54420 del 27/01/2006
Sede legale: Via Duca D'Este, 6 - 41036 Medolla (MO)

Committente: PROVINCIA DI MODENA
Cantiere: MIRANDOLA Istituto Galilei
Data: 28/05/2013

Quota:
Preforo:
Falda: -2.00

Certificato di prova n.: 13/009-01/C

Prova n° 1



34.000 m

Sperimentatore: Dott. Geol. PAOLO CESTARI

Direttore Laboratorio: Dott. Geol. RITA BALLISTA

GEOPROGETTI SRL
Laboratorio di prove geotecniche in sito
Decreto di concessione n. 54420 del 27/01/2006
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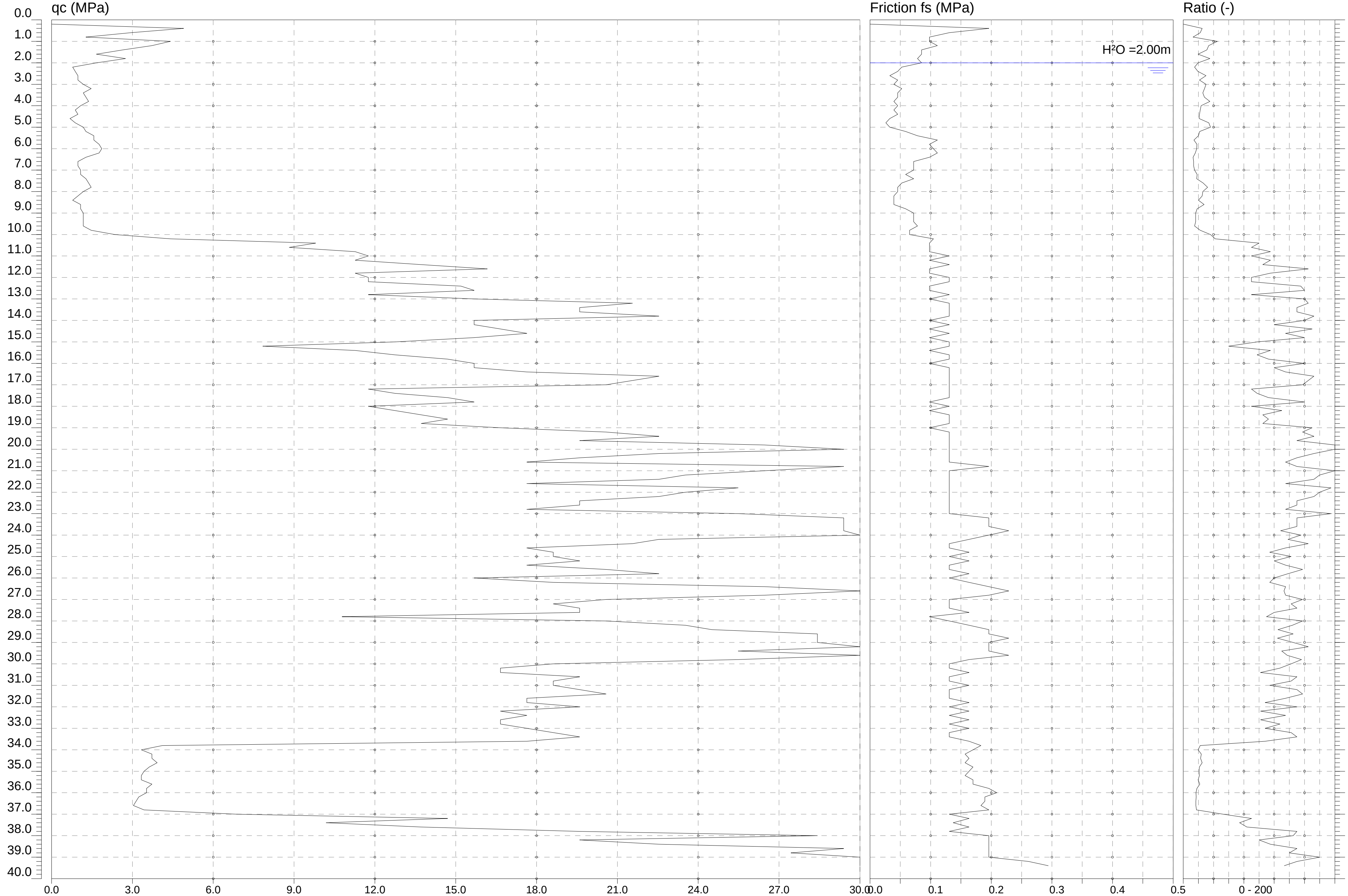
Committente: PROVINCIA DI MODENA
Cantiere: MIRANDOLA Istituto Galilei
Data: 28/05/2013

Quota:
Preforo:
Falda: -2.00

Certificato di prova n.: 13/009-02/C

Prova n° 2

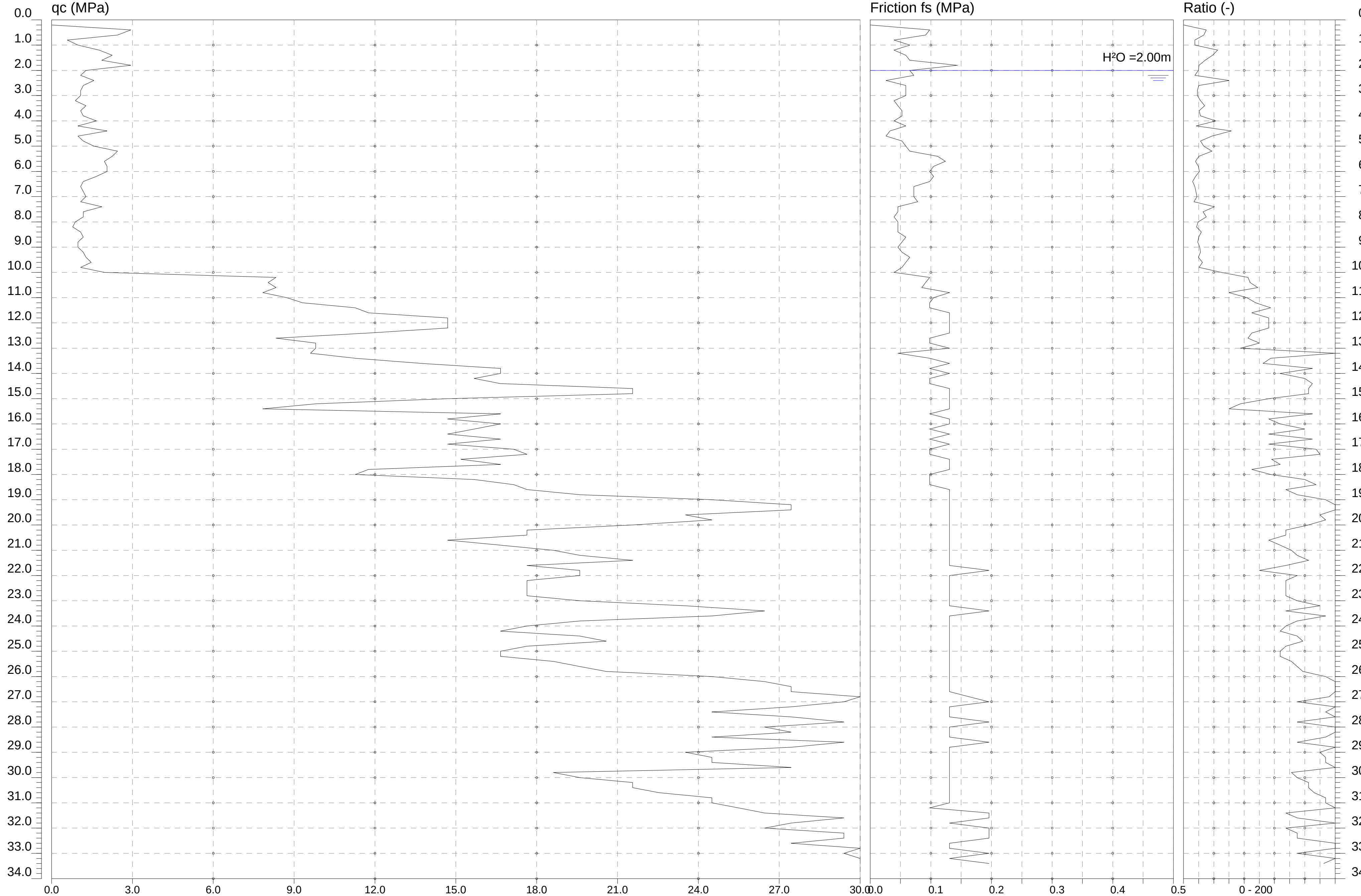


39.400 m

Sperimentatore: Dott. Geol. PAOLO CESTARI

Direttore Laboratorio: Dott. Geol. RITA BALLISTA

GEOPROGETTI SRL Laboratorio di prove geotecniche in sito Decreto di concessione n. 54420 del 27/01/2006 Sede legale: Via Duca D'Este, 6 - 41036 Medolla (MO)	Committente: PROVINCIA DI MODENA Cantiere: MIRANDOLA Istituto Galilei Data: 28/05/2013	Quota: Preforo: Falda: -2.00	Certificato di prova n.: 13/009-03/C Prova n° 3

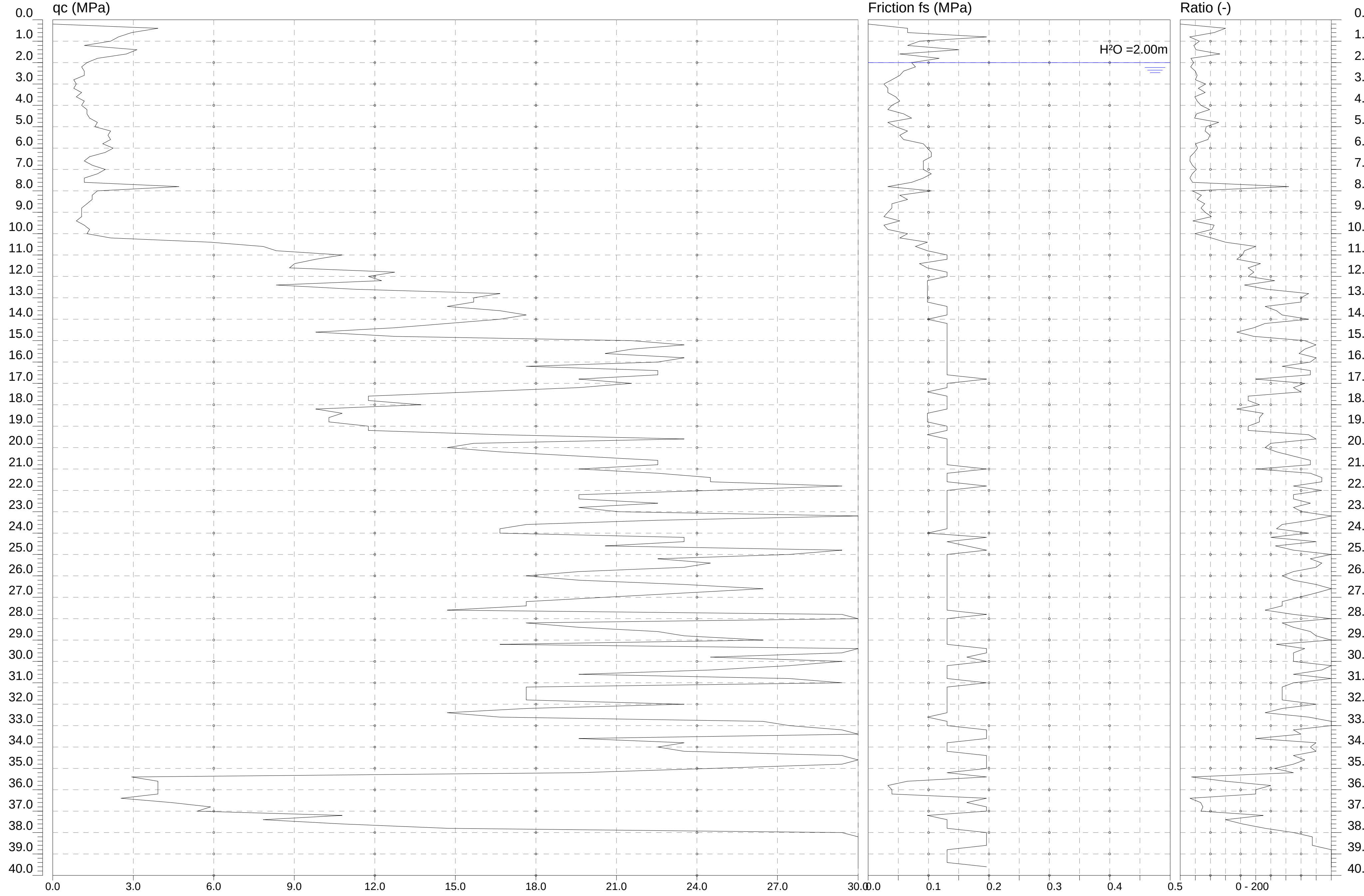


33.400 m

Sperimentatore: Dott. Geol. PAOLO CESTARI

Direttore Laboratorio: Dott. Geol. RITA BALLISTA

GEOPROGETTI SRL Laboratorio di prove geotecniche in sito Decreto di concessione n. 54420 del 27/01/2006 Sede legale: Via Duca D'Este, 6 - 41036 Medolla (MO)	Committente: PROVINCIA DI MODENA Cantiere: MIRANDOLA Istituto Galilei Data: 28/05/2013	Quota: Preforo: Falda: -2.00	Certificato di prova n.: 13/009-04/C Prova n° 4



39.600 m

Sperimentatore: Dott. Geol. PAOLO CESTARI

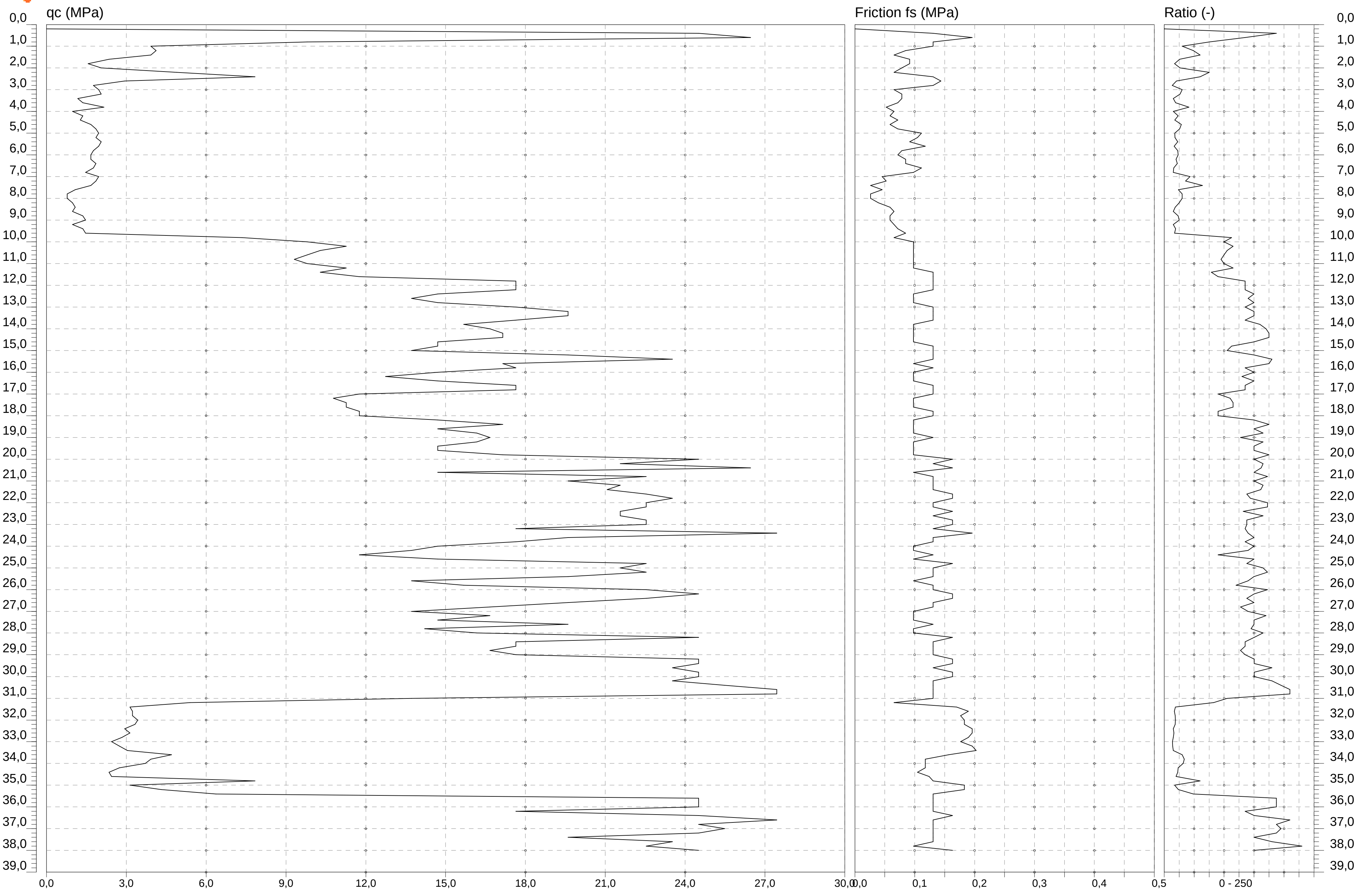
Direttore Laboratorio: Dott. Geol. RITA BALLISTA

GEOPROGETTI SRL
Laboratorio di prove geotecniche in sito
Decreto di concessione n. 54420 del 27/01/2006
Sede legale: Via Duca D'Este, 6 - 41036 Medolla (MO)

Committente: PROVINCIA DI MODENA
Cantiere: MIRANDOLA Istituto LUOSI
Data: 01/08/2012

Quota:
Preforo:
Falda: 0,00

Prova n° 4



38,000 m

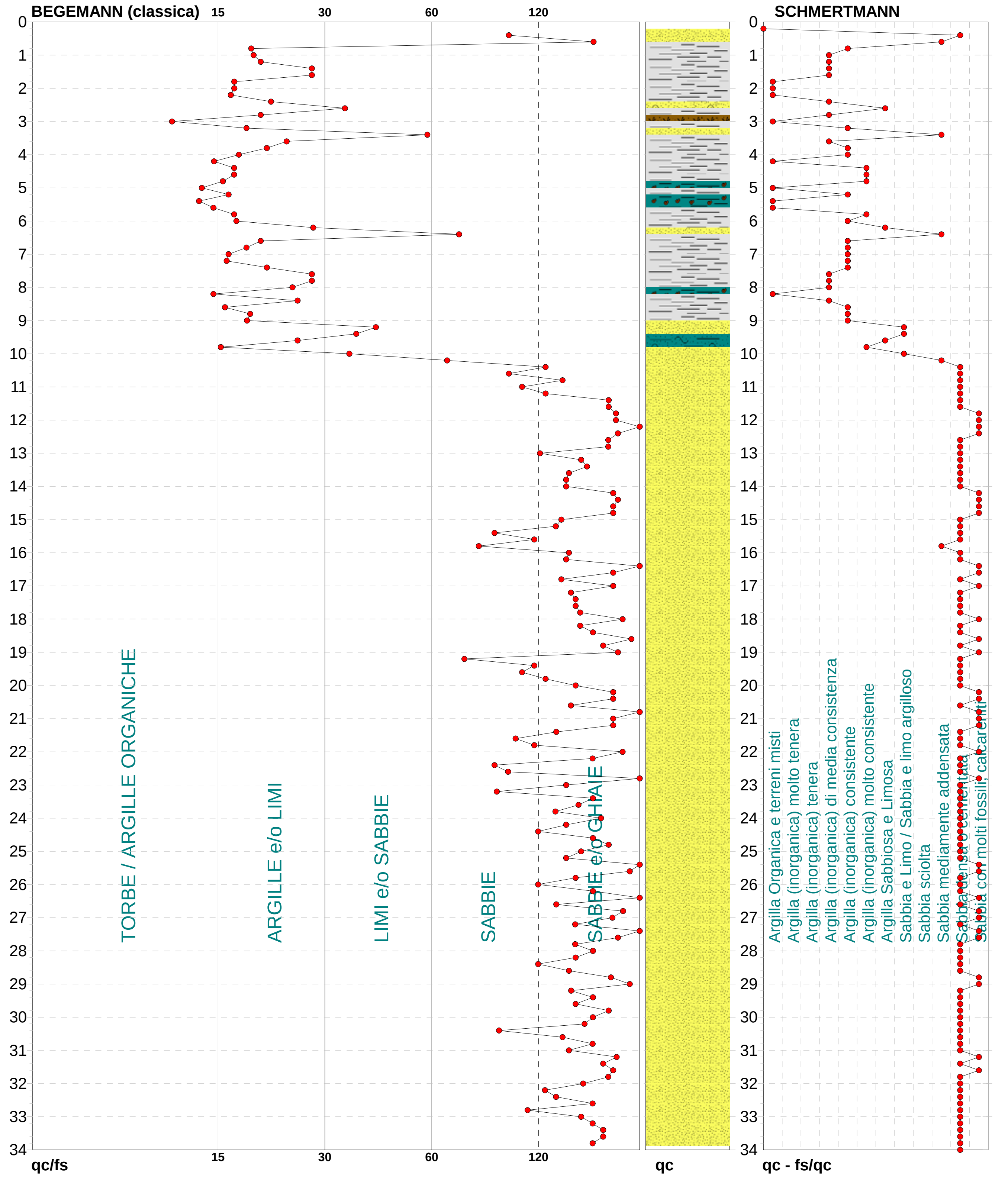
Sperimentatore: Dott. Geol. PAOLO CESTARI

Direttore Laboratorio: Dott. Geol. RITA BALLISTA

PROVA PENETROMETRICA STATICA MECCANICA
DIAGRAMMI LITOLOGIA

CPT	1
riferimento	125-2013

Committente:	PROVINCIA DI MODENA	U.M.: MPa	Data esec.: 28/05/2013
Cantiere:	MIRANDOLA Istituto Galilei	Scala: 1:170	
Località:	MIRANDOLA Istituto Galilei	Pagina: 1	
		Elaborato:	Falda: -2,00 m 2.00



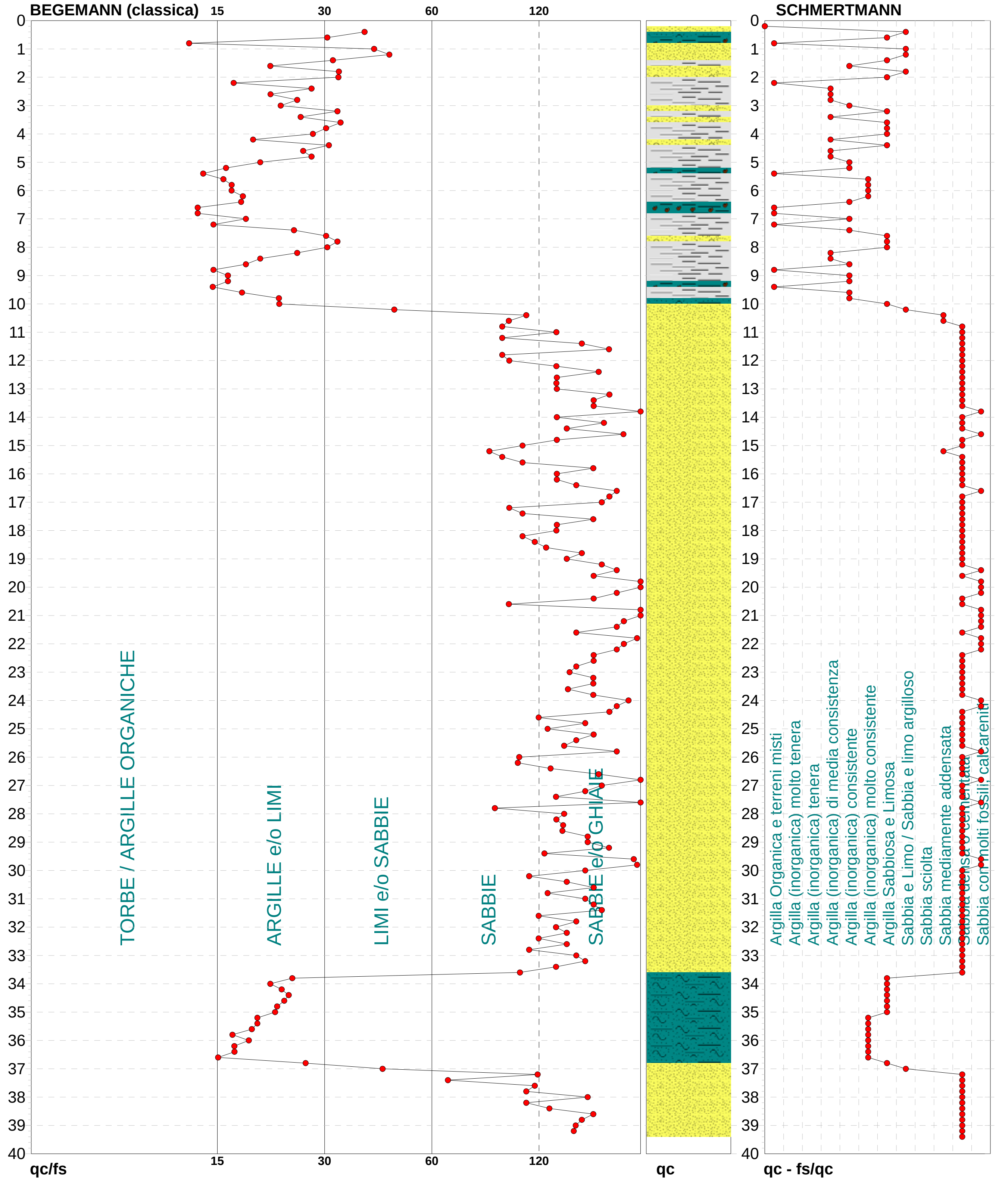
Torbe / Argille org. :	6 punti, 3,55%
Argille e/o Limi :	36 punti, 21,30%
Limi e/o Sabbie :	5 punti, 2,96%
Sabbie:	28 punti, 16,57%
Sabbie e/o Ghiaie :	94 punti, 55,62%

Argilla Organica e terreni misti:	9 punti,	5,33%
Argilla (inorganica) media consist.:	11 punti,	6,51%
Argilla (inorganica) consistente:	14 punti,	8,28%
Argilla (inorganica) molto consist.:	5 punti,	2,96%
Argilla Sabbiosa e Limosa:	3 punti,	1,78%
Sabbia e Limo / Sabbia e limo arg.:	3 punti,	1,78%
Sabbia mediamente addensata:	5 punti,	2,96%
Sabbia densa o cementata:	86 punti,	50,89%
Sabbia con molti fossili, calcareniti:	32 punti,	18,93%

nota: FON025

PROVA PENETROMETRICA STATICA MECCANICA DIAGRAMMI LITOLOGIA	CPT	2
	riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.:	**MPa**	Data esec.:	28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Scala:	1:200		
Località:	**MIRANDOLA Istituto Galilei**	Pagina:	1		
		Elaborato:		Falda:	-2,00 m 2.00



Torbe / Argille org. :	6 punti,	3,02%
Argille e/o Limi :	50 punti,	25,13%
Limi e/o Sabbie :	12 punti,	6,03%
Sabbie:	43 punti,	21,61%
Sabbie e/o Ghiaie :	85 punti,	42,71%

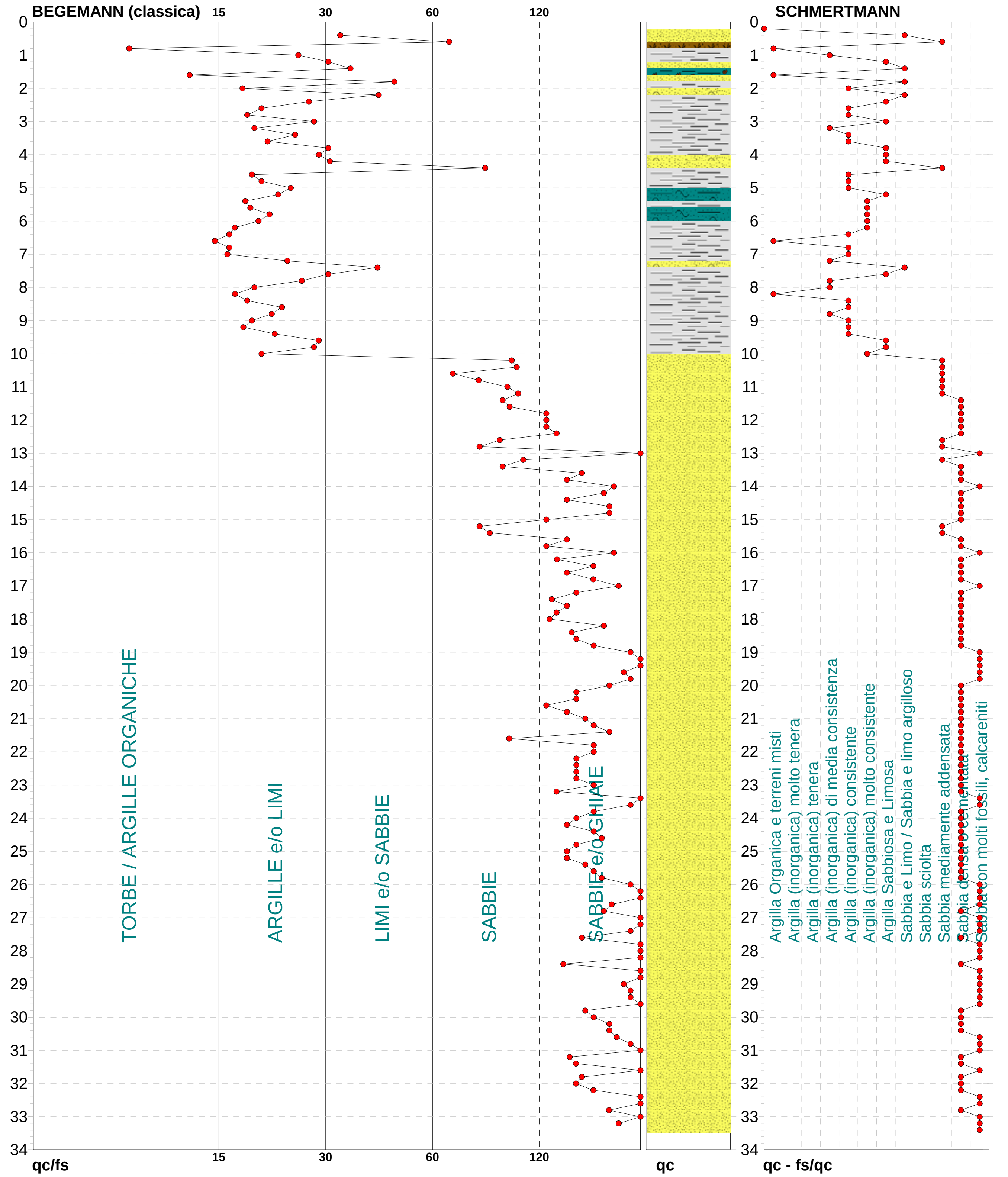
Argilla Organica e terreni misti:	8 punti,	4,02%
Argilla (inorganica) media consist.:	9 punti,	4,52%
Argilla (inorganica) consistente:	12 punti,	6,03%
Argilla (inorganica) molto consist.:	12 punti,	6,03%

Argilla Sabbiosa e Limosa:	20 punti,	10,05%
Sabbia e Limo / Sabbia e limo arg.:	6 punti,	3,02%
Sabbia mediamente addensata:	3 punti,	1,51%
Sabbia densa o cementata:	104 punti,	52,26%
Sabbia con molti fossili, calcareniti:	21 punti,	10,55%

nota: FON025

PROVA PENETROMETRICA STATICA MECCANICA DIAGRAMMI LITOLOGIA	CPT	3
	riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.:	**MPa**	Data esec.:	28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Scala:	1:170		
Località:	**MIRANDOLA Istituto Galilei**	Pagina:	1	Falda:	-2,00 m 2.00
		Elaborato:			



Torbe / Argille org. :	3 punti,	1,78%
Argille e/o Limi :	39 punti,	23,08%
Limi e/o Sabbie :	6 punti,	3,55%
Sabbie:	28 punti,	16,57%
Sabbie e/o Ghiaie :	90 punti,	53,25%

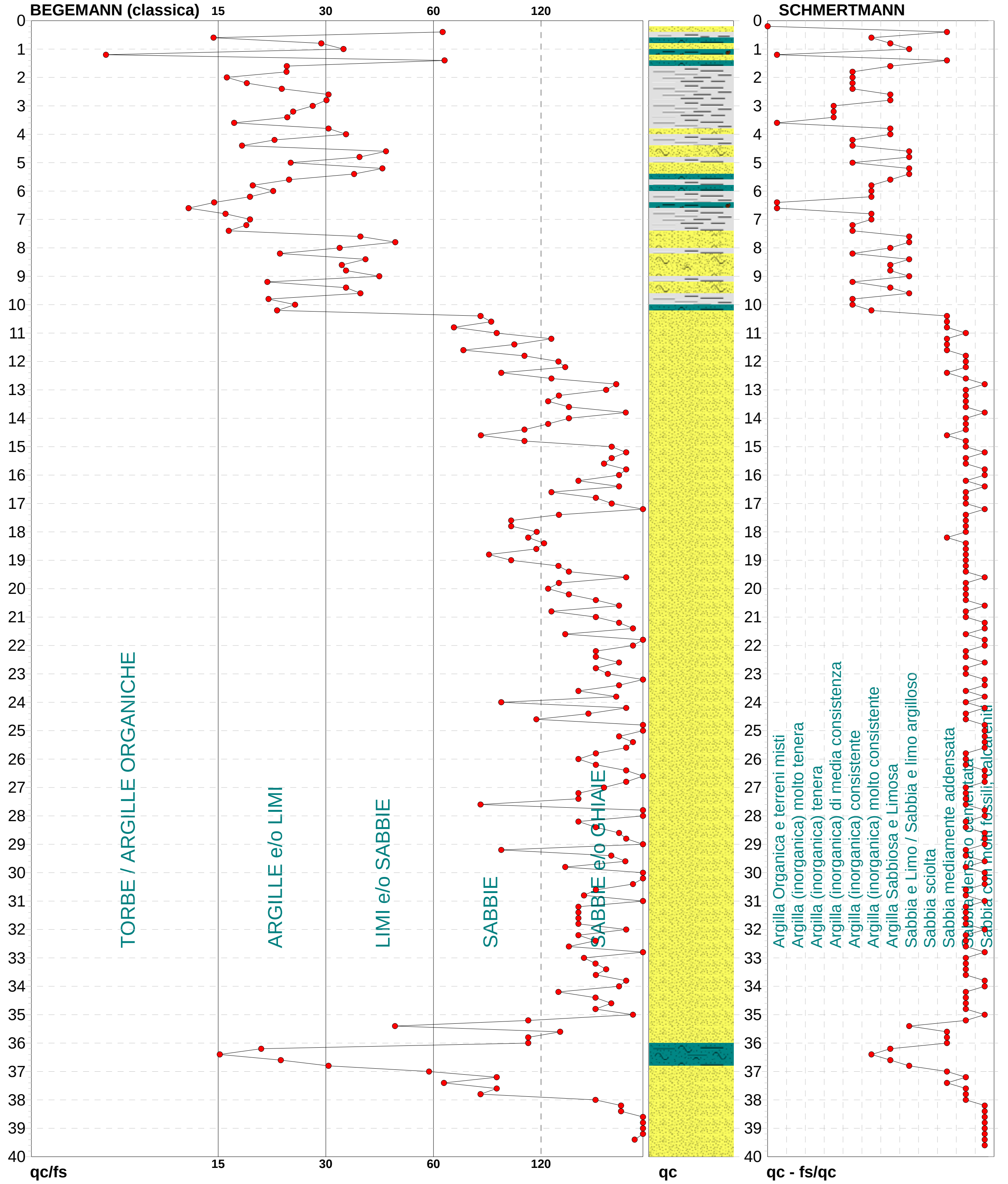
Argilla Organica e terreni misti:	4 punti,	2,37%
Argilla (inorganica) media consist.:	6 punti,	3,55%
Argilla (inorganica) consistente:	16 punti,	9,47%
Argilla (inorganica) molto consist.:	6 punti,	3,55%
Argilla Sabbiosa e Limosa:	10 punti,	5,92%
Sabbia e Limo / Sabbia e limo arg.:	5 punti,	2,96%
Sabbia mediamente addensata:	13 punti,	7,69%
Sabbia densa o cementata:	70 punti,	41,42%
Sabbia con molti fossili, calcareniti:	35 punti,	20,71%

nota:

FON025

PROVA PENETROMETRICA STATICA MECCANICA	**CPT**	**4**
DIAGRAMMI LITOLOGIA	riferimento	**125-2013**

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Scala: 1:200	
Località:	**MIRANDOLA Istituto Galilei**	Pagina: 1	
		Elaborato:	Falda: -2,00 m 2.00



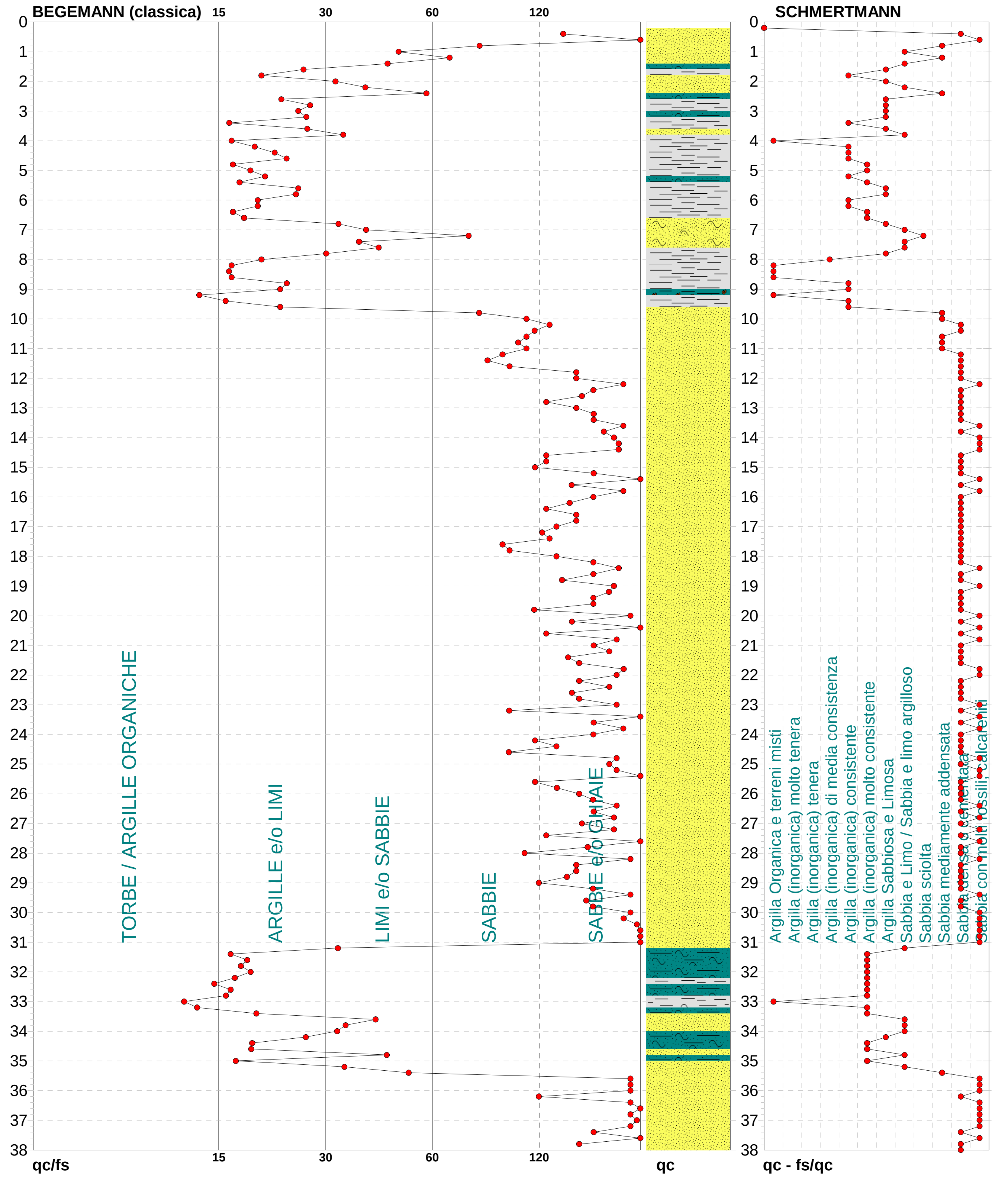
Torbe / Argille org. :	4 punti,	2,01%
Argille e/o Limi :	34 punti,	17,09%
Limi e/o Sabbie :	18 punti,	9,05%
Sabbie:	41 punti,	20,60%
Sabbie e/o Ghiaie :	100 punti,	50,25%

Argilla Organica e terreni misti:	4 punti,	2,01%
Argilla (inorganica) media consist.:	3 punti,	1,51%
Argilla (inorganica) consistente:	13 punti,	6,53%
Argilla (inorganica) molto consist.:	8 punti,	4,02%
Argilla Sabbiosa e Limosa:	13 punti,	6,53%
Sabbia e Limo / Sabbia e limo arg.:	12 punti,	6,03%
Sabbia mediamente addensata:	16 punti,	8,04%
Sabbia densa o cementata:	79 punti,	39,70%
Sabbia con molti fossili, calcareniti:	48 punti,	24,12%

nota: FON025

PROVA PENETROMETRICA STATICA MECCANICA DIAGRAMMI LITOLOGIA	CPT	4
	riferimento	089-2012

Committente:	**PROVINCIA DI MODENA**	U.M.:	**MPa**	Data esec.:	01/08/2012
Cantiere:	**MIRANDOLA Istituto LUOSI**	Scala:	1:190		
Località:	**MIRANDOLA Istituto LUOSI**	Pagina:	1		
		Elaborato:		Falda:	



Torbe / Argille org. :	5 punti,	2,65%
Argille e/o Limi :	43 punti,	22,75%
Limi e/o Sabbie :	17 punti,	8,99%
Sabbie:	35 punti,	18,52%
Sabbie e/o Ghiaie :	89 punti,	47,09%

Argilla Organica e terreni misti:	6 punti,	3,17%
Argilla (inorganica) media consist.:	1 punti,	0,53%
Argilla (inorganica) consistente:	12 punti,	6,35%
Argilla (inorganica) molto consist.:	18 punti,	9,52%

Argilla Sabbiosa e Limosa:	12 punti,	6,35%
Sabbia e Limo / Sabbia e limo arg.:	13 punti,	6,88%
Sabbia sciolta:	1 punti,	0,53%
Sabbia mediamente addensata:	9 punti,	4,76%
Sabbia densa o cementata:	74 punti,	39,15%
Sabbia con molti fossili, calcareniti:	42 punti,	22,22%

nota:

FON025

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	1
riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina: 1	
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:	Falda: -2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
0,20	--	--		1,85	3,6	154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0,40	11,8	90,2		1,85	7,3	231	--	--	--	--	--	100	43	46	44	41	45	35	2,00	19,6	29,4	35,3
0,60	7,8	150,9		1,85	10,9	205	--	--	--	--	--	100	43	42	40	37	45	33	2,00	13,1	19,6	23,5
0,80	1,0	18,9		1,85	14,5	160	49,0	28,8	8,3	12,5	3,9	--	--	--	--	--	--	--	--	--	--	--
1,00	0,9	19,1		1,85	18,1	160	44,1	19,1	7,5	11,2	3,7	--	--	--	--	--	--	--	--	--	--	--
1,20	0,8	20,0		1,85	21,8	159	39,2	13,1	6,7	10,0	3,4	--	--	--	--	--	--	--	--	--	--	--
1,40	0,9	27,3		1,85	25,4	160	44,1	12,5	7,5	11,2	3,7	--	--	--	--	--	--	--	--	--	--	--
1,60	0,9	27,3		1,85	29,0	160	44,1	10,6	7,5	11,2	3,7	--	--	--	--	--	--	--	--	--	--	--
1,80	0,8	17,0		1,85	32,6	159	39,2	7,9	7,9	11,8	3,4	--	--	--	--	--	--	--	--	--	--	--
2,00	0,8	17,0		0,86	34,3	159	39,2	7,4	8,4	12,7	3,4	--	--	--	--	--	--	--	--	--	--	--
2,20	1,0	16,7		0,90	36,1	160	49,0	9,2	8,6	12,9	3,9	--	--	--	--	--	--	--	--	--	--	--
2,40	1,0	21,3		0,90	37,8	160	49,0	8,7	9,0	13,5	3,9	--	--	--	--	--	--	--	--	--	--	--
2,60	0,9	33,3		0,85	39,5	160	44,1	7,2	9,8	14,7	3,7	11	33	25	22	21	29	26	--	1,5	2,2	2,6
2,80	0,8	20,0		0,86	41,2	159	39,2	5,9	11,0	16,4	3,4	--	--	--	--	--	--	--	--	--	--	--
3,00	0,7	11,7		0,46	42,1	158	34,3	4,9	2,2	3,3	1,0	--	--	--	--	--	--	--	--	--	--	--
3,20	1,1	18,3		0,91	43,9	161	52,6	7,9	10,6	15,9	4,2	--	--	--	--	--	--	--	--	--	--	--
3,40	2,2	55,0		0,86	45,6	168	--	--	--	--	--	39	36	29	26	24	33	28	--	3,6	5,4	6,5
3,60	1,1	23,4		0,91	47,3	161	52,6	7,2	11,8	17,7	4,2	--	--	--	--	--	--	--	--	--	--	--
3,80	1,1	20,8		0,91	49,1	161	52,6	6,8	12,4	18,7	4,2	--	--	--	--	--	--	--	--	--	--	--
4,00	1,4	17,5		0,94	51,0	163	62,4	8,1	12,2	18,3	4,7	--	--	--	--	--	--	--	--	--	--	--
4,20	1,4	15,1		0,94	52,8	163	62,4	7,7	12,8	19,2	4,7	--	--	--	--	--	--	--	--	--	--	--
4,40	1,7	17,0		0,97	54,7	165	70,9	8,7	13,0	19,4	5,3	--	--	--	--	--	--	--	--	--	--	--
4,60	1,7	17,0		0,97	56,6	165	70,9	8,3	13,5	20,2	5,3	--	--	--	--	--	--	--	--	--	--	--
4,80	1,7	15,9		0,97	58,5	165	70,9	8,0	14,1	21,1	5,3	--	--	--	--	--	--	--	--	--	--	--
5,00	1,3	14,0		0,93	60,3	162	59,3	6,1	15,9	23,8	4,6	--	--	--	--	--	--	--	--	--	--	--
5,20	1,2	16,4		0,92	62,1	162	56,0	5,5	16,8	25,2	4,4	--	--	--	--	--	--	--	--	--	--	--
5,40	1,1	13,8		0,91	63,9	161	52,6	4,9	17,7	26,5	4,2	--	--	--	--	--	--	--	--	--	--	--
5,60	1,2	15,0		0,92	65,7	162	56,0	5,1	18,1	27,1	4,4	--	--	--	--	--	--	--	--	--	--	--
5,80	1,7	17,0		0,97	67,6	165	70,9	6,7	17,3	25,9	5,3	--	--	--	--	--	--	--	--	--	--	--
6,00	1,5	17,2		0,95	69,5	164	65,3	5,8	18,6	27,8	4,9	--	--	--	--	--	--	--	--	--	--	--
6,20	1,1	27,5		0,91	71,3	161	52,6	4,3	19,9	29,9	4,2	--	--	--	--	--	--	--	--	--	--	--
6,40	2,2	66,7		0,86	73,0	168	--	--	--	--	--	27	35	27	23	22	30	28	--	3,6	5,4	6,5
6,60	1,2	20,0		0,92	74,8	162	56,0	4,4	20,9	31,3	4,4	--	--	--	--	--	--	--	--	--	--	--
6,80	1,1	18,3		0,91	76,5	161	52,6	3,9	21,4	32,2	4,2	--	--	--	--	--	--	--	--	--	--	--
7,00	1,2	16,4		0,92	78,3	162	56,0	4,1	21,9	32,8	4,4	--	--	--	--	--	--	--	--	--	--	--
7,20	1,3	16,3		0,93	80,2	162	59,3	4,3	22,4	33,6	4,6	--	--	--	--	--	--	--	--	--	--	--
7,40	1,1	20,8		0,91	81,9	161	52,6	3,6	23,1	34,7	4,2	--	--	--	--	--	--	--	--	--	--	--
7,60	0,9	27,3		0,88	83,7	160	44,1	2,8	22,4	33,6	3,7	--	--	--	--	--	--	--	--	--	--	--
7,80	0,9	27,3		0,88	85,4	160	44,1	2,7	22,6	33,9	3,7	--	--	--	--	--	--	--	--	--	--	--
8,00	0,8	24,2		0,86	87,1	159	39,2	2,3	21,2	31,9	3,4	--	--	--	--	--	--	--	--	--	--	--
8,20	0,9	15,0		0,88	88,8	160	44,1	2,6	23,0	34,5	3,7	--	--	--	--	--	--	--	--	--	--	--
8,40	1,0	25,0		0,90	90,6	160	49,0	2,9	24,5	36,8	3,9	--	--	--	--	--	--	--	--	--	--	--
8,60	1,4	16,1		0,94	92,4	163	62,4	3,8	26,0	39,0	4,7	--	--	--	--	--	--	--	--	--	--	--
8,80	1,5	18,8		0,95	94,3	164	65,3	4,0	26,3	39,5	4,9	--	--	--	--	--	--	--	--	--	--	--
9,00	1,6	18,4		0,96	96,2	164	68,2	4,1	26,8	40,3	5,1	--	--	--	--	--	--	--	--	--	--	--
9,20	3,4	40,2		0,89	97,9	176	--	--	--	--	--	36	36	27	24	23	31	29	--	5,7	8,6	10,3
9,40	4,9	35,7		0,92	99,7	186	--	--	--	--	--	48	37	29	26	24	33	31	--	8,2	12,3	14,7
9,60	3,4	25,0		0,98	101,6	176	114,3	7,3	25,1	37,7	10,3	35	35	27	24	23	31	29	--	5,7	8,6	10,3
9,80	2,4	15,7		0,94	103,4	169	87,1	5,1	28,5	42,7	7,1	22	34	25	22	21	29	28	--	3,9	5,9	7,1
10,00	2,5	34,2		0,86	105,1	170	--	--	--	--	--	23	34	25	22	21	29	28	--	4,1	6,1	7,4
10,20	6,1	62,0		0,94	107,0	194	--	--	--	--	--	53	38	30	27	25	34	32	--	10,1	15,2	18,2
10,40	14,7	112,8		1,08	109,1	250	--	--	--	--	--	83	41	34	31	29	38	36	--	24,5	36,8	44,1
10,60	11,8	90,2		1,03	111,1	231	--	--	--	--	--	75	40	33	30	28	37	35	--	19,6	29,4	35,3
10,80	12,3	125,0		1,04	113,1	234	--	--	--	--	--	76	40	33	30	28	37	35	--	20,4	30,6	36,8
11,00	12,7	97,7		1,05	115,2	237	--	--	--	--	--	77	40	33	30	28	38	35	--	21,2	31,9	38,2
11,20	14,7	112,8		1,08	117,3	250	--	--	--	--	--	82	41	34	31	29	38	36	--	24,5	36,8	44,1
11,40	21,6	165,4		1,15	119,5	295	--	--	--	--	--	94	43	36	33	31	40	38	--	35,9	53,9	64,7
11,60	21,6	165,4		1,15	121,8	295	--	--	--	--	--	94	43	35	33	31	40	38	--	35,9	53,9	64,7
11,80	22,5	172,9		1,15	124,0	301	--	--	--	--	--	95	43	36	33	31	40	39	--	37,6	56,4	67,6
12,00	22,5	172,9		1,15	126,3	301	--	--	--	--	--	94	43	36	33	31	40	39	--	37,6	56,4	67,6
12,20	19,6	200,0		1,15	128,5	282	--	--	--	--	--	89	42	35	32	30	39	38	--	32,7	49,0	58,8
12,40	17,2	175,0		1,11	130,7	266	--	--	--	--	--	84	41	34	31	29	38	37	--	28,6	42,9	51,5
12,60	16,2	165,0		1,10	132,9	260	--	--	--	--	--	82	41	34	31	29	38	37	--	27,0	40,4	48,5
12,80	16,2	165,0		1,10	135,0	260	--	--	--	--	--	81	41	34	31	29	38	37	--	27,0	40,4	48,5
13,00	14,2	109,0		1,07	137,1	247	--	--	--	--	--	77	40	33	30	28	37	36	--	23,7	35,5	42,6
13,20	13,7	140,0		1,06	139,2	244	--	--	--	--	--	75	40	33	30	28	37	36	--	22,9	34,3	41,2
13,40	14,2	145,0		1,07	141,3	247	--	--	--	--	--	76	40	33	30	28	37	36	--	23,7	35,5	42,6
13,60	12,7	130,0		1,05	143,4	237	--	--	--	--	--	72	40	32	29	27	36	35	--	21,2	31,9	38,2
13,80	16,7	127,8		1,11	145,5	263	--	--	--	--	--	81	41	33	30	28	38	37	--	27,8	41,7	50,0
14,00	16,7	127,8		1,11	147,7	263	--	--	--	--	--	80	41	33	30	28	38	37	--	27,8	41,7	50,0
14,20	16,7	170,0		1,11	149,9	263	--	--	--	--	--	80	41	33	30	28	38	37	--	27,8	41,7	50,0
14,40	17,2	175,0		1,11	152,0	266	--	--	--	--	--	81	41	33	30	28	38	37	--	28,6	42,9	51,5
14,60	16,7	170,0		1,11	154,2	263	--	--	--	--	--	79	41	33	30	28	37	37	--	27,8	41,7	50,0
14,80	16,7	170,0		1,11	156,4	263	--	--	--	--	--	79	41	33	30	28	37	37	--	27,8	41,7	50,0
15,00	16,2	124,1		1,10	158,5	260	--	--	--	--	--	77	41	33	30	28	37	37	--	27,0	40,4	48,5
15,20	11,8	120,0		1,03	160,5	231	--	--	--	--	--	66	39	31	28	26	35	35	--	19,6	29,4	35,3
15,40	10,8	82,7		1,02	162,5	224	--	--	--	--	--	63	39	31	28	26	35	34	--	18,0	27,0	32,3
15,60	13,7	105,3		1,06	164,6	244	--	--	--	--	--	71	40	32	29	27	36	36	--	22,9	34,3	41,2
15,80	9,8	75,2		1,00	166,6	218	--	--	--	--	--	59	38	30	27	25	34	34	--	16,3	24,5	29,4
16,00	12,7	130,0		1,05	168,6	237	--	--	--	--	--	68	39	31	28	26	35	35	--	21,2	31,9	38,2
16,20	16,7	127,8		1,11	170,8	263	--	--	--	--	--	77	40	33	30	28	37	37	--	27,8	41,7	50,0
16,40	19,6	200,0		1,15	173,0	282	--	--	--	--	--	82	41	33	30	28	38	38	--	32,7	49,0	58,8
16,60	16,7	170,0		1,11	175,2	263	--	--	--	--	--	76	40	32	29	28	37	37	--	27,8	41,7	50,0
16,80	16,2	124,1		1,10	177,4	260	--	--	--	--	--	75	40	32	29	27	36	37	--	27,0	40,4	48,5
17,00	16,7	170,0		1,11	179,5	263	--	--	--	--	--	75	40	32	29	27	37	37	--	27,8	41,7	50,0
17,20	17,2	131,6		1,11	181,7	266	--	--	--	--	--	76	40	32	29	28	37	37	--	28,6	42,9	51,5
17,40	17,6	135,3		1,12	183,9	269	--	--	--	--	--	77	40	32	30	28	37	37	--	29,4	44,1	52,9
17,60	17,6	135,3		1,12	186,1	269	--	--	--	--	--	77	40	32	29	28	37	37	--	29,4	44,1	52,9
17,80	18,1	139,1		1,13	188,3	272	--	--	--	--	--	77	41	32	30	28	37	37	--	30,2	45,3	54,4
18,00	17,6	180,0		1,12	190,5	269	--	--	--	--	--	76	40	32	29	27	37	37	--	29,4	44,1	52,9
18,20	18,1	139,1		1,13	192,7	272	--	--	--	--	--	77	40	32	29	28	37	37	--	30,2	45,3	54,4
18,40	19,6	150,4		1,15	195,0	282	--	--	--	--	--	79	41	33	30	28	37	38	--	32,7	49,0	58,8
18,60	18,6	190,0		1,14	197,2	276	--	--	--	--	--	77	40	32	29	28	37	37	--	31,0	46,6	55,9
18,80	15,7	160,0		1,09	199,3	256	--	--	--	--	--	71	40	31	28	27	36	36	--	26,1	39,2	47,0
19,00	17,2	175,0		1,11	201,5	266	--	--	--	--	--	74	40	32	29	27	36	37	--	28,6	42,9	51,5
19,20	11,3	68,9		1,02	203,5	228	--	--	--	--	--	59	38	30	27	25	34	35	--	18,8	28,2	33,8
19,40	13,7	105,3		1,06	205,6	244	--	--	--	--	--	65	39	31	28	26	35	36	--	22,9	34,3	41,2
19,60	12,7	97,7		1,05	207,6	237	--	--	--	--	--	63	39	30	27	25	34	35	--	21,2	31,9	38,2
19,80	14,7	112,8		1,08	209,7	250	--	--	--	--	--	67	39	31	28	26	35	36	--	24,5	36,8	44,1
20,00	17,6	135,3		1,12	211,9	269	--	--	--	--	--	73	40	32	29	27	36	37	--	29,4	44,1	52,9

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	1
riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina: 2	
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:	Falda: -2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
20,00	17,6	135,3		1,12	214,1	269	--	--	--	--	--	73	40	32	29	27	36	37	--	29,4	44,1	52,9
20,20	16,7	170,0		1,11	216,3	263	--	--	--	--	--	71	40	31	28	27	36	37	--	27,8	41,7	50,0
20,40	16,7	170,0		1,11	218,5	263	--	--	--	--	--	71	40	31	28	27	35	37	--	27,8	41,7	50,0
20,60	17,2	131,6		1,11	220,6	266	--	--	--	--	--	71	40	31	28	27	36	37	--	28,6	42,9	51,5
20,80	19,6	200,0		1,15	222,9	282	--	--	--	--	--	76	40	32	29	27	36	38	--	32,7	49,0	58,8
21,00	16,7	170,0		1,11	225,0	263	--	--	--	--	--	70	40	31	28	26	35	37	--	27,8	41,7	50,0
21,20	16,7	170,0		1,11	227,2	263	--	--	--	--	--	70	40	31	28	26	35	37	--	27,8	41,7	50,0
21,40	15,7	120,3		1,09	229,3	256	--	--	--	--	--	67	39	31	28	26	35	36	--	26,1	39,2	47,0
21,60	12,3	94,0		1,04	231,4	234	--	--	--	--	--	59	38	29	26	25	33	35	--	20,4	30,6	36,8
21,80	13,7	105,3		1,06	233,5	244	--	--	--	--	--	62	39	30	27	25	34	36	--	22,9	34,3	41,2
22,00	17,6	180,0		1,12	235,7	269	--	--	--	--	--	71	40	31	28	26	35	37	--	29,4	44,1	52,9
22,20	14,7	150,0		1,08	237,8	250	--	--	--	--	--	64	39	30	27	26	34	36	--	24,5	36,8	44,1
22,40	10,8	82,7		1,02	239,7	224	--	--	--	--	--	53	38	29	26	24	33	34	--	18,0	27,0	32,3
22,60	14,7	89,8		1,08	241,9	250	--	--	--	--	--	64	39	30	27	25	34	36	--	24,5	36,8	44,1
22,80	20,6	210,0		1,15	244,1	288	--	--	--	--	--	75	40	32	29	27	36	38	--	34,3	51,5	61,7
23,00	16,7	127,8		1,11	246,3	263	--	--	--	--	--	68	39	31	28	26	35	37	--	27,8	41,7	50,0
23,20	13,7	83,8		1,06	248,4	244	--	--	--	--	--	61	39	30	27	25	34	36	--	22,9	34,3	41,2
23,40	19,6	150,4		1,15	250,6	282	--	--	--	--	--	73	40	31	28	27	36	38	--	32,7	49,0	58,8
23,60	22,5	137,7		1,15	252,9	301	--	--	--	--	--	77	41	32	29	27	36	39	--	37,6	56,4	67,6
23,80	19,6	119,8		1,15	255,1	282	--	--	--	--	--	72	40	31	28	27	36	38	--	32,7	49,0	58,8
24,00	20,6	157,9		1,15	257,4	288	--	--	--	--	--	74	40	32	29	27	36	38	--	34,3	51,5	61,7
24,20	16,7	127,8		1,11	259,5	263	--	--	--	--	--	66	39	30	27	26	35	37	--	27,8	41,7	50,0
24,40	17,6	107,8		1,12	261,7	269	--	--	--	--	--	68	39	31	28	26	35	37	--	29,4	44,1	52,9
24,60	19,6	150,4		1,15	264,0	282	--	--	--	--	--	72	40	31	28	26	35	38	--	32,7	49,0	58,8
24,80	21,6	165,4		1,15	266,2	295	--	--	--	--	--	75	40	32	29	27	36	38	--	35,9	53,9	64,7
25,00	13,7	140,0		1,06	268,3	244	--	--	--	--	--	59	38	29	26	25	33	36	--	22,9	34,3	41,2
25,20	16,7	127,8		1,11	270,5	263	--	--	--	--	--	65	39	30	27	26	34	37	--	27,8	41,7	50,0
25,40	27,4	210,5		1,15	272,7	333	--	--	--	--	--	82	41	33	30	28	37	40	--	45,7	68,6	82,3
25,60	24,5	188,0		1,15	275,0	314	--	--	--	--	--	78	41	32	29	27	36	39	--	40,8	61,3	73,5
25,80	17,6	135,3		1,12	277,2	269	--	--	--	--	--	67	39	30	27	26	34	37	--	29,4	44,1	52,9
26,00	17,6	107,8		1,12	279,4	269	--	--	--	--	--	67	39	30	27	26	34	37	--	29,4	44,1	52,9
26,20	19,6	150,4		1,15	281,6	282	--	--	--	--	--	70	40	31	28	26	35	38	--	32,7	49,0	58,8
26,40	24,5	250,0		1,15	283,9	314	--	--	--	--	--	78	41	32	29	27	36	39	--	40,8	61,3	73,5
26,60	15,7	120,3		1,09	286,0	256	--	--	--	--	--	62	39	30	27	25	34	36	--	26,1	39,2	47,0
26,80	23,5	180,5		1,15	288,3	308	--	--	--	--	--	76	40	32	29	27	36	39	--	39,2	58,8	70,6
27,00	22,1	169,2		1,15	290,5	298	--	--	--	--	--	73	40	31	28	27	35	39	--	36,8	55,1	66,2
27,20	26,5	135,0		1,15	292,8	327	--	--	--	--	--	79	41	32	29	27	36	40	--	44,1	66,2	79,4
27,40	31,4	240,6		1,15	295,0	359	--	--	--	--	--	85	41	33	30	28	37	40	--	52,3	78,4	94,1
27,60	34,3	175,0		1,15	297,3	378	--	--	--	--	--	88	42	33	30	29	38	40	--	57,2	85,8	102,9
27,80	26,5	135,0		1,15	299,5	327	--	--	--	--	--	79	41	32	29	27	36	40	--	44,1	66,2	79,4
28,00	19,6	150,4		1,15	301,8	282	--	--	--	--	--	68	39	31	28	26	35	38	--	32,7	49,0	58,8
28,20	17,6	135,3		1,12	304,0	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
28,40	17,6	107,8		1,12	306,2	269	--	--	--	--	--	64	39	30	27	25	34	37	--	29,4	44,1	52,9
28,60	25,5	130,0		1,15	308,4	320	--	--	--	--	--	77	40	32	29	27	36	40	--	42,5	63,7	76,4
28,80	27,4	167,7		1,15	310,7	333	--	--	--	--	--	79	41	32	29	27	36	40	--	45,7	68,6	82,3
29,00	24,5	188,0		1,15	313,0	314	--	--	--	--	--	75	40	31	28	27	36	39	--	40,8	61,3	73,5
29,20	21,6	131,7		1,15	315,2	295	--	--	--	--	--	71	40	31	28	26	35	38	--	35,9	53,9	64,7
29,40	19,6	150,4		1,15	317,5	282	--	--	--	--	--	67	39	30	27	26	34	38	--	32,7	49,0	58,8
29,60	17,6	135,3		1,12	319,7	269	--	--	--	--	--	63	39	30	27	25	34	37	--	29,4	44,1	52,9
29,80	21,6	165,4		1,15	321,9	295	--	--	--	--	--	70	40	31	28	26	35	38	--	35,9	53,9	64,7
30,00	19,6	150,4		1,15	324,2	282	--	--	--	--	--	67	39	30	27	25	34	38	--	32,7	49,0	58,8
30,20	18,6	142,9		1,14	326,4	276	--	--	--	--	--	65	39	30	27	25	34	37	--	31,0	46,6	55,9
30,40	16,7	85,0		1,11	328,6	263	--	--	--	--	--	61	39	29	26	25	33	37	--	27,8	41,7	50,0
30,60	24,5	125,0		1,15	330,8	314	--	--	--	--	--	74	40	31	28	26	35	39	--	40,8	61,3	73,5
30,80	29,4	150,0		1,15	333,1	346	--	--	--	--	--	80	41	32	29	27	36	40	--	49,0	73,5	88,2
31,00	25,5	130,0		1,15	335,3	320	--	--	--	--	--	75	40	31	28	27	35	40	--	42,5	63,7	76,4
31,20	28,4	173,7		1,15	337,6	340	--	--	--	--	--	78	41	32	29	27	36	40	--	47,4	71,1	85,3
31,40	31,4	160,0		1,15	339,8	359	--	--	--	--	--	82	41	32	29	27	37	40	--	52,3	78,4	94,1
31,60	33,3	170,0		1,15	342,1	372	--	--	--	--	--	84	41	33	30	28	37	40	--	55,5	83,3	100,0
31,80	32,3	165,0		1,15	344,3	365	--	--	--	--	--	82	41	32	29	28	37	40	--	53,9	80,9	97,0
32,00	32,3	141,6		1,15	346,6	365	--	--	--	--	--	82	41	32	29	27	37	40	--	53,9	80,9	97,0
32,20	29,4	112,4		1,15	348,8	346	--	--	--	--	--	79	41	32	29	27	36	40	--	49,0	73,5	88,2
32,40	27,4	120,2		1,15	351,1	333	--	--	--	--	--	76	40	31	28	27	36	40	--	45,7	68,6	82,3
32,60	29,4	150,0		1,15	353,3	346	--	--	--	--	--	78	41	32	29	27	36	40	--	49,0	73,5	88,2
32,80	26,5	101,1		1,15	355,6	327	--	--	--	--	--	75	40	31	28	26	35	40	--	44,1	66,2	79,4
33,00	27,4	140,0		1,15	357,9	333	--	--	--	--	--	76	40	31	28	27	35	40	--	45,7	68,6	82,3
33,20	29,4	150,0		1,15	360,1	346	--	--	--	--	--	78	41	32	29	27	36	40	--	49,0	73,5	88,2
33,40	31,4	160,0		1,15	362,4	359	--	--	--	--	--	80	41	32	29	27	36	40	--	52,3	78,4	94,1
33,60	31,4	160,0		1,15	364,6	359	--	--	--	--	--	80	41	32	29	27	36	40	--	52,3	78,4	94,1
33,80	29,4	150,0		1,15	366,9	346	--	--	--	--	--	78	41	32	29	27	36	40	--	49,0	73,5	88,2
34,00	33,3	--		1,15	369,1	372	--	--	--	--	--	82	41	32	29	27	36	40	--	55,5	83,3	100,0

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	2
riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.:	**MPa**	Data esec.:	28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina:	1		
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:		Falda:	-2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
0,20	--	--		1,85	3,6	154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0,40	4,9	37,6		1,85	7,3	186	--	--	--	--	--	100	43	42	40	37	45	31	2,00	8,2	12,3	14,7
0,60	2,9	30,0		1,85	10,9	173	98,0	98,0	16,7	25,0	8,8	84	41	38	35	33	41	29	--	4,9	7,4	8,8
0,80	1,3	13,0		1,85	14,5	162	59,3	36,5	10,1	15,1	4,6	--	--	--	--	--	--	--	--	--	--	--
1,00	4,4	39,8		1,85	18,1	183	--	--	--	--	--	86	42	37	34	32	41	31	2,00	7,4	11,0	13,2
1,20	3,7	43,7		1,85	21,8	178	--	--	--	--	--	75	40	35	33	30	39	30	2,00	6,2	9,3	11,2
1,40	2,6	31,0		1,85	25,4	171	--	--	--	--	--	60	38	33	30	28	37	28	2,00	4,4	6,6	7,9
1,60	1,7	21,3		1,85	29,0	165	70,9	19,2	12,1	18,1	5,3	--	--	--	--	--	--	--	--	--	--	--
1,80	2,7	32,2		1,85	32,6	172	--	--	--	--	--	55	38	32	29	27	36	28	2,00	4,6	6,9	8,2
2,00	1,7	32,1		0,91	34,4	165	70,9	15,5	12,1	18,1	5,3	37	36	29	26	24	33	27	--	2,8	4,2	5,0
2,20	0,8	17,0		0,86	36,1	159	39,2	7,0	9,1	13,6	3,4	--	--	--	--	--	--	--	--	--	--	--
2,40	0,9	27,3		0,88	37,8	160	44,1	7,6	9,2	13,8	3,7	--	--	--	--	--	--	--	--	--	--	--
2,60	1,0	21,3		0,90	39,6	160	49,0	8,2	9,4	14,2	3,9	--	--	--	--	--	--	--	--	--	--	--
2,80	1,0	25,0		0,90	41,3	160	49,0	7,8	10,0	15,0	3,9	--	--	--	--	--	--	--	--	--	--	--
3,00	1,2	22,6		0,92	43,1	162	56,0	8,7	10,2	15,3	4,4	--	--	--	--	--	--	--	--	--	--	--
3,20	1,5	31,9		0,89	44,9	164	65,3	10,0	11,1	16,7	4,9	26	34	27	24	23	31	27	--	2,5	3,7	4,4
3,40	1,2	25,5		0,92	46,7	162	56,0	7,9	11,3	16,9	4,4	--	--	--	--	--	--	--	--	--	--	--
3,60	1,3	32,5		0,88	48,4	162	59,3	8,1	11,6	17,4	4,6	19	34	26	23	21	30	26	--	2,1	3,2	3,8
3,80	1,4	29,8		0,94	50,3	163	62,4	8,2	12,0	18,0	4,7	--	--	--	--	--	--	--	--	--	--	--
4,00	1,1	27,5		0,91	52,1	161	52,6	6,4	13,5	20,3	4,2	--	--	--	--	--	--	--	--	--	--	--
4,20	0,9	19,1		0,88	53,8	160	44,1	4,9	14,9	22,3	3,7	--	--	--	--	--	--	--	--	--	--	--
4,40	1,0	30,3		0,86	55,5	160	49,0	5,4	15,1	22,7	3,9	7	32	24	21	20	27	26	--	1,6	2,5	2,9
4,60	0,7	25,9		0,84	57,1	158	34,3	3,3	16,0	24,0	3,2	--	--	--	--	--	--	--	--	--	--	--
4,80	0,9	27,3		0,88	58,8	160	44,1	4,4	16,4	24,6	3,7	--	--	--	--	--	--	--	--	--	--	--
5,00	1,2	20,0		0,92	60,7	162	56,0	5,7	16,3	24,5	4,4	--	--	--	--	--	--	--	--	--	--	--
5,20	1,3	16,3		0,93	62,5	162	59,3	5,9	16,6	25,0	4,6	--	--	--	--	--	--	--	--	--	--	--
5,40	1,6	14,2		0,96	64,4	164	68,2	6,7	16,4	24,6	5,1	--	--	--	--	--	--	--	--	--	--	--
5,60	1,6	16,0		0,96	66,2	164	68,2	6,5	17,1	25,6	5,1	--	--	--	--	--	--	--	--	--	--	--
5,80	1,8	16,8		0,98	68,2	166	73,5	6,9	17,2	25,8	5,5	--	--	--	--	--	--	--	--	--	--	--
6,00	1,9	16,8		0,99	70,1	166	76,0	6,9	17,6	26,5	5,7	--	--	--	--	--	--	--	--	--	--	--
6,20	1,8	18,0		0,98	72,0	166	73,5	6,4	18,6	27,9	5,5	--	--	--	--	--	--	--	--	--	--	--
6,40	1,3	17,8		0,93	73,8	162	59,3	4,8	20,5	30,8	4,6	--	--	--	--	--	--	--	--	--	--	--
6,60	1,0	13,7		0,90	75,6	160	49,0	3,7	21,3	32,0	3,9	--	--	--	--	--	--	--	--	--	--	--
6,80	1,0	13,7		0,90	77,4	160	49,0	3,5	21,8	32,8	3,9	--	--	--	--	--	--	--	--	--	--	--
7,00	1,1	18,3		0,91	79,2	161	52,6	3,8	22,3	33,5	4,2	--	--	--	--	--	--	--	--	--	--	--
7,20	1,1	15,1		0,91	80,9	161	52,6	3,7	22,8	34,3	4,2	--	--	--	--	--	--	--	--	--	--	--
7,40	1,3	24,5		0,93	82,8	162	59,3	4,1	23,1	34,7	4,6	--	--	--	--	--	--	--	--	--	--	--
7,60	1,4	29,8		0,94	84,6	163	62,4	4,3	23,6	35,4	4,7	--	--	--	--	--	--	--	--	--	--	--
7,80	1,5	31,9		0,89	86,4	164	65,3	4,4	24,1	36,2	4,9	10	32	24	21	19	27	27	--	2,5	3,7	4,4
8,00	1,2	30,0		0,88	88,1	162	56,0	3,6	24,9	37,3	4,4	2	31	23	19	18	26	26	--	2,0	2,9	3,5
8,20	1,0	25,0		0,90	89,8	160	49,0	2,9	24,4	36,6	3,9	--	--	--	--	--	--	--	--	--	--	--
8,40	0,8	20,0		0,86	91,5	159	39,2	2,2	21,6	32,4	3,4	--	--	--	--	--	--	--	--	--	--	--
8,60	1,1	18,3		0,91	93,3	161	52,6	3,1	25,7	38,5	4,2	--	--	--	--	--	--	--	--	--	--	--
8,80	1,1	15,1		0,91	95,1	161	52,6	3,0	26,0	39,0	4,2	--	--	--	--	--	--	--	--	--	--	--
9,00	1,2	16,4		0,92	96,9	162	56,0	3,2	26,9	40,3	4,4	--	--	--	--	--	--	--	--	--	--	--
9,20	1,2	16,4		0,92	98,7	162	56,0	3,1	27,2	40,8	4,4	--	--	--	--	--	--	--	--	--	--	--
9,40	1,2	15,0		0,92	100,5	162	56,0	3,0	27,5	41,3	4,4	--	--	--	--	--	--	--	--	--	--	--
9,60	1,2	17,9		0,92	102,3	162	56,0	3,0	27,8	41,7	4,4	--	--	--	--	--	--	--	--	--	--	--
9,80	1,5	22,4		0,95	104,2	164	65,3	3,5	29,4	44,1	4,9	--	--	--	--	--	--	--	--	--	--	--
10,00	2,4	22,4		0,94	106,0	169	87,1	4,9	29,3	44,0	7,1	21	34	25	22	21	29	28	--	3,9	5,9	7,1
10,20	4,4	45,0		0,91	107,8	183	--	--	--	--	--	42	36	28	25	24	32	31	--	7,4	11,0	13,2
10,40	9,8	100,0		1,00	109,8	218	--	--	--	--	--	69	40	32	29	27	36	34	--	16,3	24,5	29,4
10,60	8,8	90,0		0,98	111,7	212	--	--	--	--	--	65	39	31	29	27	36	33	--	14,7	22,1	26,5
10,80	11,3	86,5		1,02	113,7	228	--	--	--	--	--	73	40	33	30	28	37	35	--	18,8	28,2	33,8
11,00	11,8	120,0		1,03	115,7	231	--	--	--	--	--	74	40	33	30	28	37	35	--	19,6	29,4	35,3
11,20	11,3	86,5		1,02	117,7	228	--	--	--	--	--	72	40	32	30	28	37	35	--	18,8	28,2	33,8
11,40	13,7	140,0		1,06	119,8	244	--	--	--	--	--	79	41	33	30	28	38	36	--	22,9	34,3	41,2
11,60	16,2	165,0		1,10	121,9	260	--	--	--	--	--	84	41	34	31	29	38	37	--	27,0	40,4	48,5
11,80	11,3	86,5		1,02	123,9	228	--	--	--	--	--	71	40	32	29	27	36	35	--	18,8	28,2	33,8
12,00	11,8	90,2		1,03	125,9	231	--	--	--	--	--	72	40	32	29	27	37	35	--	19,6	29,4	35,3
12,20	11,8	120,0		1,03	128,0	231	--	--	--	--	--	72	40	32	29	27	37	35	--	19,6	29,4	35,3
12,40	15,2	155,0		1,08	130,1	253	--	--	--	--	--	80	41	33	31	29	38	36	--	25,3	38,0	45,6
12,60	15,7	120,3		1,09	132,2	256	--	--	--	--	--	81	41	33	31	29	38	36	--	26,1	39,2	47,0
12,80	11,8	120,0		1,03	134,2	231	--	--	--	--	--	71	40	32	29	27	36	35	--	19,6	29,4	35,3
13,00	15,7	120,3		1,09	136,4	256	--	--	--	--	--	80	41	33	30	28	38	36	--	26,1	39,2	47,0
13,20	21,6	165,4		1,15	138,6	295	--	--	--	--	--	91	42	35	32	30	39	38	--	35,9	53,9	64,7
13,40	19,6	150,4		1,15	140,9	282	--	--	--	--	--	87	42	34	31	29	39	38	--	32,7	49,0	58,8
13,60	19,6	150,4		1,15	143,1	282	--	--	--	--	--	87	42	34	31	29	39	38	--	32,7	49,0	58,8
13,80	22,5	230,0		1,15	145,4	301	--	--	--	--	--	91	42	35	32	30	39	39	--	37,6	56,4	67,6
14,00	15,7	120,3		1,09	147,5	256	--	--	--	--	--	78	41	33	30	28	37	36	--	26,1	39,2	47,0
14,20	15,7	160,0		1,09	149,7	256	--	--	--	--	--	78	41	33	30	28	37	36	--	26,1	39,2	47,0
14,40	16,7	127,8		1,11	151,8	263	--	--	--	--	--	80	41	33	30	28	37	37	--	27,8	41,7	50,0
14,60	17,6	180,0		1,12	154,0	269	--	--	--	--	--	81	41	33	30	28	38	37	--	29,4	44,1	52,9
14,80	15,7	120,3		1,09	156,2	256	--	--	--	--	--	77	40	33	30	28	37	36	--	26,1	39,2	47,0
15,00	12,7	97,7		1,05	158,2	237	--	--	--	--	--	69	40	32	29	27	36	35	--	21,2	31,9	38,2
15,20	7,8	80,0		0,97	160,1	205	--	--	--	--	--	52	38	29	26	24	33	33	--	13,1	19,6	23,5
15,40	11,3	86,5		1,02	162,1	228	--	--	--	--	--	65	39	31	28	26	35	35	--	18,8	28,2	33,8
15,60	12,7	97,7		1,05	164,2	237	--	--	--	--	--	68	39	31	28	27	36	35	--	21,2	31,9	38,2
15,80	14,7	150,0		1,08	166,3	250	--	--	--	--	--	73	40	32	29	27	36	36	--	24,5	36,8	44,1
16,00	15,7	120,3		1,09	168,4	256	--	--	--	--	--	75	40	32	29	27	37	36	--	26,1	39,2	47,0
16,20	15,7	120,3		1,09	170,5	256	--	--	--	--	--	75	40	32	29	27	37	36	--	26,1	39,2	47,0
16,40	17,6	135,3		1,12	172,7	269	--	--	--	--	--	78	41	33	30	28	37	37	--	29,4	44,1	52,9
16,60	22,5	172,9		1,15	175,0	301	--	--	--	--	--	86	42	34	31	29	38	39	--	37,6	56,4	67,6
16,80	21,6	165,4		1,15	177,2	295	--	--	--	--	--	85	41	34	31	29	38	38	--	35,9	53,9	64,7
17,00	20,6	157,9		1,15	179,5	288	--	--	--	--	--	83	41	33	30	28	38	38	--	34,3	51,5	61,7
17,20	11,8	90,2		1,03	181,5	231	--	--	--	--	--	63	39	30	27	26	35	35	--	19,6	29,4	35,3
17,40	12,7	97,7		1,05	183,6	237	--	--	--	--	--	66	39	31	28	26	35	35	--	21,2	31,9	38,2
17,60	14,7	150,0		1,08	185,7	250	--	--	--	--	--	70	40	31	29	27	36	36	--	24,5	36,8	44,1
17,80	15,7	120,3		1,09	187,8	256	--	--	--	--	--	72	40	32	29	27	36	36	--	26,1	39,2	47,0
18,00	11,8	120,0		1,03	189,8	231	--	--	--	--	--	62	39	30	27	26	34	35	--	19,6	29,4	35,3
18,20	12,7	97,7		1,05	191,9	237	--	--	--	--	--	65	39	31	28	26	35	35	--	21,2	31,9	38,2
18,40	13,7	105,3		1,06	193,9	244	--	--	--	--	--	67	39	31	28	26	35	36	--	22,9	34,3	41,2
18,60	14,7	112,8		1,08	196,0	250	--	--	--	--	--	69	40	31	28	26	35	36	--	24,5	36,8	44,1
18,80	13,7	140,0		1,06	198,1	244	--	--	--	--	--	66	39	31	28	26	35	36	--	22,9	34,3	41,2
19,00	16,7	127,8		1,11	200,3	263	--	--	--	--	--	73	40	32	29	27	36	37	--	27,8	41,7	50,0
19,20	20,6	157,9		1,15	202,5	288	--	--	--	--	--	80	41	33	30	28	37	38	--	34,3	51,5	61,7
19,40	22,5	172,9		1,15	204,8	301	--	--	--	--	--	83	41	33	30	28	38	39	--	37,6	56,4	67,6
19,60	19,6	150,4		1,15	207,1	282	--	--	--	--	--	78	41	32	29	28	37	38	--	32,7	49,0	58,8
19,80	26,5	203,0		1,15	209,3	327	--	--	--	--	--	88	42	34	31	29	38	40	--	44,1	66,2	79,4
20,00	29,4	225,6		1,15	211,6	346	--	--	--	--	--	91	42	34	31	29	39	40	--	49,0	73,5	88,2

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	2
riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.:	**MPa**	Data esec.:	28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina:	2		
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:		Falda:	-2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
20,00	29,4	225,6		1,15	214,2	346	--	--	--	--	--	91	42	34	31	29	39	40	--	49,0	73,5	88,2
20,20	22,5	172,9		1,15	216,4	301	--	--	--	--	--	81	41	33	30	28	37	39	--	37,6	56,4	67,6
20,40	19,6	150,4		1,15	218,7	282	--	--	--	--	--	76	40	32	29	27	36	38	--	32,7	49,0	58,8
20,60	17,6	90,0		1,12	220,9	269	--	--	--	--	--	72	40	32	29	27	36	37	--	29,4	44,1	52,9
20,80	29,4	225,6		1,15	223,1	346	--	--	--	--	--	90	42	34	31	29	38	40	--	49,0	73,5	88,2
21,00	26,5	203,0		1,15	225,4	327	--	--	--	--	--	86	42	33	31	29	38	40	--	44,1	66,2	79,4
21,20	23,5	180,5		1,15	227,6	308	--	--	--	--	--	82	41	33	30	28	37	39	--	39,2	58,8	70,6
21,40	22,5	172,9		1,15	229,9	301	--	--	--	--	--	80	41	33	30	28	37	39	--	37,6	56,4	67,6
21,60	17,6	135,3		1,12	232,1	269	--	--	--	--	--	71	40	31	28	27	35	37	--	29,4	44,1	52,9
21,80	25,5	195,5		1,15	234,3	320	--	--	--	--	--	84	41	33	30	28	37	40	--	42,5	63,7	76,4
22,00	23,5	180,5		1,15	236,6	308	--	--	--	--	--	81	41	33	30	28	37	39	--	39,2	58,8	70,6
22,20	22,5	172,9		1,15	238,9	301	--	--	--	--	--	79	41	32	29	28	37	39	--	37,6	56,4	67,6
22,40	19,6	150,4		1,15	241,1	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
22,60	19,6	150,4		1,15	243,4	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
22,80	17,6	135,3		1,12	245,6	269	--	--	--	--	--	70	40	31	28	26	35	37	--	29,4	44,1	52,9
23,00	25,5	130,0		1,15	247,8	320	--	--	--	--	--	82	41	33	30	28	37	40	--	42,5	63,7	76,4
23,20	29,4	150,0		1,15	250,1	346	--	--	--	--	--	87	42	33	31	29	38	40	--	49,0	73,5	88,2
23,40	29,4	150,0		1,15	252,3	346	--	--	--	--	--	87	42	33	31	29	38	40	--	49,0	73,5	88,2
23,60	29,4	128,8		1,15	254,6	346	--	--	--	--	--	86	42	33	30	29	38	40	--	49,0	73,5	88,2
23,80	29,4	150,0		1,15	256,8	346	--	--	--	--	--	86	42	33	30	28	38	40	--	49,0	73,5	88,2
24,00	30,4	185,6		1,15	259,1	352	--	--	--	--	--	87	42	33	31	29	38	40	--	50,6	76,0	91,1
24,20	22,5	172,9		1,15	261,3	301	--	--	--	--	--	77	40	32	29	27	36	39	--	37,6	56,4	67,6
24,40	21,6	165,4		1,15	263,6	295	--	--	--	--	--	75	40	32	29	27	36	38	--	35,9	53,9	64,7
24,60	17,6	107,8		1,12	265,8	269	--	--	--	--	--	68	39	31	28	26	35	37	--	29,4	44,1	52,9
24,80	18,6	142,9		1,14	268,0	276	--	--	--	--	--	69	40	31	28	26	35	37	--	31,0	46,6	55,9
25,00	18,6	113,8		1,14	270,2	276	--	--	--	--	--	69	40	31	28	26	35	37	--	31,0	46,6	55,9
25,20	19,6	150,4		1,15	272,5	282	--	--	--	--	--	71	40	31	28	26	35	38	--	32,7	49,0	58,8
25,40	17,6	135,3		1,12	274,7	269	--	--	--	--	--	67	39	30	27	26	35	37	--	29,4	44,1	52,9
25,60	20,6	125,7		1,15	276,9	288	--	--	--	--	--	72	40	31	28	26	35	38	--	34,3	51,5	61,7
25,80	22,5	172,9		1,15	279,2	301	--	--	--	--	--	75	40	32	29	27	36	39	--	37,6	56,4	67,6
26,00	15,7	95,8		1,09	281,3	256	--	--	--	--	--	62	39	30	27	25	34	36	--	26,1	39,2	47,0
26,20	18,6	95,0		1,14	283,6	276	--	--	--	--	--	68	39	31	28	26	35	37	--	31,0	46,6	55,9
26,40	26,5	115,9		1,15	285,8	327	--	--	--	--	--	80	41	32	29	27	37	40	--	44,1	66,2	79,4
26,60	30,4	155,0		1,15	288,1	352	--	--	--	--	--	85	41	33	30	28	37	40	--	50,6	76,0	91,1
26,80	26,5	203,0		1,15	290,3	327	--	--	--	--	--	80	41	32	29	27	36	40	--	44,1	66,2	79,4
27,00	20,6	157,9		1,15	292,6	288	--	--	--	--	--	71	40	31	28	26	35	38	--	34,3	51,5	61,7
27,20	18,6	142,9		1,14	294,8	276	--	--	--	--	--	67	39	30	27	26	34	37	--	31,0	46,6	55,9
27,40	19,6	119,8		1,15	297,0	282	--	--	--	--	--	69	39	31	28	26	35	38	--	32,7	49,0	58,8
27,60	19,6	200,0		1,15	299,3	282	--	--	--	--	--	69	39	31	28	26	35	38	--	32,7	49,0	58,8
27,80	10,8	82,7		1,02	301,3	224	--	--	--	--	--	48	37	28	24	23	31	34	--	18,0	27,0	32,3
28,00	20,6	125,7		1,15	303,5	288	--	--	--	--	--	70	40	31	28	26	35	38	--	34,3	51,5	61,7
28,20	23,5	120,0		1,15	305,8	308	--	--	--	--	--	74	40	31	28	27	36	39	--	39,2	58,8	70,6
28,40	24,5	125,0		1,15	308,1	314	--	--	--	--	--	76	40	32	29	27	36	39	--	40,8	61,3	73,5
28,60	28,4	124,5		1,15	310,3	340	--	--	--	--	--	80	41	32	29	27	36	40	--	47,4	71,1	85,3
28,80	28,4	145,0		1,15	312,6	340	--	--	--	--	--	80	41	32	29	27	36	40	--	47,4	71,1	85,3
29,00	28,4	145,0		1,15	314,8	340	--	--	--	--	--	80	41	32	29	27	36	40	--	47,4	71,1	85,3
29,20	32,3	165,0		1,15	317,1	365	--	--	--	--	--	84	41	33	30	28	37	40	--	53,9	80,9	97,0
29,40	25,5	111,6		1,15	319,3	320	--	--	--	--	--	76	40	32	29	27	36	40	--	42,5	63,7	76,4
29,60	31,4	191,6		1,15	321,6	359	--	--	--	--	--	83	41	33	30	28	37	40	--	52,3	78,4	94,1
29,80	25,5	195,5		1,15	323,8	320	--	--	--	--	--	76	40	31	29	27	36	40	--	42,5	63,7	76,4
30,00	18,6	142,9		1,14	326,1	276	--	--	--	--	--	65	39	30	27	25	34	37	--	31,0	46,6	55,9
30,20	16,7	101,8		1,11	328,2	263	--	--	--	--	--	61	39	29	26	25	33	37	--	27,8	41,7	50,0
30,40	16,7	127,8		1,11	330,4	263	--	--	--	--	--	61	39	29	26	25	33	37	--	27,8	41,7	50,0
30,60	19,6	150,4		1,15	332,6	282	--	--	--	--	--	66	39	30	27	25	34	38	--	32,7	49,0	58,8
30,80	18,6	113,8		1,14	334,9	276	--	--	--	--	--	64	39	30	27	25	34	37	--	31,0	46,6	55,9
31,00	18,6	142,9		1,14	337,1	276	--	--	--	--	--	64	39	30	27	25	34	37	--	31,0	46,6	55,9
31,20	19,6	150,4		1,15	339,3	282	--	--	--	--	--	66	39	30	27	25	34	38	--	32,7	49,0	58,8
31,40	20,6	157,9		1,15	341,6	288	--	--	--	--	--	67	39	30	27	25	34	38	--	34,3	51,5	61,7
31,60	17,6	107,8		1,12	343,8	269	--	--	--	--	--	62	39	29	26	25	33	37	--	29,4	44,1	52,9
31,80	17,6	135,3		1,12	346,0	269	--	--	--	--	--	61	39	29	26	25	33	37	--	29,4	44,1	52,9
32,00	19,6	119,8		1,15	348,2	282	--	--	--	--	--	65	39	30	27	25	34	38	--	32,7	49,0	58,8
32,20	16,7	127,8		1,11	350,4	263	--	--	--	--	--	59	38	29	26	24	33	37	--	27,8	41,7	50,0
32,40	17,6	107,8		1,12	352,6	269	--	--	--	--	--	61	39	29	26	25	33	37	--	29,4	44,1	52,9
32,60	16,7	127,8		1,11	354,8	263	--	--	--	--	--	59	38	29	26	24	33	37	--	27,8	41,7	50,0
32,80	16,7	101,8		1,11	356,9	263	--	--	--	--	--	59	38	29	26	24	33	37	--	27,8	41,7	50,0
33,00	17,6	135,3		1,12	359,1	269	--	--	--	--	--	60	38	29	26	24	33	37	--	29,4	44,1	52,9
33,20	18,6	142,9		1,14	361,4	276	--	--	--	--	--	62	39	29	26	25	33	37	--	31,0	46,6	55,9
33,40	19,6	119,8		1,15	363,6	282	--	--	--	--	--	64	39	30	27	25	34	38	--	32,7	49,0	58,8
33,60	17,6	96,3		1,12	365,8	269	--	--	--	--	--	60	38	29	26	24	33	37	--	29,4	44,1	52,9
33,80	4,1	24,3		1,00	367,8	181	137,2	1,8	78,0	117,0	12,3	10	32	22	18	17	25	30	--	6,9	10,3	12,3
34,00	3,3	21,3		0,98	369,7	176	111,1	1,4	65,2	97,8	10,0	3	32	21	17	16	25	29	--	5,6	8,3	10,0
34,20	3,7	22,8		0,99	371,6	178	124,1	1,6	71,9	107,9	11,2	6	32	21	18	17	25	30	--	6,2	9,3	11,2
34,40	3,7	23,8		0,99	373,6	178	124,1	1,6	72,0	108,0	11,2	6	32	21	18	17	25	30	--	6,2	9,3	11,2
34,60	3,9	23,1		1,00	375,5	180	130,7	1,7	75,2	112,9	11,8	8	32	21	18	17	25	30	--	6,5	9,8	11,8
34,80	3,6	22,2		0,99	377,5	178	120,9	1,5	70,4	105,7	10,9	5	32	21	18	17	25	30	--	6,0	9,1	10,9
35,00	3,4	21,9		0,98	379,4	176	114,3	1,4	67,1	100,7	10,3	3	32	21	17	16	25	29	--	5,7	8,6	10,3
35,20	3,3	19,7		0,98	381,3	176	111,1	1,3	65,4	98,2	10,0	2	31	21	17	16	25	29	--	5,6	8,3	10,0
35,40	3,3	19,7		0,98	383,2	176	111,1	1,3	65,5	98,2	10,0	2	31	21	17	16	25	29	--	5,6	8,3	10,0
35,60	3,7	19,0		0,99	385,2	178	124,1	1,5	72,3	108,4	11,2	5	32	21	18	17	25	30	--	6,2	9,3	11,2
35,80	3,5	16,9		0,99	387,1	177	117,6	1,4	69,0	103,5	10,6	3	32	21	17	16	25	30	--	5,9	8,8	10,6
36,00	3,5	18,7		0,99	389,0	177	117,6	1,4	69,0	103,5	10,6	3	32	21	17	16	25	30	--	5,9	8,8	10,6
36,20	3,2	17,1		0,97	390,9	175	107,8	1,3	63,9	95,8	9,7	--	31	20	17	16	25	29	--	5,4	8,1	9,7
36,40	3,1	17,1		0,97	392,8	174	104,5	1,2	62,1	93,2	9,4	--	31	20	17	16	25	29	--	5,2	7,8	9,4
36,60	3,0	15,5		0,97	394,7	174	101,3	1,1	60,3	90,5	9,1	--	31	20	16	16	25	29	--	5,1	7,6	9,1
36,80	3,4	26,3		0,98	396,7	176	114,3	1,3	67,4	101,2	10,3	2	31	20	17	16	25	29	--	5,7	8,6	10,3
37,00	6,9	41,9		0,95	398,5	199	--	--	--	--	--	26	34	24	21	19	27	32	--	11,4	17,2	20,6
37,20	14,7	107,1		1,08	400,6	250	--	--	--	--	--	52	37	28	25	23	31	36	--	24,5	36,8	44,1
37,40	10,2	62,3		1,01	402,6	221	--	--	--	--	--	39	36	26	23	21	29	34	--	17,0	25,5	30,6
37,60	13,7	105,3		1,06	404,7	244	--	--	--	--	--	49	37	27	24	23	31	36	--	22,9	34,3	41,2
37,80	19,6	100,0		1,15	406,9	282	--	--	--	--	--	61	39	29	26	24	33	38	--	32,7	49,0	58,8
38,00	28,4	145,0		1,15	409,2	340	--	--	--	--	--	74	40	31	28	26	35	40	--	47,4	71,1	85,3
38,20	19,6	100,0		1,15	411,4	282	--	--	--	--	--	61	39	29	26	24	33	38	--	32,7	49,0	58,8
38,40	22,5	115,0		1,15	413,7	301	--	--	--	--	--	65	39	30	27	25	34	39	--	37,6	56,4	67,6
38,60	29,4	150,0		1,15	415,9	346	--	--	--	--	--	74	40	31	28	26	35	40	--	49,0	73,5	88,2
38,80	27,4	140,0		1,15	418,2	333	--	--	--	--	--	72	40	31	28	26	35	40	--	45,7	68,6	82,3
39,00	35,3	134,8		1,15	420,4	384	--	--	--	--	--	80	41	32	29	27	36	40	--	58,8	88,2	105,8
39,20	39,2	133,3		1,15	422,7	410	--	--	--	--	--	84	41	32	29	27	37	40	--	65,3	98,0	117,6
39,40	39,2	--		1,15	425,0	410	--	--	--	--	--	84	41	32	29	27	37	40	--	65,3	98,0	117,6

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	3
riferimento	125-2013

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina: 1	
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:	Falda: -2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ'	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
0,20	--	--		1,85	3,6	154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0,40	2,9	32,3		1,85	7,3	173	--	--	--	--	--	94	43	40	37	34	43	29	2,00	4,9	7,4	8,8
0,60	2,5	62,5		1,85	10,9	170	--	--	--	--	--	78	41	37	34	32	41	28	2,00	4,1	6,1	7,4
0,80	0,6	9,0		1,85	14,5	158	29,4	15,2	1,2	1,8	0,9	--	--	--	--	--	--	--	--	--	--	--
1,00	1,0	25,0		1,85	18,1	160	49,0	21,8	8,3	12,5	3,9	--	--	--	--	--	--	--	--	--	--	--
1,20	1,8	30,0		1,85	21,8	166	73,5	28,8	12,5	18,7	5,5	50	37	32	29	27	36	27	--	2,9	4,4	5,3
1,40	2,3	34,3		1,85	25,4	169	--	--	--	--	--	54	38	32	29	27	36	28	2,00	3,8	5,6	6,8
1,60	1,9	12,9		1,85	29,0	166	76,0	20,9	12,9	19,4	5,7	--	--	--	--	--	--	--	--	--	--	--
1,80	2,9	44,8		1,85	32,6	173	--	--	--	--	--	57	38	32	29	27	36	29	2,00	4,9	7,4	8,8
2,00	1,3	17,8		0,93	34,5	162	59,3	12,4	10,1	15,1	4,6	--	--	--	--	--	--	--	--	--	--	--
2,20	1,1	40,7		0,87	36,2	161	52,6	10,0	8,9	13,4	4,2	20	34	27	23	22	30	26	--	1,8	2,7	3,2
2,40	1,6	26,7		0,96	38,0	164	68,2	13,0	11,6	17,4	5,1	--	--	--	--	--	--	--	--	--	--	--
2,60	1,2	20,0		0,92	39,8	162	56,0	9,6	9,6	14,4	4,4	--	--	--	--	--	--	--	--	--	--	--
2,80	1,1	18,3		0,91	41,6	161	52,6	8,4	9,9	14,8	4,2	--	--	--	--	--	--	--	--	--	--	--
3,00	1,1	27,5		0,91	43,4	161	52,6	8,0	10,4	15,6	4,2	--	--	--	--	--	--	--	--	--	--	--
3,20	0,9	19,1		0,88	45,1	160	44,1	6,1	11,9	17,8	3,7	--	--	--	--	--	--	--	--	--	--	--
3,40	1,3	24,5		0,93	47,0	162	59,3	8,4	11,2	16,7	4,6	--	--	--	--	--	--	--	--	--	--	--
3,60	1,1	20,8		0,91	48,7	161	52,6	6,9	12,3	18,4	4,2	--	--	--	--	--	--	--	--	--	--	--
3,80	1,2	30,0		0,88	50,5	162	56,0	7,2	12,6	18,8	4,4	15	33	25	22	21	29	26	--	2,0	2,9	3,5
4,00	1,7	28,3		0,97	52,4	165	70,9	9,2	12,4	18,7	5,3	--	--	--	--	--	--	--	--	--	--	--
4,20	1,0	30,3		0,86	54,1	160	49,0	5,6	14,6	21,9	3,9	7	32	24	21	20	27	26	--	1,6	2,5	2,9
4,40	2,1	77,8		0,85	55,7	167	--	--	--	--	--	32	35	28	25	23	31	27	--	3,4	5,1	6,2
4,60	1,0	18,9		0,90	57,5	160	49,0	5,1	15,8	23,7	3,9	--	--	--	--	--	--	--	--	--	--	--
4,80	1,2	20,0		0,92	59,3	162	56,0	5,8	15,8	23,7	4,4	--	--	--	--	--	--	--	--	--	--	--
5,00	1,6	23,9		0,96	61,2	164	68,2	7,2	15,2	22,8	5,1	--	--	--	--	--	--	--	--	--	--	--
5,20	2,5	22,1		0,94	63,0	170	89,1	9,7	15,3	22,9	7,4	35	35	28	25	23	32	28	--	4,1	6,1	7,4
5,40	2,3	18,1		0,94	64,9	169	85,1	8,8	15,4	23,0	6,8	32	35	27	24	23	31	28	--	3,8	5,6	6,8
5,60	2,0	18,7		0,93	66,7	167	78,4	7,7	16,2	24,3	5,9	26	34	27	23	22	30	27	--	3,3	4,9	5,9
5,80	2,1	21,0		0,93	68,5	167	80,7	7,7	16,6	24,9	6,2	27	35	27	23	22	30	27	--	3,4	5,1	6,2
6,00	2,1	19,6		0,93	70,3	167	80,7	7,5	17,3	25,9	6,2	26	34	27	23	22	30	27	--	3,4	5,1	6,2
6,20	1,7	17,0		0,97	72,2	165	70,9	6,1	19,0	28,5	5,3	--	--	--	--	--	--	--	--	--	--	--
6,40	1,2	16,4		0,92	74,0	162	56,0	4,4	20,7	31,0	4,4	--	--	--	--	--	--	--	--	--	--	--
6,60	1,1	15,1		0,91	75,8	161	52,6	4,0	21,2	31,8	4,2	--	--	--	--	--	--	--	--	--	--	--
6,80	1,2	16,4		0,92	77,6	162	56,0	4,2	21,7	32,5	4,4	--	--	--	--	--	--	--	--	--	--	--
7,00	1,3	16,3		0,93	79,4	162	59,3	4,4	22,2	33,3	4,6	--	--	--	--	--	--	--	--	--	--	--
7,20	1,1	23,4		0,91	81,2	161	52,6	3,6	22,9	34,4	4,2	--	--	--	--	--	--	--	--	--	--	--
7,40	1,9	40,4		0,92	83,0	166	76,0	5,6	22,4	33,6	5,7	19	34	25	22	21	29	27	--	3,1	4,7	5,6
7,60	1,2	30,0		0,88	84,7	162	56,0	3,7	23,9	35,8	4,4	3	32	23	19	18	26	26	--	2,0	2,9	3,5
7,80	1,2	25,5		0,92	86,5	162	56,0	3,6	24,4	36,7	4,4	--	--	--	--	--	--	--	--	--	--	--
8,00	0,9	19,1		0,88	88,3	160	44,1	2,6	23,0	34,4	3,7	--	--	--	--	--	--	--	--	--	--	--
8,20	0,8	17,0		0,86	90,0	159	39,2	2,2	21,5	32,2	3,4	--	--	--	--	--	--	--	--	--	--	--
8,40	1,1	18,3		0,91	91,7	161	52,6	3,1	25,4	38,1	4,2	--	--	--	--	--	--	--	--	--	--	--
8,60	1,2	22,6		0,92	93,5	162	56,0	3,3	26,2	39,3	4,4	--	--	--	--	--	--	--	--	--	--	--
8,80	1,0	21,3		0,90	95,3	160	49,0	2,7	25,2	37,8	3,9	--	--	--	--	--	--	--	--	--	--	--
9,00	1,0	18,9		0,90	97,1	160	49,0	2,7	25,4	38,1	3,9	--	--	--	--	--	--	--	--	--	--	--
9,20	1,2	17,9		0,92	98,9	162	56,0	3,1	27,2	40,9	4,4	--	--	--	--	--	--	--	--	--	--	--
9,40	1,3	21,7		0,93	100,7	162	59,3	3,2	28,1	42,1	4,6	--	--	--	--	--	--	--	--	--	--	--
9,60	1,5	28,3		0,95	102,6	164	65,3	3,6	28,9	43,4	4,9	--	--	--	--	--	--	--	--	--	--	--
9,80	1,1	27,5		0,91	104,3	161	52,6	2,7	27,3	40,9	4,2	--	--	--	--	--	--	--	--	--	--	--
10,00	2,0	20,0		0,93	106,2	167	78,4	4,3	29,6	44,5	5,9	15	33	24	21	20	28	27	--	3,3	4,9	5,9
10,20	8,3	91,4		0,98	108,1	208	--	--	--	--	--	64	39	31	28	27	36	33	--	13,9	20,8	25,0
10,40	8,0	94,3		0,97	110,0	206	--	--	--	--	--	62	39	31	28	26	35	33	--	13,4	20,1	24,1
10,60	8,3	63,9		0,98	111,9	208	--	--	--	--	--	63	39	31	28	26	35	33	--	13,9	20,8	25,0
10,80	7,8	74,8		0,97	113,8	205	--	--	--	--	--	61	39	31	28	26	35	33	--	13,1	19,6	23,5
11,00	8,7	89,0		0,98	115,7	211	--	--	--	--	--	64	39	31	28	26	35	33	--	14,5	21,8	26,2
11,20	9,3	95,0		0,99	117,6	215	--	--	--	--	--	66	39	31	29	27	36	34	--	15,5	23,3	27,9
11,40	11,3	86,5		1,02	119,6	228	--	--	--	--	--	72	40	32	29	28	37	35	--	18,8	28,2	33,8
11,60	11,8	90,2		1,03	121,6	231	--	--	--	--	--	73	40	32	30	28	37	35	--	19,6	29,4	35,3
11,80	14,7	112,8		1,08	123,8	250	--	--	--	--	--	80	41	33	31	29	38	36	--	24,5	36,8	44,1
12,00	14,7	112,8		1,08	125,9	250	--	--	--	--	--	80	41	33	31	29	38	36	--	24,5	36,8	44,1
12,20	14,7	112,8		1,08	128,0	250	--	--	--	--	--	79	41	33	30	28	38	36	--	24,5	36,8	44,1
12,40	11,8	120,0		1,03	130,0	231	--	--	--	--	--	71	40	32	29	27	36	35	--	19,6	29,4	35,3
12,60	8,3	85,0		0,98	131,9	208	--	--	--	--	--	59	38	30	27	26	34	33	--	13,9	20,8	25,0
12,80	9,8	75,2		1,00	133,9	218	--	--	--	--	--	64	39	31	28	26	35	34	--	16,3	24,5	29,4
13,00	9,8	212,8		1,00	135,8	218	--	--	--	--	--	64	39	31	28	26	35	34	--	16,3	24,5	29,4
13,20	9,6	98,0		1,00	137,8	217	--	--	--	--	--	63	39	31	28	26	35	34	--	16,0	24,0	28,8
13,40	11,3	86,5		1,02	139,8	228	--	--	--	--	--	68	39	32	29	27	36	35	--	18,8	28,2	33,8
13,60	13,7	140,0		1,06	141,8	244	--	--	--	--	--	75	40	32	30	28	37	36	--	22,9	34,3	41,2
13,80	16,7	127,8		1,11	144,0	263	--	--	--	--	--	81	41	33	31	29	38	37	--	27,8	41,7	50,0
14,00	16,7	170,0		1,11	146,2	263	--	--	--	--	--	80	41	33	30	28	38	37	--	27,8	41,7	50,0
14,20	15,7	160,0		1,09	148,3	256	--	--	--	--	--	78	41	33	30	28	37	36	--	26,1	39,2	47,0
14,40	16,7	127,8		1,11	150,5	263	--	--	--	--	--	80	41	33	30	28	38	37	--	27,8	41,7	50,0
14,60	21,6	165,4		1,15	152,7	295	--	--	--	--	--	88	42	34	32	29	39	38	--	35,9	53,9	64,7
14,80	21,6	165,4		1,15	155,0	295	--	--	--	--	--	88	42	34	31	29	39	38	--	35,9	53,9	64,7
15,00	14,7	112,8		1,08	157,1	250	--	--	--	--	--	74	40	32	29	28	37	36	--	24,5	36,8	44,1
15,20	9,8	75,2		1,00	159,1	218	--	--	--	--	--	60	38	30	27	26	34	34	--	16,3	24,5	29,4
15,40	7,8	80,0		0,97	160,9	205	--	--	--	--	--	52	38	29	26	24	33	33	--	13,1	19,6	23,5
15,60	16,7	127,8		1,11	163,1	263	--	--	--	--	--	78	41	33	30	28	37	37	--	27,8	41,7	50,0
15,80	14,7	112,8		1,08	165,2	250	--	--	--	--	--	73	40	32	29	27	36	36	--	24,5	36,8	44,1
16,00	16,7	170,0		1,11	167,4	263	--	--	--	--	--	77	41	33	30	28	37	37	--	27,8	41,7	50,0
16,20	15,7	120,3		1,09	169,5	256	--	--	--	--	--	75	40	32	29	27	37	36	--	26,1	39,2	47,0
16,40	14,7	150,0		1,08	171,6	250	--	--	--	--	--	72	40	32	29	27	36	36	--	24,5	36,8	44,1
16,60	16,7	127,8		1,11	173,8	263	--	--	--	--	--	76	40	32	30	28	37	37	--	27,8	41,7	50,0
16,80	14,7	150,0		1,08	175,9	250	--	--	--	--	--	72	40	32	29	27	36	36	--	24,5	36,8	44,1
17,00	17,2	175,0		1,11	178,1	266	--	--	--	--	--	77	40	32	30	28	37	37	--	28,6	42,9	51,5
17,20	17,6	135,3		1,12	180,3	269	--	--	--	--	--	77	41	33	30	28	37	37	--	29,4	44,1	52,9
17,40	15,2	116,5		1,08	182,4	253	--	--	--	--	--	72	40	32	29	27	36	36	--	25,3	38,0	45,6
17,60	16,7	127,8		1,11	184,6	263	--	--	--	--	--	75	40	32	29	27	36	37	--	27,8	41,7	50,0
17,80	11,8	120,0		1,03	186,6	231	--	--	--	--	--	63	39	30	27	26	34	35	--	19,6	29,4	35,3
18,00	11,3	115,0		1,02	188,6	228	--	--	--	--	--	61	39	30	27	25	34	35	--	18,8	28,2	33,8
18,20	15,7	160,0		1,09	190,7	256	--	--	--	--	--	72	40	32	29	27	36	36	--	26,1	39,2	47,0
18,40	17,2	131,6		1,11	192,9	266	--	--	--	--	--	75	40	32	29	27	36	37	--	28,6	42,9	51,5
18,60	17,6	135,3		1,12	195,1	269	--	--	--	--	--	75	40	32	29	27	36	37	--	29,4	44,1	52,9
18,80	19,6	150,4		1,15	197,3	282	--	--	--	--	--	79	41	33	30	28	37	38	--	32,7	49,0	58,8
19,00	24,5	188,0		1,15	199,6	314	--	--	--	--	--	86	42	34	31	29	38	39	--	40,8	61,3	73,5
19,20	27,4	210,5		1,15	201,8	333	--	--	--	--	--	90	42	34	31	29	39	40	--	45,7	68,6	82,3
19,40	27,4	210,5		1,15	204,1	333	--	--	--	--	--	89	42	34	31	29	38	40	--	45,7	68,6	82,3
19,60	23,5	180,5		1,15	206,3	308	--	--	--	--	--	84	41	33	30	28	38	39	--	39,2	58,8	70,6
19,80	24,5	188,0		1,15	208,6	314	--	--	--	--	--	85	41	33	31	29	38	39	--	40,8	61,3	73,5
20,00	21,6	165,4		1,15	210,9	295	--	--	--	--	--	80	41	33	30	28	37	38	--	35,9	53,9	64,7

PROVA PENETROMETRICA STATICA MECCANICA PARAMETRI GEOTECNICI	**CPT**	**3**
	riferimento	**125-2013**

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.:	28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina: 2		
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:	Falda: -2,00 m 2.00	

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
20,00	21,6	165,4		1,15	213,1	295	--	--	--	--	--	80	41	33	30	28	37	38	--	35,9	53,9	64,7
20,20	17,6	135,3		1,12	215,3	269	--	--	--	--	--	73	40	32	29	27	36	37	--	29,4	44,1	52,9
20,40	17,6	135,3		1,12	217,5	269	--	--	--	--	--	73	40	32	29	27	36	37	--	29,4	44,1	52,9
20,60	14,7	112,8		1,08	219,6	250	--	--	--	--	--	66	39	31	28	26	35	36	--	24,5	36,8	44,1
20,80	16,7	127,8		1,11	221,8	263	--	--	--	--	--	70	40	31	28	26	35	37	--	27,8	41,7	50,0
21,00	18,6	142,9		1,14	224,0	276	--	--	--	--	--	74	40	32	29	27	36	37	--	31,0	46,6	55,9
21,20	19,6	150,4		1,15	226,3	282	--	--	--	--	--	75	40	32	29	27	36	38	--	32,7	49,0	58,8
21,40	21,6	165,4		1,15	228,5	295	--	--	--	--	--	78	41	32	29	28	37	38	--	35,9	53,9	64,7
21,60	17,6	90,0		1,12	230,7	269	--	--	--	--	--	71	40	31	28	27	35	37	--	29,4	44,1	52,9
21,80	19,6	150,4		1,15	233,0	282	--	--	--	--	--	75	40	32	29	27	36	38	--	32,7	49,0	58,8
22,00	19,6	150,4		1,15	235,2	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
22,20	17,6	135,3		1,12	237,4	269	--	--	--	--	--	71	40	31	28	26	35	37	--	29,4	44,1	52,9
22,40	17,6	135,3		1,12	239,6	269	--	--	--	--	--	70	40	31	28	26	35	37	--	29,4	44,1	52,9
22,60	17,6	135,3		1,12	241,8	269	--	--	--	--	--	70	40	31	28	26	35	37	--	29,4	44,1	52,9
22,80	17,6	135,3		1,12	244,0	269	--	--	--	--	--	70	40	31	28	26	35	37	--	29,4	44,1	52,9
23,00	19,6	150,4		1,15	246,2	282	--	--	--	--	--	73	40	32	29	27	36	38	--	32,7	49,0	58,8
23,20	23,5	120,0		1,15	248,5	308	--	--	--	--	--	79	41	32	29	28	37	39	--	39,2	58,8	70,6
23,40	26,5	203,0		1,15	250,8	327	--	--	--	--	--	83	41	33	30	28	37	40	--	44,1	66,2	79,4
23,60	24,5	188,0		1,15	253,0	314	--	--	--	--	--	80	41	32	30	28	37	39	--	40,8	61,3	73,5
23,80	19,6	150,4		1,15	255,3	282	--	--	--	--	--	72	40	31	28	27	36	38	--	32,7	49,0	58,8
24,00	17,6	135,3		1,12	257,5	269	--	--	--	--	--	69	39	31	28	26	35	37	--	29,4	44,1	52,9
24,20	16,7	127,8		1,11	259,6	263	--	--	--	--	--	66	39	30	27	26	35	37	--	27,8	41,7	50,0
24,40	19,6	150,4		1,15	261,9	282	--	--	--	--	--	72	40	31	28	26	35	38	--	32,7	49,0	58,8
24,60	20,6	157,9		1,15	264,1	288	--	--	--	--	--	73	40	31	28	27	36	38	--	34,3	51,5	61,7
24,80	17,6	135,3		1,12	266,3	269	--	--	--	--	--	68	39	31	28	26	35	37	--	29,4	44,1	52,9
25,00	16,7	127,8		1,11	268,5	263	--	--	--	--	--	66	39	30	27	26	34	37	--	27,8	41,7	50,0
25,20	16,7	127,8		1,11	270,7	263	--	--	--	--	--	65	39	30	27	26	34	37	--	27,8	41,7	50,0
25,40	18,6	142,9		1,14	272,9	276	--	--	--	--	--	69	40	31	28	26	35	37	--	31,0	46,6	55,9
25,60	19,6	150,4		1,15	275,1	282	--	--	--	--	--	71	40	31	28	26	35	38	--	32,7	49,0	58,8
25,80	20,6	157,9		1,15	277,4	288	--	--	--	--	--	72	40	31	28	26	35	38	--	34,3	51,5	61,7
26,00	24,5	188,0		1,15	279,6	314	--	--	--	--	--	78	41	32	29	27	36	39	--	40,8	61,3	73,5
26,20	26,5	203,0		1,15	281,9	327	--	--	--	--	--	80	41	32	29	28	37	40	--	44,1	66,2	79,4
26,40	27,4	210,5		1,15	284,2	333	--	--	--	--	--	81	41	32	30	28	37	40	--	45,7	68,6	82,3
26,60	27,4	167,7		1,15	286,4	333	--	--	--	--	--	81	41	32	30	28	37	40	--	45,7	68,6	82,3
26,80	31,4	160,0		1,15	288,7	359	--	--	--	--	--	86	42	33	30	28	37	40	--	52,3	78,4	94,1
27,00	29,4	225,6		1,15	290,9	346	--	--	--	--	--	83	41	33	30	28	37	40	--	49,0	73,5	88,2
27,20	27,4	210,5		1,15	293,2	333	--	--	--	--	--	81	41	32	29	28	37	40	--	45,7	68,6	82,3
27,40	24,5	188,0		1,15	295,4	314	--	--	--	--	--	77	40	32	29	27	36	39	--	40,8	61,3	73,5
27,60	27,4	140,0		1,15	297,7	333	--	--	--	--	--	80	41	32	29	27	37	40	--	45,7	68,6	82,3
27,80	29,4	225,6		1,15	299,9	346	--	--	--	--	--	82	41	33	30	28	37	40	--	49,0	73,5	88,2
28,00	26,5	203,0		1,15	302,2	327	--	--	--	--	--	79	41	32	29	27	36	40	--	44,1	66,2	79,4
28,20	27,4	210,5		1,15	304,4	333	--	--	--	--	--	80	41	32	29	27	36	40	--	45,7	68,6	82,3
28,40	24,5	125,0		1,15	306,7	314	--	--	--	--	--	76	40	32	29	27	36	39	--	40,8	61,3	73,5
28,60	29,4	225,6		1,15	308,9	346	--	--	--	--	--	82	41	32	29	28	37	40	--	49,0	73,5	88,2
28,80	27,4	210,5		1,15	311,2	333	--	--	--	--	--	79	41	32	29	27	36	40	--	45,7	68,6	82,3
29,00	23,5	180,5		1,15	313,5	308	--	--	--	--	--	74	40	31	28	26	35	39	--	39,2	58,8	70,6
29,20	24,5	188,0		1,15	315,7	314	--	--	--	--	--	75	40	31	28	27	36	39	--	40,8	61,3	73,5
29,40	24,5	188,0		1,15	318,0	314	--	--	--	--	--	75	40	31	28	27	36	39	--	40,8	61,3	73,5
29,60	27,4	210,5		1,15	320,2	333	--	--	--	--	--	78	41	32	29	27	36	40	--	45,7	68,6	82,3
29,80	18,6	142,9		1,14	322,4	276	--	--	--	--	--	65	39	30	27	25	34	37	--	31,0	46,6	55,9
30,00	19,6	150,4		1,15	324,7	282	--	--	--	--	--	67	39	30	27	25	34	38	--	32,7	49,0	58,8
30,20	21,6	165,4		1,15	326,9	295	--	--	--	--	--	70	40	31	28	26	35	38	--	35,9	53,9	64,7
30,40	21,6	165,4		1,15	329,2	295	--	--	--	--	--	70	40	31	28	26	35	38	--	35,9	53,9	64,7
30,60	22,5	172,9		1,15	331,5	301	--	--	--	--	--	71	40	31	28	26	35	39	--	37,6	56,4	67,6
30,80	24,5	188,0		1,15	333,7	314	--	--	--	--	--	74	40	31	28	26	35	39	--	40,8	61,3	73,5
31,00	24,5	250,0		1,15	336,0	314	--	--	--	--	--	73	40	31	28	26	35	39	--	40,8	61,3	73,5
31,20	25,5	130,0		1,15	338,2	320	--	--	--	--	--	75	40	31	28	26	35	40	--	42,5	63,7	76,4
31,40	26,5	135,0		1,15	340,5	327	--	--	--	--	--	76	40	31	28	27	36	40	--	44,1	66,2	79,4
31,60	29,4	225,6		1,15	342,7	346	--	--	--	--	--	79	41	32	29	27	36	40	--	49,0	73,5	88,2
31,80	27,4	140,0		1,15	345,0	333	--	--	--	--	--	77	40	32	29	27	36	40	--	45,7	68,6	82,3
32,00	26,5	135,0		1,15	347,2	327	--	--	--	--	--	75	40	31	28	27	35	40	--	44,1	66,2	79,4
32,20	29,4	150,0		1,15	349,5	346	--	--	--	--	--	79	41	32	29	27	36	40	--	49,0	73,5	88,2
32,40	29,4	225,6		1,15	351,7	346	--	--	--	--	--	79	41	32	29	27	36	40	--	49,0	73,5	88,2
32,60	27,4	210,5		1,15	354,0	333	--	--	--	--	--	76	40	31	28	27	36	40	--	45,7	68,6	82,3
32,80	32,3	165,0		1,15	356,2	365	--	--	--	--	--	82	41	32	29	27	36	40	--	53,9	80,9	97,0
33,00	29,4	225,6		1,15	358,5	346	--	--	--	--	--	78	41	32	29	27	36	40	--	49,0	73,5	88,2
33,20	34,3	175,0		1,15	360,8	378	--	--	--	--	--	83	41	32	29	28	37	40	--	57,2	85,8	102,9
33,40	36,3	--		1,15	363,0	391	--	--	--	--	--	85	41	33	30	28	37	40	--	60,4	90,7	108,8

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	4
riferimento	125-2013

		U.M.:	MPa	Data esec.:	28/05/2013
Committente:	**PROVINCIA DI MODENA**				
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina:	1		
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:		Falda:	-2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
0,20	--	--		1,85	3,6	154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0,40	3,9	59,7		1,85	7,3	180	--	--	--	--	--	100	43	41	39	36	44	30	2,00	6,5	9,8	11,8
0,60	2,9	15,0		1,85	10,9	173	98,0	98,0	16,7	25,0	8,8	84	41	38	35	33	41	29	--	4,9	7,4	8,8
0,80	2,5	28,7		1,85	14,5	170	89,1	60,7	15,1	22,7	7,4	71	40	35	32	30	39	28	--	4,1	6,1	7,4
1,00	2,2	32,8		1,85	18,1	168	--	--	--	--	--	61	39	34	31	29	38	28	2,00	3,6	5,4	6,5
1,20	1,2	7,8		1,85	21,8	162	56,0	20,5	9,5	14,3	4,4	--	--	--	--	--	--	--	--	--	--	--
1,40	3,1	60,4		1,85	25,4	174	--	--	--	--	--	66	39	34	31	29	38	29	2,00	5,2	7,8	9,4
1,60	2,7	23,3		1,85	29,0	172	94,6	27,5	16,1	24,1	8,2	58	38	32	29	28	37	28	--	4,6	6,9	8,2
1,80	1,7	23,3		1,85	32,6	165	70,9	16,6	12,1	18,1	5,3	--	--	--	--	--	--	--	--	--	--	--
2,00	1,3	16,3		0,93	34,5	162	59,3	12,4	10,1	15,1	4,6	--	--	--	--	--	--	--	--	--	--	--
2,20	1,1	18,3		0,91	36,2	161	52,6	10,0	8,9	13,4	4,2	--	--	--	--	--	--	--	--	--	--	--
2,40	1,2	22,6		0,92	38,0	162	56,0	10,2	9,5	14,3	4,4	--	--	--	--	--	--	--	--	--	--	--
2,60	1,2	30,0		0,88	39,8	162	56,0	9,6	9,6	14,4	4,4	21	34	27	23	22	30	26	--	2,0	2,9	3,5
2,80	0,8	29,6		0,86	41,4	159	39,2	5,9	11,0	16,6	3,4	--	--	--	--	--	--	--	--	--	--	--
3,00	0,9	27,3		0,88	43,2	160	44,1	6,4	11,2	16,7	3,7	--	--	--	--	--	--	--	--	--	--	--
3,20	0,8	24,2		0,86	44,9	159	39,2	5,3	12,3	18,4	3,4	--	--	--	--	--	--	--	--	--	--	--
3,40	1,1	23,4		0,91	46,6	161	52,6	7,3	11,5	17,3	4,2	--	--	--	--	--	--	--	--	--	--	--
3,60	0,9	17,0		0,88	48,4	160	44,1	5,6	13,1	19,6	3,7	--	--	--	--	--	--	--	--	--	--	--
3,80	1,2	30,0		0,88	50,1	162	56,0	7,2	12,4	18,6	4,4	16	33	25	22	21	29	26	--	2,0	2,9	3,5
4,00	1,1	33,3		0,87	51,8	161	52,6	6,4	13,4	20,1	4,2	12	33	25	22	20	28	26	--	1,8	2,7	3,2
4,20	1,3	21,7		0,93	53,6	162	59,3	7,1	13,4	20,1	4,6	--	--	--	--	--	--	--	--	--	--	--
4,40	1,3	17,8		0,93	55,4	162	59,3	6,8	14,0	21,1	4,6	--	--	--	--	--	--	--	--	--	--	--
4,60	1,4	42,4		0,89	57,2	163	62,4	7,0	14,3	21,5	4,7	18	33	26	22	21	29	26	--	2,3	3,4	4,1
4,80	1,7	36,2		0,91	58,9	165	70,9	7,9	14,2	21,3	5,3	23	34	26	23	22	30	27	--	2,8	4,2	5,0
5,00	1,6	23,9		0,96	60,8	164	68,2	7,2	15,1	22,6	5,1	--	--	--	--	--	--	--	--	--	--	--
5,20	2,2	41,5		0,86	62,5	168	--	--	--	--	--	31	35	27	24	23	31	28	--	3,6	5,4	6,5
5,40	2,1	35,0		0,85	64,2	167	--	--	--	--	--	29	35	27	24	22	31	27	--	3,4	5,1	6,2
5,60	2,2	23,7		0,93	66,0	168	82,9	8,4	15,7	23,6	6,5	30	35	27	24	22	31	28	--	3,6	5,4	6,5
5,80	1,9	19,0		0,99	67,9	166	76,0	7,2	16,9	25,3	5,7	--	--	--	--	--	--	--	--	--	--	--
6,00	2,3	21,5		0,94	69,8	169	85,1	8,0	16,7	25,1	6,8	30	35	27	24	22	31	28	--	3,8	5,6	6,8
6,20	2,0	18,7		0,93	71,6	167	78,4	7,0	17,9	26,9	5,9	24	34	26	23	22	30	27	--	3,3	4,9	5,9
6,40	1,4	15,1		0,94	73,4	163	62,4	5,1	20,2	30,3	4,7	--	--	--	--	--	--	--	--	--	--	--
6,60	1,2	12,9		0,92	75,2	162	56,0	4,3	21,0	31,5	4,4	--	--	--	--	--	--	--	--	--	--	--
6,80	1,5	16,1		0,95	77,1	164	65,3	5,1	21,2	31,8	4,9	--	--	--	--	--	--	--	--	--	--	--
7,00	2,0	18,7		0,93	78,9	167	78,4	6,2	20,6	31,0	5,9	22	34	26	23	21	29	27	--	3,3	4,9	5,9
7,20	1,7	18,3		0,97	80,8	165	70,9	5,3	22,1	33,1	5,3	--	--	--	--	--	--	--	--	--	--	--
7,40	1,2	16,4		0,92	82,6	162	56,0	3,9	23,2	34,8	4,4	--	--	--	--	--	--	--	--	--	--	--
7,60	1,2	36,4		0,88	84,3	162	56,0	3,8	23,8	35,7	4,4	3	32	23	20	18	26	26	--	2,0	2,9	3,5
7,80	4,7	44,9		0,91	86,1	185	--	--	--	--	--	50	37	30	27	25	34	31	--	7,8	11,8	14,1
8,00	1,7	32,1		0,91	87,9	165	70,9	4,8	24,4	36,6	5,3	14	33	24	21	20	28	27	--	2,8	4,2	5,0
8,20	1,5	22,4		0,95	89,8	164	65,3	4,2	25,1	37,6	4,9	--	--	--	--	--	--	--	--	--	--	--
8,40	1,5	37,5		0,89	91,5	164	65,3	4,1	25,6	38,3	4,9	8	32	24	20	19	27	27	--	2,5	3,7	4,4
8,60	1,3	32,5		0,88	93,2	162	59,3	3,6	26,3	39,5	4,6	3	32	23	19	18	26	26	--	2,1	3,2	3,8
8,80	1,1	33,3		0,87	94,9	161	52,6	3,0	25,9	38,9	4,2	--	31	22	18	17	25	26	--	1,8	2,7	3,2
9,00	1,1	40,7		0,87	96,6	161	52,6	2,9	26,2	39,3	4,2	--	31	22	18	17	25	26	--	1,8	2,7	3,2
9,20	1,1	20,8		0,91	98,4	161	52,6	2,9	26,5	39,7	4,2	--	--	--	--	--	--	--	--	--	--	--
9,40	0,9	33,3		0,85	100,1	160	44,1	2,3	24,1	36,1	3,7	--	31	21	17	16	25	26	--	1,5	2,2	2,6
9,60	1,2	36,4		0,88	101,8	162	56,0	3,0	27,7	41,6	4,4	--	31	22	19	18	25	26	--	2,0	2,9	3,5
9,80	1,4	20,9		0,94	103,7	163	62,4	3,3	29,0	43,6	4,7	--	--	--	--	--	--	--	--	--	--	--
10,00	1,3	24,5		0,93	105,5	162	59,3	3,1	29,0	43,5	4,6	--	--	--	--	--	--	--	--	--	--	--
10,20	2,2	22,0		0,93	107,3	168	82,9	4,5	29,9	44,9	6,5	18	33	25	21	20	28	28	--	3,6	5,4	6,5
10,40	5,9	75,0		0,93	109,1	192	--	--	--	--	--	52	37	30	27	25	34	32	--	9,8	14,7	17,6
10,60	7,8	80,0		0,97	111,0	205	--	--	--	--	--	61	39	31	28	26	35	33	--	13,1	19,6	23,5
10,80	8,3	63,9		0,98	112,9	208	--	--	--	--	--	63	39	31	28	26	35	33	--	13,9	20,8	25,0
11,00	10,8	82,7		1,02	114,9	224	--	--	--	--	--	71	40	32	29	28	37	34	--	18,0	27,0	32,3
11,20	9,8	114,9		1,00	116,9	218	--	--	--	--	--	68	39	32	29	27	36	34	--	16,3	24,5	29,4
11,40	9,0	92,0		0,99	118,8	213	--	--	--	--	--	64	39	31	28	27	35	33	--	15,0	22,5	27,0
11,60	8,8	67,7		0,98	120,8	212	--	--	--	--	--	63	39	31	28	26	35	33	--	14,7	22,1	26,5
11,80	12,7	97,7		1,05	122,8	237	--	--	--	--	--	75	40	33	30	28	37	35	--	21,2	31,9	38,2
12,00	11,8	120,0		1,03	124,8	231	--	--	--	--	--	72	40	32	29	28	37	35	--	19,6	29,4	35,3
12,20	12,3	125,0		1,04	126,9	234	--	--	--	--	--	73	40	32	30	28	37	35	--	20,4	30,6	36,8
12,40	8,3	85,0		0,98	128,8	208	--	--	--	--	--	60	38	30	27	26	35	33	--	13,9	20,8	25,0
12,60	11,3	115,0		1,02	130,8	228	--	--	--	--	--	70	40	32	29	27	36	35	--	18,8	28,2	33,8
12,80	16,7	170,0		1,11	132,9	263	--	--	--	--	--	83	41	34	31	29	38	37	--	27,8	41,7	50,0
13,00	15,7	160,0		1,09	135,1	256	--	--	--	--	--	80	41	33	31	29	38	36	--	26,1	39,2	47,0
13,20	15,7	120,3		1,09	137,2	256	--	--	--	--	--	80	41	33	30	28	38	36	--	26,1	39,2	47,0
13,40	14,7	112,8		1,08	139,3	250	--	--	--	--	--	77	41	33	30	28	37	36	--	24,5	36,8	44,1
13,60	16,7	127,8		1,11	141,5	263	--	--	--	--	--	81	41	33	31	29	38	37	--	27,8	41,7	50,0
13,80	17,6	180,0		1,12	143,7	269	--	--	--	--	--	83	41	34	31	29	38	37	--	29,4	44,1	52,9
14,00	16,7	127,8		1,11	145,8	263	--	--	--	--	--	81	41	33	30	28	38	37	--	27,8	41,7	50,0
14,20	14,7	112,8		1,08	147,9	250	--	--	--	--	--	76	40	33	30	28	37	36	--	24,5	36,8	44,1
14,40	12,7	97,7		1,05	150,0	237	--	--	--	--	--	71	40	32	29	27	36	35	--	21,2	31,9	38,2
14,60	9,8	75,2		1,00	151,9	218	--	--	--	--	--	61	39	30	27	26	35	34	--	16,3	24,5	29,4
14,80	12,7	97,7		1,05	154,0	237	--	--	--	--	--	70	40	32	29	27	36	35	--	21,2	31,9	38,2
15,00	21,6	165,4		1,15	156,3	295	--	--	--	--	--	88	42	34	31	29	39	38	--	35,9	53,9	64,7
15,20	23,5	180,5		1,15	158,5	308	--	--	--	--	--	90	42	35	32	30	39	39	--	39,2	58,8	70,6
15,40	21,6	165,4		1,15	160,8	295	--	--	--	--	--	87	42	34	31	29	38	38	--	35,9	53,9	64,7
15,60	20,6	157,9		1,15	163,0	288	--	--	--	--	--	85	41	34	31	29	38	38	--	34,3	51,5	61,7
15,80	23,5	180,5		1,15	165,3	308	--	--	--	--	--	89	42	34	32	30	39	39	--	39,2	58,8	70,6
16,00	22,5	172,9		1,15	167,5	301	--	--	--	--	--	88	42	34	31	29	38	39	--	37,6	56,4	67,6
16,20	17,6	135,3		1,12	169,7	269	--	--	--	--	--	79	41	33	30	28	37	37	--	29,4	44,1	52,9
16,40	22,5	172,9		1,15	172,0	301	--	--	--	--	--	87	42	34	31	29	38	39	--	37,6	56,4	67,6
16,60	22,5	115,0		1,15	174,2	301	--	--	--	--	--	87	42	34	31	29	38	39	--	37,6	56,4	67,6
16,80	19,6	150,4		1,15	176,5	282	--	--	--	--	--	81	41	33	30	28	38	38	--	32,7	49,0	58,8
17,00	21,6	165,4		1,15	178,7	295	--	--	--	--	--	84	41	34	31	29	38	38	--	35,9	53,9	64,7
17,20	19,6	200,0		1,15	181,0	282	--	--	--	--	--	81	41	33	30	28	37	38	--	32,7	49,0	58,8
17,40	15,7	120,3		1,09	183,1	256	--	--	--	--	--	73	40	32	29	27	36	36	--	26,1	39,2	47,0
17,60	11,8	90,2		1,03	185,1	231	--	--	--	--	--	63	39	30	27	26	34	35	--	19,6	29,4	35,3
17,80	11,8	90,2		1,03	187,2	231	--	--	--	--	--	62	39	30	27	26	34	35	--	19,6	29,4	35,3
18,00	13,7	105,3		1,06	189,2	244	--	--	--	--	--	67	39	31	28	26	35	36	--	22,9	34,3	41,2
18,20	9,8	100,0		1,00	191,2	218	--	--	--	--	--	56	38	29	26	25	33	34	--	16,3	24,5	29,4
18,40	10,8	110,0		1,02	193,2	224	--	--	--	--	--	59	38	30	27	25	34	34	--	18,0	27,0	32,3
18,60	10,3	105,0		1,01	195,2	221	--	--	--	--	--	57	38	29	26	25	33	34	--	17,2	25,7	30,9
18,80	10,3	78,9		1,01	197,1	221	--	--	--	--	--	57	38	29	26	25	33	34	--	17,2	25,7	30,9
19,00	11,8	90,2		1,03	199,2	231	--	--	--	--	--	61	39	30	27	25	34	35	--	19,6	29,4	35,3
19,20	11,8	120,0		1,03	201,2	231	--	--	--	--	--	61	39	30	27	25	34	35	--	19,6	29,4	35,3
19,40	16,7	127,8		1,11	203,4	263	--	--	--	--	--	72	40	32	29	27	36	37	--	27,8	41,7	50,0
19,60	23,5	180,5		1,15	205,6	308	--	--	--	--	--	84	41	33	30	28	38	39	--	39,2	58,8	70,6
19,80	15,7	120,3		1,09	207,7	256	--	--	--	--	--	70	40	31	28	26	35	36	--	26,1	39,2	47,0
20,00	14,7	112,8		1,08	209,8	250	--	--	--	--	--	67	39	31	28	26	35	36	--	24,5	36,8	44,1

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	4
riferimento	**125-2013**

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 28/05/2013
Cantiere:	**MIRANDOLA Istituto Galilei**	Pagina: 2	
Località:	**MIRANDOLA Istituto Galilei**	Elaborato:	Falda: -2,00 m 2.00

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ'	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
20,00	14,7	112,8		1,08	213,0	250	--	--	--	--	--	67	39	31	28	26	35	36	--	24,5	36,8	44,1
20,20	16,7	127,8		1,11	215,1	263	--	--	--	--	--	71	40	31	28	27	36	37	--	27,8	41,7	50,0
20,40	19,6	150,4		1,15	217,4	282	--	--	--	--	--	76	40	32	29	27	36	38	--	32,7	49,0	58,8
20,60	22,5	172,9		1,15	219,6	301	--	--	--	--	--	81	41	33	30	28	37	39	--	37,6	56,4	67,6
20,80	22,5	115,0		1,15	221,9	301	--	--	--	--	--	81	41	33	30	28	37	39	--	37,6	56,4	67,6
21,00	19,6	150,4		1,15	224,1	282	--	--	--	--	--	76	40	32	29	27	36	38	--	32,7	49,0	58,8
21,20	22,5	172,9		1,15	226,4	301	--	--	--	--	--	80	41	33	30	28	37	39	--	37,6	56,4	67,6
21,40	24,5	188,0		1,15	228,7	314	--	--	--	--	--	83	41	33	30	28	37	39	--	40,8	61,3	73,5
21,60	24,5	125,0		1,15	230,9	314	--	--	--	--	--	83	41	33	30	28	37	39	--	40,8	61,3	73,5
21,80	29,4	225,6		1,15	233,2	346	--	--	--	--	--	89	42	34	31	29	38	40	--	49,0	73,5	88,2
22,00	24,5	188,0		1,15	235,4	314	--	--	--	--	--	82	41	33	30	28	37	39	--	40,8	61,3	73,5
22,20	19,6	150,4		1,15	237,7	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
22,40	19,6	150,4		1,15	239,9	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
22,60	22,5	172,9		1,15	242,2	301	--	--	--	--	--	79	41	32	29	27	37	39	--	37,6	56,4	67,6
22,80	19,6	150,4		1,15	244,4	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
23,00	21,1	161,7		1,15	246,7	292	--	--	--	--	--	76	40	32	29	27	36	38	--	35,1	52,7	63,2
23,20	32,3	248,1		1,15	248,9	365	--	--	--	--	--	90	42	34	31	29	38	40	--	53,9	80,9	97,0
23,40	22,5	172,9		1,15	251,2	301	--	--	--	--	--	78	41	32	29	27	36	39	--	37,6	56,4	67,6
23,60	17,6	135,3		1,12	253,4	269	--	--	--	--	--	69	40	31	28	26	35	37	--	29,4	44,1	52,9
23,80	16,7	170,0		1,11	255,6	263	--	--	--	--	--	67	39	31	28	26	35	37	--	27,8	41,7	50,0
24,00	16,7	85,0		1,11	257,7	263	--	--	--	--	--	67	39	30	27	26	35	37	--	27,8	41,7	50,0
24,20	23,5	180,5		1,15	260,0	308	--	--	--	--	--	78	41	32	29	27	36	39	--	39,2	58,8	70,6
24,40	23,5	143,7		1,15	262,2	308	--	--	--	--	--	78	41	32	29	27	36	39	--	39,2	58,8	70,6
24,60	20,6	105,0		1,15	264,5	288	--	--	--	--	--	73	40	31	28	27	36	38	--	34,3	51,5	61,7
24,80	29,4	225,6		1,15	266,7	346	--	--	--	--	--	85	41	33	30	28	38	40	--	49,0	73,5	88,2
25,00	27,4	210,5		1,15	269,0	333	--	--	--	--	--	83	41	33	30	28	37	40	--	45,7	68,6	82,3
25,20	22,5	172,9		1,15	271,2	301	--	--	--	--	--	76	40	32	29	27	36	39	--	37,6	56,4	67,6
25,40	24,5	188,0		1,15	273,5	314	--	--	--	--	--	78	41	32	29	27	36	39	--	40,8	61,3	73,5
25,60	23,5	180,5		1,15	275,8	308	--	--	--	--	--	77	40	32	29	27	36	39	--	39,2	58,8	70,6
25,80	19,6	150,4		1,15	278,0	282	--	--	--	--	--	70	40	31	28	26	35	38	--	32,7	49,0	58,8
26,00	17,6	135,3		1,12	280,2	269	--	--	--	--	--	67	39	30	27	26	34	37	--	29,4	44,1	52,9
26,20	19,6	150,4		1,15	282,5	282	--	--	--	--	--	70	40	31	28	26	35	38	--	32,7	49,0	58,8
26,40	23,5	180,5		1,15	284,7	308	--	--	--	--	--	76	40	32	29	27	36	39	--	39,2	58,8	70,6
26,60	26,5	203,0		1,15	287,0	327	--	--	--	--	--	80	41	32	29	27	37	40	--	44,1	66,2	79,4
26,80	23,5	180,5		1,15	289,2	308	--	--	--	--	--	76	40	32	29	27	36	39	--	39,2	58,8	70,6
27,00	20,6	157,9		1,15	291,5	288	--	--	--	--	--	71	40	31	28	26	35	38	--	34,3	51,5	61,7
27,20	17,6	135,3		1,12	293,7	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
27,40	17,6	135,3		1,12	295,9	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
27,60	14,7	75,0		1,08	298,0	250	--	--	--	--	--	59	38	29	26	24	33	36	--	24,5	36,8	44,1
27,80	29,4	225,6		1,15	300,2	346	--	--	--	--	--	82	41	33	30	28	37	40	--	49,0	73,5	88,2
28,00	32,3	248,1		1,15	302,5	365	--	--	--	--	--	86	42	33	30	28	37	40	--	53,9	80,9	97,0
28,20	17,6	135,3		1,12	304,7	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
28,40	19,6	150,4		1,15	306,9	282	--	--	--	--	--	68	39	30	27	26	34	38	--	32,7	49,0	58,8
28,60	22,5	172,9		1,15	309,2	301	--	--	--	--	--	73	40	31	28	26	35	39	--	37,6	56,4	67,6
28,80	23,5	180,5		1,15	311,4	308	--	--	--	--	--	74	40	31	28	26	35	39	--	39,2	58,8	70,6
29,00	26,5	203,0		1,15	313,7	327	--	--	--	--	--	78	41	32	29	27	36	40	--	44,1	66,2	79,4
29,20	16,7	85,0		1,11	315,9	263	--	--	--	--	--	62	39	29	26	25	33	37	--	27,8	41,7	50,0
29,40	32,3	165,0		1,15	318,1	365	--	--	--	--	--	84	41	33	30	28	37	40	--	53,9	80,9	97,0
29,60	29,4	179,6		1,15	320,4	346	--	--	--	--	--	81	41	32	29	27	37	40	--	49,0	73,5	88,2
29,80	24,5	125,0		1,15	322,6	314	--	--	--	--	--	74	40	31	28	27	35	39	--	40,8	61,3	73,5
30,00	29,4	225,6		1,15	324,9	346	--	--	--	--	--	80	41	32	29	27	36	40	--	49,0	73,5	88,2
30,20	27,4	210,5		1,15	327,1	333	--	--	--	--	--	78	41	32	29	27	36	40	--	45,7	68,6	82,3
30,40	24,5	188,0		1,15	329,4	314	--	--	--	--	--	74	40	31	28	26	35	39	--	40,8	61,3	73,5
30,60	19,6	150,4		1,15	331,6	282	--	--	--	--	--	66	39	30	27	25	34	38	--	32,7	49,0	58,8
30,80	27,4	140,0		1,15	333,9	333	--	--	--	--	--	77	41	32	29	27	36	40	--	45,7	68,6	82,3
31,00	29,4	225,6		1,15	336,1	346	--	--	--	--	--	80	41	32	29	27	36	40	--	49,0	73,5	88,2
31,20	17,6	135,3		1,12	338,3	269	--	--	--	--	--	62	39	29	26	25	33	37	--	29,4	44,1	52,9
31,40	17,6	135,3		1,12	340,5	269	--	--	--	--	--	62	39	29	26	25	33	37	--	29,4	44,1	52,9
31,60	17,6	135,3		1,12	342,7	269	--	--	--	--	--	62	39	29	26	25	33	37	--	29,4	44,1	52,9
31,80	17,6	135,3		1,12	344,9	269	--	--	--	--	--	61	39	29	26	25	33	37	--	29,4	44,1	52,9
32,00	23,5	180,5		1,15	347,2	308	--	--	--	--	--	71	40	31	28	26	35	39	--	39,2	58,8	70,6
32,20	17,6	135,3		1,12	349,4	269	--	--	--	--	--	61	39	29	26	25	33	37	--	29,4	44,1	52,9
32,40	14,7	150,0		1,08	351,5	250	--	--	--	--	--	55	38	28	25	24	32	36	--	24,5	36,8	44,1
32,60	16,7	127,8		1,11	353,6	263	--	--	--	--	--	59	38	29	26	24	33	37	--	27,8	41,7	50,0
32,80	26,5	203,0		1,15	355,9	327	--	--	--	--	--	75	40	31	28	26	35	40	--	44,1	66,2	79,4
33,00	27,4	140,0		1,15	358,2	333	--	--	--	--	--	76	40	31	28	27	35	40	--	45,7	68,6	82,3
33,20	29,4	150,0		1,15	360,4	346	--	--	--	--	--	78	41	32	29	27	36	40	--	49,0	73,5	88,2
33,40	31,4	160,0		1,15	362,7	359	--	--	--	--	--	80	41	32	29	27	36	40	--	52,3	78,4	94,1
33,60	19,6	150,4		1,15	364,9	282	--	--	--	--	--	64	39	30	27	25	34	38	--	32,7	49,0	58,8
33,80	23,5	180,5		1,15	367,2	308	--	--	--	--	--	70	40	30	27	26	34	39	--	39,2	58,8	70,6
34,00	22,5	172,9		1,15	369,4	301	--	--	--	--	--	68	39	30	27	25	34	39	--	37,6	56,4	67,6
34,20	23,5	120,0		1,15	371,7	308	--	--	--	--	--	70	40	30	27	26	34	39	--	39,2	58,8	70,6
34,40	29,4	150,0		1,15	373,9	346	--	--	--	--	--	77	40	31	28	27	36	40	--	49,0	73,5	88,2
34,60	32,3	165,0		1,15	376,2	365	--	--	--	--	--	80	41	32	29	27	36	40	--	53,9	80,9	97,0
34,80	29,4	150,0		1,15	378,4	346	--	--	--	--	--	77	40	31	28	27	36	40	--	49,0	73,5	88,2
35,00	24,5	188,0		1,15	380,7	314	--	--	--	--	--	70	40	30	27	26	35	39	--	40,8	61,3	73,5
35,20	19,6	100,0		1,15	382,9	282	--	--	--	--	--	63	39	29	26	25	33	38	--	32,7	49,0	58,8
35,40	2,9	44,8		0,88	384,7	173	--	--	--	--	--	--	31	20	16	16	25	29	--	4,9	7,4	8,8
35,60	3,9	121,2		0,90	386,4	180	--	--	--	--	--	7	32	21	18	17	25	30	--	6,5	9,8	11,8
35,80	3,9	100,0		0,90	388,2	180	--	--	--	--	--	7	32	21	18	17	25	30	--	6,5	9,8	11,8
36,00	3,9	100,0		0,90	390,0	180	--	--	--	--	--	7	32	21	18	17	25	30	--	6,5	9,8	11,8
36,20	3,9	20,0		1,00	391,9	180	130,7	1,6	75,7	113,6	11,8	7	32	21	18	17	25	30	--	6,5	9,8	11,8
36,40	2,5	15,6		0,95	393,8	171	91,0	1,0	54,6	81,9	7,6	--	31	19	16	15	25	28	--	4,2	6,4	7,6
36,60	4,4	22,5		1,00	395,7	183	147,0	1,8	83,7	125,5	13,2	10	33	22	18	17	25	31	--	7,4	11,0	13,2
36,80	5,9	30,0		1,02	397,7	192	196,0	2,6	102,7	154,0	17,6	20	34	23	20	19	26	32	--	9,8	14,7	17,6
37,00	5,4	55,0		0,93	399,5	189	--	--	--	--	--	17	33	23	19	18	26	31	--	9,0	13,5	16,2
37,20	10,8	82,7		1,02	401,5	224	--	--	--	--	--	41	36	26	23	22	30	34	--	18,0	27,0	32,3
37,40	7,8	60,2		0,97	403,4	205	--	--	--	--	--	30	35	25	21	20	28	33	--	13,1	19,6	23,5
37,60	10,8	82,7		1,02	405,4	224	--	--	--	--	--	41	36	26	23	22	30	34	--	18,0	27,0	32,3
37,80	14,7	75,0		1,08	407,5	250	--	--	--	--	--	51	37	28	24	23	31	36	--	24,5	36,8	44,1
38,00	29,4	150,0		1,15	409,8	346	--	--	--	--	--	75	40	31	28	26	35	40	--	49,0	73,5	88,2
38,20	34,3	175,0		1,15	412,0	378	--	--	--	--	--	80	41	32	29	27	36	40	--	57,2	85,8	102,9
38,40	34,3	175,0		1,15	414,3	378	--	--	--	--	--	80	41	32	29	27	36	40	--	57,2	85,8	102,9
38,60	34,3	263,2		1,15	416,5	378	--	--	--	--	--	80	41	32	29	27	36	40	--	57,2	85,8	102,9
38,80	32,3	248,1		1,15	418,8	365	--	--	--	--	--	78	41	31	28	27	36	40	--	53,9	80,9	97,0
39,00	34,3	263,2		1,15	421,0	378	--	--	--	--	--	79	41	32	29	27	36	40	--	57,2	85,8	102,9
39,20	37,2	285,7		1,15	423,3	397	--	--	--	--	--	82	41	32	29	27	36	40	--	62,1	93,1	111,7
39,40	37,2	190,0		1,15	425,6	397	--	--	--	--	--	82	41	32	29	27	36	40	--	62,1	93,1	111,7
39,60	39,2	--		1,15	427,8	410	--	--	--	--	--	84	41	32	29	27	36	40	--	65,3	98,0	117,6

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	4
riferimento	089-2012

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 01/08/2012
Cantiere:	**MIRANDOLA Istituto LUOSI**	Pagina: 1	
Località:	**MIRANDOLA Istituto LUOSI**	Elaborato:	Falda:

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ'	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
0,20	--	--		1,85	3,6	154	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0,40	24,5	125,0		1,85	7,3	314	--	--	--	--	--	100	43	50	48	45	45	39	--	40,8	61,3	73,5
0,60	26,5	203,0		1,85	10,9	327	--	--	--	--	--	100	43	48	46	43	45	40	--	44,1	66,2	79,4
0,80	9,8	75,2		1,85	14,5	218	--	--	--	--	--	100	43	42	40	37	45	34	--	16,3	24,5	29,4
1,00	3,9	46,0		1,85	18,1	180	--	--	--	--	--	82	41	36	34	31	40	30	--	6,5	9,8	11,8
1,20	4,1	62,7		1,85	21,8	181	--	--	--	--	--	79	41	36	33	31	40	30	--	6,9	10,3	12,3
1,40	3,9	43,0		1,85	25,4	180	--	--	--	--	--	73	40	35	32	30	39	30	--	6,5	9,8	11,8
1,60	2,4	25,8		1,85	29,0	169	87,1	24,8	14,8	22,2	7,1	53	38	32	29	27	36	28	--	3,9	5,9	7,1
1,80	1,6	20,0		1,85	32,6	164	68,2	15,8	11,6	17,4	5,1	--	--	--	--	--	--	--	--	--	--	--
2,00	2,1	31,3		1,85	36,3	167	--	--	--	--	--	43	36	30	27	25	34	27	--	3,4	5,1	6,2
2,20	4,9	37,6		1,85	39,9	186	--	--	--	--	--	70	40	34	31	29	38	31	--	8,2	12,3	14,7
2,40	7,8	54,4		1,85	43,5	205	--	--	--	--	--	84	41	36	33	31	40	33	--	13,1	19,6	23,5
2,60	2,9	22,6		1,85	47,1	173	98,0	15,7	16,7	25,0	8,8	48	37	30	27	26	34	29	--	4,9	7,4	8,8
2,80	1,8	26,9		1,85	50,8	166	73,5	10,0	12,5	18,7	5,5	--	--	--	--	--	--	--	--	--	--	--
3,00	2,0	25,0		1,85	54,4	167	78,4	9,9	13,3	20,0	5,9	31	35	28	24	23	31	27	--	3,3	4,9	5,9
3,20	2,1	26,3		1,85	58,0	167	80,7	9,5	13,9	20,9	6,2	31	35	28	24	23	31	27	--	3,4	5,1	6,2
3,40	1,2	16,4		1,85	61,6	162	56,0	5,6	16,7	25,0	4,4	--	--	--	--	--	--	--	--	--	--	--
3,60	1,4	26,4		1,85	65,3	163	62,4	5,9	17,3	26,0	4,7	--	--	--	--	--	--	--	--	--	--	--
3,80	2,2	32,8		1,85	68,9	168	--	--	--	--	--	29	35	27	24	22	30	28	--	3,6	5,4	6,5
4,00	1,0	16,7		1,85	72,5	160	49,0	3,8	20,4	30,6	3,9	--	--	--	--	--	--	--	--	--	--	--
4,20	1,4	19,2		1,85	76,1	163	62,4	4,9	21,1	31,6	4,7	--	--	--	--	--	--	--	--	--	--	--
4,40	1,3	21,7		1,85	79,8	162	59,3	4,3	22,3	33,4	4,6	--	--	--	--	--	--	--	--	--	--	--
4,60	1,7	23,3		1,85	83,4	165	70,9	5,1	22,9	34,4	5,3	--	--	--	--	--	--	--	--	--	--	--
4,80	1,9	16,8		1,85	87,0	166	76,0	5,3	23,8	35,7	5,7	--	--	--	--	--	--	--	--	--	--	--
5,00	2,0	18,7		1,85	90,7	167	78,4	5,2	24,8	37,2	5,9	19	33	25	22	21	28	27	--	3,3	4,9	5,9
5,20	1,9	20,4		1,85	94,3	166	76,0	4,8	26,2	39,2	5,7	--	--	--	--	--	--	--	--	--	--	--
5,40	2,1	17,5		1,85	97,9	167	80,7	4,9	27,1	40,6	6,2	18	33	25	22	20	28	27	--	3,4	5,1	6,2
5,60	2,0	25,0		1,85	101,5	167	78,4	4,5	28,3	42,4	5,9	16	33	24	21	20	28	27	--	3,3	4,9	5,9
5,80	1,8	24,7		1,85	105,2	166	73,5	4,0	29,3	44,0	5,5	--	--	--	--	--	--	--	--	--	--	--
6,00	1,7	19,5		1,85	108,8	165	70,9	3,7	30,7	46,1	5,3	--	--	--	--	--	--	--	--	--	--	--
6,20	1,7	19,5		1,85	112,4	165	70,9	3,5	31,7	47,6	5,3	--	--	--	--	--	--	--	--	--	--	--
6,40	1,9	16,8		1,85	116,0	166	76,0	3,7	32,7	49,1	5,7	--	--	--	--	--	--	--	--	--	--	--
6,60	1,8	18,0		1,85	119,7	166	73,5	3,4	33,7	50,5	5,5	--	--	--	--	--	--	--	--	--	--	--
6,80	1,5	31,9		1,85	123,3	164	65,3	2,8	33,1	49,6	4,9	1	31	22	19	18	25	27	--	2,5	3,7	4,4
7,00	2,0	37,7		1,85	126,9	167	78,4	3,4	35,7	53,6	5,9	10	32	23	20	19	27	27	--	3,3	4,9	5,9
7,20	1,9	70,4		1,85	130,5	166	76,0	3,2	36,3	54,4	5,7	8	32	23	20	19	26	27	--	3,1	4,7	5,6
7,40	1,7	36,2		1,85	134,2	165	70,9	2,8	35,9	53,9	5,3	3	32	22	19	18	25	27	--	2,8	4,2	5,0
7,60	1,1	40,7		1,85	137,8	161	52,6	1,9	29,8	44,6	4,2	--	31	20	16	16	25	26	--	1,8	2,7	3,2
7,80	0,8	29,6		1,85	141,4	159	39,2	1,3	23,2	34,8	3,4	--	--	--	--	--	--	--	--	--	--	--
8,00	0,8	20,0		1,85	145,0	159	39,2	1,2	23,3	34,9	3,4	--	--	--	--	--	--	--	--	--	--	--
8,20	1,0	16,7		1,85	148,7	160	49,0	1,6	28,4	42,7	3,9	--	--	--	--	--	--	--	--	--	--	--
8,40	1,1	16,4		1,85	152,3	161	52,6	1,7	30,3	45,5	4,2	--	--	--	--	--	--	--	--	--	--	--
8,60	1,0	16,7		1,85	155,9	160	49,0	1,5	28,6	42,9	3,9	--	--	--	--	--	--	--	--	--	--	--
8,80	1,4	23,3		1,85	159,5	163	62,4	1,9	35,1	52,7	4,7	--	--	--	--	--	--	--	--	--	--	--
9,00	1,5	22,4		1,85	163,2	164	65,3	2,0	36,6	54,9	4,9	--	--	--	--	--	--	--	--	--	--	--
9,20	1,0	13,7		1,85	166,8	160	49,0	1,4	28,8	43,3	3,9	--	--	--	--	--	--	--	--	--	--	--
9,40	1,4	16,1		1,85	170,4	163	62,4	1,8	35,6	53,4	4,7	--	--	--	--	--	--	--	--	--	--	--
9,60	1,5	22,4		1,85	174,0	164	65,3	1,8	37,1	55,7	4,9	--	--	--	--	--	--	--	--	--	--	--
9,80	7,4	75,0		1,85	177,7	202	--	--	--	--	--	48	37	28	25	24	32	32	--	12,3	18,4	22,1
10,00	9,8	100,0		1,85	181,3	218	--	--	--	--	--	57	38	30	27	25	34	34	--	16,3	24,5	29,4
10,20	11,3	115,0		1,85	184,9	228	--	--	--	--	--	61	39	30	27	25	34	35	--	18,8	28,2	33,8
10,40	10,3	105,0		1,85	188,6	221	--	--	--	--	--	58	38	30	27	25	34	34	--	17,2	25,7	30,9
10,60	9,8	100,0		1,85	192,2	218	--	--	--	--	--	56	38	29	26	25	33	34	--	16,3	24,5	29,4
10,80	9,3	95,0		1,85	195,8	215	--	--	--	--	--	53	38	29	26	24	33	34	--	15,5	23,3	27,9
11,00	9,8	100,0		1,85	199,4	218	--	--	--	--	--	55	38	29	26	24	33	34	--	16,3	24,5	29,4
11,20	11,3	86,5		1,85	203,1	228	--	--	--	--	--	59	38	30	27	25	34	35	--	18,8	28,2	33,8
11,40	10,3	78,9		1,85	206,7	221	--	--	--	--	--	55	38	29	26	25	33	34	--	17,2	25,7	30,9
11,60	11,8	90,2		1,85	210,3	231	--	--	--	--	--	60	38	30	27	25	34	35	--	19,6	29,4	35,3
11,80	17,6	135,3		1,85	213,9	269	--	--	--	--	--	73	40	32	29	27	36	37	--	29,4	44,1	52,9
12,00	17,6	135,3		1,85	217,6	269	--	--	--	--	--	73	40	32	29	27	36	37	--	29,4	44,1	52,9
12,20	17,6	180,0		1,85	221,2	269	--	--	--	--	--	72	40	32	29	27	36	37	--	29,4	44,1	52,9
12,40	14,7	150,0		1,85	224,8	250	--	--	--	--	--	66	39	31	28	26	35	36	--	24,5	36,8	44,1
12,60	13,7	140,0		1,85	228,4	244	--	--	--	--	--	63	39	30	27	25	34	36	--	22,9	34,3	41,2
12,80	14,7	112,8		1,85	232,1	250	--	--	--	--	--	65	39	30	27	26	34	36	--	24,5	36,8	44,1
13,00	17,6	135,3		1,85	235,7	269	--	--	--	--	--	71	40	31	28	26	35	37	--	29,4	44,1	52,9
13,20	19,6	150,4		1,85	239,3	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
13,40	19,6	150,4		1,85	242,9	282	--	--	--	--	--	74	40	32	29	27	36	38	--	32,7	49,0	58,8
13,60	17,6	180,0		1,85	246,6	269	--	--	--	--	--	70	40	31	28	26	35	37	--	29,4	44,1	52,9
13,80	15,7	160,0		1,85	250,2	256	--	--	--	--	--	65	39	30	27	26	34	36	--	26,1	39,2	47,0
14,00	16,7	170,0		1,85	253,8	263	--	--	--	--	--	67	39	31	28	26	35	37	--	27,8	41,7	50,0
14,20	17,2	175,0		1,85	257,4	266	--	--	--	--	--	68	39	31	28	26	35	37	--	28,6	42,9	51,5
14,40	17,2	175,0		1,85	261,1	266	--	--	--	--	--	67	39	31	28	26	35	37	--	28,6	42,9	51,5
14,60	14,7	112,8		1,85	264,7	250	--	--	--	--	--	62	39	30	27	25	34	36	--	24,5	36,8	44,1
14,80	14,7	112,8		1,85	268,3	250	--	--	--	--	--	61	39	30	27	25	34	36	--	24,5	36,8	44,1
15,00	13,7	105,3		1,85	272,0	244	--	--	--	--	--	59	38	29	26	25	33	36	--	22,9	34,3	41,2
15,20	19,6	150,4		1,85	275,6	282	--	--	--	--	--	71	40	31	28	26	35	38	--	32,7	49,0	58,8
15,40	23,5	240,0		1,85	279,2	308	--	--	--	--	--	77	40	32	29	27	36	39	--	39,2	58,8	70,6
15,60	17,2	131,6		1,85	282,8	266	--	--	--	--	--	65	39	30	27	25	34	37	--	28,6	42,9	51,5
15,80	17,6	180,0		1,85	286,5	269	--	--	--	--	--	66	39	30	27	26	34	37	--	29,4	44,1	52,9
16,00	14,7	150,0		1,85	290,1	250	--	--	--	--	--	59	38	29	26	25	33	36	--	24,5	36,8	44,1
16,20	12,7	130,0		1,85	293,7	237	--	--	--	--	--	54	38	28	25	24	32	35	--	21,2	31,9	38,2
16,40	14,7	112,8		1,85	297,3	250	--	--	--	--	--	59	38	29	26	24	33	36	--	24,5	36,8	44,1
16,60	17,6	135,3		1,85	301,0	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
16,80	17,6	135,3		1,85	304,6	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
17,00	11,8	120,0		1,85	308,2	231	--	--	--	--	--	50	37	28	25	23	32	35	--	19,6	29,4	35,3
17,20	10,8	110,0		1,85	311,8	224	--	--	--	--	--	47	37	27	24	23	31	34	--	18,0	27,0	32,3
17,40	11,3	115,0		1,85	315,5	228	--	--	--	--	--	48	37	28	24	23	31	35	--	18,8	28,2	33,8
17,60	11,3	86,5		1,85	319,1	228	--	--	--	--	--	48	37	27	24	23	31	35	--	18,8	28,2	33,8
17,80	11,8	90,2		1,85	322,7	231	--	--	--	--	--	49	37	28	24	23	31	35	--	19,6	29,4	35,3
18,00	11,8	120,0		1,85	326,3	231	--	--	--	--	--	49	37	28	24	23	31	35	--	19,6	29,4	35,3
18,20	14,7	150,0		1,85	330,0	250	--	--	--	--	--	56	38	29	26	24	32	36	--	24,5	36,8	44,1
18,40	17,2	175,0		1,85	333,6	266	--	--	--	--	--	61	39	29	26	25	33	37	--	28,6	42,9	51,5
18,60	14,7	150,0		1,85	337,2	250	--	--	--	--	--	56	38	29	25	24	32	36	--	24,5	36,8	44,1
18,80	16,2	124,1		1,85	340,8	260	--	--	--	--	--	59	38	29	26	24	33	37	--	27,0	40,4	48,5
19,00	16,7	170,0		1,85	344,5	263	--	--	--	--	--	60	38	29	26	24	33	37	--	27,8	41,7	50,0
19,20	16,2	165,0		1,85	348,1	260	--	--	--	--	--	58	38	29	26	24	33	37	--	27,0	40,4	48,5
19,40	14,7	150,0		1,85	351,7	250	--	--	--	--	--	55	38	28	25	24	32	36	--	24,5	36,8	44,1
19,60	14,7	150,0		1,85	355,3	250	--	--	--	--	--	54	38	28	25	24	32	36	--	24,5	36,8	44,1
19,80	17,2	104,8		1,85	359,0	266	--	--	--	--	--	60	38	29	26	24	33	37	--	28,6	42,9	51,5
20,00	24,5	188,0		1,85	362,6	314	--	--	--	--	--	72	40	31	28	26	35	39	--	40,8	61,3	73,5

PROVA PENETROMETRICA STATICA MECCANICA
PARAMETRI GEOTECNICI

CPT	4
riferimento	089-2012

Committente:	**PROVINCIA DI MODENA**	U.M.: **MPa**	Data esec.: 01/08/2012
Cantiere:	**MIRANDOLA Istituto LUOSI**	Pagina: 2	
Località:	**MIRANDOLA Istituto LUOSI**	Elaborato:	Falda:

							NATURA COESIVA					NATURA GRANULARE										
Prof.	qc	qc/fs	zone	γ '	σ'vo	Vs	Cu	OCR	Eu50	Eu25	Mo	Dr	øSc	øCa	øKo	øDB	øDM	øMe	F.L.	E'50	E'25	Mo
m	U.M.			t/m³	kPa	m/s	kPa	%	U.M.	U.M.	U.M.	%	(°)	(°)	(°)	(°)	(°)	(°)		U.M.	U.M.	U.M.
20,00	24,5	188,0		1,85	232,5	314	--	--	--	--	--	82	41	33	30	28	37	39	--	40,8	61,3	73,5
20,20	21,6	131,7		1,85	236,1	295	--	--	--	--	--	78	41	32	29	27	36	38	--	35,9	53,9	64,7
20,40	26,5	270,0		1,85	239,7	327	--	--	--	--	--	84	41	33	30	28	38	40	--	44,1	66,2	79,4
20,60	14,7	112,8		1,85	243,3	250	--	--	--	--	--	64	39	30	27	25	34	36	--	24,5	36,8	44,1
20,80	22,5	172,9		1,85	247,0	301	--	--	--	--	--	78	41	32	29	27	36	39	--	37,6	56,4	67,6
21,00	19,6	150,4		1,85	250,6	282	--	--	--	--	--	73	40	31	28	27	36	38	--	32,7	49,0	58,8
21,20	21,6	165,4		1,85	254,2	295	--	--	--	--	--	76	40	32	29	27	36	38	--	35,9	53,9	64,7
21,40	21,1	128,7		1,85	257,8	292	--	--	--	--	--	75	40	32	29	27	36	38	--	35,1	52,7	63,2
21,60	22,5	137,7		1,85	261,5	301	--	--	--	--	--	77	40	32	29	27	36	39	--	37,6	56,4	67,6
21,80	23,5	180,5		1,85	265,1	308	--	--	--	--	--	78	41	32	29	27	36	39	--	39,2	58,8	70,6
22,00	22,5	172,9		1,85	268,7	301	--	--	--	--	--	76	40	32	29	27	36	39	--	37,6	56,4	67,6
22,20	22,5	137,7		1,85	272,4	301	--	--	--	--	--	76	40	32	29	27	36	39	--	37,6	56,4	67,6
22,40	21,6	165,4		1,85	276,0	295	--	--	--	--	--	74	40	31	28	27	36	38	--	35,9	53,9	64,7
22,60	21,6	131,7		1,85	279,6	295	--	--	--	--	--	73	40	31	28	27	36	38	--	35,9	53,9	64,7
22,80	22,5	137,7		1,85	283,2	301	--	--	--	--	--	75	40	32	29	27	36	39	--	37,6	56,4	67,6
23,00	22,5	172,9		1,85	286,9	301	--	--	--	--	--	74	40	31	28	27	36	39	--	37,6	56,4	67,6
23,20	17,6	90,0		1,85	290,5	269	--	--	--	--	--	66	39	30	27	25	34	37	--	29,4	44,1	52,9
23,40	27,4	210,5		1,85	294,1	333	--	--	--	--	--	81	41	32	29	27	37	40	--	45,7	68,6	82,3
23,60	19,6	150,4		1,85	297,7	282	--	--	--	--	--	69	39	31	28	26	35	38	--	32,7	49,0	58,8
23,80	17,6	180,0		1,85	301,4	269	--	--	--	--	--	65	39	30	27	25	34	37	--	29,4	44,1	52,9
24,00	14,7	150,0		1,85	305,0	250	--	--	--	--	--	58	38	29	26	24	33	36	--	24,5	36,8	44,1
24,20	13,7	105,3		1,85	308,6	244	--	--	--	--	--	56	38	29	26	24	32	36	--	22,9	34,3	41,2
24,40	11,8	120,0		1,85	312,2	231	--	--	--	--	--	50	37	28	25	23	32	35	--	19,6	29,4	35,3
24,60	14,7	89,8		1,85	315,9	250	--	--	--	--	--	57	38	29	26	24	33	36	--	24,5	36,8	44,1
24,80	22,5	172,9		1,85	319,5	301	--	--	--	--	--	72	40	31	28	26	35	39	--	37,6	56,4	67,6
25,00	21,6	165,4		1,85	323,1	295	--	--	--	--	--	70	40	31	28	26	35	38	--	35,9	53,9	64,7
25,20	22,5	172,9		1,85	326,7	301	--	--	--	--	--	71	40	31	28	26	35	39	--	37,6	56,4	67,6
25,40	19,6	200,0		1,85	330,4	282	--	--	--	--	--	66	39	30	27	25	34	38	--	32,7	49,0	58,8
25,60	13,7	105,3		1,85	334,0	244	--	--	--	--	--	54	38	28	25	24	32	36	--	22,9	34,3	41,2
25,80	15,7	120,3		1,85	337,6	256	--	--	--	--	--	58	38	29	26	24	33	36	--	26,1	39,2	47,0
26,00	22,5	137,7		1,85	341,2	301	--	--	--	--	--	70	40	31	28	26	35	39	--	37,6	56,4	67,6
26,20	24,5	149,7		1,85	344,9	314	--	--	--	--	--	73	40	31	28	26	35	39	--	40,8	61,3	73,5
26,40	22,5	172,9		1,85	348,5	301	--	--	--	--	--	70	40	30	27	26	35	39	--	37,6	56,4	67,6
26,60	19,6	150,4		1,85	352,1	282	--	--	--	--	--	65	39	30	27	25	34	38	--	32,7	49,0	58,8
26,80	16,7	170,0		1,85	355,7	263	--	--	--	--	--	59	38	29	26	24	33	37	--	27,8	41,7	50,0
27,00	13,7	140,0		1,85	359,4	244	--	--	--	--	--	52	37	28	25	23	32	36	--	22,9	34,3	41,2
27,20	16,7	170,0		1,85	363,0	263	--	--	--	--	--	58	38	29	26	24	33	37	--	27,8	41,7	50,0
27,40	14,7	112,8		1,85	366,6	250	--	--	--	--	--	54	38	28	25	23	32	36	--	24,5	36,8	44,1
27,60	19,6	200,0		1,85	370,3	282	--	--	--	--	--	63	39	29	26	25	33	38	--	32,7	49,0	58,8
27,80	14,2	145,0		1,85	373,9	247	--	--	--	--	--	52	38	28	25	23	32	36	--	23,7	35,5	42,6
28,00	16,2	98,8		1,85	377,5	260	--	--	--	--	--	56	38	28	25	24	32	37	--	27,0	40,4	48,5
28,20	24,5	188,0		1,85	381,1	314	--	--	--	--	--	70	40	30	27	26	35	39	--	40,8	61,3	73,5
28,40	17,6	135,3		1,85	384,8	269	--	--	--	--	--	59	38	29	26	24	33	37	--	29,4	44,1	52,9
28,60	17,6	135,3		1,85	388,4	269	--	--	--	--	--	59	38	29	26	24	33	37	--	29,4	44,1	52,9
28,80	16,7	127,8		1,85	392,0	263	--	--	--	--	--	56	38	28	25	24	32	37	--	27,8	41,7	50,0
29,00	17,6	107,8		1,85	395,6	269	--	--	--	--	--	58	38	29	26	24	32	37	--	29,4	44,1	52,9
29,20	24,5	149,7		1,85	399,3	314	--	--	--	--	--	69	40	30	27	25	34	39	--	40,8	61,3	73,5
29,40	24,5	188,0		1,85	402,9	314	--	--	--	--	--	69	40	30	27	25	34	39	--	40,8	61,3	73,5
29,60	23,5	143,7		1,85	406,5	308	--	--	--	--	--	67	39	30	27	25	34	39	--	39,2	58,8	70,6
29,80	24,5	149,7		1,85	410,1	314	--	--	--	--	--	69	39	30	27	25	34	39	--	40,8	61,3	73,5
30,00	24,5	188,0		1,85	413,8	314	--	--	--	--	--	68	39	30	27	25	34	39	--	40,8	61,3	73,5
30,20	23,5	180,5		1,85	417,4	308	--	--	--	--	--	67	39	30	27	25	34	39	--	39,2	58,8	70,6
30,40	25,5	195,5		1,85	421,0	320	--	--	--	--	--	69	40	30	27	25	34	40	--	42,5	63,7	76,4
30,60	27,4	210,5		1,85	424,6	333	--	--	--	--	--	72	40	30	27	26	35	40	--	45,7	68,6	82,3
30,80	27,4	210,5		1,85	428,3	333	--	--	--	--	--	71	40	30	27	26	34	40	--	45,7	68,6	82,3
31,00	13,7	209,0		1,85	431,9	244	--	--	--	--	--	47	37	27	24	22	31	36	--	22,9	34,3	41,2
31,20	5,4	31,8		1,85	435,5	189	--	--	--	--	--	15	33	22	19	18	25	31	--	9,0	13,5	16,2
31,40	3,1	16,6		1,85	439,1	174	104,5	1,0	62,6	93,9	9,4	--	31	20	16	15	25	29	--	5,2	7,8	9,4
31,60	3,2	18,3		1,85	442,8	175	107,8	1,1	64,5	96,7	9,7	--	31	20	16	15	25	29	--	5,4	8,1	9,7
31,80	3,2	17,6		1,85	446,4	175	107,8	1,1	64,5	96,7	9,7	--	31	20	16	15	25	29	--	5,4	8,1	9,7
32,00	3,4	18,7		1,85	450,0	176	114,3	1,1	68,2	102,3	10,3	--	31	20	16	16	25	29	--	5,7	8,6	10,3
32,20	3,3	17,0		1,85	453,7	176	111,1	1,1	66,4	99,6	10,0	--	31	20	16	15	25	29	--	5,6	8,3	10,0
32,40	2,9	15,0		1,85	457,3	173	98,0	0,9	58,8	88,2	8,8	--	31	19	15	15	25	29	--	4,9	7,4	8,8
32,60	3,1	16,6		1,85	460,9	174	104,5	1,0	62,7	94,1	9,4	--	31	19	16	15	25	29	--	5,2	7,8	9,4
32,80	2,8	16,1		1,85	464,5	173	96,3	0,9	57,8	86,7	8,5	--	31	19	15	15	25	29	--	4,7	7,1	8,5
33,00	2,5	12,5		1,85	468,2	170	89,1	0,8	53,5	80,2	7,4	--	31	18	14	14	25	28	--	4,1	6,1	7,4
33,20	2,7	13,5		1,85	471,8	172	94,6	0,8	56,8	85,2	8,2	--	31	19	15	14	25	28	--	4,6	6,9	8,2
33,40	3,0	19,4		1,85	475,4	174	101,3	0,9	60,8	91,1	9,1	--	31	19	15	15	25	29	--	5,1	7,6	9,1
33,60	4,7	40,0		1,85	479,0	185	--	--	--	--	--	8	32	21	18	17	25	31	--	7,8	11,8	14,1
33,80	3,9	33,3		1,85	482,7	180	--	--	--	--	--	2	31	20	17	16	25	30	--	6,5	9,8	11,8
34,00	3,7	31,7		1,85	486,3	178	--	--	--	--	--	--	31	20	16	16	25	30	--	6,2	9,3	11,2
34,20	2,7	26,2		1,85	489,9	172	94,6	0,8	56,8	85,2	8,2	--	31	18	15	14	25	28	--	4,6	6,9	8,2
34,40	2,4	18,9		1,85	493,5	169	87,1	0,7	52,3	78,4	7,1	--	31	18	14	13	25	28	--	3,9	5,9	7,1
34,60	2,5	18,8		1,85	497,2	170	89,1	0,7	53,5	80,2	7,4	--	31	18	14	13	25	28	--	4,1	6,1	7,4
34,80	7,8	42,8		1,85	500,8	205	--	--	--	--	--	25	34	23	20	19	27	33	--	13,1	19,6	23,5
35,00	3,1	17,1		1,85	504,4	174	104,5	0,9	62,7	94,1	9,4	--	31	19	15	15	25	29	--	5,2	7,8	9,4
35,20	4,3	33,1		1,85	508,0	182	--	--	--	--	--	4	32	20	17	16	25	31	--	7,2	10,8	12,9
35,40	6,4	48,9		1,85	511,7	196	--	--	--	--	--	17	33	22	19	18	25	32	--	10,6	15,9	19,1
35,60	24,5	188,0		1,85	515,3	314	--	--	--	--	--	63	39	29	26	24	33	39	--	40,8	61,3	73,5
35,80	24,5	188,0		1,85	518,9	314	--	--	--	--	--	63	39	29	26	24	33	39	--	40,8	61,3	73,5
36,00	24,5	188,0		1,85	522,5	314	--	--	--	--	--	63	39	29	26	24	33	39	--	40,8	61,3	73,5
36,20	17,6	107,8		1,85	526,2	269	--	--	--	--	--	51	37	27	24	23	31	37	--	29,4	44,1	52,9
36,40	24,5	188,0		1,85	529,8	314	--	--	--	--	--	62	39	29	26	24	33	39	--	40,8	61,3	73,5
36,60	27,4	210,5		1,85	533,4	333	--	--	--	--	--	66	39	29	26	25	33	40	--	45,7	68,6	82,3
36,80	24,5	188,0		1,85	537,0	314	--	--	--	--	--	62	39	29	26	24	33	39	--	40,8	61,3	73,5
37,00	25,5	195,5		1,85	540,7	320	--	--	--	--	--	63	39	29	26	24	33	40	--	42,5	63,7	76,4
37,20	24,5	188,0		1,85	544,3	314	--	--	--	--	--	62	39	29	26	24	33	39	--	40,8	61,3	73,5
37,40	19,6	150,4		1,85	547,9	282	--	--	--	--	--	54	38	28	24	23	31	38	--	32,7	49,0	58,8
37,60	23,5	240,0		1,85	551,6	308	--	--	--	--	--	60	38	28	25	24	32	39	--	39,2	58,8	70,6
37,80	22,5	137,7		1,85	555,2	301	--	--	--	--	--	58	38	28	25	24	32	39	--	37,6	56,4	67,6
38,00	24,5	--		1,85	558,8	314	--	--	--	--	--	61	39	29	25	24	32	39	--	40,8	61,3	73,5

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INDAGINI GEOLOGICHE & MONITORAGGI GEOTECNICI

REGIONE EMILIA ROMAGNA
PROVINCIA DI MODENA
COMUNE DI MIRANDOLA

Indagini geognostiche Presso l'Istituto Superiore Statale

G.Galilei di Mirandola (MO)

COMMITTENTE:

Geoprogetti

Verbale Lavori

Giugno 2013

Committente: *Geoprogetti* *Commessa:* *04600013_FG*	*Redatto* *Dott. Marco Cocchi*	*Approvato* *Dott. Geol. Fabrizio Giorgini*

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ALLEGATO 2
Prova sismica

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1. PREMESSA

Su incarico ricevuto da Geoprogetti, in data 5 Giugno 2013 è stata eseguita una prova penetrometrica statica con piezocono sismico all'interno dell'area cortilizia dell'Istituto Superiore Statale G. Galilei di Mirandola (MO).
L'ubicazione del punto d'indagine è stata collocata in accordo con la Committenza.

2. INDAGINI ESEGUITE

Con lo scopo di ottenere informazioni più dirette sulla natura litologica e sulle condizioni generali dell'area, è stata eseguita la seguente indagine:

- n.° 1 Prova penetrometrica statica con piezocono sismico (SCPTU);

L'ubicazione della prova eseguita è riportata nella figura 1.

Figura 1: *Ubicazione prova di indagine.*

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2.1 Prova Penetrometrica Statica con piezocono sismico

In data 5 Giugno 2013 è stata effettuata una prova penetrometrica statica con piezocono sismico denominata CPTU1 utilizzando un penetrometro statico tipo Tecnotest autoancorante montato su un camion FIAT PC90 4x4 con spinta numinale di 200 KNspinta.
La profondità raggiunta dalla prova è riportata schematicamente nella tabella 1, nella quale viene riportato anche la quota rilevata della falda.

Prova	Profondità m. da p.c.	Profondità falda m da p.c.
SCPTU1	20,00 m	Foro chiuso a 3,43 m.

Tab.1: Profondità raggiunta dalla prova penetrometrica statica con piezocono sismico.

La prova penetrometrica è stata eseguita seguendo le prescrizioni riportate negli Standards ASTM D3441-86, *"Standards Tests Method for Deep Quasi-Static, Cone and Friction-Cone Penetration Tests of Soil"*.
La punta elettrica utilizzata è realizzata dalla ditta TECNOPENTA e presenta le seguenti caratteristiche:
<u>punta conica</u>
- diametro 35,7 mm;
- altezza nominale 30,9 mm;
- angolo d'apertura 60°;
- area nominale 1000 mm^2;
- altezza: base cilindro-filtro 10 mm;
- altezza quadring 3,5 mm;

<u>piezocono sismico</u>
- area di punta 10,0 cm^2;
- diametro 35,7 mm;
- area netta (An) 6,6;
- superficie manicotto 150,0 cm^2;
- lunghezza manicotto 133,7 mm;
- area superiore manicotto 2,22 cm^2;
- lunghezza totale punta elettrica 600,0 mm;
- peso complessivo 3kg.

2.1.1. Metodologia di prova

La prova è stata eseguita secondo le procedure standard, ovvero attraverso l'infissione della punta elettrica (piezocono) a velocità costante di 2 cm/s, e registrazione dei valori della resistenza alla punta q_c e dell'attrito laterale f_s locale ogni 2 cm.
Tramite il piezocono, opportunamente saturato a grasso di litio prima dello svolgimento della prova, è stato possibile acquisire un terzo parametro cioè la pressione neutrale dell'acqua U del terreno attraversato.
L'inclinazione dello strumento durante l'avanzamento nel sottosuolo è determinata per mezzo di inclinometri.
L'acquisizione e la restituzione dei dati è fornita tramite un sistema analogico digitale munito di "encoder" di sincronizzazione con l'avanzamento delle aste nel terreno, di registratore grafico di R_p (resistenza alla punta), f_s (resistenza laterale), $u+\Delta u$ (pressione interstiziale) ed inclinazione, di registratore grafico della variazione nel tempo della pressione interstiziale per le prove di dissipazione.

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Il sistema si compone di alcuni dispositivi fondamentali quali:

- centralina di interfaccia con Personal Computer;
- cavo di collegamento tra punta e centralina interno alle aste di penetrazione;
- sistema di sincronizzazione tra l'avanzamento della punta ed il sistema d'acquisizione dati;
- interruttore di comando;
- software di gestione del sistema per la visualizzazione dell'andamento dei parametri rilevati, la loro registrazione ed altre funzioni.

Figura 2: Sistema acquisizione dati.

Nei report dei dati di lettura, sono state riportate le curve di:

- q_t (kg/cm^2): resistenza alla punta corretta;
- f_s (kg/cm^2): resistenza laterale
- U (bar): pressione neutrale
- f_s / q_c (%): rapporto di frizione;
- inclinazione;

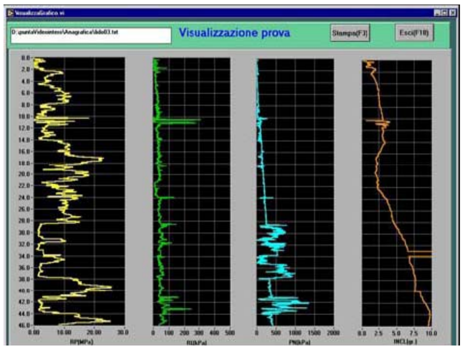

Figura 3: Visualizzazione della prova.

Il sistema di acquisizione dei segnali provenienti dalla punta è gestito da un programma che consente la visualizzazione in forma grafica dei valori della prova penetrometrica in corso, quali resistenza alla punta e laterale, pressione dell'acqua, inclinazione, velocità d'avanzamento, profondità raggiunta e temperatura del piezocono direttamente sul video del PC (Fig. 3).

2.1.2 Prova con cono sismico

Il cono sismico oltre all'acquisizione dei normali parametri di resistenza alla punta (q_c), attrito laterale (f_s) e pressione neutra (U) permette di determinare la velocità delle onde compressionali (Vp) e di taglio (Vs) tramite l'aggiunta, nella parte sommatale della sonda, di un manicotto di 49 mm di diametro contenente un geofono triassiale.

Tale geofono è costituito da 3 accelerometri SERCEL HF-10 con frequenza naturale di 10 Hz, di cui uno disposto verticalmente e due orizzontalmente, ortogonali l'uno all'altro, secondo le tre direzioni X, Y e Z.

Per determinare la velocità di propagazione delle onde compressionali e di taglio è necessario predisporre un'appropriata sorgente di segnale sismico che deve preferenzialmente generare onde compressionali e di taglio. Per le prime è stato utilizzato un piattello di ferro di 30 cm di diametro e posto a 1,20 m. di distanza rispetto alla verticale di prova, che viene colpito con una mazza da 10 kg perpendicolarmente al terreno.
Per le seconde, invece, è stata utilizzata una traversina di legno (dimensioni 700x250x250mm) con fissate due piastre di ferro alle terminazioni della stessa, caricata con uno stabilizzatore dell'autocarro del penetrometro. Tale traversina è posta ad una distanza di 1,20 m. dalla verticale di prova.

La prova penetrometrica è stata spinta fino alla profondità di rifiuto seguendo le normative tecniche standard e successivamente durante il recupero delle aste, ad intervalli regolari di 1,00 m., è stata effettuata l'acquisizione dei dati al geofono triassiale ripetendo l'energizzazione più volte sul piattello e su ambo i lati della traversina.

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La velocità di propagazione delle onde di compressionali e di taglio è dato dal rapporto tra la differenza della distanza tra la sorgente ed il ricevitore e dal ritardo dell'arrivo dell'impulso dal primo al secondo ricevitore.
Nell'elaborato riportato in allegato 2, sono riportati i sismogrammi registrati durante la generazione di onde di taglio e compressionali, i tempi di arrivo valutati con una precisione di $1x10^{-3}$ sec., la Vs relativa al tempo di percorrenza delle onde dal piano campagna sino alla profondità di indagine raggiunta (Vs m/s) e la Vs relativa al tempo di percorrenza di ogni singolo metro indagato (Vs percorrenza L).

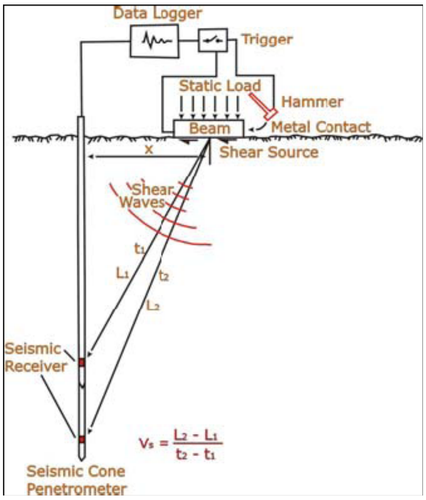

Figura 4: Schema acquisizione dati.

Giugno 2013

SUBSOIL Srl
Il geologo
Dott. Fabrizio Giorgini

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n.° iscrizione alla CCIAA di RE 01999810359 – n.REA 241942 – CF e PI 01999510359

Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

CERTIFICATO DI PROVA **n.° 007E/2013**
emessa in data 24/07/2013

SETTORE DI PROVA: 3 – "Prove in sito" – settore "C" Circolare 349/99/STC

3.3 PROVE DI DEFORMABILITA' E RESISTENZA MECCANICA:

CODICE PROVA	DESCIZIONE PROVA	N. PROVE DA ESEGUIRE	NORMATIVA DI RIFERIMENTO
3.3.1.b	Prove penetrometriche statiche con punta elettrica con piezocono		- *Raccomandazioni A.G.I. 1977* - *ASTM D 3441/86* - *ISSMFE 1988*

Committente: Geoprogetti

Cantiere: Mirandola (MO)

N.° commessa: 04600013_FG

Nome prova: CPTU1b

Data esecuzione prova: 23/07/2013

Allegato 1 (risultato della prova):

	Relazione
x	Diagramma
	Documentazione fotografica

Allegato 2 (ubicazione del punto di indagine):

	Corografia in scala opportuna con indicazione ubicazioni
x	Indicazione planoaltimetrica dei punti di indagine
	Coordinate geografiche

Eventuali anomalie riscontrate:……..

Note:. Il foro si è chiuso alla profondità di 4,75 m. dal piano campagna.
Le aste sono risultate bagnate a partire da circa 10,00 m p.c.

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

CERTIFICATO DI PROVA **n.° 007E/2013**
emessa in data 24/07/2013

ALLEGATO 1
Risultato della prova

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
0,02	0,552352	0,205596	42,245	1,517203
0,04	1,972756	0,576362	51,4	2,162138
0,06	2,855735	3,342319	48,96	2,294516
0,08	3,755857	1,521809	56,895	2,41928
0,10	4,553729	0,989894	61,17	2,301867
0,12	5,089778	10,78913	60,56	2,321893
0,14	5,181389	17,37287	51,4	2,242276
0,16	6,003293	25,46598	65,445	2,219982
0,18	5,709554	36,22266	50,18	2,337488
0,20	5,354357	39,18938	47,74	2,023189
0,22	5,29841	40,24521	45,905	2,184215
0,24	5,372878	45,45798	47,74	2,027357
0,26	5,223942	55,45798	44,075	2,035083
0,28	5,357113	63,34632	41,025	2,201143
0,30	5,237336	68,01917	38,58	2,049145
0,32	5,047224	72,27849	34,31	2,089268
0,34	4,773926	68,6127	22,71	2,181831
0,36	4,401586	75,95313	20,265	2,178937
0,38	4,627745	76,38666	29,425	2,149142
0,40	4,976054	84,03823	31,865	2,15865
0,42	5,478809	76,49304	41,025	2,152217
0,44	5,212852	91,06751	43,465	2,130367
0,46	6,010724	109,1526	58,115	2,094577
0,48	7,575932	107,4545	69,105	1,999417
0,50	9,203591	79,36938	84,37	1,988517
0,52	9,256783	99,263	91,695	1,931989
0,54	7,639761	169,3694	26,37	2,029292
0,56	11,45753	109,8973	31,255	2,137417
0,58	9,699458	137,4425	23,32	2,219444
0,60	10,61297	134,6725	0,73	2,402101
0,62	14,37893	149,0342	50,18	2,59907
0,64	11,75127	98,6087	53,845	2,656574
0,66	12,50521	105,3068	79,485	2,664378
0,68	10,45064	108,8135	56,895	2,673882
0,70	10,34151	162,6353	56,285	2,707166
0,72	8,97192	131,5794	47,74	2,73755
0,74	7,47192	141,7922	42,245	2,749148
0,76	6,969165	145,614	41,635	2,757351
0,78	5,926612	162,3161	36,75	2,756053
0,80	5,384058	155,2948	35,53	2,76605
0,82	4,903957	146,8866	33,085	2,747836
0,84	4,765659	154,5461	32,475	2,758658
0,86	4,570037	163,4703	36,14	2,369518
0,88	4,390563	155,4956	34,31	2,763975
0,90	4,325356	150,4916	34,31	2,794154
0,92	5,099196	152,5049	43,465	2,791964
0,94	5,149632	158,2416	52,625	2,809725
0,96	6,379541	162,6976	62,39	2,813218
0,98	7,037738	141,949	69,105	2,826264
1,00	6,004445	156,0939	55,065	2,83924

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
1,02	5,588174	156,941	53,845	2,835664
1,04	6,540583	167,7225	-4,155	2,88257
1,06	6,529945	165,5948	-4,765	2,859523
1,08	6,381009	166,5523	-5,375	2,877109
1,10	6,200158	167,7225	-5,985	2,872263
1,12	6,008668	176,6587	-6,595	2,877654
1,14	5,710796	169,9565	-7,205	2,919712
1,16	5,454099	169,3142	-7,815	2,882509
1,18	5,156227	171,8674	-8,425	2,892234
1,20	4,866237	179,6254	-9,04	2,896323
1,22	4,621556	182,6041	-9,65	2,90196
1,24	4,247838	185,898	-10,26	2,900424
1,26	4,013796	185,2597	-10,87	2,903791
1,28	3,884758	182,5961	-12,09	2,928135
1,30	3,840827	178,3368	-12,09	2,921099
1,32	3,701152	168,3328	-12,7	2,918397
1,34	3,621556	149,6254	-7,205	2,899509
1,36	3,610918	142,4977	-7,815	2,907908
1,38	3,709418	134,9525	-8,425	2,893275
1,40	4,241333	130,4844	-7,205	2,910193
1,42	4,549844	130,91	-7,205	2,938871
1,44	4,858354	126,9738	-7,205	2,910324
1,46	4,656227	123,8887	-8,425	2,915937
1,48	4,220057	133,8887	-9,65	2,92299
1,50	3,975376	126,9738	-10,26	2,920567
1,52	3,720057	114,7398	-11,48	2,918147
1,54	3,528567	107,1866	-11,48	2,916961
1,56	3,081759	101,9738	-13,31	2,925062
1,58	2,379631	92,08019	-21,86	2,903956
1,60	2,379631	93,56955	-18,805	2,912753
1,62	2,507291	94,73977	-12,09	2,863445
1,64	2,540583	100,1693	-11,48	2,893123
1,66	2,519307	99,21185	-10,87	2,893001
1,68	2,4342	101,1267	-10,87	2,897921
1,70	2,327817	94,95653	-11,48	2,898169
1,72	2,273248	93,46317	-12,09	2,89325
1,74	2,273248	91,44189	-12,09	2,898246
1,76	2,251971	96,44189	-12,7	2,893001
1,78	2,313046	103,5616	-10,26	2,888081
1,80	2,588264	101,3235	-9,04	2,892965
1,82	2,449966	90,68521	-7,205	2,883234
1,84	1,864859	85,68521	-9,04	2,873736
1,86	1,7372	91,74904	-10,26	2,884593
1,88	1,747838	82,38734	-9,65	2,845792
1,90	1,831567	73,2344	-8,425	2,861861
1,92	1,886136	63,8767	-8,425	2,848186
1,94	1,969865	54,93653	-7,815	2,82027
1,96	2,088264	49,62138	-7,815	2,820957
1,98	2,171992	37,38334	-7,815	2,814272
2,00	2,289013	31,42589	-7,205	2,819175

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

SUBSOIL Srl – Società Unipersonale
Via Moranti 3; 43020 Quattro Castella, Reggio Emilia.
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n.° iscrizione alla CCIAA di RE 01999810359 – n.REA 241942 – CF e PI 01999510359

Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
2,02	2,257099	29,511	-7,815	2,815148
2,04	2,129439	30,57483	-8,425	2,800444
2,06	2,052441	35,155	-10,85	2,800444
2,08	1,854605	37,95126	-13,92	2,8205
2,10	1,834706	43,59355	-13,92	2,821908
2,12	1,898536	50,40206	-13,31	2,83219
2,14	2,070126	58,49117	-12,09	2,842478
2,16	2,252355	60,8356	-12,09	2,834757
2,18	2,381866	56,02245	-18,195	2,884593
2,20	2,573356	52,16904	-13,31	2,86447
2,22	2,328675	48,87117	-13,92	2,864612
2,24	1,988249	49,61585	-15,145	2,86984
2,26	1,754207	50,78606	-16,365	2,840022
2,28	1,690377	53,44564	-15,755	2,84494
2,30	1,935058	55,78606	-11,48	2,840336
2,32	2,147824	55,89245	-11,48	2,840022
2,34	2,190761	50,49892	-9,65	2,83448
2,36	1,979373	45,18377	-10,26	2,844663
2,38	1,819798	45,29015	-11,48	2,830042
2,40	1,766607	48,05611	-11,48	2,839745
2,42	1,87299	50,82206	-10,26	2,835104
2,44	1,904905	50,29015	-10,26	2,845253
2,46	1,787883	52,52419	-9,04	2,820666
2,48	1,755969	54,11994	-8,425	2,830501
2,50	1,724054	57,84334	-6,595	2,820838
2,52	1,660224	57,31143	-3,545	2,840506
2,54	1,713415	53,48164	-1,71	2,835589
2,56	1,575117	59,22632	-1,71	2,831242
2,58	1,607032	60,39653	0,73	2,822064
2,60	1,649586	57,31143	3,17	2,822301
2,62	1,862352	54,11994	6,835	2,837807
2,64	1,841075	51,35398	8,055	2,83808
2,66	1,830437	51,99228	12,33	2,833167
2,68	1,830437	52,84334	12,33	2,83808
2,70	1,819798	56,88589	-13,31	2,819005
2,72	1,938197	64,86862	-12,7	2,819307
2,74	1,938197	69,65585	-11,48	2,81503
2,76	2,012665	69,54947	-13,31	2,8003
2,78	1,886384	72,42581	-13,92	2,81503
2,80	1,662979	70,72368	-13,92	2,83958
2,82	1,472868	64,87662	-14,53	2,800974
2,84	1,33457	57,85534	-15,145	2,8157
2,86	1,313293	51,68513	-13,92	2,811868
2,88	1,294772	48,18249	-12,7	2,800974
2,90	1,294772	42,96972	-11,48	2,802054
2,92	1,305411	41,2676	-10,87	2,800974
2,94	1,179129	43,82479	-10,87	2,796416
2,96	1,125937	44,56947	-11,48	2,797916
2,98	1,169868	43,19049	-10,87	2,793011
3,00	1,169868	40,85006	-10,26	2,793409

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
3,02	1,344214	41,50036	-8,425	2,793011
3,04	1,154103	40,54692	-12,09	2,772997
3,06	1,081013	39,48709	-13,31	2,773389
3,08	1,006544	37,99772	-13,31	2,773791
3,10	0,922816	35,98045	-13,92	2,750985
3,12	0,913555	32,58019	-13,92	2,790196
3,14	0,966747	27,68657	-12,7	2,785295
3,16	0,987431	21,53798	-4,765	2,79539
3,18	1,340623	43,34649	-4,765	2,794752
3,20	1,181048	43,8784	-5,375	2,780019
3,22	1,10658	43,02734	-5,375	2,766268
3,24	1,021474	40,155	-5,375	2,765931
3,26	0,904453	34,94223	-5,985	2,770197
3,28	0,925729	35,68692	-4,155	2,771177
3,30	1,000197	30,7933	-1,71	2,772614
3,32	1,159772	21,96351	3,17	2,744365
3,34	1,324555	27,33541	31,2	2,744365
3,36	1,407592	39,23755	51,4	2,758674
3,38	1,269294	42,10989	50,18	2,744781
3,40	1,17355	44,45032	49,57	2,758674
3,42	1,077805	47,10989	48,96	2,749269
3,44	1,013975	48,38649	48,35	2,739877
3,46	0,939507	48,49287	48,96	2,739877
3,48	1,003337	44,98223	50,18	2,730935
3,50	1,120358	37,74819	55,675	2,750985
3,52	1,152273	29,76947	61,78	2,760788
3,54	1,17355	25,51415	64,835	2,765689
3,56	1,150895	23,16972	67,885	2,750985
3,58	1,129619	24,33994	70,325	2,750542
3,60	1,097704	26,04206	72,16	2,759491
3,62	1,077805	28,06734	75,82	2,765689
3,64	1,077805	30,08862	79,485	2,77059
3,66	1,013975	30,93968	77,045	2,750985
3,68	1,003337	29,76947	78,875	2,746537
3,70	1,077805	26,57798	84,37	2,77594
3,72	1,17355	25,51415	91,085	2,767546
3,74	1,205465	24,34394	100,24	2,777342
3,76	1,205465	24,45032	107,57	2,766599
3,78	1,184188	25,62053	107,57	2,771498
3,80	1,099082	27,96096	109,4	2,767546
3,82	1,099082	30,40777	112,45	2,767546
3,84	1,067167	36,79075	115,505	2,771498
3,86	1,03663	36,68836	117,945	2,762648
3,88	1,100459	34,24155	120,39	2,768034
3,90	1,153651	34,45432	124,66	2,752852
3,92	1,153651	33,9224	125,885	2,769553
3,94	1,068544	31,4756	124,05	2,769037
3,96	1,016731	27,43704	125,27	2,770613
3,98	1,027369	24,88385	130,765	2,765721
4,00	1,016731	26,58598	135,04	2,757605

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
4,02	1,006092	23,18172	136,87	2,747258
4,04	1,006092	22,64981	136,87	2,757605
4,06	1,080561	27,75619	140,535	2,769732
4,08	1,242891	26,91313	147,25	2,769732
4,10	1,49821	26,70036	122,83	2,770342
4,12	1,774805	31,4876	102,685	2,752706
4,14	1,945018	38,18972	91,085	2,748479
4,16	1,913103	44,35994	78,265	2,747826
4,18	1,823638	44,43994	34,92	2,724468
4,20	1,398106	34,97185	31,255	2,714677
4,22	1,238531	33,16334	28,815	2,720088
4,24	1,047042	29,0144	26,98	2,719572
4,26	0,972574	26,99313	28,205	2,720613
4,28	1,110872	19,22717	39,8	2,712465
4,30	1,270446	18,80164	45,905	2,718493
4,32	1,475329	32,32028	35,53	2,720613
4,34	1,230648	37,00113	30,645	2,710299
4,36	1,209372	38,27772	29,425	2,705405
4,38	1,241287	36,78836	30,035	2,690201
4,40	1,422138	30,19262	34,31	2,715193
4,42	1,688095	34,12879	35,53	2,705405
4,44	1,602989	38,80964	33,695	2,707017
4,46	1,581712	41,15006	31,865	2,697235
4,48	1,528521	44,97985	30,645	2,688014
4,50	1,592351	44,44794	30,035	2,695616
4,52	1,485968	42,32028	29,425	2,690722
4,54	1,368946	37,95857	30,035	2,710826
4,56	1,251925	39,97985	31,865	2,695616
4,58	1,230648	34,55432	36,75	2,68636
4,60	1,227893	33,90802	39,8	2,68636
4,62	1,355552	37,41866	44,685	2,697235
4,64	1,738531	39,0144	50,79	2,683695
4,66	1,919382	39,75909	54,455	2,692344
4,68	2,013749	36,03168	50,79	2,684277
4,70	2,066941	39,75509	48,35	2,689164
4,72	2,098856	44,43594	45,905	2,693473
4,74	2,088217	46,24445	44,685	2,689164
4,76	2,120132	49,75509	44,075	2,698362
4,78	2,225137	53,15534	45,295	2,690353
4,80	2,162685	58,47849	43,465	2,690962
4,82	1,820882	61,66598	41,025	2,695239
4,84	1,533648	60,81492	39,8	2,686697
4,86	1,39535	54,11279	39,8	2,701348
4,88	1,225137	56,77236	44,075	2,715999
4,90	1,235776	40,49577	49,57	2,696464
4,92	1,170568	37,30028	52,01	2,691581
4,94	1,117377	39,21517	53,235	2,703909
4,96	1,085462	40,59815	55,065	2,68994
4,98	1,085462	42,93857	56,895	2,703909
5,00	1,128015	38,04496	61,78	2,691304

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
5,02	1,179829	34,42394	68,495	2,690617
5,04	1,243658	32,82819	73,99	2,691304
5,06	1,243658	31,33883	79,485	2,682962
5,08	1,272716	33,55711	111,395	2,694554
5,10	1,318126	35,06223	149,69	2,703886
5,12	1,328765	38,46649	154,575	2,68368
5,14	1,328765	42,82819	157,63	2,692706
5,16	1,381956	44,53032	159,46	2,6698
5,18	1,435148	47,29628	152,135	2,669068
5,20	1,390223	60,19262	159,46	2,684407
5,22	1,444792	58,17534	154,575	2,668346
5,24	1,487345	70,72853	158,85	2,67809
5,26	1,508622	68,49449	175,945	2,668346
5,28	1,487345	64,55832	171,06	2,662057
5,30	1,529899	79,13279	172,89	2,639121
5,32	1,581712	79,23517	177,165	2,61964
5,34	1,688095	91,36283	219,29	2,636298
5,36	1,773202	93,06496	204,025	2,618991
5,38	1,762563	93,49049	213,795	2,620987
5,40	1,698734	91,89475	213,795	2,607047
5,42	1,581712	91,46921	213,795	2,607746
5,44	1,528521	90,19262	205,86	2,588968
5,46	1,485968	88,06496	200,975	2,581981
5,48	1,4115	91,46921	197,92	2,574355
5,50	1,408744	91,5676	195,48	2,588254
5,52	1,408744	91,03568	194,26	2,55831
5,54	1,419382	89,0144	194,87	2,568056
5,56	1,418004	86,88275	204,025	2,572929
5,58	1,449919	84,54232	211,355	2,55831
5,60	1,481834	80,39338	214,405	2,572231
5,62	1,469818	76,66598	203,415	2,58755
5,64	1,469818	73,47449	197,92	2,573637
5,66	1,479079	71,5556	197,31	2,55831
5,68	1,500355	73,36411	199,145	2,562482
5,70	1,509616	74,84947	205,86	2,563893
5,72	1,477701	74,42394	200,365	2,559022
5,74	1,467063	72,08351	206,47	2,56197
5,76	1,411116	72,18189	195,48	2,559744
5,78	1,377823	72,70981	183,27	2,546617
5,80	1,324631	74,6247	177,775	2,548917
5,82	1,2807	76,42921	171,06	2,552124
5,84	1,268684	77,38266	166,175	2,543241
5,86	1,279323	78,55287	167,395	2,523827
5,88	1,287205	78,43849	168,005	2,518974
5,90	1,287205	76,62998	166,785	2,51012
5,92	1,285828	73,9664	163,125	2,498199
5,94	1,264551	70,98768	161,9	2,495162
5,96	1,273812	68,43049	166,175	2,498199
5,98	1,327003	64,91985	169,23	2,495162
6,00	1,336264	61,93713	169,84	2,496081

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
6,02	1,398716	60,65653	183,88	2,508568
6,04	1,419992	59,5927	189,985	2,4989
6,06	1,374683	58,73364	196,09	2,486341
6,08	1,373306	57,55943	183,27	2,479682
6,10	1,340013	63,72564	178,995	2,484505
6,12	1,276183	70,32138	188,765	2,489696
6,14	1,201715	71,91713	190,595	2,477957
6,16	1,159162	71,38521	191,205	2,491843
6,18	1,179829	81,01968	237,605	2,541018
6,20	1,126637	71,97713	232,72	2,533571
6,22	1,126637	74,84947	232,11	2,516582
6,24	1,094722	71,87075	232,11	2,540586
6,26	1,084084	66,23245	232,11	2,51637
6,28	1,041531	61,44521	231,5	2,51637
6,30	0,985584	52,92657	229,67	2,509152
6,32	0,974945	52,71381	228,445	2,509152
6,34	0,982828	58,13134	263,245	2,524699
6,36	0,961552	54,30155	260,805	2,523509
6,38	0,929637	49,51432	258,36	2,528325
6,40	0,876445	46,21645	255,31	2,537881
6,42	0,887083	43,76964	254,09	2,525898
6,44	0,887083	43,66326	253,475	2,534329
6,46	0,887083	43,34411	252,255	2,532039
6,48	0,887083	42,81219	245,54	2,529799
6,50	0,887083	42,59943	239,435	2,53933
6,52	0,876445	43,45049	235,16	2,532367
6,54	0,876445	44,6207	234,55	2,534975
6,56	0,875067	46,10606	232,11	2,537621
6,58	0,875067	47,38266	226,005	2,521329
6,60	0,853791	47,91457	221,73	2,527436
6,62	0,885706	47,59543	215,015	2,519972
6,64	0,851035	46,84275	210,13	2,526854
6,66	0,872312	44,50232	206,47	2,528259
6,68	0,904227	42,90657	199,145	2,518801
6,70	0,925503	41,41721	188,155	2,526375
6,72	0,925503	41,31083	166,175	2,531099
6,74	0,902849	42,47704	159,46	2,510391
6,76	0,870934	44,07279	154,575	2,510113
6,78	0,839019	46,73236	146,03	2,503916
6,80	0,816365	49,6007	142,975	2,51782
6,82	0,795088	53,43049	139,315	2,511469
6,84	0,805726	57,89857	160,07	2,527085
6,86	0,858918	59,81347	180,215	2,509939
6,88	0,900093	58,74564	188,765	2,523934
6,90	0,9852	56,40521	196,09	2,544239
6,92	1,080944	55,55415	202,195	2,54582
6,94	1,155413	53,9584	203,415	2,555178
6,96	1,217865	51,29483	182,05	2,550619
6,98	1,249779	49,5927	199,755	2,56624
7,00	1,271056	49,27355	198,53	2,565118

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
7,02	1,278939	51,39321	188,155	2,588392
7,04	1,310854	56,92513	190,595	2,573115
7,06	1,33213	62,24428	191,205	2,576495
7,08	1,320114	65,96368	189,985	2,582837
7,10	1,277561	68,9424	185,1	2,596759
7,12	1,266923	71,38921	170,45	2,578199
7,14	1,192455	74,47432	168,62	2,600169
7,16	1,16054	76,28283	169,23	2,60774
7,18	1,170524	70,35541	188,32	2,60774
7,20	1,188705	68,53687	203,415	2,615792
7,22	1,15679	60,66453	178,995	2,637291
7,24	1,188705	66,72836	171,06	2,647036
7,26	1,114237	62,57943	163,735	2,629705
7,28	1,092961	59,17517	164,345	2,630229
7,30	1,071684	53,9624	163,735	2,641854
7,32	1,080944	64,5967	198,53	2,631573
7,34	1,080944	62,46904	187,545	2,624162
7,36	1,04903	59,49032	185,1	2,626965
7,38	1,070306	59,49032	184,49	2,626965
7,40	1,080944	55,02223	183,88	2,631573
7,42	1,080944	50,76692	183,88	2,644383
7,44	1,079567	46,72036	185,1	2,65443
7,46	1,090205	41,29483	186,935	2,633312
7,48	1,111482	37,57143	189,985	2,639752
7,50	1,100843	33,63526	191,815	2,637899
7,52	1,090205	31,29483	194,87	2,642488
7,54	1,044896	28,9464	197,31	2,642488
7,56	1,087449	21,92513	210,74	2,656262
7,58	1,278939	17,03151	231,5	2,658102
7,60	1,693832	16,71236	255,31	2,660971
7,62	2,39596	22,77619	260,195	2,657224
7,64	2,981066	30,54215	208,91	2,651822
7,66	3,277561	34,5807	150,915	2,66743
7,68	3,256284	29,26155	121	2,649938
7,70	2,926497	22,66581	102,685	2,649938
7,72	2,59671	23,30411	92,915	2,647249
7,74	2,628625	29,68709	89,255	2,636658
7,76	2,649901	36,60198	86,2	2,658751
7,78	2,66054	50,53815	91,695	2,654199
7,80	2,926497	62,24028	99,02	2,642512
7,82	2,979689	63,9424	77,655	2,664616
7,84	3,084694	56,06606	72,77	2,668567
7,86	3,298838	50,219	74,6	2,670556
7,88	3,488949	51,59798	76,43	2,670556
7,90	3,840013	54,5767	82,535	2,690679
7,92	3,871928	56,70436	83,76	2,69467
7,94	3,871928	63,61926	83,15	2,698695
7,96	3,838635	61,38121	81,925	2,676571
7,98	3,764167	55,42377	80,705	2,687174
8,00	3,721614	43,29611	80,705	2,682661

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)	prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
8,02	3,825241	42,43704	81,925	2,677756	9,02	1,033874	19,33994	156,41	2,655351
8,04	3,984816	46,90513	84,98	2,679825	9,04	1,075049	16,25083	171,67	2,654116
8,06	4,101837	49,77747	87,42	2,682661	9,06	1,096326	14,01679	183,88	2,667687
8,08	4,025991	49,77347	87,42	2,679825	9,08	1,128241	12,52743	189,985	2,676293
8,10	3,738757	51,58198	84,37	2,672917	9,10	1,117603	15,187	196,7	2,677692
8,12	3,483438	44,5607	83,15	2,681903	9,12	1,096326	17,42104	204,025	2,664847
8,14	3,41823	39,34394	83,76	2,681903	9,14	1,085688	20,29338	207,08	2,673408
8,16	3,311848	48,28011	85,59	2,677111	9,16	1,064411	23,69764	210,13	2,67758
8,18	3,846902	45,12862	68,495	2,704396	9,18	1,027369	31,37321	364,59	2,695579
8,20	3,92137	53,9584	69,715	2,695395	9,20	1,069922	31,69236	343,83	2,690364
8,22	4,027753	63,74564	70,94	2,695062	9,22	1,059284	33,28811	342,61	2,695484
8,24	3,846902	68,42649	68,495	2,703746	9,24	1,059284	33,28811	333,455	2,680148
8,26	3,442647	67,36266	64,22	2,719306	9,26	1,016731	35,52215	323,075	2,681063
8,28	2,900093	62,57543	58,115	2,716929	9,28	0,984816	36,90513	321,855	2,681063
8,30	2,336264	41,93713	52,01	2,703492	9,30	0,984816	40,09662	399,995	2,708412
8,32	2,381188	38,40249	65,445	2,727594	9,32	1,080561	39,03279	392,06	2,704177
8,34	2,093954	46,06206	61,78	2,709751	9,34	1,080561	37,33066	382,905	2,695714
8,36	1,721614	54,99823	56,895	2,703128	9,36	1,059284	36,58598	374,355	2,678815
8,38	1,488949	58,72564	53,845	2,705294	9,38	1,059284	34,03279	367,64	2,703594
8,40	1,552779	56,06606	55,675	2,683035	9,40	1,038007	31,4796	348,715	2,704675
8,42	1,742891	50,31738	63	2,689756	9,42	1,038007	31,26683	336,505	2,696267
8,44	1,710976	43,08334	62,39	2,687483	9,44	1,027369	32,75619	341,39	2,693606
8,46	1,519486	37,23228	59,34	2,671902	9,46	1,080561	33,18172	351,77	2,690544
8,48	1,37055	34,99823	57,505	2,665246	9,48	1,186943	33,28811	364,59	2,701318
8,50	1,210976	31,38121	56,285	2,658592	9,50	1,250773	34,5647	381,68	2,681914
8,52	1,157784	26,06206	58,115	2,647531	9,52	1,250773	32,75619	365,81	2,706747
8,54	1,250773	22,75619	64,22	2,658695	9,54	1,249396	30,51815	359,095	2,687363
8,56	1,33588	21,4796	70,94	2,658695	9,56	1,291949	27,43304	362,755	2,708046
8,58	1,474178	23,39449	77,045	2,66753	9,58	1,313225	26,58198	356,65	2,708046
8,60	1,410348	25,94768	74,6	2,674317	9,60	1,291949	29,77347	351,77	2,714943
8,62	1,260034	26,05006	71,55	2,676372	9,62	1,238757	32,75219	343,22	2,708046
8,64	1,185566	25,199	72,77	2,678726	9,64	1,196204	35,51815	326,735	2,699738
8,66	1,121736	20,8373	75,21	2,665505	9,66	1,153651	40,94368	309,645	2,705248
8,68	1,068544	19,77347	78,875	2,661101	9,68	1,130996	46,89713	306,59	2,698344
8,70	1,025991	17,85857	83,76	2,665505	9,70	1,099082	51,25883	307,2	2,708013
8,72	1,035252	16,36521	91,085	2,665688	9,72	1,067167	52,64181	304,76	2,708013
8,74	1,099082	15,51415	99,63	2,661101	9,74	1,035252	53,17372	306,59	2,710785
8,76	1,17355	15,8333	108,79	2,661101	9,76	1,024613	52,74819	307,2	2,710785
8,78	1,290571	15,72692	115,505	2,670084	9,78	1,013975	52,64181	305,98	2,699867
8,80	1,41823	18,49287	124,05	2,685572	9,80	0,98206	49,66309	307,2	2,699867
8,82	1,471422	20,8333	133,82	2,672385	9,82	0,948768	46,57398	306,59	2,710904
8,84	1,492699	23,38649	128,325	2,690428	9,84	0,906214	43,06334	305,98	2,716526
8,86	1,363661	29,12717	116,725	2,697139	9,86	0,863661	40,29738	304,76	2,725009
8,88	1,18281	29,12717	113,675	2,677619	9,88	0,851645	36,56998	304,76	2,734786
8,90	1,087065	26,25483	116,115	2,679983	9,90	0,830369	33,9104	305,37	2,729472
8,92	1,055151	22,63781	119,78	2,691471	9,92	0,787815	30,8253	304,15	2,729472
8,94	1,023236	23,59526	124,66	2,691075	9,94	0,766539	26,67636	303,54	2,718948
8,96	1,055151	23,16972	133,21	2,685166	9,96	0,745262	22,20828	309,035	2,735209
8,98	1,033874	22,85057	139,925	2,687119	9,98	0,742507	20,28538	316,97	2,740973
9,00	1,033874	22,63781	146,64	2,676982	10,00	0,742507	17,20028	320,63	2,753718

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
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Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
10,02	0,774422	14,96623	327,35	2,73642
10,04	0,78506	13,15772	331,62	2,748534
10,06	0,815597	12,62181	326,735	2,748534
10,08	0,79432	14,00479	320,63	2,745619
10,10	0,773044	15,38777	323,075	2,740455
10,12	0,762405	14,64309	329,18	2,758419
10,14	0,741129	13,36649	330,4	2,757319
10,16	0,729113	12,83057	333,455	2,758419
10,18	0,790571	9,237553	287,665	2,782691
10,20	0,854401	12,64181	277,895	2,778223
10,22	0,822486	13,70564	277,285	2,785193
10,24	0,822486	10,93968	288,885	2,781171
10,26	0,843762	9,343936	297,435	2,784124
10,28	0,865039	8,386489	294,38	2,785193
10,30	1,132374	13,07134	320,63	2,805047
10,32	1,121736	20,09262	299,265	2,81499
10,34	1,218858	22,54343	311,475	2,833908
10,36	1,740135	22,75619	365,2	2,814
10,38	3,442263	27,33066	515,99	2,823082
10,40	5,761412	32,86257	412,205	2,848969
10,42	7,238757	37,53943	168,005	2,852938
10,44	8,091199	44,45832	120,39	2,848037
10,46	8,387693	41,36921	109,4	2,845944
10,48	8,291949	28,39049	108,79	2,857874
10,50	8,132374	23,17772	108,79	2,860886
10,52	7,90897	25,94368	108,18	2,863903
10,54	7,483438	29,66709	103,905	2,852938
10,56	6,84514	35,62453	97,19	2,858996
10,58	6,174927	42,75219	90,475	2,872992
10,60	5,333124	51,25883	80,705	2,879081
10,62	4,620358	67,21628	72,77	2,871183
10,64	4,258656	91,25883	72,16	2,883034
10,66	4,290571	125,0886	80,705	2,894405
10,68	5,257278	136,574	121	2,90621
10,70	7,075049	132,6338	221,12	2,90928
10,72	8,646762	119,9662	229,055	2,912356
10,74	9,368788	115,7069	238,215	2,910684
10,76	9,420602	97,93696	218,07	2,928631
10,78	9,057522	86,54998	197,31	2,939564
10,80	8,702325	80,155	186,32	2,92391
10,82	8,456266	77,81057	184,49	2,930929
10,84	8,827229	73,97679	203,415	2,923122
10,86	9,655639	84,07917	207,08	2,933268
10,88	10,17416	100,5605	176,555	2,933268
10,90	10,51321	113,0033	142,975	2,938796
10,92	11,03173	124,0592	125,885	2,93668
10,94	11,46514	126,1788	129,545	2,952136
10,96	11,59143	114,6855	136,87	2,958469
10,98	11,50356	91,27321	141,755	2,96801
11,00	11,61921	80,63092	152,745	2,954609

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
11,02	11,92496	72,96334	166,175	2,978899
11,04	12,15625	69,4447	175,335	2,981439
11,06	12,16551	73,90879	174,725	2,991684
11,08	12,01244	78,25849	169,84	2,989788
11,10	11,67064	80,59492	164,955	3,002562
11,12	11,41256	82,39543	163,125	2,998109
11,14	11,21832	84,83423	163,125	2,994283
11,16	11,15311	86,53236	167,395	3,001329
11,18	11,26087	80,79168	206,47	3,05389
11,20	11,37789	80,57892	188,765	3,060939
11,22	11,52683	81,74913	180,83	3,045717
11,24	11,72107	80,48053	176,555	3,05277
11,26	11,94448	78,24649	172,28	3,056027
11,28	11,88065	75,26777	164,345	3,055501
11,30	10,88577	75,35815	141,755	3,079943
11,32	11,02269	63,12011	140,535	3,088036
11,34	10,84184	63,22649	135,65	3,087
11,36	10,72482	64,07755	131,99	3,105938
11,38	10,61844	66,41798	128,935	3,099996
11,40	10,53333	67,80096	126,495	3,099432
11,42	10,36312	69,29032	122,83	3,091298
11,44	10,20355	71,3116	120,39	3,102682
11,46	9,905673	75,46053	116,725	3,105938
11,48	9,253981	81,19721	108,18	3,116252
11,50	8,913555	80,23977	103,905	3,119519
11,52	8,954731	75,76768	106,345	3,127099
11,54	9,050475	74,06555	109,4	3,123307
11,56	8,912178	70,12938	108,79	3,149347
11,58	8,538459	68,52964	104,515	3,145
11,60	8,325693	64,59347	102,685	3,141743
11,62	8,473252	59,27032	106,955	3,16459
11,64	9,303039	55,97245	122,83	3,153153
11,66	10,64209	55,75568	151,525	3,176669
11,68	11,51167	53,62002	164,955	3,161965
11,70	11,62869	52,66257	160,68	3,161965
11,72	11,53157	55,85006	159,46	3,169009
11,74	11,28689	60,6373	152,135	3,184985
11,76	10,98764	65,31415	146,64	3,183099
11,78	10,40253	68,39926	136,87	3,190756
11,80	9,730943	70,09738	126,495	3,186926
11,82	9,196272	70,19577	119,78	3,187546
11,84	8,83457	68,49364	116,725	3,206758
11,86	8,662979	66,04283	116,725	3,191382
11,88	8,661602	63,6984	120,39	3,190756
11,90	8,895644	60,82606	127,715	3,19397
11,92	9,532564	56,46036	142,365	3,200415
11,94	10,61629	52,30743	164,955	3,204236
11,96	11,68801	49,85262	180,83	3,203069
11,98	12,39013	49,21432	185,1	3,206879
12,00	12,94195	48,78479	182,05	3,194911

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Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
12,02	13,37674	50,69568	182,66	3,212814
12,04	13,7477	55,26615	180,83	3,21228
12,06	14,22643	61,11721	184,49	3,204201
12,08	15,03218	64,08794	193,65	3,207979
12,10	15,69038	68,02011	196,7	3,204201
12,12	16,37123	71,95628	202,805	3,182055
12,14	17,13581	75,99483	203,415	3,188211
12,16	18,07198	79,2927	207,69	3,1849
12,18	17,21242	84,14794	181,44	3,231035
12,20	18,9571	73,50964	199,145	3,227727
12,22	18,9904	78,51364	183,88	3,227283
12,24	18,95848	85,53492	177,775	3,235247
12,26	19,87337	92,44981	191,815	3,233509
12,28	21,34146	96,2796	207,69	3,218975
12,30	21,97976	101,7051	197,92	3,236843
12,32	19,92618	113,4816	200,365	3,219788
12,34	21,17086	98,05611	191,205	3,214871
12,36	20,46874	104,1199	150,305	3,221942
12,38	19,70278	112,737	131,375	3,221942
12,40	18,92618	116,6731	117,335	3,203065
12,42	18,03119	120,8181	103,905	3,21014
12,44	17,98863	118,3713	103,905	3,216622
12,46	17,86097	115,9244	103,295	3,220022
12,48	17,3795	116,4484	97,8	3,219757
12,50	16,98588	116,5547	95,36	3,208766
12,52	16,70928	117,725	94,745	3,218852
12,54	16,38876	115,6997	94,135	3,218494
12,56	16,05759	115,9084	94,745	3,217965
12,58	15,39664	108,7768	89,865	3,225056
12,60	14,50027	105,3645	83,15	3,231979
12,62	13,84995	100,4669	80,095	3,228289
12,64	13,4656	95,46292	80,095	3,228293
12,66	13,16635	90,35253	80,705	3,231851
12,68	12,7154	86,40436	79,485	3,228359
12,70	12,12892	82,78334	76,43	3,239273
12,72	11,6368	78,83917	74,6	3,218214
12,74	11,47447	75,42692	77,045	3,232413
12,76	11,61139	74,14632	82,535	3,235897
12,78	12,03555	72,44019	91,695	3,239512
12,80	12,62854	69,879	103,295	3,254013
12,82	12,99812	66,99866	113,06	3,243282
12,84	13,25206	65,18615	121,61	3,254013
12,86	13,49536	64,54385	130,155	3,257648
12,88	13,6642	66,24198	138,095	3,257481
12,90	13,54305	69,42147	141,755	3,264748
12,92	13,36082	73,03449	144,2	3,258242
12,94	13,28497	76,43475	149,08	3,272229
12,96	13,2304	78,5584	152,745	3,265129
12,98	12,98296	78,86955	152,745	3,275678
13,00	12,53478	80,99321	149,08	3,279329
13,02	12,1717	84,49985	148,47	3,279543
13,04	11,92564	86,19798	149,08	3,280276
13,06	11,58384	86,72589	147,25	3,273176
13,08	11,24066	86,50513	144,81	3,273741
13,10	10,94141	85,01177	143,585	3,285185
13,12	10,69672	82,99049	142,975	3,277756
13,14	10,64216	78,19926	146,03	3,275057
13,16	10,8961	74,1527	156,41	3,275424
13,18	10,87712	76,47236	42,855	3,352155
13,20	11,51542	67,00428	49,57	3,353161
13,22	11,60053	65,51492	50,18	3,353906
13,24	11,69627	64,983	50,79	3,357652
13,26	11,66436	64,02555	50,18	3,347612
13,28	11,50478	64,66385	48,96	3,365154
13,30	11,52364	66,22418	95,13	3,365154
13,32	11,55009	68,07611	122,83	3,362676
13,34	12,33733	64,03355	121,61	3,363131
13,36	12,97562	64,3527	127,715	3,352717
13,38	13,64584	64,24632	134,43	3,34659
13,40	14,20967	65,84206	135,65	3,363601
13,42	14,70967	67,75696	138,705	3,347098
13,44	15,21755	68,7064	145,42	3,351437
13,46	15,73883	71,36598	152,135	3,352543
13,48	16,08989	76,36598	155,795	3,359078
13,50	16,29202	80,72768	158,24	3,349864
13,52	16,41968	82,96172	160,68	3,352543
13,54	16,38776	85,40853	160,07	3,346024
13,56	16,26936	86,04283	158,85	3,346614
13,58	16,04596	87,21304	156,41	3,348713
13,60	15,7999	88,06011	154,575	3,342186
13,62	15,56586	88,16649	153,355	3,349281
13,64	15,50203	88,37926	155,185	3,329182
13,66	15,47937	88,90717	158,24	3,335676
13,68	15,53119	89,00955	163,735	3,343369
13,70	15,57374	89,3287	168,005	3,330427
13,72	15,39013	89,3207	168,005	3,320111
13,74	15,00578	89,84862	164,345	3,334946
13,76	14,88738	91,97228	168,005	3,339497
13,78	15,07749	91,11721	175,335	3,336993
13,80	15,38324	88,98155	186,935	3,337705
13,82	15,93506	89,40309	202,805	3,334523
13,84	16,63581	88,97355	212,575	3,347015
13,86	17,40039	87,69296	185,71	3,33047
13,88	18,10902	85,34053	192,425	3,352511
13,90	18,64882	82,88572	198,53	3,343108
13,92	19,08361	82,98811	204,635	3,339982
13,94	19,43192	85,42692	206,47	3,351019
13,96	19,67384	89,14232	208,3	3,343108
13,98	19,84268	90,5213	203,415	3,337708
14,00	20,00088	93,81517	207,08	3,343108

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
14,02	20,14706	97,74334	208,3	3,327522
14,04	20,11376	101,4627	205,86	3,330631
14,06	19,83441	104,2207	202,805	3,331495
14,08	19,47133	105,1741	196,7	3,321869
14,10	19,16007	106,4427	194,26	3,31251
14,12	18,86082	108,2473	174,725	3,308547
14,14	18,45518	109,3071	166,785	3,314789
14,16	18,10274	110,0478	168,62	3,311666
14,18	17,62203	111,1676	143,585	3,344636
14,20	17,71778	108,2953	143,585	3,338348
14,22	17,76033	108,2953	142,975	3,34149
14,24	17,5582	106,3804	137,48	3,332847
14,26	17,13267	106,1676	128,935	3,326537
14,28	16,60075	105,2101	121	3,331346
14,30	16,20714	104,7846	116,115	3,334523
14,32	16,25411	105,6477	103,905	3,32969
14,34	16,08361	96,28598	121,61	3,339174
14,36	16,01978	93,94555	117,945	3,325004
14,38	15,67936	92,77534	111,84	3,331346
14,40	15,45733	95,01338	108,18	3,314754
14,42	15,59425	96,28598	108,79	3,315522
14,44	15,75382	92,98811	110,01	3,323388
14,46	15,54106	89,37109	105,735	3,315522
14,48	15,17936	89,15832	101,465	3,30767
14,50	15,10213	90,10777	102,075	3,302141
14,52	15,36809	89,78862	105,735	3,304587
14,54	15,6766	89,2567	110,62	3,287312
14,56	15,73905	88,72079	112,45	3,296115
14,58	15,50501	89,99738	110,62	3,29214
14,60	15,33342	90,63168	110,62	3,276681
14,62	15,30013	90,73406	111,84	3,268404
14,64	15,2363	90,5213	113,06	3,278534
14,66	15,05407	90,5173	113,06	3,282542
14,68	14,76683	88,17687	111,84	3,250133
14,70	14,37046	85,40292	110,01	3,264262
14,72	13,97547	83,80317	108,79	3,248122
14,74	13,81451	81,88428	110,01	3,258205
14,76	13,8876	80,92283	114,895	3,24408
14,78	14,17346	79,855	122,22	3,240146
14,80	14,5856	79,42147	130,765	3,23118
14,82	15,12815	78,25126	139,925	3,233393
14,84	15,88209	78,35364	150,915	3,234522
14,86	16,76369	76,75389	162,515	3,23043
14,88	17,73828	76,31636	179,605	3,246384
14,90	18,63052	78,5464	199,145	3,23748
14,92	19,23553	79,39347	211,355	3,235666
14,94	19,35117	83,00649	216,845	3,238616
14,96	19,46819	86,51713	227,835	3,238616
14,98	19,47745	92,89611	232,72	3,242713
15,00	19,82576	99,90938	248,595	3,257962

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
15,02	20,27119	101,0756	268,13	3,258631
15,04	20,52513	97,98649	279,73	3,249761
15,06	20,49184	95,32292	262,025	3,267954
15,08	20,25504	93,93194	217,46	3,276819
15,10	20,01825	90,51968	204,025	3,302058
15,12	19,50623	87,43057	192,425	3,312073
15,14	18,69634	88,70317	180,215	3,309108
15,16	17,90635	91,99304	171,67	3,324338
15,18	17,00738	90,18615	178,115	3,386422
15,20	16,96483	89,33509	178,385	3,386422
15,22	16,84781	85,29253	169,84	3,388559
15,24	16,70951	83,48402	163,735	3,411654
15,26	16,61514	81,89228	159,46	3,416782
15,28	16,55131	78,27526	155,795	3,440945
15,30	16,3811	75,61568	150,915	3,428993
15,32	16,37046	72,95611	161,965	3,42277
15,34	15,72152	70,08377	166,785	3,454007
15,36	15,72428	71,58113	158,85	3,446948
15,38	15,76683	71,1556	154,575	3,464076
15,40	15,94768	67,43219	153,355	3,466178
15,42	16,06471	64,55985	151,525	3,483293
15,44	15,86258	63,92155	145,42	3,500416
15,46	15,53279	62,21943	138,705	3,512483
15,48	15,1179	59,98538	131,99	3,50542
15,50	14,55131	58,5944	124,66	3,527626
15,52	13,76408	57,42419	114,895	3,515511
15,54	12,61514	58,38164	102,685	3,552854
15,56	11,02866	60,61168	85,59	3,543767
15,58	8,964827	64,76062	64,835	3,555932
15,60	7,920896	66,77789	57,505	3,549841
15,62	6,952811	72,62896	52,01	3,549841
15,64	6,302497	73,5824	49,57	3,558984
15,66	6,387604	63,47602	53,235	3,54295
15,68	7,228029	61,34836	69,715	3,567624
15,70	8,556439	58,79117	88,64	3,58488
15,72	10,26645	48,5704	114,895	3,594109
15,74	11,76645	42,71934	137,48	3,60042
15,76	12,57358	45,90683	144,81	3,591102
15,78	13,47784	50,37492	159,46	3,614841
15,80	14,6055	53,46002	175,945	3,609589
15,82	15,35944	56,96666	186,32	3,596704
15,84	15,78497	58,5624	191,815	3,586376
15,86	15,99774	64,73262	192,425	3,603186
15,88	16,1254	68,66879	192,425	3,598749
15,90	16,06019	72,28181	188,765	3,598173
15,92	15,8687	75,79245	182,05	3,611254
15,94	15,63466	81,1116	176,555	3,600341
15,96	15,40061	83,77117	171,67	3,611254
15,98	15,25168	82,28181	169,84	3,607978
16,00	15,21701	81,63551	169,84	3,624395

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
16,02	15,1319	80,03977	169,84	3,620094
16,04	15,04542	78,65279	170,45	3,634786
16,06	15,28872	75,56368	177,775	3,644692
16,08	15,97883	73,00649	194,87	3,645686
16,10	17,09447	71,0876	223,565	3,66505
16,12	17,87895	70,22853	229,055	3,66505
16,14	18,11162	74,58623	222,34	3,671702
16,16	18,34566	78,84155	219,9	3,668828
16,18	18,65433	76,30598	197,31	3,710103
16,20	19,06922	76,30598	194,87	3,716009
16,22	19,18624	81,30598	194,87	3,716791
16,24	19,37911	84,18232	197,31	3,710103
16,26	19,48549	86,41636	196,09	3,720141
16,28	19,3472	88,6504	189,375	3,734744
16,30	19,00677	90,77806	179,605	3,738925
16,32	18,26071	96,41236	164,345	3,746462
16,34	17,43368	87,69696	171,67	3,738091
16,36	16,13581	89,50547	146,64	3,7527
16,38	15,01879	90,14377	128,935	3,753124
16,40	14,28474	89,18632	118,555	3,763989
16,42	13,73155	86,84589	111,23	3,763989
16,44	13,36985	81,63313	106,955	3,785287
16,46	13,11453	76,95228	104,515	3,779086
16,48	12,90177	72,69696	102,075	3,789504
16,50	12,8472	66,94828	103,295	3,794233
16,52	12,92166	61,62913	106,345	3,794233
16,54	13,11178	56,30598	110,01	3,809951
16,56	13,38837	52,90172	115,505	3,813764
16,58	13,80051	48,95755	124,05	3,802333
16,60	14,37498	46,61713	134,43	3,814304
16,62	14,92679	45,12377	144,81	3,814304
16,64	15,3935	44,48147	155,185	3,813764
16,66	15,82967	42,56657	163,125	3,80507
16,68	16,31765	44,47747	175,945	3,823097
16,70	16,62341	44,895	184,49	3,821952
16,72	16,9532	47,02266	194,26	3,811591
16,74	17,1965	49,14632	203,415	3,829613
16,76	17,49437	51,27398	215,015	3,818686
16,78	17,87597	54,2487	227,835	3,832876
16,80	18,18448	55,84445	239,435	3,829613
16,82	18,38523	56,05321	247,985	3,814857
16,84	18,37322	58,28326	248,595	3,82086
16,86	18,03279	60,5173	235,775	3,814304
16,88	17,47684	63,70079	213,795	3,8214
16,90	16,97684	66,46675	204,635	3,818127
16,92	16,31589	69,44147	193,65	3,824676
16,94	15,60175	70,71406	183,27	3,824676
16,96	14,95281	72,09704	177,165	3,837818
16,98	14,48335	73,36964	174,11	3,841624
17,00	14,13091	73,04649	173,5	3,85253

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
17,02	13,92602	72,40019	175,945	3,865702
17,04	13,78635	70,90683	180,215	3,866206
17,06	13,58284	69,41347	182,05	3,866723
17,08	13,30487	67,60096	181,44	3,862915
17,10	12,95105	65,67806	180,83	3,866723
17,12	12,59861	62,16343	178,385	3,866723
17,14	12,25543	59,1767	177,775	3,881446
17,16	11,94554	56,40675	177,165	3,87382
17,18	11,57435	54,69423	142,365	3,912593
17,20	11,45733	50,75806	136,87	3,909304
17,22	11,3935	49,16232	133,21	3,92958
17,24	11,32967	48,09849	130,155	3,927307
17,26	11,22329	47,56657	127,105	3,947573
17,28	11,10627	46,92828	123,44	3,940475
17,30	10,96797	47,67296	119,78	3,96411
17,32	10,90414	46,50275	117,945	3,960796
17,34	10,73844	45,80206	122,99	3,960329
17,36	10,94057	44,63185	126,495	3,973631
17,38	11,25972	44,84462	127,715	3,981171
17,40	11,58951	44,951	128,935	3,987401
17,42	11,90865	46,33398	128,325	3,987401
17,44	12,23844	46,86589	128,935	3,98827
17,46	12,65334	47,18504	130,155	4,009566
17,48	13,17461	49,20632	131,375	3,998262
17,50	13,82493	52,18904	133,82	4,015799
17,52	14,88738	53,99355	140,535	4,01914
17,54	16,55897	56,33798	147,86	4,033339
17,56	18,68663	60,69968	178,995	4,047538
17,58	21,20653	64,20632	227,835	4,061737
17,60	23,51504	64,63185	288,275	4,071782
17,62	25,1094	69,52147	311,475	4,078494
17,64	26,386	75,37253	298,655	4,053836
17,66	27,09601	83,13049	278,51	4,060554
17,68	27,59601	92,70496	264,465	4,063918
17,70	27,83931	100,4669	244,93	4,056454
17,72	27,29676	107,4882	226,005	4,062865
17,74	26,15846	115,1478	202,195	4,06964
17,76	24,39113	124,6119	177,165	4,07674
17,78	22,71954	132,7993	154,575	4,055438
17,80	21,04932	132,3738	135,65	4,06964
17,82	19,60114	128,0081	123,44	4,061635
17,84	18,57711	122,149	117,945	4,058523
17,86	17,84169	115,8684	116,725	4,060842
17,88	17,26584	107,141	117,945	4,046893
17,90	16,82554	98,08649	121,61	4,036925
17,92	16,47172	88,71679	126,495	4,057171
17,94	16,19237	82,21943	133,21	4,036114
17,96	15,99812	79,97738	140,535	4,04297
17,98	15,97409	76,35236	151,525	4,04297
18,00	16,10963	71,55713	166,175	4,03244

Tecnico del laboratorio
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Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
18,02	16,28635	68,5664	180,83	4,035869
18,04	16,35806	67,70734	193,65	4,039301
18,06	16,40712	68,01449	205,86	4,035208
18,08	16,24617	69,07432	214,405	4,03244
18,10	16,0732	70,02377	220,51	4,024874
18,12	15,98396	70,96921	229,67	4,017773
18,14	15,90674	72,13143	231,5	4,018
18,16	15,79622	73,18326	230,28	4,014335
18,18	15,67836	70,5693	193,65	4,052669
18,20	15,74219	67,27143	183,88	4,049029
18,22	15,75283	66,42036	177,775	4,049029
18,24	15,83794	66,52675	175,945	4,055958
18,26	15,99751	65,25015	177,165	4,052328
18,28	16,26347	65,25015	178,385	4,044936
18,30	16,66772	65,46292	185,1	4,059427
18,32	17,44432	65,14377	199,145	4,059275
18,34	17,77548	66,84989	221,92	4,044809
18,36	19,42442	60,04138	232,11	4,044809
18,38	20,58399	60,99883	227,225	4,041201
18,40	21,50027	64,3007	221,12	4,034223
18,42	22,26622	69,51347	219,9	4,034223
18,44	22,7875	77,27943	214,405	4,013058
18,46	23,2875	83,02411	208,91	4,01654
18,48	23,67048	89,83262	200,975	4,027003
18,50	24,24495	98,6624	185,71	4,016678
18,52	24,9258	104,3007	192,425	4,005707
18,54	25,57473	112,4922	186,935	4,009201
18,56	26,04144	119,8286	187,545	4,009201
18,58	26,62655	127,0627	186,32	3,998608
18,60	27,15708	136,8459	188,155	4,002103
18,62	27,49751	148,548	177,775	3,994904
18,64	27,68762	157,693	168,62	3,98466
18,66	27,96284	164,8166	163,735	3,97361
18,68	28,08774	172,7873	163,735	3,963115
18,70	27,96934	179,2727	156,41	3,955912
18,72	27,88286	184,4815	153,965	3,955912
18,74	27,69788	187,3418	151,525	3,942065
18,76	27,62203	185,5293	150,305	3,952524
18,78	27,75757	184,3511	157,63	3,938449
18,80	27,8811	187,8497	164,345	3,938449
18,82	28,06846	188,476	169,84	3,90671
18,84	28,21188	187,9281	171,67	3,91413
18,86	28,37658	188,9759	176,555	3,903396
18,88	28,51725	190,3349	182,66	3,89301
18,90	29,2444	188,7192	196,09	3,892831
18,92	29,57006	190,5157	184,49	3,882454
18,94	29,66029	193,0529	176,555	3,868069
18,96	29,61223	197,2922	172,89	3,868887
18,98	29,42862	199,0927	168,005	3,865006
19,00	29,40183	197,1618	166,785	3,861787

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
19,02	28,90834	192,7881	154,575	3,844396
19,04	27,97867	190,7548	144,2	3,848336
19,06	26,50646	187,445	130,765	3,841235
19,08	24,71371	183,28	119,165	3,837552
19,10	22,98617	180,8212	110,62	3,834411
19,12	21,39693	176,873	105,125	3,831003
19,14	20,44461	170,3677	108,18	3,824199
19,16	20,15187	163,5432	119,78	3,838709
19,18	20,16181	158,6235	171,67	3,934111
19,20	20,29798	146,198	181,44	3,93781
19,22	20,35117	139,7086	167,395	3,941211
19,24	20,46819	134,7086	163,125	3,934727
19,26	20,30862	123,432	153,965	3,941513
19,28	19,71287	114,1767	139,925	3,93781
19,30	19,3299	109,9214	133,21	3,927954
19,32	18,99873	102,7897	126,495	3,920854
19,34	19,00061	104,1967	200,51	3,923609
19,36	18,92189	101,6435	212,255	3,920211
19,38	19,19849	92,70734	230,28	3,933821
19,40	19,35944	89,839	207,69	3,916817
19,42	19,50837	87,39219	203,415	3,930414
19,44	19,5722	85,79645	200,975	3,948312
19,46	19,40199	89,94538	194,26	3,927312
19,48	19,08422	90,58768	187,545	3,931018
19,50	19,00837	85,79645	184,49	3,937515
19,52	19,40199	84,2007	196,09	3,944911
19,54	20,23178	82,60496	218,68	3,944333
19,56	20,77295	78,87755	228,445	3,940646
19,58	21,24104	75,15415	241,88	3,955124
19,60	21,12126	78,76317	234,55	3,961948
19,62	20,80211	88,01849	225,395	3,965365
19,64	20,40712	89,92938	216,845	3,961684
19,66	19,98021	95,56368	209,52	3,961195
19,68	19,86319	98,22326	211,965	3,975396
19,70	19,88309	96,83628	221,12	3,971512
19,72	19,89235	96,30036	227,225	3,971512
19,74	19,85768	93,73917	229,67	3,964205
19,76	19,76193	88,5264	230,89	3,957105
19,78	19,50524	87,03304	231,5	3,949811
19,80	19,33364	86,70989	235,16	3,953456
19,82	19,30035	86,81228	243,71	3,946556
19,84	19,57419	85,20853	256,53	3,960756
19,86	20,09409	84,45985	266,91	3,950211
19,88	20,91186	83,92394	265,075	3,950211
19,90	22,10197	82,74972	277,285	3,967469
19,92	23,26017	80,19253	270,57	3,971111
19,94	23,95816	81,0316	269,35	3,964011
19,96	24,33977	82,30419	267,52	3,96383
19,98	24,66818	85,91721	263,245	3,96383
20,00	24,87681	87,50096	267,52	3,967294

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
20,02	24,79032	91,64589	263,245	3,970605
20,04	24,58682	95,15253	257,14	3,97093
20,06	23,85928	98,22564	238,825	3,977561
20,08	22,81535	101,6259	226,005	3,97093
20,10	21,6544	105,7708	216,235	3,977705
20,12	20,54388	108,5248	207,69	3,981857
20,14	19,64751	109,687	207,08	3,977861
20,16	18,92679	110,3656	226,495	4,0056
20,18	18,57986	110,3485	287,665	3,998202
20,20	19,13305	91,83789	268,74	4,005299
20,22	18,98412	87,26343	245,54	4,015883
20,24	18,88837	83,96555	235,16	4,022939
20,26	18,84582	81,94428	227,835	4,008824
20,28	18,8537	80,65968	224,175	4,023018
20,30	19,14094	77,25543	226,615	4,015883
20,32	19,46008	76,82989	229,055	4,00169
20,34	19,51328	80,02138	225,395	4,026545
20,36	19,84169	78,57057	216,845	3,991014
20,38	19,7154	74,80862	214,845	4,005205
20,40	20,36434	74,06394	201,585	3,998104
20,42	20,69413	77,04266	178,995	3,994572
20,44	20,96008	80,34053	189,375	3,998131
20,46	21,38562	82,14904	177,775	3,994572
20,48	21,78987	83,85117	173,5	4,005257
20,50	21,91753	86,08521	178,385	4,001692
20,52	22,04519	89,17032	184,49	3,99107
20,54	21,86434	89,59585	183,27	3,994599
20,56	21,07711	94,80862	168,62	3,987596
20,58	20,41753	98,00011	161,29	3,987596
20,60	20,2353	99,2727	163,735	3,998208
20,62	20,3736	99,911	173,5	3,987661
20,64	20,64882	100,1198	186,935	3,994638
20,66	21,11553	97,45619	204,635	3,998336
20,68	21,4532	95,10777	218,07	3,99483
20,70	21,37735	92,76334	222,95	3,991173
20,72	21,22704	95,95083	222,95	3,987661
20,74	21,32002	96,1556	216,845	3,991173
20,76	21,67897	96,78589	178,995	3,984081
20,78	22,06057	95,71806	176,555	4,001731
20,80	21,96345	93,26726	165,565	4,008874
20,82	20,8876	92,19943	150,305	3,998163
20,84	19,37283	92,71934	134,43	4,012394
20,86	17,92465	88,88555	124,05	4,008874
20,88	16,73178	90,05177	118,555	3,998163
20,90	16,11062	86,42275	125,885	4,001731
20,92	16,07733	80,67406	140,535	4,023121
20,94	15,97883	78,32564	151,525	4,012394
20,96	16,19022	75,34292	174,725	4,005257
20,98	16,05843	82,24581	180,215	4,030068
21,00	15,98357	80,83083	222,34	4,026485

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
21,02	15,62976	81,14198	223,565	4,012295
21,04	15,28795	81,56351	223,565	4,026492
21,06	14,96605	86,12998	220,51	4,033642
21,08	14,62287	87,93049	217,46	4,037211
21,10	14,53638	91,96904	221,73	4,040705
21,12	14,77969	90,58206	235,775	4,058555
21,14	14,95778	90,89321	244,93	4,044308
21,16	14,62386	92,15781	233,94	4,048095
21,18	14,27962	91,01083	164,955	4,083261
21,20	14,12004	84,20232	158,24	4,076153
21,22	13,98174	81,54275	155,185	4,076153
21,24	14,03494	80,05338	155,795	4,097438
21,26	14,31153	79,41509	161,29	4,093894
21,28	14,70515	78,35126	168,005	4,07975
21,30	14,99238	76,86189	169,84	4,076221
21,32	15,23706	74,73423	170,45	4,086799
21,34	15,40728	75,37253	171,06	4,09745
21,36	15,4258	76,53475	166,785	4,09745
21,38	15,31842	87,20104	169,035	4,101038
21,40	15,27587	73,47764	164,345	4,115196
21,42	15,40353	76,56275	161,9	4,118756
21,44	15,57374	78,79679	161,29	4,104544
21,46	15,86235	80,39653	163,125	4,12229
21,48	16,29714	81,56275	169,23	4,12229
21,50	16,7014	81,77551	169,84	4,129368
21,52	16,82906	84,75423	166,785	4,125828
21,54	16,84758	90,49092	164,955	4,1436
21,56	17,11354	94,00155	170,45	4,157788
21,58	17,73056	96,44836	183,27	4,157761
21,60	18,7611	98,89117	207,69	4,168446
21,62	19,87812	103,1465	233,33	4,175482
21,64	20,73844	106,4404	249,205	4,164842
21,66	21,281	111,0148	255,92	4,175508
21,68	21,6094	115,7981	256,53	4,157761
21,70	21,67048	123,556	253,475	4,154206
21,72	21,46697	132,9137	244,93	4,1613
21,74	21,54144	142,0627	251,035	4,154197
21,76	22,25283	149,5055	283,39	4,175488
21,78	22,81528	157,0547	301,095	4,157745
21,80	23,02667	159,1783	305,98	4,179066
21,82	23,15157	149,2767	331,62	4,179043
21,84	22,86296	146,4004	191,205	4,168438
21,86	23,08361	138,2009	183,27	4,182727
21,88	23,29224	126,4867	200,365	4,211017
21,90	23,48235	110,9508	182,66	4,204165
21,92	23,82002	93,49602	180,83	4,204019
21,94	24,51802	80,07977	185,71	4,221954
21,96	25,12165	64,2207	179,605	4,236249
21,98	25,63091	56,98266	161,29	4,23636
22,00	26,40337	55,37492	186,32	4,243862

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
22,02	26,9871	54,839	199,755	4,247489
22,04	27,9085	50,57168	173,5	4,275735
22,06	28,61851	51,52113	178,3	4,293719
22,08	29,11575	48,00249	178,385	4,301173
22,10	30,113	47,14343	197,92	4,297187
22,12	30,99322	46,39075	189,985	4,31883
22,14	30,66205	50,64206	190,595	4,337296
22,16	31,2643	47,86411	227,835	4,358597
22,18	30,56922	61,41236	201,56	4,376024
22,20	30,78199	66,30598	147,86	4,382922
22,22	31,0905	57,79534	148,47	4,372579
22,24	30,49475	65,88045	140,535	4,380627
22,26	30,30327	72,68896	141,755	4,374068
22,28	29,15433	68,96555	131,99	4,399064
22,30	28,13443	76,41636	122,22	4,399981
22,32	26,86847	83,11849	136,26	4,435812
22,34	23,8671	84,17832	89,865	4,450014
22,36	21,87123	80,14777	78,265	4,449063
22,38	20,05545	107,649	159,56	4,437432
22,40	19,1831	72,75534	195,48	4,433753
22,42	18,11927	62,22343	168,005	4,440854
22,44	17,23767	62,22743	150,305	4,444533
22,46	16,61001	70,41892	145,42	4,454807
22,48	16,29087	67,97211	143,585	4,462416
22,50	16,02491	68,18487	141,145	4,465105
22,52	15,68448	70,09977	136,87	4,472681
22,54	15,3547	76,90828	134,43	4,486407
22,56	15,18448	89,46147	136,26	4,482971
22,58	15,23767	82,65296	142,365	4,493286
22,60	15,54481	77,11704	153,965	4,503433
22,62	16,098	75,09577	170,45	4,50689
22,64	16,89449	73,07049	191,815	4,521688
22,66	17,90513	69,879	215,015	4,53165
22,68	19,05131	66,04121	239,435	4,535113
22,70	19,96483	64,01594	253,475	4,548847
22,72	20,65494	67,09704	262,635	4,552467
22,74	21,24931	70,60368	268,13	4,559878
22,76	22,12027	72,08904	287,055	4,559878
22,78	22,51113	80,27253	258,97	4,587964
22,80	22,809	86,97466	259,58	4,588115
22,82	22,83954	94,73662	244,32	4,591588
22,84	22,17859	98,66879	219,9	4,609414
22,86	20,68785	104,7286	185,71	4,599012
22,88	19,56807	104,5079	170,45	4,592281
22,90	19,06669	108,7592	171,06	4,613581
22,92	18,8951	106,0956	178,385	4,61723
22,94	18,97883	102,581	191,815	4,624537
22,96	19,00937	98,74717	202,195	4,635518
22,98	19,15555	90,86683	213,795	4,635997
23,00	19,20599	82,02904	222,95	4,639674

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
23,02	19,27908	73,5144	230,89	4,640207
23,04	19,51036	67,12343	242,49	4,651286
23,06	19,57144	67,43457	241,265	4,669806
23,08	19,38921	62,00504	237,605	4,669806
23,10	19,324	57,10743	246,15	4,681291
23,12	19,57519	55,18053	260,805	4,692117
23,14	20,01854	58,23341	278,21	4,692117
23,16	20,39671	61,43313	277,435	4,722412
23,18	19,98496	66,32283	268,13	4,592281
23,20	19,96155	81,64198	288,885	4,603681
23,22	20,919	82,49304	308,42	4,619187
23,24	22,04666	77,59943	313,915	4,647591
23,26	23,03464	76,21245	305,98	4,655605
23,28	23,68358	76,85075	297,435	4,663031
23,30	24,00273	85,14862	301,705	4,656267
23,32	24,09572	91,31083	291,94	4,656615
23,34	24,12763	101,8427	295,6	4,65999
23,36	23,64891	105,7789	279,12	4,677916
23,38	21,94253	122,1619	193,65	4,678643
23,40	21,76853	121,1948	190,89	4,679023
23,42	20,93874	127,2587	187,145	4,675282
23,44	19,69268	135,3398	166,785	4,689867
23,46	18,27779	143,4249	137,48	4,672313
23,48	16,99055	146,4036	118,555	4,689867
23,50	15,52247	146,0844	100,85	4,696582
23,52	14,18204	140,6589	93,525	4,699944
23,54	13,21258	136,506	97,19	4,714523
23,56	12,68855	127,5618	110,62	4,714523
23,58	12,61408	114,7959	130,765	4,724982
23,60	12,91983	101,49	156,41	4,732466
23,62	13,39718	90,7413	183,27	4,732861
23,64	13,93836	80,52453	205,86	4,729923
23,66	14,15763	73,59764	213,185	4,732861
23,68	13,49667	73,06172	191,205	4,732861
23,70	12,72658	71,98589	178,385	4,733681
23,72	12,31031	71,44998	180,83	4,713696
23,74	12,10681	72,93534	189,375	4,744973
23,76	12,10405	73,14011	200,975	4,756288
23,78	12,29279	71,96189	215,015	4,739232
23,80	12,59992	68,87279	230,89	4,743017
23,82	12,95886	65,99245	238,825	4,754881
23,84	13,24334	61,94189	226,005	4,755386
23,86	13,53846	57,78496	224,785	4,744997
23,88	13,88815	55,75968	213,185	4,76958
23,90	14,22719	54,58547	221,73	4,762998
23,92	14,13795	55,21177	188,155	4,766808
23,94	13,46636	60,42053	180,215	4,760784
23,96	12,92243	61,16121	182,05	4,760784
23,98	12,6218	62,21704	188,155	4,781531
24,00	12,50341	63,06411	191,205	4,771702

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Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
24,02	12,5233	63,16649	195,48	4,779921
24,04	12,70278	61,67313	198,53	4,783756
24,06	13,05246	58,90317	200,975	4,793545
24,08	13,45396	56,55475	204,025	4,797374
24,10	13,86748	54,84862	202,805	4,797374
24,12	13,99376	55,69568	194,87	4,790851
24,14	13,886	58,6704	191,205	4,783756
24,16	13,79814	59,939	189,985	4,788778
24,18	13,79542	63,7904	186,005	4,880404
24,20	13,88478	56,76913	188,155	4,890178
24,22	14,29967	57,08828	187,545	4,883083
24,24	14,72521	57,72657	188,155	4,877152
24,26	15,31031	57,72657	189,375	4,870058
24,28	15,56563	56,23721	186,32	4,870058
24,30	14,83159	61,13083	169,23	4,859121
24,32	13,90606	66,66275	155,795	4,867411
24,34	13,37414	69,96062	157,63	4,874505
24,36	13,08691	72,40743	165,565	4,878356
24,38	12,84435	74,85423	155,795	4,88221
24,40	12,78077	67,59619	161,205	4,890558
24,42	12,8446	63,7664	188,765	4,884763
24,44	12,87789	61,11083	186,32	4,891854
24,46	13,05874	59,30232	188,765	4,889986
24,48	13,31406	58,45126	189,985	4,904852
24,50	13,59992	56,74513	189,375	4,897075
24,52	14,00417	56,63875	190,595	4,901656
24,54	14,47226	58,34087	191,205	4,913346
24,56	14,78077	59,4047	191,205	4,921151
24,58	14,99354	59,08555	190,595	4,911616
24,60	15,06663	59,50709	190,595	4,902108
24,62	15,10918	60,14538	190,595	4,901269
24,64	15,15035	59,71585	191,205	4,915435
24,66	15,20355	61,73713	191,205	4,913089
24,68	15,25674	62,48181	191,815	4,92017
24,70	15,2859	64,70785	193,04	4,924928
24,72	15,42282	66,08683	193,04	4,929706
24,74	15,61431	65,55492	193,04	4,919506
24,76	16,00654	64,06155	198,53	4,919506
24,78	16,69666	62,99372	198,53	4,904513
24,80	17,22719	63,41526	196,7	4,914128
24,82	16,87337	65,003	186,32	4,929147
24,84	15,75635	65,42853	170,45	4,920351
24,86	14,84008	66,06283	167,395	4,932252
24,88	14,30679	67,12266	172,28	4,932252
24,90	13,98626	67,65057	182,05	4,947273
24,92	13,7601	67,21704	187,545	4,93798
24,94	13,47149	66,89389	188,765	4,937096
24,96	13,26799	66,14521	192,425	4,944172
24,98	13,26661	64,3327	196,09	4,96367
25,00	13,30778	62,52019	197,31	4,96367

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
25,02	13,39013	61,02283	195,48	4,968502
25,04	13,47248	59,41909	198,53	4,968502
25,06	13,55621	57,71296	197,31	4,984903
25,08	13,53218	56,85389	197,31	4,978683
25,10	13,63719	56,84989	199,755	4,975578
25,12	13,99751	55,46292	200,365	4,991981
25,14	14,78337	53,75679	201,585	4,974714
25,16	16,04795	53,6464	205,25	4,998213
25,18	17,73668	52,25543	210,74	4,990297
25,20	18,65785	53,50564	232,72	5,04136
25,22	19,7536	51,80351	216,845	5,033482
25,24	20,03019	55,73968	207,69	5,039778
25,26	19,91317	61,80351	201,585	5,047647
25,28	19,50892	67,54819	192,425	5,057097
25,30	18,98902	74,57347	183,88	5,068111
25,32	18,40253	77,86734	175,335	5,073658
25,34	17,74296	81,69713	166,175	5,073658
25,36	16,8919	86,16521	155,795	5,080742
25,38	16,27487	86,69713	155,795	5,096595
25,40	16,05072	89,46709	169,645	5,09416
25,42	15,40391	78,50964	200,89	5,112248
25,44	15,27625	75,53092	208,3	5,112248
25,46	15,15923	74,04155	198,53	5,112248
25,48	15,06486	71,81151	196,7	5,135208
25,50	14,95848	67,76896	193,65	5,129589
25,52	15,04359	65,32215	210,74	5,150846
25,54	14,74571	69,3647	191,815	5,149959
25,56	14,76699	81,2796	205,25	5,160198
25,58	14,86136	72,97772	196,09	5,162597
25,60	14,92381	69,995	200,975	5,18145
25,62	14,87062	67,33543	198,53	5,171988
25,64	14,7735	63,7144	200,975	5,186154
25,66	14,78413	63,39526	202,805	5,193238
25,68	14,78138	56,47236	200,365	5,201942
25,70	14,80128	58,06411	201,585	5,199545
25,72	14,66298	59,3407	202,805	5,211337
25,74	14,6417	61,36198	205,25	5,211337
25,76	14,59777	61,35798	204,025	5,23104
25,78	14,56448	61,88589	204,025	5,239669
25,80	14,57374	62,83934	206,47	5,240534
25,82	14,87161	61,13721	209,52	5,256217
25,84	15,41141	61,02283	212,575	5,271312
25,86	15,99514	61,01883	211,355	5,272047
25,88	16,54695	64,09994	215,625	5,289394
25,90	17,25834	69,62785	220,51	5,285485
25,92	17,89664	72,28743	213,795	5,285485
25,94	18,19176	76,96028	216,235	5,302838
25,96	17,77548	81,53075	198,53	5,313831
25,98	16,92304	85,35653	186,32	5,31774
26,00	16,32592	85,67168	193,04	5,310653

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
26,02	15,87773	84,71023	195,48	5,331913
26,04	15,37498	83,42564	194,87	5,331913
26,06	14,90552	83,10249	194,87	5,324826
26,08	14,59563	81,1836	200,975	5,349995
26,10	14,42541	76,39636	206,47	5,346086
26,12	14,4532	72,44819	211,355	5,36344
26,14	14,5582	70,74206	213,185	5,357081
26,16	14,67384	69,99338	211,965	5,372737
26,18	14,81192	70,08538	216,15	5,411629
26,20	15,26936	68,17049	224,785	5,425806
26,22	15,62043	68,38326	214,405	5,43679
26,24	15,80128	68,38326	208,3	5,450268
26,26	15,89702	67,85134	206,47	5,447072
26,28	16,0566	67,74496	207,69	5,453467
26,30	16,22681	67,31943	207,69	5,43679
26,32	16,46085	67,74496	211,355	5,46241
26,34	16,6417	67,00028	210,74	5,447568
26,36	16,85447	66,04283	211,355	5,451443
26,38	17,00203	65,40053	213,795	5,454659
26,40	17,05785	63,61202	212,025	5,451443
26,42	17,06349	58,19049	227,835	5,441139
26,44	17,39327	57,12666	221,12	5,447568
26,46	17,82944	55,74368	221,12	5,450787
26,48	18,44646	54,89262	224,175	5,446916
26,50	19,16987	53,7224	226,615	5,450139
26,52	19,86136	53,61602	226,615	5,47206
26,54	19,77625	56,48836	213,185	5,466917
26,56	18,92519	61,80751	191,815	5,47015
26,58	17,98902	68,40326	181,44	5,477243
26,60	17,54221	74,57347	191,205	5,495917
26,62	17,65785	79,995	212,575	5,489465
26,64	18,10466	83,39926	227,835	5,50174
26,66	18,33733	78,50164	222,34	5,499206
26,68	17,80266	67,74896	202,805	5,480469
26,70	17,26936	62,42581	196,7	5,51271
26,72	16,83181	61,46436	201,585	5,513385
26,74	16,58713	59,86862	208,3	5,513385
26,76	16,36235	60,50292	213,185	5,515921
26,78	16,3397	61,2436	219,9	5,516591
26,80	16,45396	60,81006	222,95	5,540407
26,82	16,64407	61,2316	223,565	5,527564
26,84	16,94057	60,48292	226,615	5,540407
26,86	17,20515	59,947	231,5	5,554588
26,88	17,49889	60,36053	230,28	5,541071
26,90	17,93368	60,14377	232,72	5,537192
26,92	18,65708	60,03738	241,88	5,547498
26,94	19,68762	60,77806	248,595	5,542332
26,96	21,20477	61,29798	257,75	5,547498
26,98	22,58637	60,12377	255,92	5,546843
27,00	23,31903	68,09849	255,31	5,550715

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
27,02	24,18073	77,14104	265,685	5,550065
27,04	25,36021	85,32853	272,405	5,553934
27,06	26,48373	92,76334	282,78	5,556516
27,08	27,14193	100,9508	285,225	5,550065
27,10	27,48098	109,2447	276,065	5,554588
27,12	27,66045	117,3258	265,075	5,537192
27,14	27,82653	126,3564	263,245	5,551373
27,16	27,98473	134,9694	263,855	5,544951
27,18	28,17484	145,7101	262,635	5,544283
27,20	28,41539	156,9747	263,855	5,548833
27,22	28,41064	161,278	262,205	5,590703
27,24	28,87873	156,8099	261,415	5,591373
27,26	29,07297	157,9881	245,54	5,59663
27,28	29,01978	159,1583	230,89	5,592738
27,30	28,81765	157,5626	216,845	5,584962
27,32	28,54106	156,9243	207,69	5,583865
27,34	28,24319	154,6902	201,585	5,565789
27,36	27,99575	154,0439	198,53	5,573592
27,38	27,76171	155,2141	199,755	5,581404
27,40	27,84505	142,4122	211,595	5,575051
27,42	27,69824	141,0292	277,895	5,573382
27,44	27,40888	142,9441	263,855	5,578075
27,46	27,31451	143,9056	250,425	5,572559
27,48	27,41026	146,5651	252,255	5,571771
27,50	27,61239	150,0758	257,75	5,578854
27,52	27,81451	146,7779	256,53	5,56708
27,54	27,7826	146,5651	251,645	5,571027
27,56	27,48335	150,3909	240,655	5,5758
27,58	26,98335	152,4122	227,225	5,572675
27,60	26,47133	150,9188	219,29	5,571247
27,62	25,81964	148,464	206,47	5,566434
27,64	24,86082	146,226	188,765	5,56417
27,66	23,76369	145,3709	176,555	5,557954
27,68	22,90061	142,8137	173,5	5,549535
27,70	22,29148	136,21	180,215	5,5659
27,72	21,74617	129,7126	186,32	5,560592
27,74	21,16894	127,6833	191,205	5,581815
27,76	20,64491	125,1221	197,31	5,575637
27,78	20,22726	121,0716	205,86	5,592873
27,80	19,70185	114,1447	209,52	5,585449
27,82	19,06218	111,0556	210,13	5,582377
27,84	18,29209	106,2564	205,86	5,599591
27,86	17,4489	101,6739	200,975	5,60359
27,88	16,59508	97,83611	198,53	5,604834
27,90	15,58031	93,67517	190,595	5,598395
27,92	14,60947	88,66717	187,545	5,616811
27,94	13,94714	84,51023	195,48	5,613735
27,96	13,57067	79,711	210,74	5,624804
27,98	13,536	76,83066	230,28	5,631876
28,00	13,99069	73,84394	255,31	5,629738

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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n.° iscrizione alla CCIAA di RE 01999810359 – n.REA 241942 – CF e PI 01999510359

Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
28,02	15,11559	72,02743	290,72	5,636809
28,04	16,91071	70,3173	263,855	5,652172
28,06	19,12072	70,3093	256,53	5,635647
28,08	20,99031	72,74811	270,57	5,65284
28,10	22,16978	79,12709	293,16	5,643679
28,12	23,11245	86,66828	303,54	5,656725
28,14	24,03661	90,9196	301,095	5,653688
28,16	23,40757	103,1496	251,035	5,677922
28,18	23,40398	114,357	255,92	5,701594
28,20	23,11675	124,677	255,31	5,701594
28,22	22,85079	124,145	265,685	5,701594
28,24	22,49835	123,183	272,405	5,701594
28,26	22,25367	112,970	282,78	5,701594
28,28	22,25229	112,754	285,225	5,701594
28,30	22,57144	103,647	276,065	5,701594
28,32	23,10197	97,175	265,075	5,714428
28,34	23,36793	92,750	263,245	5,714428
28,36	23,48357	83,916	263,855	5,748708
28,38	23,48357	84,448	262,635	5,714428
28,40	23,55529	83,376	263,855	5,748708
28,42	23,85316	83,589	262,205	5,714428
28,44	24,12838	83,372	261,415	5,748708
28,46	24,30785	94,432	245,54	5,714428
28,48	24,33977	95,815	230,89	5,748708
28,50	23,44477	87,300	217,46	5,761694
28,52	23,90811	92,242	204,025	5,748708
28,54	24,03715	93,416	192,425	5,748708
28,56	24,22864	95,650	180,215	5,748708
28,58	24,45204	97,033	171,67	5,761694
28,60	24,56907	108,310	178,115	5,761694
28,62	24,62226	119,054	178,385	5,761694
28,64	24,66481	119,799	169,84	5,761694
28,66	24,45204	120,437	163,735	5,761694
28,68	24,00524	120,650	159,46	5,761694
28,70	23,55843	119,799	155,795	5,761694
28,72	23,05705	119,795	150,915	5,774925
28,74	21,71884	114,434	161,965	5,794826
28,76	18,87703	109,856	166,785	5,826054
28,78	16,93949	106,022	158,85	5,826054
28,80	15,6296	102,720	158,24	5,845259
28,82	14,7545	98,350	163,735	5,845259
28,84	14,14674	92,495	168,005	5,876417
28,86	13,64536	87,279	168,005	5,876417
28,88	13,16526	92,594	164,345	5,907684
28,90	12,73697	98,543	168,005	5,907684
28,92	12,459	104,603	175,335	5,907684
28,94	12,38315	109,812	186,935	5,970541
28,96	12,69167	115,025	202,805	5,970541
28,98	13,33922	122,999	212,575	6,002126
29,00	14,40305	125,340	185,71	6,002126

prof m	Rp MPa	Rl Kpa	U bar	Incli. (°)
29,02	15,49742	120,123	192,425	6,033807
29,04	16,28465	116,187	198,53	6,033807
29,06	16,50806	117,995	204,635	6,033807
29,08	16,19955	116,612	206,47	6,065584
29,10	15,61444	116,719	208,3	6,065584
29,12	15,14636	120,761	203,415	6,065584
29,14	14,73284	117,893	207,08	6,065584
29,16	14,46688	119,276	208,3	6,129418
29,18	14,31551	104,516	205,86	6,241072
29,20	15,06807	97,912	202,805	6,30621
29,22	16,19573	97,912	200,975	6,30621
29,24	17,30211	98,657	194,26	6,30621
29,26	18,17308	91,100	187,545	6,338889
29,28	18,50286	92,908	184,49	6,338889
29,30	18,27946	94,610	196,09	6,338889
29,32	17,66244	95,355	218,68	6,371643
29,34	16,94829	94,819	228,445	6,371643
29,36	16,27808	93,223	241,88	6,371643
29,38	15,86319	93,436	234,55	6,404463
29,40	15,77808	91,330	225,395	6,404463
29,42	16,04404	93,436	227,835	6,470311
29,44	17,86319	88,181	232,72	6,470311
29,46	18,18096	85,666	248,595	6,470311
29,48	19,61713	86,517	268,13	6,503331
29,50	20,7767	88,645	279,73	6,503331
29,52	21,64767	89,811	262,025	6,503331
29,54	22,2115	91,832	217,46	6,536412
29,56	22,09447	93,960	204,025	6,536412
29,58	21,10473	93,183	192,425	6,72138
29,60	20,57144	94,669	180,215	6,75498
29,62	19,68846	96,158	171,67	6,75498
29,64	19,29261	94,984	178,115	6,75498
29,66	19,13176	94,026	178,385	6,822333
29,68	19,10197	96,899	176,555	6,822333
29,70	19,8041	97,324	142,975	6,822333
29,72	18,50286	102,908	125,885	6,848889
29,74	18,27946	104,610	129,545	6,848889
29,76	17,66244	105,355	136,87	6,881643
29,78	16,94829	104,819	141,755	6,881643
29,80	16,27808	103,223	152,745	6,881643
29,82	15,86319	103,436	166,175	6,914463
29,84	15,77808	103,330	175,335	6,914463
29,86	16,04404	103,436	174,725	6,980311
29,88	16,86319	104,181	176,555	6,980311
29,90	18,18096	105,666	142,975	6,980311
29,92	19,61713	106,517	125,885	7,013331
29,94	20,7767	108,645	129,545	7,013331
29,96	21,71884	114,434	136,87	7,013331
29,98	22,87703	119,856	141,755	7,013331
30,00	24,93949	126,022	152,745	7,013331

Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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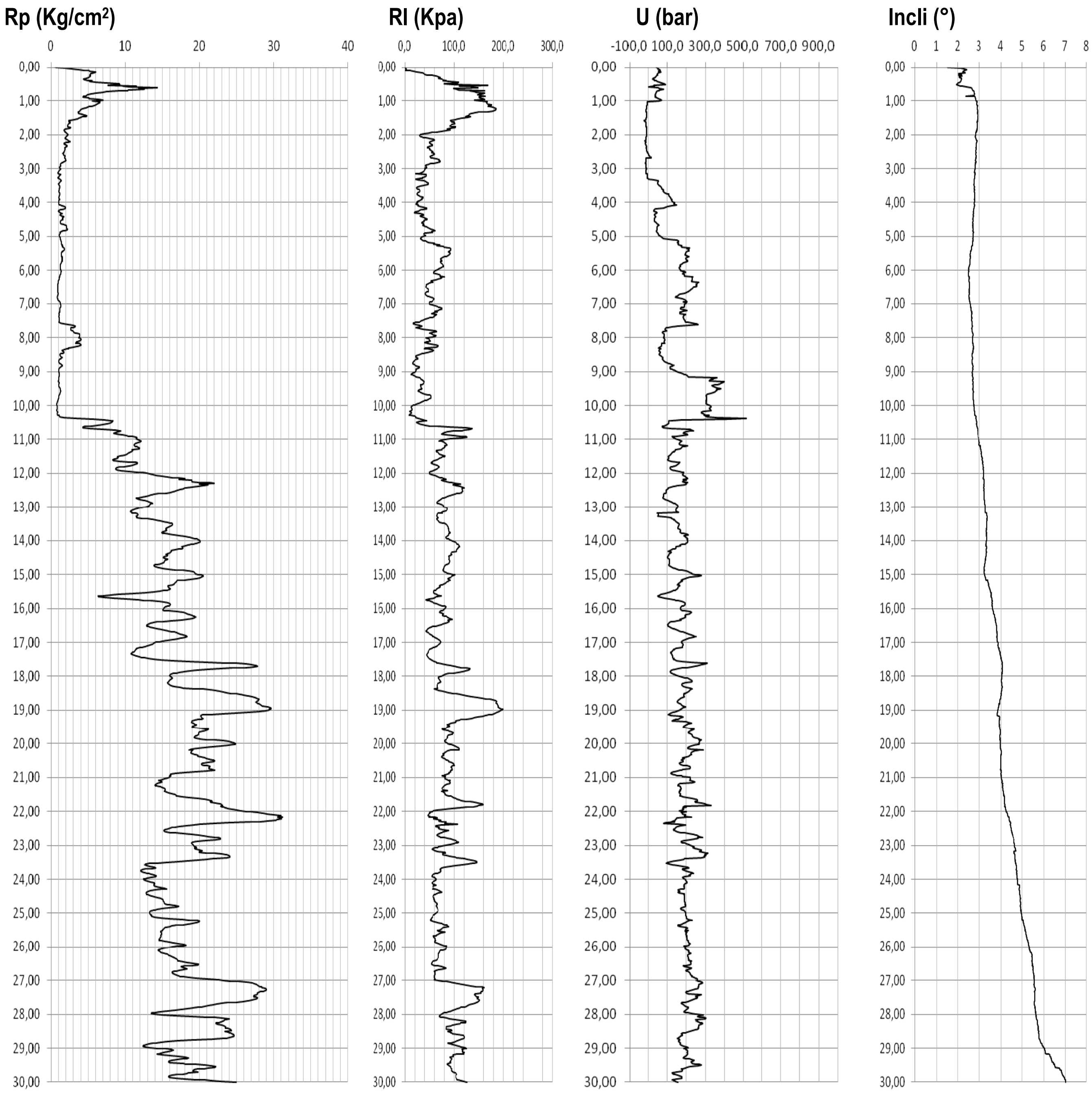
Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

PROVA PENETROMETRICA STATICA CON PIEZOCONO CPTU 1b

Committente:	Geoprogetti	Data:	23/07/2013
Località:	Mirandola MO	quota inizio:	Piano Campagna
Cantiere:	Istituto superiore statale G. Galilei	prof. Falda:	-
Note:			



Tecnico del laboratorio
(Dott. Marco Cocchi)

Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

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Concessione Ministero Infrastrutture e Trasporti:
Decreto n.° 3655 del 22/03/2012 – Settore "C" circolare 349/99/STC (prove geotecniche in sito)

CERTIFICATO DI PROVA **n.° 007E/2013**
emessa in data 24/07/2013

ALLEGATO 2
Ubicazione della prova

Prova CPTU1

Tecnico del laboratorio
(Dott. Marco Cocchi)

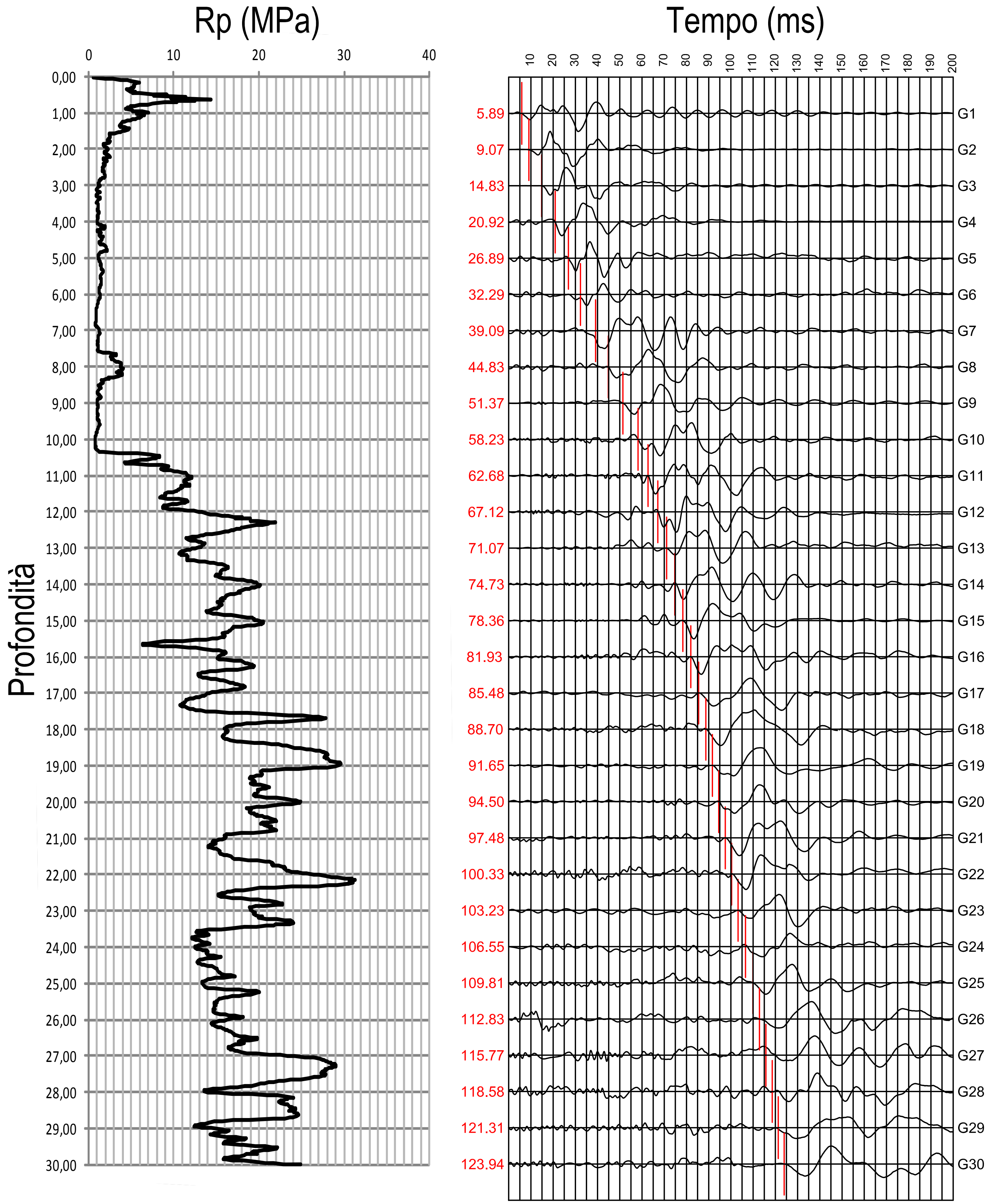
Direttore del Laboratorio
(Dott. Geol. Fabrizio Giorgini)

Via Morandi 3, - Quattro Castella (RE)
Tel. 0522/887268 – Fax. 0522/ 249540

ALLEGATO 3

Prova sismica

Indagini geognosticge presso l'Istituto Superiore Statale G. Galilei di Mirandola (MO)	
Sismogrammi onde S	SCPTU1b



Indagini geognosticge presso l'Istituto Superiore Statale G. Galilei di Mirandola (MO)

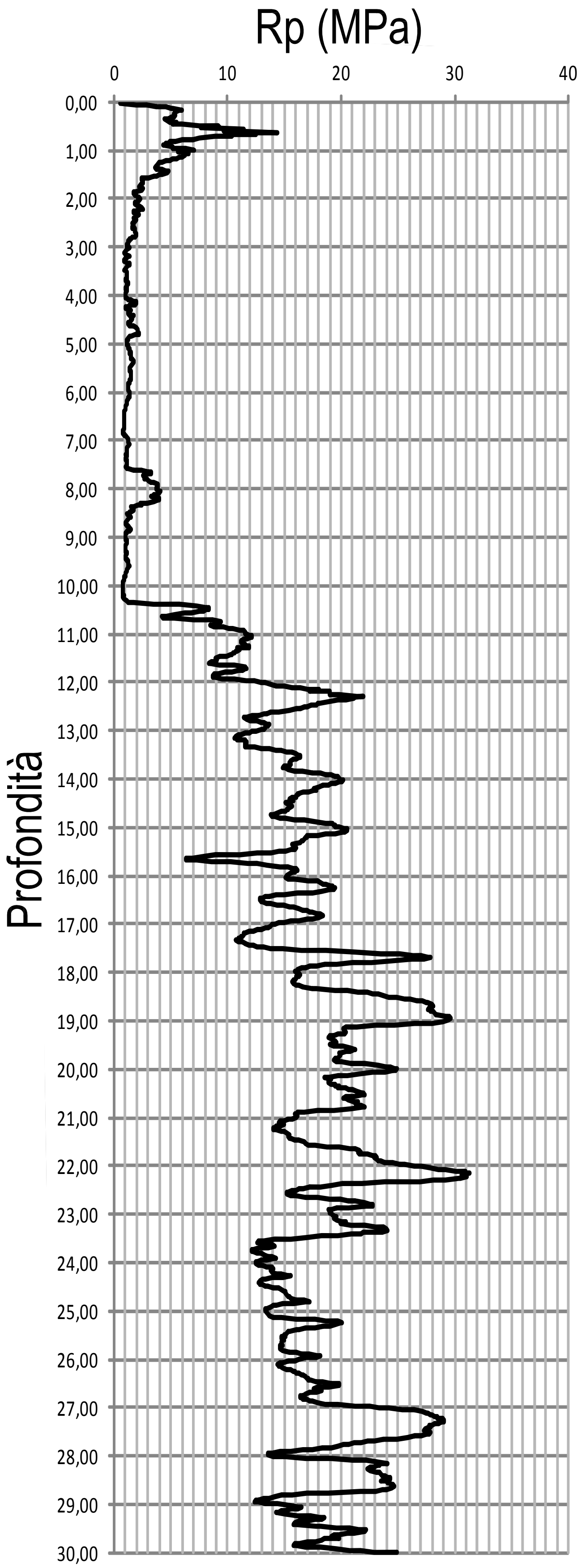
Tabella onde S	SCPTU1b

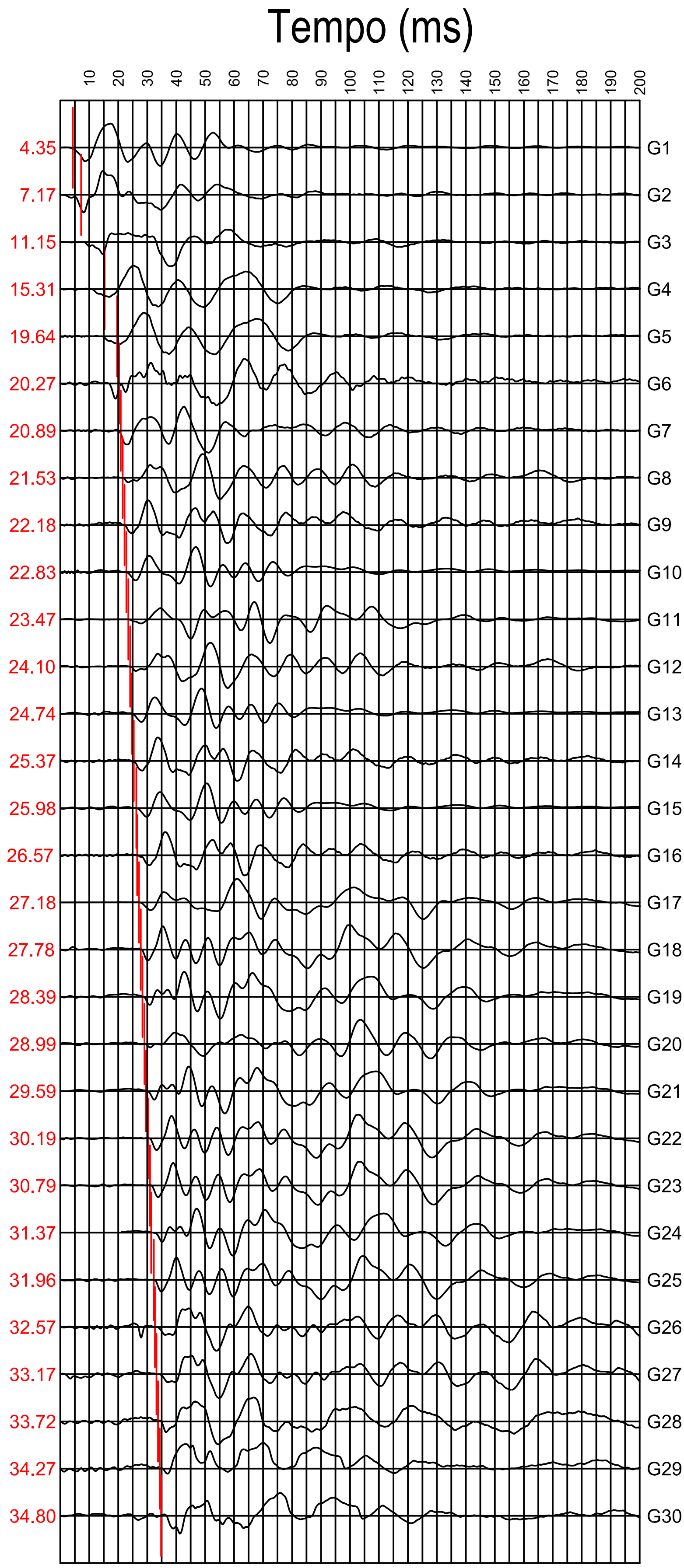
Sismic data acquisition depth	Distance source S-wave - triaxial geofone	Arrival time S-wave	Arrival time S-wave	Vs to travel L Vs = L/t	L2 - L1	t2 - t1	Vs for each level of one meter Vs = (L2-L1)/(t2-t1)
(m)	L (m)	t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1,00	1,71	0,006	5,890	290	1,71	0,0059	290
2,00	2,37	0,009	9,075	261	0,66	0,0032	207
3,00	3,18	0,015	14,830	214	0,81	0,0058	141
4,00	4,05	0,021	20,925	193	0,87	0,0061	143
5,00	4,95	0,027	26,890	184	0,90	0,0060	151
6,00	5,86	0,032	32,295	181	0,91	0,0054	169
7,00	6,78	0,039	39,090	174	0,92	0,0068	136
8,00	7,71	0,045	44,835	172	0,93	0,0057	162
9,00	8,65	0,051	51,370	168	0,93	0,0065	143
10,00	9,58	0,058	58,230	165	0,94	0,0069	136
11,00	10,52	0,063	62,685	168	0,94	0,0045	211
12,00	11,46	0,067	67,125	171	0,94	0,0044	212
13,00	12,40	0,071	71,070	174	0,94	0,0039	238
14,00	13,30	0,075	74,735	178	0,90	0,0037	247
15,00	14,19	0,078	78,365	181	0,89	0,0036	245
16,00	15,08	0,082	81,930	184	0,89	0,0036	249
17,00	15,96	0,085	85,485	187	0,87	0,0036	246
18,00	16,85	0,089	88,705	190	0,90	0,0032	278
19,00	17,73	0,092	91,655	193	0,87	0,0030	296
20,00	18,59	0,095	94,505	197	0,87	0,0028	304
21,00	19,45	0,097	97,480	200	0,86	0,0030	290
22,00	20,31	0,100	100,335	202	0,86	0,0029	300
23,00	21,17	0,103	103,235	205	0,86	0,0029	297
24,00	22,02	0,107	106,550	207	0,84	0,0033	255
25,00	22,85	0,110	109,815	208	0,84	0,0033	257
26,00	23,74	0,113	112,830	210	0,88	0,0030	293
27,00	24,59	0,116	115,770	212	0,86	0,0029	291
28,00	25,37	0,119	118,580	214	0,78	0,0028	277
29,00	26,13	0,121	121,310	215	0,76	0,0027	278
30,00	26,86	0,124	123,945	217	0,73	0,0026	276

Vs30 = 216 m/s	Categoria di suolo C

Indagini geognosticge presso l'Istituto Superiore Statale G. Galilei di Mirandola (MO)

	Sismogrammi onde P	SCPTU1b





Indagini geognosticge presso l'Istituto Superiore Statale G. Galilei di Mirandola (MO)

Tabella onde P | SCPTU1b

Sismic data acquisition depth	Distance source P-wave triaxial geofone	Arrival time P-wave	Arrival time P-wave	Vp to travel L Vp = L/t	L2 - L1	t2 - t1	Vp for each level of one meter Vp = (L2-L1)/(t2-t1)
(m)		t (s)	t (ms)	(m/s)	(m)	(s)	(m/s)
1,00	1,65	0,004	4,350	380	1,65	0,0044	380
2,00	2,34	0,007	7,170	327	0,69	0,0028	245
3,00	3,18	0,011	11,150	285	0,83	0,0040	210
4,00	4,07	0,015	15,315	266	0,89	0,0042	214
5,00	4,98	0,020	19,640	254	0,92	0,0043	212
6,00	5,91	0,020	20,275	292	0,93	0,0006	1464
7,00	6,85	0,021	20,895	328	0,94	0,0006	1513
8,00	7,79	0,022	21,535	362	0,94	0,0006	1474
9,00	8,74	0,022	22,180	394	0,95	0,0006	1468
10,00	9,69	0,023	22,835	424	0,95	0,0007	1449
11,00	10,64	0,023	23,470	453	0,95	0,0006	1498
12,00	11,59	0,024	24,105	481	0,95	0,0006	1500
13,00	12,55	0,025	24,740	507	0,95	0,0006	1502
14,00	13,47	0,025	25,370	531	0,93	0,0006	1469
15,00	14,39	0,026	25,980	554	0,91	0,0006	1499
16,00	15,30	0,027	26,575	576	0,91	0,0006	1536
17,00	16,21	0,027	27,180	596	0,90	0,0006	1493
18,00	17,12	0,028	27,785	616	0,92	0,0006	1519
19,00	18,03	0,028	28,390	635	0,90	0,0006	1491
20,00	18,92	0,029	28,995	653	0,90	0,0006	1483
21,00	19,82	0,030	29,590	670	0,89	0,0006	1501
22,00	20,71	0,030	30,195	686	0,89	0,0006	1469
23,00	21,60	0,031	30,790	701	0,89	0,0006	1499
24,00	22,48	0,031	31,375	716	0,88	0,0006	1505
25,00	23,35	0,032	31,965	731	0,88	0,0006	1484
26,00	24,27	0,033	32,570	745	0,91	0,0006	1506
27,00	25,15	0,033	33,175	758	0,89	0,0006	1469
28,00	25,98	0,034	33,725	770	0,83	0,0006	1508
29,00	26,80	0,034	34,275	782	0,81	0,0006	1480
30,00	27,59	0,035	34,805	793	0,79	0,0005	1489

Validazione del codice di calcolo

Informativa sull'affidabilità dei codici di calcolo D.M. 14-01-2008 paragrafo 10.2.

Le fasi di progettazione e sviluppo dei software ***GeoStru*** sono sottoposti al controllo gestione di qualità aziendale ISO (*International Organization for Standardization*) 9001:2000 certificato da CVI ITALIA srl - ***Certificato nr. 7007 1 04.***

Sono stati forniti degli esempi di calcolo, in allegato a questo documento, al fine di verificare la validità delle procedure di calcolo ed effettuare le procedure di controllo con altri strumenti di calcolo.

I software ***GeoStru*** sono dotati di sistemi di controllo dei dati di input e di output molto sofisticati i quali sono in grado di rilevare errori gravi tali da non consentire le corrette elaborazioni.

Bianco 15/09/2010

GeoStru Software
Web: www.geostru.com Email: geostru@geostru.com
Skype Nick: **geostru_support_it-eng-spa**

LIQUEFACTION ANALYSIS REPORT

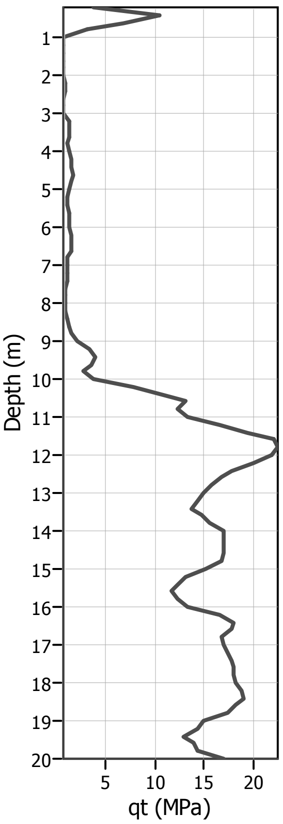
Project title : **Location :**

CPT file : CPT01

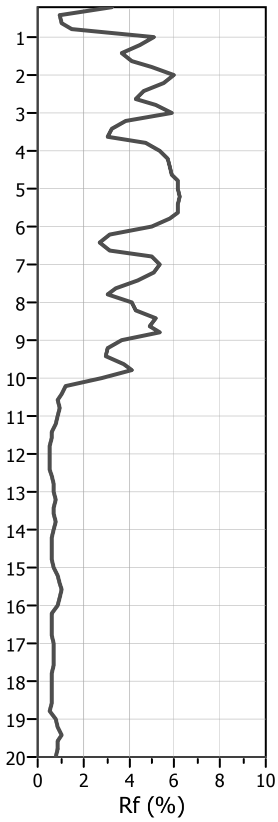
Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude M_w:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	No		

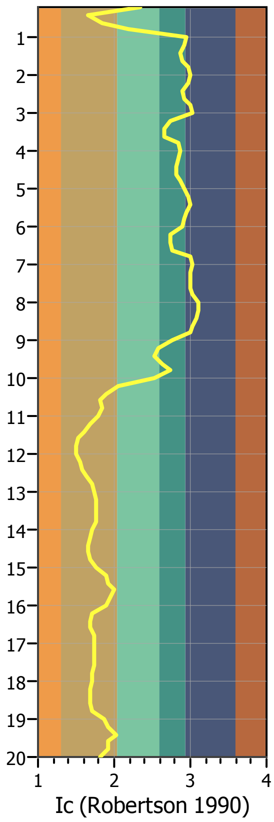
Cone resistance



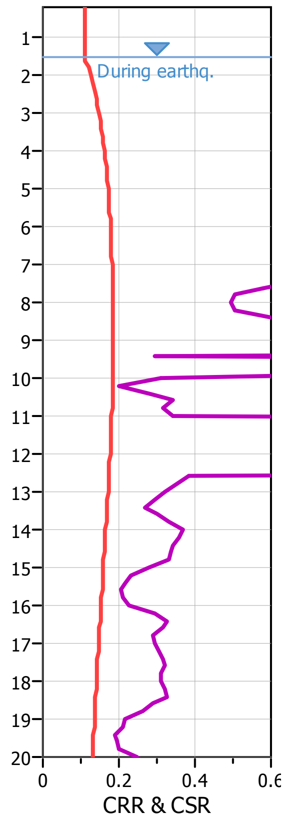
Friction Ratio



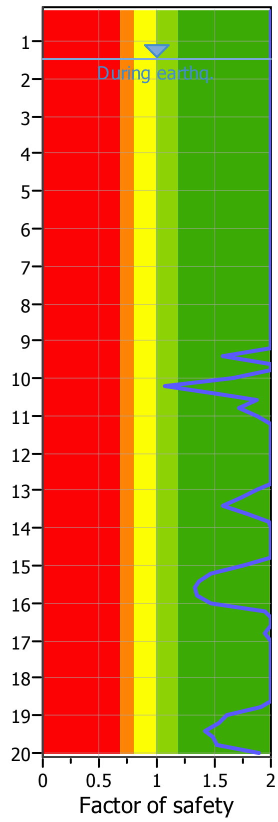
SBTn Plot



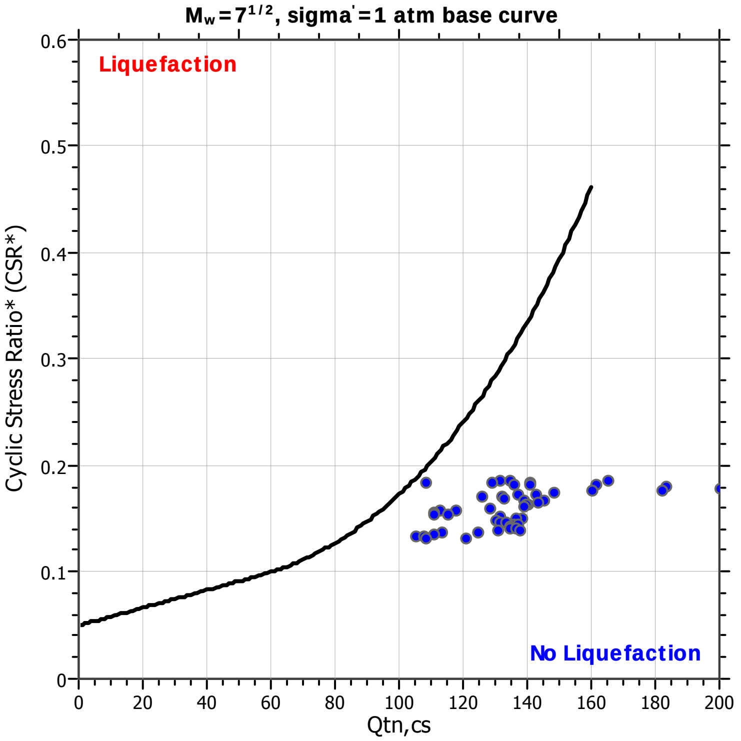
CRR plot



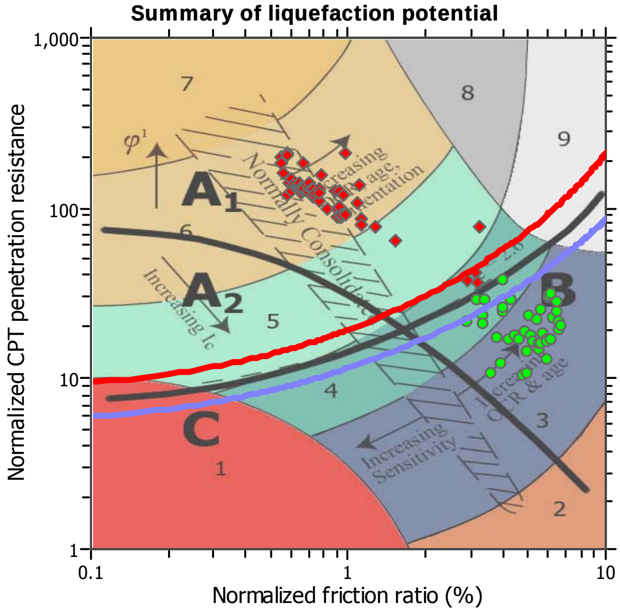
FS Plot



$M_w=7^{1/2}$, sigma'=1 atm base curve

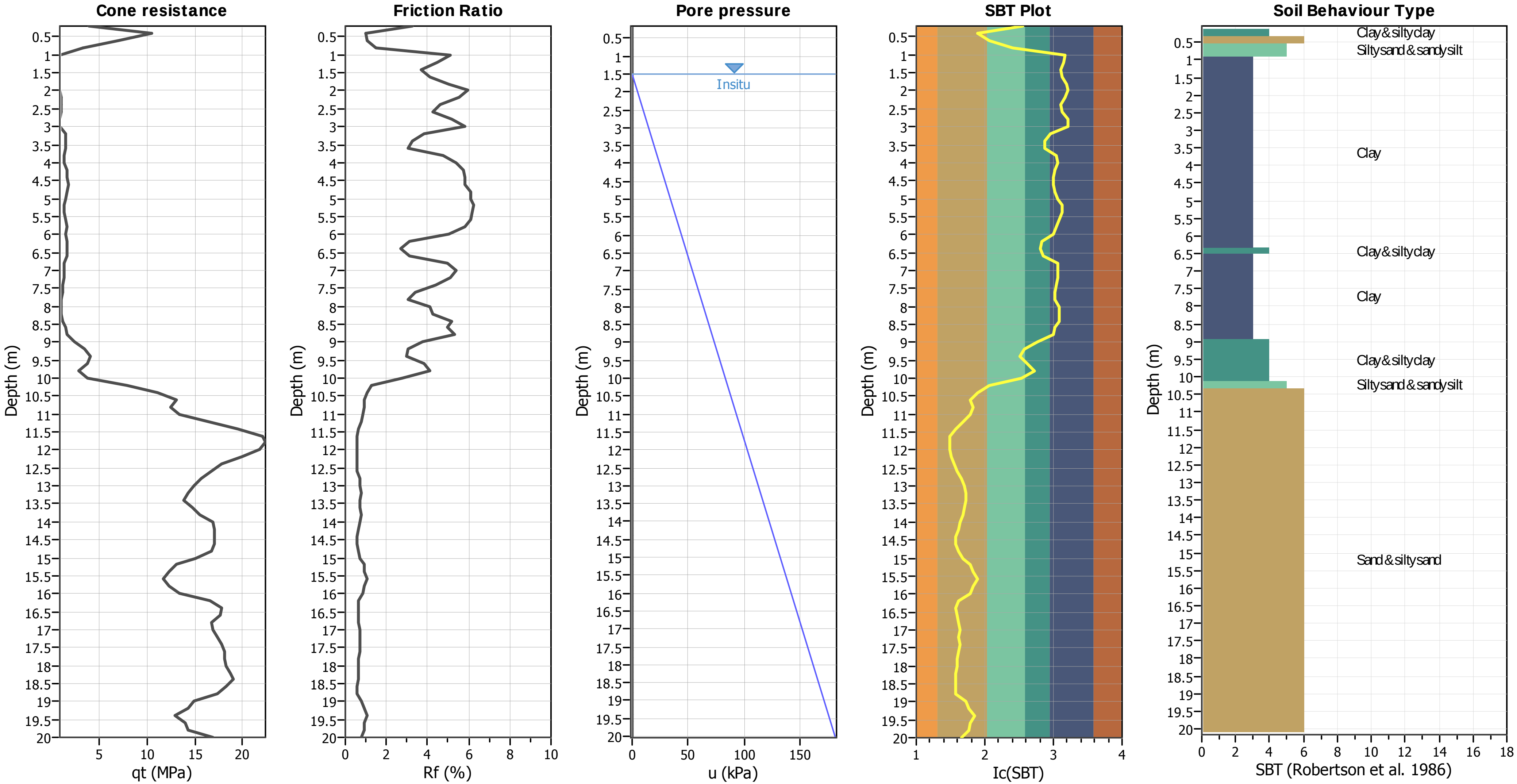


Summary of liquefaction potential



Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



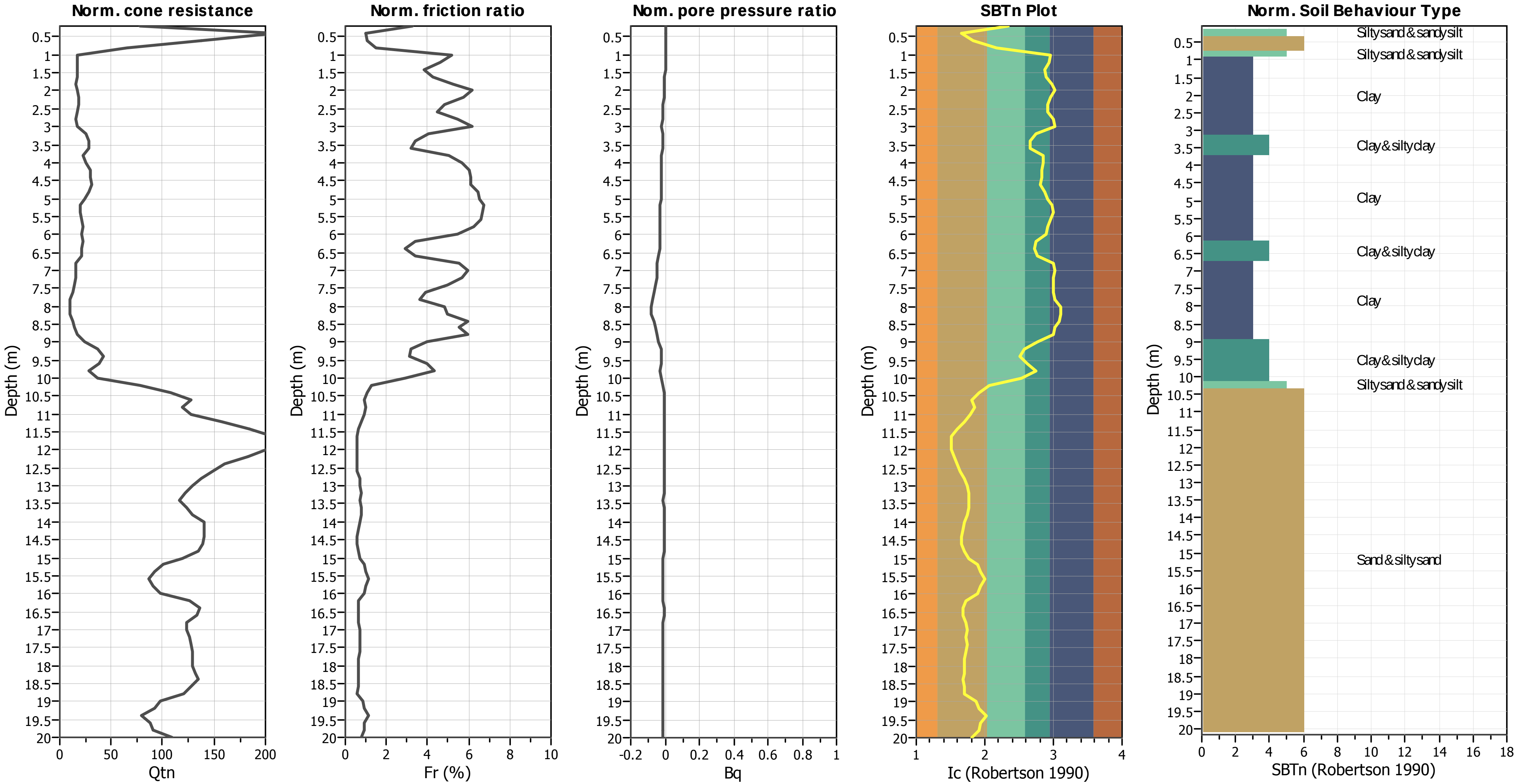
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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)



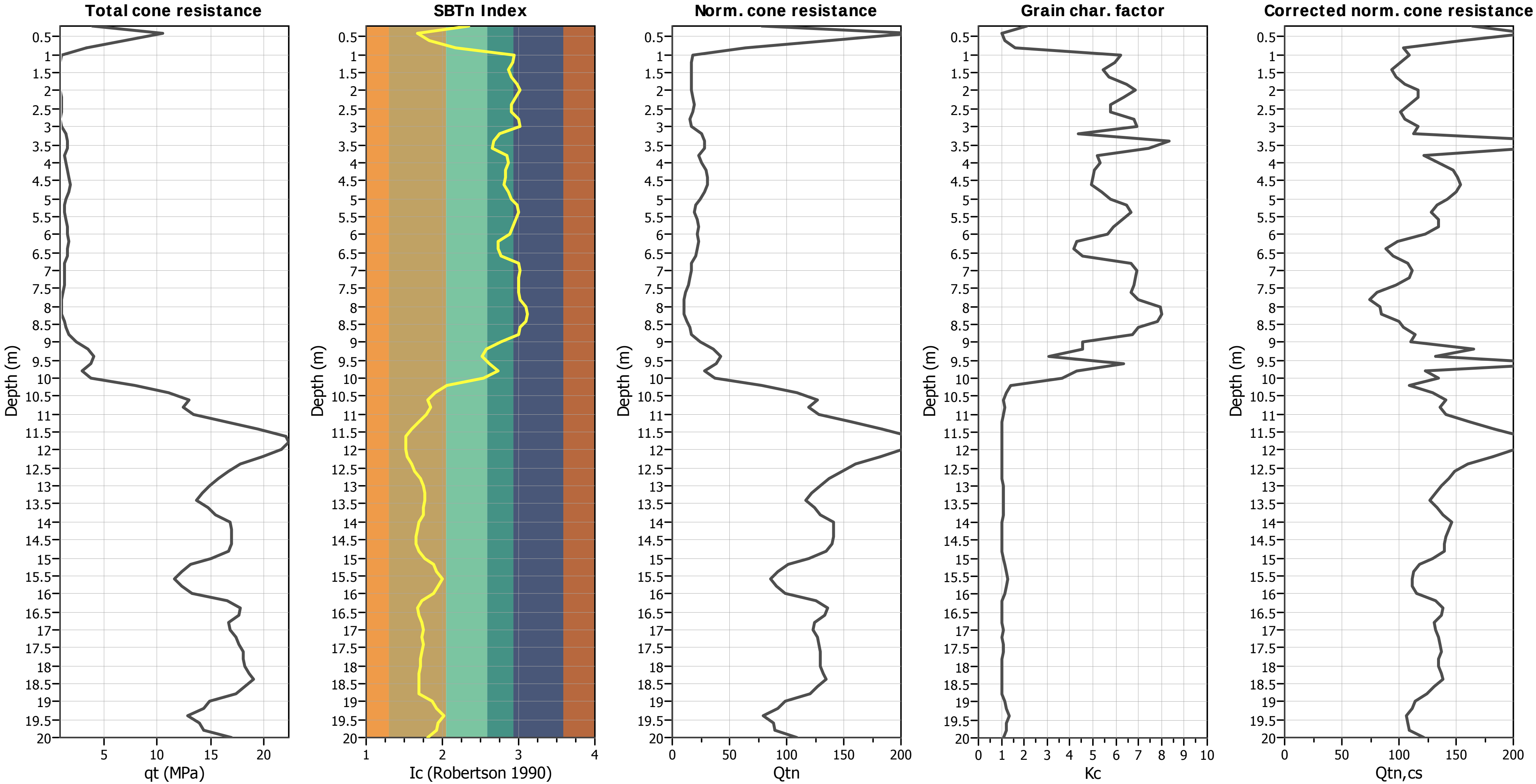
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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

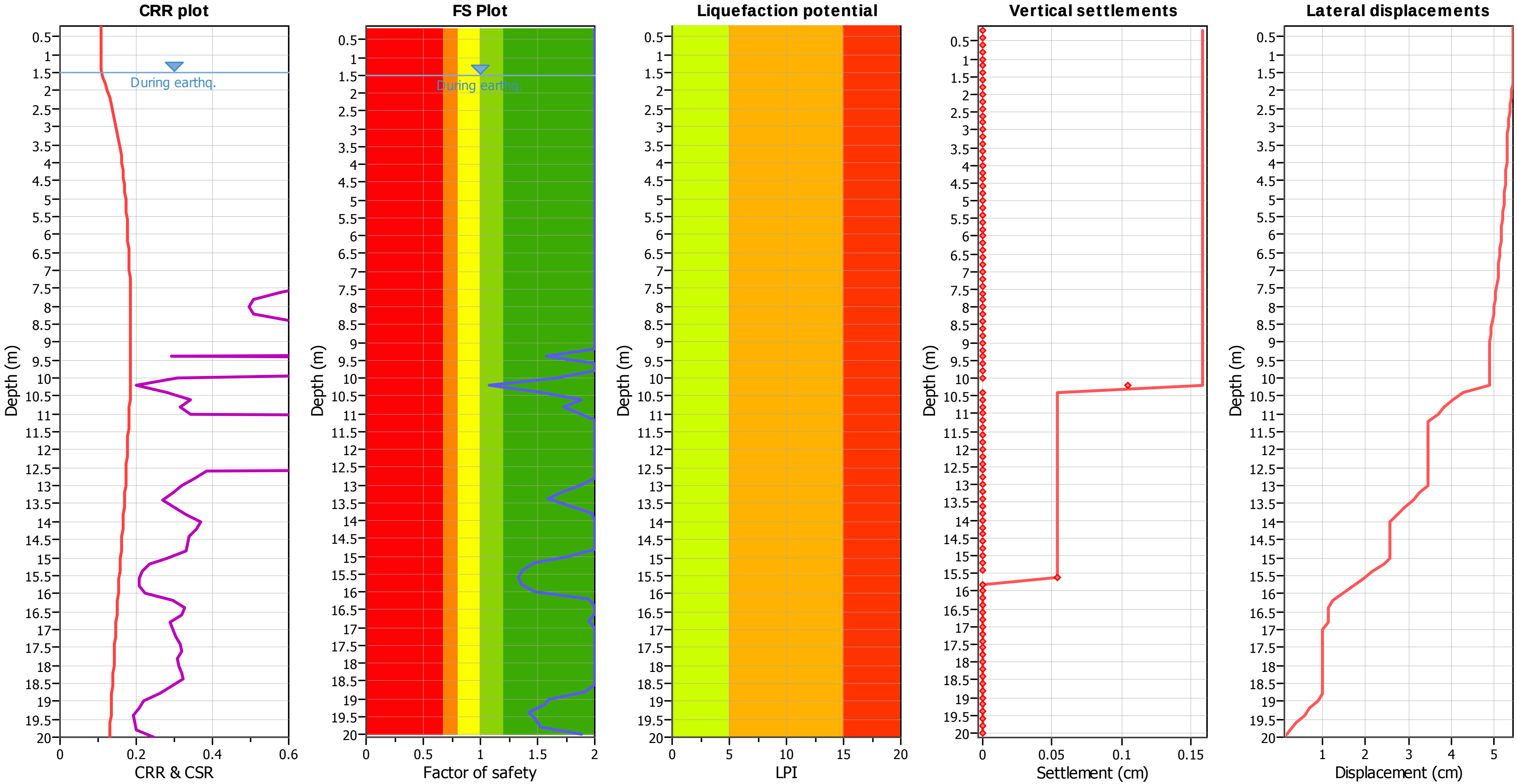
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

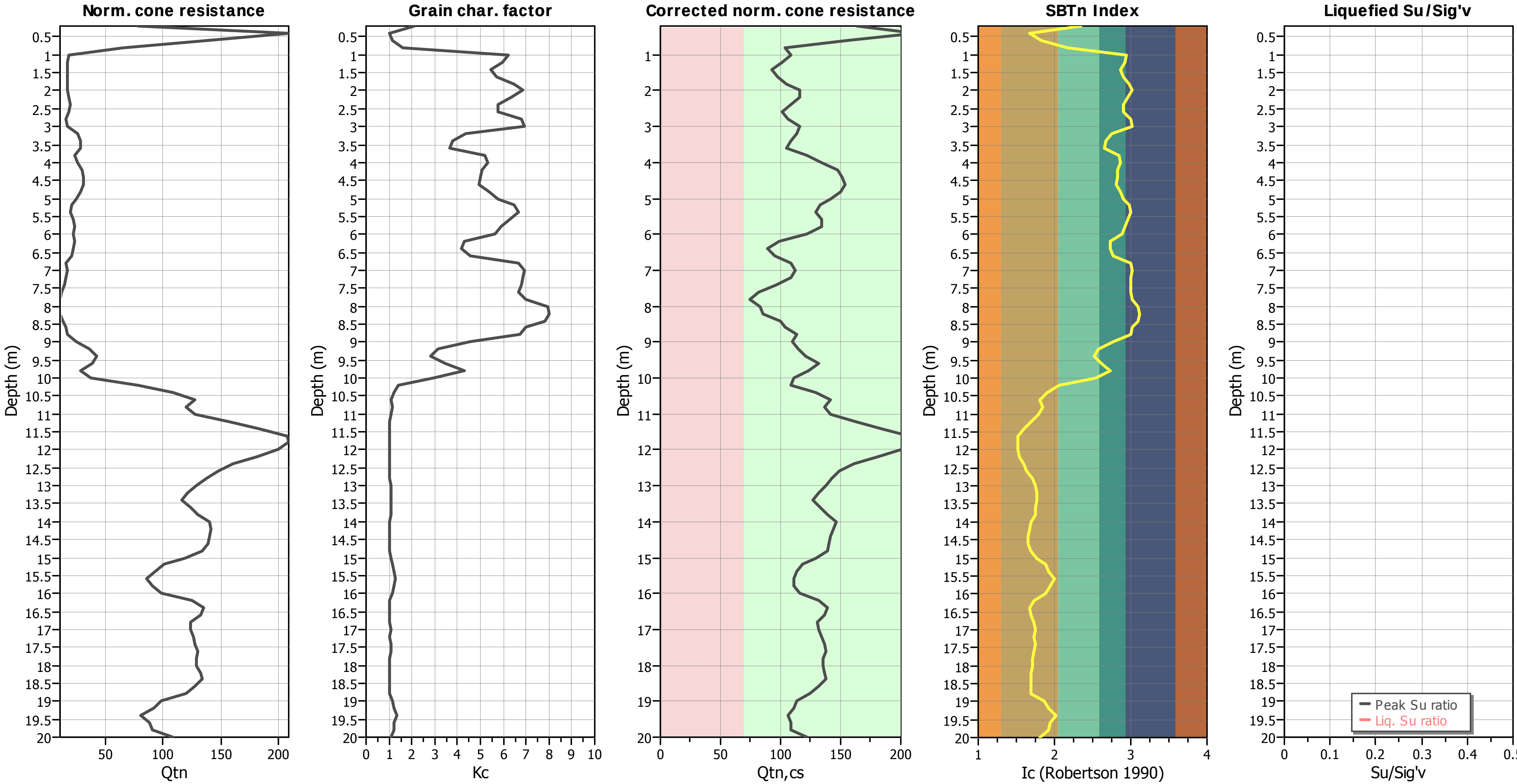
F.S. color scheme

- 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 (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	127.49	0.00	24.04	19.09
2	0.40	11.78	127.49	0.00	5.49	19.21
3	0.60	7.86	49.03	0.00	8.85	18.70
4	0.80	0.99	49.03	0.00	18.07	17.92
5	1.00	0.89	49.03	0.00	55.10	17.35
6	1.20	0.81	39.23	0.00	53.65	17.16
7	1.40	0.91	29.42	0.00	50.36	16.95
8	1.60	0.91	29.42	0.00	52.13	17.06
9	1.80	0.81	49.03	0.00	56.84	17.24
10	2.00	0.81	49.03	0.00	59.22	17.50
11	2.20	1.02	58.84	0.00	56.18	17.53
12	2.40	1.02	49.03	0.00	52.34	17.39
13	2.60	0.92	29.42	0.00	52.52	17.18
14	2.80	0.82	39.23	0.00	58.90	17.23
15	3.00	0.73	58.84	0.00	59.42	17.50
16	3.20	1.14	58.84	0.00	42.97	17.66
17	3.40	2.22	39.23	0.00	38.78	17.63
18	3.60	1.14	49.03	0.00	37.85	17.55
19	3.80	1.14	49.03	0.00	48.79	17.76
20	4.00	1.43	78.45	0.00	49.41	18.02
21	4.20	1.44	88.26	0.00	47.85	18.31
22	4.40	1.74	98.07	0.00	47.29	18.42
23	4.60	1.74	98.07	0.00	46.99	18.52
24	4.80	1.74	107.87	0.00	49.84	18.45
25	5.00	1.34	88.26	0.00	52.56	18.29
26	5.20	1.25	68.65	0.00	56.91	18.10
27	5.40	1.16	78.45	0.00	57.86	18.04
28	5.60	1.25	78.45	0.00	55.48	18.23
29	5.80	1.75	98.07	0.00	53.14	18.31
30	6.00	1.55	88.26	0.00	51.57	18.12
31	6.20	1.18	39.23	0.00	42.41	17.74
32	6.40	2.26	29.42	0.00	41.84	17.48
33	6.60	1.27	58.84	0.00	44.35	17.64
34	6.80	1.18	58.84	0.00	58.17	17.83
35	7.00	1.27	68.65	0.00	59.44	17.95
36	7.20	1.38	78.45	0.00	59.00	17.90
37	7.40	1.19	49.03	0.00	58.93	17.61
38	7.60	0.99	29.42	0.00	58.18	17.13
39	7.80	0.99	29.42	0.00	59.91	16.87
40	8.00	0.89	29.42	0.00	65.67	17.20
41	8.20	1.00	58.84	0.00	65.97	17.30
42	8.40	1.10	39.23	0.00	64.81	17.81
43	8.60	1.49	88.26	0.00	59.98	17.98
44	8.80	1.59	78.45	0.00	58.56	18.28
45	9.00	1.69	88.26	0.00	44.24	18.42
46	9.20	3.57	88.26	0.00	34.07	18.81
47	9.40	5.04	137.29	0.00	31.37	19.05
48	9.60	3.57	137.29	0.00	36.58	19.18

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	2.49	147.10	0.00	42.56	18.88
50	10.00	2.59	68.65	0.00	32.44	18.85
51	10.20	6.23	98.07	0.00	14.60	19.06
52	10.40	14.86	127.49	0.00	10.58	19.40
53	10.60	11.91	127.49	0.00	8.22	19.46
54	10.80	12.40	98.07	0.00	9.01	19.44
55	11.00	12.90	127.49	0.00	8.05	19.47
56	11.20	14.88	127.49	0.00	5.98	19.64
57	11.40	21.74	127.49	0.00	4.25	19.71
58	11.60	21.74	127.49	0.00	3.08	19.76
59	11.80	22.72	127.49	0.00	2.99	19.76
60	12.00	22.72	127.49	0.00	2.97	19.66
61	12.20	19.79	98.07	0.00	3.46	19.53
62	12.40	17.34	98.07	0.00	4.21	19.37
63	12.60	16.36	98.07	0.00	4.96	19.35
64	12.80	16.36	98.07	0.00	6.19	19.43
65	13.00	14.40	127.49	0.00	6.91	19.41
66	13.20	13.92	98.07	0.00	7.55	19.40
67	13.40	14.41	98.07	0.00	7.54	19.27
68	13.60	12.94	98.07	0.00	7.24	19.41
69	13.80	16.86	127.49	0.00	7.10	19.53
70	14.00	16.86	127.49	0.00	6.15	19.56
71	14.20	16.88	98.07	0.00	5.63	19.46
72	14.40	17.37	98.07	0.00	5.21	19.36
73	14.60	16.88	98.07	0.00	5.27	19.36
74	14.80	16.88	98.07	0.00	6.02	19.46
75	15.00	16.39	127.49	0.00	7.39	19.42
76	15.20	11.98	98.07	0.00	10.01	19.46
77	15.40	11.00	127.49	0.00	11.11	19.44
78	15.60	13.95	127.49	0.00	12.73	19.51
79	15.80	10.02	127.49	0.00	11.28	19.44
80	16.00	12.96	98.07	0.00	10.12	19.47
81	16.20	16.90	127.49	0.00	6.53	19.45
82	16.40	19.84	98.07	0.00	5.65	19.48
83	16.60	16.90	98.07	0.00	5.81	19.48
84	16.80	16.41	127.49	0.00	6.58	19.46
85	17.00	16.90	98.07	0.00	6.99	19.56
86	17.20	17.41	127.49	0.00	6.66	19.57
87	17.40	17.90	127.49	0.00	6.92	19.67
88	17.60	17.90	127.49	0.00	6.74	19.68
89	17.80	18.39	127.49	0.00	6.35	19.59
90	18.00	17.90	98.07	0.00	6.29	19.59
91	18.20	18.40	127.49	0.00	6.01	19.60
92	18.40	19.87	127.49	0.00	5.84	19.61
93	18.60	18.89	98.07	0.00	5.98	19.49
94	18.80	15.95	98.07	0.00	6.12	19.36
95	19.00	17.42	98.07	0.00	9.54	19.55
96	19.20	11.55	166.71	0.00	10.87	19.62

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	14.00	127.49	0.00	13.43	19.66
98	19.60	13.02	127.49	0.00	11.22	19.58
99	19.80	14.98	127.49	0.00	10.90	19.59
100	20.00	17.93	127.49	0.00	8.32	19.65

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.82	0.00	3.82	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
2	0.40	7.66	0.00	7.66	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
3	0.60	11.40	0.00	11.40	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
4	0.80	14.98	0.00	14.98	1.00	0.181	1.67	0.109	1.00	1.00	2.000	No
5	1.00	18.45	0.00	18.45	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
6	1.20	21.89	0.00	21.89	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
7	1.40	25.28	0.00	25.28	0.99	0.180	1.67	0.108	1.00	1.00	2.000	No
8	1.60	28.69	0.98	27.71	0.99	0.186	1.67	0.112	1.00	1.00	0.112	No
9	1.80	32.14	2.94	29.20	0.99	0.198	1.67	0.119	1.00	1.00	0.119	No
10	2.00	35.64	4.91	30.73	0.99	0.208	1.67	0.125	1.00	1.00	0.125	No
11	2.20	39.14	6.87	32.28	0.99	0.217	1.67	0.130	1.00	1.00	0.130	No
12	2.40	42.62	8.83	33.79	0.98	0.226	1.67	0.135	1.00	1.00	0.135	No
13	2.60	46.06	10.79	35.27	0.98	0.233	1.67	0.140	1.00	1.00	0.140	No
14	2.80	49.50	12.75	36.75	0.98	0.240	1.67	0.144	1.00	1.00	0.144	No
15	3.00	53.00	14.71	38.29	0.98	0.247	1.67	0.148	1.00	1.00	0.148	No
16	3.20	56.54	16.68	39.86	0.98	0.252	1.67	0.151	1.00	1.00	0.151	No
17	3.40	60.06	18.64	41.42	0.98	0.258	1.67	0.154	1.00	1.00	0.154	No
18	3.60	63.57	20.60	42.97	0.98	0.263	1.67	0.157	1.00	1.00	0.157	No
19	3.80	67.12	22.56	44.56	0.97	0.267	1.67	0.160	1.00	1.00	0.160	No
20	4.00	70.73	24.52	46.20	0.97	0.271	1.67	0.162	1.00	1.00	0.162	No
21	4.20	74.39	26.49	47.90	0.97	0.274	1.67	0.165	1.00	1.00	0.165	No
22	4.40	78.07	28.45	49.62	0.97	0.278	1.67	0.166	1.00	1.00	0.166	No
23	4.60	81.78	30.41	51.37	0.97	0.281	1.67	0.168	1.00	1.00	0.168	No
24	4.80	85.47	32.37	53.09	0.97	0.283	1.67	0.170	1.00	1.00	0.170	No
25	5.00	89.12	34.34	54.79	0.97	0.286	1.67	0.171	1.00	1.00	0.171	No
26	5.20	92.74	36.30	56.45	0.96	0.288	1.67	0.173	1.00	1.00	0.173	No
27	5.40	96.35	38.26	58.09	0.96	0.291	1.67	0.174	1.00	1.00	0.174	No
28	5.60	100.00	40.22	59.78	0.96	0.293	1.67	0.175	1.00	1.00	0.175	No
29	5.80	103.66	42.18	61.48	0.96	0.294	1.67	0.176	1.00	1.00	0.176	No
30	6.00	107.28	44.15	63.14	0.96	0.296	1.67	0.178	1.00	1.00	0.178	No
31	6.20	110.83	46.11	64.72	0.96	0.298	1.67	0.179	1.00	1.00	0.179	No
32	6.40	114.33	48.07	66.26	0.95	0.300	1.67	0.180	1.00	1.00	0.180	No
33	6.60	117.85	50.03	67.82	0.95	0.301	1.67	0.181	1.00	1.00	0.181	No
34	6.80	121.42	51.99	69.43	0.95	0.303	1.67	0.181	1.00	1.00	0.181	No
35	7.00	125.01	53.95	71.05	0.95	0.304	1.67	0.182	1.00	1.00	0.182	No
36	7.20	128.59	55.92	72.67	0.95	0.305	1.67	0.183	1.00	1.00	0.183	No
37	7.40	132.11	57.88	74.23	0.94	0.306	1.67	0.183	1.00	1.00	0.183	No
38	7.60	135.54	59.84	75.70	0.94	0.307	1.67	0.184	1.00	1.00	0.184	No
39	7.80	138.91	61.80	77.11	0.94	0.308	1.67	0.185	1.00	1.00	0.185	No
40	8.00	142.35	63.77	78.59	0.94	0.309	1.67	0.185	1.00	1.00	0.185	No
41	8.20	145.81	65.73	80.08	0.93	0.310	1.67	0.186	1.00	1.00	0.186	No
42	8.40	149.37	67.69	81.68	0.93	0.310	1.67	0.186	1.00	1.00	0.186	No
43	8.60	152.97	69.65	83.32	0.93	0.310	1.67	0.186	1.00	1.00	0.186	No
44	8.80	156.63	71.61	85.01	0.93	0.311	1.67	0.186	1.00	1.00	0.186	No
45	9.00	160.31	73.58	86.74	0.92	0.310	1.67	0.186	1.00	1.00	0.186	No
46	9.20	164.07	75.54	88.54	0.92	0.310	1.67	0.186	1.00	1.00	0.186	No
47	9.40	167.88	77.50	90.38	0.92	0.310	1.67	0.186	1.00	1.00	0.186	No
48	9.60	171.72	79.46	92.26	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.50	81.42	94.07	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No
50	10.00	179.27	83.39	95.88	0.90	0.308	1.67	0.185	1.00	1.00	0.185	No
51	10.20	183.08	85.35	97.73	0.90	0.307	1.67	0.184	1.00	1.00	0.184	No
52	10.40	186.96	87.31	99.65	0.90	0.306	1.67	0.184	1.00	1.00	0.184	No
53	10.60	190.85	89.27	101.58	0.89	0.305	1.67	0.183	1.00	1.00	0.183	No
54	10.80	194.74	91.23	103.51	0.89	0.304	1.67	0.182	1.00	1.00	0.182	No
55	11.00	198.63	93.19	105.44	0.88	0.303	1.67	0.181	1.00	1.00	0.181	No
56	11.20	202.56	95.16	107.41	0.88	0.301	1.67	0.181	1.00	1.00	0.181	No
57	11.40	206.50	97.12	109.38	0.87	0.300	1.67	0.180	1.00	1.00	0.180	No
58	11.60	210.45	99.08	111.37	0.87	0.298	1.67	0.179	1.00	1.00	0.179	No
59	11.80	214.41	101.04	113.36	0.86	0.297	1.67	0.178	1.00	1.00	0.178	No
60	12.00	218.34	103.00	115.33	0.86	0.295	1.67	0.177	1.00	1.00	0.177	No
61	12.20	222.24	104.97	117.28	0.85	0.293	1.67	0.176	1.00	1.00	0.176	No
62	12.40	226.12	106.93	119.19	0.84	0.292	1.67	0.175	1.00	1.00	0.175	No
63	12.60	229.99	108.89	121.10	0.84	0.290	1.67	0.174	1.00	1.00	0.174	No
64	12.80	233.87	110.85	123.02	0.83	0.288	1.67	0.173	1.00	1.00	0.173	No
65	13.00	237.76	112.81	124.94	0.83	0.286	1.67	0.172	1.00	1.00	0.172	No
66	13.20	241.64	114.78	126.86	0.82	0.284	1.67	0.170	1.00	1.00	0.170	No
67	13.40	245.49	116.74	128.75	0.81	0.282	1.67	0.169	1.00	1.00	0.169	No
68	13.60	249.37	118.70	130.67	0.81	0.280	1.67	0.168	1.00	1.00	0.168	No
69	13.80	253.28	120.66	132.62	0.80	0.278	1.67	0.167	1.00	1.00	0.167	No
70	14.00	257.19	122.63	134.57	0.79	0.276	1.67	0.166	1.00	1.00	0.166	No
71	14.20	261.08	124.59	136.50	0.79	0.274	1.67	0.164	1.00	1.00	0.164	No
72	14.40	264.95	126.55	138.41	0.78	0.272	1.67	0.163	1.00	1.00	0.163	No
73	14.60	268.83	128.51	140.31	0.77	0.270	1.67	0.162	1.00	1.00	0.162	No
74	14.80	272.72	130.47	142.24	0.77	0.268	1.67	0.161	1.00	1.00	0.161	No
75	15.00	276.60	132.44	144.17	0.76	0.266	1.67	0.159	1.00	1.00	0.159	No
76	15.20	280.49	134.40	146.10	0.75	0.263	1.67	0.158	1.00	1.00	0.158	No
77	15.40	284.38	136.36	148.02	0.75	0.261	1.67	0.157	1.00	1.00	0.157	No
78	15.60	288.28	138.32	149.96	0.74	0.259	1.67	0.155	1.00	1.00	0.155	No
79	15.80	292.17	140.28	151.89	0.73	0.257	1.67	0.154	1.00	1.00	0.154	No
80	16.00	296.07	142.25	153.82	0.73	0.255	1.67	0.153	1.00	1.00	0.153	No
81	16.20	299.96	144.21	155.75	0.72	0.253	1.67	0.152	1.00	1.00	0.152	No
82	16.40	303.85	146.17	157.68	0.71	0.251	1.67	0.150	1.00	1.00	0.150	No
83	16.60	307.75	148.13	159.62	0.71	0.249	1.67	0.149	1.00	1.00	0.149	No
84	16.80	311.64	150.09	161.55	0.70	0.247	1.67	0.148	1.00	1.00	0.148	No
85	17.00	315.55	152.06	163.50	0.70	0.245	1.67	0.147	1.00	1.00	0.147	No
86	17.20	319.47	154.02	165.45	0.69	0.243	1.67	0.145	1.00	1.00	0.145	No
87	17.40	323.40	155.98	167.42	0.68	0.241	1.67	0.144	1.00	1.00	0.144	No
88	17.60	327.34	157.94	169.40	0.68	0.239	1.67	0.143	1.00	1.00	0.143	No
89	17.80	331.25	159.90	171.35	0.67	0.237	1.67	0.142	1.00	1.00	0.142	No
90	18.00	335.17	161.87	173.31	0.67	0.235	1.67	0.141	1.00	1.00	0.141	No
91	18.20	339.09	163.83	175.27	0.66	0.233	1.67	0.140	1.00	1.00	0.140	No
92	18.40	343.01	165.79	177.23	0.66	0.231	1.67	0.139	1.00	1.00	0.139	No
93	18.60	346.91	167.75	179.16	0.65	0.229	1.67	0.138	1.00	1.00	0.138	No
94	18.80	350.79	169.71	181.07	0.65	0.228	1.67	0.137	1.00	1.00	0.137	No
95	19.00	354.69	171.68	183.02	0.64	0.226	1.67	0.136	1.00	1.00	0.136	No
96	19.20	358.62	173.64	184.98	0.64	0.224	1.67	0.135	1.00	1.00	0.135	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	362.55	175.60	186.95	0.63	0.223	1.67	0.134	1.00	1.00	0.134	No
98	19.60	366.47	177.56	188.91	0.63	0.221	1.67	0.133	1.00	1.00	0.133	No
99	19.80	370.39	179.52	190.86	0.62	0.220	1.67	0.132	1.00	1.00	0.132	No
100	20.00	374.32	181.49	192.83	0.62	0.218	1.67	0.131	1.00	1.00	0.131	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	3.93	2.34	3.24	0.74	78.58	2.08	163.80	4.000	No	No	2.00
2	0.40	10.47	1.67	0.97	0.49	209.25	1.01	212.31	4.000	No	No	2.00
3	0.60	6.87	1.83	1.10	0.55	137.26	1.13	155.37	4.000	No	No	2.00
4	0.80	3.25	2.17	1.52	0.69	64.61	1.60	103.45	4.000	No	No	2.00
5	1.00	0.90	2.95	5.20	0.98	17.60	6.19	109.01	4.000	No	Yes	2.00
6	1.20	0.87	2.93	4.61	0.98	17.02	5.96	101.39	4.000	No	Yes	2.00
7	1.40	0.88	2.87	3.83	0.96	17.08	5.44	92.98	4.000	No	Yes	2.00
8	1.60	0.88	2.90	4.23	0.97	17.01	5.72	97.29	0.812	No	Yes	2.00
9	1.80	0.85	2.98	5.22	1.00	16.29	6.47	105.45	0.777	No	Yes	2.00
10	2.00	0.88	3.01	6.17	1.00	16.94	6.87	116.30	0.808	No	Yes	2.00
11	2.20	0.95	2.97	5.73	1.00	18.24	6.37	116.15	0.870	No	Yes	2.00
12	2.40	0.99	2.91	4.84	0.97	18.89	5.75	108.69	0.901	No	Yes	2.00
13	2.60	0.92	2.91	4.48	0.98	17.52	5.78	101.26	0.836	No	Yes	2.00
14	2.80	0.82	3.01	5.49	1.00	15.49	6.81	105.53	0.739	No	Yes	2.00
15	3.00	0.90	3.01	6.20	1.00	16.86	6.90	116.30	0.804	No	Yes	2.00
16	3.20	1.36	2.75	4.01	0.92	26.07	4.35	113.33	1.244	No	Yes	2.00
17	3.40	1.50	2.67	3.41	0.89	28.75	8.34	239.79	4.000	No	No	2.00
18	3.60	1.50	2.65	3.19	0.88	28.68	7.44	213.43	4.000	No	No	2.00
19	3.80	1.24	2.85	5.03	0.96	23.38	5.20	121.64	1.115	No	Yes	2.00
20	4.00	1.34	2.86	5.68	0.96	25.33	5.30	134.18	1.208	No	Yes	2.00
21	4.20	1.54	2.83	6.04	0.95	29.25	5.06	147.99	1.395	No	Yes	2.00
22	4.40	1.64	2.82	6.08	0.95	30.36	4.98	151.12	1.448	No	Yes	2.00
23	4.60	1.74	2.82	6.13	0.95	31.14	4.93	153.55	1.485	No	Yes	2.00
24	4.80	1.61	2.86	6.45	0.97	28.06	5.36	150.48	1.338	No	Yes	2.00
25	5.00	1.45	2.91	6.51	0.99	24.54	5.79	142.00	1.170	No	Yes	2.00
26	5.20	1.25	2.98	6.77	1.00	20.54	6.48	133.18	0.980	No	Yes	2.00
27	5.40	1.22	2.99	6.68	1.00	19.38	6.64	128.71	0.925	No	Yes	2.00
28	5.60	1.39	2.95	6.61	1.00	21.51	6.25	134.53	1.026	No	Yes	2.00
29	5.80	1.52	2.92	6.25	0.99	22.90	5.88	134.60	1.092	No	Yes	2.00
30	6.00	1.49	2.89	5.43	0.98	21.75	5.63	122.49	1.037	No	Yes	2.00
31	6.20	1.66	2.74	3.37	0.93	23.18	4.27	98.92	1.106	No	Yes	2.00
32	6.40	1.57	2.73	2.92	0.92	21.27	4.19	89.07	1.014	No	Yes	2.00
33	6.60	1.57	2.77	3.38	0.94	20.91	4.54	95.00	0.997	No	Yes	2.00
34	6.80	1.24	3.00	5.54	1.00	16.15	6.69	108.05	0.770	No	Yes	2.00
35	7.00	1.28	3.01	5.95	1.00	16.23	6.90	112.03	0.774	No	Yes	2.00
36	7.20	1.28	3.01	5.67	1.00	15.87	6.83	108.36	0.757	No	Yes	2.00
37	7.40	1.19	3.01	4.96	1.00	14.21	6.82	96.86	0.678	No	Yes	2.00
38	7.60	1.06	3.00	3.91	1.00	12.16	6.69	81.36	0.580	No	Yes	2.00
39	7.80	0.96	3.02	3.59	1.00	10.61	6.98	74.10	0.506	No	Yes	2.00
40	8.00	0.96	3.10	4.79	1.00	10.41	7.96	82.89	0.497	No	Yes	2.00
41	8.20	1.00	3.11	4.99	1.00	10.62	8.01	85.12	0.507	No	Yes	2.00
42	8.40	1.20	3.09	5.93	1.00	12.82	7.81	100.12	0.611	No	Yes	2.00
43	8.60	1.39	3.02	5.54	1.00	14.88	6.99	104.04	0.710	No	Yes	2.00
44	8.80	1.59	3.00	5.93	1.00	16.85	6.76	113.83	0.804	No	Yes	2.00
45	9.00	2.28	2.77	4.01	0.95	24.28	4.53	109.95	1.158	No	Yes	2.00
46	9.20	3.43	2.57	3.20	0.87	36.36	4.55	165.45	4.000	No	No	2.00
47	9.40	4.06	2.52	3.11	0.85	42.43	3.10	131.67	0.292	No	No	1.57
48	9.60	3.70	2.62	3.98	0.90	37.93	6.34	240.40	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	2.88	2.74	4.35	0.94	28.68	4.29	123.01	1.368	No	Yes	2.00
50	10.00	3.77	2.54	2.91	0.87	37.23	3.62	134.85	0.308	No	No	1.67
51	10.20	7.89	2.06	1.27	0.68	78.30	1.38	108.44	0.199	No	No	1.08
52	10.40	11.00	1.91	1.09	0.63	108.37	1.20	129.62	0.283	No	No	1.54
53	10.60	13.06	1.80	0.91	0.59	127.50	1.11	141.54	0.344	No	No	1.88
54	10.80	12.41	1.84	0.96	0.60	119.59	1.14	136.05	0.314	No	No	1.72
55	11.00	13.39	1.80	0.89	0.59	127.90	1.10	141.23	0.342	No	No	1.88
56	11.20	16.50	1.69	0.78	0.55	156.76	1.03	161.89	4.000	No	No	2.00
57	11.40	19.45	1.59	0.66	0.51	183.83	1.00	183.83	4.000	No	No	2.00
58	11.60	22.07	1.52	0.58	0.48	207.48	1.00	207.48	4.000	No	No	2.00
59	11.80	22.39	1.51	0.57	0.48	208.78	1.00	208.78	4.000	No	No	2.00
60	12.00	21.74	1.51	0.55	0.48	200.93	1.00	200.93	4.000	No	No	2.00
61	12.20	19.95	1.54	0.55	0.50	182.27	1.00	182.27	4.000	No	No	2.00
62	12.40	17.83	1.59	0.56	0.52	160.79	1.00	160.79	4.000	No	No	2.00
63	12.60	16.68	1.64	0.60	0.53	148.56	1.00	148.56	0.385	No	No	2.00
64	12.80	15.70	1.70	0.70	0.56	137.73	1.04	143.28	0.354	No	No	2.00
65	13.00	14.89	1.74	0.74	0.58	128.89	1.07	137.32	0.321	No	No	1.87
66	13.20	14.24	1.77	0.77	0.59	121.68	1.09	132.30	0.295	No	No	1.73
67	13.40	13.75	1.77	0.73	0.59	116.37	1.09	126.47	0.268	No	No	1.58
68	13.60	14.73	1.76	0.74	0.58	123.86	1.08	133.36	0.301	No	No	1.79
69	13.80	15.55	1.75	0.77	0.58	129.75	1.07	139.09	0.330	No	No	1.98
70	14.00	16.86	1.70	0.71	0.57	140.40	1.04	145.86	0.369	No	No	2.00
71	14.20	17.03	1.67	0.64	0.56	141.09	1.02	143.90	0.357	No	No	2.00
72	14.40	17.04	1.65	0.58	0.55	140.39	1.00	140.88	0.340	No	No	2.00
73	14.60	17.04	1.65	0.58	0.55	139.21	1.01	139.99	0.335	No	No	2.00
74	14.80	16.71	1.70	0.66	0.57	134.64	1.03	139.28	0.331	No	No	2.00
75	15.00	15.08	1.76	0.73	0.59	119.12	1.08	128.87	0.279	No	No	1.75
76	15.20	13.12	1.88	0.92	0.64	100.74	1.17	118.26	0.234	No	No	1.48
77	15.40	12.31	1.93	0.98	0.66	92.87	1.22	113.08	0.214	No	No	1.37
78	15.60	11.66	1.99	1.12	0.68	86.17	1.29	111.11	0.208	No	No	1.34
79	15.80	12.31	1.94	0.98	0.66	91.07	1.22	111.54	0.209	No	No	1.36
80	16.00	13.29	1.89	0.91	0.65	98.40	1.18	115.93	0.225	No	No	1.47
81	16.20	16.57	1.72	0.66	0.58	125.58	1.05	132.18	0.295	No	No	1.95
82	16.40	17.88	1.67	0.61	0.57	135.75	1.02	138.54	0.327	No	No	2.00
83	16.60	17.71	1.68	0.62	0.57	133.26	1.03	136.81	0.318	No	No	2.00
84	16.80	16.73	1.72	0.66	0.59	123.88	1.05	130.58	0.287	No	No	1.94
85	17.00	16.90	1.74	0.71	0.60	123.71	1.07	132.14	0.295	No	No	2.00
86	17.20	17.40	1.73	0.69	0.59	126.82	1.06	134.06	0.304	No	No	2.00
87	17.40	17.73	1.74	0.73	0.60	127.96	1.07	136.42	0.316	No	No	2.00
88	17.60	18.06	1.73	0.72	0.59	129.60	1.06	137.35	0.321	No	No	2.00
89	17.80	18.06	1.71	0.66	0.59	129.15	1.05	135.12	0.309	No	No	2.00
90	18.00	18.23	1.71	0.66	0.59	129.49	1.04	135.19	0.310	No	No	2.00
91	18.20	18.72	1.69	0.64	0.58	132.51	1.03	136.99	0.319	No	No	2.00
92	18.40	19.05	1.69	0.63	0.58	134.18	1.03	137.90	0.324	No	No	2.00
93	18.60	18.23	1.69	0.60	0.58	127.19	1.03	131.39	0.291	No	No	2.00
94	18.80	17.42	1.70	0.57	0.59	120.34	1.04	124.90	0.261	No	No	1.91
95	19.00	14.97	1.86	0.83	0.65	98.58	1.16	114.01	0.218	No	No	1.61
96	19.20	14.32	1.92	0.94	0.67	92.26	1.21	111.43	0.209	No	No	1.55

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	12.86	2.02	1.12	0.71	80.03	1.32	105.92	0.191	No	No	1.43
98	19.60	14.00	1.93	0.93	0.68	88.41	1.22	108.06	0.197	No	No	1.49
99	19.80	14.33	1.92	0.91	0.68	90.10	1.21	108.95	0.200	No	No	1.52
100	20.00	16.95	1.81	0.77	0.64	109.14	1.11	121.54	0.247	No	No	1.89

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	2.00	0.00	9.20	0.20	0.00
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	1.57	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	1.67	0.00	5.00	0.20	0.00
10.20	1.08	0.00	4.90	0.20	0.00	10.40	1.54	0.00	4.80	0.20	0.00
10.60	1.88	0.00	4.70	0.20	0.00	10.80	1.72	0.00	4.60	0.20	0.00
11.00	1.88	0.00	4.50	0.20	0.00	11.20	2.00	0.00	4.40	0.20	0.00
11.40	2.00	0.00	4.30	0.20	0.00	11.60	2.00	0.00	4.20	0.20	0.00
11.80	2.00	0.00	4.10	0.20	0.00	12.00	2.00	0.00	4.00	0.20	0.00
12.20	2.00	0.00	3.90	0.20	0.00	12.40	2.00	0.00	3.80	0.20	0.00
12.60	2.00	0.00	3.70	0.20	0.00	12.80	2.00	0.00	3.60	0.20	0.00
13.00	1.87	0.00	3.50	0.20	0.00	13.20	1.73	0.00	3.40	0.20	0.00
13.40	1.58	0.00	3.30	0.20	0.00	13.60	1.79	0.00	3.20	0.20	0.00
13.80	1.98	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	2.00	0.00	2.70	0.20	0.00	14.80	2.00	0.00	2.60	0.20	0.00
15.00	1.75	0.00	2.50	0.20	0.00	15.20	1.48	0.00	2.40	0.20	0.00
15.40	1.37	0.00	2.30	0.20	0.00	15.60	1.34	0.00	2.20	0.20	0.00
15.80	1.36	0.00	2.10	0.20	0.00	16.00	1.47	0.00	2.00	0.20	0.00
16.20	1.95	0.00	1.90	0.20	0.00	16.40	2.00	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	1.94	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	2.00	0.00	1.40	0.20	0.00
17.40	2.00	0.00	1.30	0.20	0.00	17.60	2.00	0.00	1.20	0.20	0.00
17.80	2.00	0.00	1.10	0.20	0.00	18.00	2.00	0.00	1.00	0.20	0.00
18.20	2.00	0.00	0.90	0.20	0.00	18.40	2.00	0.00	0.80	0.20	0.00
18.60	2.00	0.00	0.70	0.20	0.00	18.80	1.91	0.00	0.60	0.20	0.00
19.00	1.61	0.00	0.50	0.20	0.00	19.20	1.55	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	1.43	0.00	0.30	0.20	0.00	19.60	1.49	0.00	0.20	0.20	0.00
19.80	1.52	0.00	0.10	0.20	0.00	20.00	1.89	0.00	0.00	0.20	0.00

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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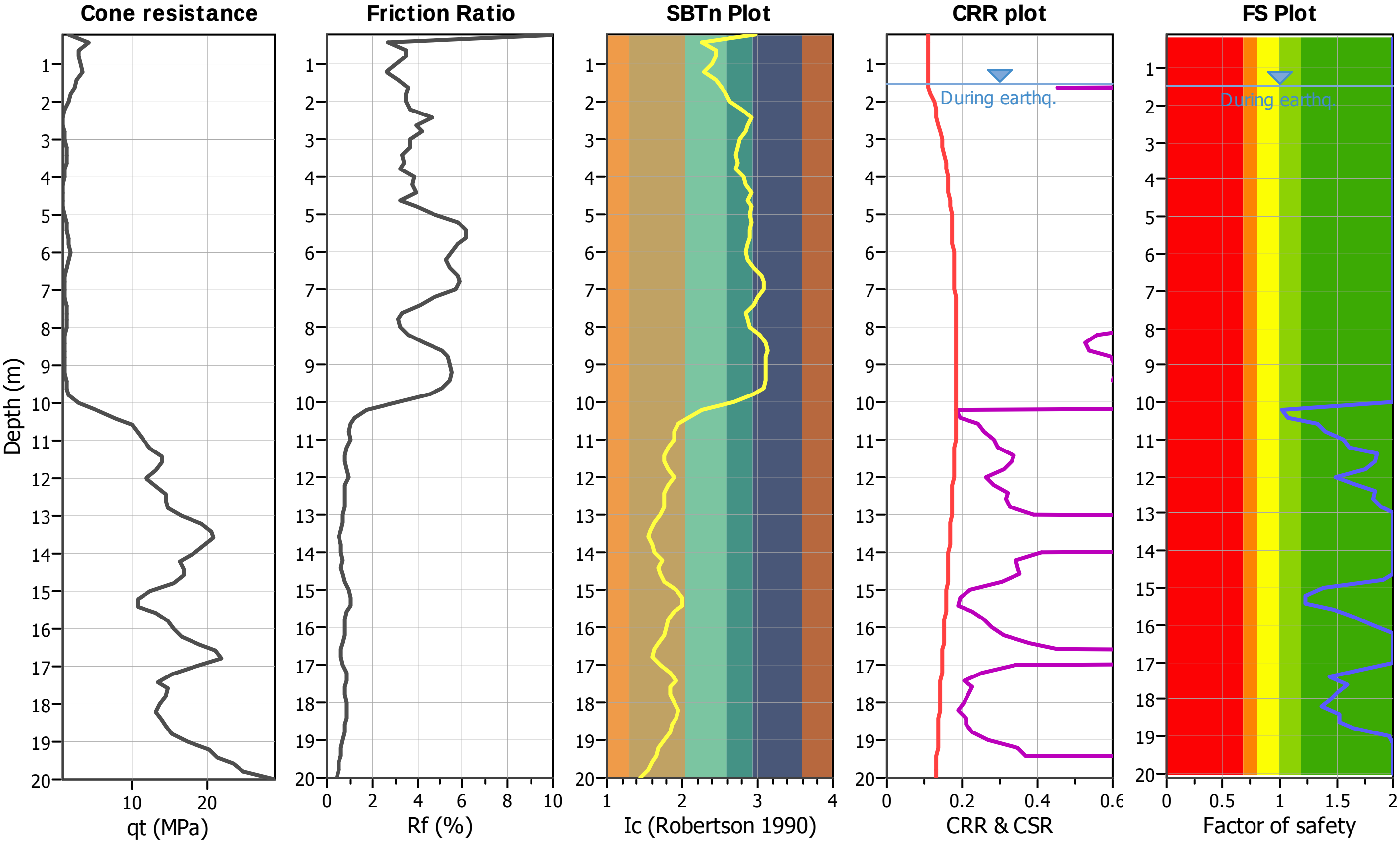
LIQUEFACTION ANALYSIS REPORT

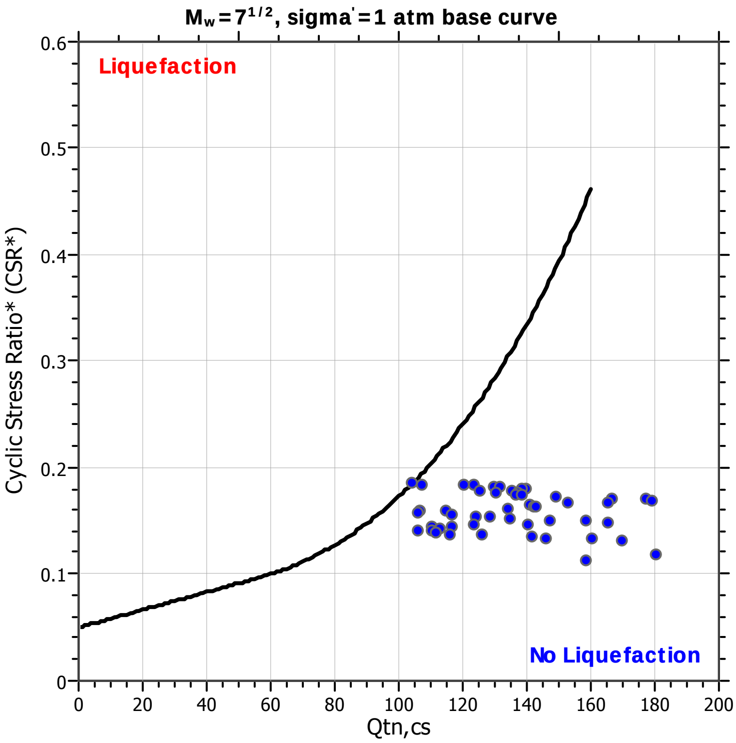
Project title : **Location :**

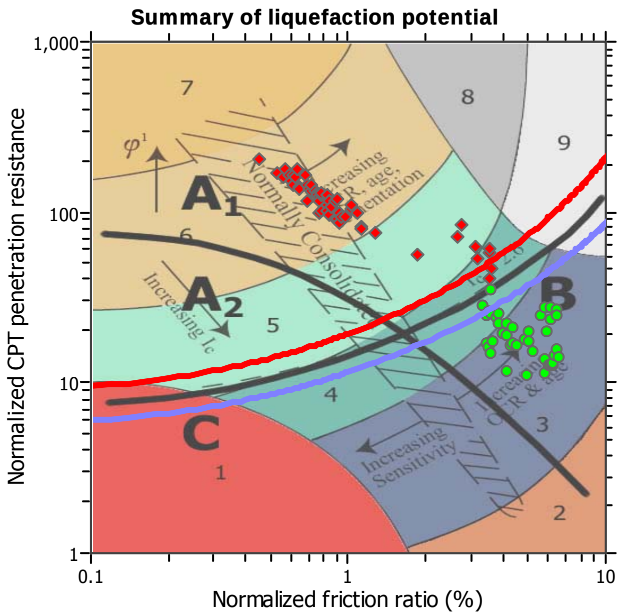
CPT file : CPT02

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude M_w:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	No		

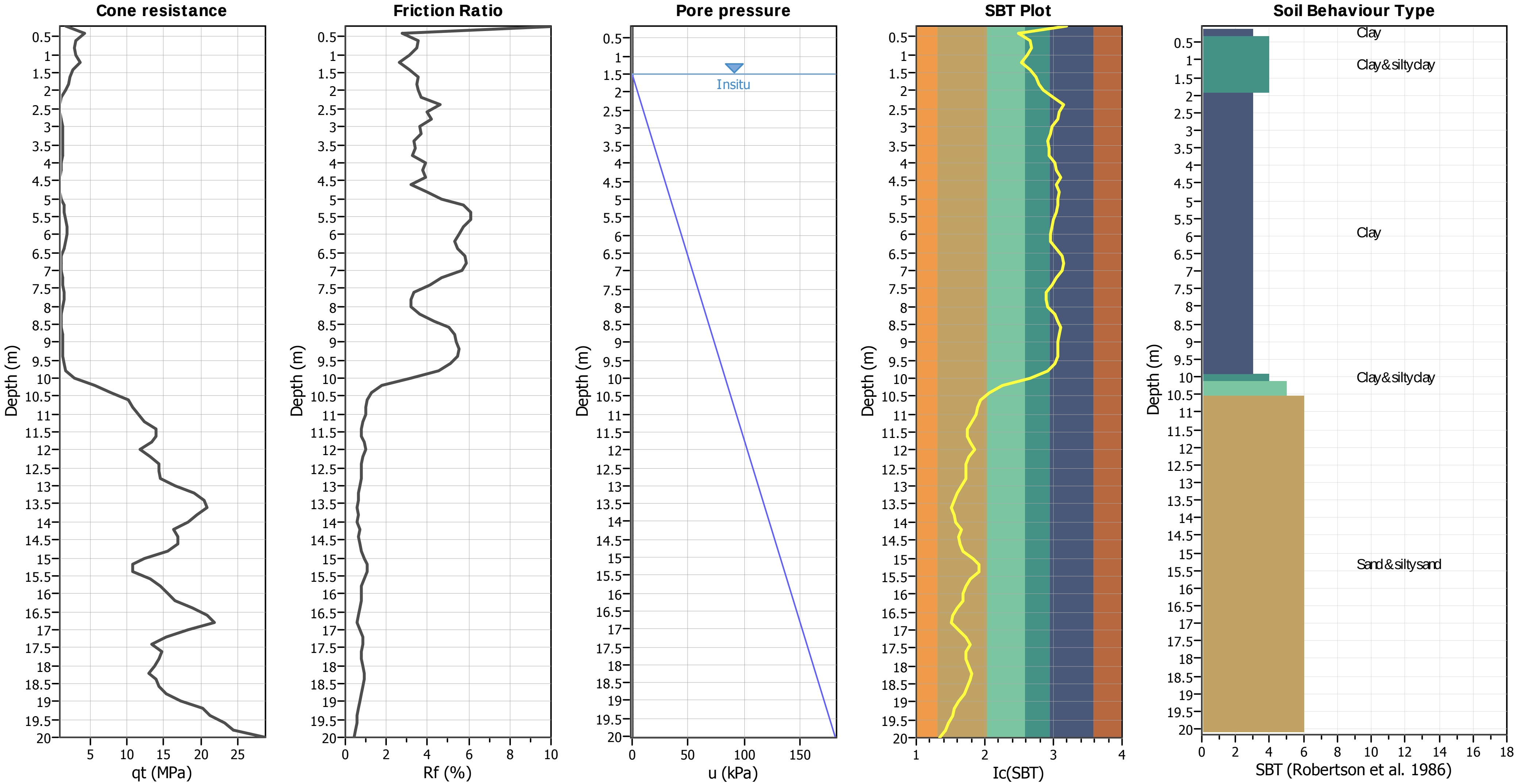






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



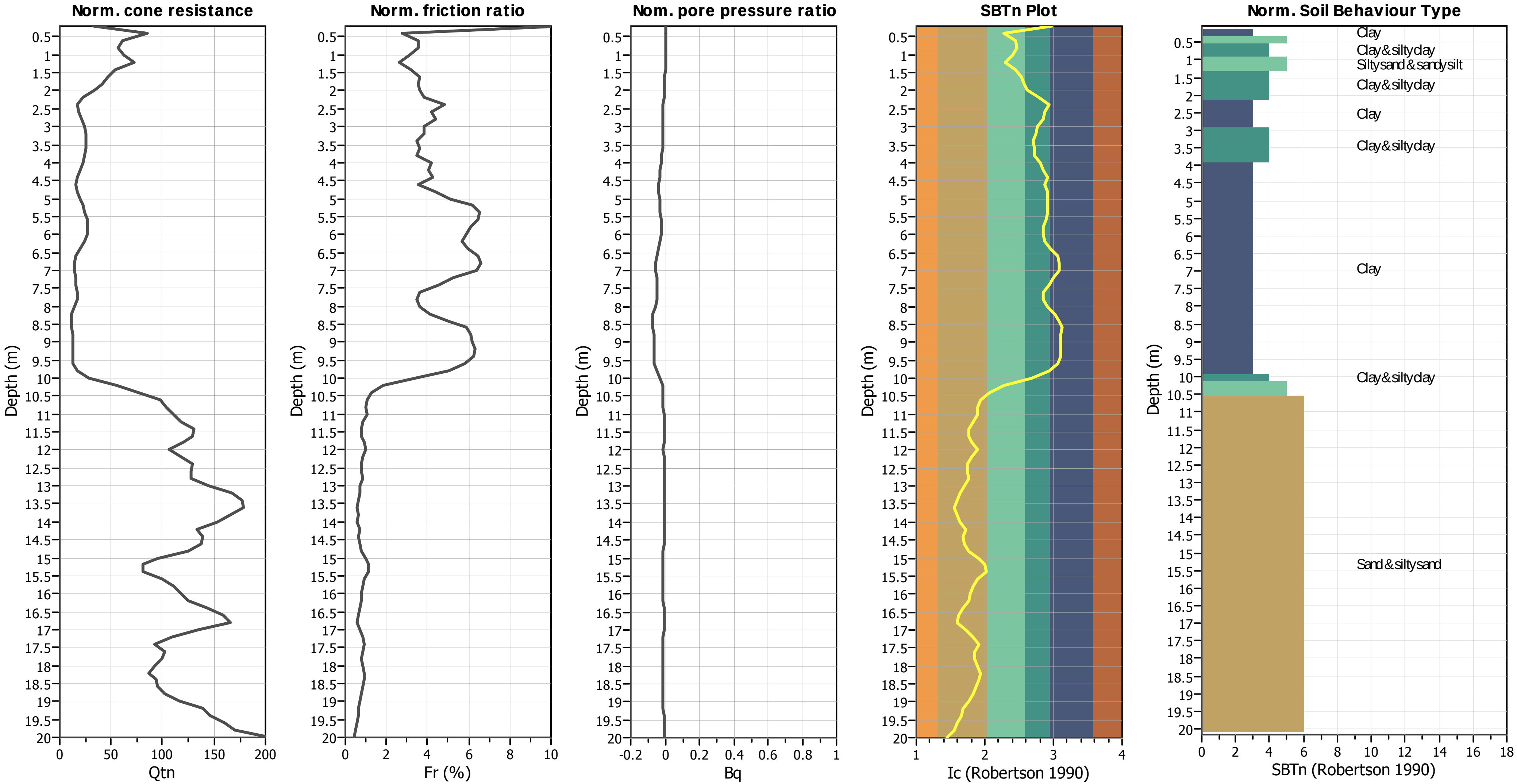
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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)



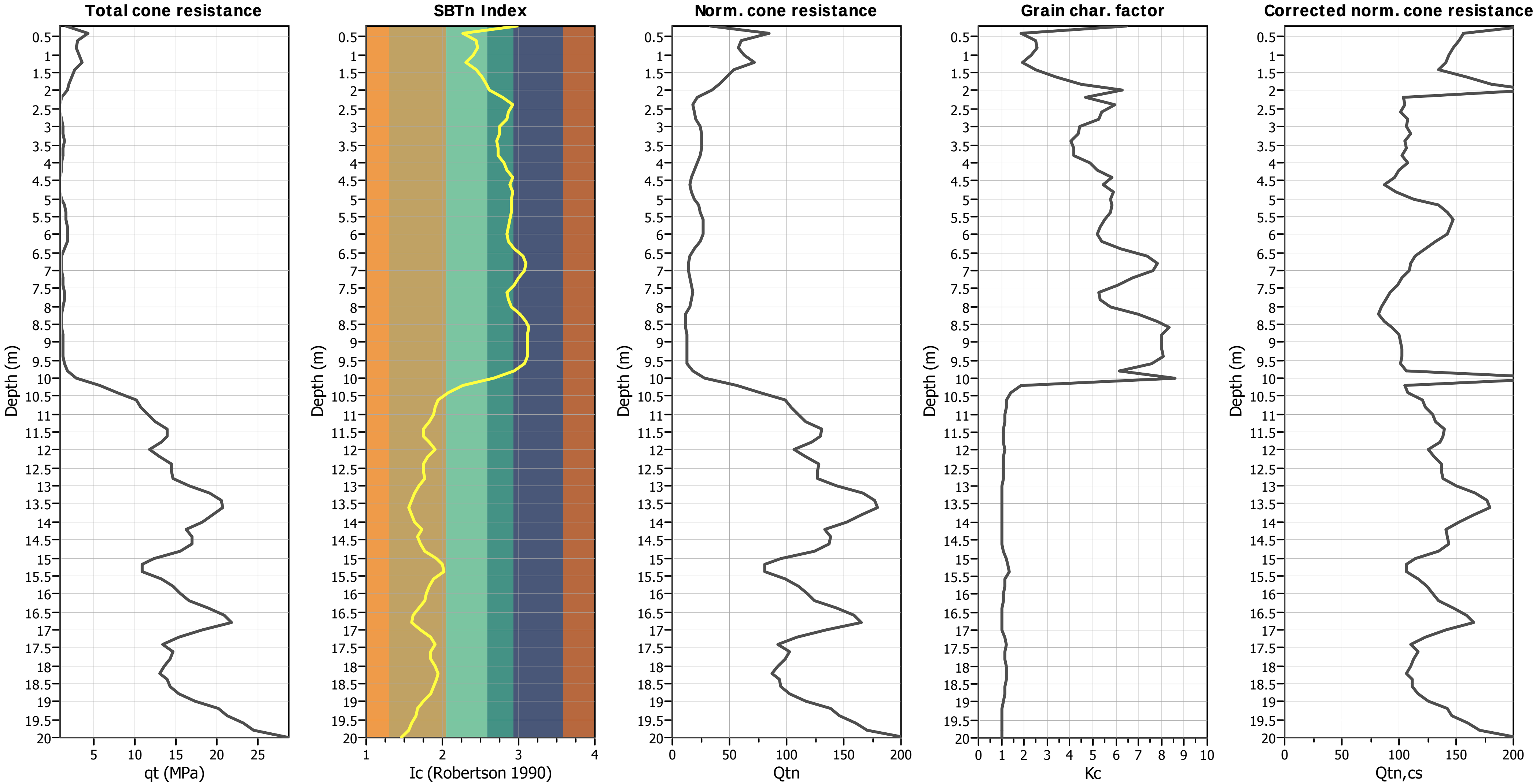
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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

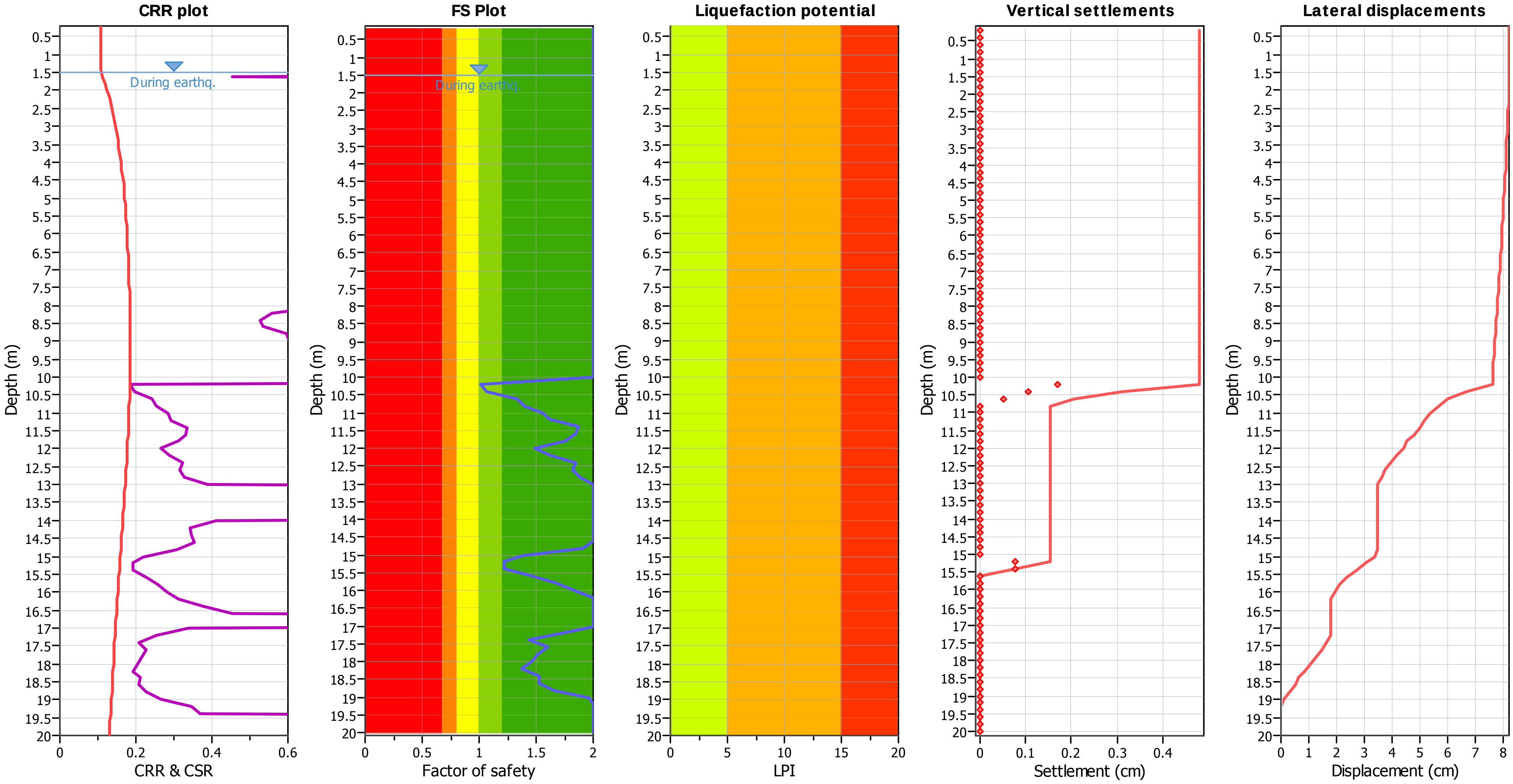
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

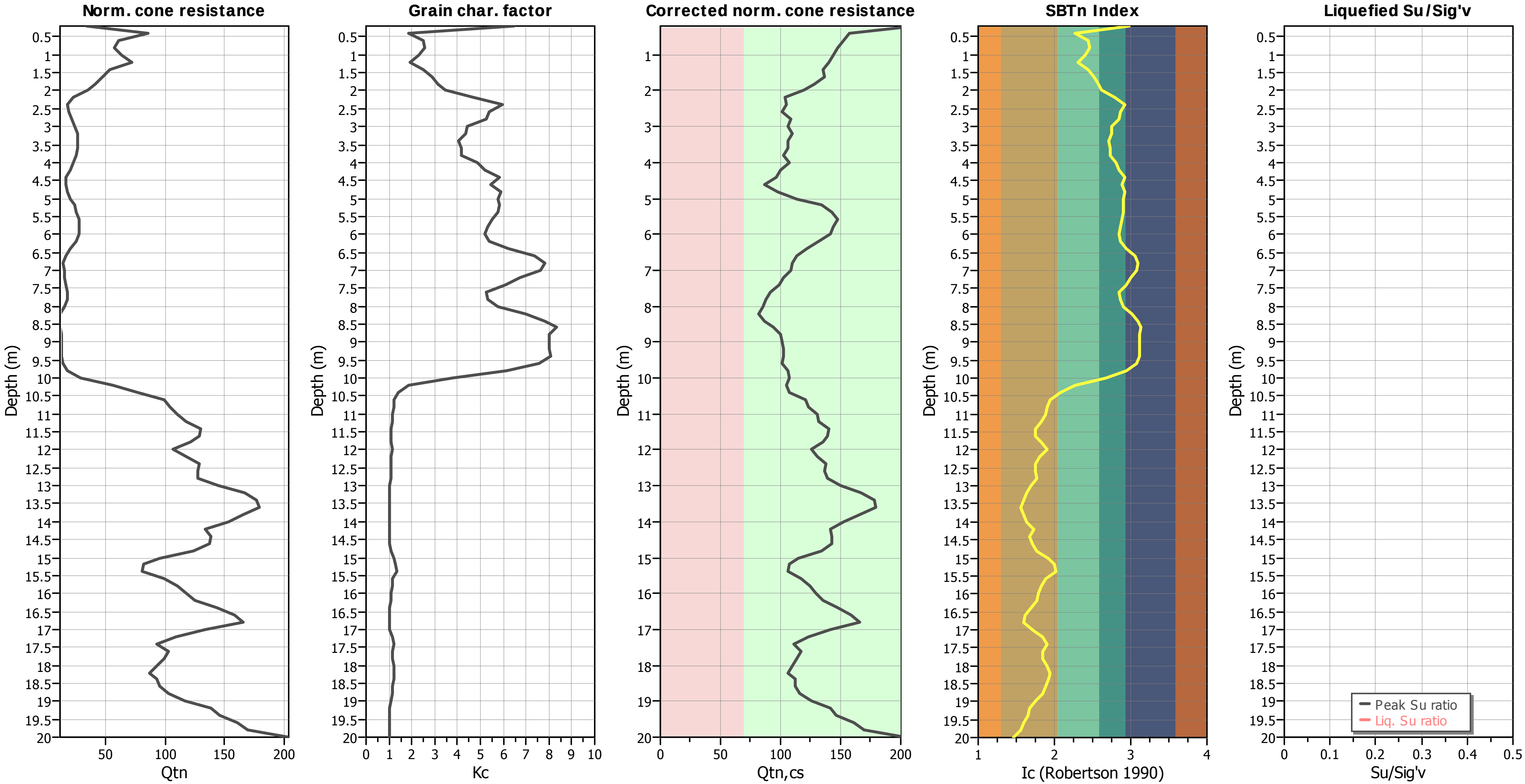
F.S. color scheme

- 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 (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	196.13	0.00	56.83	19.11
2	0.40	4.91	127.49	0.00	21.29	19.03
3	0.60	2.95	98.07	0.00	28.28	18.80
4	0.80	1.28	98.07	0.00	28.93	18.71
5	1.00	4.42	107.87	0.00	26.24	18.71
6	1.20	3.76	88.26	0.00	22.56	18.72
7	1.40	2.68	88.26	0.00	28.38	18.49
8	1.60	1.70	78.45	0.00	31.95	18.44
9	1.80	2.77	88.26	0.00	33.93	18.19
10	2.00	1.70	49.03	0.00	36.52	17.96
11	2.20	0.82	49.03	0.00	45.28	17.36
12	2.40	0.92	29.42	0.00	53.86	17.27
13	2.60	1.02	49.03	0.00	49.86	17.21
14	2.80	1.02	39.23	0.00	48.94	17.42
15	3.00	1.22	49.03	0.00	43.65	17.48
16	3.20	1.53	49.03	0.00	42.85	17.58
17	3.40	1.24	49.03	0.00	40.86	17.51
18	3.60	1.33	39.23	0.00	41.79	17.50
19	3.80	1.43	49.03	0.00	41.61	17.41
20	4.00	1.14	39.23	0.00	46.65	17.45
21	4.20	0.95	49.03	0.00	48.85	17.23
22	4.40	1.05	29.42	0.00	53.03	17.08
23	4.60	0.76	29.42	0.00	50.57	16.85
24	4.80	0.95	29.42	0.00	53.09	17.21
25	5.00	1.25	58.84	0.00	52.32	17.68
26	5.20	1.35	78.45	0.00	52.69	18.19
27	5.40	1.65	107.87	0.00	52.45	18.40
28	5.60	1.65	98.07	0.00	50.97	18.55
29	5.80	1.84	107.87	0.00	49.45	18.57
30	6.00	1.94	107.87	0.00	48.55	18.58
31	6.20	1.86	98.07	0.00	50.04	18.40
32	6.40	1.37	68.65	0.00	55.15	18.15
33	6.60	1.08	68.65	0.00	62.29	17.92
34	6.80	1.08	68.65	0.00	64.76	17.84
35	7.00	1.18	58.84	0.00	63.88	17.85
36	7.20	1.19	68.65	0.00	58.42	17.77
37	7.40	1.38	49.03	0.00	54.47	17.73
38	7.60	1.48	49.03	0.00	49.12	17.62
39	7.80	1.58	49.03	0.00	49.39	17.53
40	8.00	1.28	39.23	0.00	52.44	17.41
41	8.20	1.10	39.23	0.00	60.11	17.25
42	8.40	0.90	39.23	0.00	64.97	17.42
43	8.60	1.20	58.84	0.00	67.91	17.65
44	8.80	1.20	68.65	0.00	66.02	17.88
45	9.00	1.29	68.65	0.00	66.01	17.95
46	9.20	1.31	68.65	0.00	65.99	18.01
47	9.40	1.31	78.45	0.00	66.32	18.02
48	9.60	1.31	68.65	0.00	63.25	18.04

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	1.61	68.65	0.00	54.80	18.28
50	10.00	2.49	107.87	0.00	39.00	18.59
51	10.20	4.56	98.07	0.00	21.63	18.97
52	10.40	9.95	98.07	0.00	14.87	19.06
53	10.60	8.97	98.07	0.00	11.35	19.26
54	10.80	11.43	127.49	0.00	10.49	19.29
55	11.00	11.91	98.07	0.00	10.07	19.42
56	11.20	11.44	127.49	0.00	8.61	19.34
57	11.40	13.90	98.07	0.00	7.20	19.39
58	11.60	16.35	98.07	0.00	7.28	19.39
59	11.80	11.44	127.49	0.00	8.51	19.47
60	12.00	11.94	127.49	0.00	10.30	19.42
61	12.20	11.94	98.07	0.00	8.30	19.36
62	12.40	15.38	98.07	0.00	7.11	19.40
63	12.60	15.87	127.49	0.00	7.18	19.40
64	12.80	11.94	98.07	0.00	7.61	19.50
65	13.00	15.87	127.49	0.00	6.08	19.55
66	13.20	21.76	127.49	0.00	4.87	19.70
67	13.40	19.80	127.49	0.00	4.21	19.73
68	13.60	19.80	127.49	0.00	3.74	19.64
69	13.80	22.74	98.07	0.00	4.45	19.62
70	14.00	15.88	127.49	0.00	4.84	19.49
71	14.20	15.90	98.07	0.00	6.68	19.55
72	14.40	16.88	127.49	0.00	5.79	19.46
73	14.60	17.86	98.07	0.00	6.30	19.56
74	14.80	15.90	127.49	0.00	7.40	19.53
75	15.00	12.96	127.49	0.00	10.94	19.44
76	15.20	8.06	98.07	0.00	13.20	19.39
77	15.40	11.49	127.49	0.00	13.30	19.39
78	15.60	12.96	127.49	0.00	10.15	19.46
79	15.80	14.93	98.07	0.00	8.62	19.51
80	16.00	15.91	127.49	0.00	7.77	19.53
81	16.20	15.92	127.49	0.00	7.48	19.65
82	16.40	17.88	127.49	0.00	5.87	19.70
83	16.60	22.78	127.49	0.00	4.77	19.73
84	16.80	21.80	127.49	0.00	4.31	19.75
85	17.00	20.82	127.49	0.00	6.47	19.68
86	17.20	12.01	127.49	0.00	8.96	19.61
87	17.40	12.99	127.49	0.00	10.63	19.47
88	17.60	14.96	98.07	0.00	9.23	19.51
89	17.80	15.94	127.49	0.00	9.08	19.40
90	18.00	12.01	98.07	0.00	10.46	19.48
91	18.20	13.00	127.49	0.00	11.35	19.46
92	18.40	13.98	127.49	0.00	10.78	19.58
93	18.60	14.96	127.49	0.00	9.92	19.50
94	18.80	13.98	98.07	0.00	8.96	19.52
95	19.00	16.93	127.49	0.00	7.28	19.57
96	19.20	20.87	127.49	0.00	5.73	19.72

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	22.83	127.49	0.00	5.20	19.74
98	19.60	19.89	127.49	0.00	4.24	19.77
99	19.80	26.75	127.49	0.00	3.69	19.80
100	20.00	29.70	127.49	0.00	2.18	19.86

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.82	0.00	3.82	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
2	0.40	7.63	0.00	7.63	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
3	0.60	11.39	0.00	11.39	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
4	0.80	15.13	0.00	15.13	1.00	0.181	1.67	0.109	1.00	1.00	2.000	No
5	1.00	18.87	0.00	18.87	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
6	1.20	22.62	0.00	22.62	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
7	1.40	26.32	0.00	26.32	0.99	0.180	1.67	0.108	1.00	1.00	2.000	No
8	1.60	30.00	0.98	29.02	0.99	0.186	1.67	0.112	1.00	1.00	0.112	No
9	1.80	33.64	2.94	30.70	0.99	0.197	1.67	0.118	1.00	1.00	0.118	No
10	2.00	37.23	4.91	32.33	0.99	0.207	1.67	0.124	1.00	1.00	0.124	No
11	2.20	40.70	6.87	33.84	0.99	0.216	1.67	0.129	1.00	1.00	0.129	No
12	2.40	44.16	8.83	35.33	0.98	0.224	1.67	0.134	1.00	1.00	0.134	No
13	2.60	47.60	10.79	36.81	0.98	0.231	1.67	0.139	1.00	1.00	0.139	No
14	2.80	51.09	12.75	38.33	0.98	0.238	1.67	0.143	1.00	1.00	0.143	No
15	3.00	54.58	14.71	39.87	0.98	0.244	1.67	0.146	1.00	1.00	0.146	No
16	3.20	58.10	16.68	41.42	0.98	0.250	1.67	0.150	1.00	1.00	0.150	No
17	3.40	61.60	18.64	42.96	0.98	0.255	1.67	0.153	1.00	1.00	0.153	No
18	3.60	65.10	20.60	44.50	0.98	0.260	1.67	0.156	1.00	1.00	0.156	No
19	3.80	68.58	22.56	46.02	0.97	0.264	1.67	0.158	1.00	1.00	0.158	No
20	4.00	72.07	24.52	47.55	0.97	0.268	1.67	0.161	1.00	1.00	0.161	No
21	4.20	75.52	26.49	49.03	0.97	0.272	1.67	0.163	1.00	1.00	0.163	No
22	4.40	78.93	28.45	50.48	0.97	0.276	1.67	0.165	1.00	1.00	0.165	No
23	4.60	82.30	30.41	51.89	0.97	0.280	1.67	0.168	1.00	1.00	0.168	No
24	4.80	85.75	32.37	53.37	0.97	0.283	1.67	0.169	1.00	1.00	0.169	No
25	5.00	89.28	34.34	54.95	0.97	0.286	1.67	0.171	1.00	1.00	0.171	No
26	5.20	92.92	36.30	56.62	0.96	0.288	1.67	0.173	1.00	1.00	0.173	No
27	5.40	96.60	38.26	58.34	0.96	0.290	1.67	0.174	1.00	1.00	0.174	No
28	5.60	100.31	40.22	60.09	0.96	0.292	1.67	0.175	1.00	1.00	0.175	No
29	5.80	104.02	42.18	61.84	0.96	0.294	1.67	0.176	1.00	1.00	0.176	No
30	6.00	107.74	44.15	63.59	0.96	0.295	1.67	0.177	1.00	1.00	0.177	No
31	6.20	111.42	46.11	65.31	0.96	0.297	1.67	0.178	1.00	1.00	0.178	No
32	6.40	115.05	48.07	66.98	0.95	0.298	1.67	0.179	1.00	1.00	0.179	No
33	6.60	118.63	50.03	68.60	0.95	0.300	1.67	0.180	1.00	1.00	0.180	No
34	6.80	122.20	51.99	70.21	0.95	0.301	1.67	0.180	1.00	1.00	0.180	No
35	7.00	125.77	53.95	71.82	0.95	0.302	1.67	0.181	1.00	1.00	0.181	No
36	7.20	129.32	55.92	73.41	0.95	0.303	1.67	0.182	1.00	1.00	0.182	No
37	7.40	132.87	57.88	74.99	0.94	0.305	1.67	0.183	1.00	1.00	0.183	No
38	7.60	136.39	59.84	76.55	0.94	0.305	1.67	0.183	1.00	1.00	0.183	No
39	7.80	139.90	61.80	78.10	0.94	0.306	1.67	0.184	1.00	1.00	0.184	No
40	8.00	143.38	63.77	79.62	0.94	0.307	1.67	0.184	1.00	1.00	0.184	No
41	8.20	146.83	65.73	81.11	0.93	0.308	1.67	0.185	1.00	1.00	0.185	No
42	8.40	150.32	67.69	82.63	0.93	0.309	1.67	0.185	1.00	1.00	0.185	No
43	8.60	153.85	69.65	84.20	0.93	0.309	1.67	0.185	1.00	1.00	0.185	No
44	8.80	157.42	71.61	85.81	0.93	0.309	1.67	0.185	1.00	1.00	0.185	No
45	9.00	161.01	73.58	87.44	0.92	0.309	1.67	0.185	1.00	1.00	0.185	No
46	9.20	164.62	75.54	89.08	0.92	0.309	1.67	0.185	1.00	1.00	0.185	No
47	9.40	168.22	77.50	90.72	0.92	0.309	1.67	0.185	1.00	1.00	0.185	No
48	9.60	171.83	79.46	92.37	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.48	81.42	94.06	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No
50	10.00	179.20	83.39	95.82	0.90	0.308	1.67	0.185	1.00	1.00	0.185	No
51	10.20	183.00	85.35	97.65	0.90	0.307	1.67	0.184	1.00	1.00	0.184	No
52	10.40	186.81	87.31	99.50	0.90	0.306	1.67	0.184	1.00	1.00	0.184	No
53	10.60	190.66	89.27	101.39	0.89	0.305	1.67	0.183	1.00	1.00	0.183	No
54	10.80	194.52	91.23	103.29	0.89	0.304	1.67	0.182	1.00	1.00	0.182	No
55	11.00	198.40	93.19	105.21	0.88	0.303	1.67	0.182	1.00	1.00	0.182	No
56	11.20	202.27	95.16	107.11	0.88	0.302	1.67	0.181	1.00	1.00	0.181	No
57	11.40	206.15	97.12	109.03	0.87	0.300	1.67	0.180	1.00	1.00	0.180	No
58	11.60	210.03	99.08	110.94	0.87	0.299	1.67	0.179	1.00	1.00	0.179	No
59	11.80	213.92	101.04	112.88	0.86	0.297	1.67	0.178	1.00	1.00	0.178	No
60	12.00	217.80	103.00	114.80	0.86	0.296	1.67	0.177	1.00	1.00	0.177	No
61	12.20	221.68	104.97	116.71	0.85	0.294	1.67	0.176	1.00	1.00	0.176	No
62	12.40	225.56	106.93	118.63	0.84	0.292	1.67	0.175	1.00	1.00	0.175	No
63	12.60	229.44	108.89	120.55	0.84	0.291	1.67	0.174	1.00	1.00	0.174	No
64	12.80	233.34	110.85	122.48	0.83	0.289	1.67	0.173	1.00	1.00	0.173	No
65	13.00	237.25	112.81	124.43	0.83	0.287	1.67	0.172	1.00	1.00	0.172	No
66	13.20	241.19	114.78	126.41	0.82	0.285	1.67	0.171	1.00	1.00	0.171	No
67	13.40	245.13	116.74	128.39	0.81	0.283	1.67	0.170	1.00	1.00	0.170	No
68	13.60	249.06	118.70	130.36	0.81	0.281	1.67	0.168	1.00	1.00	0.168	No
69	13.80	252.99	120.66	132.32	0.80	0.279	1.67	0.167	1.00	1.00	0.167	No
70	14.00	256.88	122.63	134.26	0.79	0.277	1.67	0.166	1.00	1.00	0.166	No
71	14.20	260.79	124.59	136.21	0.79	0.274	1.67	0.165	1.00	1.00	0.165	No
72	14.40	264.68	126.55	138.14	0.78	0.272	1.67	0.163	1.00	1.00	0.163	No
73	14.60	268.60	128.51	140.09	0.77	0.270	1.67	0.162	1.00	1.00	0.162	No
74	14.80	272.50	130.47	142.03	0.77	0.268	1.67	0.161	1.00	1.00	0.161	No
75	15.00	276.39	132.44	143.96	0.76	0.266	1.67	0.159	1.00	1.00	0.159	No
76	15.20	280.27	134.40	145.87	0.75	0.264	1.67	0.158	1.00	1.00	0.158	No
77	15.40	284.15	136.36	147.79	0.75	0.262	1.67	0.157	1.00	1.00	0.157	No
78	15.60	288.04	138.32	149.72	0.74	0.259	1.67	0.155	1.00	1.00	0.155	No
79	15.80	291.94	140.28	151.66	0.73	0.257	1.67	0.154	1.00	1.00	0.154	No
80	16.00	295.85	142.25	153.60	0.73	0.255	1.67	0.153	1.00	1.00	0.153	No
81	16.20	299.78	144.21	155.57	0.72	0.253	1.67	0.152	1.00	1.00	0.152	No
82	16.40	303.72	146.17	157.55	0.71	0.251	1.67	0.150	1.00	1.00	0.150	No
83	16.60	307.66	148.13	159.53	0.71	0.249	1.67	0.149	1.00	1.00	0.149	No
84	16.80	311.61	150.09	161.52	0.70	0.247	1.67	0.148	1.00	1.00	0.148	No
85	17.00	315.55	152.06	163.49	0.70	0.245	1.67	0.147	1.00	1.00	0.147	No
86	17.20	319.47	154.02	165.45	0.69	0.242	1.67	0.145	1.00	1.00	0.145	No
87	17.40	323.37	155.98	167.39	0.68	0.241	1.67	0.144	1.00	1.00	0.144	No
88	17.60	327.27	157.94	169.33	0.68	0.239	1.67	0.143	1.00	1.00	0.143	No
89	17.80	331.15	159.90	171.24	0.67	0.237	1.67	0.142	1.00	1.00	0.142	No
90	18.00	335.04	161.87	173.18	0.67	0.235	1.67	0.141	1.00	1.00	0.141	No
91	18.20	338.93	163.83	175.11	0.66	0.233	1.67	0.140	1.00	1.00	0.140	No
92	18.40	342.85	165.79	177.06	0.66	0.231	1.67	0.139	1.00	1.00	0.139	No
93	18.60	346.75	167.75	179.00	0.65	0.230	1.67	0.138	1.00	1.00	0.138	No
94	18.80	350.66	169.71	180.94	0.65	0.228	1.67	0.137	1.00	1.00	0.137	No
95	19.00	354.57	171.68	182.89	0.64	0.226	1.67	0.136	1.00	1.00	0.136	No
96	19.20	358.51	173.64	184.88	0.64	0.225	1.67	0.135	1.00	1.00	0.135	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	362.46	175.60	186.86	0.63	0.223	1.67	0.134	1.00	1.00	0.134	No
98	19.60	366.42	177.56	188.86	0.63	0.221	1.67	0.133	1.00	1.00	0.133	No
99	19.80	370.38	179.52	190.85	0.62	0.220	1.67	0.132	1.00	1.00	0.132	No
100	20.00	374.35	181.49	192.86	0.62	0.218	1.67	0.131	1.00	1.00	0.131	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	1.64	2.98	10.56	0.99	32.81	6.47	212.38	4.000	No	Yes	2.00
2	0.40	4.26	2.27	2.77	0.72	85.03	1.84	156.87	4.000	No	No	2.00
3	0.60	3.05	2.44	3.55	0.79	60.77	2.50	152.23	4.000	No	No	2.00
4	0.80	2.89	2.46	3.53	0.79	57.43	2.57	147.84	4.000	No	No	2.00
5	1.00	3.15	2.40	3.13	0.77	62.72	2.29	143.93	4.000	No	No	2.00
6	1.20	3.62	2.30	2.64	0.74	71.92	1.95	140.41	4.000	No	No	2.00
7	1.40	2.71	2.45	3.17	0.80	53.67	2.52	135.03	4.000	No	No	2.00
8	1.60	2.38	2.53	3.61	0.83	47.06	3.38	159.00	0.454	No	No	2.00
9	1.80	2.06	2.57	3.56	0.84	40.45	4.46	180.61	4.000	No	No	2.00
10	2.00	1.77	2.62	3.59	0.87	34.56	6.29	217.44	4.000	No	No	2.00
11	2.20	1.15	2.79	3.84	0.93	22.14	4.68	103.59	1.056	No	Yes	2.00
12	2.40	0.92	2.93	4.84	0.98	17.56	5.99	105.21	0.837	No	Yes	2.00
13	2.60	0.99	2.87	4.17	0.96	18.79	5.37	100.86	0.897	No	Yes	2.00
14	2.80	1.09	2.85	4.42	0.96	20.68	5.23	108.09	0.987	No	Yes	2.00
15	3.00	1.26	2.76	3.81	0.92	24.02	4.44	106.70	1.146	No	Yes	2.00
16	3.20	1.33	2.74	3.86	0.92	25.38	4.33	109.91	1.211	No	Yes	2.00
17	3.40	1.37	2.71	3.51	0.90	26.10	4.05	105.75	1.245	No	Yes	2.00
18	3.60	1.33	2.72	3.61	0.91	25.38	4.18	106.08	1.211	No	Yes	2.00
19	3.80	1.30	2.72	3.45	0.91	24.66	4.16	102.47	1.176	No	Yes	2.00
20	4.00	1.17	2.81	4.15	0.94	22.03	4.88	107.56	1.051	No	Yes	2.00
21	4.20	1.05	2.85	4.04	0.96	19.24	5.21	100.27	0.918	No	Yes	2.00
22	4.40	0.92	2.92	4.28	0.99	16.47	5.86	96.57	0.786	No	Yes	2.00
23	4.60	0.92	2.88	3.52	0.97	15.82	5.48	86.63	0.755	No	Yes	2.00
24	4.80	0.98	2.92	4.37	0.99	16.70	5.87	98.04	0.797	No	Yes	2.00
25	5.00	1.18	2.91	5.08	0.98	19.72	5.75	113.38	0.941	No	Yes	2.00
26	5.20	1.42	2.91	6.18	0.99	23.19	5.81	134.65	1.106	No	Yes	2.00
27	5.40	1.55	2.91	6.52	0.99	24.73	5.77	142.69	1.180	No	Yes	2.00
28	5.60	1.71	2.88	6.48	0.98	26.56	5.54	147.06	1.267	No	Yes	2.00
29	5.80	1.81	2.86	6.13	0.97	27.22	5.30	144.33	1.298	No	Yes	2.00
30	6.00	1.88	2.84	5.89	0.97	27.48	5.17	141.99	1.311	No	Yes	2.00
31	6.20	1.73	2.87	5.67	0.98	24.47	5.39	131.98	1.167	No	Yes	2.00
32	6.40	1.44	2.95	5.93	1.00	19.76	6.20	122.47	0.942	No	Yes	2.00
33	6.60	1.18	3.06	6.49	1.00	15.43	7.38	113.87	0.736	No	Yes	2.00
34	6.80	1.11	3.09	6.61	1.00	14.09	7.80	109.97	0.672	No	Yes	2.00
35	7.00	1.15	3.08	6.40	1.00	14.23	7.65	108.87	0.679	No	Yes	2.00
36	7.20	1.25	3.00	5.26	1.00	15.25	6.73	102.71	0.728	No	Yes	2.00
37	7.40	1.35	2.94	4.56	1.00	16.23	6.09	98.87	0.774	No	Yes	2.00
38	7.60	1.48	2.85	3.65	0.98	17.45	5.25	91.67	0.832	No	Yes	2.00
39	7.80	1.45	2.86	3.50	0.98	16.66	5.29	88.22	0.795	No	Yes	2.00
40	8.00	1.32	2.91	3.61	1.00	14.78	5.77	85.24	0.705	No	Yes	2.00
41	8.20	1.09	3.02	4.14	1.00	11.69	7.01	81.99	0.558	No	Yes	2.00
42	8.40	1.07	3.09	5.00	1.00	11.07	7.84	86.82	0.528	No	Yes	2.00
43	8.60	1.10	3.13	5.89	1.00	11.21	8.35	93.63	0.535	No	Yes	2.00
44	8.80	1.23	3.11	6.10	1.00	12.48	8.02	100.13	0.595	No	Yes	2.00
45	9.00	1.27	3.11	6.20	1.00	12.66	8.02	101.51	0.604	No	Yes	2.00
46	9.20	1.31	3.11	6.29	1.00	12.83	8.02	102.83	0.612	No	Yes	2.00
47	9.40	1.31	3.11	6.28	1.00	12.63	8.07	101.94	0.602	No	Yes	2.00
48	9.60	1.41	3.07	5.80	1.00	13.43	7.54	101.30	0.640	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	1.80	2.94	5.02	1.00	17.32	6.14	106.38	0.826	No	Yes	2.00
50	10.00	2.89	2.67	3.38	0.92	28.15	8.57	241.24	4.000	No	No	2.00
51	10.20	5.67	2.28	1.85	0.77	55.86	1.87	104.61	0.186	No	No	1.01
52	10.40	7.83	2.07	1.28	0.69	76.69	1.40	107.36	0.195	No	No	1.06
53	10.60	10.12	1.94	1.09	0.64	98.39	1.23	120.81	0.244	No	No	1.33
54	10.80	10.77	1.90	1.02	0.63	103.64	1.19	123.60	0.256	No	No	1.40
55	11.00	11.59	1.89	1.03	0.62	110.42	1.18	129.90	0.284	No	No	1.56
56	11.20	12.42	1.82	0.88	0.60	117.24	1.12	131.73	0.293	No	No	1.62
57	11.40	13.90	1.76	0.79	0.57	130.28	1.08	140.12	0.336	No	No	1.87
58	11.60	13.90	1.76	0.79	0.58	128.91	1.08	138.98	0.330	No	No	1.84
59	11.80	13.24	1.82	0.90	0.60	121.16	1.12	135.71	0.312	No	No	1.75
60	12.00	11.77	1.90	1.02	0.63	105.94	1.19	125.57	0.264	No	No	1.49
61	12.20	13.09	1.81	0.84	0.60	117.29	1.11	130.51	0.287	No	No	1.63
62	12.40	14.40	1.75	0.76	0.58	128.41	1.07	137.71	0.323	No	No	1.84
63	12.60	14.40	1.75	0.76	0.58	127.14	1.07	136.64	0.317	No	No	1.82
64	12.80	14.56	1.78	0.82	0.59	127.16	1.09	138.50	0.327	No	No	1.89
65	13.00	16.52	1.70	0.72	0.56	144.13	1.04	149.39	0.390	No	No	2.00
66	13.20	19.14	1.63	0.67	0.53	166.77	1.00	166.77	4.000	No	No	2.00
67	13.40	20.45	1.59	0.63	0.52	177.44	1.00	177.44	4.000	No	No	2.00
68	13.60	20.78	1.56	0.57	0.51	179.35	1.00	179.35	4.000	No	No	2.00
69	13.80	19.47	1.61	0.61	0.53	165.79	1.00	165.79	4.000	No	No	2.00
70	14.00	18.17	1.63	0.60	0.54	152.91	1.00	152.91	0.413	No	No	2.00
71	14.20	16.22	1.73	0.74	0.58	133.50	1.06	141.20	0.342	No	No	2.00
72	14.40	16.88	1.68	0.65	0.56	138.63	1.03	142.21	0.347	No	No	2.00
73	14.60	16.88	1.71	0.71	0.57	136.98	1.04	143.08	0.352	No	No	2.00
74	14.80	15.57	1.77	0.77	0.59	124.21	1.08	134.41	0.306	No	No	1.90
75	15.00	12.30	1.92	0.98	0.65	94.76	1.21	114.73	0.220	No	No	1.38
76	15.20	10.84	2.01	1.11	0.69	81.40	1.31	106.82	0.193	No	No	1.22
77	15.40	10.84	2.01	1.11	0.69	80.59	1.32	106.14	0.191	No	No	1.22
78	15.60	13.13	1.89	0.92	0.64	98.97	1.18	116.73	0.228	No	No	1.47
79	15.80	14.60	1.82	0.82	0.62	110.49	1.12	124.18	0.258	No	No	1.67
80	16.00	15.58	1.78	0.77	0.61	117.84	1.09	129.00	0.280	No	No	1.83
81	16.20	16.57	1.77	0.78	0.60	124.68	1.08	135.24	0.310	No	No	2.00
82	16.40	18.86	1.69	0.69	0.57	143.10	1.03	147.22	0.377	No	No	2.00
83	16.60	20.82	1.62	0.62	0.55	158.75	1.00	158.75	0.452	No	No	2.00
84	16.80	21.80	1.60	0.59	0.54	165.94	1.00	165.94	4.000	No	No	2.00
85	17.00	18.21	1.72	0.71	0.59	134.12	1.05	140.87	0.340	No	No	2.00
86	17.20	15.28	1.84	0.85	0.63	108.73	1.14	123.48	0.255	No	No	1.76
87	17.40	13.32	1.91	0.91	0.66	92.44	1.20	110.77	0.206	No	No	1.43
88	17.60	14.63	1.85	0.82	0.64	102.11	1.15	116.94	0.229	No	No	1.60
89	17.80	14.30	1.84	0.77	0.64	99.11	1.14	112.98	0.214	No	No	1.51
90	18.00	13.65	1.90	0.88	0.66	92.59	1.19	110.32	0.205	No	No	1.46
91	18.20	13.00	1.94	0.93	0.68	86.68	1.23	106.42	0.192	No	No	1.38
92	18.40	13.98	1.92	0.93	0.67	93.10	1.20	112.11	0.211	No	No	1.52
93	18.60	14.31	1.88	0.84	0.66	95.31	1.17	111.59	0.209	No	No	1.52
94	18.80	15.29	1.84	0.79	0.64	102.16	1.14	116.03	0.225	No	No	1.65
95	19.00	17.26	1.76	0.70	0.61	116.83	1.08	125.96	0.266	No	No	1.96
96	19.20	20.21	1.68	0.64	0.58	138.79	1.02	142.05	0.347	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	21.20	1.65	0.61	0.57	145.69	1.00	146.11	0.370	No	No	2.00
98	19.60	23.16	1.59	0.56	0.55	160.52	1.00	160.52	4.000	No	No	2.00
99	19.80	24.46	1.56	0.53	0.54	170.05	1.00	170.05	4.000	No	No	2.00
100	20.00	28.71	1.45	0.45	0.50	204.08	1.00	204.08	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	2.00	0.00	9.20	0.20	0.00
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	2.00	0.00	5.00	0.20	0.00
10.20	1.01	0.00	4.90	0.20	0.00	10.40	1.06	0.00	4.80	0.20	0.00
10.60	1.33	0.00	4.70	0.20	0.00	10.80	1.40	0.00	4.60	0.20	0.00
11.00	1.56	0.00	4.50	0.20	0.00	11.20	1.62	0.00	4.40	0.20	0.00
11.40	1.87	0.00	4.30	0.20	0.00	11.60	1.84	0.00	4.20	0.20	0.00
11.80	1.75	0.00	4.10	0.20	0.00	12.00	1.49	0.00	4.00	0.20	0.00
12.20	1.63	0.00	3.90	0.20	0.00	12.40	1.84	0.00	3.80	0.20	0.00
12.60	1.82	0.00	3.70	0.20	0.00	12.80	1.89	0.00	3.60	0.20	0.00
13.00	2.00	0.00	3.50	0.20	0.00	13.20	2.00	0.00	3.40	0.20	0.00
13.40	2.00	0.00	3.30	0.20	0.00	13.60	2.00	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	2.00	0.00	2.70	0.20	0.00	14.80	1.90	0.00	2.60	0.20	0.00
15.00	1.38	0.00	2.50	0.20	0.00	15.20	1.22	0.00	2.40	0.20	0.00
15.40	1.22	0.00	2.30	0.20	0.00	15.60	1.47	0.00	2.20	0.20	0.00
15.80	1.67	0.00	2.10	0.20	0.00	16.00	1.83	0.00	2.00	0.20	0.00
16.20	2.00	0.00	1.90	0.20	0.00	16.40	2.00	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	2.00	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	1.76	0.00	1.40	0.20	0.00
17.40	1.43	0.00	1.30	0.20	0.00	17.60	1.60	0.00	1.20	0.20	0.00
17.80	1.51	0.00	1.10	0.20	0.00	18.00	1.46	0.00	1.00	0.20	0.00
18.20	1.38	0.00	0.90	0.20	0.00	18.40	1.52	0.00	0.80	0.20	0.00
18.60	1.52	0.00	0.70	0.20	0.00	18.80	1.65	0.00	0.60	0.20	0.00
19.00	1.96	0.00	0.50	0.20	0.00	19.20	2.00	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	2.00	0.00	0.30	0.20	0.00	19.60	2.00	0.00	0.20	0.20	0.00
19.80	2.00	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 0.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

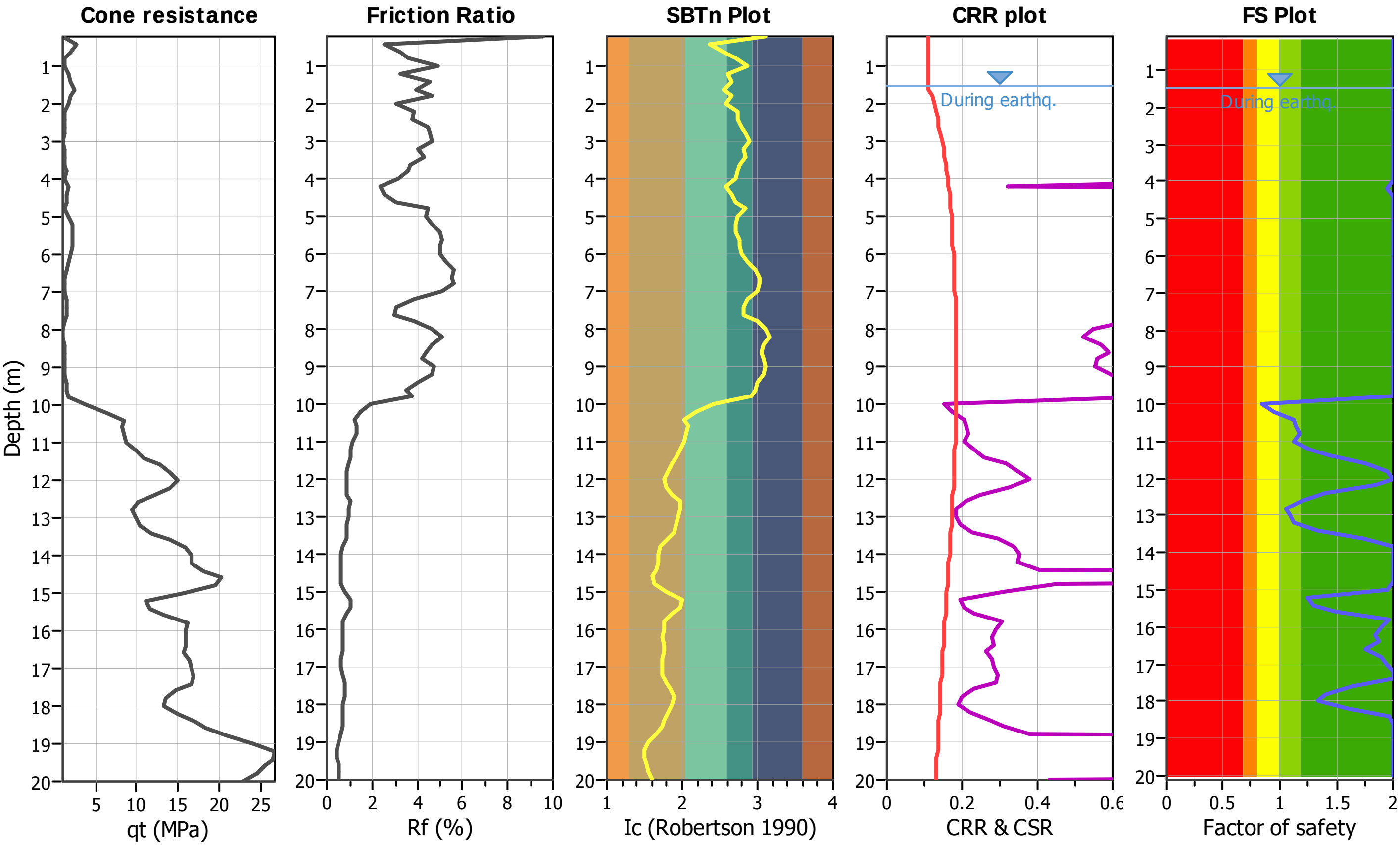
LIQUEFACTION ANALYSIS REPORT

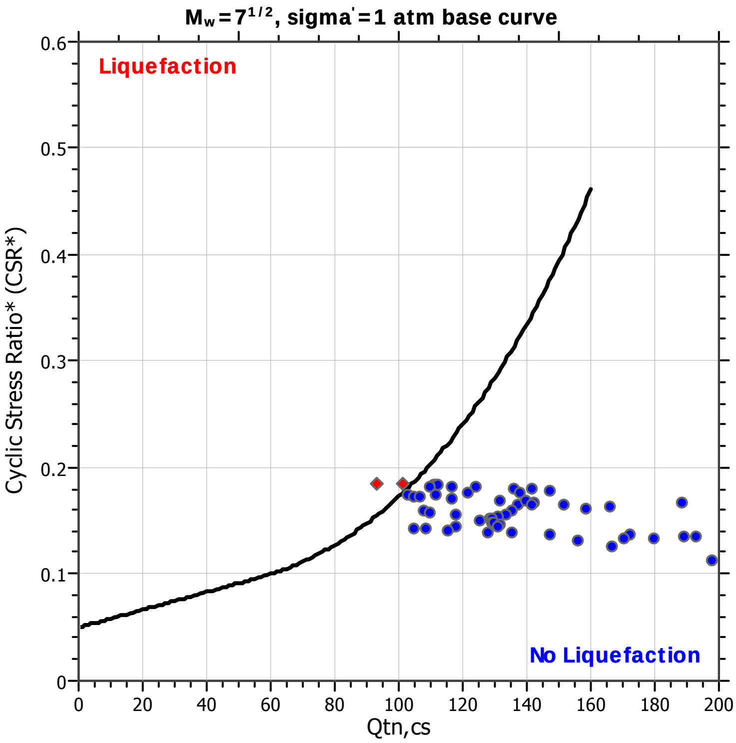
Project title : **Location :**

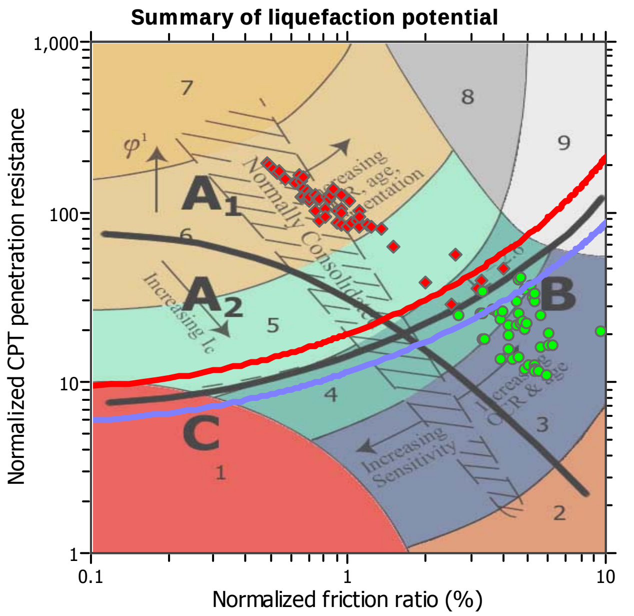
CPT file : CPT03

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude M_w:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	No		

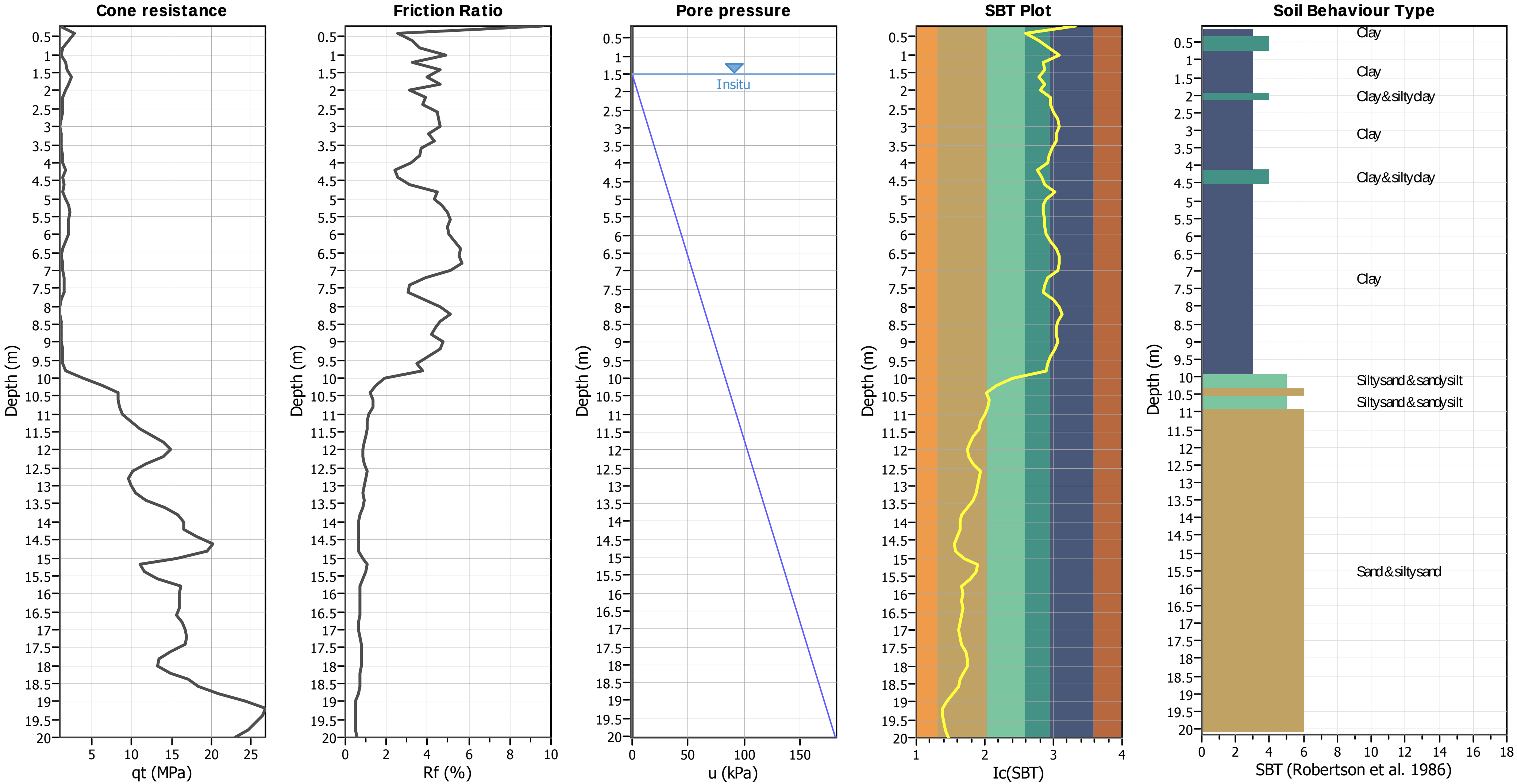






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



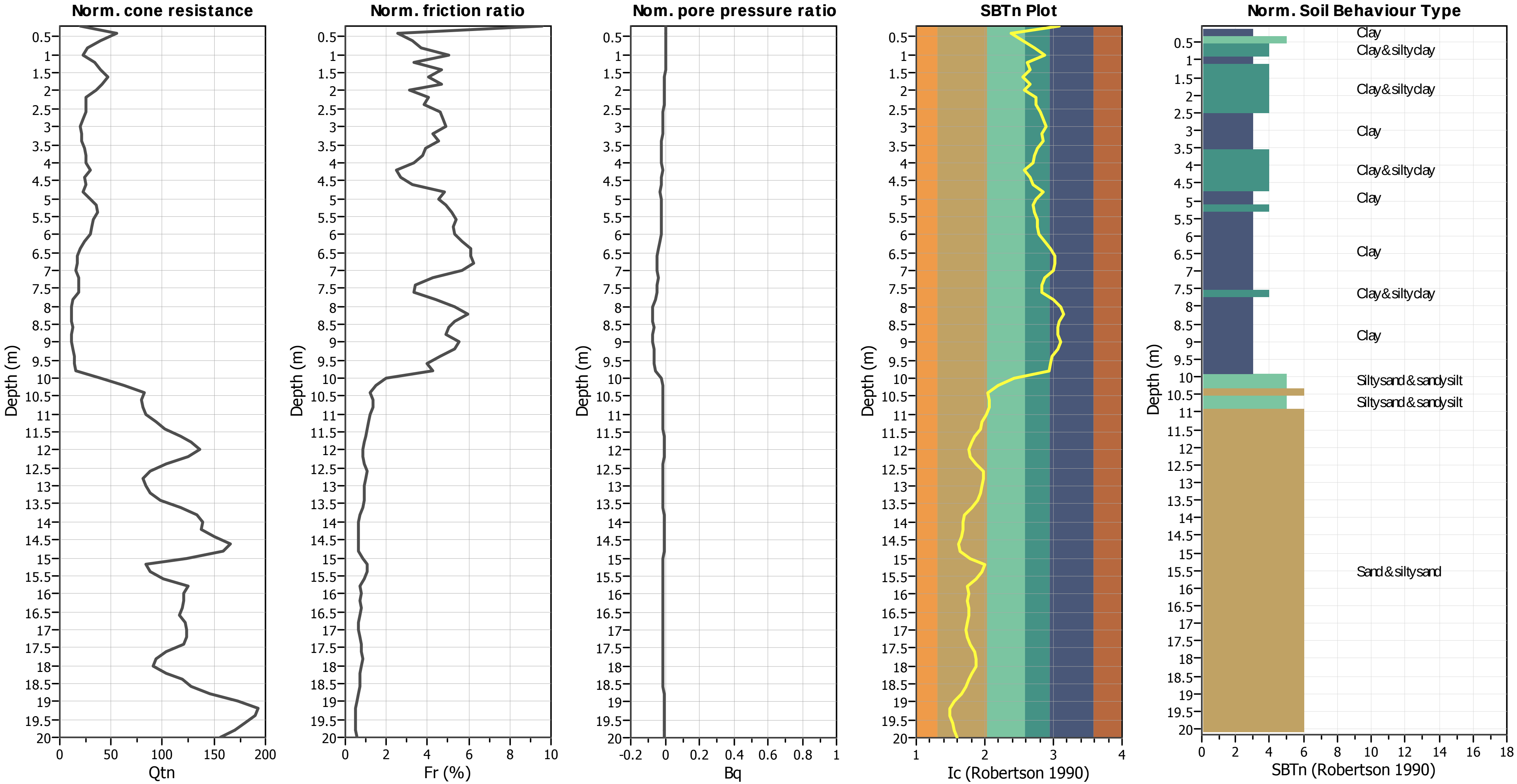
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

SBT 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

CPT basic interpretation plots (normalized)



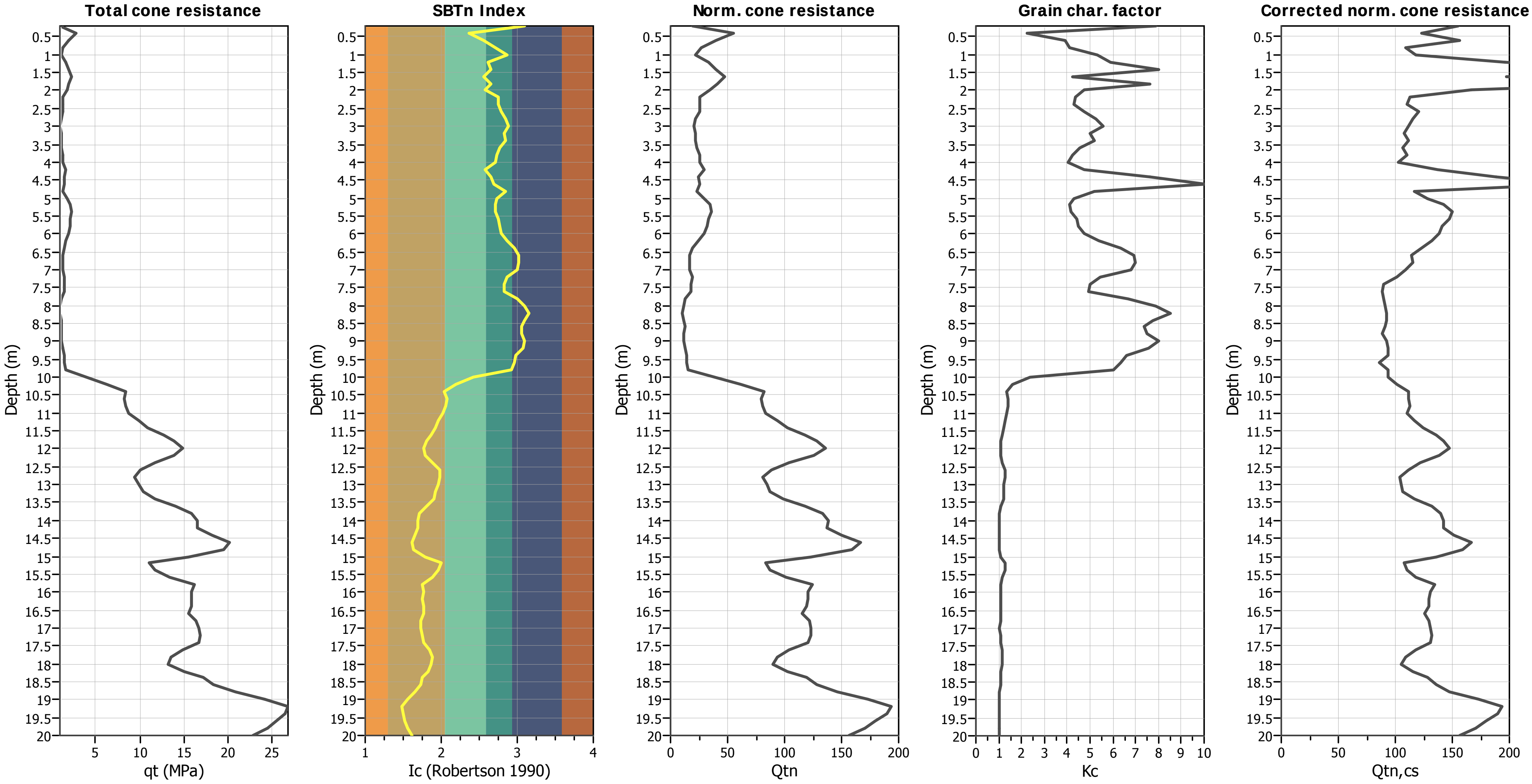
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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

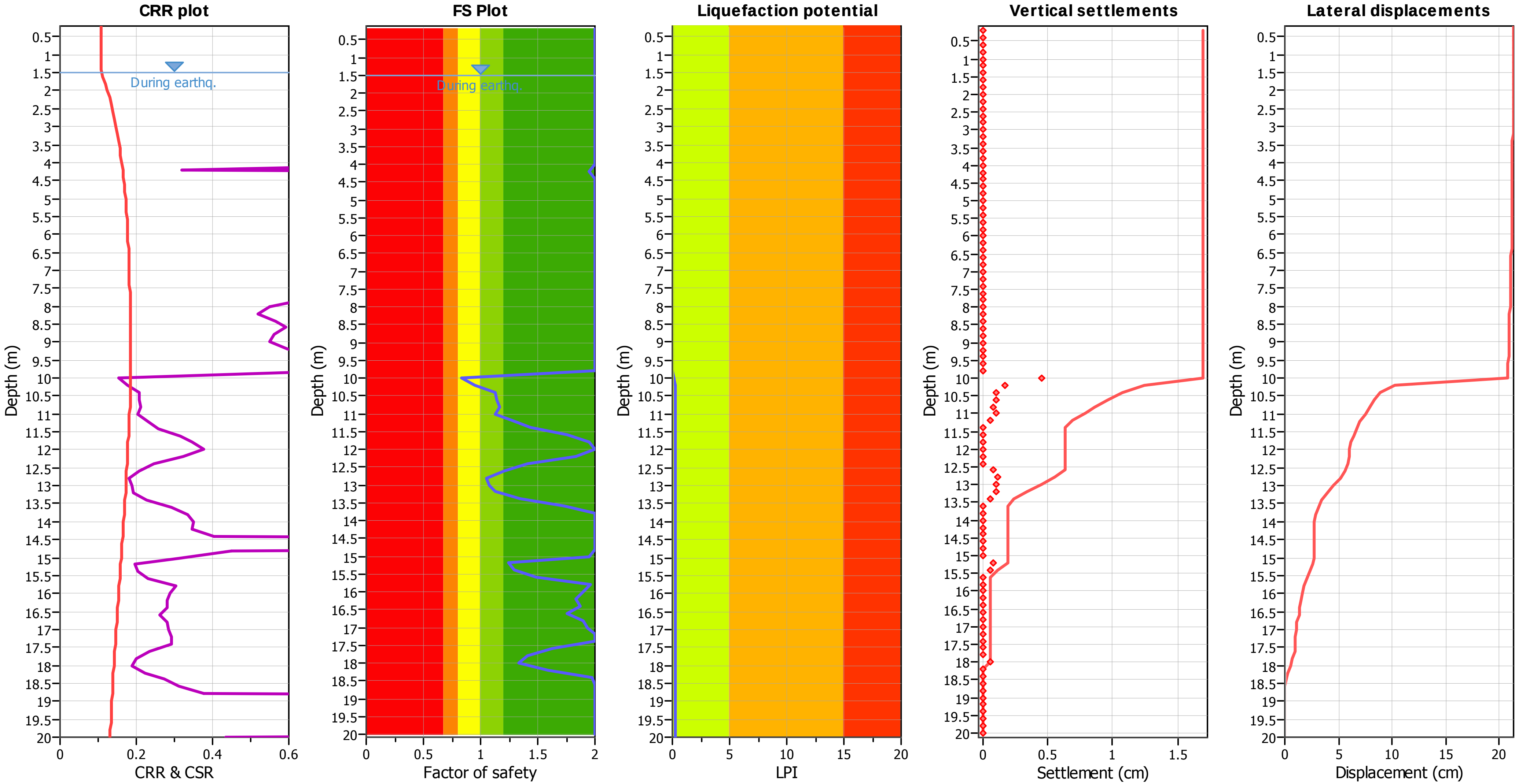
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

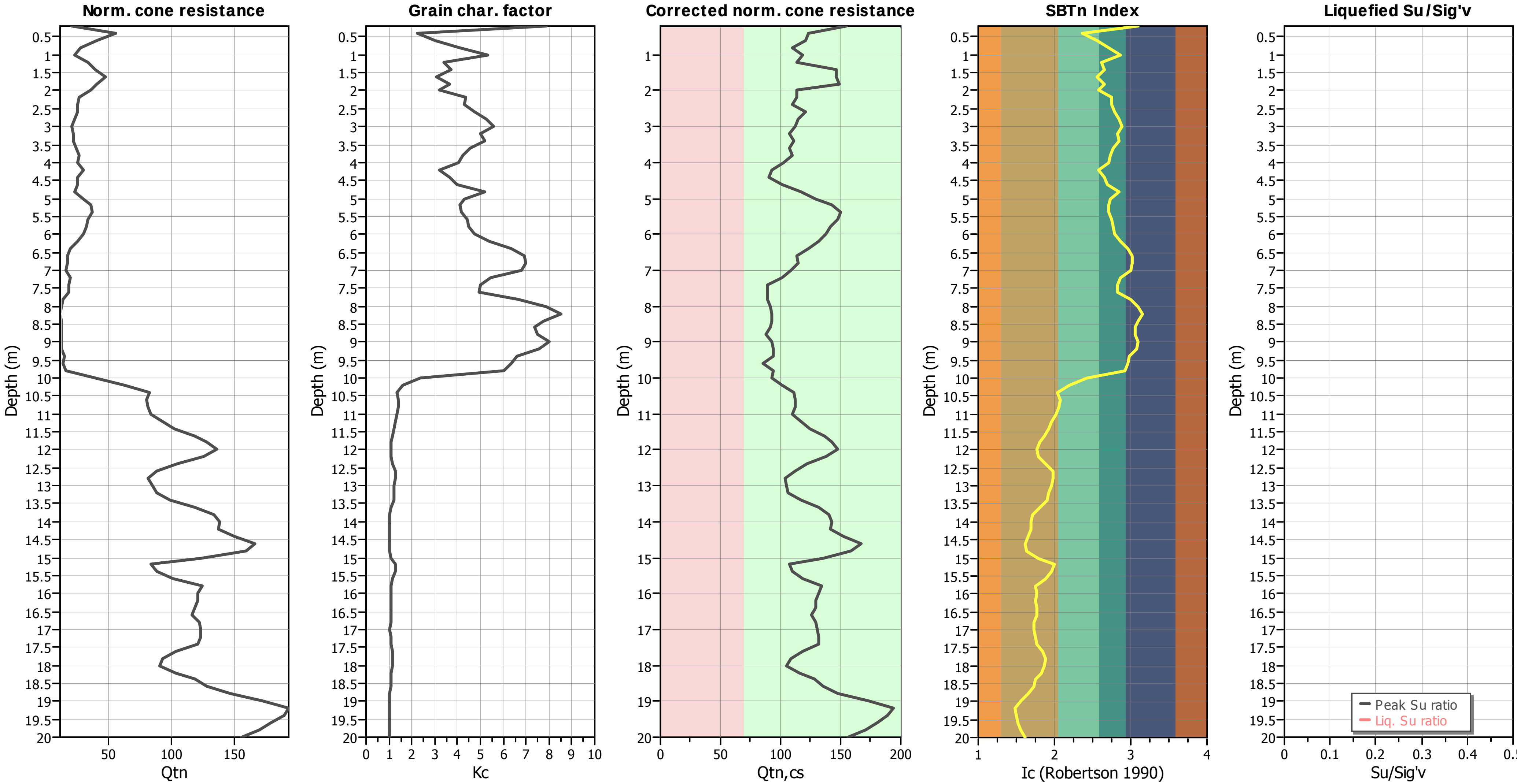
F.S. color scheme

- 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 (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	98.07	0.00	65.13	18.23
2	0.40	2.95	88.26	0.00	25.40	18.30
3	0.60	2.46	39.23	0.00	33.03	18.07
4	0.80	0.60	68.65	0.00	41.16	17.59
5	1.00	0.99	39.23	0.00	49.71	17.66
6	1.20	1.79	58.84	0.00	35.98	17.82
7	1.40	2.29	68.65	0.00	38.42	18.45
8	1.60	1.89	147.10	0.00	33.50	18.56
9	1.80	2.97	68.65	0.00	38.07	18.51
10	2.00	1.30	68.65	0.00	34.36	17.84
11	2.20	1.12	29.42	0.00	42.97	17.66
12	2.40	1.61	58.84	0.00	42.81	17.58
13	2.60	1.22	58.84	0.00	45.88	17.78
14	2.80	1.12	58.84	0.00	48.96	17.60
15	3.00	1.12	39.23	0.00	51.20	17.49
16	3.20	0.94	49.03	0.00	47.58	17.44
17	3.40	1.33	49.03	0.00	48.64	17.52
18	3.60	1.14	49.03	0.00	44.49	17.47
19	3.80	1.24	39.23	0.00	42.08	17.59
20	4.00	1.73	58.84	0.00	40.85	17.42
21	4.20	1.05	29.42	0.00	34.33	17.40
22	4.40	2.13	29.42	0.00	38.07	17.25
23	4.60	1.05	49.03	0.00	40.34	17.54
24	4.80	1.25	58.84	0.00	48.64	17.78
25	5.00	1.64	68.65	0.00	42.63	18.24
26	5.20	2.53	107.87	0.00	41.08	18.60
27	5.40	2.33	127.49	0.00	41.51	18.76
28	5.60	2.04	107.87	0.00	43.48	18.71
29	5.80	2.14	98.07	0.00	44.03	18.63
30	6.00	2.14	107.87	0.00	45.56	18.57
31	6.20	1.76	98.07	0.00	50.00	18.40
32	6.40	1.27	68.65	0.00	56.10	18.14
33	6.60	1.18	68.65	0.00	59.70	17.94
34	6.80	1.27	68.65	0.00	60.07	18.00
35	7.00	1.37	78.45	0.00	58.72	17.90
36	7.20	1.19	49.03	0.00	50.29	17.84
37	7.40	1.97	49.03	0.00	47.54	17.54
38	7.60	1.28	39.23	0.00	47.18	17.55
39	7.80	1.28	49.03	0.00	57.89	17.46
40	8.00	0.99	49.03	0.00	65.35	17.49
41	8.20	0.90	49.03	0.00	68.79	17.56
42	8.40	1.20	58.84	0.00	64.55	17.59
43	8.60	1.29	49.03	0.00	62.34	17.61
44	8.80	1.10	49.03	0.00	63.06	17.53
45	9.00	1.10	49.03	0.00	65.81	17.67
46	9.20	1.31	68.65	0.00	63.19	17.77
47	9.40	1.41	58.84	0.00	57.73	17.82
48	9.60	1.61	49.03	0.00	56.01	17.60

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	1.22	39.23	0.00	53.94	17.93
50	10.00	2.10	98.07	0.00	27.14	18.49
51	10.20	8.48	88.26	0.00	18.45	18.89
52	10.40	8.19	88.26	0.00	13.87	19.12
53	10.60	8.48	127.49	0.00	14.86	19.19
54	10.80	7.99	107.87	0.00	14.73	19.23
55	11.00	8.88	98.07	0.00	13.43	19.14
56	11.20	9.48	98.07	0.00	11.94	19.26
57	11.40	11.44	127.49	0.00	11.11	19.40
58	11.60	11.94	127.49	0.00	9.46	19.55
59	11.80	14.88	127.49	0.00	8.33	19.58
60	12.00	14.88	127.49	0.00	7.50	19.60
61	12.20	14.89	127.49	0.00	7.99	19.49
62	12.40	11.94	98.07	0.00	9.87	19.32
63	12.60	8.51	98.07	0.00	12.34	19.27
64	12.80	9.98	127.49	0.00	12.36	19.05
65	13.00	9.98	49.03	0.00	11.72	19.07
66	13.20	9.80	98.07	0.00	11.03	19.09
67	13.40	11.46	127.49	0.00	10.36	19.32
68	13.60	13.92	98.07	0.00	8.32	19.49
69	13.80	16.86	127.49	0.00	6.32	19.44
70	14.00	16.86	98.07	0.00	5.89	19.45
71	14.20	15.90	98.07	0.00	5.94	19.45
72	14.40	16.88	127.49	0.00	5.33	19.59
73	14.60	21.78	127.49	0.00	4.64	19.72
74	14.80	21.78	127.49	0.00	5.05	19.71
75	15.00	14.92	127.49	0.00	7.91	19.62
76	15.20	10.02	127.49	0.00	12.90	19.40
77	15.40	8.06	98.07	0.00	11.98	19.42
78	15.60	16.89	127.49	0.00	9.93	19.47
79	15.80	14.93	127.49	0.00	7.13	19.55
80	16.00	16.89	98.07	0.00	7.46	19.54
81	16.20	15.92	127.49	0.00	7.02	19.44
82	16.40	14.94	98.07	0.00	7.58	19.54
83	16.60	16.90	127.49	0.00	7.42	19.43
84	16.80	14.94	98.07	0.00	6.80	19.45
85	17.00	17.39	98.07	0.00	6.60	19.46
86	17.20	17.90	127.49	0.00	7.01	19.56
87	17.40	15.45	127.49	0.00	7.66	19.65
88	17.60	16.92	127.49	0.00	9.03	19.51
89	17.80	12.01	98.07	0.00	9.95	19.37
90	18.00	11.52	98.07	0.00	9.79	19.26
91	18.20	15.95	98.07	0.00	8.51	19.41
92	18.40	17.42	127.49	0.00	7.21	19.57
93	18.60	17.91	127.49	0.00	6.74	19.69
94	18.80	19.87	127.49	0.00	5.23	19.73
95	19.00	24.77	127.49	0.00	3.66	19.79
96	19.20	27.73	127.49	0.00	2.69	19.83

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	27.73	127.49	0.00	2.83	19.83
98	19.60	23.81	127.49	0.00	3.24	19.81
99	19.80	24.79	127.49	0.00	3.67	19.80
100	20.00	21.85	127.49	0.00	4.46	19.77

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.65	0.00	3.65	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
2	0.40	7.31	0.00	7.31	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
3	0.60	10.92	0.00	10.92	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
4	0.80	14.44	0.00	14.44	1.00	0.181	1.67	0.109	1.00	1.00	2.000	No
5	1.00	17.97	0.00	17.97	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
6	1.20	21.53	0.00	21.53	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
7	1.40	25.22	0.00	25.22	0.99	0.180	1.67	0.108	1.00	1.00	2.000	No
8	1.60	28.93	0.98	27.95	0.99	0.186	1.67	0.112	1.00	1.00	0.112	No
9	1.80	32.64	2.94	29.69	0.99	0.198	1.67	0.118	1.00	1.00	0.118	No
10	2.00	36.20	4.91	31.30	0.99	0.208	1.67	0.125	1.00	1.00	0.125	No
11	2.20	39.73	6.87	32.87	0.99	0.217	1.67	0.130	1.00	1.00	0.130	No
12	2.40	43.25	8.83	34.42	0.98	0.225	1.67	0.135	1.00	1.00	0.135	No
13	2.60	46.81	10.79	36.02	0.98	0.232	1.67	0.139	1.00	1.00	0.139	No
14	2.80	50.33	12.75	37.57	0.98	0.239	1.67	0.143	1.00	1.00	0.143	No
15	3.00	53.83	14.71	39.11	0.98	0.245	1.67	0.147	1.00	1.00	0.147	No
16	3.20	57.31	16.68	40.64	0.98	0.251	1.67	0.150	1.00	1.00	0.150	No
17	3.40	60.82	18.64	42.18	0.98	0.256	1.67	0.154	1.00	1.00	0.154	No
18	3.60	64.31	20.60	43.71	0.98	0.261	1.67	0.157	1.00	1.00	0.157	No
19	3.80	67.83	22.56	45.27	0.97	0.266	1.67	0.159	1.00	1.00	0.159	No
20	4.00	71.31	24.52	46.79	0.97	0.270	1.67	0.162	1.00	1.00	0.162	No
21	4.20	74.79	26.49	48.31	0.97	0.274	1.67	0.164	1.00	1.00	0.164	No
22	4.40	78.24	28.45	49.79	0.97	0.277	1.67	0.166	1.00	1.00	0.166	No
23	4.60	81.75	30.41	51.34	0.97	0.281	1.67	0.168	1.00	1.00	0.168	No
24	4.80	85.31	32.37	52.93	0.97	0.284	1.67	0.170	1.00	1.00	0.170	No
25	5.00	88.95	34.34	54.62	0.97	0.286	1.67	0.172	1.00	1.00	0.172	No
26	5.20	92.67	36.30	56.38	0.96	0.288	1.67	0.173	1.00	1.00	0.173	No
27	5.40	96.43	38.26	58.17	0.96	0.290	1.67	0.174	1.00	1.00	0.174	No
28	5.60	100.17	40.22	59.95	0.96	0.292	1.67	0.175	1.00	1.00	0.175	No
29	5.80	103.89	42.18	61.71	0.96	0.294	1.67	0.176	1.00	1.00	0.176	No
30	6.00	107.61	44.15	63.46	0.96	0.296	1.67	0.177	1.00	1.00	0.177	No
31	6.20	111.29	46.11	65.18	0.96	0.297	1.67	0.178	1.00	1.00	0.178	No
32	6.40	114.92	48.07	66.85	0.95	0.299	1.67	0.179	1.00	1.00	0.179	No
33	6.60	118.51	50.03	68.47	0.95	0.300	1.67	0.180	1.00	1.00	0.180	No
34	6.80	122.11	51.99	70.11	0.95	0.301	1.67	0.181	1.00	1.00	0.181	No
35	7.00	125.69	53.95	71.73	0.95	0.302	1.67	0.181	1.00	1.00	0.181	No
36	7.20	129.25	55.92	73.34	0.95	0.304	1.67	0.182	1.00	1.00	0.182	No
37	7.40	132.76	57.88	74.88	0.94	0.305	1.67	0.183	1.00	1.00	0.183	No
38	7.60	136.27	59.84	76.43	0.94	0.306	1.67	0.183	1.00	1.00	0.183	No
39	7.80	139.76	61.80	77.96	0.94	0.307	1.67	0.184	1.00	1.00	0.184	No
40	8.00	143.26	63.77	79.50	0.94	0.307	1.67	0.184	1.00	1.00	0.184	No
41	8.20	146.77	65.73	81.05	0.93	0.308	1.67	0.185	1.00	1.00	0.185	No
42	8.40	150.29	67.69	82.60	0.93	0.309	1.67	0.185	1.00	1.00	0.185	No
43	8.60	153.81	69.65	84.16	0.93	0.309	1.67	0.185	1.00	1.00	0.185	No
44	8.80	157.32	71.61	85.71	0.93	0.309	1.67	0.185	1.00	1.00	0.185	No
45	9.00	160.85	73.58	87.28	0.92	0.310	1.67	0.186	1.00	1.00	0.186	No
46	9.20	164.41	75.54	88.87	0.92	0.310	1.67	0.186	1.00	1.00	0.186	No
47	9.40	167.97	77.50	90.47	0.92	0.310	1.67	0.186	1.00	1.00	0.186	No
48	9.60	171.49	79.46	92.03	0.91	0.310	1.67	0.186	1.00	1.00	0.186	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.08	81.42	93.66	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No
50	10.00	178.78	83.39	95.39	0.90	0.309	1.67	0.185	1.00	1.00	0.185	No
51	10.20	182.56	85.35	97.21	0.90	0.308	1.67	0.185	1.00	1.00	0.185	No
52	10.40	186.38	87.31	99.07	0.90	0.307	1.67	0.184	1.00	1.00	0.184	No
53	10.60	190.22	89.27	100.95	0.89	0.306	1.67	0.183	1.00	1.00	0.183	No
54	10.80	194.06	91.23	102.83	0.89	0.305	1.67	0.183	1.00	1.00	0.183	No
55	11.00	197.89	93.19	104.70	0.88	0.304	1.67	0.182	1.00	1.00	0.182	No
56	11.20	201.74	95.16	106.59	0.88	0.302	1.67	0.181	1.00	1.00	0.181	No
57	11.40	205.62	97.12	108.50	0.87	0.301	1.67	0.180	1.00	1.00	0.180	No
58	11.60	209.53	99.08	110.45	0.87	0.300	1.67	0.180	1.00	1.00	0.180	No
59	11.80	213.45	101.04	112.40	0.86	0.298	1.67	0.179	1.00	1.00	0.179	No
60	12.00	217.37	103.00	114.36	0.86	0.296	1.67	0.178	1.00	1.00	0.178	No
61	12.20	221.26	104.97	116.30	0.85	0.295	1.67	0.177	1.00	1.00	0.177	No
62	12.40	225.13	106.93	118.20	0.84	0.293	1.67	0.176	1.00	1.00	0.176	No
63	12.60	228.98	108.89	120.09	0.84	0.291	1.67	0.175	1.00	1.00	0.175	No
64	12.80	232.79	110.85	121.94	0.83	0.289	1.67	0.173	1.00	1.00	0.173	No
65	13.00	236.61	112.81	123.79	0.83	0.288	1.67	0.172	1.00	1.00	0.172	No
66	13.20	240.42	114.78	125.65	0.82	0.286	1.67	0.171	1.00	1.00	0.171	No
67	13.40	244.29	116.74	127.55	0.81	0.284	1.67	0.170	1.00	1.00	0.170	No
68	13.60	248.19	118.70	129.49	0.81	0.282	1.67	0.169	1.00	1.00	0.169	No
69	13.80	252.07	120.66	131.41	0.80	0.280	1.67	0.168	1.00	1.00	0.168	No
70	14.00	255.96	122.63	133.34	0.79	0.277	1.67	0.166	1.00	1.00	0.166	No
71	14.20	259.85	124.59	135.27	0.79	0.275	1.67	0.165	1.00	1.00	0.165	No
72	14.40	263.77	126.55	137.22	0.78	0.273	1.67	0.164	1.00	1.00	0.164	No
73	14.60	267.72	128.51	139.21	0.77	0.271	1.67	0.162	1.00	1.00	0.162	No
74	14.80	271.66	130.47	141.19	0.77	0.269	1.67	0.161	1.00	1.00	0.161	No
75	15.00	275.58	132.44	143.15	0.76	0.267	1.67	0.160	1.00	1.00	0.160	No
76	15.20	279.46	134.40	145.07	0.75	0.264	1.67	0.158	1.00	1.00	0.158	No
77	15.40	283.35	136.36	146.99	0.75	0.262	1.67	0.157	1.00	1.00	0.157	No
78	15.60	287.24	138.32	148.92	0.74	0.260	1.67	0.156	1.00	1.00	0.156	No
79	15.80	291.15	140.28	150.87	0.73	0.258	1.67	0.155	1.00	1.00	0.155	No
80	16.00	295.06	142.25	152.81	0.73	0.256	1.67	0.153	1.00	1.00	0.153	No
81	16.20	298.94	144.21	154.74	0.72	0.254	1.67	0.152	1.00	1.00	0.152	No
82	16.40	302.85	146.17	156.68	0.71	0.251	1.67	0.151	1.00	1.00	0.151	No
83	16.60	306.74	148.13	158.61	0.71	0.249	1.67	0.149	1.00	1.00	0.149	No
84	16.80	310.63	150.09	160.54	0.70	0.247	1.67	0.148	1.00	1.00	0.148	No
85	17.00	314.52	152.06	162.47	0.70	0.245	1.67	0.147	1.00	1.00	0.147	No
86	17.20	318.43	154.02	164.42	0.69	0.243	1.67	0.146	1.00	1.00	0.146	No
87	17.40	322.36	155.98	166.38	0.68	0.241	1.67	0.145	1.00	1.00	0.145	No
88	17.60	326.26	157.94	168.32	0.68	0.239	1.67	0.143	1.00	1.00	0.143	No
89	17.80	330.14	159.90	170.24	0.67	0.237	1.67	0.142	1.00	1.00	0.142	No
90	18.00	333.99	161.87	172.13	0.67	0.236	1.67	0.141	1.00	1.00	0.141	No
91	18.20	337.87	163.83	174.05	0.66	0.234	1.67	0.140	1.00	1.00	0.140	No
92	18.40	341.79	165.79	176.00	0.66	0.232	1.67	0.139	1.00	1.00	0.139	No
93	18.60	345.72	167.75	177.97	0.65	0.230	1.67	0.138	1.00	1.00	0.138	No
94	18.80	349.67	169.71	179.96	0.65	0.228	1.67	0.137	1.00	1.00	0.137	No
95	19.00	353.63	171.68	181.95	0.64	0.227	1.67	0.136	1.00	1.00	0.136	No
96	19.20	357.60	173.64	183.96	0.64	0.225	1.67	0.135	1.00	1.00	0.135	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	361.56	175.60	185.96	0.63	0.223	1.67	0.134	1.00	1.00	0.134	No
98	19.60	365.52	177.56	187.96	0.63	0.222	1.67	0.133	1.00	1.00	0.133	No
99	19.80	369.48	179.52	189.96	0.62	0.220	1.67	0.132	1.00	1.00	0.132	No
100	20.00	373.44	181.49	191.95	0.62	0.219	1.67	0.131	1.00	1.00	0.131	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	0.99	3.10	9.60	1.00	19.74	7.87	155.27	4.000	No	Yes	2.00
2	0.40	2.79	2.37	2.59	0.76	55.62	2.21	123.08	4.000	No	No	2.00
3	0.60	2.00	2.55	3.28	0.83	39.85	3.94	156.94	4.000	No	No	2.00
4	0.80	1.35	2.71	3.67	0.89	26.70	4.09	109.31	4.000	No	Yes	2.00
5	1.00	1.13	2.86	5.01	0.95	22.19	5.34	118.58	4.000	No	Yes	2.00
6	1.20	1.69	2.61	3.33	0.86	33.37	5.87	195.77	4.000	No	No	2.00
7	1.40	1.99	2.66	4.66	0.88	39.32	7.99	314.03	4.000	No	No	2.00
8	1.60	2.38	2.56	4.03	0.84	47.08	4.21	198.07	4.000	No	No	2.00
9	1.80	2.06	2.65	4.69	0.88	40.47	7.65	309.47	4.000	No	No	2.00
10	2.00	1.80	2.58	3.15	0.85	35.23	4.73	166.74	4.000	No	No	2.00
11	2.20	1.34	2.75	4.01	0.91	26.07	4.35	113.33	1.244	No	Yes	2.00
12	2.40	1.31	2.74	3.86	0.91	25.41	4.32	109.90	1.212	No	Yes	2.00
13	2.60	1.31	2.80	4.64	0.93	25.34	4.77	120.83	1.209	No	Yes	2.00
14	2.80	1.15	2.85	4.75	0.95	22.01	5.23	115.06	1.050	No	Yes	2.00
15	3.00	1.06	2.89	4.88	0.97	20.10	5.57	112.06	0.959	No	Yes	2.00
16	3.20	1.13	2.83	4.26	0.95	21.47	5.02	107.79	1.024	No	Yes	2.00
17	3.40	1.14	2.85	4.55	0.96	21.54	5.18	111.56	1.027	No	Yes	2.00
18	3.60	1.24	2.77	3.91	0.93	23.43	4.56	106.96	1.118	No	Yes	2.00
19	3.80	1.37	2.73	3.78	0.91	25.98	4.22	109.64	1.239	No	Yes	2.00
20	4.00	1.34	2.71	3.36	0.90	25.17	4.05	101.93	1.201	No	Yes	2.00
21	4.20	1.63	2.58	2.52	0.86	29.11	4.72	137.27	0.321	No	No	1.95
22	4.40	1.41	2.65	2.70	0.89	24.68	7.65	188.72	4.000	No	No	2.00
23	4.60	1.47	2.70	3.29	0.90	25.44	10.05	255.61	4.000	No	No	2.00
24	4.80	1.31	2.85	4.80	0.96	22.58	5.18	116.95	1.077	No	Yes	2.00
25	5.00	1.80	2.74	4.57	0.92	29.96	4.30	128.79	1.429	No	Yes	2.00
26	5.20	2.17	2.71	4.88	0.91	34.99	4.08	142.82	1.669	No	Yes	2.00
27	5.40	2.30	2.72	5.19	0.92	36.21	4.14	149.99	1.727	No	Yes	2.00
28	5.60	2.17	2.76	5.37	0.93	33.33	4.42	147.27	1.590	No	Yes	2.00
29	5.80	2.11	2.77	5.23	0.93	31.43	4.50	141.38	1.499	No	Yes	2.00
30	6.00	2.01	2.79	5.32	0.95	29.30	4.72	138.32	1.398	No	Yes	2.00
31	6.20	1.73	2.87	5.67	0.98	24.51	5.39	132.09	1.169	No	Yes	2.00
32	6.40	1.41	2.96	6.08	1.00	19.31	6.35	122.67	0.921	No	Yes	2.00
33	6.60	1.24	3.02	6.11	1.00	16.41	6.95	114.00	0.783	No	Yes	2.00
34	6.80	1.27	3.02	6.24	1.00	16.44	7.01	115.24	0.784	No	Yes	2.00
35	7.00	1.28	3.00	5.67	1.00	16.07	6.78	109.01	0.766	No	Yes	2.00
36	7.20	1.51	2.87	4.26	0.98	18.72	5.43	101.70	0.893	No	Yes	2.00
37	7.40	1.48	2.83	3.39	0.96	17.82	5.01	89.36	0.850	No	Yes	2.00
38	7.60	1.51	2.82	3.32	0.96	17.84	4.96	88.50	0.851	No	Yes	2.00
39	7.80	1.19	2.99	4.37	1.00	13.43	6.65	89.24	0.641	No	Yes	2.00
40	8.00	1.06	3.10	5.35	1.00	11.52	7.90	91.04	0.549	No	Yes	2.00
41	8.20	1.03	3.14	5.93	1.00	10.89	8.50	92.60	0.519	No	Yes	2.00
42	8.40	1.13	3.09	5.33	1.00	11.87	7.77	92.17	0.566	No	Yes	2.00
43	8.60	1.20	3.06	5.02	1.00	12.38	7.39	91.51	0.591	No	Yes	2.00
44	8.80	1.16	3.07	4.87	1.00	11.74	7.51	88.17	0.560	No	Yes	2.00
45	9.00	1.17	3.10	5.51	1.00	11.56	7.98	92.31	0.552	No	Yes	2.00
46	9.20	1.27	3.07	5.30	1.00	12.49	7.53	94.11	0.596	No	Yes	2.00
47	9.40	1.44	2.99	4.61	1.00	14.11	6.62	93.40	0.673	No	Yes	2.00
48	9.60	1.41	2.96	3.95	1.00	13.48	6.34	85.45	0.643	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	1.64	2.93	4.24	1.00	15.65	6.01	94.00	0.747	No	Yes	2.00
50	10.00	3.93	2.42	2.00	0.82	39.02	2.39	93.09	0.155	No	No	0.84
51	10.20	6.26	2.18	1.51	0.73	62.01	1.63	100.95	0.176	No	No	0.95
52	10.40	8.38	2.03	1.24	0.67	82.50	1.35	111.07	0.207	No	No	1.13
53	10.60	8.22	2.07	1.34	0.69	79.79	1.40	111.67	0.209	No	No	1.14
54	10.80	8.45	2.06	1.35	0.69	80.99	1.39	112.78	0.213	No	No	1.17
55	11.00	8.78	2.02	1.18	0.67	83.25	1.32	110.19	0.204	No	No	1.12
56	11.20	9.93	1.96	1.11	0.65	93.37	1.25	117.01	0.229	No	No	1.26
57	11.40	10.95	1.93	1.09	0.64	102.02	1.22	124.21	0.258	No	No	1.43
58	11.60	12.75	1.86	1.02	0.61	118.00	1.15	136.12	0.315	No	No	1.75
59	11.80	13.90	1.81	0.93	0.60	127.62	1.11	142.15	0.347	No	No	1.94
60	12.00	14.88	1.77	0.87	0.58	135.62	1.09	147.20	0.377	No	No	2.00
61	12.20	13.90	1.79	0.86	0.59	125.12	1.10	137.89	0.324	No	No	1.83
62	12.40	11.78	1.88	0.93	0.62	104.09	1.17	121.65	0.247	No	No	1.41
63	12.60	10.15	1.98	1.09	0.66	87.83	1.27	111.64	0.209	No	No	1.20
64	12.80	9.49	1.98	0.99	0.66	81.16	1.27	103.24	0.182	No	No	1.05
65	13.00	9.92	1.95	0.95	0.66	84.18	1.24	104.69	0.187	No	No	1.08
66	13.20	10.41	1.93	0.90	0.65	87.78	1.21	106.58	0.193	No	No	1.12
67	13.40	11.73	1.90	0.94	0.64	98.32	1.19	116.78	0.228	No	No	1.34
68	13.60	14.08	1.81	0.85	0.60	118.32	1.11	131.75	0.293	No	No	1.73
69	13.80	15.88	1.71	0.69	0.57	133.81	1.05	139.85	0.334	No	No	2.00
70	14.00	16.54	1.69	0.66	0.56	138.60	1.03	142.69	0.350	No	No	2.00
71	14.20	16.54	1.69	0.66	0.56	137.42	1.03	141.75	0.345	No	No	2.00
72	14.40	18.18	1.66	0.66	0.55	150.59	1.01	151.84	0.406	No	No	2.00
73	14.60	20.15	1.62	0.64	0.54	166.51	1.00	166.51	4.000	No	No	2.00
74	14.80	19.49	1.64	0.66	0.55	159.23	1.00	158.73	0.452	No	No	2.00
75	15.00	15.57	1.79	0.83	0.60	123.19	1.10	135.45	0.311	No	No	1.95
76	15.20	11.00	2.00	1.10	0.68	83.12	1.30	107.85	0.197	No	No	1.24
77	15.40	11.66	1.96	1.03	0.67	87.81	1.25	110.20	0.204	No	No	1.30
78	15.60	13.29	1.88	0.90	0.64	100.75	1.17	117.97	0.233	No	No	1.49
79	15.80	16.23	1.75	0.74	0.59	124.92	1.07	134.05	0.304	No	No	1.97
80	16.00	15.91	1.77	0.75	0.60	121.06	1.08	131.26	0.290	No	No	1.89
81	16.20	15.91	1.75	0.69	0.59	120.53	1.07	128.90	0.279	No	No	1.84
82	16.40	15.92	1.77	0.75	0.60	119.02	1.09	129.54	0.282	No	No	1.87
83	16.60	15.59	1.77	0.71	0.60	115.75	1.08	125.35	0.263	No	No	1.76
84	16.80	16.41	1.74	0.67	0.59	121.64	1.06	129.17	0.280	No	No	1.89
85	17.00	16.74	1.73	0.66	0.59	123.44	1.05	130.21	0.285	No	No	1.94
86	17.20	16.91	1.75	0.71	0.60	123.26	1.07	131.76	0.293	No	No	2.00
87	17.40	16.75	1.78	0.78	0.61	120.39	1.09	131.36	0.291	No	No	2.00
88	17.60	14.79	1.84	0.81	0.64	103.88	1.14	118.22	0.234	No	No	1.63
89	17.80	13.48	1.88	0.82	0.65	92.98	1.17	108.97	0.200	No	No	1.41
90	18.00	13.16	1.87	0.76	0.65	90.10	1.17	105.03	0.188	No	No	1.33
91	18.20	14.96	1.82	0.74	0.63	103.16	1.12	115.53	0.223	No	No	1.59
92	18.40	17.09	1.76	0.70	0.61	118.82	1.08	127.83	0.274	No	No	1.97
93	18.60	18.40	1.73	0.71	0.60	127.79	1.06	135.43	0.311	No	No	2.00
94	18.80	20.85	1.65	0.62	0.57	146.71	1.00	147.34	0.377	No	No	2.00
95	19.00	24.12	1.56	0.54	0.53	172.67	1.00	172.67	4.000	No	No	2.00
96	19.20	26.75	1.49	0.48	0.51	193.42	1.00	193.42	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	26.43	1.50	0.49	0.51	189.40	1.00	189.40	4.000	No	No	2.00
98	19.60	25.45	1.53	0.51	0.53	179.92	1.00	179.92	4.000	No	No	2.00
99	19.80	24.46	1.56	0.53	0.54	170.58	1.00	170.58	4.000	No	No	2.00
100	20.00	22.83	1.61	0.57	0.56	156.06	1.00	156.06	0.433	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	2.00	0.00	9.20	0.20	0.00
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	1.95	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	0.84	0.16	5.00	0.20	0.16
10.20	0.95	0.05	4.90	0.20	0.05	10.40	1.13	0.00	4.80	0.20	0.00
10.60	1.14	0.00	4.70	0.20	0.00	10.80	1.17	0.00	4.60	0.20	0.00
11.00	1.12	0.00	4.50	0.20	0.00	11.20	1.26	0.00	4.40	0.20	0.00
11.40	1.43	0.00	4.30	0.20	0.00	11.60	1.75	0.00	4.20	0.20	0.00
11.80	1.94	0.00	4.10	0.20	0.00	12.00	2.00	0.00	4.00	0.20	0.00
12.20	1.83	0.00	3.90	0.20	0.00	12.40	1.41	0.00	3.80	0.20	0.00
12.60	1.20	0.00	3.70	0.20	0.00	12.80	1.05	0.00	3.60	0.20	0.00
13.00	1.08	0.00	3.50	0.20	0.00	13.20	1.12	0.00	3.40	0.20	0.00
13.40	1.34	0.00	3.30	0.20	0.00	13.60	1.73	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	2.00	0.00	2.70	0.20	0.00	14.80	2.00	0.00	2.60	0.20	0.00
15.00	1.95	0.00	2.50	0.20	0.00	15.20	1.24	0.00	2.40	0.20	0.00
15.40	1.30	0.00	2.30	0.20	0.00	15.60	1.49	0.00	2.20	0.20	0.00
15.80	1.97	0.00	2.10	0.20	0.00	16.00	1.89	0.00	2.00	0.20	0.00
16.20	1.84	0.00	1.90	0.20	0.00	16.40	1.87	0.00	1.80	0.20	0.00
16.60	1.76	0.00	1.70	0.20	0.00	16.80	1.89	0.00	1.60	0.20	0.00
17.00	1.94	0.00	1.50	0.20	0.00	17.20	2.00	0.00	1.40	0.20	0.00
17.40	2.00	0.00	1.30	0.20	0.00	17.60	1.63	0.00	1.20	0.20	0.00
17.80	1.41	0.00	1.10	0.20	0.00	18.00	1.33	0.00	1.00	0.20	0.00
18.20	1.59	0.00	0.90	0.20	0.00	18.40	1.97	0.00	0.80	0.20	0.00
18.60	2.00	0.00	0.70	0.20	0.00	18.80	2.00	0.00	0.60	0.20	0.00
19.00	2.00	0.00	0.50	0.20	0.00	19.20	2.00	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	2.00	0.00	0.30	0.20	0.00	19.60	2.00	0.00	0.20	0.20	0.00
19.80	2.00	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 0.21

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

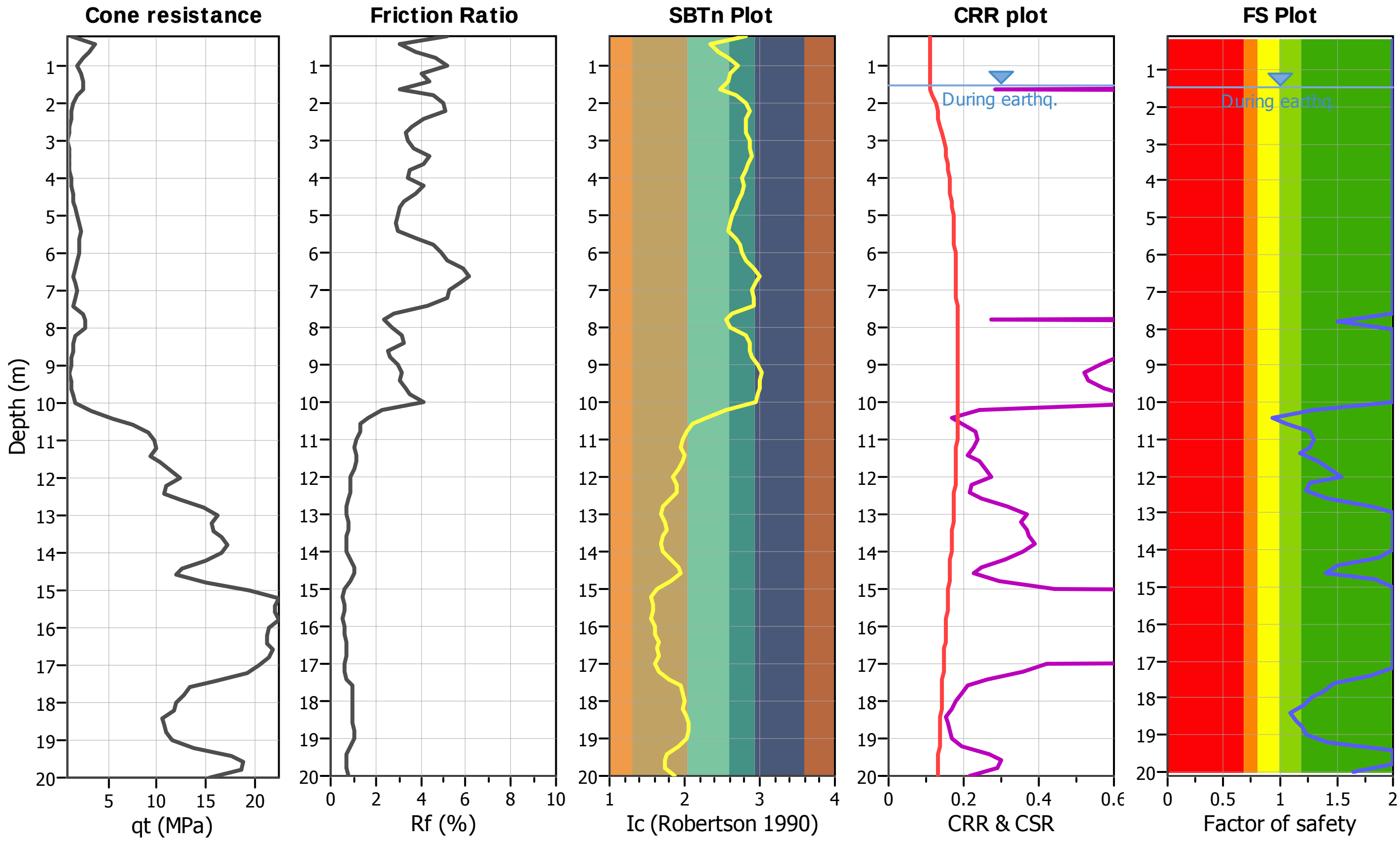
LIQUEFACTION ANALYSIS REPORT

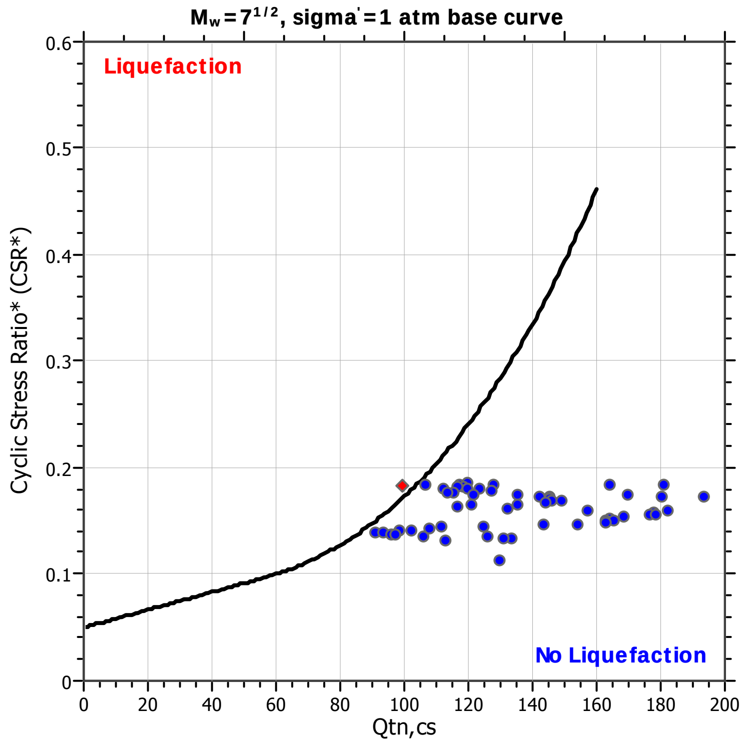
Project title : **Location :**

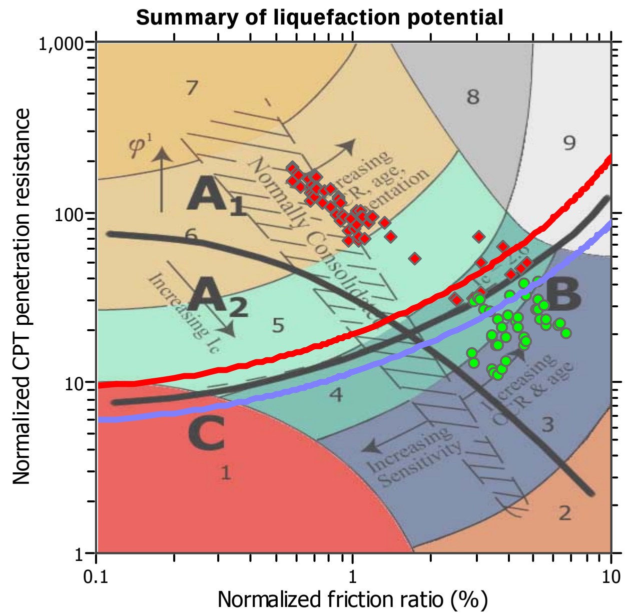
CPT file : CPT04

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude M_w:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	No		

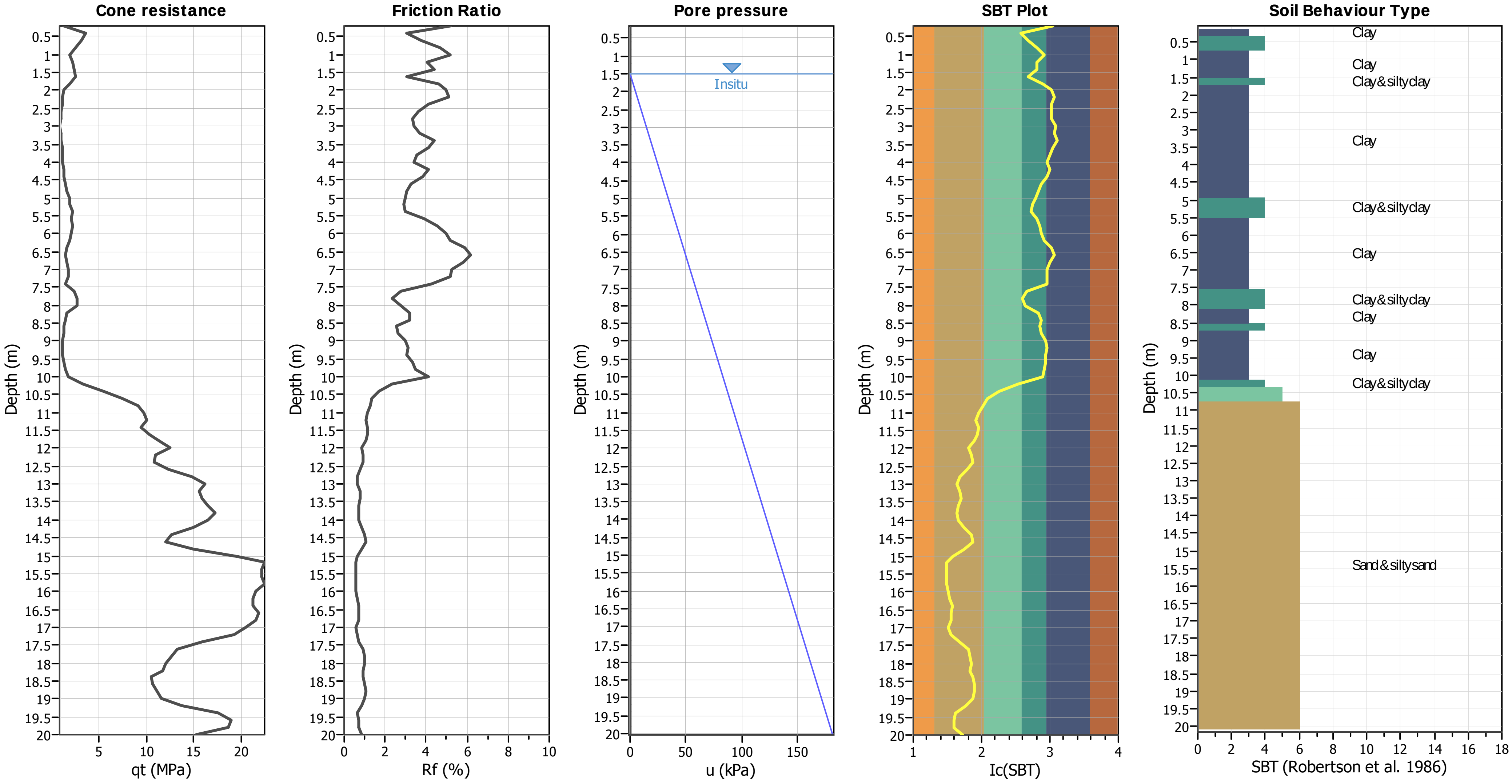






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



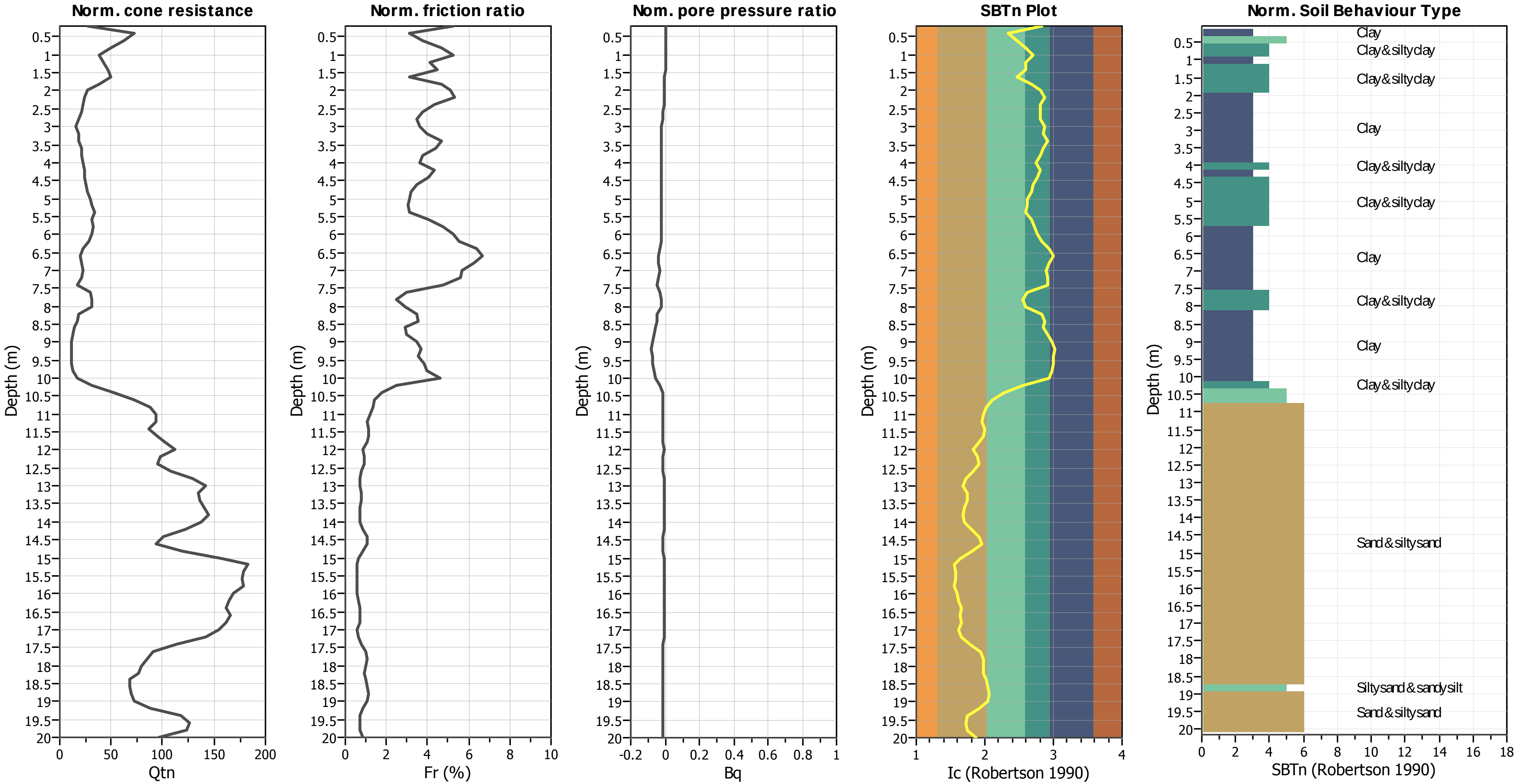
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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)



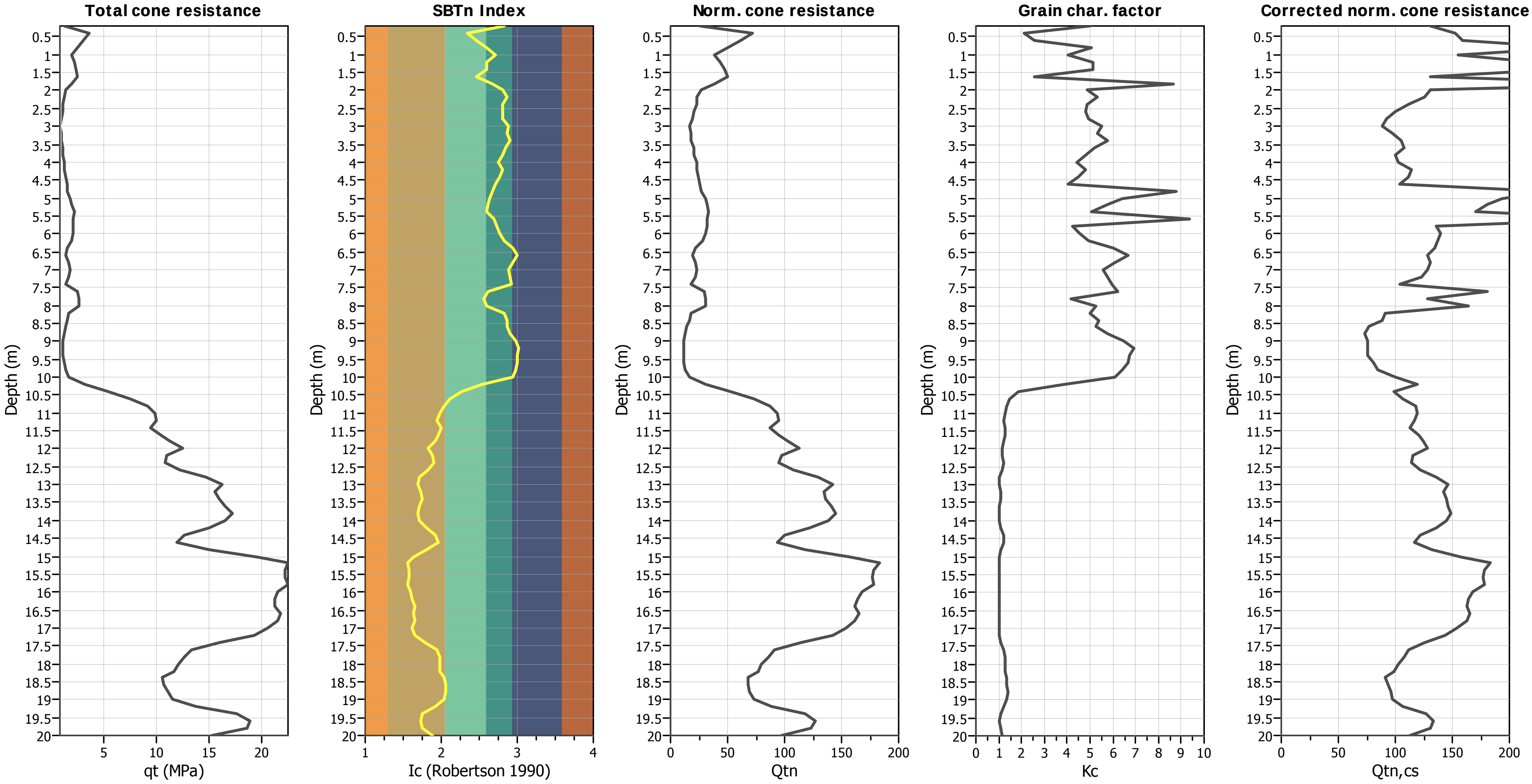
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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

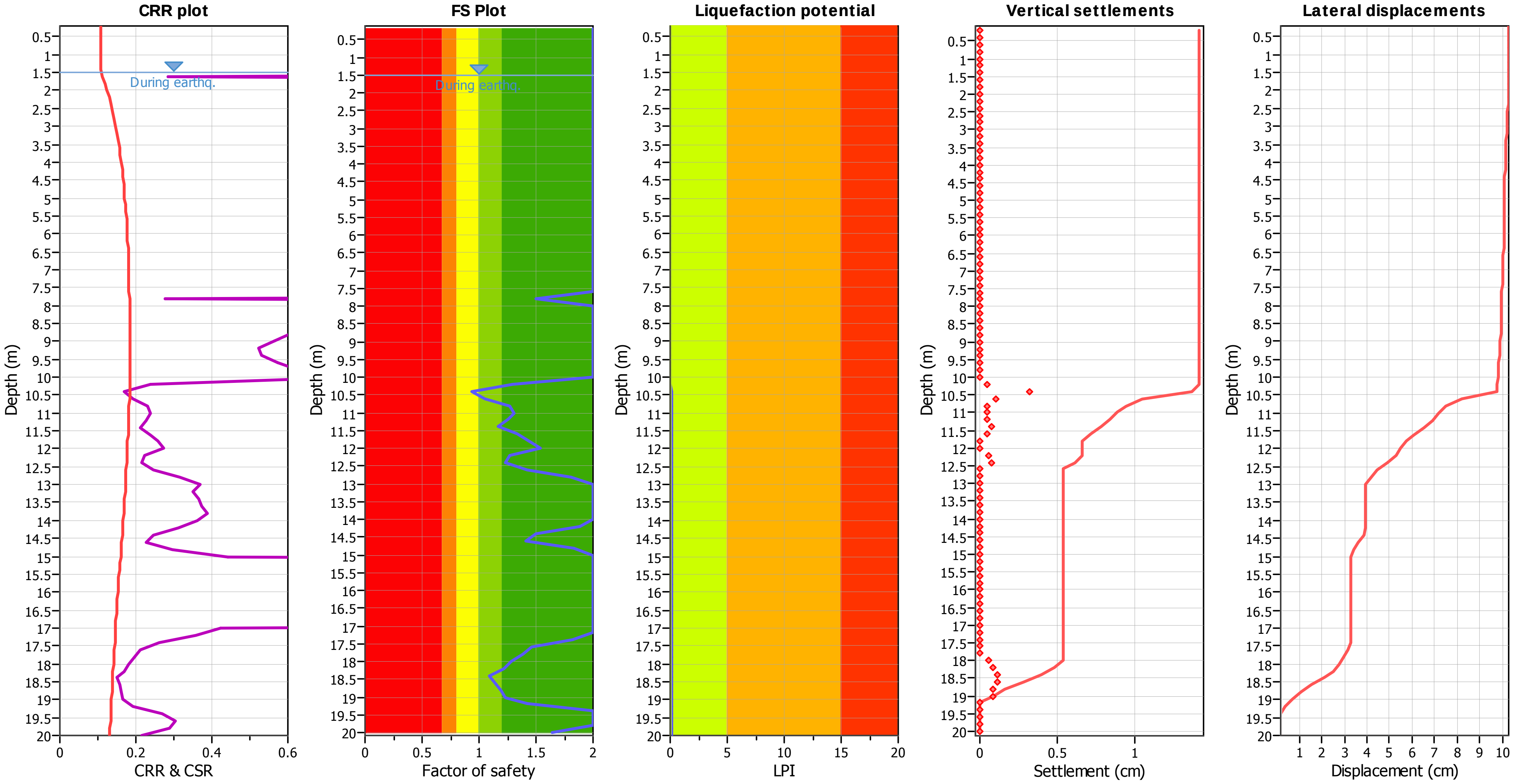
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

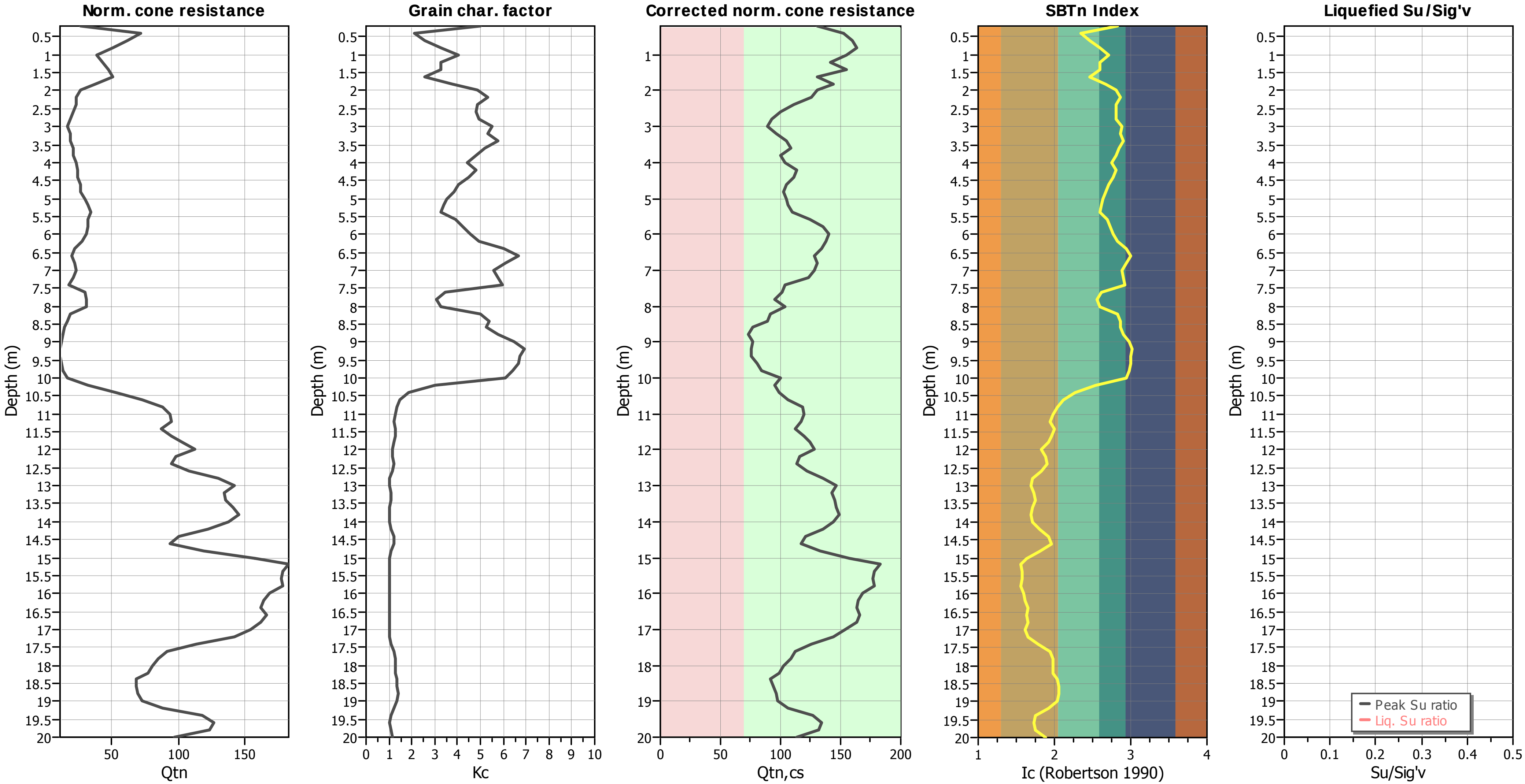
F.S. color scheme

- 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 (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	68.65	0.00	47.24	17.96
2	0.40	3.93	68.65	0.00	24.44	18.90
3	0.60	2.95	196.13	0.00	28.90	18.91
4	0.80	2.46	88.26	0.00	34.83	18.83
5	1.00	2.17	68.65	0.00	40.73	18.56
6	1.20	1.21	147.10	0.00	35.00	18.45
7	1.40	3.17	49.03	0.00	34.93	18.67
8	1.60	2.77	117.68	0.00	29.03	18.37
9	1.80	1.70	68.65	0.00	39.06	18.40
10	2.00	1.30	78.45	0.00	46.64	17.98
11	2.20	1.12	58.84	0.00	49.65	17.82
12	2.40	1.22	49.03	0.00	46.60	17.53
13	2.60	1.22	39.23	0.00	46.26	17.25
14	2.80	0.82	29.42	0.00	47.00	17.00
15	3.00	0.92	29.42	0.00	50.65	16.83
16	3.20	0.84	29.42	0.00	49.59	17.10
17	3.40	1.14	49.03	0.00	52.34	17.30
18	3.60	0.94	49.03	0.00	48.72	17.43
19	3.80	1.24	39.23	0.00	46.29	17.25
20	4.00	1.14	29.42	0.00	43.43	17.39
21	4.20	1.34	58.84	0.00	46.09	17.64
22	4.40	1.34	68.65	0.00	44.07	17.67
23	4.60	1.44	29.42	0.00	40.71	17.63
24	4.80	1.74	49.03	0.00	39.22	17.65
25	5.00	1.64	68.65	0.00	36.70	17.85
26	5.20	2.24	49.03	0.00	35.83	17.95
27	5.40	2.14	58.84	0.00	34.84	18.10
28	5.60	2.24	88.26	0.00	39.75	18.34
29	5.80	1.94	98.07	0.00	41.97	18.56
30	6.00	2.33	107.87	0.00	44.41	18.63
31	6.20	2.06	107.87	0.00	47.12	18.56
32	6.40	1.47	88.26	0.00	54.14	18.41
33	6.60	1.27	88.26	0.00	58.05	18.29
34	6.80	1.57	88.26	0.00	54.48	18.42
35	7.00	2.06	107.87	0.00	51.10	18.45
36	7.20	1.77	88.26	0.00	52.50	18.35
37	7.40	1.28	68.65	0.00	53.55	17.88
38	7.60	1.28	29.42	0.00	36.39	18.20
39	7.80	4.82	107.87	0.00	33.47	18.11
40	8.00	1.77	49.03	0.00	35.14	18.35
41	8.20	1.59	68.65	0.00	47.50	17.74
42	8.40	1.59	39.23	0.00	50.10	17.63
43	8.60	1.39	39.23	0.00	49.35	17.24
44	8.80	1.20	29.42	0.00	52.45	17.09
45	9.00	1.20	29.42	0.00	56.67	17.18
46	9.20	1.22	49.03	0.00	59.56	17.17
47	9.40	1.02	29.42	0.00	58.47	17.18
48	9.60	1.31	29.42	0.00	58.13	17.40

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	1.51	68.65	0.00	56.62	17.60
50	10.00	1.41	49.03	0.00	54.47	18.12
51	10.20	2.31	98.07	0.00	32.81	18.41
52	10.40	6.03	78.45	0.00	21.68	18.84
53	10.60	7.99	98.07	0.00	16.05	19.08
54	10.80	8.48	127.49	0.00	13.81	19.33
55	11.00	10.93	127.49	0.00	12.51	19.32
56	11.20	9.97	88.26	0.00	11.57	19.23
57	11.40	9.19	98.07	0.00	12.77	19.20
58	11.60	8.99	127.49	0.00	12.11	19.37
59	11.80	12.91	127.49	0.00	10.85	19.41
60	12.00	11.94	98.07	0.00	8.92	19.34
61	12.20	12.44	98.07	0.00	10.23	19.19
62	12.40	8.51	98.07	0.00	10.55	19.18
63	12.60	11.45	98.07	0.00	8.75	19.23
64	12.80	16.85	98.07	0.00	6.43	19.30
65	13.00	15.87	98.07	0.00	5.84	19.45
66	13.20	15.88	127.49	0.00	6.87	19.53
67	13.40	14.90	127.49	0.00	7.13	19.63
68	13.60	16.86	127.49	0.00	6.24	19.55
69	13.80	17.84	98.07	0.00	5.83	19.57
70	14.00	16.86	127.49	0.00	6.36	19.55
71	14.20	14.92	127.49	0.00	8.24	19.61
72	14.40	12.96	127.49	0.00	10.81	19.54
73	14.60	10.01	127.49	0.00	11.77	19.52
74	14.80	12.96	127.49	0.00	8.45	19.61
75	15.00	21.78	127.49	0.00	5.11	19.71
76	15.20	23.75	127.49	0.00	3.66	19.76
77	15.40	21.79	127.49	0.00	3.85	19.76
78	15.60	20.81	127.49	0.00	3.89	19.76
79	15.80	23.75	127.49	0.00	3.78	19.76
80	16.00	22.77	127.49	0.00	4.29	19.75
81	16.20	17.88	127.49	0.00	4.50	19.74
82	16.40	22.78	127.49	0.00	5.38	19.93
83	16.60	22.78	196.13	0.00	5.07	19.94
84	16.80	19.84	127.49	0.00	5.30	19.94
85	17.00	21.80	127.49	0.00	4.64	19.64
86	17.20	19.86	98.07	0.00	5.44	19.61
87	17.40	15.94	127.49	0.00	7.91	19.54
88	17.60	12.01	127.49	0.00	11.28	19.56
89	17.80	12.01	127.49	0.00	12.23	19.54
90	18.00	13.97	127.49	0.00	12.64	19.43
91	18.20	10.06	98.07	0.00	12.56	19.32
92	18.40	11.04	98.07	0.00	13.82	19.17
93	18.60	10.55	98.07	0.00	14.38	19.29
94	18.80	10.55	127.49	0.00	14.60	19.40
95	19.00	12.02	127.49	0.00	13.84	19.42
96	19.20	12.04	98.07	0.00	10.88	19.48

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	16.95	127.49	0.00	7.12	19.58
98	19.60	23.81	127.49	0.00	6.67	19.70
99	19.80	15.96	127.49	0.00	6.96	19.69
100	20.00	14.98	127.49	0.00	9.87	19.62

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.59	0.00	3.59	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
2	0.40	7.37	0.00	7.37	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
3	0.60	11.16	0.00	11.16	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
4	0.80	14.92	0.00	14.92	1.00	0.181	1.67	0.109	1.00	1.00	2.000	No
5	1.00	18.63	0.00	18.63	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
6	1.20	22.32	0.00	22.32	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
7	1.40	26.06	0.00	26.06	0.99	0.180	1.67	0.108	1.00	1.00	2.000	No
8	1.60	29.73	0.98	28.75	0.99	0.186	1.67	0.112	1.00	1.00	0.112	No
9	1.80	33.41	2.94	30.47	0.99	0.197	1.67	0.118	1.00	1.00	0.118	No
10	2.00	37.01	4.91	32.10	0.99	0.207	1.67	0.124	1.00	1.00	0.124	No
11	2.20	40.57	6.87	33.70	0.99	0.216	1.67	0.129	1.00	1.00	0.129	No
12	2.40	44.08	8.83	35.25	0.98	0.224	1.67	0.134	1.00	1.00	0.134	No
13	2.60	47.53	10.79	36.74	0.98	0.231	1.67	0.139	1.00	1.00	0.139	No
14	2.80	50.93	12.75	38.17	0.98	0.238	1.67	0.143	1.00	1.00	0.143	No
15	3.00	54.29	14.71	39.58	0.98	0.245	1.67	0.147	1.00	1.00	0.147	No
16	3.20	57.71	16.68	41.04	0.98	0.250	1.67	0.150	1.00	1.00	0.150	No
17	3.40	61.17	18.64	42.53	0.98	0.256	1.67	0.153	1.00	1.00	0.153	No
18	3.60	64.66	20.60	44.06	0.98	0.261	1.67	0.156	1.00	1.00	0.156	No
19	3.80	68.11	22.56	45.54	0.97	0.265	1.67	0.159	1.00	1.00	0.159	No
20	4.00	71.59	24.52	47.06	0.97	0.269	1.67	0.161	1.00	1.00	0.161	No
21	4.20	75.11	26.49	48.63	0.97	0.273	1.67	0.164	1.00	1.00	0.164	No
22	4.40	78.65	28.45	50.20	0.97	0.277	1.67	0.166	1.00	1.00	0.166	No
23	4.60	82.17	30.41	51.76	0.97	0.280	1.67	0.168	1.00	1.00	0.168	No
24	4.80	85.70	32.37	53.33	0.97	0.283	1.67	0.170	1.00	1.00	0.170	No
25	5.00	89.27	34.34	54.94	0.97	0.286	1.67	0.171	1.00	1.00	0.171	No
26	5.20	92.86	36.30	56.57	0.96	0.288	1.67	0.173	1.00	1.00	0.173	No
27	5.40	96.48	38.26	58.22	0.96	0.290	1.67	0.174	1.00	1.00	0.174	No
28	5.60	100.15	40.22	59.93	0.96	0.292	1.67	0.175	1.00	1.00	0.175	No
29	5.80	103.87	42.18	61.68	0.96	0.294	1.67	0.176	1.00	1.00	0.176	No
30	6.00	107.59	44.15	63.45	0.96	0.296	1.67	0.177	1.00	1.00	0.177	No
31	6.20	111.30	46.11	65.20	0.96	0.297	1.67	0.178	1.00	1.00	0.178	No
32	6.40	114.99	48.07	66.92	0.95	0.298	1.67	0.179	1.00	1.00	0.179	No
33	6.60	118.64	50.03	68.61	0.95	0.300	1.67	0.180	1.00	1.00	0.180	No
34	6.80	122.33	51.99	70.33	0.95	0.301	1.67	0.180	1.00	1.00	0.180	No
35	7.00	126.02	53.95	72.06	0.95	0.302	1.67	0.181	1.00	1.00	0.181	No
36	7.20	129.69	55.92	73.77	0.95	0.303	1.67	0.182	1.00	1.00	0.182	No
37	7.40	133.26	57.88	75.38	0.94	0.304	1.67	0.182	1.00	1.00	0.182	No
38	7.60	136.90	59.84	77.06	0.94	0.305	1.67	0.183	1.00	1.00	0.183	No
39	7.80	140.53	61.80	78.72	0.94	0.305	1.67	0.183	1.00	1.00	0.183	No
40	8.00	144.20	63.77	80.43	0.94	0.306	1.67	0.183	1.00	1.00	0.183	No
41	8.20	147.74	65.73	82.02	0.93	0.306	1.67	0.184	1.00	1.00	0.184	No
42	8.40	151.27	67.69	83.58	0.93	0.307	1.67	0.184	1.00	1.00	0.184	No
43	8.60	154.72	69.65	85.07	0.93	0.308	1.67	0.184	1.00	1.00	0.184	No
44	8.80	158.14	71.61	86.52	0.93	0.308	1.67	0.185	1.00	1.00	0.185	No
45	9.00	161.57	73.58	88.00	0.92	0.308	1.67	0.185	1.00	1.00	0.185	No
46	9.20	165.01	75.54	89.47	0.92	0.309	1.67	0.185	1.00	1.00	0.185	No
47	9.40	168.44	77.50	90.94	0.92	0.309	1.67	0.185	1.00	1.00	0.185	No
48	9.60	171.92	79.46	92.46	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.44	81.42	94.02	0.91	0.309	1.67	0.185	1.00	1.00	0.185	No
50	10.00	179.07	83.39	95.68	0.90	0.308	1.67	0.185	1.00	1.00	0.185	No
51	10.20	182.75	85.35	97.40	0.90	0.308	1.67	0.184	1.00	1.00	0.184	No
52	10.40	186.52	87.31	99.21	0.90	0.307	1.67	0.184	1.00	1.00	0.184	No
53	10.60	190.33	89.27	101.06	0.89	0.306	1.67	0.183	1.00	1.00	0.183	No
54	10.80	194.20	91.23	102.97	0.89	0.305	1.67	0.183	1.00	1.00	0.183	No
55	11.00	198.06	93.19	104.87	0.88	0.303	1.67	0.182	1.00	1.00	0.182	No
56	11.20	201.91	95.16	106.75	0.88	0.302	1.67	0.181	1.00	1.00	0.181	No
57	11.40	205.75	97.12	108.63	0.87	0.301	1.67	0.180	1.00	1.00	0.180	No
58	11.60	209.62	99.08	110.54	0.87	0.299	1.67	0.179	1.00	1.00	0.179	No
59	11.80	213.50	101.04	112.46	0.86	0.298	1.67	0.179	1.00	1.00	0.179	No
60	12.00	217.37	103.00	114.37	0.86	0.296	1.67	0.178	1.00	1.00	0.178	No
61	12.20	221.21	104.97	116.24	0.85	0.295	1.67	0.177	1.00	1.00	0.177	No
62	12.40	225.05	106.93	118.12	0.84	0.293	1.67	0.176	1.00	1.00	0.176	No
63	12.60	228.89	108.89	120.00	0.84	0.291	1.67	0.175	1.00	1.00	0.175	No
64	12.80	232.75	110.85	121.90	0.83	0.289	1.67	0.173	1.00	1.00	0.173	No
65	13.00	236.64	112.81	123.83	0.83	0.288	1.67	0.172	1.00	1.00	0.172	No
66	13.20	240.55	114.78	125.77	0.82	0.286	1.67	0.171	1.00	1.00	0.171	No
67	13.40	244.47	116.74	127.73	0.81	0.284	1.67	0.170	1.00	1.00	0.170	No
68	13.60	248.38	118.70	129.68	0.81	0.281	1.67	0.169	1.00	1.00	0.169	No
69	13.80	252.30	120.66	131.63	0.80	0.279	1.67	0.167	1.00	1.00	0.167	No
70	14.00	256.21	122.63	133.58	0.79	0.277	1.67	0.166	1.00	1.00	0.166	No
71	14.20	260.13	124.59	135.54	0.79	0.275	1.67	0.165	1.00	1.00	0.165	No
72	14.40	264.04	126.55	137.49	0.78	0.273	1.67	0.164	1.00	1.00	0.164	No
73	14.60	267.94	128.51	139.43	0.77	0.271	1.67	0.162	1.00	1.00	0.162	No
74	14.80	271.86	130.47	141.39	0.77	0.269	1.67	0.161	1.00	1.00	0.161	No
75	15.00	275.80	132.44	143.37	0.76	0.266	1.67	0.160	1.00	1.00	0.160	No
76	15.20	279.76	134.40	145.36	0.75	0.264	1.67	0.158	1.00	1.00	0.158	No
77	15.40	283.71	136.36	147.35	0.75	0.262	1.67	0.157	1.00	1.00	0.157	No
78	15.60	287.66	138.32	149.34	0.74	0.260	1.67	0.156	1.00	1.00	0.156	No
79	15.80	291.61	140.28	151.33	0.73	0.257	1.67	0.154	1.00	1.00	0.154	No
80	16.00	295.56	142.25	153.32	0.73	0.255	1.67	0.153	1.00	1.00	0.153	No
81	16.20	299.51	144.21	155.30	0.72	0.253	1.67	0.152	1.00	1.00	0.152	No
82	16.40	303.49	146.17	157.33	0.71	0.251	1.67	0.150	1.00	1.00	0.150	No
83	16.60	307.48	148.13	159.35	0.71	0.249	1.67	0.149	1.00	1.00	0.149	No
84	16.80	311.47	150.09	161.38	0.70	0.247	1.67	0.148	1.00	1.00	0.148	No
85	17.00	315.40	152.06	163.34	0.70	0.245	1.67	0.147	1.00	1.00	0.147	No
86	17.20	319.32	154.02	165.30	0.69	0.243	1.67	0.145	1.00	1.00	0.145	No
87	17.40	323.23	155.98	167.25	0.68	0.241	1.67	0.144	1.00	1.00	0.144	No
88	17.60	327.14	157.94	169.20	0.68	0.239	1.67	0.143	1.00	1.00	0.143	No
89	17.80	331.05	159.90	171.15	0.67	0.237	1.67	0.142	1.00	1.00	0.142	No
90	18.00	334.93	161.87	173.07	0.67	0.235	1.67	0.141	1.00	1.00	0.141	No
91	18.20	338.80	163.83	174.97	0.66	0.233	1.67	0.140	1.00	1.00	0.140	No
92	18.40	342.63	165.79	176.84	0.66	0.231	1.67	0.139	1.00	1.00	0.139	No
93	18.60	346.49	167.75	178.74	0.65	0.230	1.67	0.138	1.00	1.00	0.138	No
94	18.80	350.37	169.71	180.66	0.65	0.228	1.67	0.137	1.00	1.00	0.137	No
95	19.00	354.25	171.68	182.58	0.64	0.226	1.67	0.136	1.00	1.00	0.136	No
96	19.20	358.15	173.64	184.51	0.64	0.225	1.67	0.135	1.00	1.00	0.135	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	362.06	175.60	186.47	0.63	0.223	1.67	0.134	1.00	1.00	0.134	No
98	19.60	366.00	177.56	188.44	0.63	0.222	1.67	0.133	1.00	1.00	0.133	No
99	19.80	369.94	179.52	190.42	0.62	0.220	1.67	0.132	1.00	1.00	0.132	No
100	20.00	373.86	181.49	192.38	0.62	0.219	1.67	0.131	1.00	1.00	0.131	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	1.32	2.82	5.23	0.93	26.27	4.97	130.58	4.000	No	Yes	2.00
2	0.40	3.61	2.35	3.09	0.75	71.96	2.12	152.67	4.000	No	No	2.00
3	0.60	3.12	2.46	3.79	0.79	62.08	2.57	159.61	4.000	No	No	2.00
4	0.80	2.53	2.59	4.69	0.84	50.23	5.05	253.48	4.000	No	No	2.00
5	1.00	1.94	2.71	5.26	0.89	38.52	4.03	155.41	4.000	No	Yes	2.00
6	1.20	2.18	2.59	4.09	0.85	43.16	5.16	222.70	4.000	No	No	2.00
7	1.40	2.38	2.59	4.44	0.85	47.14	5.11	240.87	4.000	No	No	2.00
8	1.60	2.55	2.46	3.12	0.80	50.34	2.59	130.13	0.285	No	No	2.00
9	1.80	1.93	2.67	4.67	0.88	37.84	8.63	326.59	4.000	No	No	2.00
10	2.00	1.37	2.81	5.14	0.94	26.72	4.88	130.39	1.275	No	Yes	2.00
11	2.20	1.21	2.86	5.30	0.96	23.44	5.33	125.04	1.118	No	Yes	2.00
12	2.40	1.18	2.81	4.30	0.94	22.79	4.87	111.06	1.087	No	Yes	2.00
13	2.60	1.09	2.80	3.78	0.94	20.76	4.82	100.11	0.990	No	Yes	2.00
14	2.80	0.99	2.82	3.49	0.94	18.73	4.93	92.38	0.893	No	Yes	2.00
15	3.00	0.86	2.88	3.64	0.97	16.17	5.49	88.77	0.772	No	Yes	2.00
16	3.20	0.97	2.86	3.95	0.96	18.20	5.33	96.91	0.868	No	Yes	2.00
17	3.40	0.97	2.91	4.66	0.98	18.26	5.75	105.03	0.871	No	Yes	2.00
18	3.60	1.10	2.85	4.40	0.96	20.81	5.19	108.05	0.992	No	Yes	2.00
19	3.80	1.10	2.81	3.78	0.94	20.74	4.83	100.12	0.989	No	Yes	2.00
20	4.00	1.24	2.75	3.64	0.92	23.35	4.41	103.06	1.114	No	Yes	2.00
21	4.20	1.28	2.80	4.36	0.94	23.67	4.80	113.58	1.129	No	Yes	2.00
22	4.40	1.38	2.77	4.03	0.93	24.63	4.50	110.94	1.175	No	Yes	2.00
23	4.60	1.51	2.70	3.44	0.91	25.90	4.03	104.40	1.235	No	Yes	2.00
24	4.80	1.61	2.68	3.23	0.90	26.71	8.79	234.91	4.000	No	No	2.00
25	5.00	1.87	2.63	3.12	0.88	30.15	6.44	194.02	4.000	No	No	2.00
26	5.20	2.00	2.61	3.08	0.87	31.43	5.75	180.80	4.000	No	No	2.00
27	5.40	2.20	2.59	3.10	0.87	33.66	5.05	170.02	4.000	No	No	2.00
28	5.60	2.11	2.69	4.08	0.90	31.85	9.37	298.45	4.000	No	No	2.00
29	5.80	2.17	2.73	4.74	0.92	32.25	4.21	135.63	1.538	No	Yes	2.00
30	6.00	2.11	2.77	5.22	0.94	30.71	4.55	139.84	1.465	No	Yes	2.00
31	6.20	1.95	2.82	5.50	0.96	27.76	4.95	137.46	1.324	No	Yes	2.00
32	6.40	1.60	2.93	6.38	1.00	22.22	6.04	134.13	1.060	No	Yes	2.00
33	6.60	1.44	2.99	6.69	1.00	19.23	6.67	128.35	0.917	No	Yes	2.00
34	6.80	1.63	2.94	6.27	1.00	21.50	6.09	130.96	1.025	No	Yes	2.00
35	7.00	1.80	2.89	5.66	0.99	23.13	5.56	128.57	1.103	No	Yes	2.00
36	7.20	1.71	2.91	5.60	0.99	21.34	5.78	123.27	1.018	No	Yes	2.00
37	7.40	1.45	2.92	4.72	1.00	17.44	5.94	103.68	0.832	No	Yes	2.00
38	7.60	2.46	2.62	2.95	0.89	29.29	6.19	181.36	4.000	No	No	2.00
39	7.80	2.63	2.56	2.50	0.87	30.56	4.19	128.08	0.275	No	No	1.51
40	8.00	2.73	2.60	2.91	0.88	31.27	5.25	164.26	4.000	No	No	2.00
41	8.20	1.65	2.83	3.48	0.97	18.21	5.01	91.21	0.869	No	Yes	2.00
42	8.40	1.52	2.87	3.57	0.98	16.38	5.40	88.48	0.781	No	Yes	2.00
43	8.60	1.39	2.86	2.90	0.98	14.51	5.29	76.72	0.692	No	Yes	2.00
44	8.80	1.26	2.91	2.96	1.00	12.75	5.77	73.58	0.608	No	Yes	2.00
45	9.00	1.20	2.97	3.45	1.00	11.83	6.45	76.26	0.564	No	Yes	2.00
46	9.20	1.14	3.02	3.67	1.00	10.94	6.92	75.75	0.522	No	Yes	2.00
47	9.40	1.18	3.00	3.54	1.00	11.16	6.74	75.23	0.532	No	Yes	2.00
48	9.60	1.28	2.99	3.83	1.00	12.00	6.68	80.21	0.572	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	1.41	2.97	3.97	1.00	13.15	6.44	84.68	0.627	No	Yes	2.00
50	10.00	1.74	2.94	4.60	1.00	16.34	6.09	99.51	0.779	No	Yes	2.00
51	10.20	3.25	2.55	2.45	0.87	31.37	3.82	119.79	0.240	No	No	1.30
52	10.40	5.44	2.28	1.74	0.77	52.88	1.88	99.28	0.171	No	No	0.93
53	10.60	7.50	2.11	1.39	0.70	72.57	1.47	106.65	0.193	No	No	1.05
54	10.80	9.14	2.03	1.32	0.68	87.67	1.34	117.74	0.232	No	No	1.27
55	11.00	9.80	1.98	1.19	0.66	93.03	1.28	118.99	0.237	No	No	1.30
56	11.20	10.03	1.95	1.06	0.65	94.24	1.24	116.58	0.227	No	No	1.26
57	11.40	9.38	1.99	1.14	0.66	86.88	1.29	112.22	0.211	No	No	1.17
58	11.60	10.37	1.97	1.16	0.66	95.11	1.26	119.90	0.240	No	No	1.34
59	11.80	11.28	1.92	1.06	0.64	102.69	1.21	123.94	0.257	No	No	1.44
60	12.00	12.43	1.84	0.88	0.61	112.55	1.13	127.66	0.273	No	No	1.54
61	12.20	10.96	1.89	0.91	0.63	97.68	1.18	115.52	0.223	No	No	1.26
62	12.40	10.80	1.91	0.93	0.64	95.13	1.19	113.68	0.217	No	No	1.23
63	12.60	12.27	1.83	0.81	0.61	107.81	1.13	121.64	0.247	No	No	1.42
64	12.80	14.72	1.72	0.68	0.56	129.57	1.05	135.91	0.313	No	No	1.81
65	13.00	16.20	1.69	0.68	0.55	141.79	1.03	145.74	0.368	No	No	2.00
66	13.20	15.55	1.74	0.77	0.58	134.14	1.06	142.77	0.351	No	No	2.00
67	13.40	15.88	1.75	0.82	0.58	135.59	1.07	145.49	0.366	No	No	2.00
68	13.60	16.53	1.71	0.72	0.57	140.58	1.04	146.52	0.373	No	No	2.00
69	13.80	17.18	1.68	0.69	0.56	145.26	1.03	149.25	0.389	No	No	2.00
70	14.00	16.54	1.71	0.72	0.57	138.07	1.05	144.47	0.360	No	No	2.00
71	14.20	14.91	1.81	0.87	0.61	121.85	1.11	135.36	0.311	No	No	1.88
72	14.40	12.63	1.92	1.03	0.65	100.55	1.21	121.20	0.246	No	No	1.50
73	14.60	11.97	1.96	1.09	0.66	93.86	1.25	116.91	0.229	No	No	1.41
74	14.80	14.92	1.82	0.87	0.61	118.46	1.12	132.43	0.296	No	No	1.84
75	15.00	19.50	1.64	0.66	0.55	157.76	1.00	157.62	0.444	No	No	2.00
76	15.20	22.44	1.56	0.58	0.52	182.76	1.00	182.76	4.000	No	No	2.00
77	15.40	22.12	1.57	0.58	0.52	178.41	1.00	178.41	4.000	No	No	2.00
78	15.60	22.12	1.57	0.58	0.52	176.99	1.00	176.99	4.000	No	No	2.00
79	15.80	22.44	1.56	0.58	0.52	178.48	1.00	178.48	4.000	No	No	2.00
80	16.00	21.47	1.60	0.60	0.53	168.47	1.00	168.47	4.000	No	No	2.00
81	16.20	21.14	1.61	0.61	0.54	164.31	1.00	164.31	4.000	No	No	2.00
82	16.40	21.15	1.66	0.72	0.56	161.64	1.01	163.26	4.000	No	No	2.00
83	16.60	21.80	1.64	0.70	0.56	165.92	1.00	165.54	4.000	No	No	2.00
84	16.80	21.47	1.65	0.71	0.56	161.77	1.01	162.87	4.000	No	No	2.00
85	17.00	20.50	1.62	0.58	0.55	154.26	1.00	154.26	0.421	No	No	2.00
86	17.20	19.20	1.66	0.62	0.57	142.02	1.01	143.80	0.357	No	No	2.00
87	17.40	15.94	1.79	0.75	0.62	113.75	1.10	125.05	0.262	No	No	1.82
88	17.60	13.32	1.94	0.98	0.67	91.24	1.22	111.74	0.210	No	No	1.47
89	17.80	12.67	1.97	1.03	0.69	85.26	1.27	107.97	0.197	No	No	1.39
90	18.00	12.02	1.99	1.01	0.69	79.82	1.29	102.60	0.180	No	No	1.28
91	18.20	11.69	1.99	0.95	0.69	77.00	1.28	98.68	0.169	No	No	1.21
92	18.40	10.55	2.03	0.96	0.71	68.01	1.34	91.37	0.151	No	No	1.09
93	18.60	10.72	2.05	1.04	0.72	68.21	1.37	93.66	0.156	No	No	1.14
94	18.80	11.04	2.06	1.10	0.72	69.64	1.39	96.46	0.163	No	No	1.20
95	19.00	11.54	2.03	1.05	0.72	72.70	1.34	97.74	0.167	No	No	1.23
96	19.20	13.67	1.92	0.88	0.67	88.10	1.21	106.45	0.192	No	No	1.43

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	17.60	1.75	0.68	0.61	117.82	1.07	126.38	0.268	No	No	2.00
98	19.60	18.91	1.73	0.69	0.60	126.52	1.06	133.77	0.303	No	No	2.00
99	19.80	18.58	1.74	0.70	0.61	122.97	1.07	131.22	0.290	No	No	2.00
100	20.00	15.31	1.88	0.85	0.66	96.87	1.17	113.22	0.215	No	No	1.64

Abbreviations

Depth:	Depth from free surface, at which CPT was performed (m)
q_t:	Total cone resistance
I_c:	Soil behavior type index
Fr:	Normalized friction ratio (%)
n:	Stress exponent
Q_{tn}:	Normalized cone resistance
K_c:	Cone resistance correction factor due to fines
$Q_{tn,cs}$:	Normalized and adjusted cone resistance
$CRR_{7.5}$:	Cyclic resistance ratio for M_w=7.5
FS:	Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	2.00	0.00	9.20	0.20	0.00
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	1.51	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	2.00	0.00	5.00	0.20	0.00
10.20	1.30	0.00	4.90	0.20	0.00	10.40	0.93	0.07	4.80	0.20	0.07
10.60	1.05	0.00	4.70	0.20	0.00	10.80	1.27	0.00	4.60	0.20	0.00
11.00	1.30	0.00	4.50	0.20	0.00	11.20	1.26	0.00	4.40	0.20	0.00
11.40	1.17	0.00	4.30	0.20	0.00	11.60	1.34	0.00	4.20	0.20	0.00
11.80	1.44	0.00	4.10	0.20	0.00	12.00	1.54	0.00	4.00	0.20	0.00
12.20	1.26	0.00	3.90	0.20	0.00	12.40	1.23	0.00	3.80	0.20	0.00
12.60	1.42	0.00	3.70	0.20	0.00	12.80	1.81	0.00	3.60	0.20	0.00
13.00	2.00	0.00	3.50	0.20	0.00	13.20	2.00	0.00	3.40	0.20	0.00
13.40	2.00	0.00	3.30	0.20	0.00	13.60	2.00	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	1.88	0.00	2.90	0.20	0.00	14.40	1.50	0.00	2.80	0.20	0.00
14.60	1.41	0.00	2.70	0.20	0.00	14.80	1.84	0.00	2.60	0.20	0.00
15.00	2.00	0.00	2.50	0.20	0.00	15.20	2.00	0.00	2.40	0.20	0.00
15.40	2.00	0.00	2.30	0.20	0.00	15.60	2.00	0.00	2.20	0.20	0.00
15.80	2.00	0.00	2.10	0.20	0.00	16.00	2.00	0.00	2.00	0.20	0.00
16.20	2.00	0.00	1.90	0.20	0.00	16.40	2.00	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	2.00	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	2.00	0.00	1.40	0.20	0.00
17.40	1.82	0.00	1.30	0.20	0.00	17.60	1.47	0.00	1.20	0.20	0.00
17.80	1.39	0.00	1.10	0.20	0.00	18.00	1.28	0.00	1.00	0.20	0.00
18.20	1.21	0.00	0.90	0.20	0.00	18.40	1.09	0.00	0.80	0.20	0.00
18.60	1.14	0.00	0.70	0.20	0.00	18.80	1.20	0.00	0.60	0.20	0.00
19.00	1.23	0.00	0.50	0.20	0.00	19.20	1.43	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	2.00	0.00	0.30	0.20	0.00	19.60	2.00	0.00	0.20	0.20	0.00
19.80	2.00	0.00	0.10	0.20	0.00	20.00	1.64	0.00	0.00	0.20	0.00

Overall liquefaction potential: 0.07

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

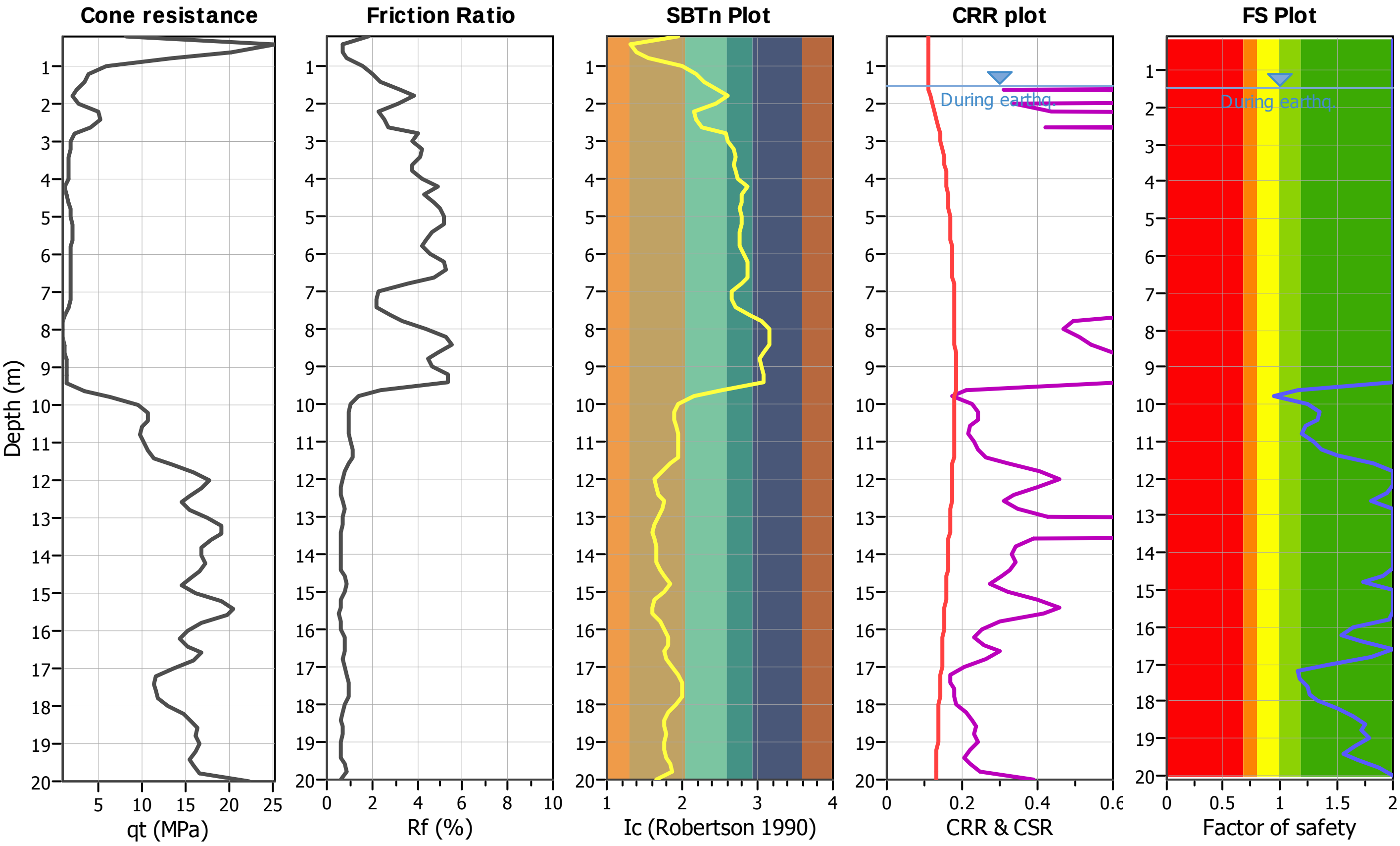
LIQUEFACTION ANALYSIS REPORT

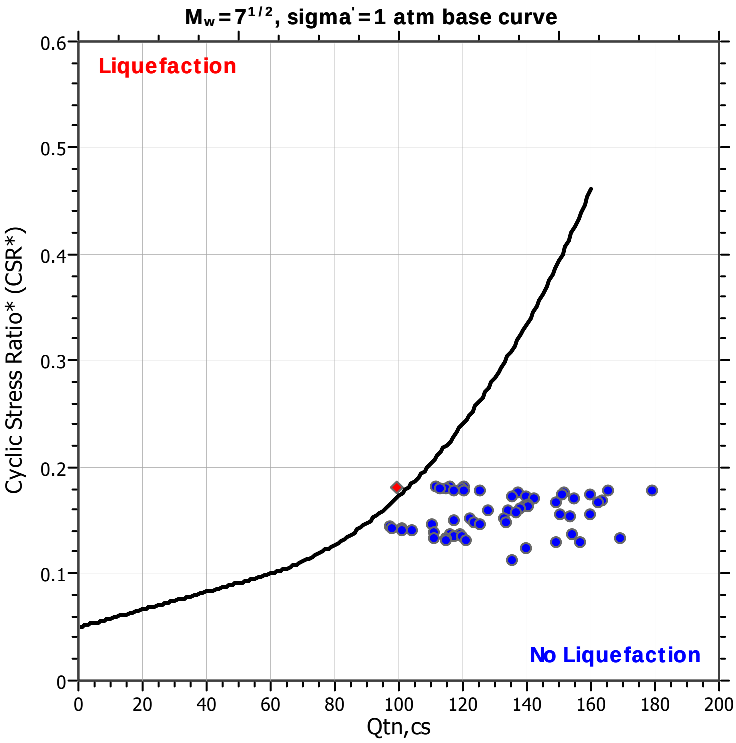
Project title : **Location :**

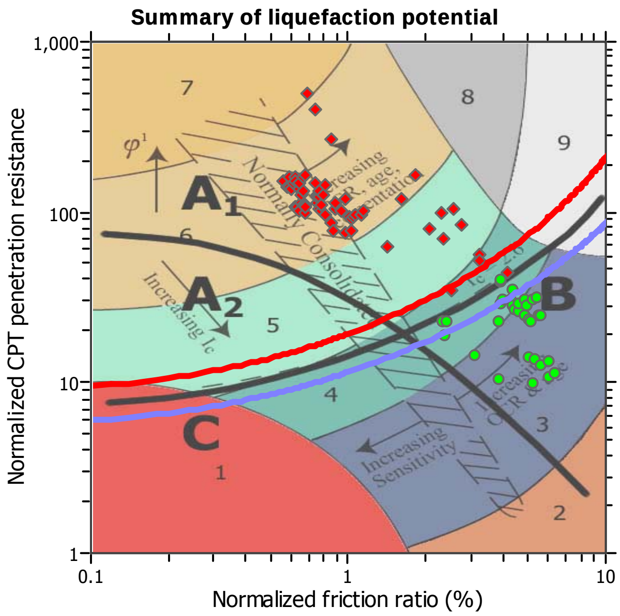
CPT file : CPT04Bis

Input parameters and analysis data

Analysis method:	Robertson (2009)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	All soils
Fines correction method:	Robertson (2009)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	20.00 m
Earthquake magnitude M_w:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	No		

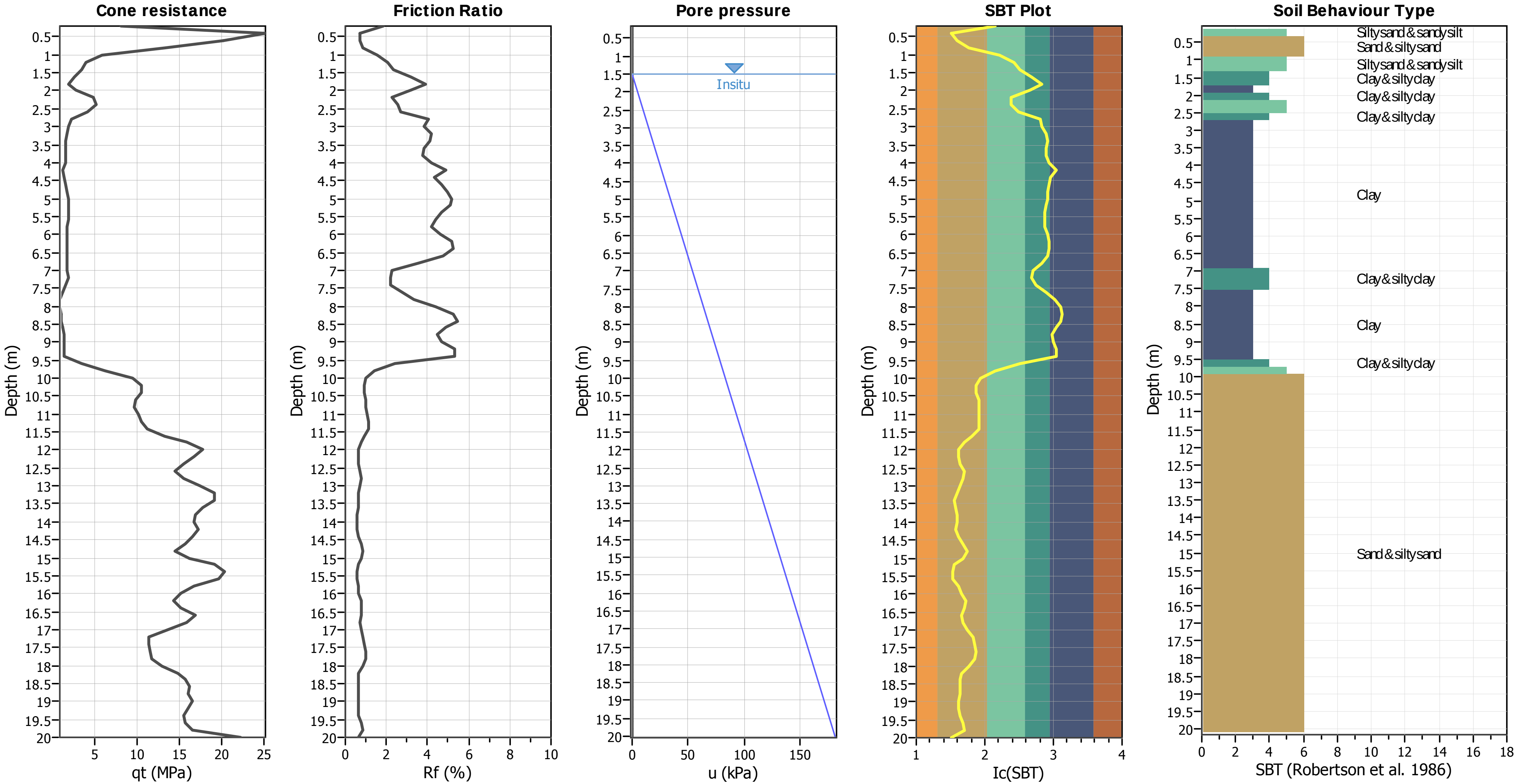






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



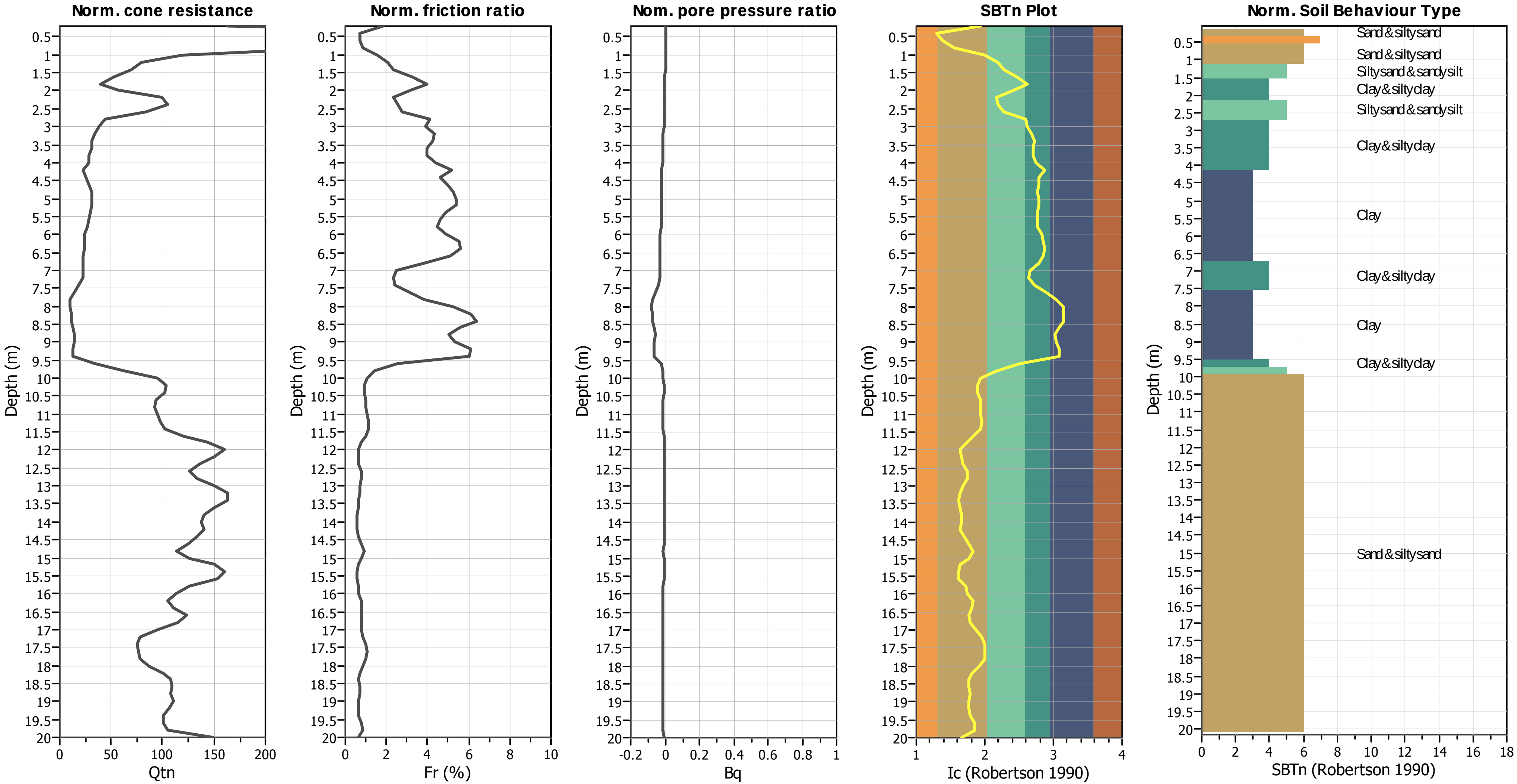
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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)



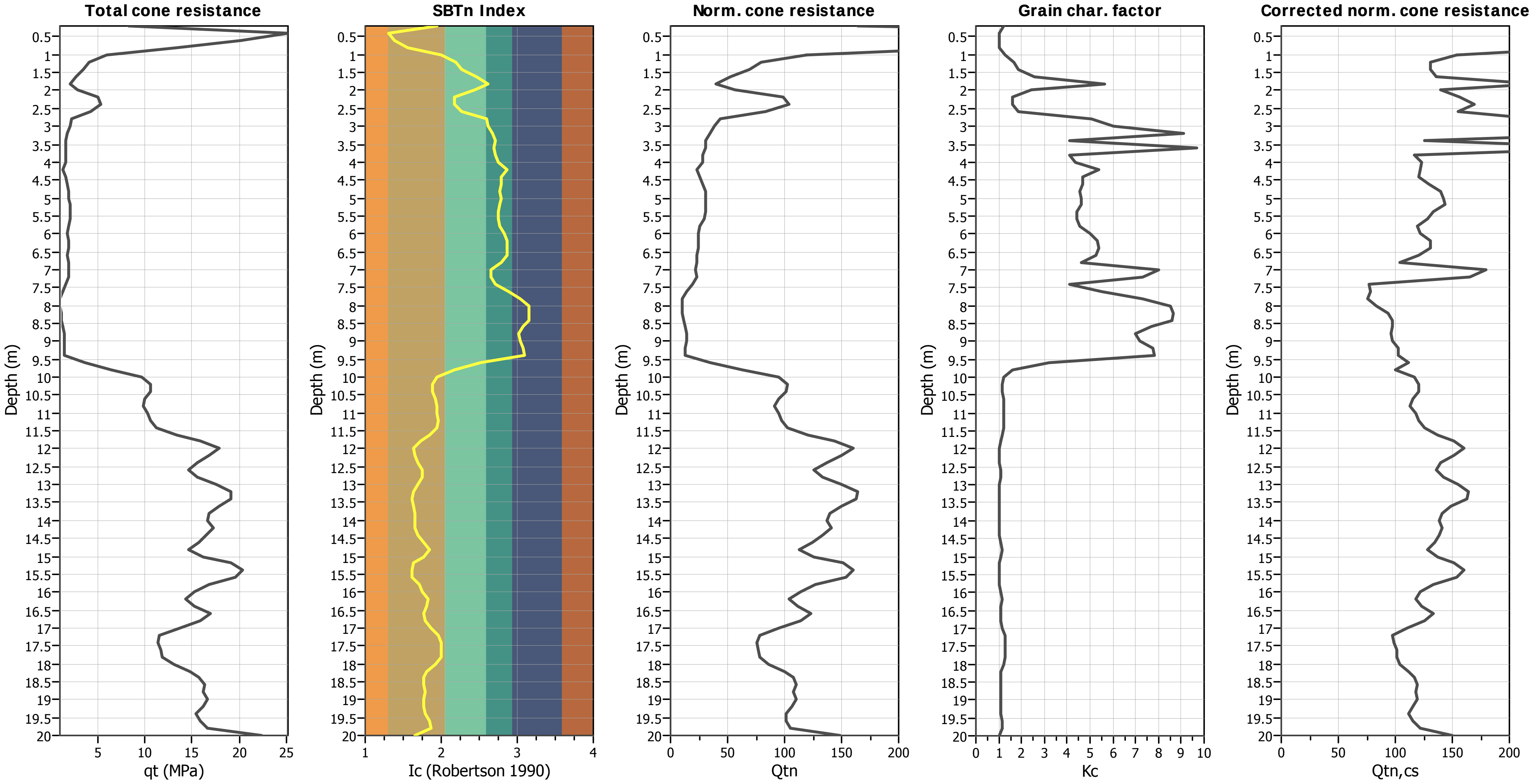
Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

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

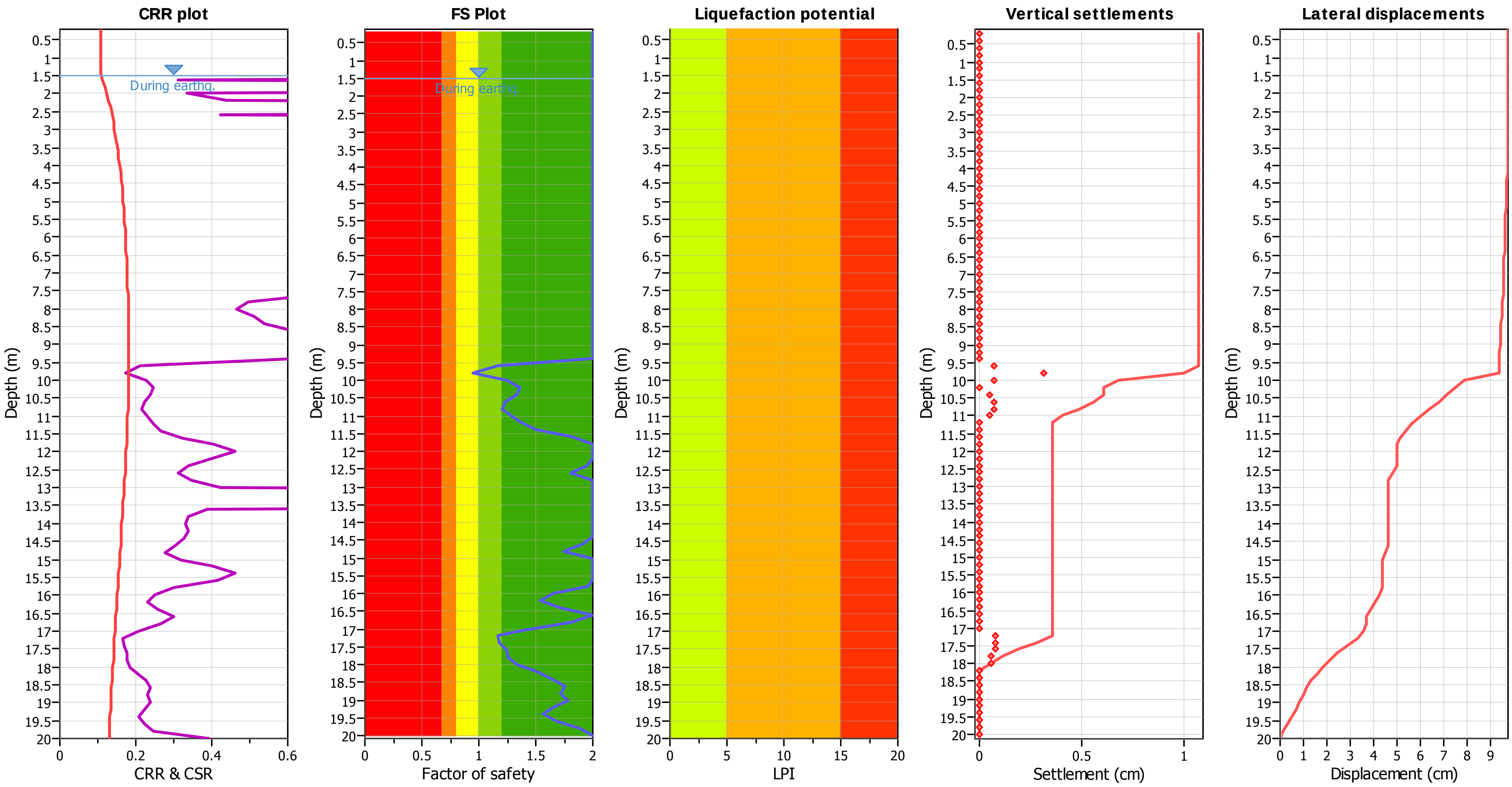
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

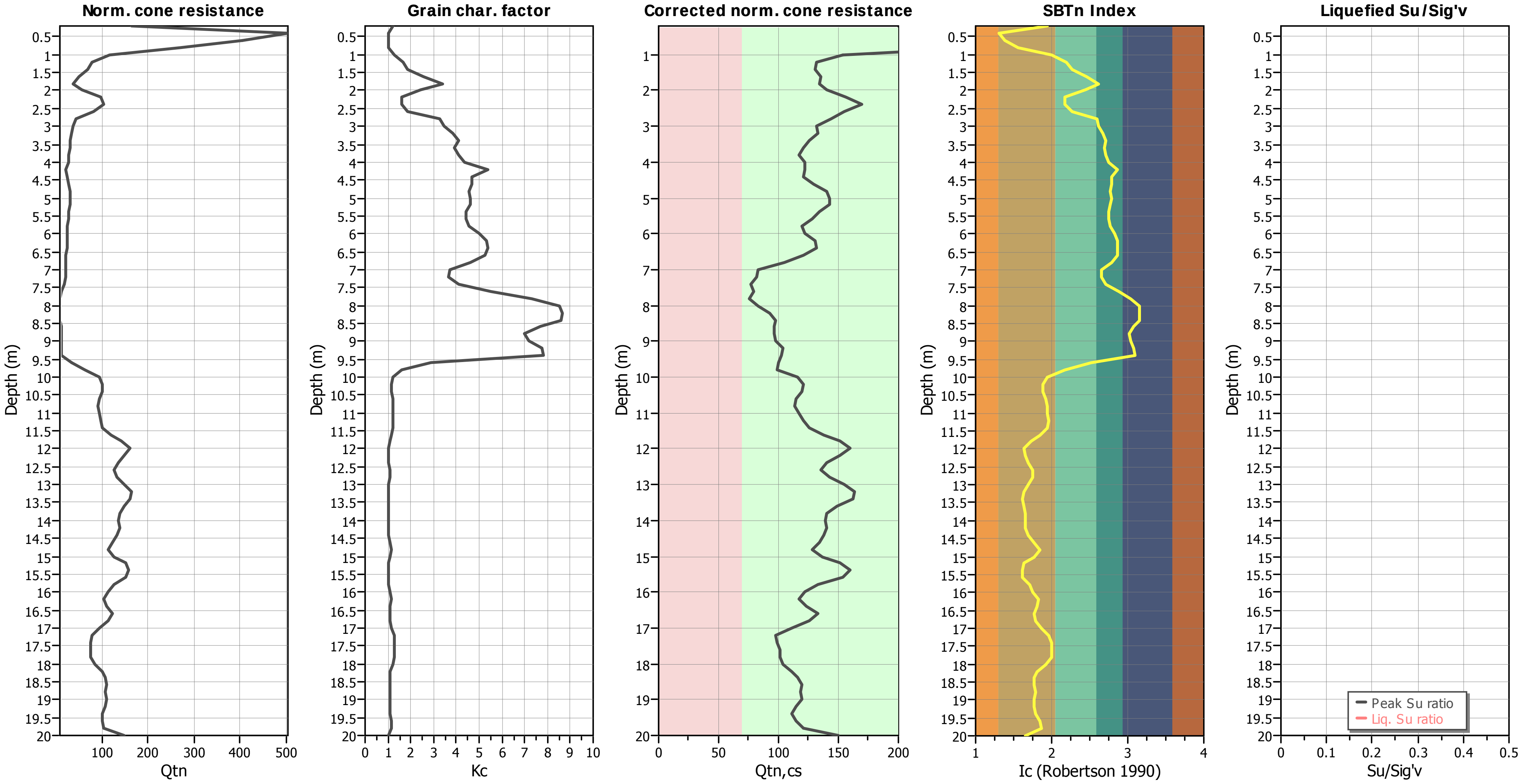
F.S. color scheme

- 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 (Robertson (2010))



Input parameters and analysis data

Analysis method:	Robertson (2009)	Depth to water table (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	Robertson (2009)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	No
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	All soils
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	20.00 m

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	127.49	0.00	11.50	19.57
2	0.40	24.53	196.13	0.00	0.48	20.16
3	0.60	26.49	127.49	0.00	1.40	19.91
4	0.80	9.82	127.49	0.00	3.62	19.44
5	1.00	3.93	88.26	0.00	12.74	18.91
6	1.20	4.15	68.65	0.00	18.73	18.59
7	1.40	3.95	88.26	0.00	21.71	18.54
8	1.60	2.38	88.26	0.00	29.08	18.48
9	1.80	1.60	78.45	0.00	35.70	18.28
10	2.00	2.09	68.65	0.00	27.88	18.59
11	2.20	4.94	127.49	0.00	17.88	19.06
12	2.40	7.88	147.10	0.00	18.38	19.26
13	2.60	2.98	127.49	0.00	21.37	19.00
14	2.80	1.80	68.65	0.00	34.85	18.50
15	3.00	2.00	78.45	0.00	36.17	18.22
16	3.20	2.12	78.45	0.00	39.49	18.18
17	3.40	1.24	68.65	0.00	41.14	17.98
18	3.60	1.43	49.03	0.00	40.01	17.93
19	3.80	2.22	68.65	0.00	41.05	17.85
20	4.00	1.04	58.84	0.00	43.08	17.97
21	4.20	1.44	68.65	0.00	50.01	17.84
22	4.40	1.34	58.84	0.00	45.47	17.96
23	4.60	1.74	68.65	0.00	45.35	18.21
24	4.80	1.93	107.87	0.00	44.52	18.47
25	5.00	2.03	107.87	0.00	44.91	18.57
26	5.20	1.94	88.26	0.00	44.76	18.61
27	5.40	2.14	117.68	0.00	43.61	18.50
28	5.60	2.04	78.45	0.00	43.52	18.41
29	5.80	1.84	68.65	0.00	44.47	18.25
30	6.00	1.75	88.26	0.00	47.41	18.28
31	6.20	1.76	88.26	0.00	49.62	18.46
32	6.40	1.96	107.87	0.00	49.92	18.51
33	6.60	1.86	98.07	0.00	49.32	18.33
34	6.80	1.57	49.03	0.00	44.87	18.03
35	7.00	2.06	49.03	0.00	38.48	17.55
36	7.20	1.97	29.42	0.00	37.68	17.56
37	7.40	1.77	49.03	0.00	41.29	17.30
38	7.60	1.19	29.42	0.00	51.00	17.21
39	7.80	0.89	29.42	0.00	61.75	17.00
40	8.00	0.89	39.23	0.00	68.95	17.29
41	8.20	1.10	58.84	0.00	69.69	17.64
42	8.40	1.20	68.65	0.00	69.31	17.79
43	8.60	1.10	58.84	0.00	64.25	17.83
44	8.80	1.49	58.84	0.00	59.99	17.87
45	9.00	1.59	68.65	0.00	61.28	17.93
46	9.20	1.12	68.65	0.00	64.37	18.09
47	9.40	1.51	88.26	0.00	64.69	18.09
48	9.60	1.61	68.65	0.00	31.64	18.59

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	7.49	98.07	0.00	17.89	18.86
50	10.00	9.94	98.07	0.00	11.38	19.14
51	10.20	11.43	98.07	0.00	10.00	19.17
52	10.40	10.44	98.07	0.00	10.09	19.17
53	10.60	9.95	98.07	0.00	11.16	19.15
54	10.80	9.46	98.07	0.00	11.53	19.14
55	11.00	9.95	98.07	0.00	11.52	19.27
56	11.20	11.44	127.49	0.00	11.74	19.38
57	11.40	10.46	127.49	0.00	11.45	19.50
58	11.60	11.94	127.49	0.00	8.94	19.56
59	11.80	17.82	127.49	0.00	6.78	19.63
60	12.00	17.82	127.49	0.00	5.05	19.58
61	12.20	17.83	98.07	0.00	5.31	19.46
62	12.40	14.89	98.07	0.00	5.81	19.32
63	12.60	13.91	98.07	0.00	7.18	19.40
64	12.80	14.89	127.49	0.00	6.91	19.53
65	13.00	17.83	127.49	0.00	5.95	19.67
66	13.20	19.80	127.49	0.00	4.98	19.70
67	13.40	19.80	127.49	0.00	4.64	19.61
68	13.60	17.84	98.07	0.00	5.05	19.48
69	13.80	15.88	98.07	0.00	5.28	19.35
70	14.00	16.86	98.07	0.00	5.44	19.35
71	14.20	17.37	98.07	0.00	5.16	19.36
72	14.40	17.37	98.07	0.00	6.14	19.45
73	14.60	14.92	127.49	0.00	7.33	19.53
74	14.80	14.92	127.49	0.00	8.94	19.60
75	15.00	13.94	127.49	0.00	7.51	19.64
76	15.20	19.83	127.49	0.00	5.07	19.61
77	15.40	23.75	98.07	0.00	4.47	19.63
78	15.60	17.38	127.49	0.00	4.47	19.52
79	15.80	17.87	98.07	0.00	6.42	19.46
80	16.00	14.93	98.07	0.00	7.14	19.31
81	16.20	12.97	98.07	0.00	8.69	19.40
82	16.40	14.94	127.49	0.00	8.33	19.52
83	16.60	17.88	127.49	0.00	7.46	19.65
84	16.80	17.88	127.49	0.00	7.86	19.54
85	17.00	11.99	98.07	0.00	9.67	19.38
86	17.20	11.03	98.07	0.00	11.87	19.20
87	17.40	11.52	98.07	0.00	12.90	19.31
88	17.60	11.52	127.49	0.00	13.15	19.42
89	17.80	12.01	127.49	0.00	12.98	19.43
90	18.00	12.01	98.07	0.00	10.81	19.36
91	18.20	14.96	98.07	0.00	8.25	19.30
92	18.40	17.42	98.07	0.00	7.41	19.33
93	18.60	14.96	98.07	0.00	7.58	19.45
94	18.80	16.44	127.49	0.00	7.79	19.44
95	19.00	16.93	98.07	0.00	7.42	19.45
96	19.20	16.46	98.07	0.00	7.35	19.33

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	14.98	98.07	0.00	7.98	19.32
98	19.60	14.98	98.07	0.00	9.02	19.57
99	19.80	17.44	166.71	0.00	9.46	19.79
100	20.00	24.79	127.49	0.00	5.29	19.87

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.91	0.00	3.91	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
2	0.40	7.94	0.00	7.94	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
3	0.60	11.93	0.00	11.93	1.00	0.182	1.67	0.109	1.00	1.00	2.000	No
4	0.80	15.82	0.00	15.82	1.00	0.181	1.67	0.109	1.00	1.00	2.000	No
5	1.00	19.60	0.00	19.60	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
6	1.20	23.32	0.00	23.32	0.99	0.181	1.67	0.108	1.00	1.00	2.000	No
7	1.40	27.02	0.00	27.02	0.99	0.180	1.67	0.108	1.00	1.00	2.000	No
8	1.60	30.72	0.98	29.74	0.99	0.186	1.67	0.112	1.00	1.00	0.112	No
9	1.80	34.38	2.94	31.43	0.99	0.197	1.67	0.118	1.00	1.00	0.118	No
10	2.00	38.09	4.91	33.19	0.99	0.206	1.67	0.124	1.00	1.00	0.124	No
11	2.20	41.91	6.87	35.04	0.99	0.214	1.67	0.129	1.00	1.00	0.129	No
12	2.40	45.76	8.83	36.93	0.98	0.222	1.67	0.133	1.00	1.00	0.133	No
13	2.60	49.56	10.79	38.77	0.98	0.229	1.67	0.137	1.00	1.00	0.137	No
14	2.80	53.26	12.75	40.51	0.98	0.235	1.67	0.141	1.00	1.00	0.141	No
15	3.00	56.90	14.71	42.19	0.98	0.240	1.67	0.144	1.00	1.00	0.144	No
16	3.20	60.54	16.68	43.86	0.98	0.246	1.67	0.147	1.00	1.00	0.147	No
17	3.40	64.14	18.64	45.50	0.98	0.251	1.67	0.150	1.00	1.00	0.150	No
18	3.60	67.72	20.60	47.12	0.98	0.255	1.67	0.153	1.00	1.00	0.153	No
19	3.80	71.29	22.56	48.73	0.97	0.259	1.67	0.155	1.00	1.00	0.155	No
20	4.00	74.89	24.52	50.36	0.97	0.263	1.67	0.158	1.00	1.00	0.158	No
21	4.20	78.45	26.49	51.97	0.97	0.267	1.67	0.160	1.00	1.00	0.160	No
22	4.40	82.05	28.45	53.60	0.97	0.270	1.67	0.162	1.00	1.00	0.162	No
23	4.60	85.69	30.41	55.28	0.97	0.273	1.67	0.164	1.00	1.00	0.164	No
24	4.80	89.38	32.37	57.01	0.97	0.276	1.67	0.165	1.00	1.00	0.165	No
25	5.00	93.10	34.34	58.76	0.97	0.278	1.67	0.167	1.00	1.00	0.167	No
26	5.20	96.82	36.30	60.52	0.96	0.281	1.67	0.168	1.00	1.00	0.168	No
27	5.40	100.52	38.26	62.26	0.96	0.283	1.67	0.170	1.00	1.00	0.170	No
28	5.60	104.20	40.22	63.98	0.96	0.285	1.67	0.171	1.00	1.00	0.171	No
29	5.80	107.85	42.18	65.67	0.96	0.287	1.67	0.172	1.00	1.00	0.172	No
30	6.00	111.51	44.15	67.36	0.96	0.289	1.67	0.173	1.00	1.00	0.173	No
31	6.20	115.20	46.11	69.09	0.96	0.290	1.67	0.174	1.00	1.00	0.174	No
32	6.40	118.90	48.07	70.83	0.95	0.292	1.67	0.175	1.00	1.00	0.175	No
33	6.60	122.57	50.03	72.54	0.95	0.293	1.67	0.176	1.00	1.00	0.176	No
34	6.80	126.17	51.99	74.18	0.95	0.294	1.67	0.176	1.00	1.00	0.176	No
35	7.00	129.68	53.95	75.73	0.95	0.296	1.67	0.177	1.00	1.00	0.177	No
36	7.20	133.19	55.92	77.28	0.95	0.297	1.67	0.178	1.00	1.00	0.178	No
37	7.40	136.66	57.88	78.78	0.94	0.298	1.67	0.179	1.00	1.00	0.179	No
38	7.60	140.10	59.84	80.26	0.94	0.299	1.67	0.179	1.00	1.00	0.179	No
39	7.80	143.50	61.80	81.69	0.94	0.300	1.67	0.180	1.00	1.00	0.180	No
40	8.00	146.96	63.77	83.19	0.94	0.301	1.67	0.181	1.00	1.00	0.181	No
41	8.20	150.48	65.73	84.76	0.93	0.302	1.67	0.181	1.00	1.00	0.181	No
42	8.40	154.04	67.69	86.35	0.93	0.303	1.67	0.181	1.00	1.00	0.181	No
43	8.60	157.61	69.65	87.96	0.93	0.303	1.67	0.182	1.00	1.00	0.182	No
44	8.80	161.18	71.61	89.57	0.93	0.303	1.67	0.182	1.00	1.00	0.182	No
45	9.00	164.77	73.58	91.19	0.92	0.303	1.67	0.182	1.00	1.00	0.182	No
46	9.20	168.39	75.54	92.85	0.92	0.304	1.67	0.182	1.00	1.00	0.182	No
47	9.40	172.00	77.50	94.51	0.92	0.303	1.67	0.182	1.00	1.00	0.182	No
48	9.60	175.72	79.46	96.26	0.91	0.303	1.67	0.182	1.00	1.00	0.182	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	179.49	81.42	98.07	0.91	0.303	1.67	0.181	1.00	1.00	0.181	No
50	10.00	183.32	83.39	99.93	0.90	0.302	1.67	0.181	1.00	1.00	0.181	No
51	10.20	187.15	85.35	101.81	0.90	0.301	1.67	0.181	1.00	1.00	0.181	No
52	10.40	190.99	87.31	103.68	0.90	0.301	1.67	0.180	1.00	1.00	0.180	No
53	10.60	194.82	89.27	105.55	0.89	0.300	1.67	0.180	1.00	1.00	0.180	No
54	10.80	198.65	91.23	107.41	0.89	0.299	1.67	0.179	1.00	1.00	0.179	No
55	11.00	202.50	93.19	109.31	0.88	0.298	1.67	0.178	1.00	1.00	0.178	No
56	11.20	206.38	95.16	111.22	0.88	0.296	1.67	0.178	1.00	1.00	0.178	No
57	11.40	210.28	97.12	113.16	0.87	0.295	1.67	0.177	1.00	1.00	0.177	No
58	11.60	214.19	99.08	115.11	0.87	0.294	1.67	0.176	1.00	1.00	0.176	No
59	11.80	218.12	101.04	117.07	0.86	0.292	1.67	0.175	1.00	1.00	0.175	No
60	12.00	222.03	103.00	119.03	0.86	0.291	1.67	0.174	1.00	1.00	0.174	No
61	12.20	225.93	104.97	120.96	0.85	0.289	1.67	0.173	1.00	1.00	0.173	No
62	12.40	229.79	106.93	122.86	0.84	0.288	1.67	0.172	1.00	1.00	0.172	No
63	12.60	233.67	108.89	124.78	0.84	0.286	1.67	0.171	1.00	1.00	0.171	No
64	12.80	237.58	110.85	126.72	0.83	0.284	1.67	0.170	1.00	1.00	0.170	No
65	13.00	241.51	112.81	128.69	0.83	0.282	1.67	0.169	1.00	1.00	0.169	No
66	13.20	245.45	114.78	130.67	0.82	0.280	1.67	0.168	1.00	1.00	0.168	No
67	13.40	249.37	116.74	132.63	0.81	0.279	1.67	0.167	1.00	1.00	0.167	No
68	13.60	253.27	118.70	134.57	0.81	0.277	1.67	0.166	1.00	1.00	0.166	No
69	13.80	257.14	120.66	136.48	0.80	0.275	1.67	0.165	1.00	1.00	0.165	No
70	14.00	261.01	122.63	138.38	0.79	0.273	1.67	0.163	1.00	1.00	0.163	No
71	14.20	264.88	124.59	140.29	0.79	0.271	1.67	0.162	1.00	1.00	0.162	No
72	14.40	268.77	126.55	142.22	0.78	0.269	1.67	0.161	1.00	1.00	0.161	No
73	14.60	272.68	128.51	144.17	0.77	0.267	1.67	0.160	1.00	1.00	0.160	No
74	14.80	276.60	130.47	146.12	0.77	0.264	1.67	0.158	1.00	1.00	0.158	No
75	15.00	280.52	132.44	148.09	0.76	0.262	1.67	0.157	1.00	1.00	0.157	No
76	15.20	284.45	134.40	150.05	0.75	0.260	1.67	0.156	1.00	1.00	0.156	No
77	15.40	288.37	136.36	152.01	0.75	0.258	1.67	0.155	1.00	1.00	0.155	No
78	15.60	292.28	138.32	153.96	0.74	0.256	1.67	0.153	1.00	1.00	0.153	No
79	15.80	296.17	140.28	155.88	0.73	0.254	1.67	0.152	1.00	1.00	0.152	No
80	16.00	300.03	142.25	157.79	0.73	0.252	1.67	0.151	1.00	1.00	0.151	No
81	16.20	303.91	144.21	159.70	0.72	0.250	1.67	0.150	1.00	1.00	0.150	No
82	16.40	307.81	146.17	161.65	0.71	0.248	1.67	0.148	1.00	1.00	0.148	No
83	16.60	311.74	148.13	163.61	0.71	0.246	1.67	0.147	1.00	1.00	0.147	No
84	16.80	315.65	150.09	165.56	0.70	0.244	1.67	0.146	1.00	1.00	0.146	No
85	17.00	319.53	152.06	167.47	0.70	0.242	1.67	0.145	1.00	1.00	0.145	No
86	17.20	323.37	154.02	169.35	0.69	0.240	1.67	0.144	1.00	1.00	0.144	No
87	17.40	327.23	155.98	171.25	0.68	0.238	1.67	0.143	1.00	1.00	0.143	No
88	17.60	331.12	157.94	173.17	0.68	0.236	1.67	0.141	1.00	1.00	0.141	No
89	17.80	335.00	159.90	175.10	0.67	0.234	1.67	0.140	1.00	1.00	0.140	No
90	18.00	338.87	161.87	177.01	0.67	0.232	1.67	0.139	1.00	1.00	0.139	No
91	18.20	342.73	163.83	178.91	0.66	0.231	1.67	0.138	1.00	1.00	0.138	No
92	18.40	346.60	165.79	180.81	0.66	0.229	1.67	0.137	1.00	1.00	0.137	No
93	18.60	350.49	167.75	182.74	0.65	0.227	1.67	0.136	1.00	1.00	0.136	No
94	18.80	354.38	169.71	184.66	0.65	0.226	1.67	0.135	1.00	1.00	0.135	No
95	19.00	358.27	171.68	186.59	0.64	0.224	1.67	0.134	1.00	1.00	0.134	No
96	19.20	362.13	173.64	188.50	0.64	0.222	1.67	0.133	1.00	1.00	0.133	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	366.00	175.60	190.40	0.63	0.221	1.67	0.132	1.00	1.00	0.132	No
98	19.60	369.91	177.56	192.35	0.63	0.219	1.67	0.132	1.00	1.00	0.132	No
99	19.80	373.87	179.52	194.34	0.62	0.218	1.67	0.131	1.00	1.00	0.131	No
100	20.00	377.84	181.49	196.36	0.62	0.216	1.67	0.130	1.00	1.00	0.130	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	8.18	1.94	1.84	0.59	163.56	1.23	201.85	4.000	No	No	2.00
2	0.40	25.18	1.31	0.69	0.35	503.44	1.00	503.44	4.000	No	No	2.00
3	0.60	20.28	1.39	0.74	0.39	405.29	1.00	405.29	4.000	No	No	2.00
4	0.80	13.41	1.55	0.85	0.45	267.92	1.00	267.92	4.000	No	No	2.00
5	1.00	5.97	1.99	1.59	0.62	118.91	1.29	153.40	4.000	No	No	2.00
6	1.20	4.01	2.19	2.05	0.70	79.75	1.65	131.40	4.000	No	No	2.00
7	1.40	3.49	2.28	2.36	0.73	69.35	1.88	130.37	4.000	No	No	2.00
8	1.60	2.64	2.46	3.25	0.80	52.27	2.59	135.42	0.311	No	No	2.00
9	1.80	2.02	2.61	3.94	0.86	39.78	5.65	224.95	4.000	No	No	2.00
10	2.00	2.88	2.44	3.22	0.79	56.77	2.46	139.84	0.334	No	No	2.00
11	2.20	4.97	2.17	2.32	0.69	98.61	1.59	156.60	0.437	No	No	2.00
12	2.40	5.27	2.18	2.57	0.70	104.48	1.62	169.57	4.000	No	No	2.00
13	2.60	4.22	2.27	2.74	0.73	83.48	1.85	154.58	0.424	No	No	2.00
14	2.80	2.26	2.59	4.14	0.86	44.17	5.06	223.42	4.000	No	No	2.00
15	3.00	1.97	2.62	3.92	0.87	38.35	6.02	230.71	4.000	No	No	2.00
16	3.20	1.78	2.68	4.36	0.89	34.49	9.08	313.31	4.000	No	No	2.00
17	3.40	1.60	2.71	4.27	0.91	30.62	4.09	125.29	1.461	No	Yes	2.00
18	3.60	1.63	2.69	3.98	0.90	30.69	9.66	296.47	4.000	No	No	2.00
19	3.80	1.56	2.71	3.95	0.91	28.64	4.08	116.80	1.366	No	Yes	2.00
20	4.00	1.57	2.75	4.38	0.92	28.08	4.36	122.49	1.340	No	Yes	2.00
21	4.20	1.28	2.87	5.19	0.97	22.57	5.39	121.63	1.076	No	Yes	2.00
22	4.40	1.51	2.79	4.59	0.94	25.62	4.71	120.63	1.222	No	Yes	2.00
23	4.60	1.67	2.79	4.95	0.94	27.68	4.69	129.83	1.320	No	Yes	2.00
24	4.80	1.90	2.77	5.24	0.94	30.62	4.57	139.93	1.461	No	Yes	2.00
25	5.00	1.97	2.78	5.40	0.94	30.89	4.63	142.90	1.474	No	Yes	2.00
26	5.20	2.04	2.78	5.39	0.94	31.09	4.60	143.12	1.483	No	Yes	2.00
27	5.40	2.04	2.76	4.89	0.93	30.17	4.44	133.89	1.439	No	Yes	2.00
28	5.60	2.01	2.76	4.64	0.93	28.86	4.42	127.69	1.377	No	Yes	2.00
29	5.80	1.88	2.77	4.44	0.94	26.26	4.56	119.78	1.253	No	Yes	2.00
30	6.00	1.78	2.82	4.88	0.96	24.45	4.99	122.12	1.166	No	Yes	2.00
31	6.20	1.82	2.86	5.55	0.97	24.50	5.33	130.59	1.169	No	Yes	2.00
32	6.40	1.86	2.87	5.62	0.98	24.43	5.38	131.34	1.165	No	Yes	2.00
33	6.60	1.80	2.86	5.07	0.97	22.91	5.28	121.04	1.093	No	Yes	2.00
34	6.80	1.83	2.78	3.84	0.95	22.61	4.62	104.45	1.078	No	Yes	2.00
35	7.00	1.87	2.66	2.45	0.90	22.32	8.04	179.50	4.000	No	No	2.00
36	7.20	1.94	2.65	2.36	0.90	22.71	7.29	165.48	4.000	No	No	2.00
37	7.40	1.64	2.72	2.38	0.92	18.80	4.11	77.26	0.897	No	Yes	2.00
38	7.60	1.28	2.88	3.14	0.99	14.23	5.54	78.84	0.679	No	Yes	2.00
39	7.80	0.99	3.05	3.86	1.00	10.37	7.29	75.56	0.494	No	Yes	2.00
40	8.00	0.96	3.15	5.22	1.00	9.78	8.53	83.44	0.467	No	Yes	2.00
41	8.20	1.06	3.16	6.10	1.00	10.75	8.66	93.16	0.513	No	Yes	2.00
42	8.40	1.13	3.15	6.36	1.00	11.31	8.59	97.20	0.539	No	Yes	2.00
43	8.60	1.26	3.08	5.63	1.00	12.55	7.71	96.84	0.599	No	Yes	2.00
44	8.80	1.39	3.02	5.04	1.00	13.75	6.99	96.17	0.656	No	Yes	2.00
45	9.00	1.40	3.04	5.30	1.00	13.54	7.21	97.62	0.646	No	Yes	2.00
46	9.20	1.41	3.08	6.08	1.00	13.33	7.74	103.09	0.636	No	Yes	2.00
47	9.40	1.41	3.09	6.06	1.00	13.12	7.79	102.23	0.626	No	Yes	2.00
48	9.60	3.54	2.52	2.53	0.86	34.73	3.23	112.10	0.211	No	No	1.16

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	6.35	2.17	1.43	0.72	62.56	1.59	99.38	0.171	No	No	0.94
50	10.00	9.62	1.94	1.04	0.64	94.41	1.23	116.05	0.225	No	No	1.24
51	10.20	10.60	1.88	0.94	0.62	103.02	1.17	120.93	0.244	No	No	1.35
52	10.40	10.61	1.89	0.94	0.62	101.85	1.18	119.91	0.240	No	No	1.33
53	10.60	9.95	1.93	1.00	0.64	94.28	1.22	115.02	0.221	No	No	1.23
54	10.80	9.79	1.95	1.02	0.65	91.59	1.24	113.15	0.215	No	No	1.20
55	11.00	10.29	1.95	1.07	0.65	95.21	1.23	117.57	0.231	No	No	1.30
56	11.20	10.62	1.95	1.13	0.65	97.19	1.24	120.93	0.244	No	No	1.38
57	11.40	11.28	1.94	1.15	0.65	102.20	1.23	125.92	0.266	No	No	1.50
58	11.60	13.41	1.84	0.97	0.61	121.11	1.13	137.44	0.321	No	No	1.83
59	11.80	15.86	1.73	0.82	0.57	142.97	1.06	151.70	0.405	No	No	2.00
60	12.00	17.82	1.64	0.67	0.53	160.35	1.00	159.83	0.460	No	No	2.00
61	12.20	16.84	1.66	0.65	0.54	149.92	1.01	151.00	0.400	No	No	2.00
62	12.40	15.54	1.68	0.64	0.55	136.63	1.03	140.28	0.337	No	No	1.95
63	12.60	14.56	1.75	0.75	0.58	125.97	1.07	135.40	0.311	No	No	1.81
64	12.80	15.54	1.74	0.77	0.58	133.49	1.07	142.23	0.348	No	No	2.00
65	13.00	17.50	1.69	0.74	0.56	149.94	1.03	154.69	0.424	No	No	2.00
66	13.20	19.14	1.64	0.67	0.54	163.60	1.00	163.60	4.000	No	No	2.00
67	13.40	19.15	1.62	0.62	0.53	162.59	1.00	162.59	4.000	No	No	2.00
68	13.60	17.84	1.64	0.61	0.54	149.69	1.00	149.20	0.389	No	No	2.00
69	13.80	16.86	1.65	0.59	0.55	139.98	1.01	140.84	0.340	No	No	2.00
70	14.00	16.70	1.66	0.60	0.55	137.37	1.01	139.10	0.330	No	No	2.00
71	14.20	17.20	1.65	0.58	0.55	140.67	1.00	140.85	0.340	No	No	2.00
72	14.40	16.55	1.70	0.66	0.57	133.24	1.04	138.39	0.326	No	No	2.00
73	14.60	15.73	1.76	0.76	0.59	124.44	1.08	134.36	0.306	No	No	1.91
74	14.80	14.59	1.84	0.89	0.62	113.00	1.13	128.25	0.276	No	No	1.74
75	15.00	16.23	1.77	0.80	0.60	126.05	1.09	136.89	0.319	No	No	2.00
76	15.20	19.17	1.64	0.62	0.55	151.06	1.00	150.67	0.398	No	No	2.00
77	15.40	20.32	1.61	0.59	0.54	159.89	1.00	159.89	0.460	No	No	2.00
78	15.60	19.67	1.61	0.56	0.54	153.52	1.00	153.52	0.417	No	No	2.00
79	15.80	16.72	1.72	0.66	0.58	126.89	1.05	133.03	0.299	No	No	1.96
80	16.00	15.26	1.75	0.66	0.60	113.92	1.07	122.30	0.250	No	No	1.66
81	16.20	14.28	1.83	0.77	0.63	104.26	1.13	117.42	0.231	No	No	1.54
82	16.40	15.26	1.81	0.79	0.62	111.02	1.11	123.65	0.256	No	No	1.72
83	16.60	16.90	1.77	0.77	0.61	123.10	1.08	133.45	0.301	No	No	2.00
84	16.80	15.92	1.79	0.75	0.61	114.47	1.10	125.68	0.265	No	No	1.81
85	17.00	13.63	1.87	0.81	0.65	95.42	1.16	110.82	0.207	No	No	1.43
86	17.20	11.52	1.96	0.88	0.68	78.18	1.25	97.73	0.167	No	No	1.16
87	17.40	11.36	2.00	0.98	0.70	75.82	1.30	98.41	0.169	No	No	1.18
88	17.60	11.69	2.01	1.04	0.70	77.25	1.31	101.18	0.176	No	No	1.25
89	17.80	11.85	2.00	1.02	0.70	77.79	1.30	101.25	0.177	No	No	1.26
90	18.00	13.00	1.92	0.85	0.67	86.39	1.21	104.13	0.185	No	No	1.33
91	18.20	14.80	1.81	0.68	0.63	100.33	1.11	111.49	0.209	No	No	1.51
92	18.40	15.78	1.77	0.64	0.61	107.34	1.08	116.19	0.226	No	No	1.65
93	18.60	16.27	1.77	0.68	0.62	109.72	1.09	119.42	0.238	No	No	1.75
94	18.80	16.11	1.78	0.68	0.62	107.56	1.10	117.80	0.232	No	No	1.72
95	19.00	16.61	1.77	0.66	0.62	110.61	1.08	119.77	0.240	No	No	1.79
96	19.20	16.12	1.76	0.62	0.62	106.65	1.08	115.22	0.222	No	No	1.67

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	I_c	Fr (%)	n	Q_{tn}	K_c	$Q_{tn,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	15.48	1.79	0.65	0.63	100.79	1.10	111.06	0.207	No	No	1.57
98	19.60	15.80	1.84	0.78	0.65	101.01	1.14	114.94	0.221	No	No	1.68
99	19.80	16.62	1.86	0.89	0.66	105.05	1.15	121.18	0.245	No	No	1.88
100	20.00	22.34	1.65	0.64	0.58	148.60	1.01	149.59	0.391	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
I_c: Soil behavior type index
Fr: Normalized friction ratio (%)
n: Stress exponent
Q_{tn}: Normalized cone resistance
K_c: Cone resistance correction factor due to fines
$Q_{tn,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	2.00	0.00	9.20	0.20	0.00
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	1.16	0.00	5.20	0.20	0.00
9.80	0.94	0.06	5.10	0.20	0.06	10.00	1.24	0.00	5.00	0.20	0.00
10.20	1.35	0.00	4.90	0.20	0.00	10.40	1.33	0.00	4.80	0.20	0.00
10.60	1.23	0.00	4.70	0.20	0.00	10.80	1.20	0.00	4.60	0.20	0.00
11.00	1.30	0.00	4.50	0.20	0.00	11.20	1.38	0.00	4.40	0.20	0.00
11.40	1.50	0.00	4.30	0.20	0.00	11.60	1.83	0.00	4.20	0.20	0.00
11.80	2.00	0.00	4.10	0.20	0.00	12.00	2.00	0.00	4.00	0.20	0.00
12.20	2.00	0.00	3.90	0.20	0.00	12.40	1.95	0.00	3.80	0.20	0.00
12.60	1.81	0.00	3.70	0.20	0.00	12.80	2.00	0.00	3.60	0.20	0.00
13.00	2.00	0.00	3.50	0.20	0.00	13.20	2.00	0.00	3.40	0.20	0.00
13.40	2.00	0.00	3.30	0.20	0.00	13.60	2.00	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	1.91	0.00	2.70	0.20	0.00	14.80	1.74	0.00	2.60	0.20	0.00
15.00	2.00	0.00	2.50	0.20	0.00	15.20	2.00	0.00	2.40	0.20	0.00
15.40	2.00	0.00	2.30	0.20	0.00	15.60	2.00	0.00	2.20	0.20	0.00
15.80	1.96	0.00	2.10	0.20	0.00	16.00	1.66	0.00	2.00	0.20	0.00
16.20	1.54	0.00	1.90	0.20	0.00	16.40	1.72	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	1.81	0.00	1.60	0.20	0.00
17.00	1.43	0.00	1.50	0.20	0.00	17.20	1.16	0.00	1.40	0.20	0.00
17.40	1.18	0.00	1.30	0.20	0.00	17.60	1.25	0.00	1.20	0.20	0.00
17.80	1.26	0.00	1.10	0.20	0.00	18.00	1.33	0.00	1.00	0.20	0.00
18.20	1.51	0.00	0.90	0.20	0.00	18.40	1.65	0.00	0.80	0.20	0.00
18.60	1.75	0.00	0.70	0.20	0.00	18.80	1.72	0.00	0.60	0.20	0.00
19.00	1.79	0.00	0.50	0.20	0.00	19.20	1.67	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	1.57	0.00	0.30	0.20	0.00	19.60	1.68	0.00	0.20	0.20	0.00
19.80	1.88	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 0.06

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

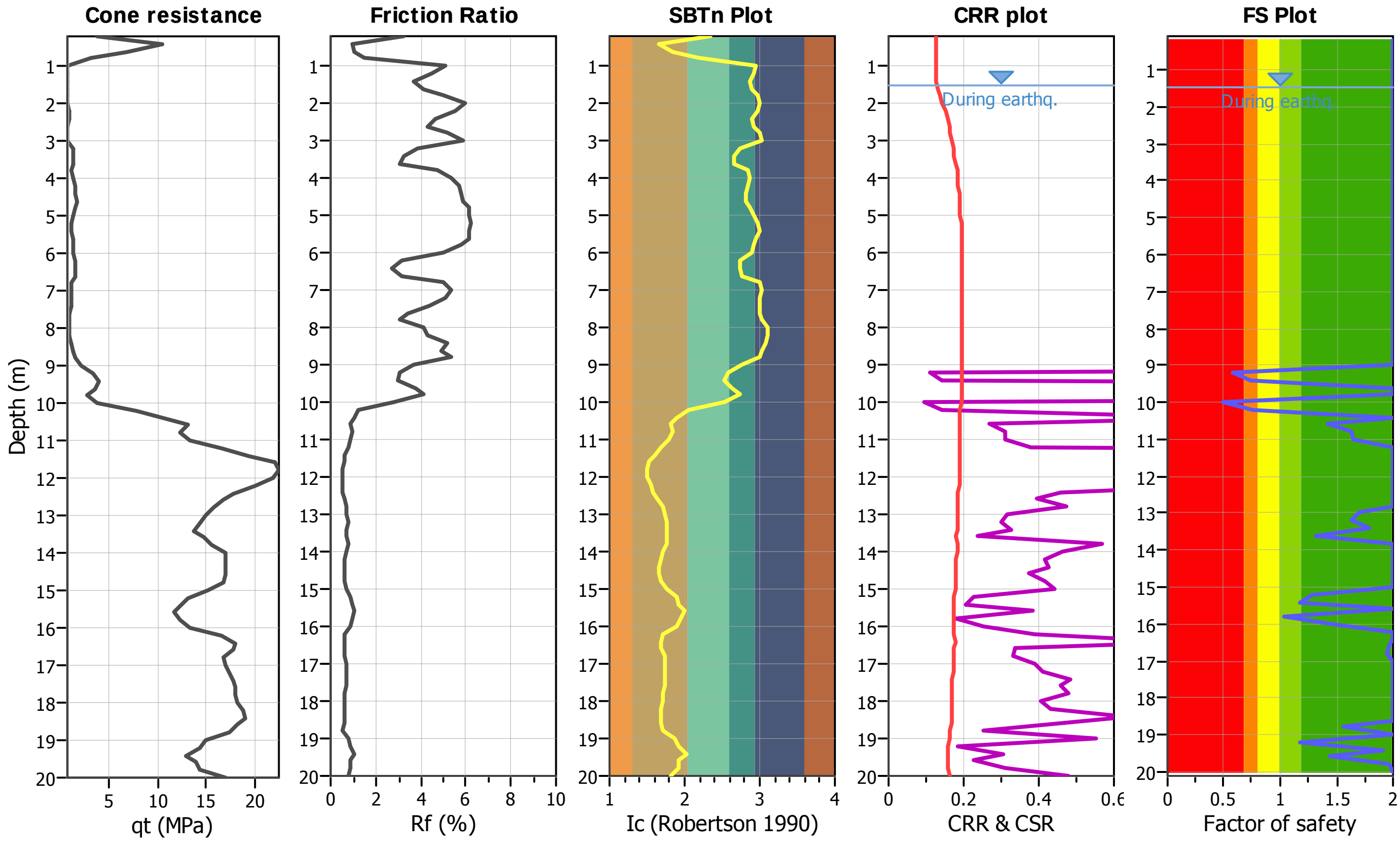
LIQUEFACTION ANALYSIS REPORT

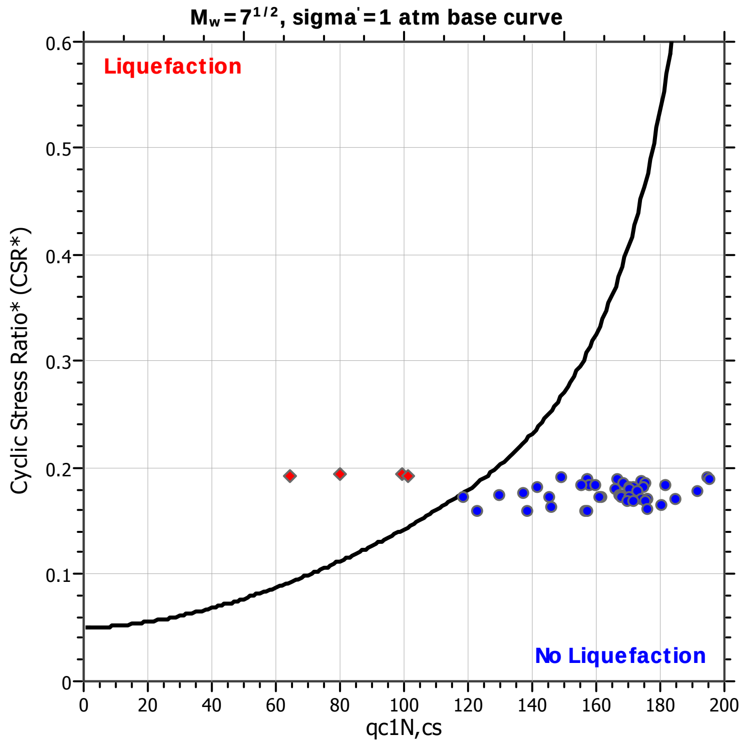
Project title : **Location :**

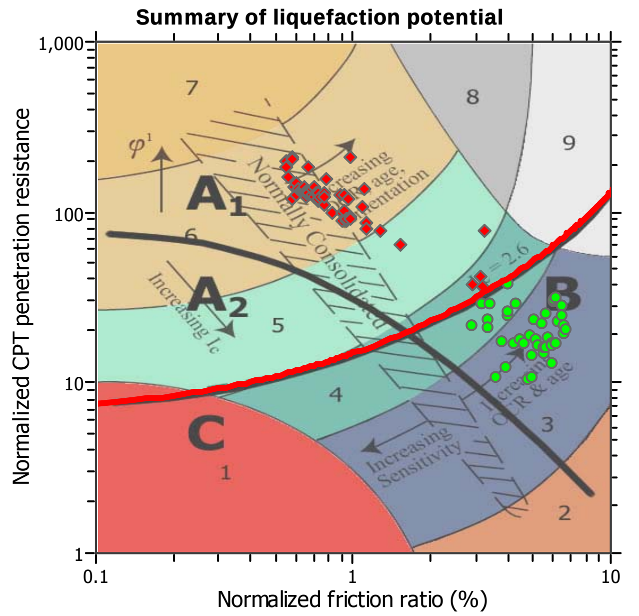
CPT file : CPT01

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:	Sands only
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:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

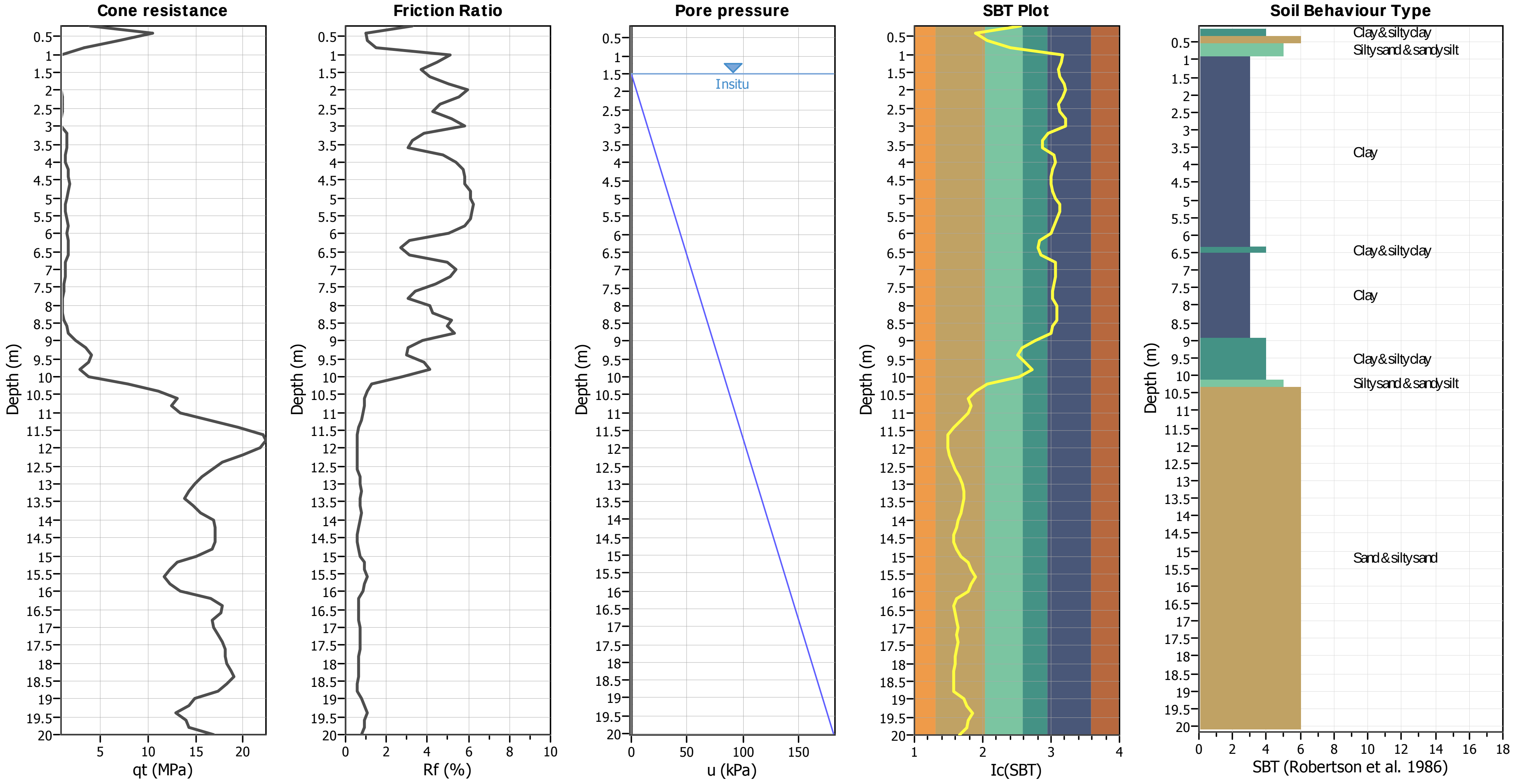






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



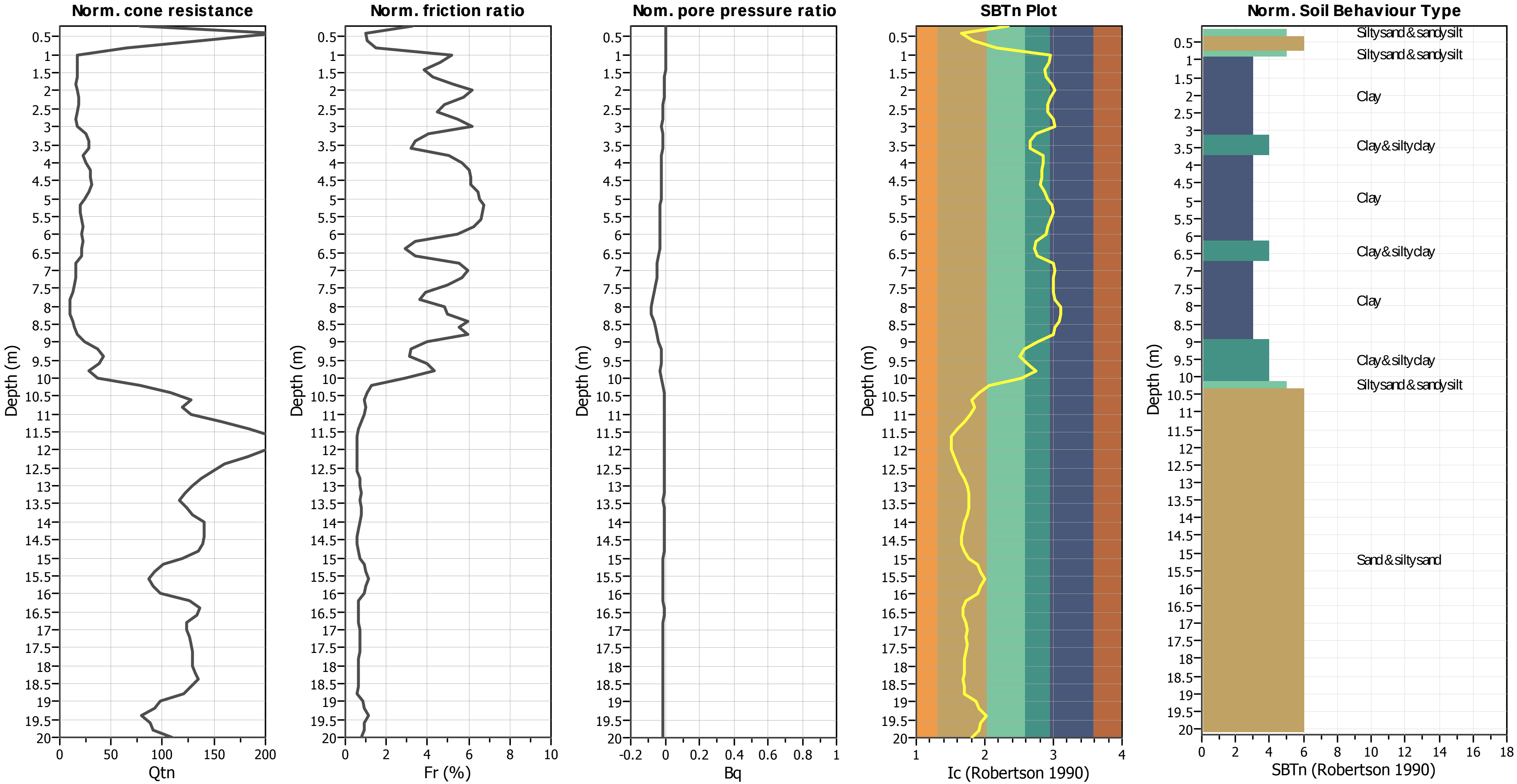
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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
- 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

CPT basic interpretation plots (normalized)



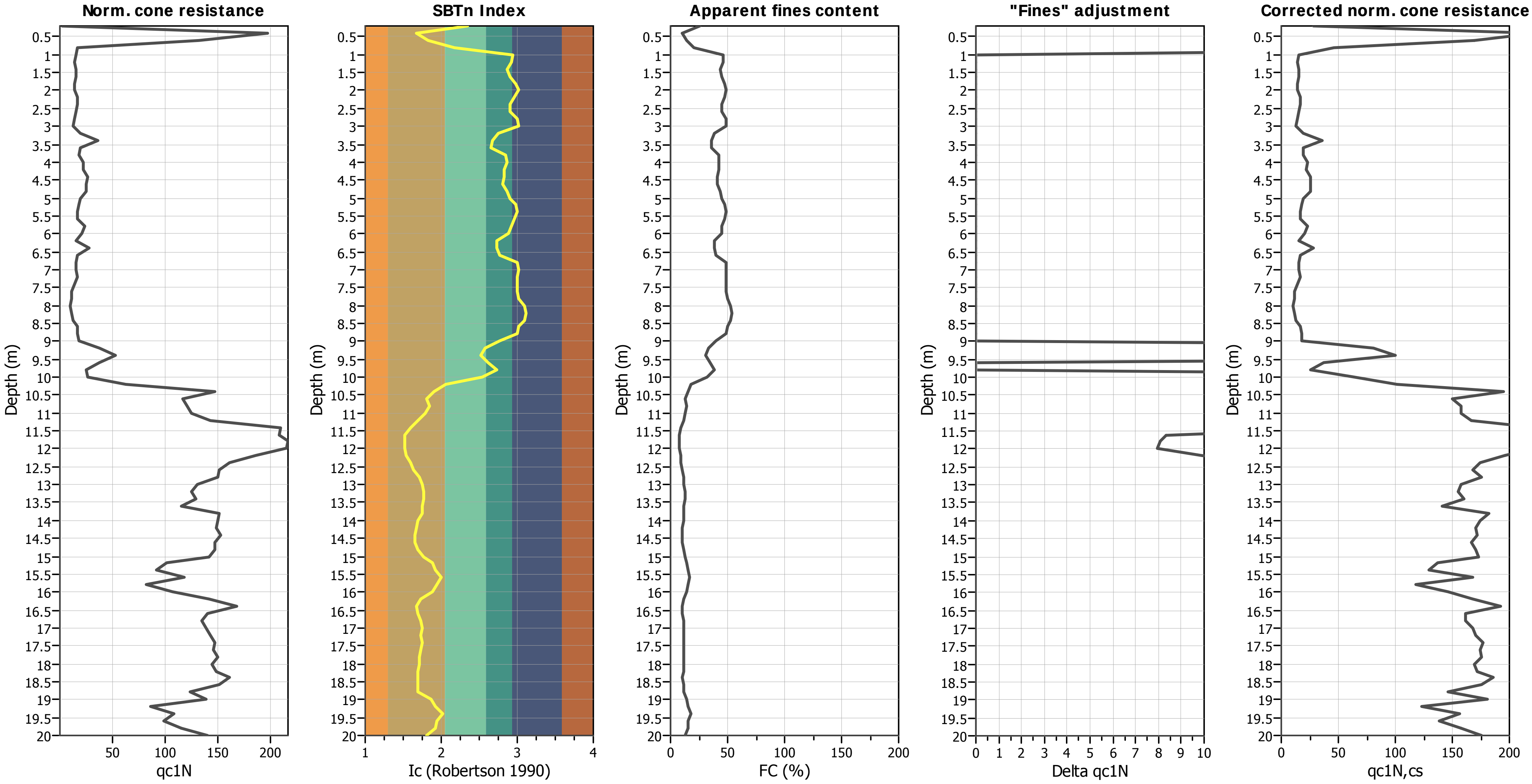
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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

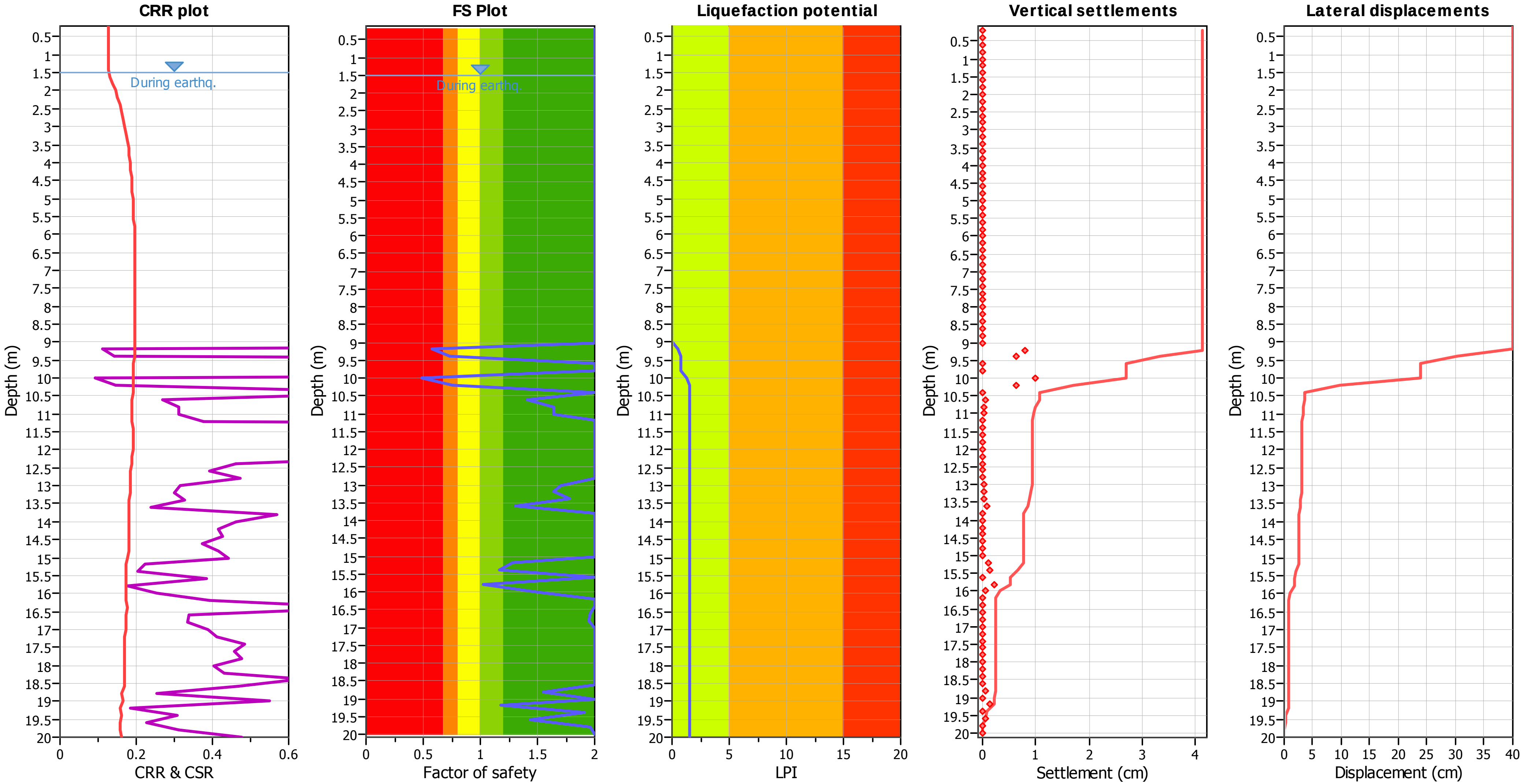
Liquefaction analysis overall plots (intermediate results)



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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

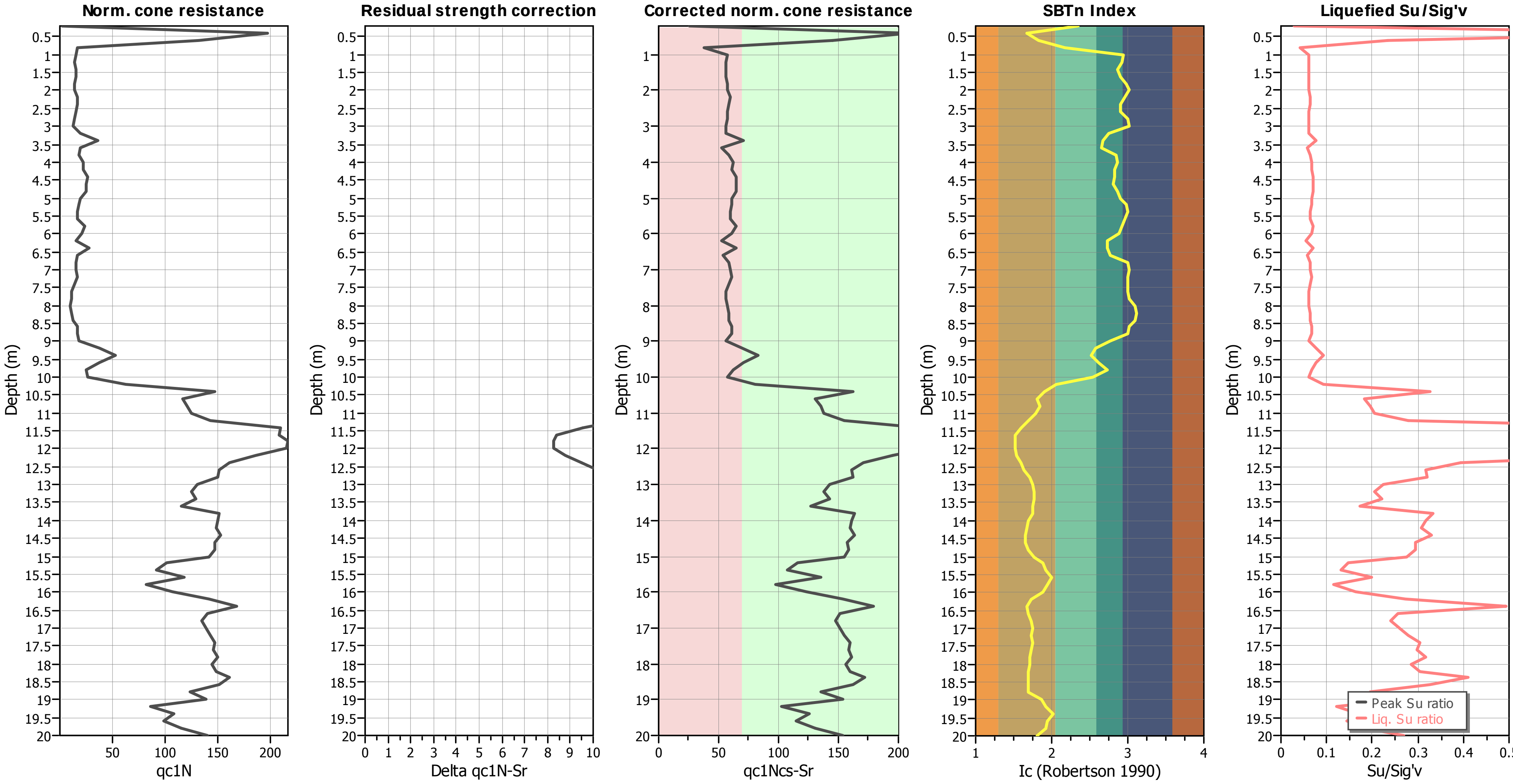
F.S. color scheme

- 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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	127.49	0.00	24.04	19.09
2	0.40	11.78	127.49	0.00	5.49	19.21
3	0.60	7.86	49.03	0.00	8.85	18.70
4	0.80	0.99	49.03	0.00	18.07	17.92
5	1.00	0.89	49.03	0.00	55.10	17.35
6	1.20	0.81	39.23	0.00	53.65	17.16
7	1.40	0.91	29.42	0.00	50.36	16.95
8	1.60	0.91	29.42	0.00	52.13	17.06
9	1.80	0.81	49.03	0.00	56.84	17.24
10	2.00	0.81	49.03	0.00	59.22	17.50
11	2.20	1.02	58.84	0.00	56.18	17.53
12	2.40	1.02	49.03	0.00	52.34	17.39
13	2.60	0.92	29.42	0.00	52.52	17.18
14	2.80	0.82	39.23	0.00	58.90	17.23
15	3.00	0.73	58.84	0.00	59.42	17.50
16	3.20	1.14	58.84	0.00	42.97	17.66
17	3.40	2.22	39.23	0.00	38.78	17.63
18	3.60	1.14	49.03	0.00	37.85	17.55
19	3.80	1.14	49.03	0.00	48.79	17.76
20	4.00	1.43	78.45	0.00	49.41	18.02
21	4.20	1.44	88.26	0.00	47.85	18.31
22	4.40	1.74	98.07	0.00	47.29	18.42
23	4.60	1.74	98.07	0.00	46.99	18.52
24	4.80	1.74	107.87	0.00	49.84	18.45
25	5.00	1.34	88.26	0.00	52.56	18.29
26	5.20	1.25	68.65	0.00	56.91	18.10
27	5.40	1.16	78.45	0.00	57.86	18.04
28	5.60	1.25	78.45	0.00	55.48	18.23
29	5.80	1.75	98.07	0.00	53.14	18.31
30	6.00	1.55	88.26	0.00	51.57	18.12
31	6.20	1.18	39.23	0.00	42.41	17.74
32	6.40	2.26	29.42	0.00	41.84	17.48
33	6.60	1.27	58.84	0.00	44.35	17.64
34	6.80	1.18	58.84	0.00	58.17	17.83
35	7.00	1.27	68.65	0.00	59.44	17.95
36	7.20	1.38	78.45	0.00	59.00	17.90
37	7.40	1.19	49.03	0.00	58.93	17.61
38	7.60	0.99	29.42	0.00	58.18	17.13
39	7.80	0.99	29.42	0.00	59.91	16.87
40	8.00	0.89	29.42	0.00	65.67	17.20
41	8.20	1.00	58.84	0.00	65.97	17.30
42	8.40	1.10	39.23	0.00	64.81	17.81
43	8.60	1.49	88.26	0.00	59.98	17.98
44	8.80	1.59	78.45	0.00	58.56	18.28
45	9.00	1.69	88.26	0.00	44.24	18.42
46	9.20	3.57	88.26	0.00	34.07	18.81
47	9.40	5.04	137.29	0.00	31.37	19.05
48	9.60	3.57	137.29	0.00	36.58	19.18

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	2.49	147.10	0.00	42.56	18.88
50	10.00	2.59	68.65	0.00	32.44	18.85
51	10.20	6.23	98.07	0.00	14.60	19.06
52	10.40	14.86	127.49	0.00	10.58	19.40
53	10.60	11.91	127.49	0.00	8.22	19.46
54	10.80	12.40	98.07	0.00	9.01	19.44
55	11.00	12.90	127.49	0.00	8.05	19.47
56	11.20	14.88	127.49	0.00	5.98	19.64
57	11.40	21.74	127.49	0.00	4.25	19.71
58	11.60	21.74	127.49	0.00	3.08	19.76
59	11.80	22.72	127.49	0.00	2.99	19.76
60	12.00	22.72	127.49	0.00	2.97	19.66
61	12.20	19.79	98.07	0.00	3.46	19.53
62	12.40	17.34	98.07	0.00	4.21	19.37
63	12.60	16.36	98.07	0.00	4.96	19.35
64	12.80	16.36	98.07	0.00	6.19	19.43
65	13.00	14.40	127.49	0.00	6.91	19.41
66	13.20	13.92	98.07	0.00	7.55	19.40
67	13.40	14.41	98.07	0.00	7.54	19.27
68	13.60	12.94	98.07	0.00	7.24	19.41
69	13.80	16.86	127.49	0.00	7.10	19.53
70	14.00	16.86	127.49	0.00	6.15	19.56
71	14.20	16.88	98.07	0.00	5.63	19.46
72	14.40	17.37	98.07	0.00	5.21	19.36
73	14.60	16.88	98.07	0.00	5.27	19.36
74	14.80	16.88	98.07	0.00	6.02	19.46
75	15.00	16.39	127.49	0.00	7.39	19.42
76	15.20	11.98	98.07	0.00	10.01	19.46
77	15.40	11.00	127.49	0.00	11.11	19.44
78	15.60	13.95	127.49	0.00	12.73	19.51
79	15.80	10.02	127.49	0.00	11.28	19.44
80	16.00	12.96	98.07	0.00	10.12	19.47
81	16.20	16.90	127.49	0.00	6.53	19.45
82	16.40	19.84	98.07	0.00	5.65	19.48
83	16.60	16.90	98.07	0.00	5.81	19.48
84	16.80	16.41	127.49	0.00	6.58	19.46
85	17.00	16.90	98.07	0.00	6.99	19.56
86	17.20	17.41	127.49	0.00	6.66	19.57
87	17.40	17.90	127.49	0.00	6.92	19.67
88	17.60	17.90	127.49	0.00	6.74	19.68
89	17.80	18.39	127.49	0.00	6.35	19.59
90	18.00	17.90	98.07	0.00	6.29	19.59
91	18.20	18.40	127.49	0.00	6.01	19.60
92	18.40	19.87	127.49	0.00	5.84	19.61
93	18.60	18.89	98.07	0.00	5.98	19.49
94	18.80	15.95	98.07	0.00	6.12	19.36
95	19.00	17.42	98.07	0.00	9.54	19.55
96	19.20	11.55	166.71	0.00	10.87	19.62

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	14.00	127.49	0.00	13.43	19.66
98	19.60	13.02	127.49	0.00	11.22	19.58
99	19.80	14.98	127.49	0.00	10.90	19.59
100	20.00	17.93	127.49	0.00	8.32	19.65

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
1	0.20	3.82	0.00	3.82	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
2	0.40	7.66	0.00	7.66	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
3	0.60	11.40	0.00	11.40	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
4	0.80	14.98	0.00	14.98	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
5	1.00	18.45	0.00	18.45	0.99	0.181	1.43	0.127	1.00	1.00	2.000	No
6	1.20	21.89	0.00	21.89	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
7	1.40	25.28	0.00	25.28	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
8	1.60	28.69	0.98	27.71	0.99	0.186	1.43	0.130	1.00	1.00	0.130	No
9	1.80	32.14	2.94	29.20	0.98	0.197	1.43	0.138	1.00	1.00	0.138	No
10	2.00	35.64	4.91	30.73	0.98	0.207	1.43	0.145	1.00	1.00	0.145	No
11	2.20	39.14	6.87	32.28	0.98	0.215	1.43	0.151	1.00	1.00	0.151	No
12	2.40	42.62	8.83	33.79	0.97	0.223	1.43	0.156	1.00	1.00	0.156	No
13	2.60	46.06	10.79	35.27	0.97	0.230	1.43	0.161	1.00	1.00	0.161	No
14	2.80	49.50	12.75	36.75	0.97	0.237	1.43	0.166	1.00	1.00	0.166	No
15	3.00	53.00	14.71	38.29	0.96	0.242	1.43	0.170	1.00	1.00	0.170	No
16	3.20	56.54	16.68	39.86	0.96	0.247	1.43	0.173	1.00	1.00	0.173	No
17	3.40	60.06	18.64	41.42	0.95	0.252	1.43	0.176	1.00	1.00	0.176	No
18	3.60	63.57	20.60	42.97	0.95	0.256	1.43	0.179	1.00	1.00	0.179	No
19	3.80	67.12	22.56	44.56	0.95	0.259	1.43	0.182	1.00	1.00	0.182	No
20	4.00	70.73	24.52	46.20	0.94	0.263	1.43	0.184	1.00	1.00	0.184	No
21	4.20	74.39	26.49	47.90	0.94	0.265	1.43	0.186	1.00	1.00	0.186	No
22	4.40	78.07	28.45	49.62	0.93	0.268	1.43	0.187	1.00	1.00	0.187	No
23	4.60	81.78	30.41	51.37	0.93	0.270	1.43	0.189	1.00	1.00	0.189	No
24	4.80	85.47	32.37	53.09	0.93	0.271	1.43	0.190	1.00	1.00	0.190	No
25	5.00	89.12	34.34	54.79	0.92	0.273	1.43	0.191	1.00	1.00	0.191	No
26	5.20	92.74	36.30	56.45	0.92	0.275	1.43	0.192	1.00	1.00	0.192	No
27	5.40	96.35	38.26	58.09	0.91	0.276	1.43	0.193	1.00	1.00	0.193	No
28	5.60	100.00	40.22	59.78	0.91	0.277	1.43	0.194	1.00	1.00	0.194	No
29	5.80	103.66	42.18	61.48	0.91	0.278	1.43	0.194	1.00	1.00	0.194	No
30	6.00	107.28	44.15	63.14	0.90	0.279	1.43	0.195	1.00	1.00	0.195	No
31	6.20	110.83	46.11	64.72	0.90	0.279	1.43	0.196	1.00	1.00	0.196	No
32	6.40	114.33	48.07	66.26	0.89	0.280	1.43	0.196	1.00	1.00	0.196	No
33	6.60	117.85	50.03	67.82	0.89	0.281	1.43	0.196	1.00	1.00	0.196	No
34	6.80	121.42	51.99	69.43	0.88	0.281	1.43	0.197	1.00	1.00	0.197	No
35	7.00	125.01	53.95	71.05	0.88	0.281	1.43	0.197	1.00	1.00	0.197	No
36	7.20	128.59	55.92	72.67	0.87	0.281	1.43	0.197	1.00	1.00	0.197	No
37	7.40	132.11	57.88	74.23	0.87	0.282	1.43	0.197	1.00	1.00	0.197	No
38	7.60	135.54	59.84	75.70	0.86	0.282	1.43	0.197	1.00	1.00	0.197	No
39	7.80	138.91	61.80	77.11	0.86	0.282	1.43	0.197	1.00	1.00	0.197	No
40	8.00	142.35	63.77	78.59	0.86	0.282	1.43	0.197	1.00	1.00	0.197	No
41	8.20	145.81	65.73	80.08	0.85	0.282	1.43	0.197	1.00	1.00	0.197	No
42	8.40	149.37	67.69	81.68	0.85	0.282	1.43	0.197	1.00	1.00	0.197	No
43	8.60	152.97	69.65	83.32	0.84	0.281	1.43	0.197	1.00	1.00	0.197	No
44	8.80	156.63	71.61	85.01	0.84	0.280	1.43	0.196	1.00	1.00	0.196	No
45	9.00	160.31	73.58	86.74	0.83	0.280	1.43	0.196	1.00	1.00	0.196	No
46	9.20	164.07	75.54	88.54	0.83	0.279	1.43	0.195	1.00	1.00	0.195	No
47	9.40	167.88	77.50	90.38	0.82	0.278	1.43	0.195	1.00	1.00	0.195	No
48	9.60	171.72	79.46	92.26	0.82	0.277	1.43	0.194	1.00	1.00	0.194	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.50	81.42	94.07	0.81	0.276	1.43	0.193	1.00	1.00	0.193	No
50	10.00	179.27	83.39	95.88	0.81	0.275	1.43	0.192	1.00	1.00	0.192	No
51	10.20	183.08	85.35	97.73	0.80	0.274	1.43	0.192	1.00	1.00	0.192	No
52	10.40	186.96	87.31	99.65	0.80	0.273	1.43	0.191	1.00	1.00	0.191	No
53	10.60	190.85	89.27	101.58	0.79	0.271	1.43	0.190	1.00	1.00	0.190	No
54	10.80	194.74	91.23	103.51	0.79	0.270	1.43	0.189	1.00	1.00	0.190	No
55	11.00	198.63	93.19	105.44	0.78	0.269	1.43	0.188	0.99	1.00	0.189	No
56	11.20	202.56	95.16	107.41	0.78	0.267	1.43	0.187	0.99	1.00	0.189	No
57	11.40	206.50	97.12	109.38	0.77	0.266	1.43	0.186	0.98	1.00	0.191	No
58	11.60	210.45	99.08	111.37	0.77	0.265	1.43	0.185	0.97	1.00	0.190	No
59	11.80	214.41	101.04	113.36	0.76	0.263	1.43	0.184	0.97	1.00	0.191	No
60	12.00	218.34	103.00	115.33	0.76	0.262	1.43	0.183	0.96	1.00	0.191	No
61	12.20	222.24	104.97	117.28	0.76	0.261	1.43	0.182	0.97	1.00	0.189	No
62	12.40	226.12	106.93	119.19	0.75	0.259	1.43	0.181	0.97	1.00	0.187	No
63	12.60	229.99	108.89	121.10	0.75	0.258	1.43	0.180	0.97	1.00	0.186	No
64	12.80	233.87	110.85	123.02	0.74	0.256	1.43	0.180	0.97	1.00	0.185	No
65	13.00	237.76	112.81	124.94	0.74	0.255	1.43	0.179	0.97	1.00	0.184	No
66	13.20	241.64	114.78	126.86	0.73	0.254	1.43	0.178	0.97	1.00	0.183	No
67	13.40	245.49	116.74	128.75	0.73	0.252	1.43	0.177	0.97	1.00	0.183	No
68	13.60	249.37	118.70	130.67	0.72	0.251	1.43	0.176	0.97	1.00	0.181	No
69	13.80	253.28	120.66	132.62	0.72	0.250	1.43	0.175	0.96	1.00	0.183	No
70	14.00	257.19	122.63	134.57	0.71	0.248	1.43	0.174	0.95	1.00	0.182	No
71	14.20	261.08	124.59	136.50	0.71	0.247	1.43	0.173	0.95	1.00	0.181	No
72	14.40	264.95	126.55	138.41	0.70	0.245	1.43	0.172	0.95	1.00	0.181	No
73	14.60	268.83	128.51	140.31	0.70	0.244	1.43	0.171	0.95	1.00	0.180	No
74	14.80	272.72	130.47	142.24	0.70	0.243	1.43	0.170	0.95	1.00	0.179	No
75	15.00	276.60	132.44	144.17	0.69	0.241	1.43	0.169	0.95	1.00	0.178	No
76	15.20	280.49	134.40	146.10	0.69	0.240	1.43	0.168	0.96	1.00	0.175	No
77	15.40	284.38	136.36	148.02	0.68	0.239	1.43	0.167	0.96	1.00	0.174	No
78	15.60	288.28	138.32	149.96	0.68	0.237	1.43	0.166	0.95	1.00	0.174	No
79	15.80	292.17	140.28	151.89	0.67	0.236	1.43	0.165	0.96	1.00	0.171	No
80	16.00	296.07	142.25	153.82	0.67	0.234	1.43	0.164	0.95	1.00	0.172	No
81	16.20	299.96	144.21	155.75	0.66	0.233	1.43	0.163	0.94	1.00	0.174	No
82	16.40	303.85	146.17	157.68	0.66	0.232	1.43	0.162	0.92	1.00	0.177	No
83	16.60	307.75	148.13	159.62	0.66	0.230	1.43	0.161	0.93	1.00	0.173	No
84	16.80	311.64	150.09	161.55	0.65	0.229	1.43	0.160	0.93	1.00	0.172	No
85	17.00	315.55	152.06	163.50	0.65	0.228	1.43	0.159	0.93	1.00	0.171	No
86	17.20	319.47	154.02	165.45	0.64	0.226	1.43	0.158	0.93	1.00	0.171	No
87	17.40	323.40	155.98	167.42	0.64	0.225	1.43	0.157	0.92	1.00	0.171	No
88	17.60	327.34	157.94	169.40	0.64	0.224	1.43	0.157	0.92	1.00	0.170	No
89	17.80	331.25	159.90	171.35	0.63	0.222	1.43	0.156	0.92	1.00	0.170	No
90	18.00	335.17	161.87	173.31	0.63	0.221	1.43	0.155	0.92	1.00	0.169	No
91	18.20	339.09	163.83	175.27	0.62	0.220	1.43	0.154	0.91	1.00	0.168	No
92	18.40	343.01	165.79	177.23	0.62	0.218	1.43	0.153	0.90	1.00	0.170	No
93	18.60	346.91	167.75	179.16	0.62	0.217	1.43	0.152	0.91	1.00	0.168	No
94	18.80	350.79	169.71	181.07	0.61	0.216	1.43	0.151	0.93	1.00	0.163	No
95	19.00	354.69	171.68	183.02	0.61	0.215	1.43	0.150	0.91	1.00	0.164	No
96	19.20	358.62	173.64	184.98	0.61	0.214	1.43	0.149	0.94	1.00	0.159	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	362.55	175.60	186.95	0.60	0.212	1.43	0.149	0.93	1.00	0.160	No
98	19.60	366.47	177.56	188.91	0.60	0.211	1.43	0.148	0.93	1.00	0.158	No
99	19.80	370.39	179.52	190.86	0.59	0.210	1.43	0.147	0.92	1.00	0.159	No
100	20.00	374.32	181.49	192.83	0.59	0.209	1.43	0.146	0.91	1.00	0.161	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	3.93	25.54	2.34	0.74	1.70	0.17	27.67	27.84	4.000	No	No	2.00
2	0.40	10.47	10.56	1.67	0.30	1.70	197.61	24.95	222.56	4.000	No	No	2.00
3	0.60	6.87	13.54	1.83	0.37	1.70	131.79	37.21	169.00	4.000	No	No	2.00
4	0.80	3.25	21.04	2.17	0.65	1.70	16.61	29.87	46.48	4.000	No	No	2.00
5	1.00	0.90	46.59	2.95	0.64	1.70	14.97	0.00	14.97	4.000	No	Yes	2.00
6	1.20	0.87	45.66	2.93	0.64	1.70	13.66	0.00	13.66	4.000	No	Yes	2.00
7	1.40	0.88	43.55	2.87	0.64	1.70	15.30	0.00	15.30	4.000	No	Yes	2.00
8	1.60	0.88	44.69	2.90	0.64	1.70	15.30	0.00	15.30	4.000	No	Yes	2.00
9	1.80	0.85	47.68	2.98	0.64	1.70	13.66	0.00	13.66	4.000	No	Yes	2.00
10	2.00	0.88	49.17	3.01	0.64	1.70	13.66	0.00	13.66	4.000	No	Yes	2.00
11	2.20	0.95	47.27	2.97	0.63	1.70	17.11	0.00	17.11	4.000	No	Yes	2.00
12	2.40	0.99	44.83	2.91	0.63	1.70	17.11	0.00	17.11	4.000	No	Yes	2.00
13	2.60	0.92	44.94	2.91	0.63	1.70	15.47	0.00	15.47	4.000	No	Yes	2.00
14	2.80	0.82	48.98	3.01	0.64	1.70	13.82	0.00	13.82	4.000	No	Yes	2.00
15	3.00	0.90	49.30	3.01	0.65	1.70	12.18	0.00	12.18	4.000	No	Yes	2.00
16	3.20	1.36	38.72	2.75	0.62	1.70	19.09	0.00	19.09	4.000	No	Yes	2.00
17	3.40	1.50	35.92	2.67	0.55	1.64	35.79	0.00	35.79	4.000	No	Yes	2.00
18	3.60	1.50	35.29	2.65	0.62	1.70	19.09	0.00	19.09	4.000	No	Yes	2.00
19	3.80	1.24	42.54	2.85	0.62	1.66	18.67	0.00	18.67	4.000	No	Yes	2.00
20	4.00	1.34	42.94	2.86	0.60	1.60	22.65	0.00	22.65	4.000	No	Yes	2.00
21	4.20	1.54	41.93	2.83	0.60	1.57	22.35	0.00	22.35	4.000	No	Yes	2.00
22	4.40	1.64	41.57	2.82	0.59	1.52	26.05	0.00	26.05	4.000	No	Yes	2.00
23	4.60	1.74	41.37	2.82	0.59	1.49	25.56	0.00	25.56	4.000	No	Yes	2.00
24	4.80	1.61	43.22	2.86	0.59	1.46	25.10	0.00	25.10	4.000	No	Yes	2.00
25	5.00	1.45	44.97	2.91	0.62	1.46	19.37	0.00	19.37	4.000	No	Yes	2.00
26	5.20	1.25	47.73	2.98	0.62	1.44	17.83	0.00	17.83	4.000	No	Yes	2.00
27	5.40	1.22	48.32	2.99	0.63	1.42	16.21	0.00	16.21	4.000	No	Yes	2.00
28	5.60	1.39	46.83	2.95	0.63	1.39	17.23	0.00	17.23	4.000	No	Yes	2.00
29	5.80	1.52	45.34	2.92	0.60	1.35	23.24	0.00	23.24	4.000	No	Yes	2.00
30	6.00	1.49	44.33	2.89	0.61	1.34	20.41	0.00	20.41	4.000	No	Yes	2.00
31	6.20	1.66	38.35	2.74	0.64	1.33	15.44	0.00	15.44	4.000	No	Yes	2.00
32	6.40	1.57	37.97	2.73	0.58	1.28	28.46	0.00	28.46	4.000	No	Yes	2.00
33	6.60	1.57	39.63	2.77	0.63	1.29	16.21	0.00	16.21	4.000	No	Yes	2.00
34	6.80	1.24	48.52	3.00	0.64	1.27	14.78	0.00	14.78	4.000	No	Yes	2.00
35	7.00	1.28	49.31	3.01	0.63	1.25	15.75	0.00	15.75	4.000	No	Yes	2.00
36	7.20	1.28	49.04	3.01	0.63	1.23	16.81	0.00	16.81	4.000	No	Yes	2.00
37	7.40	1.19	49.00	3.01	0.64	1.22	14.30	0.00	14.30	4.000	No	Yes	2.00
38	7.60	1.06	48.52	3.00	0.65	1.21	11.82	0.00	11.82	4.000	No	Yes	2.00
39	7.80	0.96	49.61	3.02	0.65	1.20	11.68	0.00	11.68	4.000	No	Yes	2.00
40	8.00	0.96	53.17	3.10	0.66	1.18	10.41	0.00	10.41	4.000	No	Yes	2.00
41	8.20	1.00	53.35	3.11	0.65	1.17	11.51	0.00	11.51	4.000	No	Yes	2.00
42	8.40	1.20	52.64	3.09	0.65	1.15	12.46	0.00	12.46	4.000	No	Yes	2.00
43	8.60	1.39	49.65	3.02	0.63	1.13	16.64	0.00	16.64	4.000	No	Yes	2.00
44	8.80	1.59	48.76	3.00	0.62	1.12	17.50	0.00	17.50	4.000	No	Yes	2.00
45	9.00	2.28	39.56	2.77	0.62	1.10	18.34	0.00	18.34	4.000	No	Yes	2.00
46	9.20	3.43	32.69	2.57	0.55	1.08	37.92	42.37	80.29	0.113	No	No	0.58
47	9.40	4.06	30.81	2.52	0.50	1.06	52.67	46.88	99.55	0.142	No	No	0.73
48	9.60	3.70	34.42	2.62	0.55	1.05	37.09	0.00	37.09	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	2.88	38.45	2.74	0.59	1.04	25.68	0.00	25.68	4.000	No	Yes	2.00
50	10.00	3.77	31.56	2.54	0.59	1.03	26.40	38.20	64.60	0.093	No	No	0.48
51	10.20	7.89	18.31	2.06	0.50	1.02	62.56	38.71	101.27	0.145	No	No	0.75
52	10.40	11.00	15.01	1.91	0.34	1.01	147.45	47.73	195.18	0.921	No	No	2.00
53	10.60	13.06	13.00	1.80	0.40	1.00	117.47	31.93	149.41	0.269	No	No	1.41
54	10.80	12.41	13.68	1.84	0.39	0.99	121.41	36.14	157.55	0.311	No	No	1.64
55	11.00	13.39	12.84	1.80	0.39	0.98	125.31	32.32	157.63	0.311	No	No	1.65
56	11.20	16.50	11.00	1.69	0.38	0.98	143.64	23.16	166.80	0.378	No	No	2.00
57	11.40	19.45	9.39	1.59	0.30	0.98	209.75	16.32	226.08	4.000	No	No	2.00
58	11.60	22.07	8.27	1.52	0.31	0.97	208.41	8.36	216.77	2.851	No	No	2.00
59	11.80	22.39	8.19	1.51	0.30	0.97	216.87	8.06	224.93	4.000	No	No	2.00
60	12.00	21.74	8.17	1.51	0.30	0.96	215.72	7.93	223.64	4.000	No	No	2.00
61	12.20	19.95	8.64	1.54	0.34	0.95	185.97	9.91	195.88	0.949	No	No	2.00
62	12.40	17.83	9.36	1.59	0.37	0.94	161.26	13.42	174.68	0.460	No	No	2.00
63	12.60	16.68	10.06	1.64	0.37	0.94	151.01	17.49	168.50	0.393	No	No	2.00
64	12.80	15.70	11.19	1.70	0.36	0.93	150.43	25.16	175.58	0.471	No	No	2.00
65	13.00	14.89	11.83	1.74	0.39	0.92	130.92	27.13	158.05	0.314	No	No	1.71
66	13.20	14.24	12.41	1.77	0.39	0.92	125.69	29.87	155.56	0.299	No	No	1.64
67	13.40	13.75	12.39	1.77	0.39	0.91	129.57	30.34	159.90	0.325	No	No	1.78
68	13.60	14.73	12.13	1.76	0.42	0.90	114.79	26.80	141.59	0.238	No	No	1.31
69	13.80	15.55	12.01	1.75	0.35	0.91	151.22	30.83	182.05	0.571	No	No	2.00
70	14.00	16.86	11.15	1.70	0.37	0.90	150.00	24.86	174.86	0.462	No	No	2.00
71	14.20	17.03	10.68	1.67	0.37	0.90	149.11	21.55	170.66	0.414	No	No	2.00
72	14.40	17.04	10.30	1.65	0.37	0.89	152.75	19.22	171.97	0.428	No	No	2.00
73	14.60	17.04	10.35	1.65	0.38	0.88	147.28	19.11	166.39	0.374	No	No	2.00
74	14.80	16.71	11.04	1.70	0.37	0.88	146.83	23.78	170.61	0.414	No	No	2.00
75	15.00	15.08	12.26	1.76	0.37	0.88	142.10	31.29	173.39	0.444	No	No	2.00
76	15.20	13.12	14.53	1.88	0.42	0.86	101.25	36.34	137.59	0.225	No	No	1.29
77	15.40	12.31	15.46	1.93	0.44	0.85	91.97	38.02	129.99	0.203	No	No	1.17
78	15.60	11.66	16.80	1.99	0.38	0.86	118.74	48.70	167.43	0.383	No	No	2.00
79	15.80	12.31	15.60	1.94	0.46	0.83	82.11	36.39	118.49	0.176	No	No	1.03
80	16.00	13.29	14.62	1.89	0.41	0.84	107.78	38.02	145.79	0.253	No	No	1.47
81	16.20	16.57	11.50	1.72	0.37	0.85	141.96	26.33	168.29	0.391	No	No	2.00
82	16.40	17.88	10.70	1.67	0.34	0.86	168.41	23.44	191.85	0.806	No	No	2.00
83	16.60	17.71	10.85	1.68	0.38	0.84	140.03	21.81	161.84	0.339	No	No	1.96
84	16.80	16.73	11.54	1.72	0.39	0.84	135.26	25.81	161.08	0.333	No	No	1.94
85	17.00	16.90	11.91	1.74	0.38	0.84	139.37	28.64	168.01	0.388	No	No	2.00
86	17.20	17.40	11.62	1.73	0.37	0.83	143.19	27.25	170.44	0.412	No	No	2.00
87	17.40	17.73	11.85	1.74	0.36	0.83	147.24	29.28	176.52	0.484	No	No	2.00
88	17.60	18.06	11.69	1.73	0.37	0.83	146.39	28.09	174.48	0.457	No	No	2.00
89	17.80	18.06	11.34	1.71	0.36	0.83	149.95	26.14	176.09	0.478	No	No	2.00
90	18.00	18.23	11.28	1.71	0.37	0.82	144.63	25.17	169.80	0.405	No	No	2.00
91	18.20	18.72	11.02	1.69	0.37	0.82	148.33	23.82	172.15	0.430	No	No	2.00
92	18.40	19.05	10.87	1.69	0.35	0.82	161.23	24.04	185.27	0.634	No	No	2.00
93	18.60	18.23	11.00	1.69	0.36	0.81	151.48	23.99	175.47	0.470	No	No	2.00
94	18.80	17.42	11.13	1.70	0.41	0.79	124.03	21.98	146.01	0.254	No	No	1.56
95	19.00	14.97	14.13	1.86	0.36	0.81	139.25	41.67	180.92	0.551	No	No	2.00
96	19.20	14.32	15.26	1.92	0.45	0.76	86.89	36.24	123.12	0.186	No	No	1.18

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	12.86	17.36	2.02	0.39	0.79	108.67	48.06	156.73	0.306	No	No	1.92
98	19.60	14.00	15.55	1.93	0.42	0.77	98.70	39.79	138.49	0.227	No	No	1.44
99	19.80	14.33	15.28	1.92	0.39	0.78	115.46	42.33	157.79	0.312	No	No	1.96
100	20.00	16.95	13.08	1.81	0.36	0.79	140.04	35.99	176.03	0.477	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	2.00	0.00	9.20	0.20	0.00
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	0.58	0.42	5.40	0.20	0.45
9.40	0.73	0.27	5.30	0.20	0.29	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	0.48	0.52	5.00	0.20	0.52
10.20	0.75	0.25	4.90	0.20	0.24	10.40	2.00	0.00	4.80	0.20	0.00
10.60	1.41	0.00	4.70	0.20	0.00	10.80	1.64	0.00	4.60	0.20	0.00
11.00	1.65	0.00	4.50	0.20	0.00	11.20	2.00	0.00	4.40	0.20	0.00
11.40	2.00	0.00	4.30	0.20	0.00	11.60	2.00	0.00	4.20	0.20	0.00
11.80	2.00	0.00	4.10	0.20	0.00	12.00	2.00	0.00	4.00	0.20	0.00
12.20	2.00	0.00	3.90	0.20	0.00	12.40	2.00	0.00	3.80	0.20	0.00
12.60	2.00	0.00	3.70	0.20	0.00	12.80	2.00	0.00	3.60	0.20	0.00
13.00	1.71	0.00	3.50	0.20	0.00	13.20	1.64	0.00	3.40	0.20	0.00
13.40	1.78	0.00	3.30	0.20	0.00	13.60	1.31	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	2.00	0.00	2.70	0.20	0.00	14.80	2.00	0.00	2.60	0.20	0.00
15.00	2.00	0.00	2.50	0.20	0.00	15.20	1.29	0.00	2.40	0.20	0.00
15.40	1.17	0.00	2.30	0.20	0.00	15.60	2.00	0.00	2.20	0.20	0.00
15.80	1.03	0.00	2.10	0.20	0.00	16.00	1.47	0.00	2.00	0.20	0.00
16.20	2.00	0.00	1.90	0.20	0.00	16.40	2.00	0.00	1.80	0.20	0.00
16.60	1.96	0.00	1.70	0.20	0.00	16.80	1.94	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	2.00	0.00	1.40	0.20	0.00
17.40	2.00	0.00	1.30	0.20	0.00	17.60	2.00	0.00	1.20	0.20	0.00
17.80	2.00	0.00	1.10	0.20	0.00	18.00	2.00	0.00	1.00	0.20	0.00
18.20	2.00	0.00	0.90	0.20	0.00	18.40	2.00	0.00	0.80	0.20	0.00
18.60	2.00	0.00	0.70	0.20	0.00	18.80	1.56	0.00	0.60	0.20	0.00
19.00	2.00	0.00	0.50	0.20	0.00	19.20	1.18	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	1.92	0.00	0.30	0.20	0.00	19.60	1.44	0.00	0.20	0.20	0.00
19.80	1.96	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 1.50

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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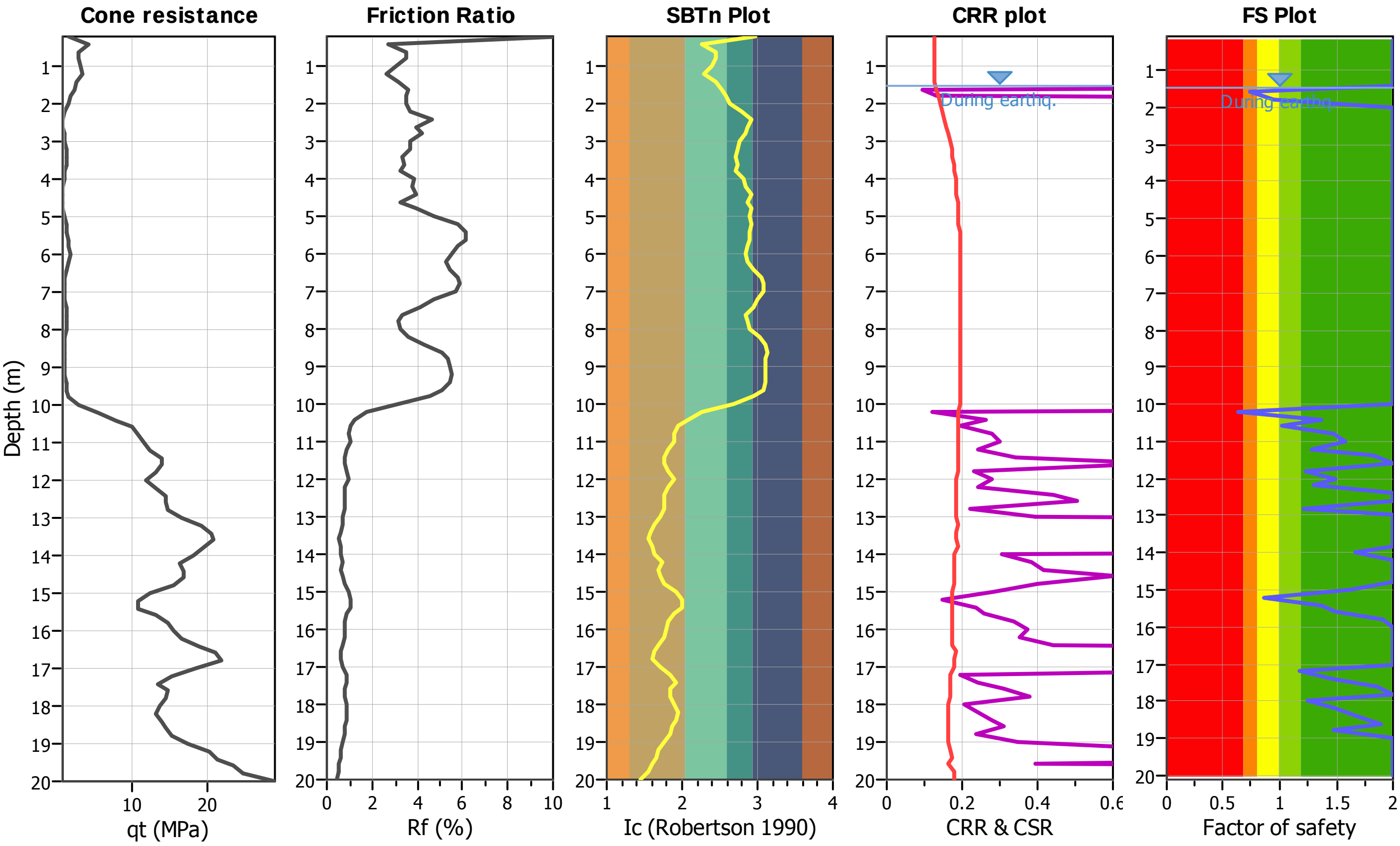
LIQUEFACTION ANALYSIS REPORT

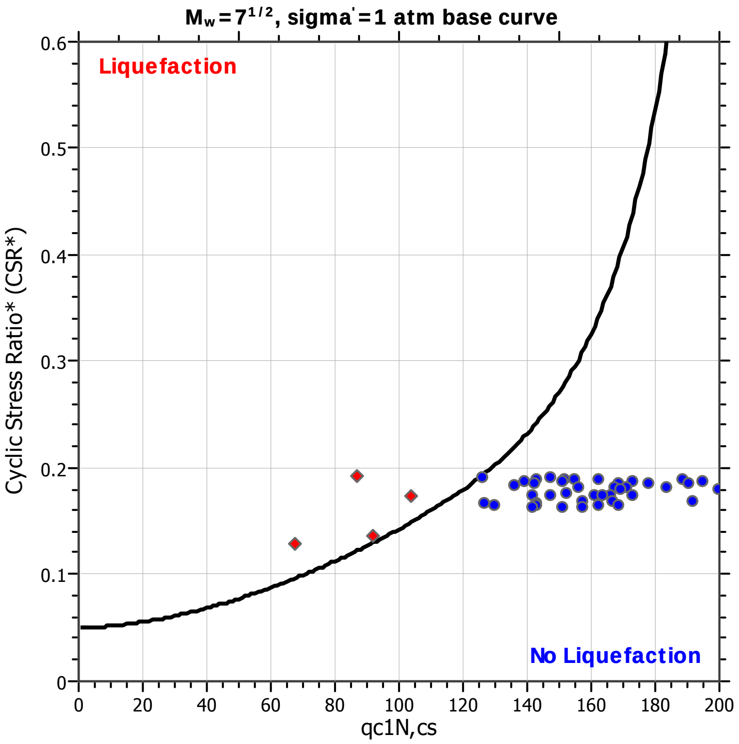
Project title : **Location :**

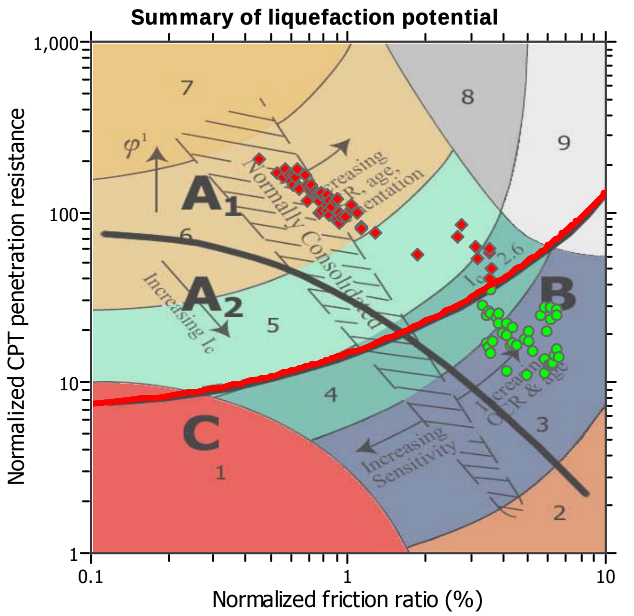
CPT file : CPT02

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:	Sands only
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:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

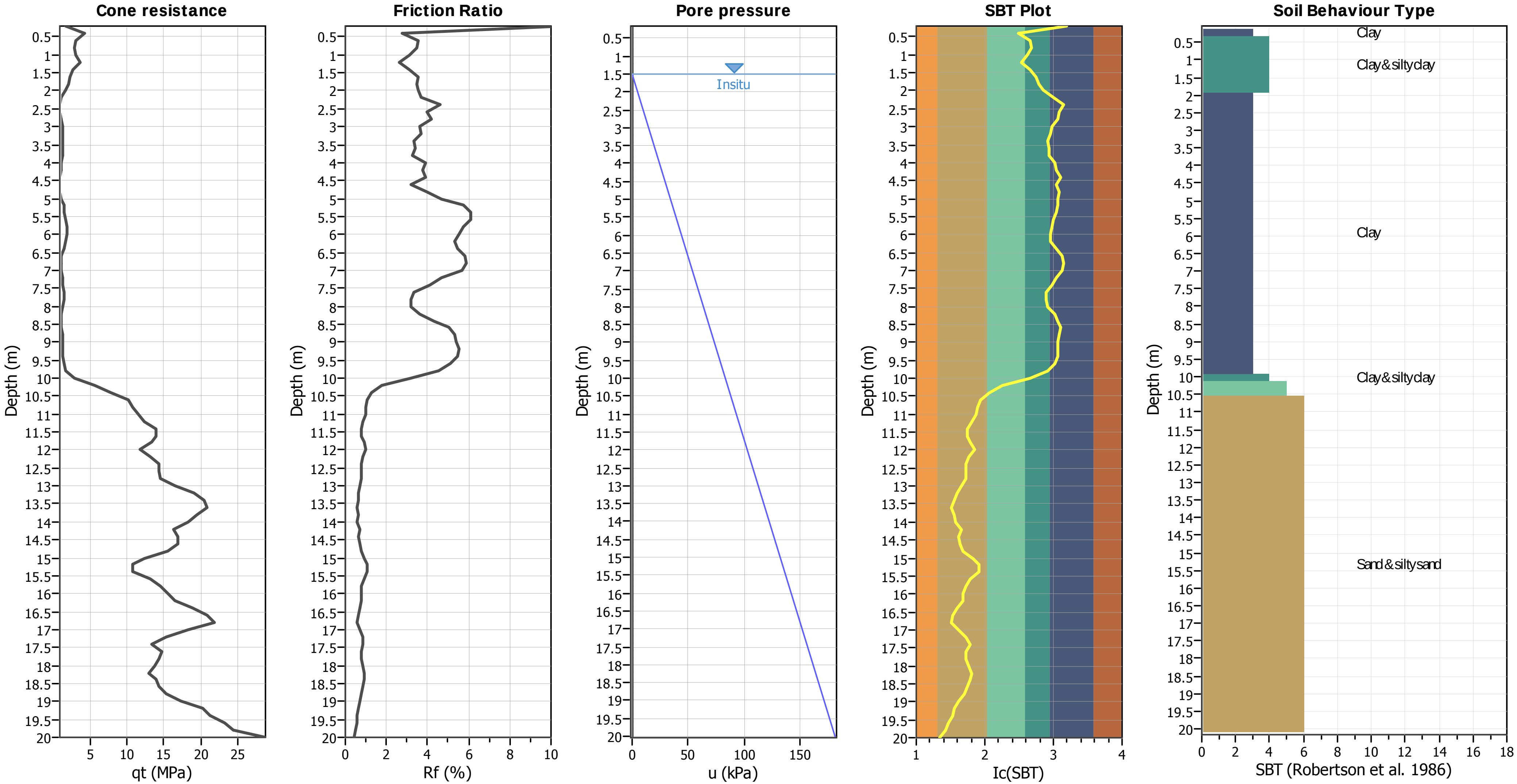






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



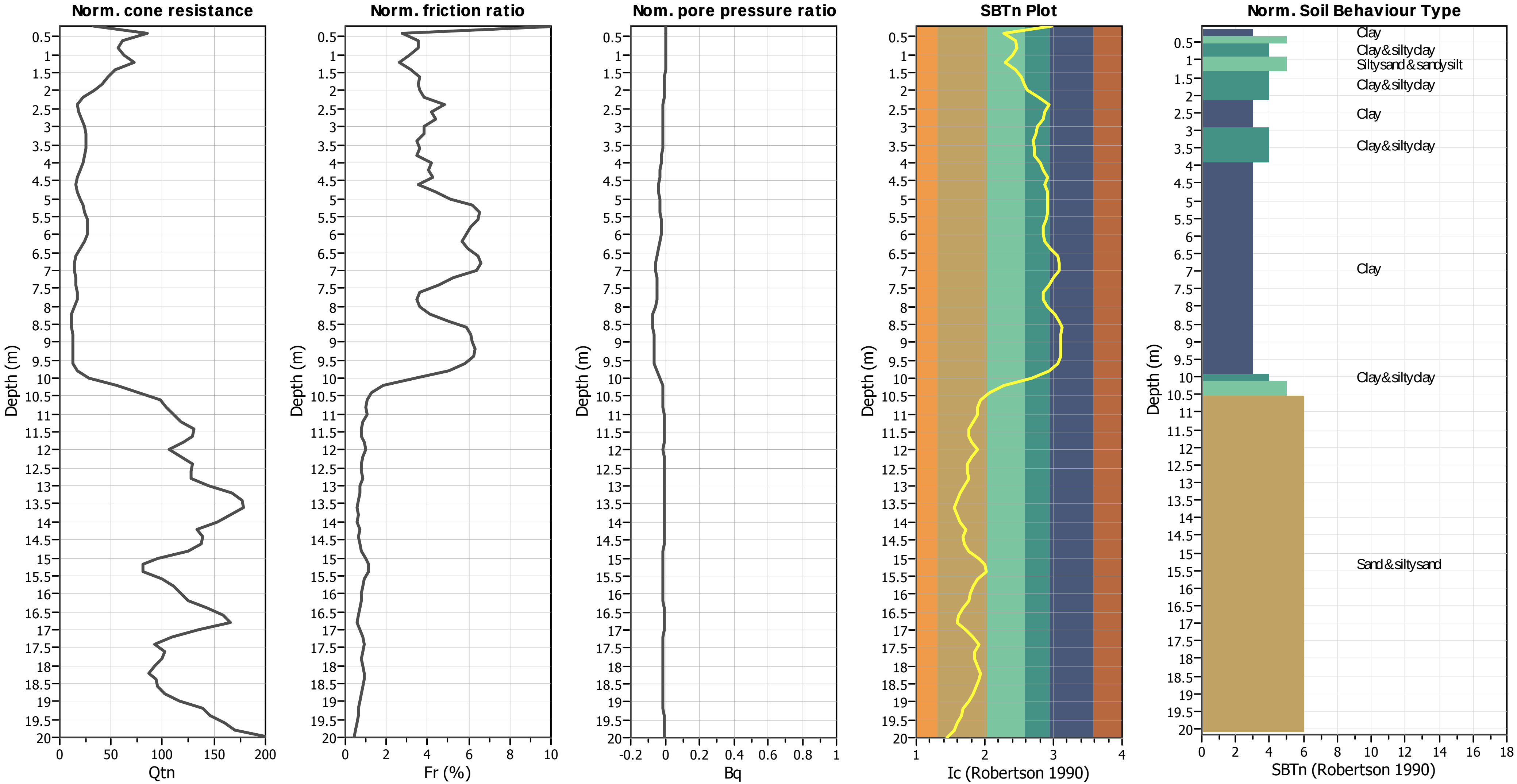
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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)



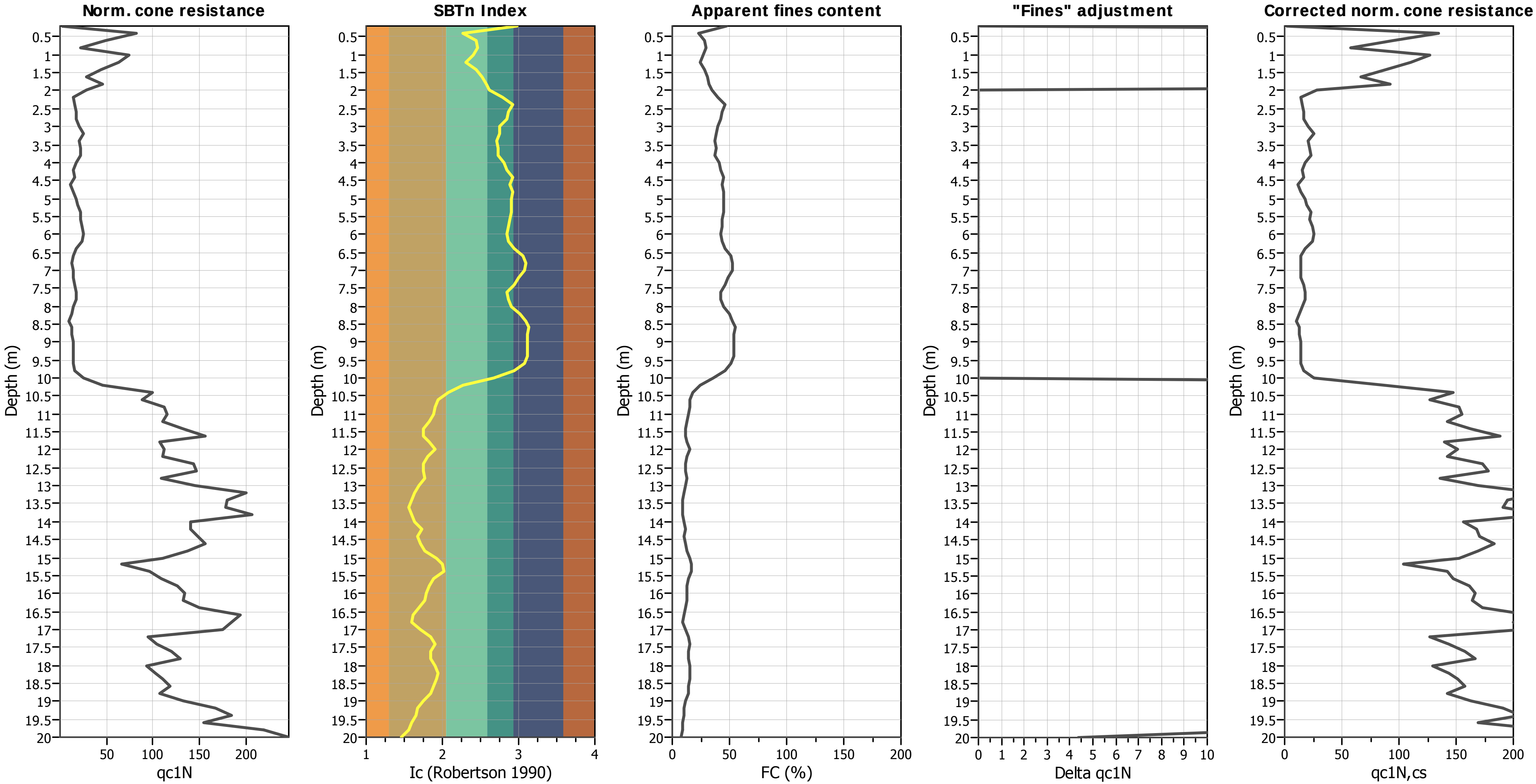
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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

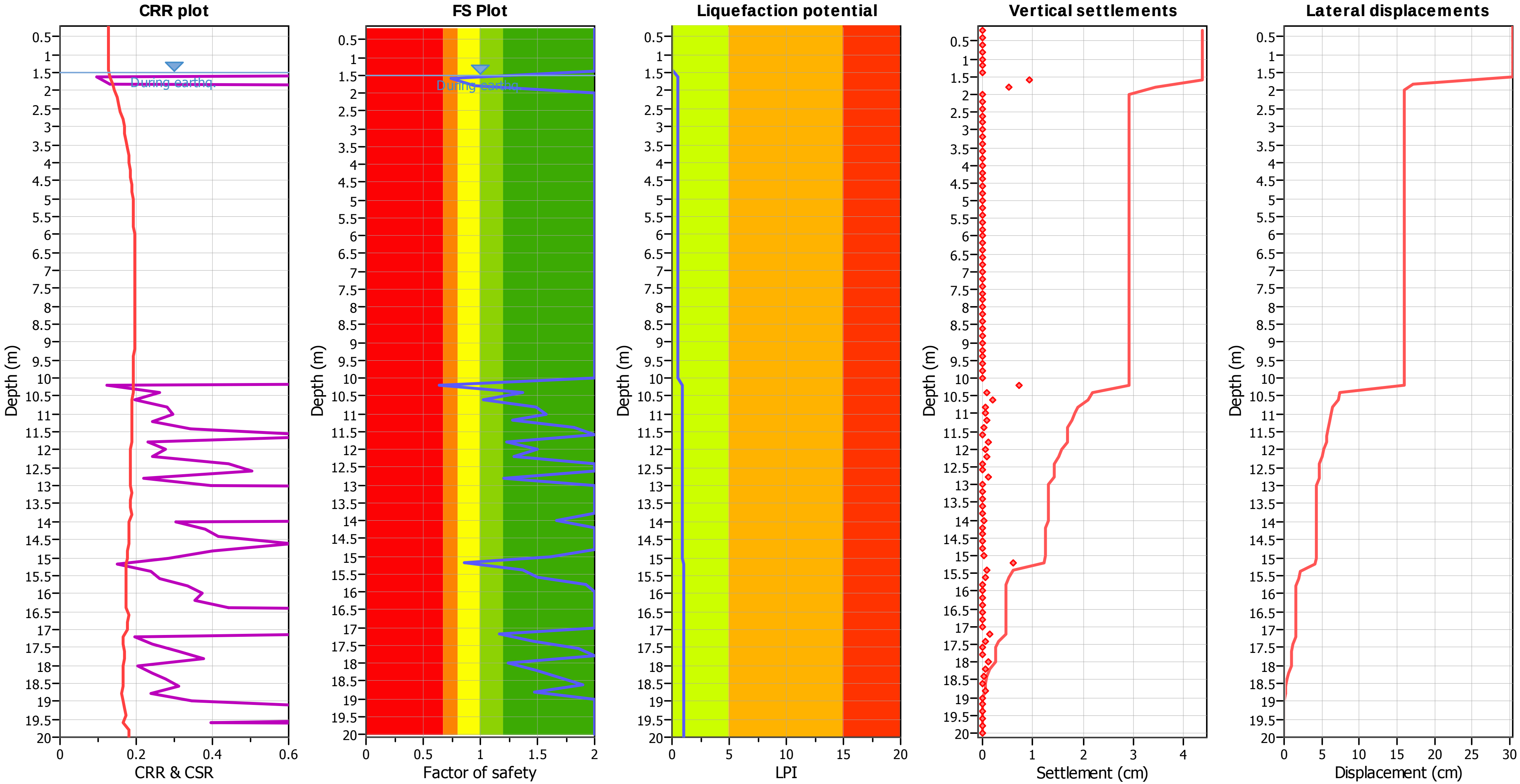
Liquefaction analysis overall plots (intermediate results)



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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

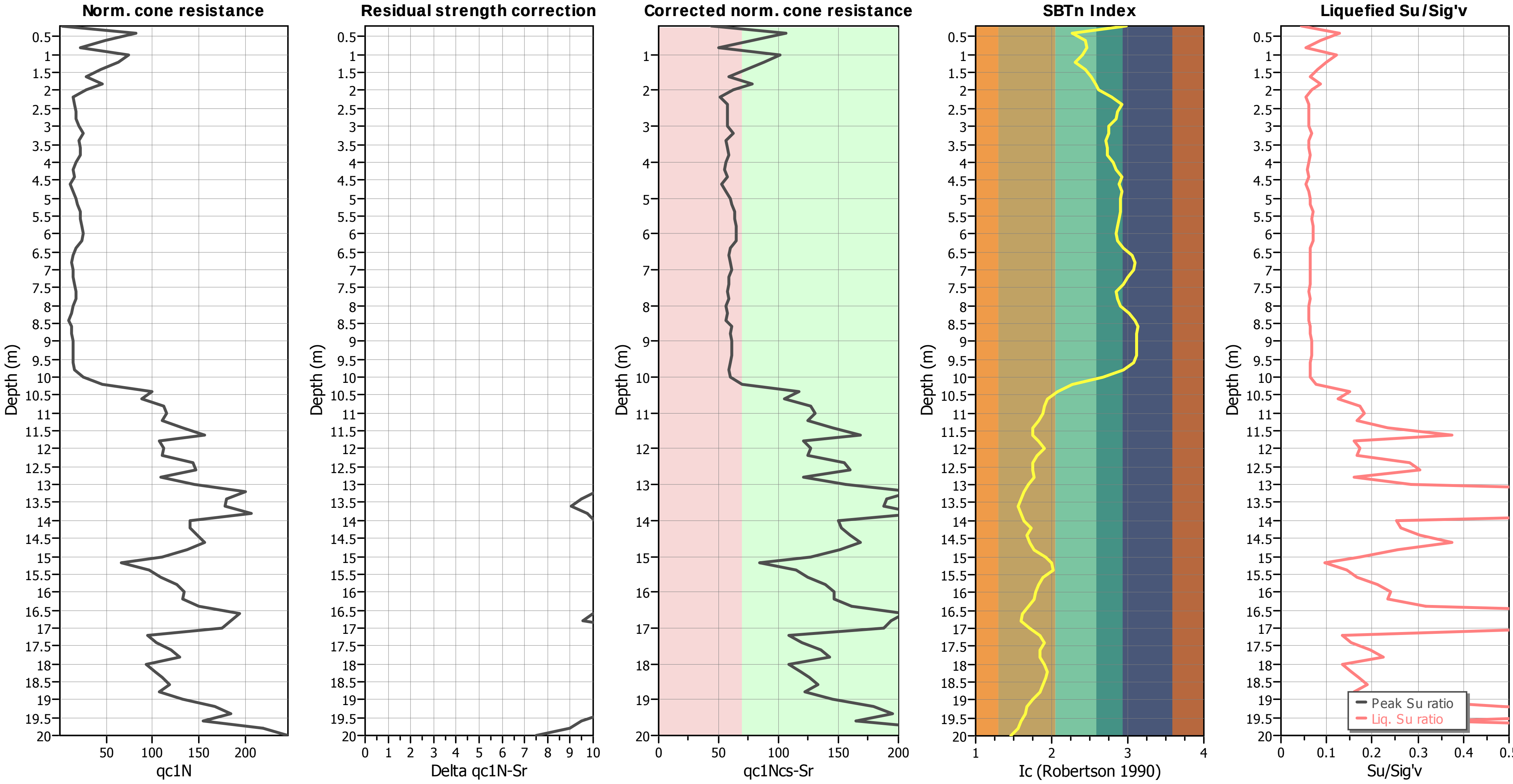
F.S. color scheme

- 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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	196.13	0.00	56.83	19.11
2	0.40	4.91	127.49	0.00	21.29	19.03
3	0.60	2.95	98.07	0.00	28.28	18.80
4	0.80	1.28	98.07	0.00	28.93	18.71
5	1.00	4.42	107.87	0.00	26.24	18.71
6	1.20	3.76	88.26	0.00	22.56	18.72
7	1.40	2.68	88.26	0.00	28.38	18.49
8	1.60	1.70	78.45	0.00	31.95	18.44
9	1.80	2.77	88.26	0.00	33.93	18.19
10	2.00	1.70	49.03	0.00	36.52	17.96
11	2.20	0.82	49.03	0.00	45.28	17.36
12	2.40	0.92	29.42	0.00	53.86	17.27
13	2.60	1.02	49.03	0.00	49.86	17.21
14	2.80	1.02	39.23	0.00	48.94	17.42
15	3.00	1.22	49.03	0.00	43.65	17.48
16	3.20	1.53	49.03	0.00	42.85	17.58
17	3.40	1.24	49.03	0.00	40.86	17.51
18	3.60	1.33	39.23	0.00	41.79	17.50
19	3.80	1.43	49.03	0.00	41.61	17.41
20	4.00	1.14	39.23	0.00	46.65	17.45
21	4.20	0.95	49.03	0.00	48.85	17.23
22	4.40	1.05	29.42	0.00	53.03	17.08
23	4.60	0.76	29.42	0.00	50.57	16.85
24	4.80	0.95	29.42	0.00	53.09	17.21
25	5.00	1.25	58.84	0.00	52.32	17.68
26	5.20	1.35	78.45	0.00	52.69	18.19
27	5.40	1.65	107.87	0.00	52.45	18.40
28	5.60	1.65	98.07	0.00	50.97	18.55
29	5.80	1.84	107.87	0.00	49.45	18.57
30	6.00	1.94	107.87	0.00	48.55	18.58
31	6.20	1.86	98.07	0.00	50.04	18.40
32	6.40	1.37	68.65	0.00	55.15	18.15
33	6.60	1.08	68.65	0.00	62.29	17.92
34	6.80	1.08	68.65	0.00	64.76	17.84
35	7.00	1.18	58.84	0.00	63.88	17.85
36	7.20	1.19	68.65	0.00	58.42	17.77
37	7.40	1.38	49.03	0.00	54.47	17.73
38	7.60	1.48	49.03	0.00	49.12	17.62
39	7.80	1.58	49.03	0.00	49.39	17.53
40	8.00	1.28	39.23	0.00	52.44	17.41
41	8.20	1.10	39.23	0.00	60.11	17.25
42	8.40	0.90	39.23	0.00	64.97	17.42
43	8.60	1.20	58.84	0.00	67.91	17.65
44	8.80	1.20	68.65	0.00	66.02	17.88
45	9.00	1.29	68.65	0.00	66.01	17.95
46	9.20	1.31	68.65	0.00	65.99	18.01
47	9.40	1.31	78.45	0.00	66.32	18.02
48	9.60	1.31	68.65	0.00	63.25	18.04

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	1.61	68.65	0.00	54.80	18.28
50	10.00	2.49	107.87	0.00	39.00	18.59
51	10.20	4.56	98.07	0.00	21.63	18.97
52	10.40	9.95	98.07	0.00	14.87	19.06
53	10.60	8.97	98.07	0.00	11.35	19.26
54	10.80	11.43	127.49	0.00	10.49	19.29
55	11.00	11.91	98.07	0.00	10.07	19.42
56	11.20	11.44	127.49	0.00	8.61	19.34
57	11.40	13.90	98.07	0.00	7.20	19.39
58	11.60	16.35	98.07	0.00	7.28	19.39
59	11.80	11.44	127.49	0.00	8.51	19.47
60	12.00	11.94	127.49	0.00	10.30	19.42
61	12.20	11.94	98.07	0.00	8.30	19.36
62	12.40	15.38	98.07	0.00	7.11	19.40
63	12.60	15.87	127.49	0.00	7.18	19.40
64	12.80	11.94	98.07	0.00	7.61	19.50
65	13.00	15.87	127.49	0.00	6.08	19.55
66	13.20	21.76	127.49	0.00	4.87	19.70
67	13.40	19.80	127.49	0.00	4.21	19.73
68	13.60	19.80	127.49	0.00	3.74	19.64
69	13.80	22.74	98.07	0.00	4.45	19.62
70	14.00	15.88	127.49	0.00	4.84	19.49
71	14.20	15.90	98.07	0.00	6.68	19.55
72	14.40	16.88	127.49	0.00	5.79	19.46
73	14.60	17.86	98.07	0.00	6.30	19.56
74	14.80	15.90	127.49	0.00	7.40	19.53
75	15.00	12.96	127.49	0.00	10.94	19.44
76	15.20	8.06	98.07	0.00	13.20	19.39
77	15.40	11.49	127.49	0.00	13.30	19.39
78	15.60	12.96	127.49	0.00	10.15	19.46
79	15.80	14.93	98.07	0.00	8.62	19.51
80	16.00	15.91	127.49	0.00	7.77	19.53
81	16.20	15.92	127.49	0.00	7.48	19.65
82	16.40	17.88	127.49	0.00	5.87	19.70
83	16.60	22.78	127.49	0.00	4.77	19.73
84	16.80	21.80	127.49	0.00	4.31	19.75
85	17.00	20.82	127.49	0.00	6.47	19.68
86	17.20	12.01	127.49	0.00	8.96	19.61
87	17.40	12.99	127.49	0.00	10.63	19.47
88	17.60	14.96	98.07	0.00	9.23	19.51
89	17.80	15.94	127.49	0.00	9.08	19.40
90	18.00	12.01	98.07	0.00	10.46	19.48
91	18.20	13.00	127.49	0.00	11.35	19.46
92	18.40	13.98	127.49	0.00	10.78	19.58
93	18.60	14.96	127.49	0.00	9.92	19.50
94	18.80	13.98	98.07	0.00	8.96	19.52
95	19.00	16.93	127.49	0.00	7.28	19.57
96	19.20	20.87	127.49	0.00	5.73	19.72

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	22.83	127.49	0.00	5.20	19.74
98	19.60	19.89	127.49	0.00	4.24	19.77
99	19.80	26.75	127.49	0.00	3.69	19.80
100	20.00	29.70	127.49	0.00	2.18	19.86

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.82	0.00	3.82	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
2	0.40	7.63	0.00	7.63	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
3	0.60	11.39	0.00	11.39	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
4	0.80	15.13	0.00	15.13	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
5	1.00	18.87	0.00	18.87	0.99	0.181	1.43	0.127	1.00	1.00	2.000	No
6	1.20	22.62	0.00	22.62	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
7	1.40	26.32	0.00	26.32	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
8	1.60	30.00	0.98	29.02	0.99	0.185	1.43	0.130	1.00	1.00	0.130	No
9	1.80	33.64	2.94	30.70	0.98	0.196	1.43	0.137	1.00	1.00	0.137	No
10	2.00	37.23	4.91	32.33	0.98	0.205	1.43	0.144	1.00	1.00	0.144	No
11	2.20	40.70	6.87	33.84	0.98	0.214	1.43	0.149	1.00	1.00	0.149	No
12	2.40	44.16	8.83	35.33	0.97	0.221	1.43	0.155	1.00	1.00	0.155	No
13	2.60	47.60	10.79	36.81	0.97	0.228	1.43	0.160	1.00	1.00	0.160	No
14	2.80	51.09	12.75	38.33	0.97	0.234	1.43	0.164	1.00	1.00	0.164	No
15	3.00	54.58	14.71	39.87	0.96	0.240	1.43	0.168	1.00	1.00	0.168	No
16	3.20	58.10	16.68	41.42	0.96	0.245	1.43	0.171	1.00	1.00	0.171	No
17	3.40	61.60	18.64	42.96	0.95	0.249	1.43	0.174	1.00	1.00	0.174	No
18	3.60	65.10	20.60	44.50	0.95	0.253	1.43	0.177	1.00	1.00	0.177	No
19	3.80	68.58	22.56	46.02	0.95	0.257	1.43	0.180	1.00	1.00	0.180	No
20	4.00	72.07	24.52	47.55	0.94	0.260	1.43	0.182	1.00	1.00	0.182	No
21	4.20	75.52	26.49	49.03	0.94	0.263	1.43	0.184	1.00	1.00	0.184	No
22	4.40	78.93	28.45	50.48	0.93	0.266	1.43	0.186	1.00	1.00	0.186	No
23	4.60	82.30	30.41	51.89	0.93	0.269	1.43	0.188	1.00	1.00	0.188	No
24	4.80	85.75	32.37	53.37	0.93	0.271	1.43	0.190	1.00	1.00	0.190	No
25	5.00	89.28	34.34	54.95	0.92	0.273	1.43	0.191	1.00	1.00	0.191	No
26	5.20	92.92	36.30	56.62	0.92	0.274	1.43	0.192	1.00	1.00	0.192	No
27	5.40	96.60	38.26	58.34	0.91	0.275	1.43	0.193	1.00	1.00	0.193	No
28	5.60	100.31	40.22	60.09	0.91	0.276	1.43	0.193	1.00	1.00	0.193	No
29	5.80	104.02	42.18	61.84	0.91	0.277	1.43	0.194	1.00	1.00	0.194	No
30	6.00	107.74	44.15	63.59	0.90	0.278	1.43	0.194	1.00	1.00	0.194	No
31	6.20	111.42	46.11	65.31	0.90	0.278	1.43	0.195	1.00	1.00	0.195	No
32	6.40	115.05	48.07	66.98	0.89	0.279	1.43	0.195	1.00	1.00	0.195	No
33	6.60	118.63	50.03	68.60	0.89	0.279	1.43	0.195	1.00	1.00	0.195	No
34	6.80	122.20	51.99	70.21	0.88	0.280	1.43	0.196	1.00	1.00	0.196	No
35	7.00	125.77	53.95	71.82	0.88	0.280	1.43	0.196	1.00	1.00	0.196	No
36	7.20	129.32	55.92	73.41	0.87	0.280	1.43	0.196	1.00	1.00	0.196	No
37	7.40	132.87	57.88	74.99	0.87	0.280	1.43	0.196	1.00	1.00	0.196	No
38	7.60	136.39	59.84	76.55	0.86	0.280	1.43	0.196	1.00	1.00	0.196	No
39	7.80	139.90	61.80	78.10	0.86	0.280	1.43	0.196	1.00	1.00	0.196	No
40	8.00	143.38	63.77	79.62	0.86	0.280	1.43	0.196	1.00	1.00	0.196	No
41	8.20	146.83	65.73	81.11	0.85	0.280	1.43	0.196	1.00	1.00	0.196	No
42	8.40	150.32	67.69	82.63	0.85	0.280	1.43	0.196	1.00	1.00	0.196	No
43	8.60	153.85	69.65	84.20	0.84	0.280	1.43	0.196	1.00	1.00	0.196	No
44	8.80	157.42	71.61	85.81	0.84	0.279	1.43	0.195	1.00	1.00	0.195	No
45	9.00	161.01	73.58	87.44	0.83	0.279	1.43	0.195	1.00	1.00	0.195	No
46	9.20	164.62	75.54	89.08	0.83	0.278	1.43	0.195	1.00	1.00	0.195	No
47	9.40	168.22	77.50	90.72	0.82	0.277	1.43	0.194	1.00	1.00	0.194	No
48	9.60	171.83	79.46	92.37	0.82	0.277	1.43	0.194	1.00	1.00	0.194	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.48	81.42	94.06	0.81	0.276	1.43	0.193	1.00	1.00	0.193	No
50	10.00	179.20	83.39	95.82	0.81	0.275	1.43	0.192	1.00	1.00	0.192	No
51	10.20	183.00	85.35	97.65	0.80	0.274	1.43	0.192	1.00	1.00	0.192	No
52	10.40	186.81	87.31	99.50	0.80	0.273	1.43	0.191	1.00	1.00	0.191	No
53	10.60	190.66	89.27	101.39	0.79	0.272	1.43	0.190	1.00	1.00	0.190	No
54	10.80	194.52	91.23	103.29	0.79	0.270	1.43	0.189	1.00	1.00	0.190	No
55	11.00	198.40	93.19	105.21	0.78	0.269	1.43	0.188	1.00	1.00	0.189	No
56	11.20	202.27	95.16	107.11	0.78	0.268	1.43	0.187	0.99	1.00	0.189	No
57	11.40	206.15	97.12	109.03	0.77	0.266	1.43	0.187	0.99	1.00	0.188	No
58	11.60	210.03	99.08	110.94	0.77	0.265	1.43	0.186	0.98	1.00	0.188	No
59	11.80	213.92	101.04	112.88	0.76	0.264	1.43	0.185	0.99	1.00	0.187	No
60	12.00	217.80	103.00	114.80	0.76	0.262	1.43	0.184	0.99	1.00	0.186	No
61	12.20	221.68	104.97	116.71	0.76	0.261	1.43	0.183	0.98	1.00	0.186	No
62	12.40	225.56	106.93	118.63	0.75	0.260	1.43	0.182	0.98	1.00	0.186	No
63	12.60	229.44	108.89	120.55	0.75	0.258	1.43	0.181	0.97	1.00	0.186	No
64	12.80	233.34	110.85	122.48	0.74	0.257	1.43	0.180	0.98	1.00	0.184	No
65	13.00	237.25	112.81	124.43	0.74	0.256	1.43	0.179	0.97	1.00	0.185	No
66	13.20	241.19	114.78	126.41	0.73	0.254	1.43	0.178	0.94	1.00	0.189	No
67	13.40	245.13	116.74	128.39	0.73	0.253	1.43	0.177	0.95	1.00	0.186	No
68	13.60	249.06	118.70	130.36	0.72	0.251	1.43	0.176	0.95	1.00	0.186	No
69	13.80	252.99	120.66	132.32	0.72	0.250	1.43	0.175	0.92	1.00	0.189	No
70	14.00	256.88	122.63	134.26	0.71	0.248	1.43	0.174	0.96	1.00	0.181	No
71	14.20	260.79	124.59	136.21	0.71	0.247	1.43	0.173	0.96	1.00	0.181	No
72	14.40	264.68	126.55	138.14	0.70	0.246	1.43	0.172	0.95	1.00	0.181	No
73	14.60	268.60	128.51	140.09	0.70	0.244	1.43	0.171	0.94	1.00	0.181	No
74	14.80	272.50	130.47	142.03	0.70	0.243	1.43	0.170	0.95	1.00	0.179	No
75	15.00	276.39	132.44	143.96	0.69	0.241	1.43	0.169	0.96	1.00	0.176	No
76	15.20	280.27	134.40	145.87	0.69	0.240	1.43	0.168	0.97	1.00	0.173	No
77	15.40	284.15	136.36	147.79	0.68	0.239	1.43	0.167	0.96	1.00	0.174	No
78	15.60	288.04	138.32	149.72	0.68	0.237	1.43	0.166	0.96	1.00	0.174	No
79	15.80	291.94	140.28	151.66	0.67	0.236	1.43	0.165	0.95	1.00	0.174	No
80	16.00	295.85	142.25	153.60	0.67	0.235	1.43	0.164	0.94	1.00	0.174	No
81	16.20	299.78	144.21	155.57	0.66	0.233	1.43	0.163	0.94	1.00	0.174	No
82	16.40	303.72	146.17	157.55	0.66	0.232	1.43	0.162	0.93	1.00	0.175	No
83	16.60	307.66	148.13	159.53	0.66	0.230	1.43	0.161	0.89	1.00	0.182	No
84	16.80	311.61	150.09	161.52	0.65	0.229	1.43	0.160	0.90	1.00	0.179	No
85	17.00	315.55	152.06	163.49	0.65	0.228	1.43	0.159	0.90	1.00	0.177	No
86	17.20	319.47	154.02	165.45	0.64	0.226	1.43	0.158	0.95	1.00	0.167	No
87	17.40	323.37	155.98	167.39	0.64	0.225	1.43	0.157	0.94	1.00	0.167	No
88	17.60	327.27	157.94	169.33	0.64	0.224	1.43	0.157	0.94	1.00	0.167	No
89	17.80	331.15	159.90	171.24	0.63	0.222	1.43	0.156	0.93	1.00	0.167	No
90	18.00	335.04	161.87	173.18	0.63	0.221	1.43	0.155	0.95	1.00	0.164	No
91	18.20	338.93	163.83	175.11	0.62	0.220	1.43	0.154	0.94	1.00	0.164	No
92	18.40	342.85	165.79	177.06	0.62	0.219	1.43	0.153	0.94	1.00	0.164	No
93	18.60	346.75	167.75	179.00	0.62	0.217	1.43	0.152	0.93	1.00	0.164	No
94	18.80	350.66	169.71	180.94	0.61	0.216	1.43	0.151	0.93	1.00	0.162	No
95	19.00	354.57	171.68	182.89	0.61	0.215	1.43	0.150	0.92	1.00	0.164	No
96	19.20	358.51	173.64	184.88	0.61	0.214	1.43	0.149	0.89	1.00	0.169	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	362.46	175.60	186.86	0.60	0.212	1.43	0.149	0.86	1.00	0.172	No
98	19.60	366.42	177.56	188.86	0.60	0.211	1.43	0.148	0.90	1.00	0.165	No
99	19.80	370.38	179.52	190.85	0.59	0.210	1.43	0.147	0.81	1.00	0.181	No
100	20.00	374.35	181.49	192.86	0.59	0.209	1.43	0.146	0.81	1.00	0.181	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	1.64	47.68	2.98	0.72	1.70	0.17	0.00	0.17	4.000	No	Yes	2.00
2	0.40	4.26	23.49	2.27	0.43	1.70	82.43	52.08	134.51	4.000	No	No	2.00
3	0.60	3.05	28.62	2.44	0.51	1.70	49.53	45.04	94.57	4.000	No	No	2.00
4	0.80	2.89	29.08	2.46	0.61	1.70	21.56	35.92	57.48	4.000	No	No	2.00
5	1.00	3.15	27.15	2.40	0.44	1.70	74.21	52.42	126.63	4.000	No	No	2.00
6	1.20	3.62	24.44	2.30	0.48	1.70	63.02	46.93	109.95	4.000	No	No	2.00
7	1.40	2.71	28.69	2.45	0.52	1.70	44.91	43.54	88.46	4.000	No	No	2.00
8	1.60	2.38	31.22	2.53	0.58	1.70	28.47	38.83	67.30	0.096	No	No	0.74
9	1.80	2.06	32.60	2.57	0.52	1.70	46.56	45.29	91.85	0.130	No	No	0.95
10	2.00	1.77	34.38	2.62	0.58	1.70	28.47	0.00	28.47	4.000	No	Yes	2.00
11	2.20	1.15	40.25	2.79	0.64	1.70	13.82	0.00	13.82	4.000	No	Yes	2.00
12	2.40	0.92	45.79	2.93	0.63	1.70	15.47	0.00	15.47	4.000	No	Yes	2.00
13	2.60	0.99	43.23	2.87	0.63	1.70	17.11	0.00	17.11	4.000	No	Yes	2.00
14	2.80	1.09	42.64	2.85	0.63	1.70	17.11	0.00	17.11	4.000	No	Yes	2.00
15	3.00	1.26	39.17	2.76	0.61	1.70	20.40	0.00	20.40	4.000	No	Yes	2.00
16	3.20	1.33	38.64	2.74	0.59	1.69	25.59	0.00	25.59	4.000	No	Yes	2.00
17	3.40	1.37	37.31	2.71	0.61	1.69	20.61	0.00	20.61	4.000	No	Yes	2.00
18	3.60	1.33	37.93	2.72	0.61	1.65	21.68	0.00	21.68	4.000	No	Yes	2.00
19	3.80	1.30	37.82	2.72	0.60	1.61	22.72	0.00	22.72	4.000	No	Yes	2.00
20	4.00	1.17	41.15	2.81	0.62	1.60	17.98	0.00	17.98	4.000	No	Yes	2.00
21	4.20	1.05	42.58	2.85	0.64	1.59	14.90	0.00	14.90	4.000	No	Yes	2.00
22	4.40	0.92	45.27	2.92	0.63	1.55	16.07	0.00	16.07	4.000	No	Yes	2.00
23	4.60	0.92	43.69	2.88	0.65	1.55	11.54	0.00	11.54	4.000	No	Yes	2.00
24	4.80	0.98	45.30	2.92	0.64	1.51	14.15	0.00	14.15	4.000	No	Yes	2.00
25	5.00	1.18	44.81	2.91	0.62	1.46	17.98	0.00	17.98	4.000	No	Yes	2.00
26	5.20	1.42	45.05	2.91	0.62	1.43	19.12	0.00	19.12	4.000	No	Yes	2.00
27	5.40	1.55	44.90	2.91	0.60	1.39	22.66	0.00	22.66	4.000	No	Yes	2.00
28	5.60	1.71	43.95	2.88	0.60	1.37	22.29	0.00	22.29	4.000	No	Yes	2.00
29	5.80	1.81	42.97	2.86	0.59	1.34	24.40	0.00	24.40	4.000	No	Yes	2.00
30	6.00	1.88	42.39	2.84	0.59	1.32	25.23	0.00	25.23	4.000	No	Yes	2.00
31	6.20	1.73	43.35	2.87	0.60	1.30	23.89	0.00	23.89	4.000	No	Yes	2.00
32	6.40	1.44	46.61	2.95	0.62	1.29	17.54	0.00	17.54	4.000	No	Yes	2.00
33	6.60	1.18	51.09	3.06	0.64	1.28	13.68	0.00	13.68	4.000	No	Yes	2.00
34	6.80	1.11	52.61	3.09	0.64	1.27	13.49	0.00	13.49	4.000	No	Yes	2.00
35	7.00	1.15	52.07	3.08	0.64	1.25	14.47	0.00	14.47	4.000	No	Yes	2.00
36	7.20	1.25	48.68	3.00	0.64	1.23	14.40	0.00	14.40	4.000	No	Yes	2.00
37	7.40	1.35	46.18	2.94	0.63	1.21	16.49	0.00	16.49	4.000	No	Yes	2.00
38	7.60	1.48	42.75	2.85	0.63	1.19	17.42	0.00	17.42	4.000	No	Yes	2.00
39	7.80	1.45	42.93	2.86	0.62	1.18	18.32	0.00	18.32	4.000	No	Yes	2.00
40	8.00	1.32	44.89	2.91	0.64	1.17	14.79	0.00	14.79	4.000	No	Yes	2.00
41	8.20	1.09	49.73	3.02	0.65	1.16	12.52	0.00	12.52	4.000	No	Yes	2.00
42	8.40	1.07	52.74	3.09	0.66	1.14	10.19	0.00	10.19	4.000	No	Yes	2.00
43	8.60	1.10	54.54	3.13	0.65	1.13	13.30	0.00	13.30	4.000	No	Yes	2.00
44	8.80	1.23	53.38	3.11	0.65	1.11	13.14	0.00	13.14	4.000	No	Yes	2.00
45	9.00	1.27	53.38	3.11	0.64	1.10	14.04	0.00	14.04	4.000	No	Yes	2.00
46	9.20	1.31	53.37	3.11	0.64	1.09	14.08	0.00	14.08	4.000	No	Yes	2.00
47	9.40	1.31	53.57	3.11	0.64	1.07	13.92	0.00	13.92	4.000	No	Yes	2.00
48	9.60	1.41	51.68	3.07	0.64	1.06	13.76	0.00	13.76	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	1.80	46.39	2.94	0.63	1.05	16.63	0.00	16.63	4.000	No	Yes	2.00
50	10.00	2.89	36.07	2.67	0.59	1.03	25.41	0.00	25.41	4.000	No	Yes	2.00
51	10.20	5.67	23.75	2.28	0.53	1.02	45.89	41.02	86.91	0.122	No	No	0.64
52	10.40	7.83	18.52	2.07	0.41	1.01	98.97	48.69	147.66	0.261	No	No	1.37
53	10.60	10.12	15.66	1.94	0.44	1.00	88.53	37.98	126.51	0.194	No	No	1.02
54	10.80	10.77	14.94	1.90	0.40	0.99	111.89	40.15	152.05	0.281	No	No	1.48
55	11.00	11.59	14.58	1.89	0.39	0.99	115.86	39.42	155.28	0.298	No	No	1.57
56	11.20	12.42	13.33	1.82	0.42	0.98	110.37	32.53	142.90	0.242	No	No	1.29
57	11.40	13.90	12.10	1.76	0.38	0.97	133.34	29.09	162.43	0.343	No	No	1.82
58	11.60	13.90	12.17	1.76	0.34	0.97	156.38	32.57	188.95	0.722	No	No	2.00
59	11.80	13.24	13.25	1.82	0.42	0.96	107.93	31.70	139.62	0.231	No	No	1.24
60	12.00	11.77	14.78	1.90	0.40	0.95	112.04	39.52	151.56	0.279	No	No	1.49
61	12.20	13.09	13.06	1.81	0.42	0.94	111.15	31.28	142.43	0.241	No	No	1.30
62	12.40	14.40	12.02	1.75	0.37	0.94	143.22	29.86	173.08	0.441	No	No	2.00
63	12.60	14.40	12.08	1.75	0.36	0.94	147.09	30.77	177.86	0.503	No	No	2.00
64	12.80	14.56	12.46	1.78	0.43	0.92	108.72	27.74	136.46	0.221	No	No	1.20
65	13.00	16.52	11.09	1.70	0.37	0.93	145.02	23.94	168.96	0.397	No	No	2.00
66	13.20	19.14	9.98	1.63	0.30	0.94	200.88	20.44	221.32	3.872	No	No	2.00
67	13.40	20.45	9.36	1.59	0.34	0.92	180.43	14.49	194.92	0.911	No	No	2.00
68	13.60	20.78	8.91	1.56	0.34	0.92	179.24	11.36	190.59	0.768	No	No	2.00
69	13.80	19.47	9.59	1.61	0.30	0.92	207.30	17.72	225.03	4.000	No	No	2.00
70	14.00	18.17	9.95	1.63	0.39	0.90	140.26	15.96	156.22	0.303	No	No	1.67
71	14.20	16.22	11.63	1.73	0.38	0.89	140.36	27.01	167.37	0.383	No	No	2.00
72	14.40	16.88	10.83	1.68	0.37	0.89	148.47	22.47	170.94	0.417	No	No	2.00
73	14.60	16.88	11.29	1.71	0.35	0.89	157.27	26.63	183.90	0.606	No	No	2.00
74	14.80	15.57	12.27	1.77	0.37	0.88	138.28	30.81	169.08	0.398	No	No	2.00
75	15.00	12.30	15.32	1.92	0.40	0.87	111.12	41.54	152.66	0.284	No	No	1.61
76	15.20	10.84	17.18	2.01	0.49	0.84	66.54	37.25	103.79	0.149	No	No	0.86
77	15.40	10.84	17.26	2.01	0.42	0.85	96.89	44.86	141.75	0.238	No	No	1.37
78	15.60	13.13	14.65	1.89	0.41	0.85	109.10	38.39	147.50	0.260	No	No	1.50
79	15.80	14.60	13.35	1.82	0.39	0.86	126.07	35.18	161.25	0.334	No	No	1.92
80	16.00	15.58	12.60	1.78	0.38	0.85	134.17	32.23	166.40	0.374	No	No	2.00
81	16.20	16.57	12.34	1.77	0.38	0.85	133.40	30.56	163.95	0.354	No	No	2.00
82	16.40	18.86	10.90	1.69	0.37	0.85	150.04	23.13	173.17	0.442	No	No	2.00
83	16.60	20.82	9.88	1.62	0.31	0.87	195.24	19.29	214.53	2.476	No	No	2.00
84	16.80	21.80	9.45	1.60	0.33	0.86	184.46	15.34	199.80	1.128	No	No	2.00
85	17.00	18.21	11.44	1.72	0.32	0.86	176.15	29.83	205.97	1.525	No	No	2.00
86	17.20	15.28	13.63	1.84	0.44	0.80	95.34	31.40	126.75	0.195	No	No	1.17
87	17.40	13.32	15.06	1.91	0.42	0.81	104.09	39.06	143.15	0.243	No	No	1.46
88	17.60	14.63	13.87	1.85	0.39	0.82	120.75	36.95	157.70	0.312	No	No	1.86
89	17.80	14.30	13.74	1.84	0.38	0.82	129.06	37.78	166.84	0.378	No	No	2.00
90	18.00	13.65	14.91	1.90	0.44	0.79	93.73	36.39	130.12	0.203	No	No	1.24
91	18.20	13.00	15.66	1.94	0.42	0.80	102.24	40.95	143.19	0.244	No	No	1.49
92	18.40	13.98	15.18	1.92	0.40	0.80	110.30	40.84	151.14	0.277	No	No	1.69
93	18.60	14.31	14.46	1.88	0.39	0.80	118.21	39.31	157.52	0.311	No	No	1.90
94	18.80	15.29	13.64	1.84	0.42	0.78	108.31	33.66	141.97	0.239	No	No	1.48
95	19.00	17.26	12.17	1.76	0.38	0.80	133.21	29.48	162.69	0.345	No	No	2.00
96	19.20	20.21	10.77	1.68	0.34	0.81	167.75	23.91	191.66	0.800	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	21.20	10.29	1.65	0.32	0.82	185.11	21.72	206.83	1.595	No	No	2.00
98	19.60	23.16	9.38	1.59	0.37	0.79	155.49	13.27	168.76	0.395	No	No	2.00
99	19.80	24.46	8.86	1.56	0.29	0.83	219.82	12.74	232.56	4.000	No	No	2.00
100	20.00	28.71	7.38	1.45	0.27	0.84	246.57	4.34	250.91	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	0.74	0.26	9.20	0.20	0.47
1.80	0.95	0.05	9.10	0.20	0.10	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	2.00	0.00	5.00	0.20	0.00
10.20	0.64	0.36	4.90	0.20	0.35	10.40	1.37	0.00	4.80	0.20	0.00
10.60	1.02	0.00	4.70	0.20	0.00	10.80	1.48	0.00	4.60	0.20	0.00
11.00	1.57	0.00	4.50	0.20	0.00	11.20	1.29	0.00	4.40	0.20	0.00
11.40	1.82	0.00	4.30	0.20	0.00	11.60	2.00	0.00	4.20	0.20	0.00
11.80	1.24	0.00	4.10	0.20	0.00	12.00	1.49	0.00	4.00	0.20	0.00
12.20	1.30	0.00	3.90	0.20	0.00	12.40	2.00	0.00	3.80	0.20	0.00
12.60	2.00	0.00	3.70	0.20	0.00	12.80	1.20	0.00	3.60	0.20	0.00
13.00	2.00	0.00	3.50	0.20	0.00	13.20	2.00	0.00	3.40	0.20	0.00
13.40	2.00	0.00	3.30	0.20	0.00	13.60	2.00	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	1.67	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	2.00	0.00	2.70	0.20	0.00	14.80	2.00	0.00	2.60	0.20	0.00
15.00	1.61	0.00	2.50	0.20	0.00	15.20	0.86	0.14	2.40	0.20	0.07
15.40	1.37	0.00	2.30	0.20	0.00	15.60	1.50	0.00	2.20	0.20	0.00
15.80	1.92	0.00	2.10	0.20	0.00	16.00	2.00	0.00	2.00	0.20	0.00
16.20	2.00	0.00	1.90	0.20	0.00	16.40	2.00	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	2.00	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	1.17	0.00	1.40	0.20	0.00
17.40	1.46	0.00	1.30	0.20	0.00	17.60	1.86	0.00	1.20	0.20	0.00
17.80	2.00	0.00	1.10	0.20	0.00	18.00	1.24	0.00	1.00	0.20	0.00
18.20	1.49	0.00	0.90	0.20	0.00	18.40	1.69	0.00	0.80	0.20	0.00
18.60	1.90	0.00	0.70	0.20	0.00	18.80	1.48	0.00	0.60	0.20	0.00
19.00	2.00	0.00	0.50	0.20	0.00	19.20	2.00	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	2.00	0.00	0.30	0.20	0.00	19.60	2.00	0.00	0.20	0.20	0.00
19.80	2.00	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 1.00

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

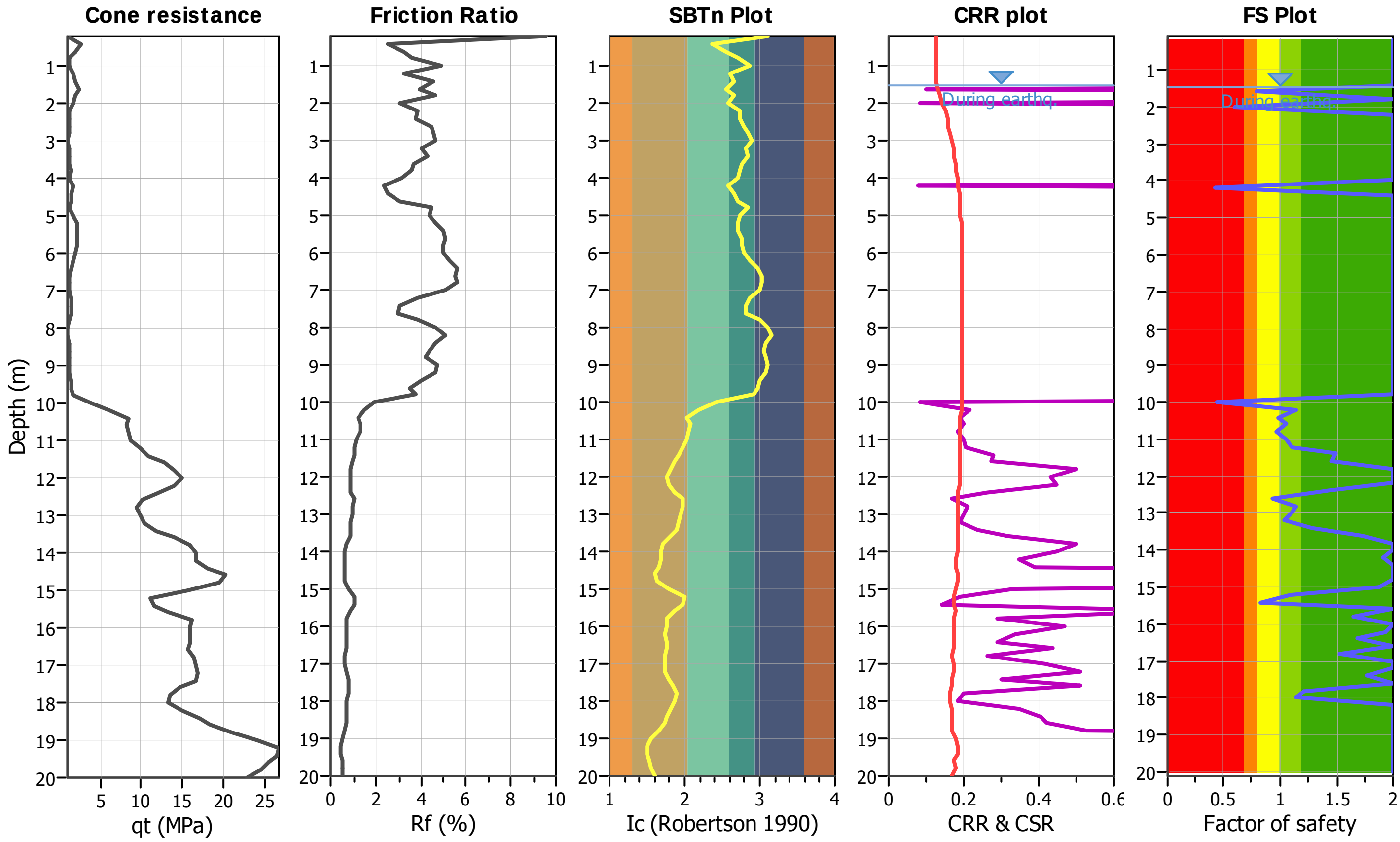
LIQUEFACTION ANALYSIS REPORT

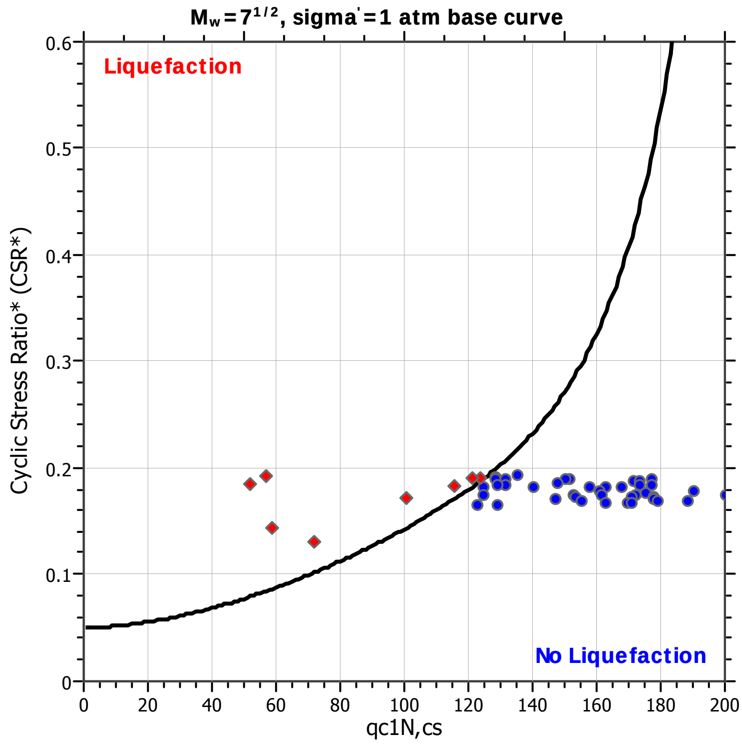
Project title : **Location :**

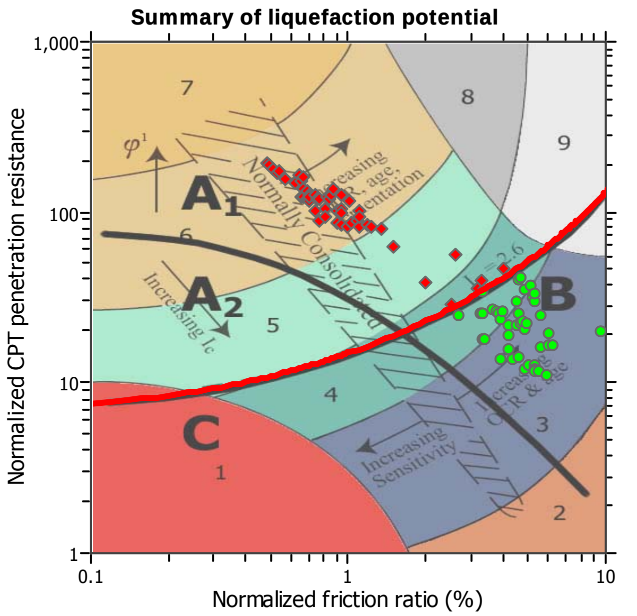
CPT file : CPT03

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:	Sands only
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:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

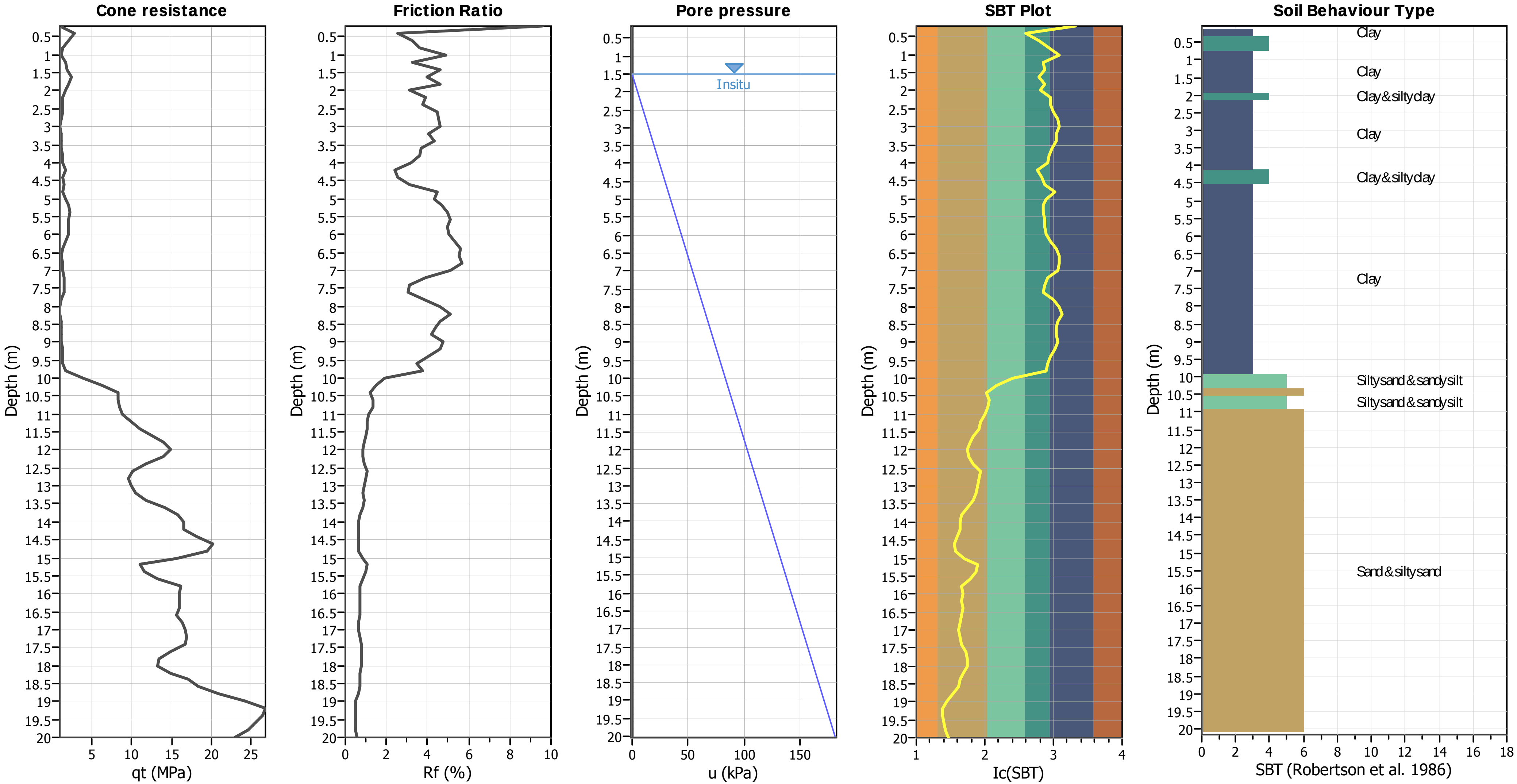






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



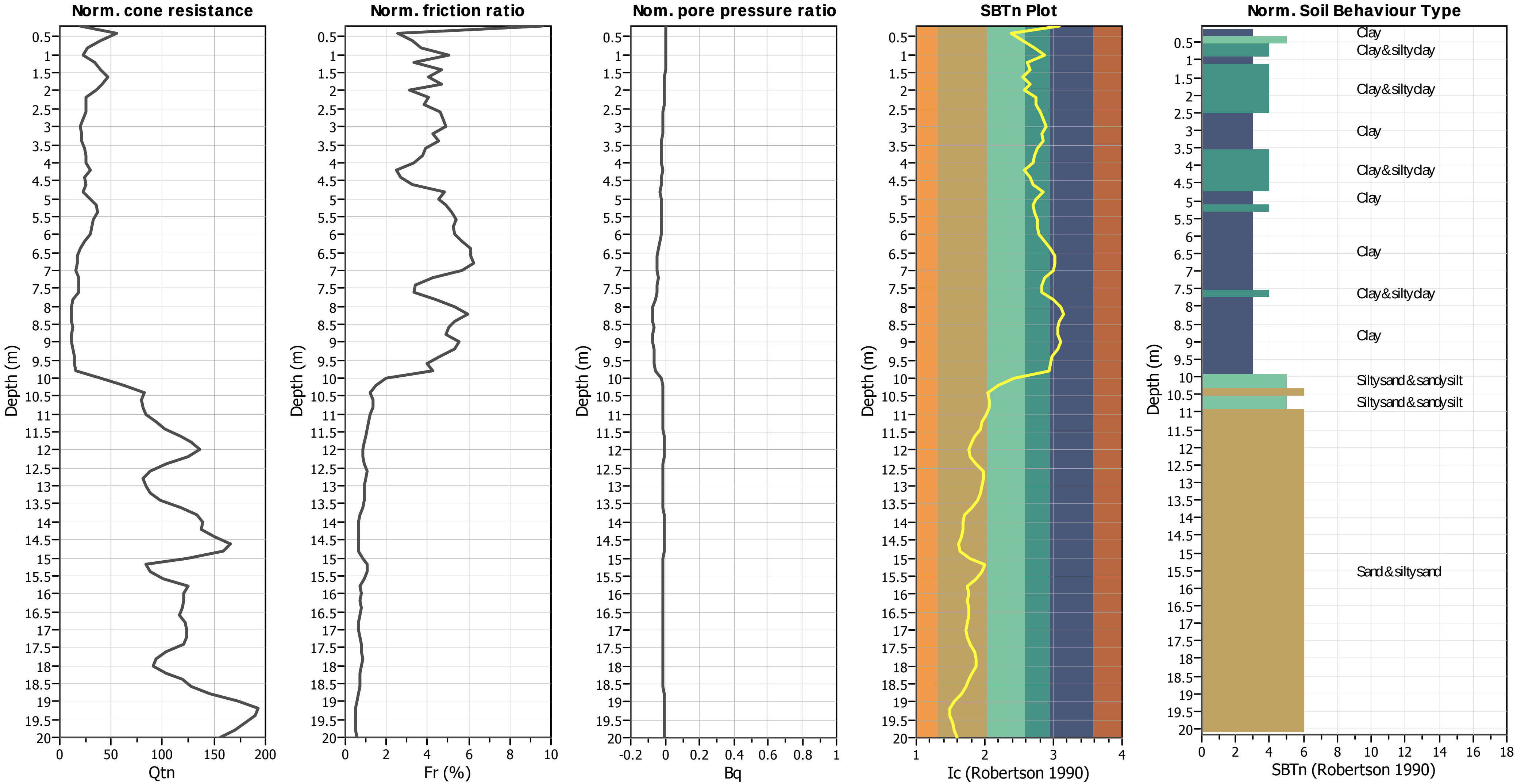
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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)



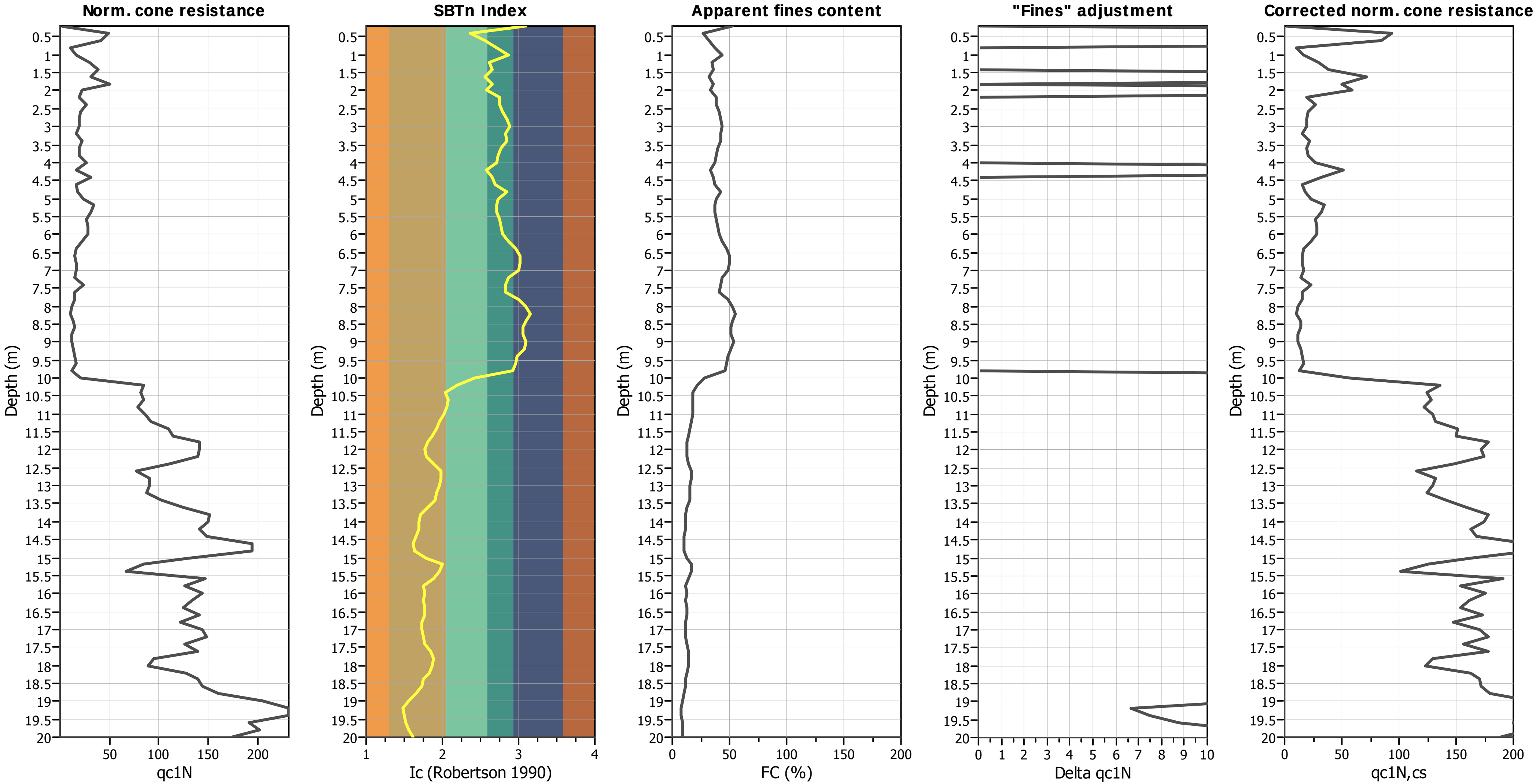
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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

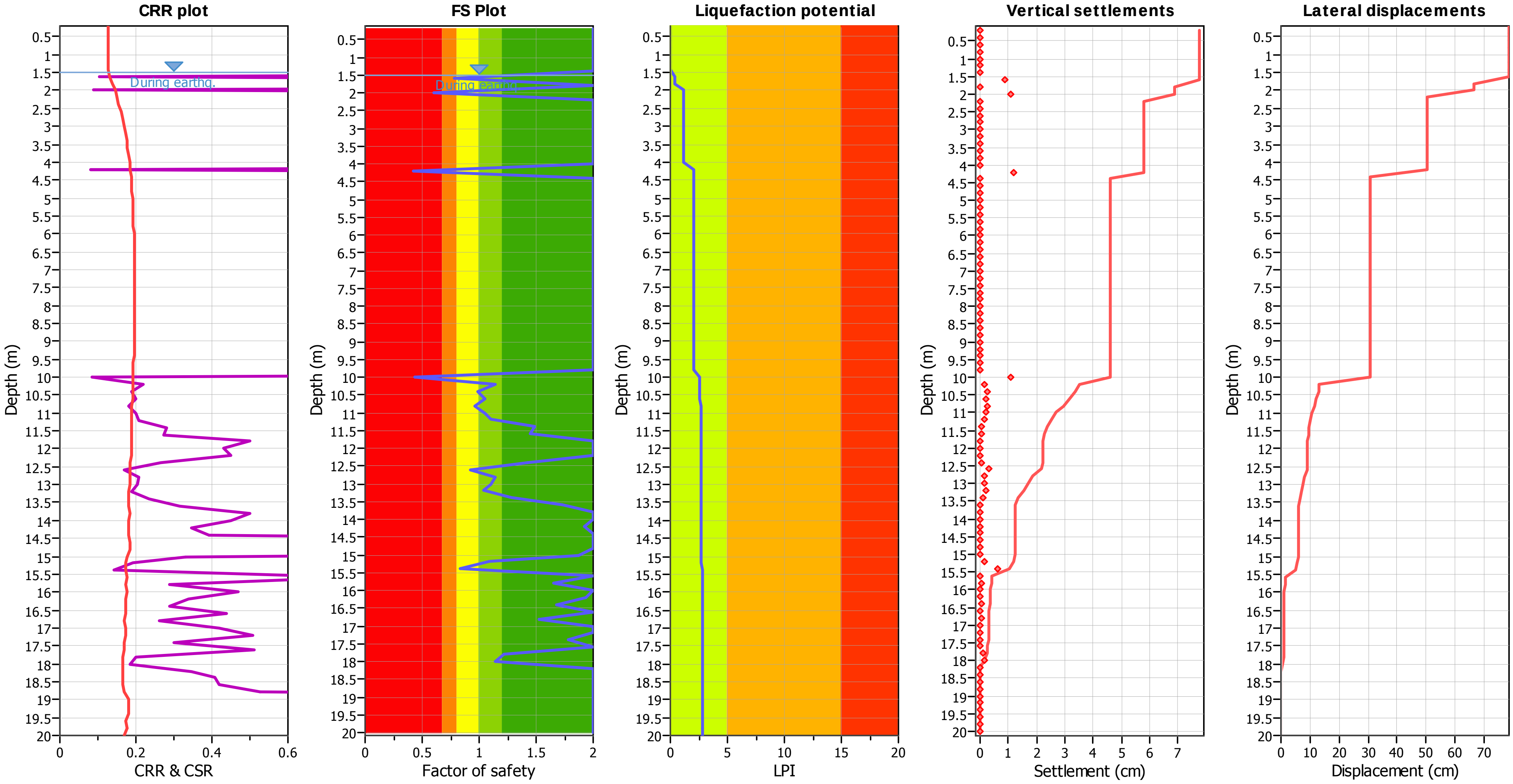
Liquefaction analysis overall plots (intermediate results)



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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

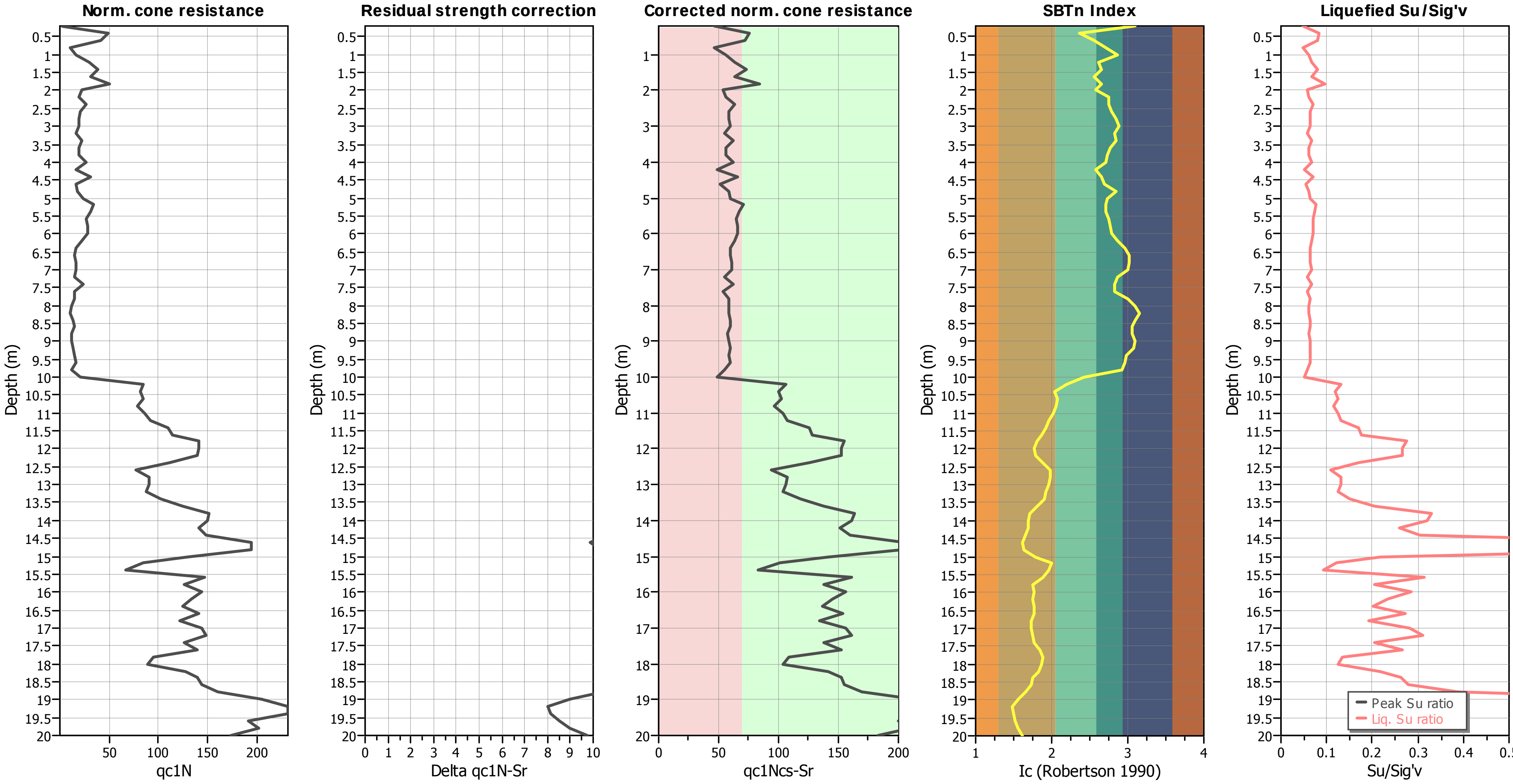
F.S. color scheme

- 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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	98.07	0.00	65.13	18.23
2	0.40	2.95	88.26	0.00	25.40	18.30
3	0.60	2.46	39.23	0.00	33.03	18.07
4	0.80	0.60	68.65	0.00	41.16	17.59
5	1.00	0.99	39.23	0.00	49.71	17.66
6	1.20	1.79	58.84	0.00	35.98	17.82
7	1.40	2.29	68.65	0.00	38.42	18.45
8	1.60	1.89	147.10	0.00	33.50	18.56
9	1.80	2.97	68.65	0.00	38.07	18.51
10	2.00	1.30	68.65	0.00	34.36	17.84
11	2.20	1.12	29.42	0.00	42.97	17.66
12	2.40	1.61	58.84	0.00	42.81	17.58
13	2.60	1.22	58.84	0.00	45.88	17.78
14	2.80	1.12	58.84	0.00	48.96	17.60
15	3.00	1.12	39.23	0.00	51.20	17.49
16	3.20	0.94	49.03	0.00	47.58	17.44
17	3.40	1.33	49.03	0.00	48.64	17.52
18	3.60	1.14	49.03	0.00	44.49	17.47
19	3.80	1.24	39.23	0.00	42.08	17.59
20	4.00	1.73	58.84	0.00	40.85	17.42
21	4.20	1.05	29.42	0.00	34.33	17.40
22	4.40	2.13	29.42	0.00	38.07	17.25
23	4.60	1.05	49.03	0.00	40.34	17.54
24	4.80	1.25	58.84	0.00	48.64	17.78
25	5.00	1.64	68.65	0.00	42.63	18.24
26	5.20	2.53	107.87	0.00	41.08	18.60
27	5.40	2.33	127.49	0.00	41.51	18.76
28	5.60	2.04	107.87	0.00	43.48	18.71
29	5.80	2.14	98.07	0.00	44.03	18.63
30	6.00	2.14	107.87	0.00	45.56	18.57
31	6.20	1.76	98.07	0.00	50.00	18.40
32	6.40	1.27	68.65	0.00	56.10	18.14
33	6.60	1.18	68.65	0.00	59.70	17.94
34	6.80	1.27	68.65	0.00	60.07	18.00
35	7.00	1.37	78.45	0.00	58.72	17.90
36	7.20	1.19	49.03	0.00	50.29	17.84
37	7.40	1.97	49.03	0.00	47.54	17.54
38	7.60	1.28	39.23	0.00	47.18	17.55
39	7.80	1.28	49.03	0.00	57.89	17.46
40	8.00	0.99	49.03	0.00	65.35	17.49
41	8.20	0.90	49.03	0.00	68.79	17.56
42	8.40	1.20	58.84	0.00	64.55	17.59
43	8.60	1.29	49.03	0.00	62.34	17.61
44	8.80	1.10	49.03	0.00	63.06	17.53
45	9.00	1.10	49.03	0.00	65.81	17.67
46	9.20	1.31	68.65	0.00	63.19	17.77
47	9.40	1.41	58.84	0.00	57.73	17.82
48	9.60	1.61	49.03	0.00	56.01	17.60

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	1.22	39.23	0.00	53.94	17.93
50	10.00	2.10	98.07	0.00	27.14	18.49
51	10.20	8.48	88.26	0.00	18.45	18.89
52	10.40	8.19	88.26	0.00	13.87	19.12
53	10.60	8.48	127.49	0.00	14.86	19.19
54	10.80	7.99	107.87	0.00	14.73	19.23
55	11.00	8.88	98.07	0.00	13.43	19.14
56	11.20	9.48	98.07	0.00	11.94	19.26
57	11.40	11.44	127.49	0.00	11.11	19.40
58	11.60	11.94	127.49	0.00	9.46	19.55
59	11.80	14.88	127.49	0.00	8.33	19.58
60	12.00	14.88	127.49	0.00	7.50	19.60
61	12.20	14.89	127.49	0.00	7.99	19.49
62	12.40	11.94	98.07	0.00	9.87	19.32
63	12.60	8.51	98.07	0.00	12.34	19.27
64	12.80	9.98	127.49	0.00	12.36	19.05
65	13.00	9.98	49.03	0.00	11.72	19.07
66	13.20	9.80	98.07	0.00	11.03	19.09
67	13.40	11.46	127.49	0.00	10.36	19.32
68	13.60	13.92	98.07	0.00	8.32	19.49
69	13.80	16.86	127.49	0.00	6.32	19.44
70	14.00	16.86	98.07	0.00	5.89	19.45
71	14.20	15.90	98.07	0.00	5.94	19.45
72	14.40	16.88	127.49	0.00	5.33	19.59
73	14.60	21.78	127.49	0.00	4.64	19.72
74	14.80	21.78	127.49	0.00	5.05	19.71
75	15.00	14.92	127.49	0.00	7.91	19.62
76	15.20	10.02	127.49	0.00	12.90	19.40
77	15.40	8.06	98.07	0.00	11.98	19.42
78	15.60	16.89	127.49	0.00	9.93	19.47
79	15.80	14.93	127.49	0.00	7.13	19.55
80	16.00	16.89	98.07	0.00	7.46	19.54
81	16.20	15.92	127.49	0.00	7.02	19.44
82	16.40	14.94	98.07	0.00	7.58	19.54
83	16.60	16.90	127.49	0.00	7.42	19.43
84	16.80	14.94	98.07	0.00	6.80	19.45
85	17.00	17.39	98.07	0.00	6.60	19.46
86	17.20	17.90	127.49	0.00	7.01	19.56
87	17.40	15.45	127.49	0.00	7.66	19.65
88	17.60	16.92	127.49	0.00	9.03	19.51
89	17.80	12.01	98.07	0.00	9.95	19.37
90	18.00	11.52	98.07	0.00	9.79	19.26
91	18.20	15.95	98.07	0.00	8.51	19.41
92	18.40	17.42	127.49	0.00	7.21	19.57
93	18.60	17.91	127.49	0.00	6.74	19.69
94	18.80	19.87	127.49	0.00	5.23	19.73
95	19.00	24.77	127.49	0.00	3.66	19.79
96	19.20	27.73	127.49	0.00	2.69	19.83

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	27.73	127.49	0.00	2.83	19.83
98	19.60	23.81	127.49	0.00	3.24	19.81
99	19.80	24.79	127.49	0.00	3.67	19.80
100	20.00	21.85	127.49	0.00	4.46	19.77

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.65	0.00	3.65	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
2	0.40	7.31	0.00	7.31	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
3	0.60	10.92	0.00	10.92	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
4	0.80	14.44	0.00	14.44	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
5	1.00	17.97	0.00	17.97	0.99	0.181	1.43	0.127	1.00	1.00	2.000	No
6	1.20	21.53	0.00	21.53	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
7	1.40	25.22	0.00	25.22	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
8	1.60	28.93	0.98	27.95	0.99	0.186	1.43	0.130	1.00	1.00	0.130	No
9	1.80	32.64	2.94	29.69	0.98	0.196	1.43	0.138	1.00	1.00	0.138	No
10	2.00	36.20	4.91	31.30	0.98	0.206	1.43	0.144	1.00	1.00	0.144	No
11	2.20	39.73	6.87	32.87	0.98	0.215	1.43	0.150	1.00	1.00	0.150	No
12	2.40	43.25	8.83	34.42	0.97	0.222	1.43	0.156	1.00	1.00	0.156	No
13	2.60	46.81	10.79	36.02	0.97	0.229	1.43	0.160	1.00	1.00	0.160	No
14	2.80	50.33	12.75	37.57	0.97	0.235	1.43	0.165	1.00	1.00	0.165	No
15	3.00	53.83	14.71	39.11	0.96	0.241	1.43	0.169	1.00	1.00	0.169	No
16	3.20	57.31	16.68	40.64	0.96	0.246	1.43	0.172	1.00	1.00	0.172	No
17	3.40	60.82	18.64	42.18	0.95	0.250	1.43	0.175	1.00	1.00	0.175	No
18	3.60	64.31	20.60	43.71	0.95	0.254	1.43	0.178	1.00	1.00	0.178	No
19	3.80	67.83	22.56	45.27	0.95	0.258	1.43	0.181	1.00	1.00	0.181	No
20	4.00	71.31	24.52	46.79	0.94	0.261	1.43	0.183	1.00	1.00	0.183	No
21	4.20	74.79	26.49	48.31	0.94	0.264	1.43	0.185	1.00	1.00	0.185	No
22	4.40	78.24	28.45	49.79	0.93	0.267	1.43	0.187	1.00	1.00	0.187	No
23	4.60	81.75	30.41	51.34	0.93	0.270	1.43	0.189	1.00	1.00	0.189	No
24	4.80	85.31	32.37	52.93	0.93	0.272	1.43	0.190	1.00	1.00	0.190	No
25	5.00	88.95	34.34	54.62	0.92	0.273	1.43	0.191	1.00	1.00	0.191	No
26	5.20	92.67	36.30	56.38	0.92	0.275	1.43	0.192	1.00	1.00	0.192	No
27	5.40	96.43	38.26	58.17	0.91	0.276	1.43	0.193	1.00	1.00	0.193	No
28	5.60	100.17	40.22	59.95	0.91	0.277	1.43	0.194	1.00	1.00	0.194	No
29	5.80	103.89	42.18	61.71	0.91	0.277	1.43	0.194	1.00	1.00	0.194	No
30	6.00	107.61	44.15	63.46	0.90	0.278	1.43	0.195	1.00	1.00	0.195	No
31	6.20	111.29	46.11	65.18	0.90	0.279	1.43	0.195	1.00	1.00	0.195	No
32	6.40	114.92	48.07	66.85	0.89	0.279	1.43	0.195	1.00	1.00	0.195	No
33	6.60	118.51	50.03	68.47	0.89	0.280	1.43	0.196	1.00	1.00	0.196	No
34	6.80	122.11	51.99	70.11	0.88	0.280	1.43	0.196	1.00	1.00	0.196	No
35	7.00	125.69	53.95	71.73	0.88	0.280	1.43	0.196	1.00	1.00	0.196	No
36	7.20	129.25	55.92	73.34	0.87	0.280	1.43	0.196	1.00	1.00	0.196	No
37	7.40	132.76	57.88	74.88	0.87	0.280	1.43	0.196	1.00	1.00	0.196	No
38	7.60	136.27	59.84	76.43	0.86	0.281	1.43	0.196	1.00	1.00	0.196	No
39	7.80	139.76	61.80	77.96	0.86	0.281	1.43	0.196	1.00	1.00	0.196	No
40	8.00	143.26	63.77	79.50	0.86	0.281	1.43	0.196	1.00	1.00	0.196	No
41	8.20	146.77	65.73	81.05	0.85	0.280	1.43	0.196	1.00	1.00	0.196	No
42	8.40	150.29	67.69	82.60	0.85	0.280	1.43	0.196	1.00	1.00	0.196	No
43	8.60	153.81	69.65	84.16	0.84	0.280	1.43	0.196	1.00	1.00	0.196	No
44	8.80	157.32	71.61	85.71	0.84	0.279	1.43	0.196	1.00	1.00	0.196	No
45	9.00	160.85	73.58	87.28	0.83	0.279	1.43	0.195	1.00	1.00	0.195	No
46	9.20	164.41	75.54	88.87	0.83	0.278	1.43	0.195	1.00	1.00	0.195	No
47	9.40	167.97	77.50	90.47	0.82	0.278	1.43	0.194	1.00	1.00	0.194	No
48	9.60	171.49	79.46	92.03	0.82	0.277	1.43	0.194	1.00	1.00	0.194	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	175.08	81.42	93.66	0.81	0.276	1.43	0.194	1.00	1.00	0.194	No
50	10.00	178.78	83.39	95.39	0.81	0.276	1.43	0.193	1.00	1.00	0.193	No
51	10.20	182.56	85.35	97.21	0.80	0.274	1.43	0.192	1.00	1.00	0.192	No
52	10.40	186.38	87.31	99.07	0.80	0.273	1.43	0.191	1.00	1.00	0.191	No
53	10.60	190.22	89.27	100.95	0.79	0.272	1.43	0.190	1.00	1.00	0.190	No
54	10.80	194.06	91.23	102.83	0.79	0.271	1.43	0.190	1.00	1.00	0.190	No
55	11.00	197.89	93.19	104.70	0.78	0.270	1.43	0.189	1.00	1.00	0.189	No
56	11.20	201.74	95.16	106.59	0.78	0.268	1.43	0.188	0.99	1.00	0.189	No
57	11.40	205.62	97.12	108.50	0.77	0.267	1.43	0.187	0.99	1.00	0.188	No
58	11.60	209.53	99.08	110.45	0.77	0.266	1.43	0.186	0.99	1.00	0.188	No
59	11.80	213.45	101.04	112.40	0.76	0.264	1.43	0.185	0.98	1.00	0.188	No
60	12.00	217.37	103.00	114.36	0.76	0.263	1.43	0.184	0.98	1.00	0.187	No
61	12.20	221.26	104.97	116.30	0.76	0.262	1.43	0.183	0.98	1.00	0.187	No
62	12.40	225.13	106.93	118.20	0.75	0.260	1.43	0.182	0.98	1.00	0.185	No
63	12.60	228.98	108.89	120.09	0.75	0.259	1.43	0.181	0.98	1.00	0.184	No
64	12.80	232.79	110.85	121.94	0.74	0.258	1.43	0.180	0.98	1.00	0.184	No
65	13.00	236.61	112.81	123.79	0.74	0.256	1.43	0.179	0.98	1.00	0.183	No
66	13.20	240.42	114.78	125.65	0.73	0.255	1.43	0.178	0.98	1.00	0.182	No
67	13.40	244.29	116.74	127.55	0.73	0.253	1.43	0.177	0.98	1.00	0.182	No
68	13.60	248.19	118.70	129.49	0.72	0.252	1.43	0.176	0.97	1.00	0.182	No
69	13.80	252.07	120.66	131.41	0.72	0.251	1.43	0.175	0.96	1.00	0.183	No
70	14.00	255.96	122.63	133.34	0.71	0.249	1.43	0.174	0.96	1.00	0.183	No
71	14.20	259.85	124.59	135.27	0.71	0.248	1.43	0.173	0.96	1.00	0.181	No
72	14.40	263.77	126.55	137.22	0.70	0.246	1.43	0.172	0.95	1.00	0.181	No
73	14.60	267.72	128.51	139.21	0.70	0.245	1.43	0.171	0.92	1.00	0.186	No
74	14.80	271.66	130.47	141.19	0.70	0.244	1.43	0.170	0.92	1.00	0.186	No
75	15.00	275.58	132.44	143.15	0.69	0.242	1.43	0.169	0.95	1.00	0.178	No
76	15.20	279.46	134.40	145.07	0.69	0.241	1.43	0.168	0.97	1.00	0.174	No
77	15.40	283.35	136.36	146.99	0.68	0.239	1.43	0.168	0.97	1.00	0.173	No
78	15.60	287.24	138.32	148.92	0.68	0.238	1.43	0.167	0.94	1.00	0.177	No
79	15.80	291.15	140.28	150.87	0.67	0.237	1.43	0.166	0.95	1.00	0.175	No
80	16.00	295.06	142.25	152.81	0.67	0.235	1.43	0.165	0.94	1.00	0.175	No
81	16.20	298.94	144.21	154.74	0.66	0.234	1.43	0.164	0.94	1.00	0.174	No
82	16.40	302.85	146.17	156.68	0.66	0.232	1.43	0.163	0.94	1.00	0.172	No
83	16.60	306.74	148.13	158.61	0.66	0.231	1.43	0.162	0.93	1.00	0.173	No
84	16.80	310.63	150.09	160.54	0.65	0.230	1.43	0.161	0.94	1.00	0.171	No
85	17.00	314.52	152.06	162.47	0.65	0.228	1.43	0.160	0.93	1.00	0.172	No
86	17.20	318.43	154.02	164.42	0.64	0.227	1.43	0.159	0.92	1.00	0.172	No
87	17.40	322.36	155.98	166.38	0.64	0.226	1.43	0.158	0.94	1.00	0.169	No
88	17.60	326.26	157.94	168.32	0.64	0.224	1.43	0.157	0.93	1.00	0.170	No
89	17.80	330.14	159.90	170.24	0.63	0.223	1.43	0.156	0.95	1.00	0.165	No
90	18.00	333.99	161.87	172.13	0.63	0.222	1.43	0.155	0.95	1.00	0.164	No
91	18.20	337.87	163.83	174.05	0.62	0.220	1.43	0.154	0.93	1.00	0.166	No
92	18.40	341.79	165.79	176.00	0.62	0.219	1.43	0.153	0.92	1.00	0.167	No
93	18.60	345.72	167.75	177.97	0.62	0.218	1.43	0.153	0.91	1.00	0.167	No
94	18.80	349.67	169.71	179.96	0.61	0.217	1.43	0.152	0.90	1.00	0.168	No
95	19.00	353.63	171.68	181.95	0.61	0.215	1.43	0.151	0.84	1.00	0.180	No
96	19.20	357.60	173.64	183.96	0.61	0.214	1.43	0.150	0.82	1.00	0.183	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	361.56	175.60	185.96	0.60	0.213	1.43	0.149	0.82	1.00	0.182	No
98	19.60	365.52	177.56	187.96	0.60	0.212	1.43	0.148	0.85	1.00	0.174	No
99	19.80	369.48	179.52	189.96	0.59	0.210	1.43	0.147	0.83	1.00	0.177	No
100	20.00	373.44	181.49	191.95	0.59	0.209	1.43	0.146	0.87	1.00	0.168	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	0.99	52.84	3.10	0.72	1.70	0.17	0.00	0.17	4.000	No	Yes	2.00
2	0.40	2.79	26.54	2.37	0.51	1.70	49.53	44.04	93.57	4.000	No	No	2.00
3	0.60	2.00	31.97	2.55	0.53	1.70	41.29	43.35	84.64	4.000	No	No	2.00
4	0.80	1.35	37.52	2.71	0.66	1.70	10.03	0.00	10.03	4.000	No	Yes	2.00
5	1.00	1.13	43.13	2.86	0.63	1.70	16.61	0.00	16.61	4.000	No	Yes	2.00
6	1.20	1.69	34.01	2.61	0.57	1.70	30.12	0.00	30.12	4.000	No	Yes	2.00
7	1.40	1.99	35.67	2.66	0.54	1.70	38.34	0.00	38.34	4.000	No	Yes	2.00
8	1.60	2.38	32.30	2.56	0.57	1.70	31.76	40.19	71.95	0.102	No	No	0.79
9	1.80	2.06	35.43	2.65	0.51	1.70	49.85	0.00	49.85	4.000	No	Yes	2.00
10	2.00	1.80	32.89	2.58	0.61	1.70	21.88	36.94	58.82	0.087	No	No	0.60
11	2.20	1.34	38.72	2.75	0.62	1.70	18.76	0.00	18.76	4.000	No	Yes	2.00
12	2.40	1.31	38.62	2.74	0.58	1.70	26.98	0.00	26.98	4.000	No	Yes	2.00
13	2.60	1.31	40.64	2.80	0.61	1.70	20.40	0.00	20.40	4.000	No	Yes	2.00
14	2.80	1.15	42.65	2.85	0.62	1.70	18.76	0.00	18.76	4.000	No	Yes	2.00
15	3.00	1.06	44.10	2.89	0.62	1.70	18.76	0.00	18.76	4.000	No	Yes	2.00
16	3.20	1.13	41.75	2.83	0.63	1.70	15.79	0.00	15.79	4.000	No	Yes	2.00
17	3.40	1.14	42.44	2.85	0.60	1.70	22.33	0.00	22.33	4.000	No	Yes	2.00
18	3.60	1.24	39.73	2.77	0.62	1.68	18.89	0.00	18.89	4.000	No	Yes	2.00
19	3.80	1.37	38.13	2.73	0.61	1.64	20.00	0.00	20.00	4.000	No	Yes	2.00
20	4.00	1.34	37.31	2.71	0.58	1.57	26.77	0.00	26.77	4.000	No	Yes	2.00
21	4.20	1.63	32.87	2.58	0.63	1.60	16.54	35.11	51.65	0.079	No	No	0.43
22	4.40	1.41	35.43	2.65	0.57	1.50	31.43	0.00	31.43	4.000	No	Yes	2.00
23	4.60	1.47	36.97	2.70	0.63	1.54	15.92	0.00	15.92	4.000	No	Yes	2.00
24	4.80	1.31	42.44	2.85	0.62	1.50	18.38	0.00	18.38	4.000	No	Yes	2.00
25	5.00	1.80	38.50	2.74	0.60	1.45	23.40	0.00	23.40	4.000	No	Yes	2.00
26	5.20	2.17	37.46	2.71	0.56	1.38	34.57	0.00	34.57	4.000	No	Yes	2.00
27	5.40	2.30	37.75	2.72	0.57	1.37	31.54	0.00	31.54	4.000	No	Yes	2.00
28	5.60	2.17	39.06	2.76	0.58	1.36	27.33	0.00	27.33	4.000	No	Yes	2.00
29	5.80	2.11	39.43	2.77	0.58	1.33	28.12	0.00	28.12	4.000	No	Yes	2.00
30	6.00	2.01	40.43	2.79	0.58	1.31	27.69	0.00	27.69	4.000	No	Yes	2.00
31	6.20	1.73	43.33	2.87	0.60	1.30	22.71	0.00	22.71	4.000	No	Yes	2.00
32	6.40	1.41	47.22	2.96	0.63	1.30	16.35	0.00	16.35	4.000	No	Yes	2.00
33	6.60	1.24	49.48	3.02	0.64	1.28	14.91	0.00	14.91	4.000	No	Yes	2.00
34	6.80	1.27	49.71	3.02	0.63	1.26	15.88	0.00	15.88	4.000	No	Yes	2.00
35	7.00	1.28	48.87	3.00	0.63	1.24	16.83	0.00	16.83	4.000	No	Yes	2.00
36	7.20	1.51	43.51	2.87	0.64	1.23	14.41	0.00	14.41	4.000	No	Yes	2.00
37	7.40	1.48	41.73	2.83	0.60	1.20	23.31	0.00	23.31	4.000	No	Yes	2.00
38	7.60	1.51	41.49	2.82	0.64	1.20	15.17	0.00	15.17	4.000	No	Yes	2.00
39	7.80	1.19	48.34	2.99	0.64	1.18	14.98	0.00	14.98	4.000	No	Yes	2.00
40	8.00	1.06	52.97	3.10	0.65	1.17	11.45	0.00	11.45	4.000	No	Yes	2.00
41	8.20	1.03	55.07	3.14	0.66	1.16	10.32	0.00	10.32	4.000	No	Yes	2.00
42	8.40	1.13	52.48	3.09	0.64	1.14	13.46	0.00	13.46	4.000	No	Yes	2.00
43	8.60	1.20	51.12	3.06	0.64	1.13	14.38	0.00	14.38	4.000	No	Yes	2.00
44	8.80	1.16	51.56	3.07	0.65	1.12	12.08	0.00	12.08	4.000	No	Yes	2.00
45	9.00	1.17	53.26	3.10	0.65	1.10	11.94	0.00	11.94	4.000	No	Yes	2.00
46	9.20	1.27	51.64	3.07	0.64	1.09	14.11	0.00	14.11	4.000	No	Yes	2.00
47	9.40	1.44	48.24	2.99	0.64	1.07	14.98	0.00	14.98	4.000	No	Yes	2.00
48	9.60	1.41	47.16	2.96	0.63	1.06	16.86	0.00	16.86	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	1.64	45.85	2.93	0.65	1.05	12.63	0.00	12.63	4.000	No	Yes	2.00
50	10.00	3.93	27.80	2.42	0.61	1.04	21.50	35.47	56.97	0.085	No	No	0.44
51	10.20	6.26	21.33	2.18	0.43	1.02	85.22	50.20	135.42	0.218	No	No	1.13
52	10.40	8.38	17.72	2.03	0.45	1.01	81.64	42.30	123.94	0.188	No	No	0.98
53	10.60	8.22	18.52	2.07	0.44	1.00	83.86	44.71	128.57	0.199	No	No	1.05
54	10.80	8.45	18.42	2.06	0.45	0.99	78.35	43.05	121.40	0.183	No	No	0.96
55	11.00	8.78	17.37	2.02	0.44	0.99	86.34	42.57	128.90	0.200	No	No	1.06
56	11.20	9.93	16.15	1.96	0.43	0.98	91.55	40.25	131.80	0.208	No	No	1.10
57	11.40	10.95	15.46	1.93	0.40	0.97	109.89	41.83	151.72	0.279	No	No	1.48
58	11.60	12.75	14.06	1.86	0.40	0.97	113.77	36.64	150.41	0.273	No	No	1.45
59	11.80	13.90	13.09	1.81	0.36	0.96	141.43	36.24	177.67	0.500	No	No	2.00
60	12.00	14.88	12.36	1.77	0.37	0.96	140.41	31.64	172.05	0.429	No	No	2.00
61	12.20	13.90	12.79	1.79	0.37	0.95	139.68	34.19	173.87	0.450	No	No	2.00
62	12.40	11.78	14.41	1.88	0.41	0.94	110.73	37.66	148.39	0.264	No	No	1.42
63	12.60	10.15	16.47	1.98	0.47	0.92	77.62	38.04	115.66	0.171	No	No	0.93
64	12.80	9.49	16.49	1.98	0.43	0.92	90.91	41.18	132.09	0.209	No	No	1.14
65	13.00	9.92	15.97	1.95	0.44	0.92	90.24	39.36	129.60	0.202	No	No	1.10
66	13.20	10.41	15.39	1.93	0.45	0.91	87.81	36.89	124.70	0.190	No	No	1.04
67	13.40	11.73	14.83	1.90	0.42	0.91	102.73	37.89	140.62	0.234	No	No	1.29
68	13.60	14.08	13.08	1.81	0.39	0.91	124.81	33.55	158.36	0.316	No	No	1.73
69	13.80	15.88	11.31	1.71	0.36	0.91	151.46	26.11	177.57	0.499	No	No	2.00
70	14.00	16.54	10.92	1.69	0.37	0.90	150.43	23.30	173.73	0.448	No	No	2.00
71	14.20	16.54	10.97	1.69	0.38	0.90	140.46	22.63	163.09	0.348	No	No	1.92
72	14.40	18.18	10.41	1.66	0.38	0.89	148.65	19.65	168.30	0.391	No	No	2.00
73	14.60	20.15	9.76	1.62	0.31	0.91	194.63	18.32	212.95	2.251	No	No	2.00
74	14.80	19.49	10.15	1.64	0.31	0.90	193.97	21.33	215.30	2.597	No	No	2.00
75	15.00	15.57	12.72	1.79	0.39	0.88	128.81	32.16	160.97	0.333	No	No	1.87
76	15.20	11.00	16.93	2.00	0.45	0.85	84.25	40.89	125.13	0.191	No	No	1.10
77	15.40	11.66	16.18	1.96	0.50	0.83	66.13	34.59	100.72	0.144	No	No	0.83
78	15.60	13.29	14.46	1.88	0.34	0.88	146.09	44.68	190.77	0.773	No	No	2.00
79	15.80	16.23	12.04	1.75	0.40	0.85	125.70	27.69	153.39	0.288	No	No	1.65
80	16.00	15.91	12.33	1.77	0.36	0.86	143.51	31.89	175.40	0.469	No	No	2.00
81	16.20	15.91	11.94	1.75	0.38	0.85	133.46	28.11	161.57	0.337	No	No	1.94
82	16.40	15.92	12.43	1.77	0.40	0.84	123.92	29.78	153.70	0.289	No	No	1.68
83	16.60	15.59	12.29	1.77	0.37	0.85	141.42	31.36	172.78	0.437	No	No	2.00
84	16.80	16.41	11.74	1.74	0.41	0.83	122.17	25.49	147.67	0.261	No	No	1.53
85	17.00	16.74	11.56	1.73	0.37	0.84	144.06	26.97	171.03	0.418	No	No	2.00
86	17.20	16.91	11.93	1.75	0.36	0.84	148.40	29.93	178.33	0.510	No	No	2.00
87	17.40	16.75	12.51	1.78	0.39	0.82	125.37	30.40	155.77	0.300	No	No	1.78
88	17.60	14.79	13.69	1.84	0.36	0.83	139.09	39.28	178.37	0.510	No	No	2.00
89	17.80	13.48	14.49	1.88	0.44	0.80	94.36	34.84	129.20	0.201	No	No	1.22
90	18.00	13.16	14.34	1.87	0.45	0.79	89.51	33.34	122.85	0.186	No	No	1.13
91	18.20	14.96	13.24	1.82	0.38	0.81	127.93	34.94	162.87	0.346	No	No	2.00
92	18.40	17.09	12.11	1.76	0.37	0.81	139.96	30.01	169.97	0.407	No	No	2.00
93	18.60	18.40	11.69	1.73	0.37	0.81	143.45	27.74	171.19	0.420	No	No	2.00
94	18.80	20.85	10.32	1.65	0.36	0.81	159.62	19.90	179.51	0.528	No	No	2.00
95	19.00	24.12	8.84	1.56	0.31	0.83	203.95	11.90	215.85	2.690	No	No	2.00
96	19.20	26.75	7.89	1.49	0.28	0.84	231.18	6.64	237.82	4.000	No	No	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	26.43	8.03	1.50	0.28	0.84	230.49	7.47	237.96	4.000	No	No	2.00
98	19.60	25.45	8.43	1.53	0.33	0.82	191.71	8.77	200.49	1.164	No	No	2.00
99	19.80	24.46	8.85	1.56	0.31	0.82	200.89	11.84	212.73	2.221	No	No	2.00
100	20.00	22.83	9.59	1.61	0.35	0.80	172.92	15.69	188.61	0.713	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	0.79	0.21	9.20	0.20	0.39
1.80	2.00	0.00	9.10	0.20	0.00	2.00	0.60	0.40	9.00	0.20	0.72
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	0.43	0.57	7.90	0.20	0.90	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	0.44	0.56	5.00	0.20	0.56
10.20	1.13	0.00	4.90	0.20	0.00	10.40	0.98	0.02	4.80	0.20	0.02
10.60	1.05	0.00	4.70	0.20	0.00	10.80	0.96	0.04	4.60	0.20	0.04
11.00	1.06	0.00	4.50	0.20	0.00	11.20	1.10	0.00	4.40	0.20	0.00
11.40	1.48	0.00	4.30	0.20	0.00	11.60	1.45	0.00	4.20	0.20	0.00
11.80	2.00	0.00	4.10	0.20	0.00	12.00	2.00	0.00	4.00	0.20	0.00
12.20	2.00	0.00	3.90	0.20	0.00	12.40	1.42	0.00	3.80	0.20	0.00
12.60	0.93	0.07	3.70	0.20	0.05	12.80	1.14	0.00	3.60	0.20	0.00
13.00	1.10	0.00	3.50	0.20	0.00	13.20	1.04	0.00	3.40	0.20	0.00
13.40	1.29	0.00	3.30	0.20	0.00	13.60	1.73	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	1.92	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	2.00	0.00	2.70	0.20	0.00	14.80	2.00	0.00	2.60	0.20	0.00
15.00	1.87	0.00	2.50	0.20	0.00	15.20	1.10	0.00	2.40	0.20	0.00
15.40	0.83	0.17	2.30	0.20	0.08	15.60	2.00	0.00	2.20	0.20	0.00
15.80	1.65	0.00	2.10	0.20	0.00	16.00	2.00	0.00	2.00	0.20	0.00
16.20	1.94	0.00	1.90	0.20	0.00	16.40	1.68	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	1.53	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	2.00	0.00	1.40	0.20	0.00
17.40	1.78	0.00	1.30	0.20	0.00	17.60	2.00	0.00	1.20	0.20	0.00
17.80	1.22	0.00	1.10	0.20	0.00	18.00	1.13	0.00	1.00	0.20	0.00
18.20	2.00	0.00	0.90	0.20	0.00	18.40	2.00	0.00	0.80	0.20	0.00
18.60	2.00	0.00	0.70	0.20	0.00	18.80	2.00	0.00	0.60	0.20	0.00
19.00	2.00	0.00	0.50	0.20	0.00	19.20	2.00	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	2.00	0.00	0.30	0.20	0.00	19.60	2.00	0.00	0.20	0.20	0.00
19.80	2.00	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 2.76

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

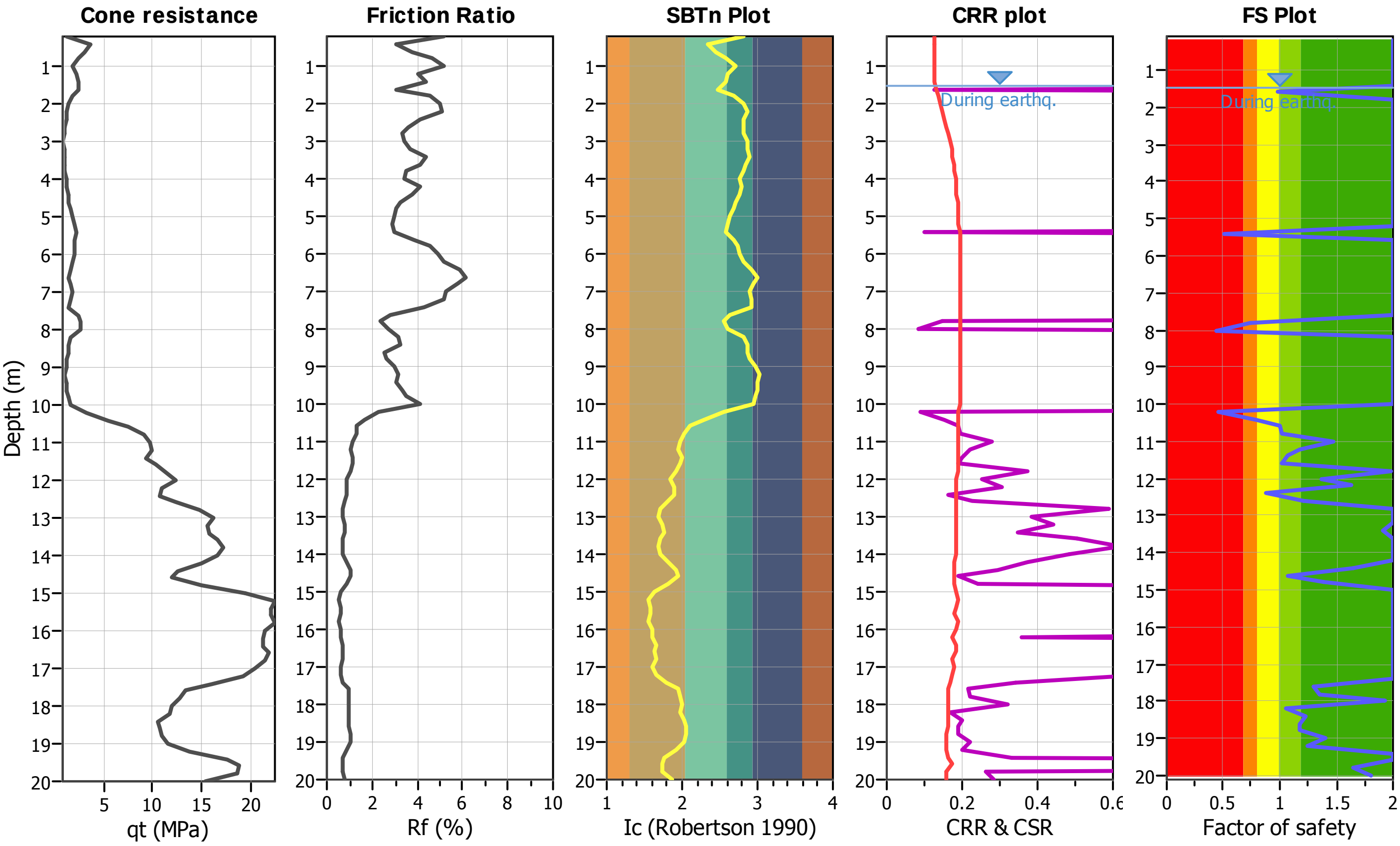
LIQUEFACTION ANALYSIS REPORT

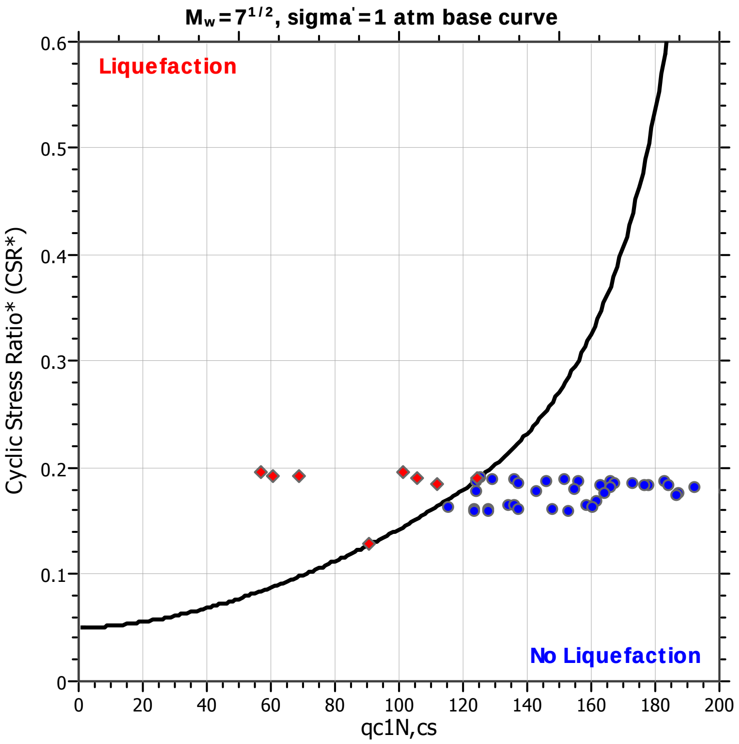
Project title : **Location :**

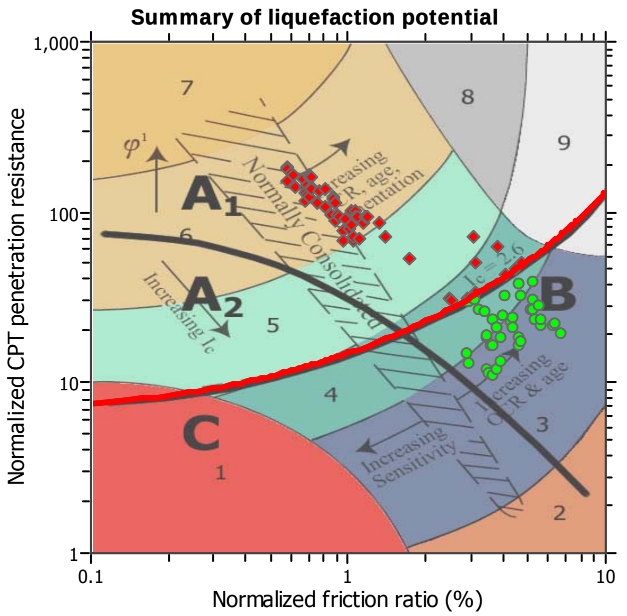
CPT file : CPT04

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:	Sands only
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:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

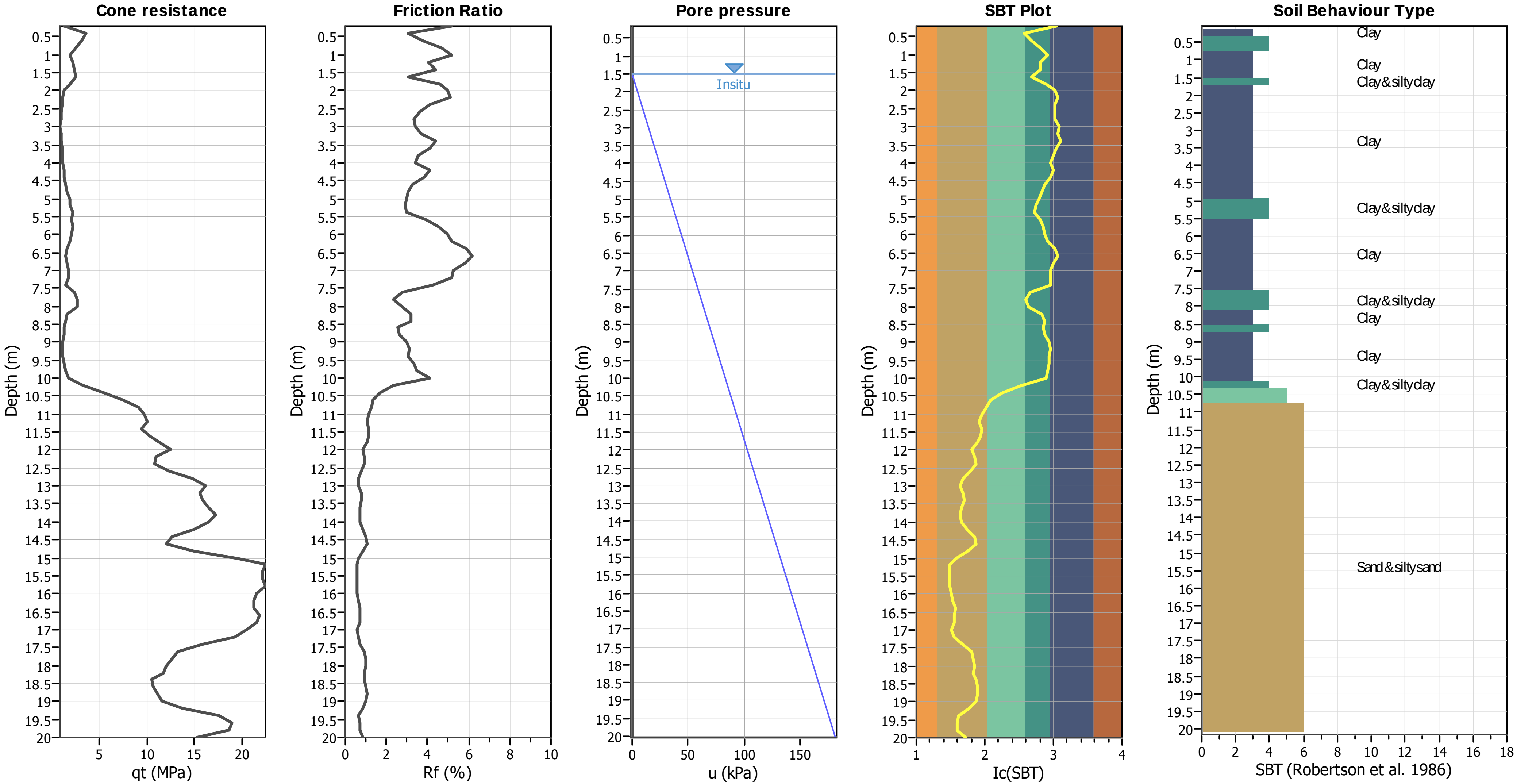






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



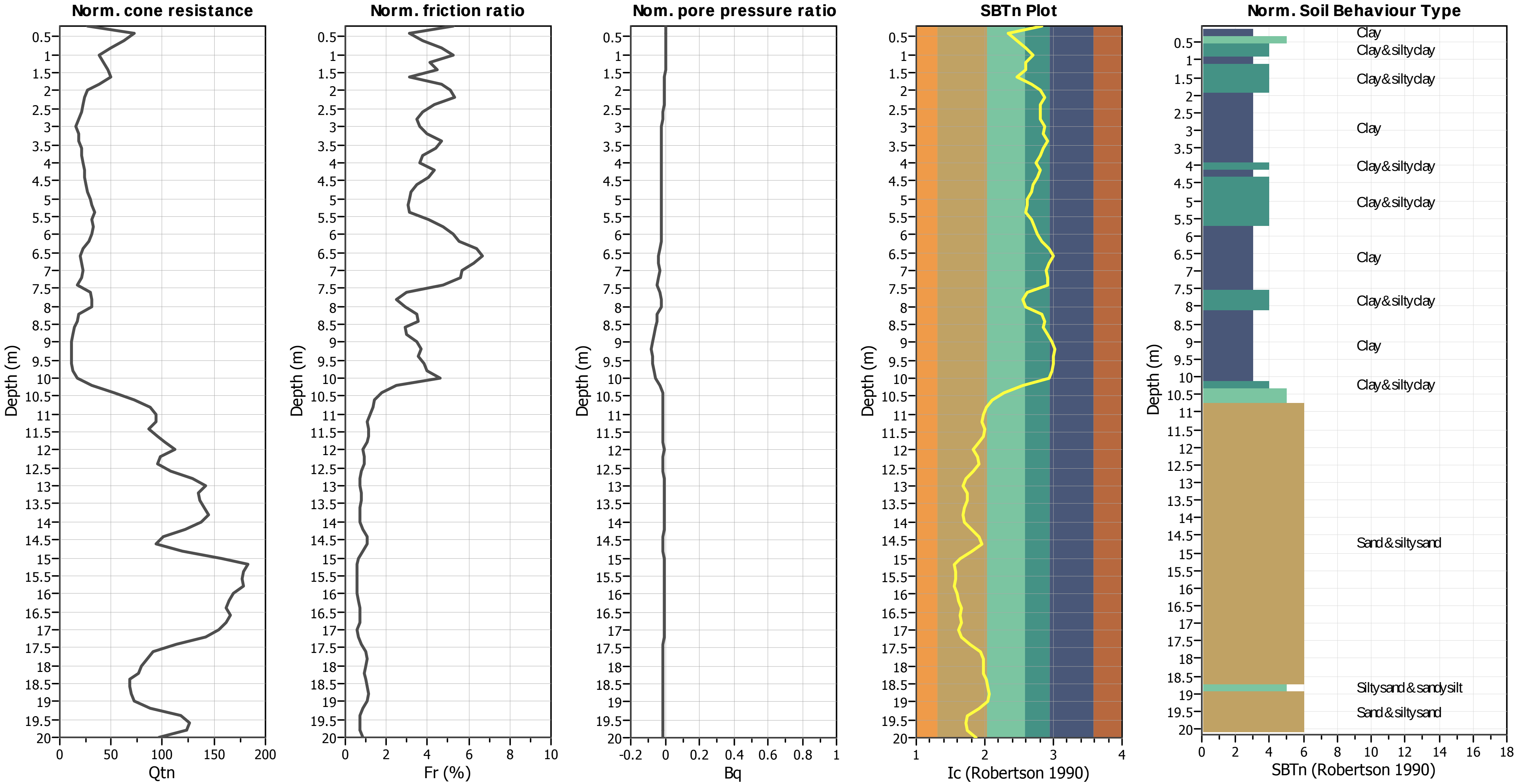
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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)



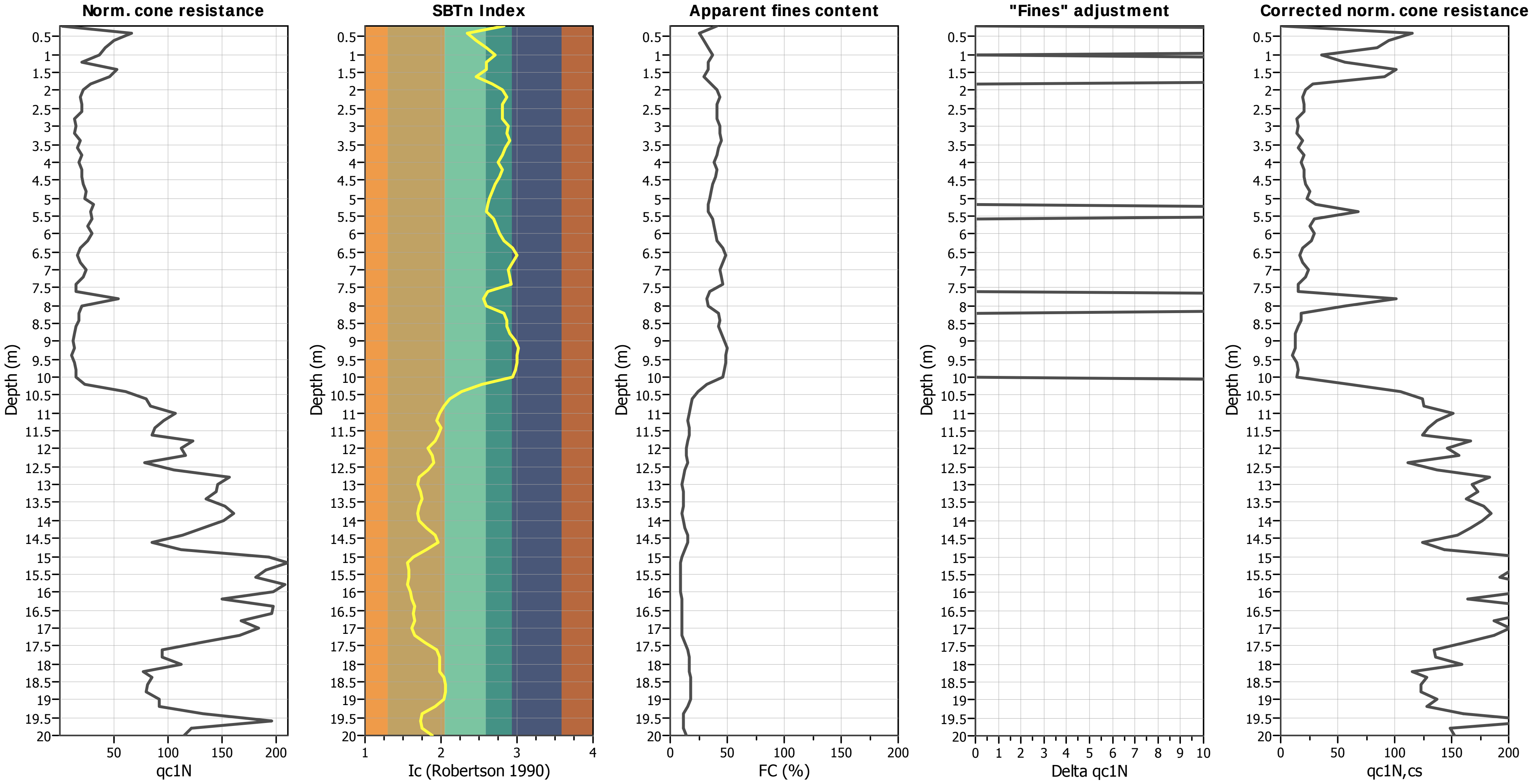
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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

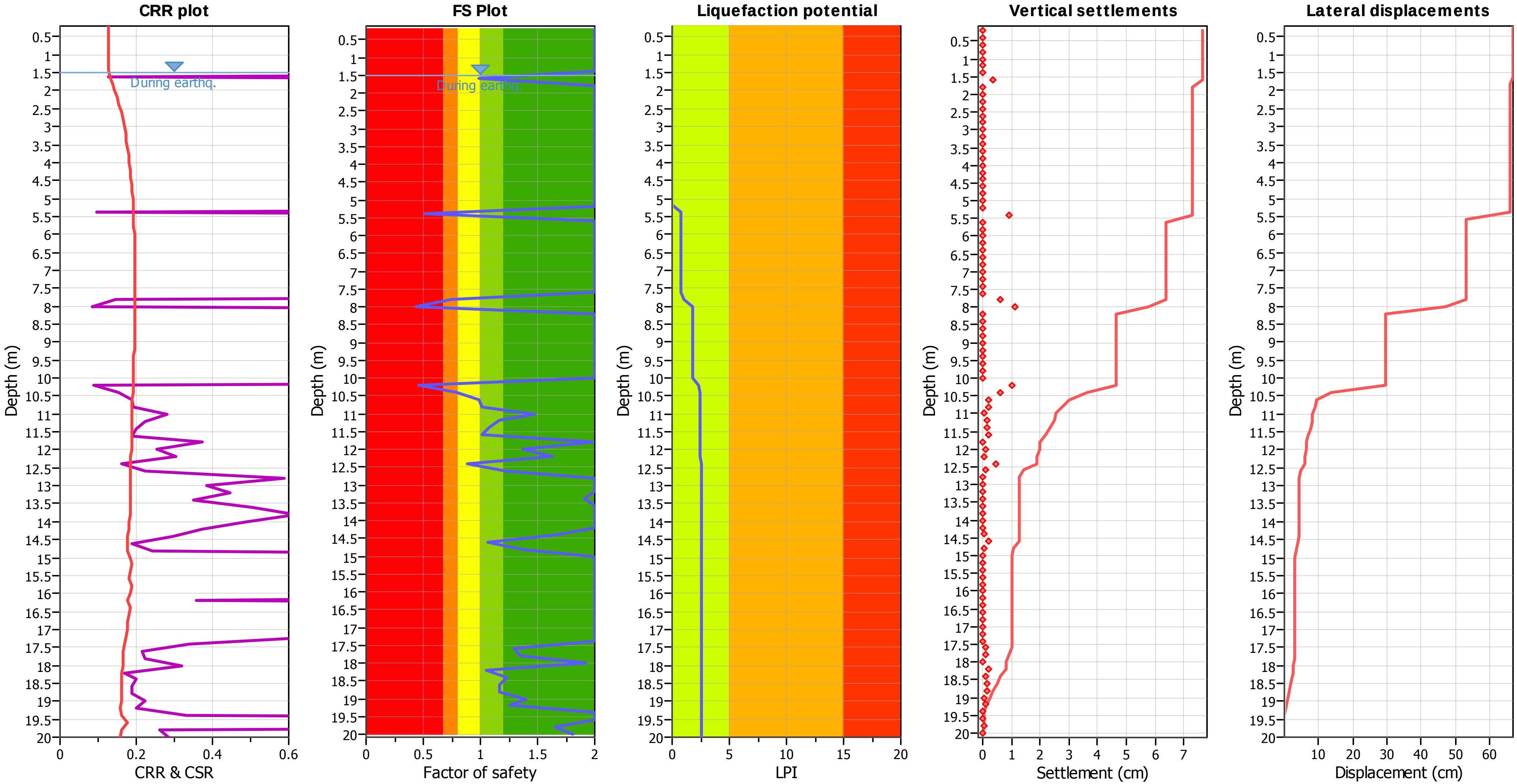
Liquefaction analysis overall plots (intermediate results)



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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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



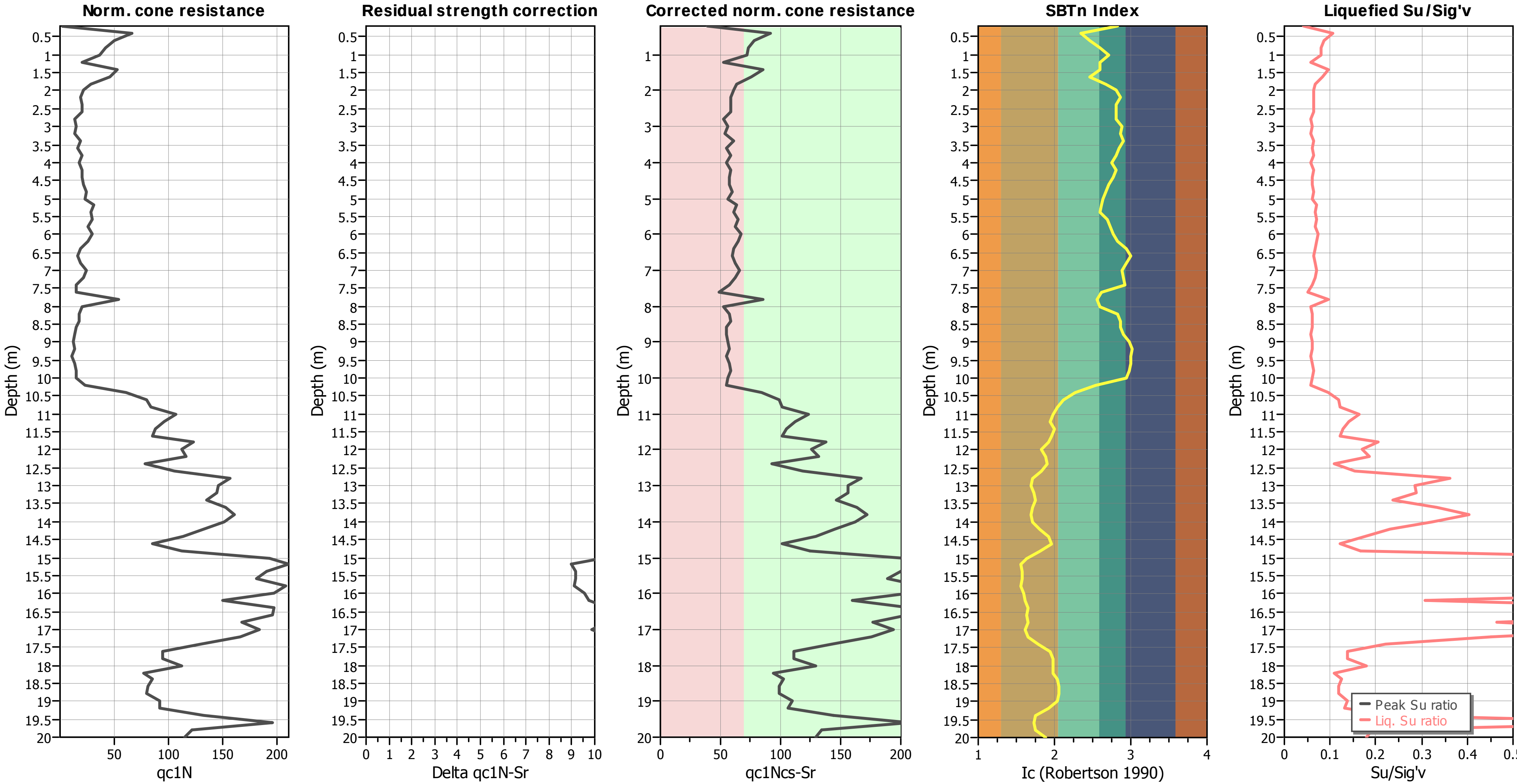
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	68.65	0.00	47.24	17.96
2	0.40	3.93	68.65	0.00	24.44	18.90
3	0.60	2.95	196.13	0.00	28.90	18.91
4	0.80	2.46	88.26	0.00	34.83	18.83
5	1.00	2.17	68.65	0.00	40.73	18.56
6	1.20	1.21	147.10	0.00	35.00	18.45
7	1.40	3.17	49.03	0.00	34.93	18.67
8	1.60	2.77	117.68	0.00	29.03	18.37
9	1.80	1.70	68.65	0.00	39.06	18.40
10	2.00	1.30	78.45	0.00	46.64	17.98
11	2.20	1.12	58.84	0.00	49.65	17.82
12	2.40	1.22	49.03	0.00	46.60	17.53
13	2.60	1.22	39.23	0.00	46.26	17.25
14	2.80	0.82	29.42	0.00	47.00	17.00
15	3.00	0.92	29.42	0.00	50.65	16.83
16	3.20	0.84	29.42	0.00	49.59	17.10
17	3.40	1.14	49.03	0.00	52.34	17.30
18	3.60	0.94	49.03	0.00	48.72	17.43
19	3.80	1.24	39.23	0.00	46.29	17.25
20	4.00	1.14	29.42	0.00	43.43	17.39
21	4.20	1.34	58.84	0.00	46.09	17.64
22	4.40	1.34	68.65	0.00	44.07	17.67
23	4.60	1.44	29.42	0.00	40.71	17.63
24	4.80	1.74	49.03	0.00	39.22	17.65
25	5.00	1.64	68.65	0.00	36.70	17.85
26	5.20	2.24	49.03	0.00	35.83	17.95
27	5.40	2.14	58.84	0.00	34.84	18.10
28	5.60	2.24	88.26	0.00	39.75	18.34
29	5.80	1.94	98.07	0.00	41.97	18.56
30	6.00	2.33	107.87	0.00	44.41	18.63
31	6.20	2.06	107.87	0.00	47.12	18.56
32	6.40	1.47	88.26	0.00	54.14	18.41
33	6.60	1.27	88.26	0.00	58.05	18.29
34	6.80	1.57	88.26	0.00	54.48	18.42
35	7.00	2.06	107.87	0.00	51.10	18.45
36	7.20	1.77	88.26	0.00	52.50	18.35
37	7.40	1.28	68.65	0.00	53.55	17.88
38	7.60	1.28	29.42	0.00	36.39	18.20
39	7.80	4.82	107.87	0.00	33.47	18.11
40	8.00	1.77	49.03	0.00	35.14	18.35
41	8.20	1.59	68.65	0.00	47.50	17.74
42	8.40	1.59	39.23	0.00	50.10	17.63
43	8.60	1.39	39.23	0.00	49.35	17.24
44	8.80	1.20	29.42	0.00	52.45	17.09
45	9.00	1.20	29.42	0.00	56.67	17.18
46	9.20	1.22	49.03	0.00	59.56	17.17
47	9.40	1.02	29.42	0.00	58.47	17.18
48	9.60	1.31	29.42	0.00	58.13	17.40

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	1.51	68.65	0.00	56.62	17.60
50	10.00	1.41	49.03	0.00	54.47	18.12
51	10.20	2.31	98.07	0.00	32.81	18.41
52	10.40	6.03	78.45	0.00	21.68	18.84
53	10.60	7.99	98.07	0.00	16.05	19.08
54	10.80	8.48	127.49	0.00	13.81	19.33
55	11.00	10.93	127.49	0.00	12.51	19.32
56	11.20	9.97	88.26	0.00	11.57	19.23
57	11.40	9.19	98.07	0.00	12.77	19.20
58	11.60	8.99	127.49	0.00	12.11	19.37
59	11.80	12.91	127.49	0.00	10.85	19.41
60	12.00	11.94	98.07	0.00	8.92	19.34
61	12.20	12.44	98.07	0.00	10.23	19.19
62	12.40	8.51	98.07	0.00	10.55	19.18
63	12.60	11.45	98.07	0.00	8.75	19.23
64	12.80	16.85	98.07	0.00	6.43	19.30
65	13.00	15.87	98.07	0.00	5.84	19.45
66	13.20	15.88	127.49	0.00	6.87	19.53
67	13.40	14.90	127.49	0.00	7.13	19.63
68	13.60	16.86	127.49	0.00	6.24	19.55
69	13.80	17.84	98.07	0.00	5.83	19.57
70	14.00	16.86	127.49	0.00	6.36	19.55
71	14.20	14.92	127.49	0.00	8.24	19.61
72	14.40	12.96	127.49	0.00	10.81	19.54
73	14.60	10.01	127.49	0.00	11.77	19.52
74	14.80	12.96	127.49	0.00	8.45	19.61
75	15.00	21.78	127.49	0.00	5.11	19.71
76	15.20	23.75	127.49	0.00	3.66	19.76
77	15.40	21.79	127.49	0.00	3.85	19.76
78	15.60	20.81	127.49	0.00	3.89	19.76
79	15.80	23.75	127.49	0.00	3.78	19.76
80	16.00	22.77	127.49	0.00	4.29	19.75
81	16.20	17.88	127.49	0.00	4.50	19.74
82	16.40	22.78	127.49	0.00	5.38	19.93
83	16.60	22.78	196.13	0.00	5.07	19.94
84	16.80	19.84	127.49	0.00	5.30	19.94
85	17.00	21.80	127.49	0.00	4.64	19.64
86	17.20	19.86	98.07	0.00	5.44	19.61
87	17.40	15.94	127.49	0.00	7.91	19.54
88	17.60	12.01	127.49	0.00	11.28	19.56
89	17.80	12.01	127.49	0.00	12.23	19.54
90	18.00	13.97	127.49	0.00	12.64	19.43
91	18.20	10.06	98.07	0.00	12.56	19.32
92	18.40	11.04	98.07	0.00	13.82	19.17
93	18.60	10.55	98.07	0.00	14.38	19.29
94	18.80	10.55	127.49	0.00	14.60	19.40
95	19.00	12.02	127.49	0.00	13.84	19.42
96	19.20	12.04	98.07	0.00	10.88	19.48

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	16.95	127.49	0.00	7.12	19.58
98	19.60	23.81	127.49	0.00	6.67	19.70
99	19.80	15.96	127.49	0.00	6.96	19.69
100	20.00	14.98	127.49	0.00	9.87	19.62

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.59	0.00	3.59	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
2	0.40	7.37	0.00	7.37	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
3	0.60	11.16	0.00	11.16	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
4	0.80	14.92	0.00	14.92	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
5	1.00	18.63	0.00	18.63	0.99	0.181	1.43	0.127	1.00	1.00	2.000	No
6	1.20	22.32	0.00	22.32	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
7	1.40	26.06	0.00	26.06	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
8	1.60	29.73	0.98	28.75	0.99	0.185	1.43	0.130	1.00	1.00	0.130	No
9	1.80	33.41	2.94	30.47	0.98	0.196	1.43	0.137	1.00	1.00	0.137	No
10	2.00	37.01	4.91	32.10	0.98	0.205	1.43	0.144	1.00	1.00	0.144	No
11	2.20	40.57	6.87	33.70	0.98	0.214	1.43	0.150	1.00	1.00	0.150	No
12	2.40	44.08	8.83	35.25	0.97	0.221	1.43	0.155	1.00	1.00	0.155	No
13	2.60	47.53	10.79	36.74	0.97	0.228	1.43	0.160	1.00	1.00	0.160	No
14	2.80	50.93	12.75	38.17	0.97	0.234	1.43	0.164	1.00	1.00	0.164	No
15	3.00	54.29	14.71	39.58	0.96	0.240	1.43	0.168	1.00	1.00	0.168	No
16	3.20	57.71	16.68	41.04	0.96	0.245	1.43	0.172	1.00	1.00	0.172	No
17	3.40	61.17	18.64	42.53	0.95	0.250	1.43	0.175	1.00	1.00	0.175	No
18	3.60	64.66	20.60	44.06	0.95	0.254	1.43	0.178	1.00	1.00	0.178	No
19	3.80	68.11	22.56	45.54	0.95	0.258	1.43	0.180	1.00	1.00	0.180	No
20	4.00	71.59	24.52	47.06	0.94	0.261	1.43	0.183	1.00	1.00	0.183	No
21	4.20	75.11	26.49	48.63	0.94	0.264	1.43	0.185	1.00	1.00	0.185	No
22	4.40	78.65	28.45	50.20	0.93	0.266	1.43	0.187	1.00	1.00	0.187	No
23	4.60	82.17	30.41	51.76	0.93	0.269	1.43	0.188	1.00	1.00	0.188	No
24	4.80	85.70	32.37	53.33	0.93	0.271	1.43	0.190	1.00	1.00	0.190	No
25	5.00	89.27	34.34	54.94	0.92	0.273	1.43	0.191	1.00	1.00	0.191	No
26	5.20	92.86	36.30	56.57	0.92	0.274	1.43	0.192	1.00	1.00	0.192	No
27	5.40	96.48	38.26	58.22	0.91	0.276	1.43	0.193	1.00	1.00	0.193	No
28	5.60	100.15	40.22	59.93	0.91	0.277	1.43	0.194	1.00	1.00	0.194	No
29	5.80	103.87	42.18	61.68	0.91	0.277	1.43	0.194	1.00	1.00	0.194	No
30	6.00	107.59	44.15	63.45	0.90	0.278	1.43	0.195	1.00	1.00	0.195	No
31	6.20	111.30	46.11	65.20	0.90	0.278	1.43	0.195	1.00	1.00	0.195	No
32	6.40	114.99	48.07	66.92	0.89	0.279	1.43	0.195	1.00	1.00	0.195	No
33	6.60	118.64	50.03	68.61	0.89	0.279	1.43	0.195	1.00	1.00	0.195	No
34	6.80	122.33	51.99	70.33	0.88	0.279	1.43	0.196	1.00	1.00	0.196	No
35	7.00	126.02	53.95	72.06	0.88	0.280	1.43	0.196	1.00	1.00	0.196	No
36	7.20	129.69	55.92	73.77	0.87	0.280	1.43	0.196	1.00	1.00	0.196	No
37	7.40	133.26	57.88	75.38	0.87	0.280	1.43	0.196	1.00	1.00	0.196	No
38	7.60	136.90	59.84	77.06	0.86	0.280	1.43	0.196	1.00	1.00	0.196	No
39	7.80	140.53	61.80	78.72	0.86	0.279	1.43	0.196	1.00	1.00	0.196	No
40	8.00	144.20	63.77	80.43	0.86	0.279	1.43	0.195	1.00	1.00	0.195	No
41	8.20	147.74	65.73	82.02	0.85	0.279	1.43	0.195	1.00	1.00	0.195	No
42	8.40	151.27	67.69	83.58	0.85	0.279	1.43	0.195	1.00	1.00	0.195	No
43	8.60	154.72	69.65	85.07	0.84	0.278	1.43	0.195	1.00	1.00	0.195	No
44	8.80	158.14	71.61	86.52	0.84	0.278	1.43	0.195	1.00	1.00	0.195	No
45	9.00	161.57	73.58	88.00	0.83	0.278	1.43	0.195	1.00	1.00	0.195	No
46	9.20	165.01	75.54	89.47	0.83	0.278	1.43	0.194	1.00	1.00	0.194	No
47	9.40	168.44	77.50	90.94	0.82	0.277	1.43	0.194	1.00	1.00	0.194	No
48	9.60	171.92	79.46	92.46	0.82	0.277	1.43	0.194	1.00	1.00	0.194	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR*	Belongs to transition
49	9.80	175.44	81.42	94.02	0.81	0.276	1.43	0.193	1.00	1.00	0.193	No
50	10.00	179.07	83.39	95.68	0.81	0.275	1.43	0.193	1.00	1.00	0.193	No
51	10.20	182.75	85.35	97.40	0.80	0.274	1.43	0.192	1.00	1.00	0.192	No
52	10.40	186.52	87.31	99.21	0.80	0.273	1.43	0.191	1.00	1.00	0.191	No
53	10.60	190.33	89.27	101.06	0.79	0.272	1.43	0.190	1.00	1.00	0.190	No
54	10.80	194.20	91.23	102.97	0.79	0.271	1.43	0.189	1.00	1.00	0.190	No
55	11.00	198.06	93.19	104.87	0.78	0.269	1.43	0.189	1.00	1.00	0.189	No
56	11.20	201.91	95.16	106.75	0.78	0.268	1.43	0.188	0.99	1.00	0.189	No
57	11.40	205.75	97.12	108.63	0.77	0.267	1.43	0.187	0.99	1.00	0.188	No
58	11.60	209.62	99.08	110.54	0.77	0.266	1.43	0.186	0.99	1.00	0.187	No
59	11.80	213.50	101.04	112.46	0.76	0.264	1.43	0.185	0.99	1.00	0.187	No
60	12.00	217.37	103.00	114.37	0.76	0.263	1.43	0.184	0.99	1.00	0.187	No
61	12.20	221.21	104.97	116.24	0.76	0.262	1.43	0.183	0.98	1.00	0.186	No
62	12.40	225.05	106.93	118.12	0.75	0.260	1.43	0.182	0.99	1.00	0.185	No
63	12.60	228.89	108.89	120.00	0.75	0.259	1.43	0.181	0.98	1.00	0.185	No
64	12.80	232.75	110.85	121.90	0.74	0.258	1.43	0.180	0.97	1.00	0.186	No
65	13.00	236.64	112.81	123.83	0.74	0.256	1.43	0.179	0.97	1.00	0.185	No
66	13.20	240.55	114.78	125.77	0.73	0.255	1.43	0.178	0.97	1.00	0.184	No
67	13.40	244.47	116.74	127.73	0.73	0.253	1.43	0.177	0.97	1.00	0.183	No
68	13.60	248.38	118.70	129.68	0.72	0.252	1.43	0.176	0.96	1.00	0.184	No
69	13.80	252.30	120.66	131.63	0.72	0.250	1.43	0.175	0.95	1.00	0.184	No
70	14.00	256.21	122.63	133.58	0.71	0.249	1.43	0.174	0.96	1.00	0.182	No
71	14.20	260.13	124.59	135.54	0.71	0.248	1.43	0.173	0.96	1.00	0.181	No
72	14.40	264.04	126.55	137.49	0.70	0.246	1.43	0.172	0.96	1.00	0.179	No
73	14.60	267.94	128.51	139.43	0.70	0.245	1.43	0.171	0.97	1.00	0.177	No
74	14.80	271.86	130.47	141.39	0.70	0.243	1.43	0.170	0.96	1.00	0.177	No
75	15.00	275.80	132.44	143.37	0.69	0.242	1.43	0.169	0.92	1.00	0.185	No
76	15.20	279.76	134.40	145.36	0.69	0.240	1.43	0.168	0.89	1.00	0.189	No
77	15.40	283.71	136.36	147.35	0.68	0.239	1.43	0.167	0.91	1.00	0.184	No
78	15.60	287.66	138.32	149.34	0.68	0.238	1.43	0.166	0.92	1.00	0.181	No
79	15.80	291.61	140.28	151.33	0.67	0.236	1.43	0.165	0.88	1.00	0.187	No
80	16.00	295.56	142.25	153.32	0.67	0.235	1.43	0.164	0.89	1.00	0.184	No
81	16.20	299.51	144.21	155.30	0.66	0.233	1.43	0.163	0.93	1.00	0.175	No
82	16.40	303.49	146.17	157.33	0.66	0.232	1.43	0.162	0.89	1.00	0.183	No
83	16.60	307.48	148.13	159.35	0.66	0.231	1.43	0.161	0.89	1.00	0.182	No
84	16.80	311.47	150.09	161.38	0.65	0.229	1.43	0.160	0.91	1.00	0.176	No
85	17.00	315.40	152.06	163.34	0.65	0.228	1.43	0.159	0.89	1.00	0.178	No
86	17.20	319.32	154.02	165.30	0.64	0.226	1.43	0.158	0.91	1.00	0.174	No
87	17.40	323.23	155.98	167.25	0.64	0.225	1.43	0.158	0.93	1.00	0.169	No
88	17.60	327.14	157.94	169.20	0.64	0.224	1.43	0.157	0.95	1.00	0.165	No
89	17.80	331.05	159.90	171.15	0.63	0.222	1.43	0.156	0.95	1.00	0.165	No
90	18.00	334.93	161.87	173.07	0.63	0.221	1.43	0.155	0.94	1.00	0.165	No
91	18.20	338.80	163.83	174.97	0.62	0.220	1.43	0.154	0.95	1.00	0.162	No
92	18.40	342.63	165.79	176.84	0.62	0.219	1.43	0.153	0.95	1.00	0.162	No
93	18.60	346.49	167.75	178.74	0.62	0.217	1.43	0.152	0.95	1.00	0.161	No
94	18.80	350.37	169.71	180.66	0.61	0.216	1.43	0.151	0.95	1.00	0.160	No
95	19.00	354.25	171.68	182.58	0.61	0.215	1.43	0.150	0.94	1.00	0.160	No
96	19.20	358.15	173.64	184.51	0.61	0.214	1.43	0.150	0.94	1.00	0.159	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	362.06	175.60	186.47	0.60	0.213	1.43	0.149	0.92	1.00	0.162	No
98	19.60	366.00	177.56	188.44	0.60	0.211	1.43	0.148	0.84	1.00	0.175	No
99	19.80	369.94	179.52	190.42	0.59	0.210	1.43	0.147	0.92	1.00	0.160	No
100	20.00	373.86	181.49	192.38	0.59	0.209	1.43	0.146	0.92	1.00	0.158	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	1.32	41.53	2.82	0.72	1.70	0.17	0.00	0.17	4.000	No	Yes	2.00
2	0.40	3.61	25.83	2.35	0.47	1.70	65.97	48.91	114.88	4.000	No	No	2.00
3	0.60	3.12	29.06	2.46	0.51	1.70	49.53	45.22	94.75	4.000	No	No	2.00
4	0.80	2.53	33.22	2.59	0.53	1.70	41.29	43.63	84.92	4.000	No	No	2.00
5	1.00	1.94	37.23	2.71	0.55	1.70	36.36	0.00	36.36	4.000	No	Yes	2.00
6	1.20	2.18	33.34	2.59	0.62	1.70	20.23	36.45	56.69	4.000	No	No	2.00
7	1.40	2.38	33.29	2.59	0.50	1.70	53.15	47.70	100.85	4.000	No	No	2.00
8	1.60	2.55	29.15	2.46	0.52	1.70	46.56	44.27	90.82	0.128	No	No	0.99
9	1.80	1.93	36.11	2.67	0.58	1.70	28.47	0.00	28.47	4.000	No	Yes	2.00
10	2.00	1.37	41.14	2.81	0.61	1.70	21.88	0.00	21.88	4.000	No	Yes	2.00
11	2.20	1.21	43.09	2.86	0.62	1.70	18.76	0.00	18.76	4.000	No	Yes	2.00
12	2.40	1.18	41.11	2.81	0.61	1.70	20.40	0.00	20.40	4.000	No	Yes	2.00
13	2.60	1.09	40.89	2.80	0.61	1.70	20.40	0.00	20.40	4.000	No	Yes	2.00
14	2.80	0.99	41.37	2.82	0.64	1.70	13.82	0.00	13.82	4.000	No	Yes	2.00
15	3.00	0.86	43.74	2.88	0.63	1.70	15.47	0.00	15.47	4.000	No	Yes	2.00
16	3.20	0.97	43.06	2.86	0.64	1.70	14.14	0.00	14.14	4.000	No	Yes	2.00
17	3.40	0.97	44.83	2.91	0.62	1.70	19.09	0.00	19.09	4.000	No	Yes	2.00
18	3.60	1.10	42.50	2.85	0.63	1.69	15.73	0.00	15.73	4.000	No	Yes	2.00
19	3.80	1.10	40.91	2.81	0.61	1.63	19.92	0.00	19.92	4.000	No	Yes	2.00
20	4.00	1.24	39.03	2.75	0.62	1.61	18.10	0.00	18.10	4.000	No	Yes	2.00
21	4.20	1.28	40.78	2.80	0.61	1.56	20.75	0.00	20.75	4.000	No	Yes	2.00
22	4.40	1.38	39.45	2.77	0.61	1.54	20.38	0.00	20.38	4.000	No	Yes	2.00
23	4.60	1.51	37.21	2.70	0.61	1.50	21.41	0.00	21.41	4.000	No	Yes	2.00
24	4.80	1.61	36.21	2.68	0.59	1.46	25.06	0.00	25.06	4.000	No	Yes	2.00
25	5.00	1.87	34.50	2.63	0.60	1.44	23.35	0.00	23.35	4.000	No	Yes	2.00
26	5.20	2.00	33.90	2.61	0.57	1.39	30.78	0.00	30.78	4.000	No	Yes	2.00
27	5.40	2.20	33.23	2.59	0.58	1.38	29.06	39.45	68.51	0.098	No	No	0.51
28	5.60	2.11	36.57	2.69	0.57	1.35	29.82	0.00	29.82	4.000	No	Yes	2.00
29	5.80	2.17	38.06	2.73	0.59	1.34	25.68	0.00	25.68	4.000	No	Yes	2.00
30	6.00	2.11	39.68	2.77	0.57	1.31	30.10	0.00	30.10	4.000	No	Yes	2.00
31	6.20	1.95	41.46	2.82	0.59	1.29	26.31	0.00	26.31	4.000	No	Yes	2.00
32	6.40	1.60	45.97	2.93	0.62	1.29	18.76	0.00	18.76	4.000	No	Yes	2.00
33	6.60	1.44	48.45	2.99	0.63	1.28	16.09	0.00	16.09	4.000	No	Yes	2.00
34	6.80	1.63	46.19	2.94	0.62	1.25	19.39	0.00	19.39	4.000	No	Yes	2.00
35	7.00	1.80	44.03	2.89	0.59	1.22	24.86	0.00	24.86	4.000	No	Yes	2.00
36	7.20	1.71	44.93	2.91	0.61	1.21	21.24	0.00	21.24	4.000	No	Yes	2.00
37	7.40	1.45	45.60	2.92	0.64	1.21	15.30	0.00	15.30	4.000	No	Yes	2.00
38	7.60	2.46	34.29	2.62	0.64	1.19	15.10	0.00	15.10	4.000	No	Yes	2.00
39	7.80	2.63	32.28	2.56	0.49	1.13	53.84	47.69	101.53	0.145	No	No	0.74
40	8.00	2.73	33.43	2.60	0.62	1.15	20.19	36.45	56.65	0.084	No	No	0.43
41	8.20	1.65	41.70	2.83	0.62	1.14	17.89	0.00	17.89	4.000	No	Yes	2.00
42	8.40	1.52	43.38	2.87	0.62	1.13	17.68	0.00	17.68	4.000	No	Yes	2.00
43	8.60	1.39	42.90	2.86	0.64	1.12	15.36	0.00	15.36	4.000	No	Yes	2.00
44	8.80	1.26	44.89	2.91	0.65	1.11	13.07	0.00	13.07	4.000	No	Yes	2.00
45	9.00	1.20	47.57	2.97	0.65	1.10	12.93	0.00	12.93	4.000	No	Yes	2.00
46	9.20	1.14	49.39	3.02	0.65	1.08	13.01	0.00	13.01	4.000	No	Yes	2.00
47	9.40	1.18	48.71	3.00	0.66	1.07	10.81	0.00	10.81	4.000	No	Yes	2.00
48	9.60	1.28	48.49	2.99	0.64	1.06	13.75	0.00	13.75	4.000	No	Yes	2.00

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	1.41	47.55	2.97	0.63	1.05	15.63	0.00	15.63	4.000	No	Yes	2.00
50	10.00	1.74	46.18	2.94	0.64	1.04	14.46	0.00	14.46	4.000	No	Yes	2.00
51	10.20	3.25	31.81	2.55	0.60	1.02	23.30	37.21	60.50	0.088	No	No	0.46
52	10.40	5.44	23.79	2.28	0.49	1.01	60.13	45.47	105.60	0.152	No	No	0.79
53	10.60	7.50	19.46	2.11	0.45	1.00	78.97	45.32	124.29	0.189	No	No	0.99
54	10.80	9.14	17.67	2.03	0.45	0.99	83.12	42.55	125.67	0.192	No	No	1.01
55	11.00	9.80	16.62	1.98	0.40	0.99	106.43	45.19	151.63	0.279	No	No	1.47
56	11.20	10.03	15.84	1.95	0.43	0.98	96.26	40.28	136.54	0.221	No	No	1.17
57	11.40	9.38	16.83	1.99	0.44	0.97	87.96	41.50	129.46	0.202	No	No	1.07
58	11.60	10.37	16.28	1.97	0.45	0.96	85.36	39.27	124.63	0.190	No	No	1.01
59	11.80	11.28	15.24	1.92	0.38	0.96	122.54	43.62	166.16	0.372	No	No	1.98
60	12.00	12.43	13.60	1.84	0.41	0.95	112.09	34.12	146.21	0.255	No	No	1.37
61	12.20	10.96	14.72	1.89	0.39	0.95	116.27	40.11	156.38	0.304	No	No	1.63
62	12.40	10.80	14.99	1.91	0.47	0.93	78.12	33.50	111.62	0.163	No	No	0.88
63	12.60	12.27	13.45	1.83	0.42	0.93	105.21	32.25	137.45	0.224	No	No	1.21
64	12.80	14.72	11.41	1.72	0.35	0.94	155.77	27.27	183.04	0.589	No	No	2.00
65	13.00	16.20	10.88	1.69	0.38	0.93	145.23	22.51	167.75	0.386	No	No	2.00
66	13.20	15.55	11.81	1.74	0.37	0.92	144.74	28.67	173.41	0.445	No	No	2.00
67	13.40	15.88	12.03	1.75	0.38	0.92	134.56	28.83	163.39	0.350	No	No	1.91
68	13.60	16.53	11.24	1.71	0.36	0.91	152.21	25.68	177.89	0.503	No	No	2.00
69	13.80	17.18	10.87	1.68	0.35	0.91	160.58	23.93	184.52	0.618	No	No	2.00
70	14.00	16.54	11.34	1.71	0.36	0.90	150.51	26.22	176.74	0.487	No	No	2.00
71	14.20	14.91	13.02	1.81	0.38	0.90	131.87	34.30	166.17	0.372	No	No	2.00
72	14.40	12.63	15.20	1.92	0.40	0.89	113.31	41.55	154.86	0.295	No	No	1.65
73	14.60	11.97	16.00	1.96	0.45	0.87	85.62	38.46	124.08	0.189	No	No	1.07
74	14.80	14.92	13.19	1.82	0.41	0.87	111.35	31.99	143.34	0.244	No	No	1.38
75	15.00	19.50	10.20	1.64	0.31	0.90	192.99	21.66	214.65	2.495	No	No	2.00
76	15.20	22.44	8.83	1.56	0.30	0.90	210.28	12.11	222.40	4.000	No	No	2.00
77	15.40	22.12	9.01	1.57	0.33	0.89	190.35	12.53	202.88	1.304	No	No	2.00
78	15.60	22.12	9.05	1.57	0.34	0.88	180.00	12.34	192.34	0.821	No	No	2.00
79	15.80	22.44	8.95	1.56	0.30	0.89	207.54	12.86	220.40	3.632	No	No	2.00
80	16.00	21.47	9.43	1.60	0.31	0.88	197.47	15.95	213.41	2.314	No	No	2.00
81	16.20	21.14	9.63	1.61	0.38	0.85	149.99	14.54	164.54	0.359	No	No	2.00
82	16.40	21.15	10.45	1.66	0.30	0.88	196.75	23.98	220.74	3.718	No	No	2.00
83	16.60	21.80	10.17	1.64	0.31	0.87	195.60	21.61	217.21	2.933	No	No	2.00
84	16.80	21.47	10.37	1.65	0.35	0.85	166.62	20.89	187.50	0.685	No	No	2.00
85	17.00	20.50	9.77	1.62	0.33	0.86	183.99	17.65	201.64	1.229	No	No	2.00
86	17.20	19.20	10.51	1.66	0.35	0.84	165.34	21.76	187.11	0.676	No	No	2.00
87	17.40	15.94	12.72	1.79	0.38	0.82	129.73	32.27	162.00	0.340	No	No	2.00
88	17.60	13.32	15.60	1.94	0.43	0.80	95.05	39.18	134.23	0.215	No	No	1.30
89	17.80	12.67	16.39	1.97	0.43	0.80	94.79	41.75	136.54	0.221	No	No	1.35
90	18.00	12.02	16.73	1.99	0.39	0.81	111.97	46.86	158.83	0.319	No	No	1.93
91	18.20	11.69	16.66	1.99	0.47	0.78	76.98	38.40	115.38	0.170	No	No	1.05
92	18.40	10.55	17.68	2.03	0.44	0.78	85.21	43.09	128.31	0.199	No	No	1.23
93	18.60	10.72	18.13	2.05	0.45	0.77	80.65	43.01	123.66	0.188	No	No	1.17
94	18.80	11.04	18.31	2.06	0.45	0.77	80.26	43.31	123.57	0.187	No	No	1.17
95	19.00	11.54	17.70	2.03	0.43	0.78	92.34	44.92	137.26	0.224	No	No	1.40
96	19.20	13.67	15.27	1.92	0.44	0.77	91.21	37.18	128.39	0.199	No	No	1.25

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	17.60	12.02	1.75	0.39	0.79	132.11	28.46	160.57	0.330	No	No	2.00
98	19.60	18.91	11.62	1.73	0.29	0.83	195.94	33.55	229.48	4.000	No	No	2.00
99	19.80	18.58	11.88	1.74	0.41	0.77	121.92	26.28	148.20	0.263	No	No	1.65
100	20.00	15.31	14.41	1.88	0.40	0.77	114.53	38.40	152.93	0.285	No	No	1.80

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	0.99	0.01	9.20	0.20	0.02
1.80	2.00	0.00	9.10	0.20	0.00	2.00	2.00	0.00	9.00	0.20	0.00
2.20	2.00	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	2.00	0.00	8.70	0.20	0.00	2.80	2.00	0.00	8.60	0.20	0.00
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	0.51	0.49	7.30	0.20	0.72	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	0.74	0.26	6.10	0.20	0.32	8.00	0.43	0.57	6.00	0.20	0.68
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	2.00	0.00	5.20	0.20	0.00
9.80	2.00	0.00	5.10	0.20	0.00	10.00	2.00	0.00	5.00	0.20	0.00
10.20	0.46	0.54	4.90	0.20	0.53	10.40	0.79	0.21	4.80	0.20	0.20
10.60	0.99	0.01	4.70	0.20	0.01	10.80	1.01	0.00	4.60	0.20	0.00
11.00	1.47	0.00	4.50	0.20	0.00	11.20	1.17	0.00	4.40	0.20	0.00
11.40	1.07	0.00	4.30	0.20	0.00	11.60	1.01	0.00	4.20	0.20	0.00
11.80	1.98	0.00	4.10	0.20	0.00	12.00	1.37	0.00	4.00	0.20	0.00
12.20	1.63	0.00	3.90	0.20	0.00	12.40	0.88	0.12	3.80	0.20	0.09
12.60	1.21	0.00	3.70	0.20	0.00	12.80	2.00	0.00	3.60	0.20	0.00
13.00	2.00	0.00	3.50	0.20	0.00	13.20	2.00	0.00	3.40	0.20	0.00
13.40	1.91	0.00	3.30	0.20	0.00	13.60	2.00	0.00	3.20	0.20	0.00
13.80	2.00	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	1.65	0.00	2.80	0.20	0.00
14.60	1.07	0.00	2.70	0.20	0.00	14.80	1.38	0.00	2.60	0.20	0.00
15.00	2.00	0.00	2.50	0.20	0.00	15.20	2.00	0.00	2.40	0.20	0.00
15.40	2.00	0.00	2.30	0.20	0.00	15.60	2.00	0.00	2.20	0.20	0.00
15.80	2.00	0.00	2.10	0.20	0.00	16.00	2.00	0.00	2.00	0.20	0.00
16.20	2.00	0.00	1.90	0.20	0.00	16.40	2.00	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	2.00	0.00	1.60	0.20	0.00
17.00	2.00	0.00	1.50	0.20	0.00	17.20	2.00	0.00	1.40	0.20	0.00
17.40	2.00	0.00	1.30	0.20	0.00	17.60	1.30	0.00	1.20	0.20	0.00
17.80	1.35	0.00	1.10	0.20	0.00	18.00	1.93	0.00	1.00	0.20	0.00
18.20	1.05	0.00	0.90	0.20	0.00	18.40	1.23	0.00	0.80	0.20	0.00
18.60	1.17	0.00	0.70	0.20	0.00	18.80	1.17	0.00	0.60	0.20	0.00
19.00	1.40	0.00	0.50	0.20	0.00	19.20	1.25	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	2.00	0.00	0.30	0.20	0.00	19.60	2.00	0.00	0.20	0.20	0.00
19.80	1.65	0.00	0.10	0.20	0.00	20.00	1.80	0.00	0.00	0.20	0.00

Overall liquefaction potential: 2.56

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point

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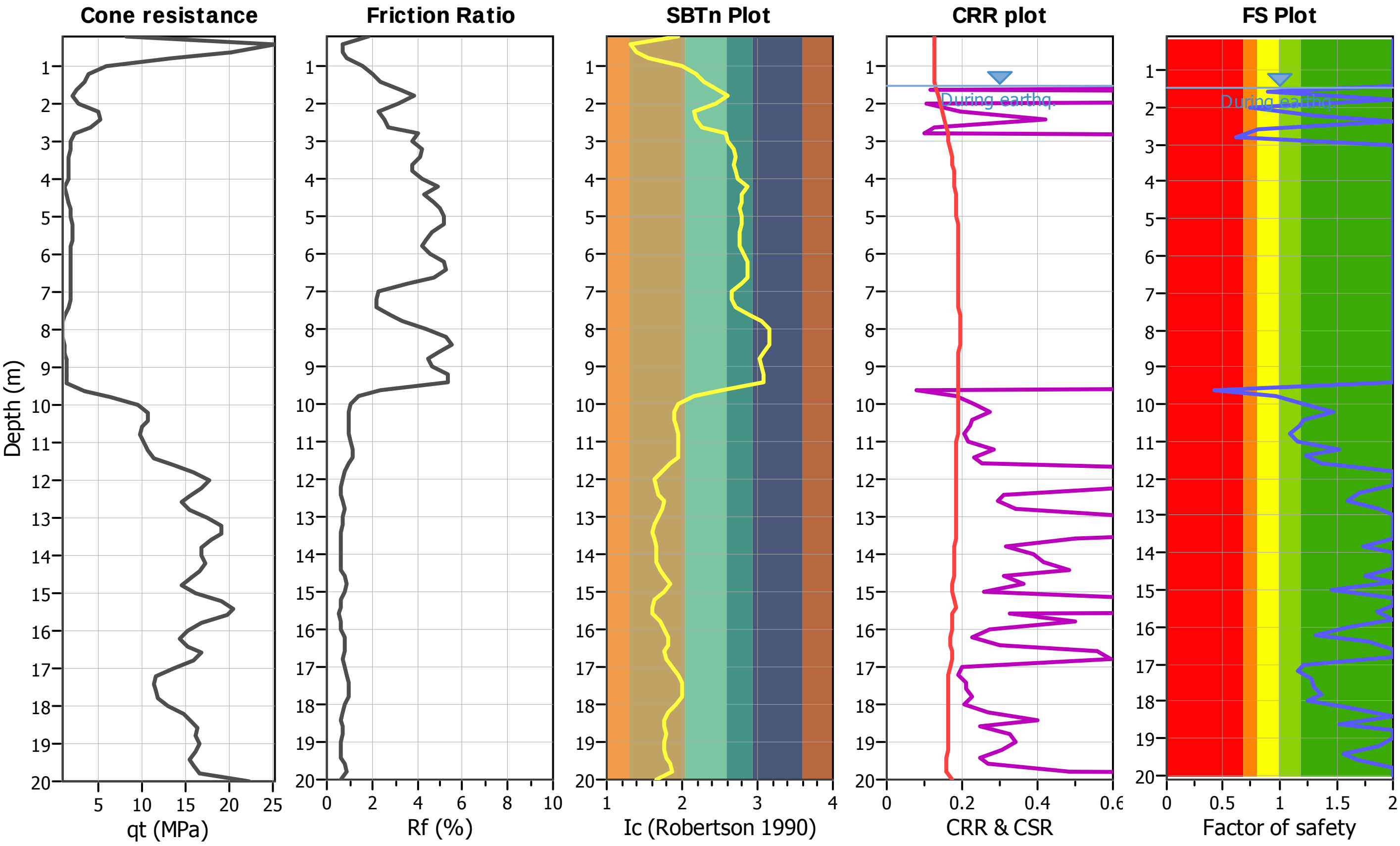
LIQUEFACTION ANALYSIS REPORT

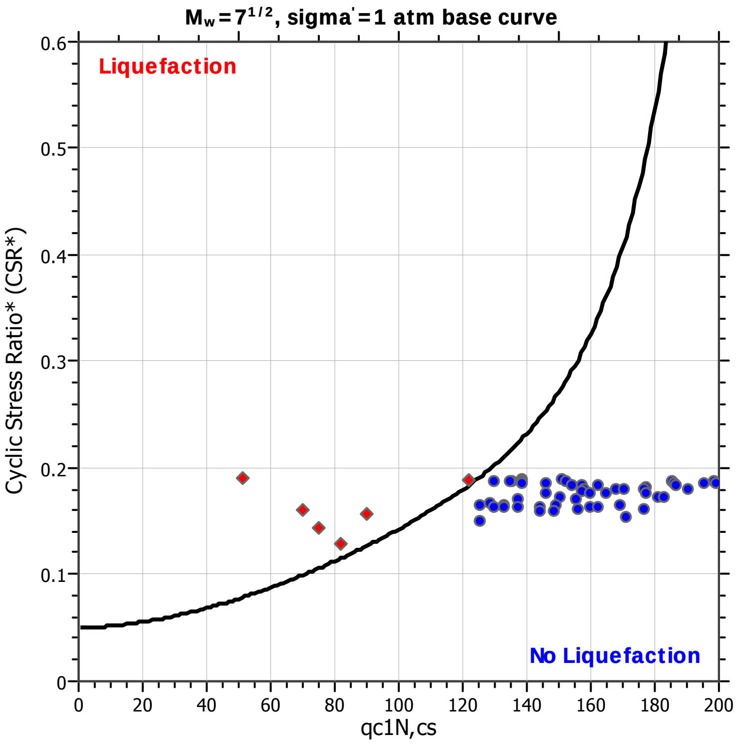
Project title : **Location :**

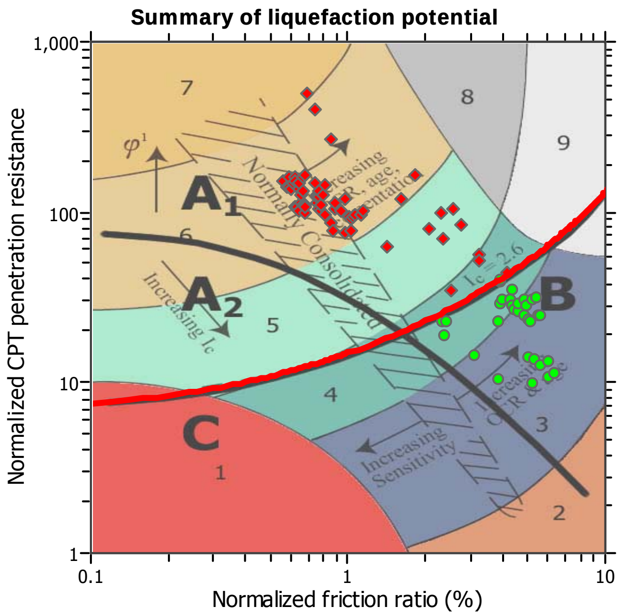
CPT file : CPT04Bis

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:	Sands only
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:	6.14	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.28	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

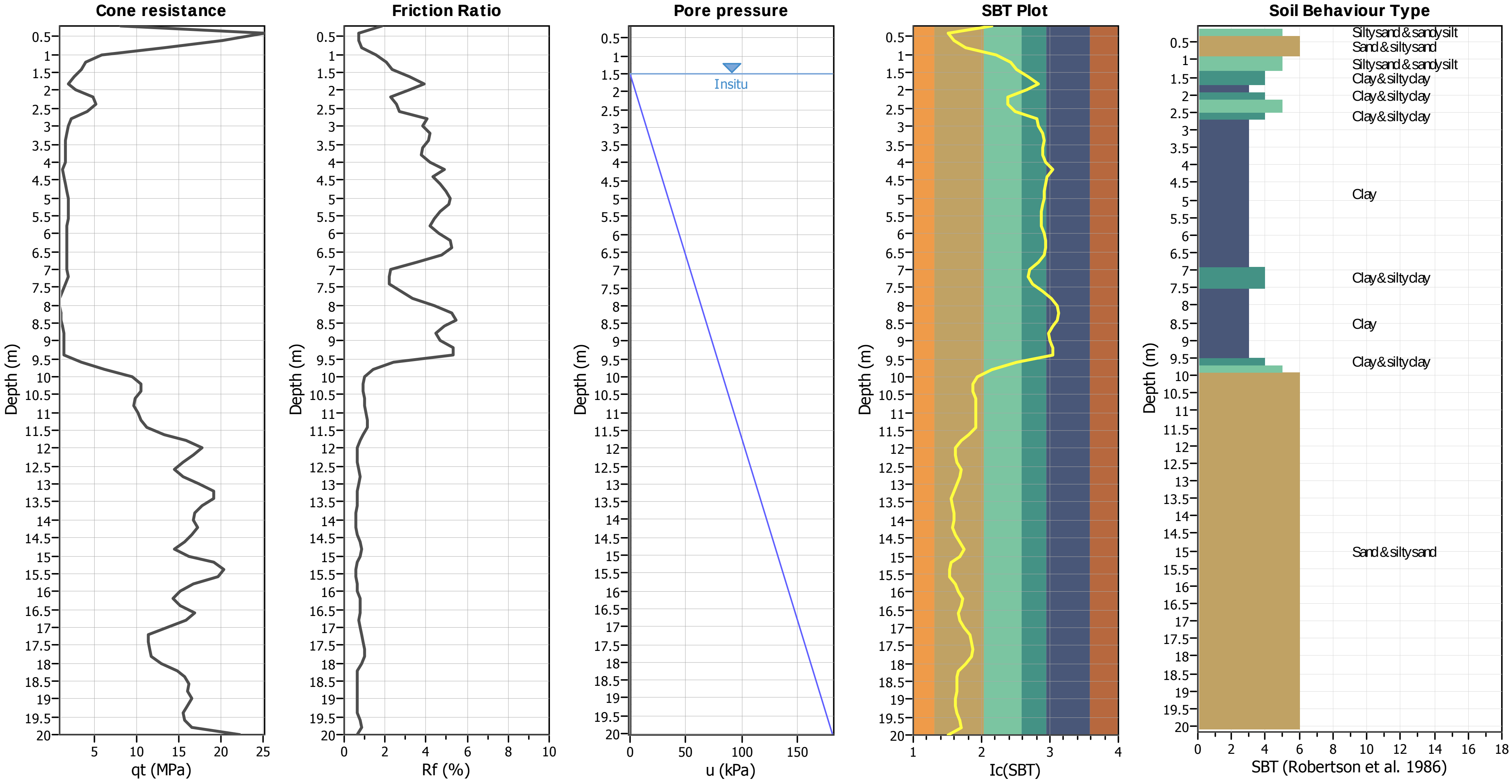






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



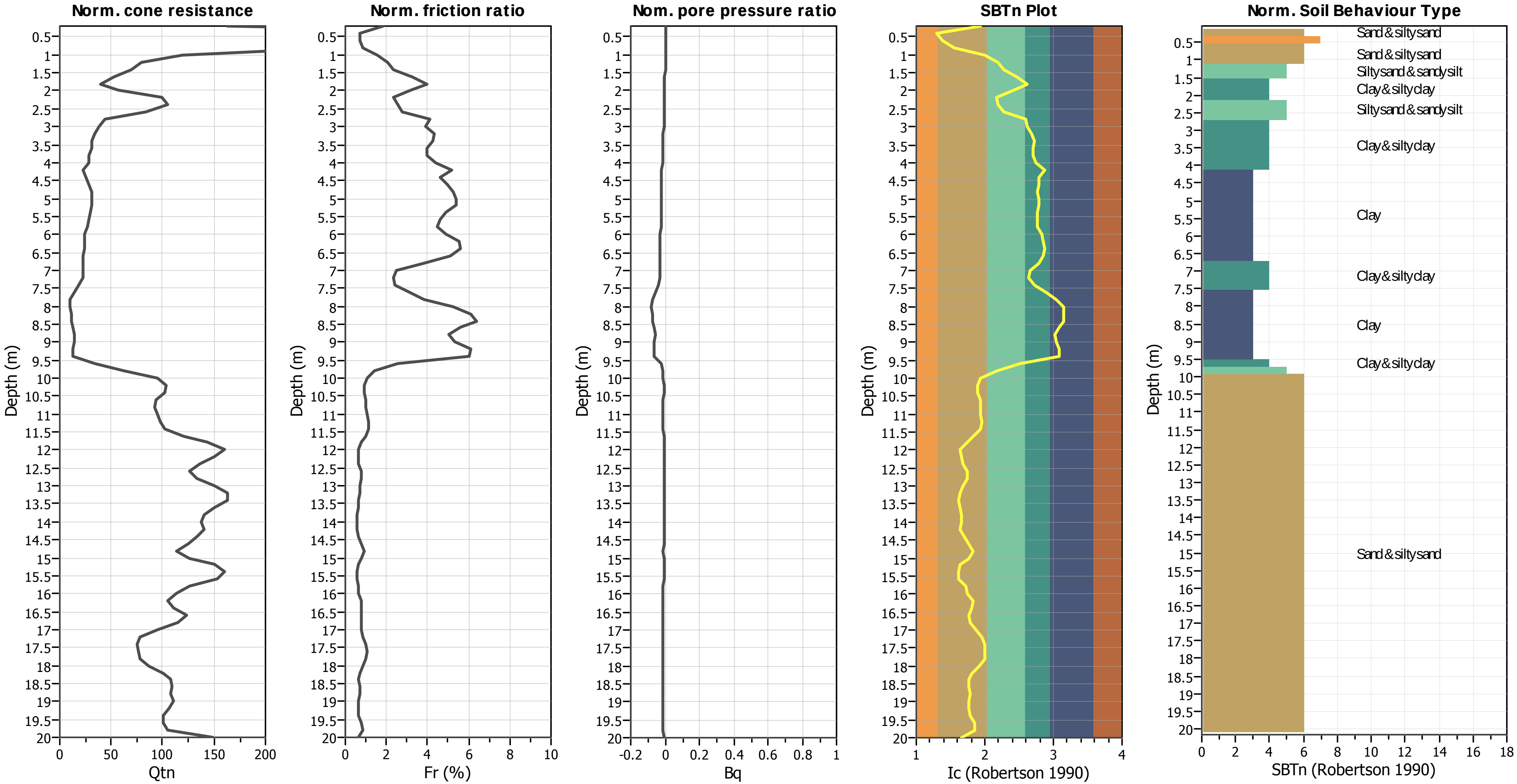
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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
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

CPT basic interpretation plots (normalized)



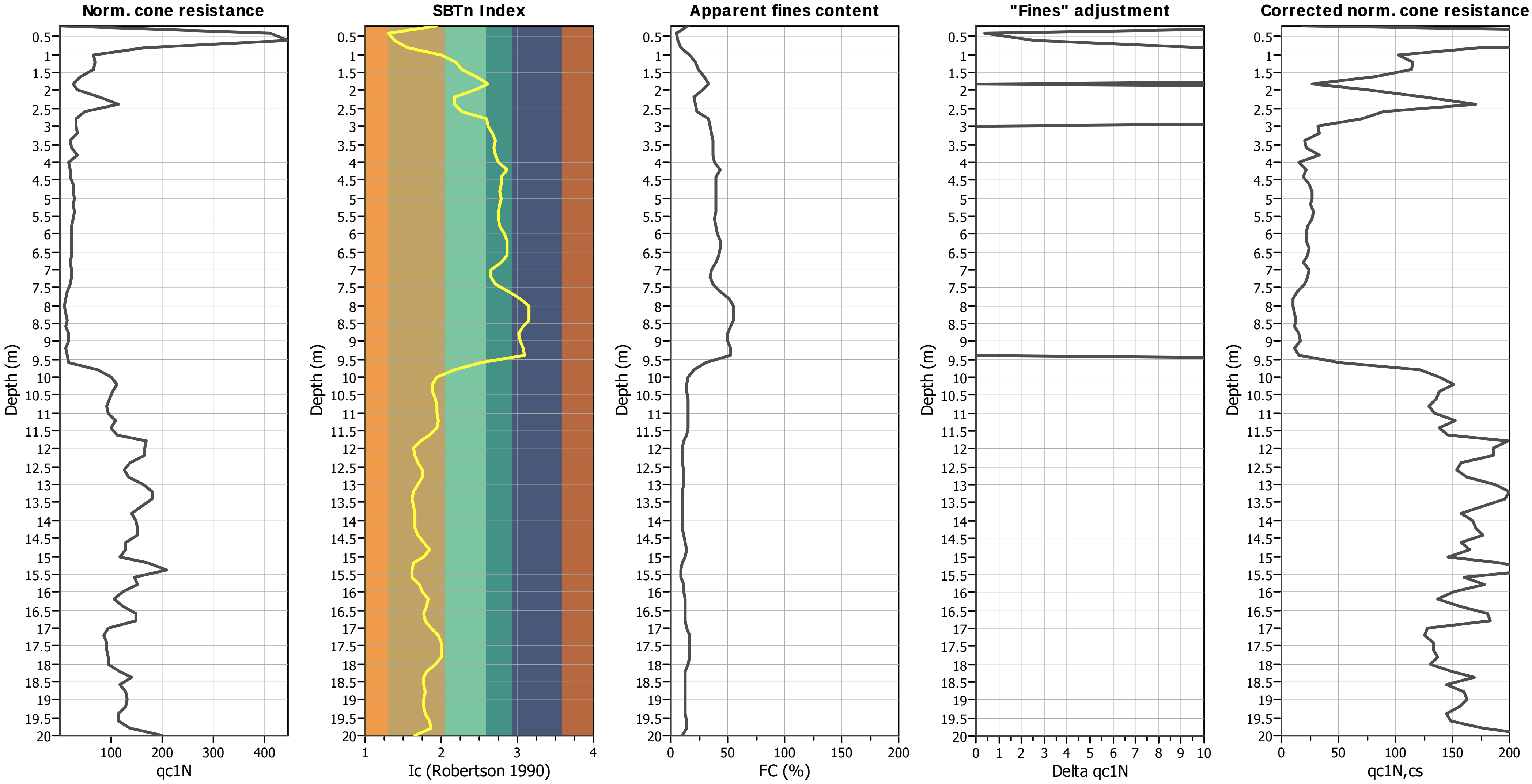
Input parameters and analysis data

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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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

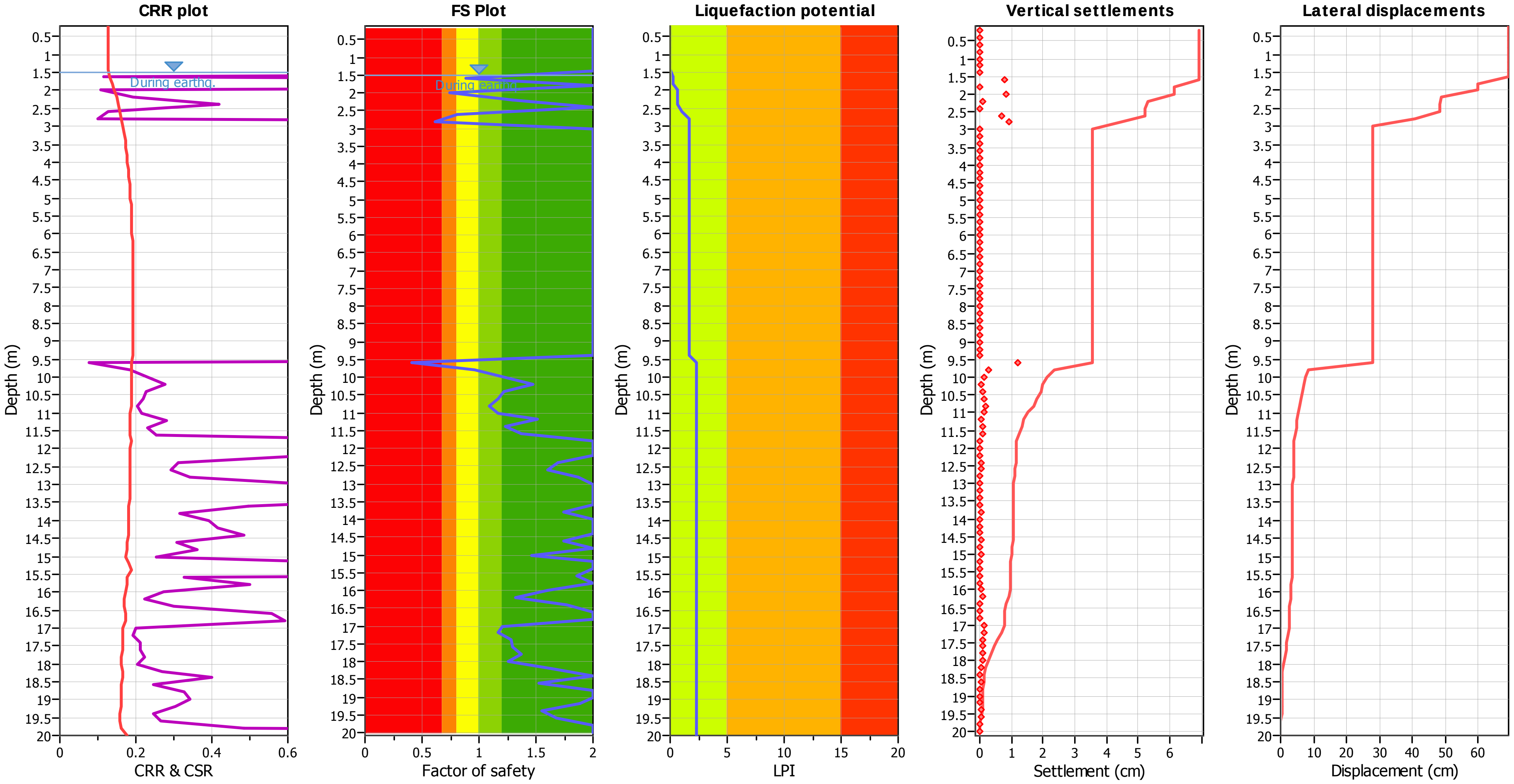
Liquefaction analysis overall plots (intermediate results)



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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

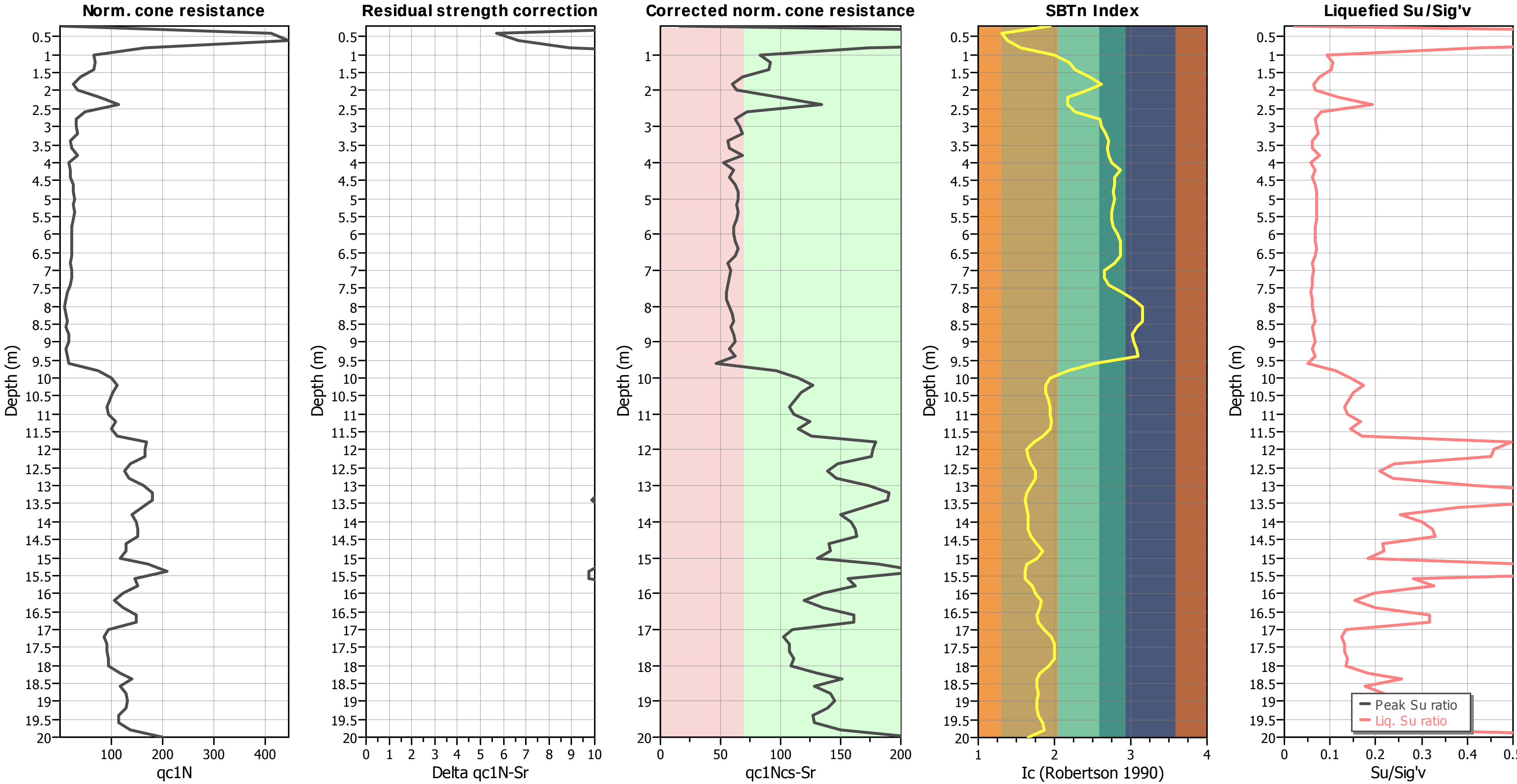
F.S. color scheme

- 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:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.14	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	N/A

:: Field input data ::

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
1	0.20	0.01	127.49	0.00	11.50	19.57
2	0.40	24.53	196.13	0.00	0.48	20.16
3	0.60	26.49	127.49	0.00	1.40	19.91
4	0.80	9.82	127.49	0.00	3.62	19.44
5	1.00	3.93	88.26	0.00	12.74	18.91
6	1.20	4.15	68.65	0.00	18.73	18.59
7	1.40	3.95	88.26	0.00	21.71	18.54
8	1.60	2.38	88.26	0.00	29.08	18.48
9	1.80	1.60	78.45	0.00	35.70	18.28
10	2.00	2.09	68.65	0.00	27.88	18.59
11	2.20	4.94	127.49	0.00	17.88	19.06
12	2.40	7.88	147.10	0.00	18.38	19.26
13	2.60	2.98	127.49	0.00	21.37	19.00
14	2.80	1.80	68.65	0.00	34.85	18.50
15	3.00	2.00	78.45	0.00	36.17	18.22
16	3.20	2.12	78.45	0.00	39.49	18.18
17	3.40	1.24	68.65	0.00	41.14	17.98
18	3.60	1.43	49.03	0.00	40.01	17.93
19	3.80	2.22	68.65	0.00	41.05	17.85
20	4.00	1.04	58.84	0.00	43.08	17.97
21	4.20	1.44	68.65	0.00	50.01	17.84
22	4.40	1.34	58.84	0.00	45.47	17.96
23	4.60	1.74	68.65	0.00	45.35	18.21
24	4.80	1.93	107.87	0.00	44.52	18.47
25	5.00	2.03	107.87	0.00	44.91	18.57
26	5.20	1.94	88.26	0.00	44.76	18.61
27	5.40	2.14	117.68	0.00	43.61	18.50
28	5.60	2.04	78.45	0.00	43.52	18.41
29	5.80	1.84	68.65	0.00	44.47	18.25
30	6.00	1.75	88.26	0.00	47.41	18.28
31	6.20	1.76	88.26	0.00	49.62	18.46
32	6.40	1.96	107.87	0.00	49.92	18.51
33	6.60	1.86	98.07	0.00	49.32	18.33
34	6.80	1.57	49.03	0.00	44.87	18.03
35	7.00	2.06	49.03	0.00	38.48	17.55
36	7.20	1.97	29.42	0.00	37.68	17.56
37	7.40	1.77	49.03	0.00	41.29	17.30
38	7.60	1.19	29.42	0.00	51.00	17.21
39	7.80	0.89	29.42	0.00	61.75	17.00
40	8.00	0.89	39.23	0.00	68.95	17.29
41	8.20	1.10	58.84	0.00	69.69	17.64
42	8.40	1.20	68.65	0.00	69.31	17.79
43	8.60	1.10	58.84	0.00	64.25	17.83
44	8.80	1.49	58.84	0.00	59.99	17.87
45	9.00	1.59	68.65	0.00	61.28	17.93
46	9.20	1.12	68.65	0.00	64.37	18.09
47	9.40	1.51	88.26	0.00	64.69	18.09
48	9.60	1.61	68.65	0.00	31.64	18.59

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
49	9.80	7.49	98.07	0.00	17.89	18.86
50	10.00	9.94	98.07	0.00	11.38	19.14
51	10.20	11.43	98.07	0.00	10.00	19.17
52	10.40	10.44	98.07	0.00	10.09	19.17
53	10.60	9.95	98.07	0.00	11.16	19.15
54	10.80	9.46	98.07	0.00	11.53	19.14
55	11.00	9.95	98.07	0.00	11.52	19.27
56	11.20	11.44	127.49	0.00	11.74	19.38
57	11.40	10.46	127.49	0.00	11.45	19.50
58	11.60	11.94	127.49	0.00	8.94	19.56
59	11.80	17.82	127.49	0.00	6.78	19.63
60	12.00	17.82	127.49	0.00	5.05	19.58
61	12.20	17.83	98.07	0.00	5.31	19.46
62	12.40	14.89	98.07	0.00	5.81	19.32
63	12.60	13.91	98.07	0.00	7.18	19.40
64	12.80	14.89	127.49	0.00	6.91	19.53
65	13.00	17.83	127.49	0.00	5.95	19.67
66	13.20	19.80	127.49	0.00	4.98	19.70
67	13.40	19.80	127.49	0.00	4.64	19.61
68	13.60	17.84	98.07	0.00	5.05	19.48
69	13.80	15.88	98.07	0.00	5.28	19.35
70	14.00	16.86	98.07	0.00	5.44	19.35
71	14.20	17.37	98.07	0.00	5.16	19.36
72	14.40	17.37	98.07	0.00	6.14	19.45
73	14.60	14.92	127.49	0.00	7.33	19.53
74	14.80	14.92	127.49	0.00	8.94	19.60
75	15.00	13.94	127.49	0.00	7.51	19.64
76	15.20	19.83	127.49	0.00	5.07	19.61
77	15.40	23.75	98.07	0.00	4.47	19.63
78	15.60	17.38	127.49	0.00	4.47	19.52
79	15.80	17.87	98.07	0.00	6.42	19.46
80	16.00	14.93	98.07	0.00	7.14	19.31
81	16.20	12.97	98.07	0.00	8.69	19.40
82	16.40	14.94	127.49	0.00	8.33	19.52
83	16.60	17.88	127.49	0.00	7.46	19.65
84	16.80	17.88	127.49	0.00	7.86	19.54
85	17.00	11.99	98.07	0.00	9.67	19.38
86	17.20	11.03	98.07	0.00	11.87	19.20
87	17.40	11.52	98.07	0.00	12.90	19.31
88	17.60	11.52	127.49	0.00	13.15	19.42
89	17.80	12.01	127.49	0.00	12.98	19.43
90	18.00	12.01	98.07	0.00	10.81	19.36
91	18.20	14.96	98.07	0.00	8.25	19.30
92	18.40	17.42	98.07	0.00	7.41	19.33
93	18.60	14.96	98.07	0.00	7.58	19.45
94	18.80	16.44	127.49	0.00	7.79	19.44
95	19.00	16.93	98.07	0.00	7.42	19.45
96	19.20	16.46	98.07	0.00	7.35	19.33

:: Field input data :: (continued)

Point ID	Depth (m)	q_c (MPa)	f_s (kPa)	u (kPa)	Fines content (%)	Unit weight (kN/m^3)
97	19.40	14.98	98.07	0.00	7.98	19.32
98	19.60	14.98	98.07	0.00	9.02	19.57
99	19.80	17.44	166.71	0.00	9.46	19.79
100	20.00	24.79	127.49	0.00	5.29	19.87

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_c: Measured cone resistance (MPa)
f_s: Sleeve friction resistance (kPa)
u: Pore pressure (kPa)
Fines content: Percentage of fines in soil (%)
Unit weight: Bulk soil unit weight (kN/m^3)

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data ::

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
1	0.20	3.91	0.00	3.91	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
2	0.40	7.94	0.00	7.94	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
3	0.60	11.93	0.00	11.93	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
4	0.80	15.82	0.00	15.82	1.00	0.182	1.43	0.127	1.00	1.00	2.000	No
5	1.00	19.60	0.00	19.60	0.99	0.181	1.43	0.127	1.00	1.00	2.000	No
6	1.20	23.32	0.00	23.32	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
7	1.40	27.02	0.00	27.02	0.99	0.180	1.43	0.126	1.00	1.00	2.000	No
8	1.60	30.72	0.98	29.74	0.99	0.185	1.43	0.130	1.00	1.00	0.130	No
9	1.80	34.38	2.94	31.43	0.98	0.195	1.43	0.137	1.00	1.00	0.137	No
10	2.00	38.09	4.91	33.19	0.98	0.204	1.43	0.143	1.00	1.00	0.143	No
11	2.20	41.91	6.87	35.04	0.98	0.212	1.43	0.149	1.00	1.00	0.149	No
12	2.40	45.76	8.83	36.93	0.97	0.219	1.43	0.153	1.00	1.00	0.153	No
13	2.60	49.56	10.79	38.77	0.97	0.225	1.43	0.158	1.00	1.00	0.158	No
14	2.80	53.26	12.75	40.51	0.97	0.231	1.43	0.162	1.00	1.00	0.162	No
15	3.00	56.90	14.71	42.19	0.96	0.236	1.43	0.165	1.00	1.00	0.165	No
16	3.20	60.54	16.68	43.86	0.96	0.241	1.43	0.168	1.00	1.00	0.168	No
17	3.40	64.14	18.64	45.50	0.95	0.245	1.43	0.171	1.00	1.00	0.171	No
18	3.60	67.72	20.60	47.12	0.95	0.249	1.43	0.174	1.00	1.00	0.174	No
19	3.80	71.29	22.56	48.73	0.95	0.252	1.43	0.176	1.00	1.00	0.176	No
20	4.00	74.89	24.52	50.36	0.94	0.255	1.43	0.179	1.00	1.00	0.179	No
21	4.20	78.45	26.49	51.97	0.94	0.258	1.43	0.181	1.00	1.00	0.181	No
22	4.40	82.05	28.45	53.60	0.93	0.260	1.43	0.182	1.00	1.00	0.182	No
23	4.60	85.69	30.41	55.28	0.93	0.263	1.43	0.184	1.00	1.00	0.184	No
24	4.80	89.38	32.37	57.01	0.93	0.264	1.43	0.185	1.00	1.00	0.185	No
25	5.00	93.10	34.34	58.76	0.92	0.266	1.43	0.186	1.00	1.00	0.186	No
26	5.20	96.82	36.30	60.52	0.92	0.267	1.43	0.187	1.00	1.00	0.187	No
27	5.40	100.52	38.26	62.26	0.91	0.268	1.43	0.188	1.00	1.00	0.188	No
28	5.60	104.20	40.22	63.98	0.91	0.270	1.43	0.189	1.00	1.00	0.189	No
29	5.80	107.85	42.18	65.67	0.91	0.271	1.43	0.189	1.00	1.00	0.189	No
30	6.00	111.51	44.15	67.36	0.90	0.271	1.43	0.190	1.00	1.00	0.190	No
31	6.20	115.20	46.11	69.09	0.90	0.272	1.43	0.190	1.00	1.00	0.190	No
32	6.40	118.90	48.07	70.83	0.89	0.272	1.43	0.191	1.00	1.00	0.191	No
33	6.60	122.57	50.03	72.54	0.89	0.273	1.43	0.191	1.00	1.00	0.191	No
34	6.80	126.17	51.99	74.18	0.88	0.273	1.43	0.191	1.00	1.00	0.191	No
35	7.00	129.68	53.95	75.73	0.88	0.274	1.43	0.192	1.00	1.00	0.192	No
36	7.20	133.19	55.92	77.28	0.87	0.274	1.43	0.192	1.00	1.00	0.192	No
37	7.40	136.66	57.88	78.78	0.87	0.274	1.43	0.192	1.00	1.00	0.192	No
38	7.60	140.10	59.84	80.26	0.86	0.275	1.43	0.192	1.00	1.00	0.192	No
39	7.80	143.50	61.80	81.69	0.86	0.275	1.43	0.192	1.00	1.00	0.192	No
40	8.00	146.96	63.77	83.19	0.86	0.275	1.43	0.192	1.00	1.00	0.192	No
41	8.20	150.48	65.73	84.76	0.85	0.275	1.43	0.192	1.00	1.00	0.192	No
42	8.40	154.04	67.69	86.35	0.85	0.275	1.43	0.192	1.00	1.00	0.192	No
43	8.60	157.61	69.65	87.96	0.84	0.274	1.43	0.192	1.00	1.00	0.192	No
44	8.80	161.18	71.61	89.57	0.84	0.274	1.43	0.192	1.00	1.00	0.192	No
45	9.00	164.77	73.58	91.19	0.83	0.273	1.43	0.191	1.00	1.00	0.191	No
46	9.20	168.39	75.54	92.85	0.83	0.273	1.43	0.191	1.00	1.00	0.191	No
47	9.40	172.00	77.50	94.51	0.82	0.272	1.43	0.191	1.00	1.00	0.191	No
48	9.60	175.72	79.46	96.26	0.82	0.272	1.43	0.190	1.00	1.00	0.190	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
49	9.80	179.49	81.42	98.07	0.81	0.271	1.43	0.189	1.00	1.00	0.189	No
50	10.00	183.32	83.39	99.93	0.81	0.270	1.43	0.189	1.00	1.00	0.189	No
51	10.20	187.15	85.35	101.81	0.80	0.269	1.43	0.188	1.00	1.00	0.188	No
52	10.40	190.99	87.31	103.68	0.80	0.268	1.43	0.187	1.00	1.00	0.188	No
53	10.60	194.82	89.27	105.55	0.79	0.267	1.43	0.187	1.00	1.00	0.187	No
54	10.80	198.65	91.23	107.41	0.79	0.265	1.43	0.186	0.99	1.00	0.187	No
55	11.00	202.50	93.19	109.31	0.78	0.264	1.43	0.185	0.99	1.00	0.186	No
56	11.20	206.38	95.16	111.22	0.78	0.263	1.43	0.184	0.99	1.00	0.186	No
57	11.40	210.28	97.12	113.16	0.77	0.262	1.43	0.183	0.99	1.00	0.185	No
58	11.60	214.19	99.08	115.11	0.77	0.261	1.43	0.182	0.99	1.00	0.185	No
59	11.80	218.12	101.04	117.07	0.76	0.259	1.43	0.182	0.97	1.00	0.187	No
60	12.00	222.03	103.00	119.03	0.76	0.258	1.43	0.181	0.97	1.00	0.186	No
61	12.20	225.93	104.97	120.96	0.76	0.257	1.43	0.180	0.97	1.00	0.186	No
62	12.40	229.79	106.93	122.86	0.75	0.256	1.43	0.179	0.97	1.00	0.184	No
63	12.60	233.67	108.89	124.78	0.75	0.254	1.43	0.178	0.97	1.00	0.183	No
64	12.80	237.58	110.85	126.72	0.74	0.253	1.43	0.177	0.97	1.00	0.183	No
65	13.00	241.51	112.81	128.69	0.74	0.252	1.43	0.176	0.96	1.00	0.184	No
66	13.20	245.45	114.78	130.67	0.73	0.250	1.43	0.175	0.95	1.00	0.185	No
67	13.40	249.37	116.74	132.63	0.73	0.249	1.43	0.174	0.94	1.00	0.185	No
68	13.60	253.27	118.70	134.57	0.72	0.248	1.43	0.173	0.95	1.00	0.182	No
69	13.80	257.14	120.66	136.48	0.72	0.246	1.43	0.172	0.96	1.00	0.180	No
70	14.00	261.01	122.63	138.38	0.71	0.245	1.43	0.171	0.95	1.00	0.180	No
71	14.20	264.88	124.59	140.29	0.71	0.244	1.43	0.171	0.95	1.00	0.180	No
72	14.40	268.77	126.55	142.22	0.70	0.242	1.43	0.170	0.95	1.00	0.179	No
73	14.60	272.68	128.51	144.17	0.70	0.241	1.43	0.169	0.95	1.00	0.177	No
74	14.80	276.60	130.47	146.12	0.70	0.240	1.43	0.168	0.95	1.00	0.176	No
75	15.00	280.52	132.44	148.09	0.69	0.238	1.43	0.167	0.95	1.00	0.175	No
76	15.20	284.45	134.40	150.05	0.69	0.237	1.43	0.166	0.92	1.00	0.179	No
77	15.40	288.37	136.36	152.01	0.68	0.236	1.43	0.165	0.88	1.00	0.187	No
78	15.60	292.28	138.32	153.96	0.68	0.234	1.43	0.164	0.94	1.00	0.175	No
79	15.80	296.17	140.28	155.88	0.67	0.233	1.43	0.163	0.93	1.00	0.175	No
80	16.00	300.03	142.25	157.79	0.67	0.232	1.43	0.162	0.94	1.00	0.172	No
81	16.20	303.91	144.21	159.70	0.66	0.230	1.43	0.161	0.95	1.00	0.170	No
82	16.40	307.81	146.17	161.65	0.66	0.229	1.43	0.160	0.94	1.00	0.170	No
83	16.60	311.74	148.13	163.61	0.66	0.228	1.43	0.159	0.92	1.00	0.172	No
84	16.80	315.65	150.09	165.56	0.65	0.226	1.43	0.158	0.92	1.00	0.172	No
85	17.00	319.53	152.06	167.47	0.65	0.225	1.43	0.158	0.95	1.00	0.166	No
86	17.20	323.37	154.02	169.35	0.64	0.224	1.43	0.157	0.95	1.00	0.165	No
87	17.40	327.23	155.98	171.25	0.64	0.223	1.43	0.156	0.95	1.00	0.164	No
88	17.60	331.12	157.94	173.17	0.64	0.221	1.43	0.155	0.95	1.00	0.164	No
89	17.80	335.00	159.90	175.10	0.63	0.220	1.43	0.154	0.94	1.00	0.163	No
90	18.00	338.87	161.87	177.01	0.63	0.219	1.43	0.153	0.94	1.00	0.162	No
91	18.20	342.73	163.83	178.91	0.62	0.218	1.43	0.152	0.93	1.00	0.164	No
92	18.40	346.60	165.79	180.81	0.62	0.216	1.43	0.151	0.92	1.00	0.165	No
93	18.60	350.49	167.75	182.74	0.62	0.215	1.43	0.151	0.93	1.00	0.162	No
94	18.80	354.38	169.71	184.66	0.61	0.214	1.43	0.150	0.92	1.00	0.163	No
95	19.00	358.27	171.68	186.59	0.61	0.213	1.43	0.149	0.92	1.00	0.163	No
96	19.20	362.13	173.64	188.50	0.61	0.212	1.43	0.148	0.92	1.00	0.161	No

:: Cyclic Stress Ratio fully adjusted (CSR*) calculation data :: (continued)

Point ID	Depth (m)	σ_v (kPa)	u_0 (kPa)	σ_v' (kPa)	r_d	CSR	MSF	CSR_{eq}	K_σ	User FS	CSR^*	Belongs to transition
97	19.40	366.00	175.60	190.40	0.60	0.210	1.43	0.147	0.93	1.00	0.159	No
98	19.60	369.91	177.56	192.35	0.60	0.209	1.43	0.146	0.92	1.00	0.159	No
99	19.80	373.87	179.52	194.34	0.59	0.208	1.43	0.146	0.91	1.00	0.160	No
100	20.00	377.84	181.49	196.36	0.59	0.207	1.43	0.145	0.82	1.00	0.176	No

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
σ_v: Total overburden pressure at test point (kPa)
u_0: Water pressure at test point (kPa)
σ_v': Effective overburden pressure based on GWT during earthquake (kPa)
r_d: Nonlinear shear mass factor
CSR: Cyclic Stress Ratio
MSF: Magnitude Scaling Factor
CSR_{eq}: CSR adjusted for M=7.5
K_σ: Effective overburden stress factor
CSR^*: CSR fully adjusted

:: Cyclic Resistance Ratio (CRR) calculation data ::

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
1	0.20	8.18	15.78	1.94	0.78	1.70	0.17	19.00	19.17	4.000	No	No	2.00
2	0.40	25.18	5.62	1.31	0.26	1.70	411.49	0.37	411.86	4.000	No	No	2.00
3	0.60	20.28	6.59	1.39	0.26	1.70	444.41	2.58	446.99	4.000	No	No	2.00
4	0.80	13.41	8.79	1.55	0.36	1.70	164.69	10.02	174.71	4.000	No	No	2.00
5	1.00	5.97	16.81	1.99	0.49	1.70	65.97	36.19	102.16	4.000	No	No	2.00
6	1.20	4.01	21.55	2.19	0.47	1.70	69.59	45.92	115.51	4.000	No	No	2.00
7	1.40	3.49	23.81	2.28	0.47	1.70	66.31	47.41	113.71	4.000	No	No	2.00
8	1.60	2.64	29.19	2.46	0.54	1.70	39.98	42.09	82.07	0.115	No	No	0.89
9	1.80	2.02	33.81	2.61	0.59	1.70	26.81	0.00	26.81	4.000	No	Yes	2.00
10	2.00	2.88	28.33	2.44	0.56	1.70	35.05	40.14	75.19	0.106	No	No	0.74
11	2.20	4.97	20.89	2.17	0.45	1.60	78.27	47.53	125.79	0.193	No	No	1.30
12	2.40	5.27	21.28	2.18	0.37	1.45	112.88	58.20	171.09	0.419	No	No	2.00
13	2.60	4.22	23.56	2.27	0.52	1.65	48.50	41.67	90.17	0.127	No	No	0.81
14	2.80	2.26	33.23	2.59	0.57	1.69	30.12	39.81	69.93	0.100	No	No	0.62
15	3.00	1.97	34.14	2.62	0.56	1.64	32.37	0.00	32.37	4.000	No	Yes	2.00
16	3.20	1.78	36.39	2.68	0.56	1.60	33.39	0.00	33.39	4.000	No	Yes	2.00
17	3.40	1.60	37.51	2.71	0.61	1.63	19.94	0.00	19.94	4.000	No	Yes	2.00
18	3.60	1.63	36.74	2.69	0.60	1.59	22.43	0.00	22.43	4.000	No	Yes	2.00
19	3.80	1.56	37.44	2.71	0.56	1.51	32.97	0.00	32.97	4.000	No	Yes	2.00
20	4.00	1.57	38.79	2.75	0.63	1.56	15.97	0.00	15.97	4.000	No	Yes	2.00
21	4.20	1.28	43.33	2.87	0.61	1.50	21.34	0.00	21.34	4.000	No	Yes	2.00
22	4.40	1.51	40.37	2.79	0.61	1.48	19.62	0.00	19.62	4.000	No	Yes	2.00
23	4.60	1.67	40.30	2.79	0.59	1.43	24.55	0.00	24.55	4.000	No	Yes	2.00
24	4.80	1.90	39.75	2.77	0.58	1.40	26.69	0.00	26.69	4.000	No	Yes	2.00
25	5.00	1.97	40.00	2.78	0.58	1.37	27.50	0.00	27.50	4.000	No	Yes	2.00
26	5.20	2.04	39.91	2.78	0.59	1.35	25.95	0.00	25.95	4.000	No	Yes	2.00
27	5.40	2.04	39.15	2.76	0.58	1.33	27.99	0.00	27.99	4.000	No	Yes	2.00
28	5.60	2.01	39.08	2.76	0.59	1.31	26.36	0.00	26.36	4.000	No	Yes	2.00
29	5.80	1.88	39.71	2.77	0.60	1.30	23.59	0.00	23.59	4.000	No	Yes	2.00
30	6.00	1.78	41.64	2.82	0.60	1.28	22.05	0.00	22.05	4.000	No	Yes	2.00
31	6.20	1.82	43.08	2.86	0.60	1.26	21.95	0.00	21.95	4.000	No	Yes	2.00
32	6.40	1.86	43.27	2.87	0.60	1.24	23.96	0.00	23.96	4.000	No	Yes	2.00
33	6.60	1.80	42.88	2.86	0.60	1.22	22.49	0.00	22.49	4.000	No	Yes	2.00
34	6.80	1.83	39.98	2.78	0.62	1.21	18.78	0.00	18.78	4.000	No	Yes	2.00
35	7.00	1.87	35.71	2.66	0.60	1.19	24.18	0.00	24.18	4.000	No	Yes	2.00
36	7.20	1.94	35.17	2.65	0.60	1.18	22.90	0.00	22.90	4.000	No	Yes	2.00
37	7.40	1.64	37.60	2.72	0.61	1.17	20.44	0.00	20.44	4.000	No	Yes	2.00
38	7.60	1.28	43.96	2.88	0.64	1.16	13.61	0.00	13.61	4.000	No	Yes	2.00
39	7.80	0.99	50.75	3.05	0.66	1.15	10.15	0.00	10.15	4.000	No	Yes	2.00
40	8.00	0.96	55.17	3.15	0.66	1.14	10.03	0.00	10.03	4.000	No	Yes	2.00
41	8.20	1.06	55.62	3.16	0.65	1.12	12.17	0.00	12.17	4.000	No	Yes	2.00
42	8.40	1.13	55.39	3.15	0.65	1.11	13.09	0.00	13.09	4.000	No	Yes	2.00
43	8.60	1.26	52.30	3.08	0.65	1.10	11.88	0.00	11.88	4.000	No	Yes	2.00
44	8.80	1.39	49.66	3.02	0.63	1.08	15.91	0.00	15.91	4.000	No	Yes	2.00
45	9.00	1.40	50.46	3.04	0.63	1.07	16.75	0.00	16.75	4.000	No	Yes	2.00
46	9.20	1.41	52.37	3.08	0.65	1.06	11.68	0.00	11.68	4.000	No	Yes	2.00
47	9.40	1.41	52.57	3.09	0.63	1.05	15.58	0.00	15.58	4.000	No	Yes	2.00
48	9.60	3.54	31.00	2.52	0.63	1.03	16.39	34.69	51.09	0.079	No	No	0.41

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
49	9.80	6.35	20.90	2.17	0.45	1.01	75.04	46.60	121.65	0.183	No	No	0.97
50	10.00	9.62	15.69	1.94	0.42	1.01	98.71	40.29	139.00	0.229	No	No	1.21
51	10.20	10.60	14.53	1.88	0.40	1.00	112.54	38.52	151.06	0.276	No	No	1.47
52	10.40	10.61	14.60	1.89	0.42	0.99	102.08	36.82	138.90	0.229	No	No	1.22
53	10.60	9.95	15.50	1.93	0.43	0.98	96.54	39.16	135.70	0.219	No	No	1.17
54	10.80	9.79	15.81	1.95	0.44	0.97	91.04	39.02	130.06	0.203	No	No	1.09
55	11.00	10.29	15.80	1.95	0.43	0.97	95.09	39.88	134.97	0.217	No	No	1.16
56	11.20	10.62	15.98	1.95	0.40	0.96	108.82	43.56	152.37	0.283	No	No	1.52
57	11.40	11.28	15.74	1.94	0.42	0.95	98.57	40.46	139.03	0.229	No	No	1.24
58	11.60	13.41	13.62	1.84	0.41	0.95	111.79	34.15	145.94	0.254	No	No	1.37
59	11.80	15.86	11.72	1.73	0.33	0.95	167.63	30.90	198.53	1.065	No	No	2.00
60	12.00	17.82	10.15	1.64	0.35	0.95	166.23	19.21	185.44	0.638	No	No	2.00
61	12.20	16.84	10.38	1.66	0.35	0.94	165.42	20.85	186.27	0.656	No	No	2.00
62	12.40	15.54	10.85	1.68	0.39	0.93	136.25	21.45	157.70	0.312	No	No	1.69
63	12.60	14.56	12.08	1.75	0.40	0.92	126.37	28.05	154.42	0.293	No	No	1.60
64	12.80	15.54	11.84	1.74	0.38	0.92	134.83	27.63	162.46	0.343	No	No	1.88
65	13.00	17.50	10.97	1.69	0.35	0.92	161.89	24.81	186.71	0.666	No	No	2.00
66	13.20	19.14	10.08	1.64	0.33	0.92	179.66	19.71	199.37	1.106	No	No	2.00
67	13.40	19.15	9.76	1.62	0.34	0.91	178.55	17.27	195.81	0.946	No	No	2.00
68	13.60	17.84	10.15	1.64	0.36	0.90	158.89	18.63	177.53	0.498	No	No	2.00
69	13.80	16.86	10.36	1.65	0.39	0.89	139.48	18.55	158.03	0.314	No	No	1.74
70	14.00	16.70	10.51	1.66	0.38	0.89	148.02	20.26	168.28	0.391	No	No	2.00
71	14.20	17.20	10.25	1.65	0.37	0.89	151.89	18.80	170.69	0.415	No	No	2.00
72	14.40	16.55	11.15	1.70	0.36	0.88	151.60	25.00	176.60	0.485	No	No	2.00
73	14.60	15.73	12.21	1.76	0.39	0.87	128.19	29.05	157.24	0.309	No	No	1.75
74	14.80	14.59	13.62	1.84	0.38	0.87	128.08	36.97	165.05	0.363	No	No	2.00
75	15.00	16.23	12.37	1.77	0.41	0.86	117.71	28.56	146.26	0.255	No	No	1.46
76	15.20	19.17	10.16	1.64	0.34	0.87	171.10	19.69	190.79	0.773	No	No	2.00
77	15.40	20.32	9.61	1.61	0.30	0.89	207.81	17.90	225.71	4.000	No	No	2.00
78	15.60	19.67	9.60	1.61	0.39	0.85	145.84	14.11	159.96	0.326	No	No	1.86
79	15.80	16.72	11.39	1.72	0.36	0.86	150.96	26.64	177.60	0.499	No	No	2.00
80	16.00	15.26	12.05	1.75	0.40	0.84	123.22	27.43	150.66	0.274	No	No	1.60
81	16.20	14.28	13.40	1.83	0.43	0.82	105.53	32.05	137.58	0.225	No	No	1.32
82	16.40	15.26	13.09	1.81	0.39	0.83	122.64	33.24	155.88	0.301	No	No	1.77
83	16.60	16.90	12.32	1.77	0.36	0.84	148.82	32.58	181.40	0.559	No	No	2.00
84	16.80	15.92	12.68	1.79	0.35	0.84	148.38	34.82	183.20	0.592	No	No	2.00
85	17.00	13.63	14.24	1.87	0.44	0.80	94.86	33.94	128.80	0.200	No	No	1.20
86	17.20	11.52	16.09	1.96	0.45	0.79	86.55	38.94	125.49	0.192	No	No	1.16
87	17.40	11.36	16.94	2.00	0.43	0.80	90.60	42.43	133.03	0.211	No	No	1.29
88	17.60	11.69	17.14	2.01	0.43	0.79	90.17	42.89	133.05	0.211	No	No	1.29
89	17.80	11.85	17.00	2.00	0.43	0.79	93.94	43.42	137.35	0.224	No	No	1.37
90	18.00	13.00	15.21	1.92	0.44	0.78	92.84	37.31	130.15	0.203	No	No	1.25
91	18.20	14.80	13.02	1.81	0.40	0.79	117.36	32.06	149.42	0.269	No	No	1.64
92	18.40	15.78	12.28	1.77	0.37	0.81	138.49	30.89	169.38	0.401	No	No	2.00
93	18.60	16.27	12.44	1.77	0.41	0.78	115.70	28.63	144.32	0.248	No	No	1.53
94	18.80	16.11	12.61	1.78	0.39	0.79	128.56	31.48	160.04	0.326	No	No	2.00
95	19.00	16.61	12.29	1.77	0.38	0.79	132.13	30.08	162.21	0.341	No	No	2.00
96	19.20	16.12	12.23	1.76	0.39	0.78	127.22	29.03	156.24	0.303	No	No	1.88

:: Cyclic Resistance Ratio (CRR) calculation data :: (continued)

Point ID	Depth (m)	q_t (MPa)	FC (%)	Ic	m	C_N	q_{c1N}	Δq_{c1N}	$q_{c1N,cs}$	$CRR_{7.5}$	Belongs to trans. layer	Clay-like behaviour	FS
97	19.40	15.48	12.79	1.79	0.41	0.77	113.97	30.27	144.24	0.247	No	No	1.55
98	19.60	15.80	13.69	1.84	0.41	0.77	114.06	34.90	148.96	0.267	No	No	1.68
99	19.80	16.62	14.06	1.86	0.36	0.79	135.89	40.69	176.58	0.485	No	No	2.00
100	20.00	22.34	10.37	1.65	0.30	0.82	200.72	23.67	224.38	4.000	No	No	2.00

Abbreviations

Depth: Depth from free surface, at which CPT was performed (m)
q_t: Total cone resistance
FC: Fines content (%)
I_c: Soil behavior type index
m: Stress exponent
C_N: Overburden correction factor
q_{c1N}: Normalized and adjusted cone resistance
Δq_{c1N}: Cone resistance correction factor due to fines
$q_{c1N,cs}$: Normalized and adjusted cone resistance
$CRR_{7.5}$: Cyclic resistance ratio for M_w=7.5
FS: Factor of safety against soil liquefaction

:: Liquefaction Potential Index calculation data ::

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
0.20	2.00	0.00	9.90	0.20	0.00	0.40	2.00	0.00	9.80	0.20	0.00
0.60	2.00	0.00	9.70	0.20	0.00	0.80	2.00	0.00	9.60	0.20	0.00
1.00	2.00	0.00	9.50	0.20	0.00	1.20	2.00	0.00	9.40	0.20	0.00
1.40	2.00	0.00	9.30	0.20	0.00	1.60	0.89	0.11	9.20	0.20	0.20
1.80	2.00	0.00	9.10	0.20	0.00	2.00	0.74	0.26	9.00	0.20	0.46
2.20	1.30	0.00	8.90	0.20	0.00	2.40	2.00	0.00	8.80	0.20	0.00
2.60	0.81	0.19	8.70	0.20	0.34	2.80	0.62	0.38	8.60	0.20	0.66
3.00	2.00	0.00	8.50	0.20	0.00	3.20	2.00	0.00	8.40	0.20	0.00
3.40	2.00	0.00	8.30	0.20	0.00	3.60	2.00	0.00	8.20	0.20	0.00
3.80	2.00	0.00	8.10	0.20	0.00	4.00	2.00	0.00	8.00	0.20	0.00
4.20	2.00	0.00	7.90	0.20	0.00	4.40	2.00	0.00	7.80	0.20	0.00
4.60	2.00	0.00	7.70	0.20	0.00	4.80	2.00	0.00	7.60	0.20	0.00
5.00	2.00	0.00	7.50	0.20	0.00	5.20	2.00	0.00	7.40	0.20	0.00
5.40	2.00	0.00	7.30	0.20	0.00	5.60	2.00	0.00	7.20	0.20	0.00
5.80	2.00	0.00	7.10	0.20	0.00	6.00	2.00	0.00	7.00	0.20	0.00
6.20	2.00	0.00	6.90	0.20	0.00	6.40	2.00	0.00	6.80	0.20	0.00
6.60	2.00	0.00	6.70	0.20	0.00	6.80	2.00	0.00	6.60	0.20	0.00
7.00	2.00	0.00	6.50	0.20	0.00	7.20	2.00	0.00	6.40	0.20	0.00
7.40	2.00	0.00	6.30	0.20	0.00	7.60	2.00	0.00	6.20	0.20	0.00
7.80	2.00	0.00	6.10	0.20	0.00	8.00	2.00	0.00	6.00	0.20	0.00
8.20	2.00	0.00	5.90	0.20	0.00	8.40	2.00	0.00	5.80	0.20	0.00
8.60	2.00	0.00	5.70	0.20	0.00	8.80	2.00	0.00	5.60	0.20	0.00
9.00	2.00	0.00	5.50	0.20	0.00	9.20	2.00	0.00	5.40	0.20	0.00
9.40	2.00	0.00	5.30	0.20	0.00	9.60	0.41	0.59	5.20	0.20	0.61
9.80	0.97	0.03	5.10	0.20	0.03	10.00	1.21	0.00	5.00	0.20	0.00
10.20	1.47	0.00	4.90	0.20	0.00	10.40	1.22	0.00	4.80	0.20	0.00
10.60	1.17	0.00	4.70	0.20	0.00	10.80	1.09	0.00	4.60	0.20	0.00
11.00	1.16	0.00	4.50	0.20	0.00	11.20	1.52	0.00	4.40	0.20	0.00
11.40	1.24	0.00	4.30	0.20	0.00	11.60	1.37	0.00	4.20	0.20	0.00
11.80	2.00	0.00	4.10	0.20	0.00	12.00	2.00	0.00	4.00	0.20	0.00
12.20	2.00	0.00	3.90	0.20	0.00	12.40	1.69	0.00	3.80	0.20	0.00
12.60	1.60	0.00	3.70	0.20	0.00	12.80	1.88	0.00	3.60	0.20	0.00
13.00	2.00	0.00	3.50	0.20	0.00	13.20	2.00	0.00	3.40	0.20	0.00
13.40	2.00	0.00	3.30	0.20	0.00	13.60	2.00	0.00	3.20	0.20	0.00
13.80	1.74	0.00	3.10	0.20	0.00	14.00	2.00	0.00	3.00	0.20	0.00
14.20	2.00	0.00	2.90	0.20	0.00	14.40	2.00	0.00	2.80	0.20	0.00
14.60	1.75	0.00	2.70	0.20	0.00	14.80	2.00	0.00	2.60	0.20	0.00
15.00	1.46	0.00	2.50	0.20	0.00	15.20	2.00	0.00	2.40	0.20	0.00
15.40	2.00	0.00	2.30	0.20	0.00	15.60	1.86	0.00	2.20	0.20	0.00
15.80	2.00	0.00	2.10	0.20	0.00	16.00	1.60	0.00	2.00	0.20	0.00
16.20	1.32	0.00	1.90	0.20	0.00	16.40	1.77	0.00	1.80	0.20	0.00
16.60	2.00	0.00	1.70	0.20	0.00	16.80	2.00	0.00	1.60	0.20	0.00
17.00	1.20	0.00	1.50	0.20	0.00	17.20	1.16	0.00	1.40	0.20	0.00
17.40	1.29	0.00	1.30	0.20	0.00	17.60	1.29	0.00	1.20	0.20	0.00
17.80	1.37	0.00	1.10	0.20	0.00	18.00	1.25	0.00	1.00	0.20	0.00
18.20	1.64	0.00	0.90	0.20	0.00	18.40	2.00	0.00	0.80	0.20	0.00
18.60	1.53	0.00	0.70	0.20	0.00	18.80	2.00	0.00	0.60	0.20	0.00
19.00	2.00	0.00	0.50	0.20	0.00	19.20	1.88	0.00	0.40	0.20	0.00

:: Liquefaction Potential Index calculation data :: (continued)

Depth (m)	FS	F_L	w_z	d_z	LPI	Depth (m)	FS	F_L	w_z	d_z	LPI
19.40	1.55	0.00	0.30	0.20	0.00	19.60	1.68	0.00	0.20	0.20	0.00
19.80	2.00	0.00	0.10	0.20	0.00	20.00	2.00	0.00	0.00	0.20	0.00

Overall liquefaction potential: 2.31

LPI = 0.00 - Liquefaction risk very low
LPI between 0.00 and 5.00 - Liquefaction risk low
LPI between 5.00 and 15.00 - Liquefaction risk high
LPI > 15.00 - Liquefaction risk very high

Abbreviations

FS: Calculated factor of safety for test point
F_L: 1 - FS
w_z: Function value of the extend of soil liquefaction according to depth
d_z: Layer thickness (m)
LPI: Liquefaction potential index value for test point