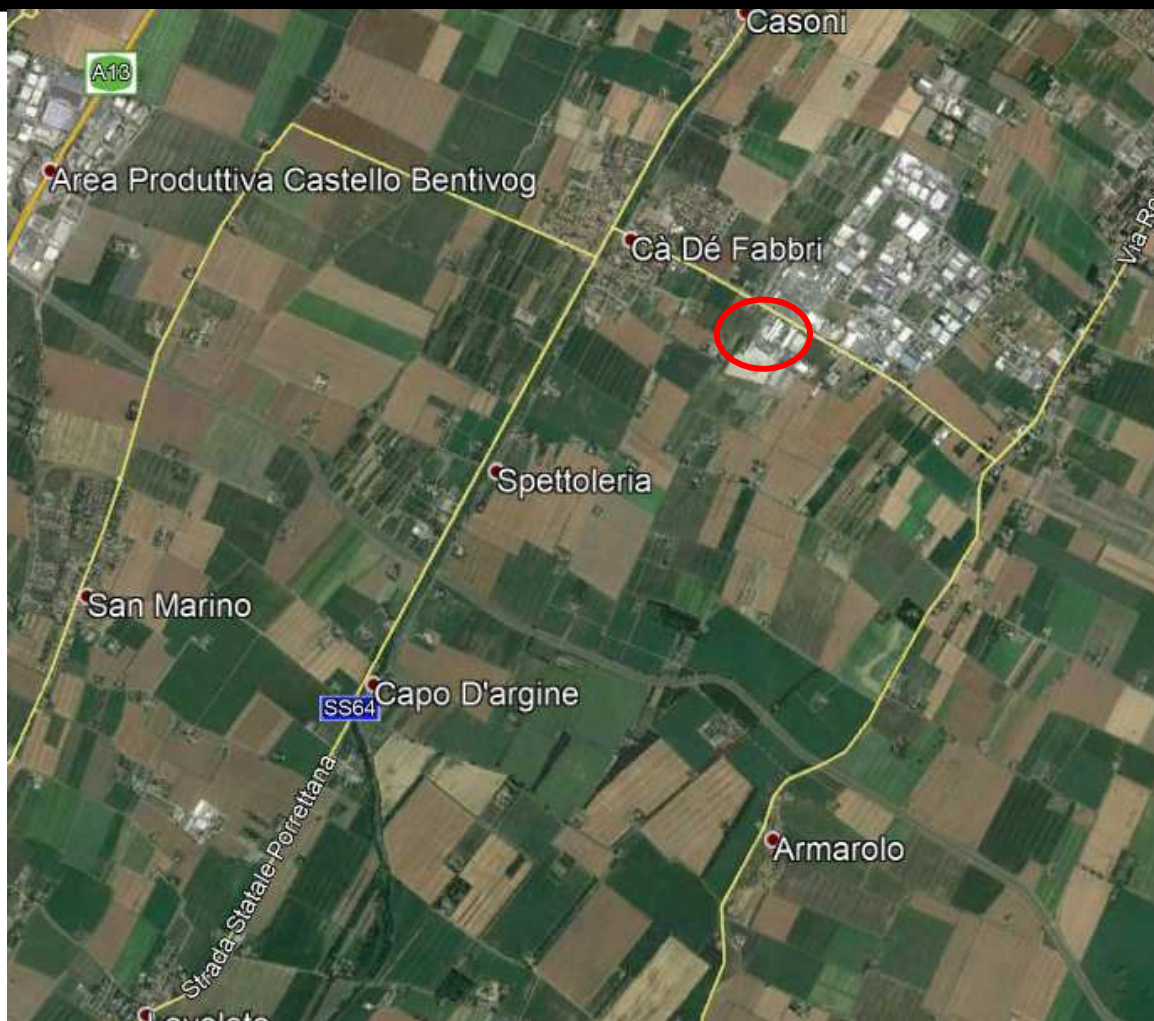


Integrazione alla Relazione geologica



Tecnico incaricato:
dott. geol. Raffaele Sandrelli

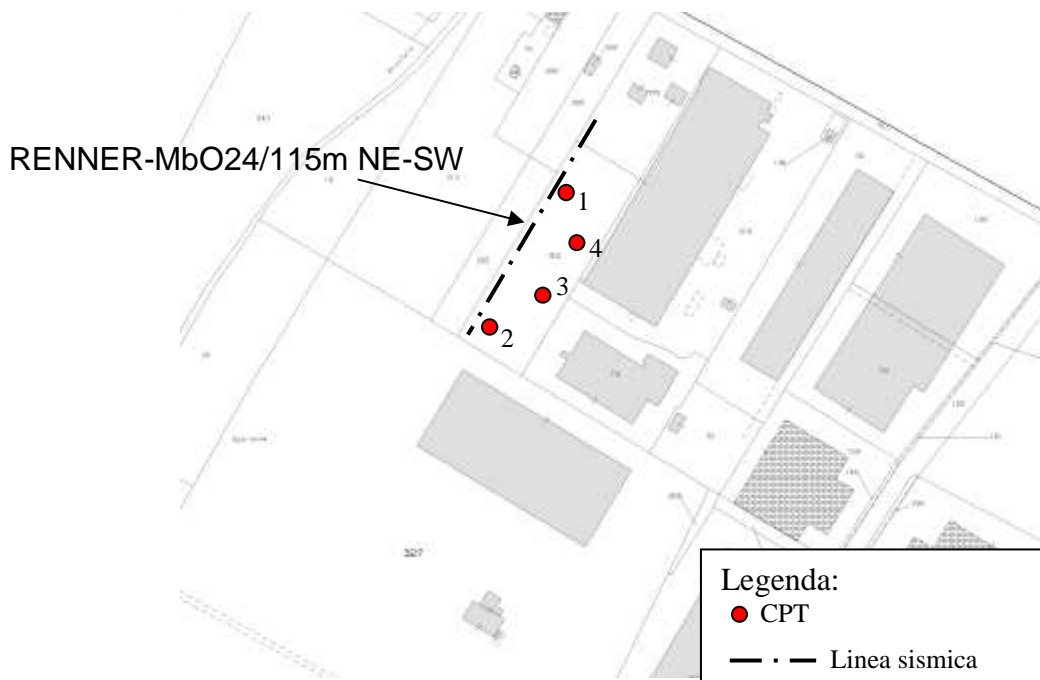


Pianoro (Bo) giugno 2018

INTEGRAZIONE ALLA RELAZIONE DEL DICEMBRE 2018

La presente integrazione consiste nel fornire agli organi competenti le tabelle e i grafici delle prove penetrometriche, menzionate nell'ultima relazione geologica del dicembre 2017, che non erano stati introdotti nella menzionata relazione.

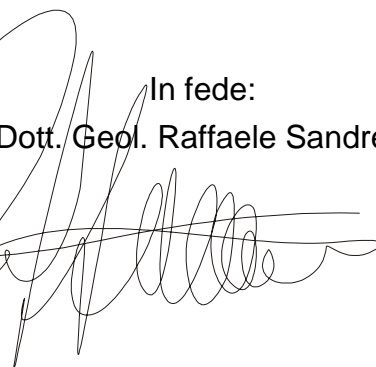
Figura: estratto di mappa (scala 1:2.000)



Bologna, giugno 2018



In fede:
(Dott. Geol. Raffaele Sandrelli)



PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

CPT 1

2.01PG05-104

- committente :	dott.ssa arch. Alessandra Grimandi	- data :	25/06/2010
- lavoro :	Realizzazione piazzale di servizio RENNEN	- quota inizio :	Piano Campagna
- località :	Minerbio-Via Ronchi inferiore	- prof. falda :	2,20 m da quota inizio
- note :	Pareti foro crollate ad estrazione aste:-9.00m	- pagina :	1

Prof. m	Letture di campagna		qc	fs	qc/fs	Prof. m	Letture di campagna		qc	fs	qc/fs
	punta	laterale	kg/cm ²				punta	laterale	kg/cm ²		
0,20	10,0	----	10,0	0,40	25,0	6,40	22,0	43,0	22,0	1,47	15,0
0,40	8,0	14,0	8,0	0,87	9,0	6,60	24,0	46,0	24,0	1,53	16,0
0,60	10,0	23,0	10,0	0,67	15,0	6,80	27,0	50,0	27,0	1,87	14,0
0,80	10,0	20,0	10,0	0,67	15,0	7,00	29,0	57,0	29,0	1,73	17,0
1,00	11,0	21,0	11,0	1,00	11,0	7,20	33,0	59,0	33,0	1,87	18,0
1,20	11,0	26,0	11,0	0,93	12,0	7,40	38,0	66,0	38,0	2,20	17,0
1,40	12,0	26,0	12,0	1,13	11,0	7,60	41,0	74,0	41,0	2,20	19,0
1,60	13,0	30,0	13,0	1,07	12,0	7,80	35,0	68,0	35,0	2,27	15,0
1,80	14,0	30,0	14,0	1,07	13,0	8,00	27,0	61,0	27,0	1,73	16,0
2,00	19,0	35,0	19,0	1,27	15,0	8,20	29,0	55,0	29,0	1,47	20,0
2,20	16,0	35,0	16,0	1,33	12,0	8,40	28,0	50,0	28,0	1,93	14,0
2,40	20,0	40,0	20,0	1,20	17,0	8,60	17,0	46,0	17,0	1,40	12,0
2,60	20,0	38,0	20,0	1,27	16,0	8,80	56,0	77,0	56,0	2,67	21,0
2,80	25,0	44,0	25,0	1,40	18,0	9,00	112,0	152,0	112,0	2,60	43,0
3,00	28,0	49,0	28,0	1,40	20,0	9,20	50,0	89,0	50,0	3,20	16,0
3,20	23,0	44,0	23,0	1,53	15,0	9,40	30,0	78,0	30,0	1,27	24,0
3,40	24,0	47,0	24,0	1,47	16,0	9,60	21,0	40,0	21,0	1,13	19,0
3,60	18,0	40,0	18,0	1,40	13,0	9,80	30,0	47,0	30,0	1,47	20,0
3,80	20,0	41,0	20,0	1,20	17,0	10,00	37,0	59,0	37,0	1,67	22,0
4,00	23,0	41,0	23,0	1,27	18,0	10,20	27,0	52,0	27,0	1,00	27,0
4,20	24,0	43,0	24,0	1,40	17,0	10,40	80,0	95,0	80,0	2,47	32,0
4,40	23,0	44,0	23,0	1,53	15,0	10,60	35,0	72,0	35,0	1,73	20,0
4,60	22,0	45,0	22,0	1,47	15,0	10,80	21,0	47,0	21,0	1,27	17,0
4,80	15,0	37,0	15,0	1,13	13,0	11,00	16,0	35,0	16,0	0,87	18,0
5,00	13,0	30,0	13,0	0,93	14,0	11,20	25,0	38,0	25,0	0,80	31,0
5,20	15,0	29,0	15,0	0,67	22,0	11,40	13,0	25,0	13,0	0,60	22,0
5,40	11,0	21,0	11,0	0,73	15,0	11,60	12,0	21,0	12,0	0,40	30,0
5,60	11,0	22,0	11,0	0,87	13,0	11,80	16,0	22,0	16,0	0,60	27,0
5,80	16,0	29,0	16,0	1,13	14,0	12,00	45,0	54,0	45,0	2,13	21,0
6,00	18,0	35,0	18,0	0,93	19,0	12,20	56,0	88,0	56,0	-----	----
6,20	21,0	35,0	21,0	1,40	15,0						

- PENETROMETRO STATICO tipo PAGANI da 10/20t
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s
- punta meccanica tipo Begemann $\varnothing = 35.7$ mm (area punta 10 cm² - apertura 60°)
- manicotto laterale (superficie 150 cm²)

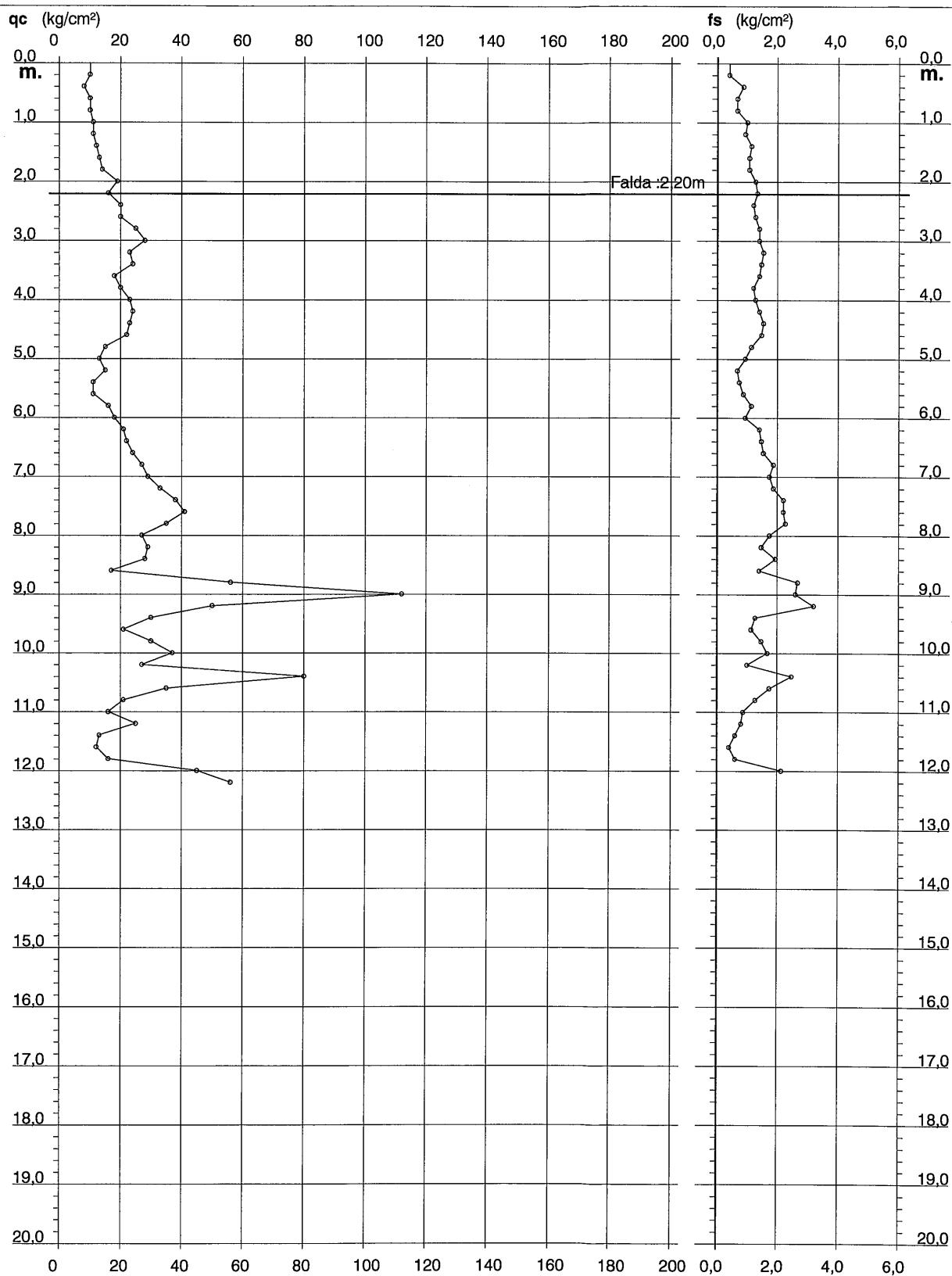
PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 1

2.01PG05-104

- committente : dott.ssa arch. Alessandra Grimandi
- lavoro : Realizzazione piazzale di servizio RENNER
- località : Minerbio-Via Ronchi inferiore
- note : Pareti foro crollate ad estrazione aste:-9.00m

- data : 25/06/2010
- quota inizio : Piano Campagna
- prof. falda : 2,20 m da quota inizio
- scala vert.: 1 : 100



PROVA PENETROMETRICA STATICA **LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

CPT 2

2.01PG05-104

- committente : dott.ssa arch. Alessandra Grimandi
- lavoro : Realizzazione piazzale di servizio RENNER
- località : Minerbio-Via Ronchi inferiore
- note : Installazione micropiezometro:-10.00m

- data : 25/06/2010
- quota inizio : Piano Campagna
- prof. falda : 0,40 m da quota inizio
- pagina : 1

Prof. m	Letture di campagna		qc kg/cm²	fs	qc/fs	Prof. m	Letture di campagna		qc kg/cm²	fs	qc/fs
	punta	laterale					punta	laterale			
0,20	5,0	----	5,0	0,40	12,0	6,20	23,0	37,0	23,0	1,87	12,0
0,40	6,0	12,0	6,0	0,60	10,0	6,40	22,0	50,0	22,0	1,67	13,0
0,60	7,0	16,0	7,0	0,67	10,0	6,60	23,0	48,0	23,0	1,80	13,0
0,80	10,0	20,0	10,0	0,53	19,0	6,80	24,0	51,0	24,0	1,93	12,0
1,00	10,0	18,0	10,0	0,60	17,0	7,00	30,0	59,0	30,0	1,87	16,0
1,20	12,0	21,0	12,0	0,73	16,0	7,20	32,0	60,0	32,0	2,13	15,0
1,40	12,0	23,0	12,0	0,67	18,0	7,40	33,0	65,0	33,0	2,47	13,0
1,60	14,0	24,0	14,0	1,07	13,0	7,60	35,0	72,0	35,0	2,60	13,0
1,80	16,0	32,0	16,0	0,73	22,0	7,80	33,0	72,0	33,0	2,47	13,0
2,00	16,0	27,0	16,0	1,20	13,0	8,00	28,0	65,0	28,0	2,33	12,0
2,20	15,0	33,0	15,0	1,13	13,0	8,20	30,0	65,0	30,0	2,40	12,0
2,40	19,0	36,0	19,0	1,20	16,0	8,40	37,0	73,0	37,0	2,13	17,0
2,60	18,0	36,0	18,0	1,27	14,0	8,60	29,0	61,0	29,0	1,87	16,0
2,80	22,0	41,0	22,0	1,40	16,0	8,80	29,0	57,0	29,0	1,93	15,0
3,00	21,0	42,0	21,0	1,40	15,0	9,00	46,0	75,0	46,0	2,53	18,0
3,20	19,0	40,0	19,0	1,47	13,0	9,20	49,0	87,0	49,0	3,20	15,0
3,40	19,0	41,0	19,0	1,40	14,0	9,40	50,0	98,0	50,0	2,60	19,0
3,60	20,0	41,0	20,0	1,40	14,0	9,60	27,0	66,0	27,0	1,60	17,0
3,80	18,0	39,0	18,0	1,33	13,0	9,80	27,0	51,0	27,0	1,80	15,0
4,00	16,0	36,0	16,0	1,20	13,0	10,00	18,0	45,0	18,0	1,53	12,0
4,20	21,0	39,0	21,0	0,93	22,0	10,20	18,0	41,0	18,0	1,27	14,0
4,40	24,0	38,0	24,0	1,27	19,0	10,40	24,0	43,0	24,0	1,87	13,0
4,60	24,0	43,0	24,0	1,40	17,0	10,60	43,0	71,0	43,0	1,40	31,0
4,80	22,0	43,0	22,0	1,47	15,0	10,80	71,0	92,0	71,0	1,60	44,0
5,00	24,0	46,0	24,0	1,33	18,0	11,00	77,0	101,0	77,0	2,20	35,0
5,20	14,0	34,0	14,0	1,00	14,0	11,20	80,0	113,0	80,0	1,00	80,0
5,40	11,0	26,0	11,0	0,60	18,0	11,40	78,0	93,0	78,0	2,27	34,0
5,60	9,0	18,0	9,0	0,53	17,0	11,60	16,0	50,0	16,0	0,87	18,0
5,80	11,0	19,0	11,0	0,87	13,0	11,80	19,0	32,0	19,0	0,27	71,0
6,00	14,0	27,0	14,0	0,93	15,0	12,00	59,0	63,0	59,0	-----	----

- PENETROMETRO STATICO tipo PAGANI da 10/20t
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s
- punta meccanica tipo Begemann $\varnothing = 35.7$ mm (area punta 10 cm² - apertura 60°)
- manicotto laterale (superficie 150 cm²)

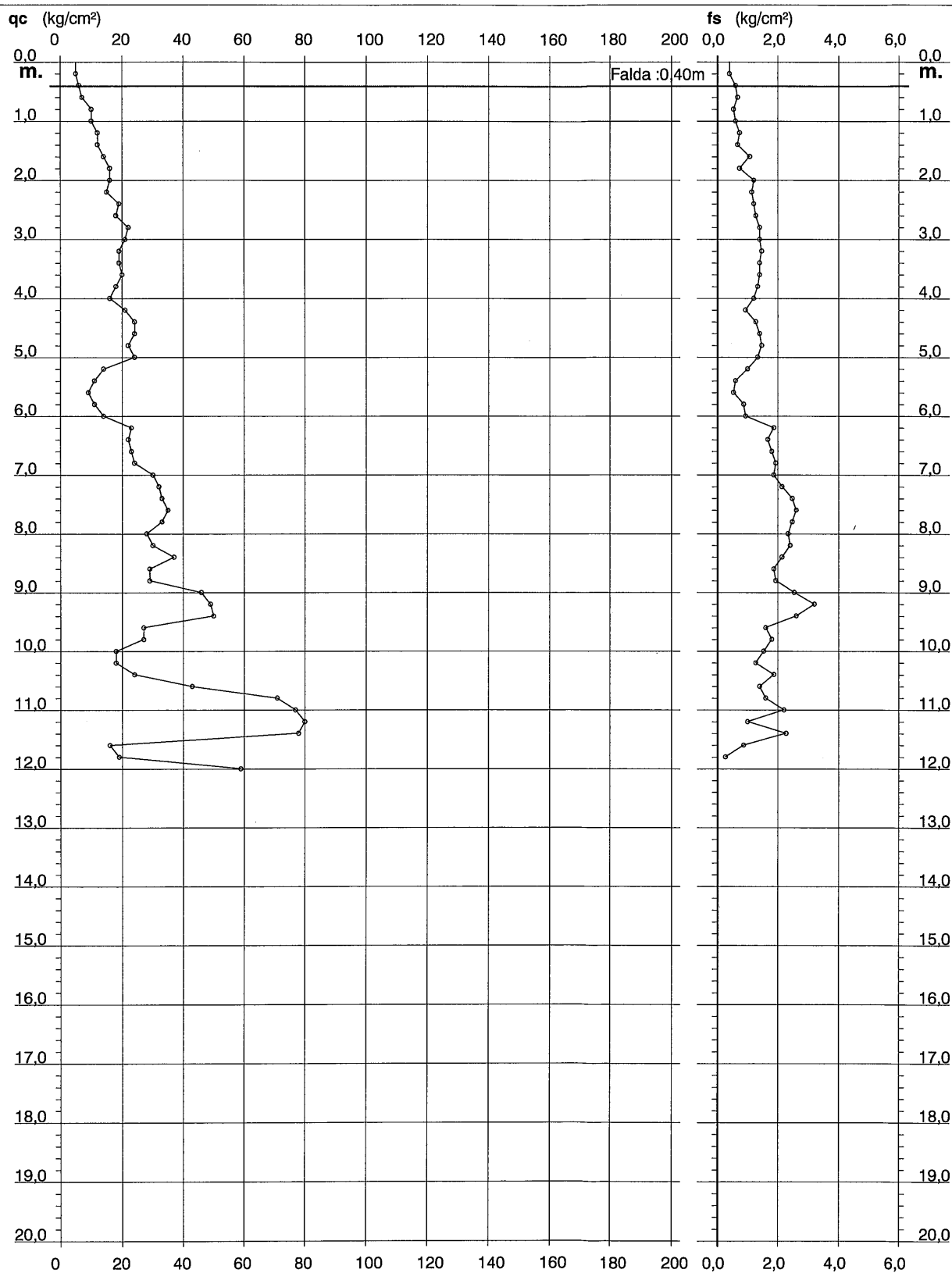
PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 2

2.01PG05-104

- committente : dott.ssa arch. Alessandra Grimandi
- lavoro : Realizzazione piazzale di servizio RENNER
- località : Minerbio-Via Ronchi inferiore
- note : Installazione micropiezometro:-10.00m

- data : 25/06/2010
- quota inizio : Piano Campagna
- prof. falda : 0,40 m da quota inizio
- scala vert.: 1 : 100



PROVA PENETROMETRICA STATICA **LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

CPT 3

2.01PG05-104

- committente :	dott.ssa arch. Alessandra Grimandi	- data :	25/06/2010
- lavoro :	Realizzazione piazzale di servizio RENNER	- quota inizio :	Piano Campagna
- località :	Minerbio-Via Ronchi inferiore	- prof. falda :	0,60 m da quota inizio
- note :	Pareti foro crollate ad estrazione aste:-1.20m	- pagina :	1

Prof. m	Letture di campagna		qc	fs	qc/fs	Prof. m	Letture di campagna		qc	fs	qc/fs
	punta	laterale	kg/cm²				punta	laterale	kg/cm²		
0,20	2,0	----	2,0	0,20	10,0	6,60	26,0	57,0	26,0	1,87	14,0
0,40	5,0	8,0	5,0	0,33	15,0	6,80	30,0	58,0	30,0	2,13	14,0
0,60	5,0	10,0	5,0	0,53	9,0	7,00	30,0	62,0	30,0	2,33	13,0
0,80	4,0	12,0	4,0	0,47	9,0	7,20	33,0	68,0	33,0	2,47	13,0
1,00	4,0	11,0	4,0	0,40	10,0	7,40	38,0	75,0	38,0	2,80	14,0
1,20	6,0	12,0	6,0	0,47	13,0	7,60	40,0	82,0	40,0	2,93	14,0
1,40	7,0	14,0	7,0	0,67	10,0	7,80	36,0	80,0	36,0	3,07	12,0
1,60	9,0	19,0	9,0	0,67	13,0	8,00	28,0	74,0	28,0	2,60	11,0
1,80	11,0	21,0	11,0	0,47	24,0	8,20	31,0	70,0	31,0	2,33	13,0
2,00	13,0	20,0	13,0	0,80	16,0	8,40	42,0	77,0	42,0	2,40	17,0
2,20	12,0	24,0	12,0	0,73	16,0	8,60	36,0	72,0	36,0	3,07	12,0
2,40	13,0	24,0	13,0	0,73	18,0	8,80	60,0	106,0	60,0	4,47	13,0
2,60	15,0	26,0	15,0	0,93	16,0	9,00	65,0	132,0	65,0	3,07	21,0
2,80	16,0	30,0	16,0	1,07	15,0	9,20	98,0	144,0	98,0	1,93	51,0
3,00	21,0	37,0	21,0	1,13	19,0	9,40	72,0	101,0	72,0	5,60	13,0
3,20	21,0	38,0	21,0	1,27	17,0	9,60	33,0	117,0	33,0	2,07	16,0
3,40	19,0	38,0	19,0	1,13	17,0	9,80	23,0	54,0	23,0	2,27	10,0
3,60	18,0	35,0	18,0	1,20	15,0	10,00	21,0	55,0	21,0	2,13	10,0
3,80	18,0	36,0	18,0	1,33	13,0	10,20	28,0	60,0	28,0	2,53	11,0
4,00	14,0	34,0	14,0	1,07	13,0	10,40	31,0	69,0	31,0	2,40	13,0
4,20	22,0	38,0	22,0	1,60	14,0	10,60	25,0	61,0	25,0	1,53	16,0
4,40	27,0	51,0	27,0	1,67	16,0	10,80	38,0	61,0	38,0	4,87	8,0
4,60	29,0	54,0	29,0	1,80	16,0	11,00	66,0	139,0	66,0	1,27	52,0
4,80	26,0	53,0	26,0	1,73	15,0	11,20	93,0	112,0	93,0	4,20	22,0
5,00	25,0	51,0	25,0	1,80	14,0	11,40	114,0	177,0	114,0	2,67	43,0
5,20	13,0	40,0	13,0	1,07	12,0	11,60	134,0	174,0	134,0	3,47	39,0
5,40	12,0	28,0	12,0	0,93	13,0	11,80	57,0	109,0	57,0	3,13	18,0
5,60	12,0	26,0	12,0	0,87	14,0	12,00	86,0	133,0	86,0	2,53	34,0
5,80	15,0	28,0	15,0	0,93	16,0	12,20	158,0	196,0	158,0	2,13	74,0
6,00	16,0	30,0	16,0	1,00	16,0	12,40	136,0	168,0	136,0	2,80	49,0
6,20	16,0	31,0	16,0	1,13	14,0	12,60	23,0	65,0	23,0	-----	----
6,40	23,0	40,0	23,0	2,07	11,0						

- PENETROMETRO STATICO tipo PAGANI da 10/20t
- COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s
- punta meccanica tipo Begemann Ø = 35.7 mm (area punta 10 cm² - apertura 60°)
- manicotto laterale (superficie 150 cm²)

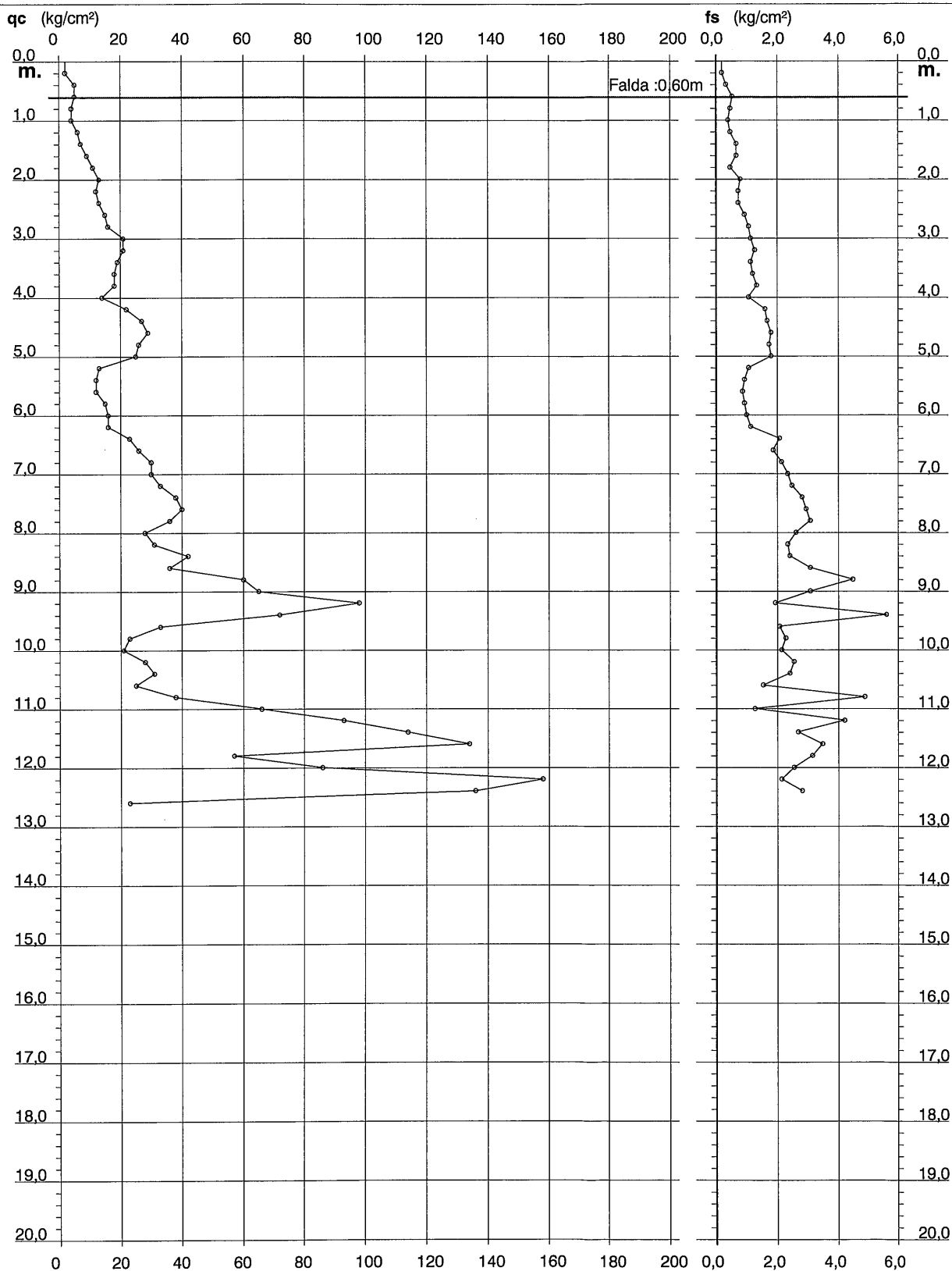
PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 3

2.01PG05-104

- committente : dott.ssa arch. Alessandra Grimandi
- lavoro : Realizzazione piazzale di servizio RENNER
- località : Minerbio-Via Ronchi inferiore
- note : Pareti foro crollate ad estrazione aste:-1.20m

- data : 25/06/2010
- quota inizio : Piano Campagna
- prof. falda : 0,60 m da quota inizio
- scala vert.: 1 : 100



PROVA PENETROMETRICA STATICA**CPT 4****LETTURE DI CAMPAGNA / VALORI DI RESISTENZA**

2.01PG05-101

- committente : RENNER Spa
 - lavoro : PSC
 - località : Minerbio-Via Ronchi Inferiore
 - note :

- data : 18/12/2017
 - quota inizio : Piano Campagna
 - prof. falda : 0,60 m da quota inizio
 - pagina : 1

Prof. m	Letture di campagna		qc kg/cm ²	fs	qc/fs	Prof. m	Letture di campagna		qc kg/cm ²	fs	qc/fs
	punta	laterale					punta	laterale			
0,20	12,0	23,0	12,0	1,27	9,0	10,20	50,0	87,0	50,0	1,53	33,0
0,40	8,0	27,0	8,0	1,20	7,0	10,40	36,0	59,0	36,0	2,20	16,0
0,60	9,0	27,0	9,0	1,20	7,0	10,60	21,0	54,0	21,0	1,27	17,0
0,80	12,0	30,0	12,0	1,07	11,0	10,80	20,0	39,0	20,0	1,07	19,0
1,00	13,0	29,0	13,0	0,87	15,0	11,00	14,0	30,0	14,0	0,53	26,0
1,20	12,0	25,0	12,0	0,93	13,0	11,20	23,0	31,0	23,0	1,73	13,0
1,40	13,0	27,0	13,0	1,13	11,0	11,40	11,0	37,0	11,0	0,80	14,0
1,60	15,0	32,0	15,0	0,93	16,0	11,60	47,0	59,0	47,0	1,13	41,0
1,80	16,0	30,0	16,0	1,27	13,0	11,80	24,0	41,0	24,0	1,47	16,0
2,00	18,0	37,0	18,0	1,20	15,0	12,00	17,0	39,0	17,0	1,33	13,0
2,20	15,0	33,0	15,0	1,53	10,0	12,20	13,0	33,0	13,0	0,87	15,0
2,40	18,0	41,0	18,0	1,47	12,0	12,40	11,0	24,0	11,0	0,67	16,0
2,60	20,0	42,0	20,0	1,47	14,0	12,60	13,0	23,0	13,0	0,93	14,0
2,80	25,0	47,0	25,0	1,73	14,0	12,80	11,0	25,0	11,0	0,67	16,0
3,00	21,0	47,0	21,0	1,60	13,0	13,00	13,0	23,0	13,0	1,00	13,0
3,20	19,0	43,0	19,0	1,53	12,0	13,20	12,0	27,0	12,0	0,93	13,0
3,40	18,0	41,0	18,0	1,40	13,0	13,40	10,0	24,0	10,0	0,87	12,0
3,60	20,0	41,0	20,0	1,47	14,0	13,60	13,0	26,0	13,0	0,93	14,0
3,80	16,0	38,0	16,0	1,40	11,0	13,80	14,0	28,0	14,0	1,07	13,0
4,00	22,0	43,0	22,0	1,60	14,0	14,00	16,0	32,0	16,0	0,93	17,0
4,20	23,0	47,0	23,0	1,93	12,0	14,20	17,0	31,0	17,0	1,20	14,0
4,40	23,0	52,0	23,0	1,93	12,0	14,40	13,0	31,0	13,0	0,87	15,0
4,60	20,0	49,0	20,0	1,93	10,0	14,60	10,0	23,0	10,0	0,87	12,0
4,80	22,0	51,0	22,0	1,80	12,0	14,80	11,0	24,0	11,0	0,80	14,0
5,00	15,0	42,0	15,0	1,13	13,0	15,00	10,0	22,0	10,0	0,67	15,0
5,20	14,0	31,0	14,0	0,87	16,0	15,20	11,0	21,0	11,0	1,00	11,0
5,40	12,0	25,0	12,0	0,67	18,0	15,40	18,0	33,0	18,0	1,27	14,0
5,60	15,0	25,0	15,0	0,73	20,0	15,60	69,0	88,0	69,0	1,80	38,0
5,80	13,0	24,0	13,0	0,67	19,0	15,80	24,0	51,0	24,0	1,40	17,0
6,00	16,0	26,0	16,0	1,00	16,0	16,00	26,0	47,0	26,0	0,80	32,0
6,20	19,0	34,0	19,0	1,40	14,0	16,20	82,0	94,0	82,0	2,47	33,0
6,40	21,0	42,0	21,0	1,67	13,0	16,40	16,0	53,0	16,0	1,20	13,0
6,60	25,0	50,0	25,0	1,73	14,0	16,60	21,0	39,0	21,0	1,80	12,0
6,80	28,0	54,0	28,0	2,07	14,0	16,80	157,0	184,0	157,0	2,27	69,0
7,00	34,0	65,0	34,0	2,27	15,0	17,00	149,0	183,0	149,0	2,27	66,0
7,20	36,0	70,0	36,0	2,47	15,0	17,20	139,0	173,0	139,0	2,73	51,0
7,40	38,0	75,0	38,0	2,47	15,0	17,40	139,0	180,0	139,0	2,87	48,0
7,60	32,0	69,0	32,0	2,67	12,0	17,60	174,0	217,0	174,0	2,13	82,0
7,80	26,0	66,0	26,0	2,13	12,0	17,80	56,0	88,0	56,0	2,40	23,0
8,00	25,0	57,0	25,0	2,07	12,0	18,00	14,0	50,0	14,0	0,93	15,0
8,20	33,0	64,0	33,0	2,40	14,0	18,20	17,0	31,0	17,0	1,00	17,0
8,40	29,0	65,0	29,0	2,07	14,0	18,40	23,0	38,0	23,0	1,20	19,0
8,60	27,0	58,0	27,0	1,40	19,0	18,60	24,0	42,0	24,0	1,07	22,0
8,80	35,0	56,0	35,0	2,13	16,0	18,80	13,0	29,0	13,0	0,87	15,0
9,00	30,0	62,0	30,0	1,40	21,0	19,00	18,0	31,0	18,0	1,27	14,0
9,20	40,0	61,0	40,0	2,00	20,0	19,20	15,0	34,0	15,0	1,20	12,0
9,40	25,0	55,0	25,0	2,00	12,0	19,40	17,0	35,0	17,0	1,07	16,0
9,60	17,0	47,0	17,0	1,33	13,0	19,60	20,0	36,0	20,0	1,40	14,0
9,80	30,0	50,0	30,0	1,93	16,0	19,80	21,0	42,0	21,0	1,20	17,0
10,00	38,0	67,0	38,0	2,47	15,0	20,00	21,0	39,0	21,0	1,33	16,0

- PENETROMETRO STATICO tipo PAGANI da 10/20t
 - COSTANTE DI TRASFORMAZIONE Ct = 10 - Velocità Avanzamento punta 2 cm/s
 - punta meccanica tipo Begemann $\phi = 35.7$ mm (area punta 10 cm² - apertura 60°)
 - manicotto laterale (superficie 150 cm²)

**PROVA PENETROMETRICA STATICA
DIAGRAMMA DI RESISTENZA****CPT 4**

2.01PG05-101

- committente : RENNER Spa
- lavoro : PSC
- località : Minerbio-Via Ronchi Inferiore

- data : 18/12/2017
- quota inizio : Piano Campagna
- prof. falda : 0,60 m da quota inizio
- scala vert.: 1 : 150

