

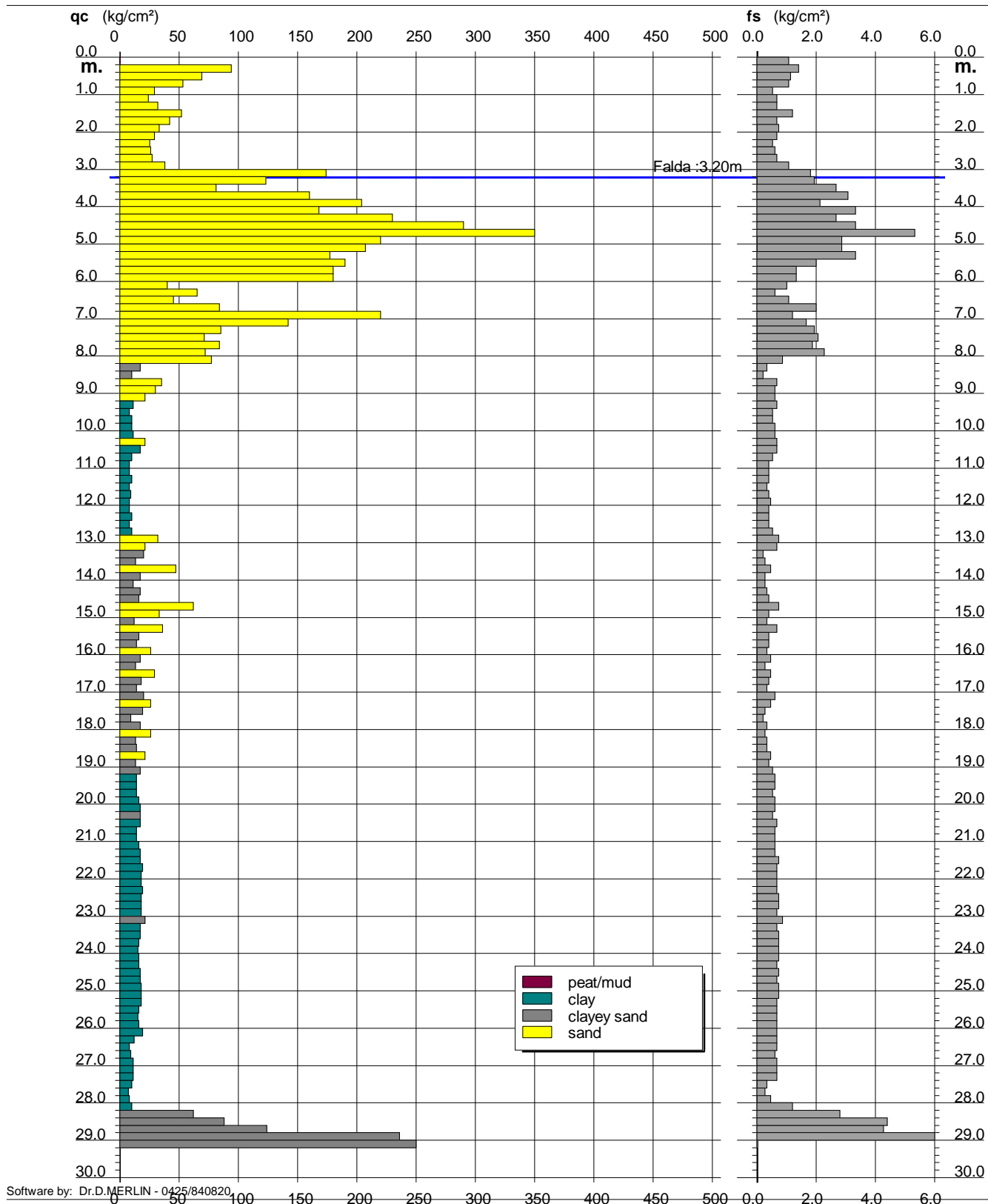
PROVA PENETROMETRICA STATICA DIAGRAMMA DI RESISTENZA

CPT 1VOT

2.01PG05-072

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrausanas piestātne
- località : 27.piestātne Ventspils brīvosta
- note : Ligums Nr.341JP092005_2005.g.20.09.

- data : 27.09.2005
- quota inizio : abs.atzime: +3.5 m
- prof. falda : 3.20 m da quota inizio
- scala vert.: 1 : 150



LEGENDA VALORI DI RESISTENZA

Strumento utilizzato:

PENETROMETRO STATICO OLANDESE tipo GOUDA (tipo meccanico).

Caratteristiche:

- punta conica meccanica \varnothing 35.7 mm, angolo di apertura $\alpha = 60^\circ$ - (area punta $A_p = 10 \text{ cm}^2$)
- manicotto laterale di attrito tipo 'Begemann' (\varnothing 35.7 mm - h 133 mm - sup. lat. Am. = 150 cm^2)
- velocità di avanzamento costante $V = 2 \text{ cm / sec}$ ($\pm 0,5 \text{ cm / sec}$)
- spinta max nominale dello strumento S_{max} variabile a seconda del tipo
- costante di trasformazione (lett. \Rightarrow Spinta) $C_t = \text{SPINTA (Kg)} / \text{LETTURA DI CAMPAGNA}$

fase 1 - resistenza alla punta $q_c \text{ (Kg / cm}^2\text{)} = \text{(L. punta) } C_t / 10$

fase 2 - resistenza laterale locale $f_s \text{ (Kg / cm}^2\text{)} = [(\text{L. laterale}) - (\text{L. punta})] C_t / 150$

fase 3 - resistenza totale $R_t \text{ (Kg)} = \text{(L. totale) } C_t$

$q_c / f_s = \text{'rapporto Begemann'}$

- L. punta = lettura di campagna durante l' infissione della sola punta (fase 1)
- L. laterale = lettura di campagna relativa all'infissione di punta e manicotto (fase 2)
- L. totale = lettura di campagna relativa all'infissione delle aste esterne (fase 3)

N.B. : la spinta $S \text{ (Kg)}$, corrispondente a ciascuna fase , si ottiene moltiplicando la corrispondente lettura di campagna L per la costante di trasformazione C_t .

N.B. : causa la distanza intercorrente (20 cm circa) fra il manicotto laterale e la punta conica del penetrometro , la resistenza laterale locale f_s viene computata 20 cm sopra la punta .

CONVERSIONI

$1 \text{ kN (kiloNewton)} = 1000 \text{ N} \approx 100 \text{ kg} = 0,1 \text{ t}$ - $1 \text{ MN (megaNewton)} = 1000 \text{ kN} = 1000000 \text{ N} \approx 100 \text{ t}$

$1 \text{ kPa (kiloPascal)} = 1 \text{ kN/m}^2 = 0,001 \text{ MN/m}^2 = 0,001 \text{ MPa} \approx 0,1 \text{ t/m}^2 = 0,01 \text{ kg/cm}^2$

$1 \text{ MPa (MegaPascal)} = 1 \text{ MN/m}^2 = 1000 \text{ kN/m}^2 = 1000 \text{ kPa} \approx 100 \text{ t/m}^2 = 10 \text{ kg/cm}^2$

$\text{kg/cm}^2 = 10 \text{ t/m}^2 \approx 100 \text{ kN/m}^2 = 100 \text{ kPa} = 0,1 \text{ MN/m}^2 = 0,1 \text{ Mpa}$

$1 \text{ t} = 1000 \text{ kg} \approx 10 \text{ kN}$

PROVA PENETROMETRICA STATICA

LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

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- 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	----	----	--	1.07	----	10.20	11.0	20.0	11.0	0.60	18.0
0.40	94.0	110.0	94.0	1.40	67.0	10.40	21.0	30.0	21.0	0.67	31.0
0.60	69.0	90.0	69.0	1.13	61.0	10.60	17.0	27.0	17.0	0.67	25.0
0.80	53.0	70.0	53.0	1.07	50.0	10.80	10.0	20.0	10.0	0.53	19.0
1.00	29.0	45.0	29.0	0.53	54.0	11.00	8.0	16.0	8.0	0.40	20.0
1.20	24.0	32.0	24.0	0.67	36.0	11.20	8.0	14.0	8.0	0.40	20.0
1.40	32.0	42.0	32.0	0.67	48.0	11.40	10.0	16.0	10.0	0.40	25.0
1.60	52.0	62.0	52.0	1.20	43.0	11.60	8.0	14.0	8.0	0.33	24.0
1.80	42.0	60.0	42.0	0.67	63.0	11.80	9.0	14.0	9.0	0.40	22.0
2.00	33.0	43.0	33.0	0.73	45.0	12.00	8.0	14.0	8.0	0.47	17.0
2.20	29.0	40.0	29.0	0.67	43.0	12.20	8.0	15.0	8.0	0.40	20.0
2.40	25.0	35.0	25.0	0.53	47.0	12.40	10.0	16.0	10.0	0.40	25.0
2.60	26.0	34.0	26.0	0.60	43.0	12.60	8.0	14.0	8.0	0.40	20.0
2.80	27.0	36.0	27.0	0.67	40.0	12.80	10.0	16.0	10.0	0.53	19.0
3.00	38.0	48.0	38.0	1.07	36.0	13.00	32.0	40.0	32.0	0.73	44.0
3.20	174.0	190.0	174.0	1.80	97.0	13.20	21.0	32.0	21.0	0.67	31.0
3.40	123.0	150.0	123.0	1.93	64.0	13.40	20.0	30.0	20.0	0.20	100.0
3.60	81.0	110.0	81.0	2.67	30.0	13.60	13.0	16.0	13.0	0.27	49.0
3.80	160.0	200.0	160.0	3.07	52.0	13.80	47.0	51.0	47.0	0.47	101.0
4.00	204.0	250.0	204.0	2.13	96.0	14.00	17.0	24.0	17.0	0.27	64.0
4.20	168.0	200.0	168.0	3.33	50.0	14.20	11.0	15.0	11.0	0.27	41.0
4.40	230.0	280.0	230.0	2.67	86.0	14.40	17.0	21.0	17.0	0.33	51.0
4.60	290.0	330.0	290.0	3.33	87.0	14.60	16.0	21.0	16.0	0.40	40.0
4.80	350.0	400.0	350.0	5.33	66.0	14.80	62.0	68.0	62.0	0.73	85.0
5.00	220.0	300.0	220.0	2.87	77.0	15.00	33.0	44.0	33.0	0.40	82.0
5.20	207.0	250.0	207.0	2.87	72.0	15.20	12.0	18.0	12.0	0.33	36.0
5.40	177.0	220.0	177.0	3.33	53.0	15.40	36.0	41.0	36.0	0.67	54.0
5.60	190.0	240.0	190.0	2.00	95.0	15.60	16.0	26.0	16.0	0.40	40.0
5.80	180.0	210.0	180.0	1.33	135.0	15.80	14.0	20.0	14.0	0.40	35.0
6.00	180.0	200.0	180.0	1.33	135.0	16.00	26.0	32.0	26.0	0.33	78.0
6.20	40.0	60.0	40.0	1.00	40.0	16.20	17.0	22.0	17.0	0.47	36.0
6.40	65.0	80.0	65.0	0.60	108.0	16.40	13.0	20.0	13.0	0.27	49.0
6.60	45.0	54.0	45.0	1.07	42.0	16.60	29.0	33.0	29.0	0.47	62.0
6.80	84.0	100.0	84.0	2.00	42.0	16.80	18.0	25.0	18.0	0.40	45.0
7.00	220.0	250.0	220.0	1.20	183.0	17.00	14.0	20.0	14.0	0.33	42.0
7.20	142.0	160.0	142.0	1.67	85.0	17.20	20.0	25.0	20.0	0.60	33.0
7.40	85.0	110.0	85.0	1.93	44.0	17.40	26.0	35.0	26.0	0.47	56.0
7.60	71.0	100.0	71.0	2.07	34.0	17.60	19.0	26.0	19.0	0.27	71.0
7.80	84.0	115.0	84.0	1.87	45.0	17.80	9.0	13.0	9.0	0.20	45.0
8.00	72.0	100.0	72.0	2.27	32.0	18.00	17.0	20.0	17.0	0.33	51.0
8.20	77.0	111.0	77.0	0.87	89.0	18.20	26.0	31.0	26.0	0.27	97.0
8.40	17.0	30.0	17.0	0.33	51.0	18.40	13.0	17.0	13.0	0.33	39.0
8.60	10.0	15.0	10.0	0.20	50.0	18.60	14.0	19.0	14.0	0.33	42.0
8.80	35.0	38.0	35.0	0.67	52.0	18.80	21.0	26.0	21.0	0.47	45.0
9.00	30.0	40.0	30.0	0.60	50.0	19.00	13.0	20.0	13.0	0.40	32.0
9.20	21.0	30.0	21.0	0.60	35.0	19.20	17.0	23.0	17.0	0.53	32.0
9.40	11.0	20.0	11.0	0.67	16.0	19.40	14.0	22.0	14.0	0.60	23.0
9.60	8.0	18.0	8.0	0.53	15.0	19.60	14.0	23.0	14.0	0.60	23.0
9.80	10.0	18.0	10.0	0.53	19.0	19.80	14.0	23.0	14.0	0.53	26.0
10.00	10.0	18.0	10.0	0.60	17.0	20.00	16.0	24.0	16.0	0.60	27.0

- 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)

Software by: Dr.D.MERLIN - 0425/840820

PROVA PENETROMETRICA STATICA LETTURE DI CAMPAGNA / VALORI DI RESISTENZA

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- pagina : 2

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			
20.20	17.0	26.0	17.0	0.60	28.0	24.80	17.0	28.0	17.0	0.67	25.0
20.40	17.0	26.0	17.0	0.53	32.0	25.00	18.0	28.0	18.0	0.73	25.0
20.60	17.0	25.0	17.0	0.67	25.0	25.20	18.0	29.0	18.0	0.73	25.0
20.80	14.0	24.0	14.0	0.60	23.0	25.40	18.0	29.0	18.0	0.67	27.0
21.00	14.0	23.0	14.0	0.60	23.0	25.60	16.0	26.0	16.0	0.67	24.0
21.20	16.0	25.0	16.0	0.60	27.0	25.80	15.0	25.0	15.0	0.67	22.0
21.40	17.0	26.0	17.0	0.60	28.0	26.00	16.0	26.0	16.0	0.67	24.0
21.60	17.0	26.0	17.0	0.73	23.0	26.20	19.0	29.0	19.0	0.67	28.0
21.80	19.0	30.0	19.0	0.67	28.0	26.40	12.0	22.0	12.0	0.67	18.0
22.00	18.0	28.0	18.0	0.67	27.0	26.60	8.0	18.0	8.0	0.67	12.0
22.20	18.0	28.0	18.0	0.67	27.0	26.80	9.0	19.0	9.0	0.60	15.0
22.40	19.0	29.0	19.0	0.67	28.0	27.00	11.0	20.0	11.0	0.67	16.0
22.60	18.0	28.0	18.0	0.73	25.0	27.20	11.0	21.0	11.0	0.67	16.0
22.80	18.0	29.0	18.0	0.73	25.0	27.40	11.0	21.0	11.0	0.67	16.0
23.00	18.0	29.0	18.0	0.67	27.0	27.60	10.0	20.0	10.0	0.33	30.0
23.20	21.0	31.0	21.0	0.87	24.0	27.80	7.0	12.0	7.0	0.27	26.0
23.40	17.0	30.0	17.0	0.67	25.0	28.00	8.0	12.0	8.0	0.47	17.0
23.60	17.0	27.0	17.0	0.73	23.0	28.20	10.0	17.0	10.0	1.20	8.0
23.80	16.0	27.0	16.0	0.73	22.0	28.40	62.0	80.0	62.0	2.80	22.0
24.00	15.0	26.0	15.0	0.73	20.0	28.60	88.0	130.0	88.0	4.40	20.0
24.20	16.0	27.0	16.0	0.73	22.0	28.80	124.0	190.0	124.0	4.27	29.0
24.40	16.0	27.0	16.0	0.67	24.0	29.00	236.0	300.0	236.0	8.00	30.0
24.60	17.0	27.0	17.0	0.73	23.0	29.20	250.0	370.0	250.0	-----	----

- 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)

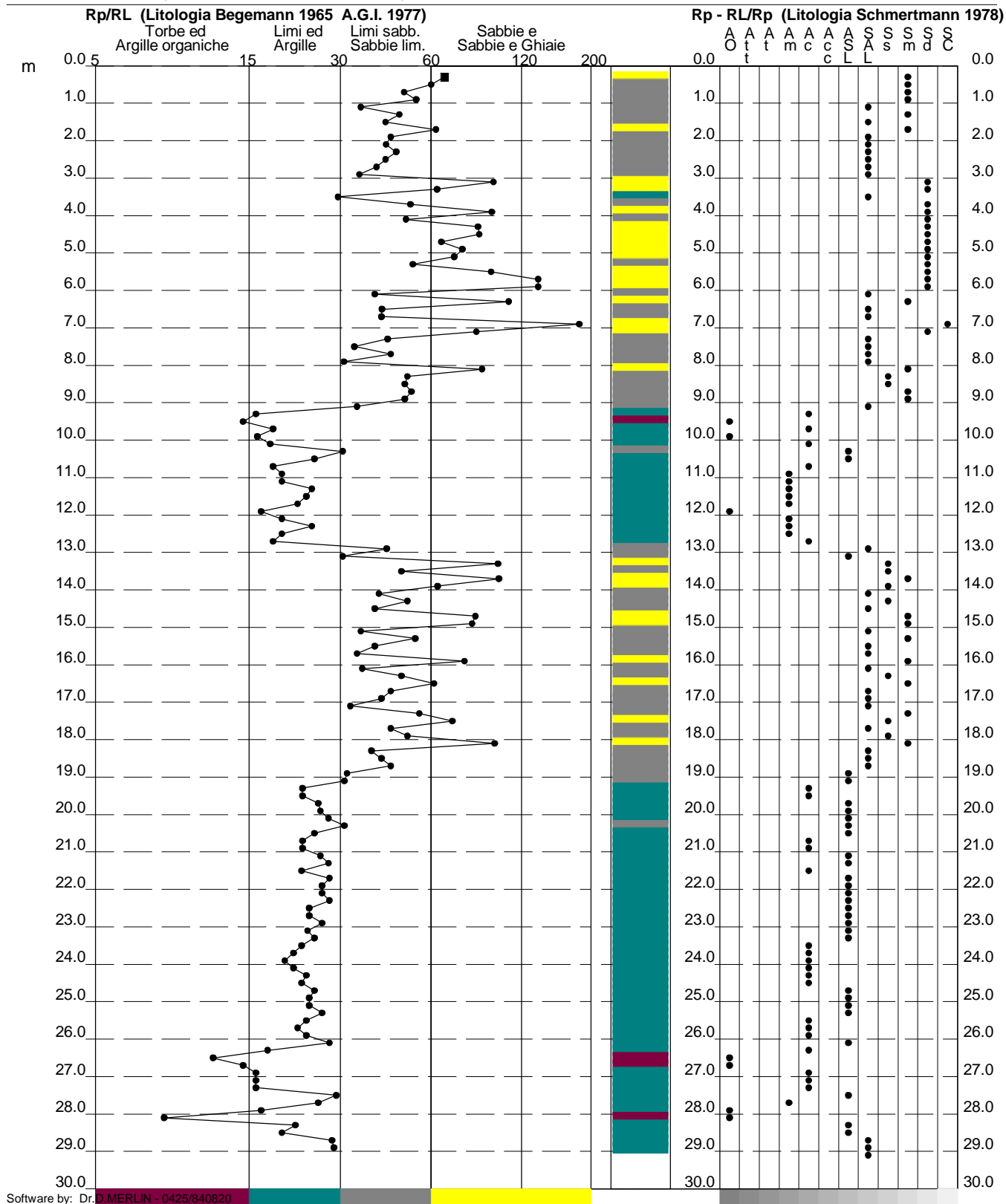
Software by: Dr.D.MERLIN - 0425/840820

PROVA PENETROMETRICA STATICA VALUTAZIONI LITOLOGICHE

2.01PG05-072

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LEGENDA VALUTAZIONI LITOLOGICHE

Valutazioni in base al rapporto: **$F = (q_c / f_s)$**

(Begemann 1965 - Raccomandazioni A.G.I. 1977)

valide in via approssimata per terreni immersi in falda :

$F = q_c / f_s$	NATURA LITOLOGICA	PROPRIETA'
$F < 15$	TORBE ED ARGILLE ORGANICHE	COESIVE
$15 < F \leq 30$	LIMI ED ARGILLE	COESIVE
$30 < F \leq 60$	LIMI SABBIOSI E SABBIE LIMOSE	GRANULARI
$F > 60$	SABBIE E SABBIE CON GHIAIA	GRANULARI

Vengono inoltre riportate le valutazioni stratigrafiche fornite da Schmertmann (1978), ricavabili in base ai valori di q_c e di $FR = (f_s / q_c) \% :$

- AO = argilla organica e terreni misti
- Att = argilla (inorganica) molto tenera
- At = argilla (inorganica) tenera
- Am = argilla (inorganica) di media consistenza
- Ac = argilla (inorganica) consistente
- Acc = argilla (inorganica) molto consistente
- ASL = argilla sabbiosa e limosa
- SAL = sabbia e limo / sabbia e limo argilloso
- Ss = sabbia sciolta
- Sm = sabbia mediamente addensata
- Sd = sabbia densa o cementata
- SC = sabbia con molti fossili, calcareniti

Secondo Schmertmann il valore della resistenza laterale da usarsi, dovrebbe essere pari a:

- $1/3 \pm 1/2$ di quello misurato , per depositi sabbiosi
- quello misurato (inalterato) , per depositi coesivi.

PROVA PENETROMETRICA STATICA TABELLA PARAMETRI GEOTECNICI

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NATURA COESIVA											NATURA GRANULARE										
Prof. m	qc kg/cm²	qc/fs (-)	Natura Litol.	Y' t/m³	d'vo kg/cm²	Cu kg/cm²	OCR (-)	Eu50 kg/cm²	Eu25 kg/cm²	Mo kg/cm²	Dr %	ø1s (°)	ø2s (°)	ø3s (°)	ø4s (°)	ødm (°)	ømy (°)	Amax/g (-)	E'50 kg/cm²	E'25 kg/cm²	Mo kg/cm²
0.20	--	--	???	1.85	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
0.40	94	67	3:00	1.85	0.07	--	--	--	--	--	100	42	43	45	46	45	34	0.258	157	235	282
0.60	69	61	3:00	1.85	0.11	--	--	--	--	--	100	42	43	45	46	45	32	0.258	115	173	207
0.80	53	50	3:00	1.85	0.15	--	--	--	--	--	97	42	43	44	46	43	31	0.247	88	133	159
1.00	29	54	3:00	1.85	0.19	--	--	--	--	--	71	38	40	42	44	39	29	0.161	48	73	87
1.20	24	36	3:00	1.85	0.22	--	--	--	--	--	60	36	38	41	43	37	28	0.130	40	60	72
1.40	32	48	3:00	1.85	0.26	--	--	--	--	--	66	37	39	41	43	38	29	0.147	53	80	96
1.60	52	43	3:00	1.85	0.30	--	--	--	--	--	79	39	41	43	44	40	31	0.187	87	130	156
1.80	42	63	3:00	1.85	0.33	--	--	--	--	--	69	38	40	41	44	38	30	0.156	70	105	126
2.00	33	45	3:00	1.85	0.37	--	--	--	--	--	58	36	38	40	43	36	29	0.125	55	83	99
2.20	29	43	3:00	1.85	0.41	--	--	--	--	--	51	35	37	40	42	35	29	0.108	48	73	87
2.40	25	47	3:00	1.85	0.44	--	--	--	--	--	44	34	37	39	42	34	28	0.090	42	63	75
2.60	26	43	3:00	1.85	0.48	--	--	--	--	--	44	34	36	39	41	34	28	0.088	43	65	78
2.80	27	40	3:00	1.85	0.52	--	--	--	--	--	43	34	36	39	41	33	28	0.087	45	68	81
3.00	38	36	3:00	1.85	0.55	--	--	--	--	--	53	35	38	40	42	35	30	0.112	63	95	114
3.20	174	97	3:00	1.11	0.58	--	--	--	--	--	100	42	43	45	46	42	37	0.258	290	435	522
3.40	123	64	3:00	1.03	0.60	--	--	--	--	--	92	41	42	44	45	40	35	0.229	205	308	369
3.60	81	30	4:00	1.03	0.62	2.70	39.6	459	689	243	76	39	40	42	44	38	33	0.179	135	203	243
3.80	160	52	3:00	1.09	0.64	--	--	--	--	--	99	42	43	45	46	41	36	0.255	267	400	480
4.00	204	96	3:00	1.15	0.66	--	--	--	--	--	100	42	43	45	46	42	38	0.258	340	510	612
4.20	168	50	3:00	1.10	0.69	--	--	--	--	--	99	42	43	45	46	41	37	0.255	280	420	504
4.40	230	86	3:00	1.15	0.71	--	--	--	--	--	100	42	43	45	46	42	39	0.258	383	575	690
4.60	290	87	3:00	1.15	0.73	--	--	--	--	--	100	42	43	45	46	43	40	0.258	483	725	870
4.80	350	66	3:00	1.15	0.75	--	--	--	--	--	100	42	43	45	46	44	40	0.258	583	875	1050
5.00	220	77	3:00	1.15	0.78	--	--	--	--	--	100	42	43	45	46	42	38	0.258	367	550	660
5.20	207	72	3:00	1.15	0.80	--	--	--	--	--	100	42	43	45	46	41	38	0.258	345	518	621
5.40	177	53	3:00	1.12	0.82	--	--	--	--	--	96	41	43	44	46	40	37	0.245	295	443	531
5.60	190	95	3:00	1.14	0.85	--	--	--	--	--	98	42	43	44	46	41	37	0.252	317	475	570
5.80	180	135	3:00	1.12	0.87	--	--	--	--	--	96	41	43	44	46	40	37	0.243	300	450	540
6.00	180	135	3:00	1.12	0.89	--	--	--	--	--	95	41	43	44	46	40	37	0.241	300	450	540
6.20	40	40	3:00	0.90	0.91	--	--	--	--	--	43	34	36	39	41	32	30	0.086	67	100	120
6.40	65	108	3:00	0.94	0.93	--	--	--	--	--	59	36	38	40	43	35	32	0.128	108	163	195
6.60	45	42	3:00	0.91	0.95	--	--	--	--	--	46	34	37	39	42	33	31	0.094	75	113	135
6.80	84	42	3:00	0.97	0.96	--	--	--	--	--	67	37	39	41	43	36	33	0.150	140	210	252
7.00	220	183	3:00	1.15	0.99	--	--	--	--	--	99	42	43	45	46	41	38	0.256	367	550	660
7.20	142	85	3:00	1.06	1.01	--	--	--	--	--	84	40	41	43	45	39	36	0.202	237	355	426
7.40	85	44	3:00	0.98	1.03	--	--	--	--	--	66	37	39	41	43	36	33	0.147	142	213	255
7.60	71	34	3:00	0.95	1.05	--	--	--	--	--	59	36	38	40	43	35	32	0.128	118	178	213
7.80	84	45	3:00	0.97	1.07	--	--	--	--	--	64	37	39	41	43	36	33	0.143	140	210	252
8.00	72	32	3:00	0.95	1.09	--	--	--	--	--	59	36	38	40	43	35	32	0.127	120	180	216
8.20	77	89	3:00	0.96	1.11	--	--	--	--	--	61	36	39	41	43	35	33	0.132	128	193	231
8.40	17	51	4:00	0.91	1.12	0.72	3.6	317	476	54	8	29	32	35	39	26	27	0.018	28	43	51
8.60	10	50	4:00	0.86	1.14	0.50	2.2	273	410	40	--	28	31	35	38	25	26	--	17	25	30
8.80	35	52	3:00	0.89	1.16	--	--	--	--	--	32	33	35	38	41	30	29	0.063	58	88	105
9.00	30	50	3:00	0.88	1.18	--	--	--	--	--	27	32	34	37	40	29	29	0.051	50	75	90
9.20	21	35	3:00	0.85	1.19	--	--	--	--	--	14	30	33	36	39	27	27	0.027	35	53	63
9.40	11	16	2:00	0.91	1.21	0.54	2.3	292	438	42	--	--	--	--	--	--	--	--	--	--	--
9.60	8	15	2:00	0.86	1.23	0.40	1.5	233	349	35	--	--	--	--	--	--	--	--	--	--	--
9.80	10	19	2:00	0.90	1.25	0.50	2.0	280	420	40	--	--	--	--	--	--	--	--	--	--	--
10.00	10	17	2:00	0.90	1.26	0.50	2.0	281	421	40	--	--	--	--	--	--	--	--	--	--	--
10.20	11	18	2:00	0.91	1.28	0.54	2.1	297	446	42	--	--	--	--	--	--	--	--	--	--	--
10.40	21	31	3:00	0.85	1.30	--	--	--	--	--	12	30	33	36	39	27	27	0.024	35	53	63
10.60	17	25	2:00	0.97	1.32	0.72	3.0	359	538	54	--	--	--	--	--	--	--	--	--	--	--
10.80	10	19	2:00	0.90	1.34	0.50	1.8	284	426	40	--	--	--	--	--	--	--	--	--	--	--
11.00	8	20	2:00	0.86	1.35	0.40	1.4	235	353	35	--	--	--	--	--	--	--	--	--	--	--
11.20	8	20	2:00	0.86	1.37	0.40	1.3	236	354	35	--	--	--	--	--	--	--	--	--	--	--
11.40	10	25	2:00	0.90	1.39	0.50	1.7	286	429	40	--	--	--	--	--	--	--	--	--	--	--
11.60	8	24	2:00	0.86	1.41	0.40	1.3	236	354	35	--	--	--	--	--	--	--	--	--	--	--
11.80	9	22	2:00	0.88	1.42	0.45	1.5	263	394	38	--	--	--	--	--	--	--	--	--	--	--
12.00	8	17	2:00	0.86	1.44	0.40	1.3	237	355	35	--	--	--	--	--	--	--	--	--	--	--
12.20	8	20	2:00	0.86	1.46	0.40	1.2	237	356	35	--	--	--	--	--	--	--	--	--	--	--
12.40	10	25	2:00	0.90	1.48	0.50	1.6	289	434	40	--	--	--	--	--	--	--	--	--	--	--
12.60	8	20	2:00	0.86	1.49	0.40	1.2	238	356	35	--	--	--	--	--	--	--	--	--	--	--
12.80	10	19	2:00	0.90	1.51	0.50	1.6	290	435	40	--	--	--	--	--	--	--	--	--	--	--
13.00	32	44	3:00	0.88	1.53	--	--	--	--	--	22	31	34	37	40	28	29	0.043	53	80	96
13.20	21	31	3:00	0.85	1.55																

PROVA PENETROMETRICA STATICA

TABELLA PARAMETRI GEOTECNICI

CPT 1VOT

2.01PG05-072

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrausanas piestātne
- località : 27.piestātne Ventspils brīvosta
- note : Ligums Nr.341JP092005_2005.g.20.09.

- data : 27.09.2005
- quota inizio : abs.atzime: +3.5 m
- prof. falda : 3.20 m da quota inizio
- pagina : 2

NATURA COESIVA											NATURA GRANULARE										
Prof. m	qc kg/cm²	qc/fs (-)	Natura Litol.	Y' t/m³	d'vo kg/cm²	Cu kg/cm²	OCR (-)	Eu50 kg/cm²	Eu25 kg/cm²	Mo kg/cm²	Dr %	ø1s (°)	ø2s (°)	ø3s (°)	ø4s (°)	ødm (°)	ømy (°)	Amax/g (-)	E'50 kg/cm²	E'25 kg/cm²	Mo kg/cm²
20.20	17	28	2////	0.97	2.18	0.72	1.6	419	629	54	--	--	--	--	--	--	--	--	--	--	--
20.40	17	32	4/-:	0.91	2.19	0.72	1.6	420	630	54	--	28	31	35	38	25	27	--	28	43	51
20.60	17	25	2////	0.97	2.21	0.72	1.6	420	631	54	--	--	--	--	--	--	--	--	--	--	--
20.80	14	23	2////	0.94	2.23	0.64	1.3	376	564	48	--	--	--	--	--	--	--	--	--	--	--
21.00	14	23	2////	0.94	2.25	0.64	1.3	376	564	48	--	--	--	--	--	--	--	--	--	--	--
21.20	16	27	2////	0.96	2.27	0.70	1.4	408	612	52	--	--	--	--	--	--	--	--	--	--	--
21.40	17	28	2////	0.97	2.29	0.72	1.5	422	634	54	--	--	--	--	--	--	--	--	--	--	--
21.60	17	23	2////	0.97	2.31	0.72	1.5	423	634	54	--	--	--	--	--	--	--	--	--	--	--
21.80	19	28	2////	0.99	2.33	0.78	1.6	450	674	58	--	--	--	--	--	--	--	--	--	--	--
22.00	18	27	2////	0.98	2.35	0.75	1.5	437	656	56	--	--	--	--	--	--	--	--	--	--	--
22.20	18	27	2////	0.98	2.37	0.75	1.5	438	657	56	--	--	--	--	--	--	--	--	--	--	--
22.40	19	28	2////	0.99	2.39	0.78	1.5	451	677	58	--	--	--	--	--	--	--	--	--	--	--
22.60	18	25	2////	0.98	2.41	0.75	1.5	439	658	56	--	--	--	--	--	--	--	--	--	--	--
22.80	18	25	2////	0.98	2.43	0.75	1.4	439	659	56	--	--	--	--	--	--	--	--	--	--	--
23.00	18	27	2////	0.98	2.45	0.75	1.4	439	659	56	--	--	--	--	--	--	--	--	--	--	--
23.20	21	24	4/-:	0.93	2.47	0.82	1.6	477	716	63	--	28	31	35	38	25	27	--	35	53	63
23.40	17	25	2////	0.97	2.48	0.72	1.3	426	639	54	--	--	--	--	--	--	--	--	--	--	--
23.60	17	23	2////	0.97	2.50	0.72	1.3	427	640	54	--	--	--	--	--	--	--	--	--	--	--
23.80	16	22	2////	0.96	2.52	0.70	1.3	412	618	52	--	--	--	--	--	--	--	--	--	--	--
24.00	15	20	2////	0.95	2.54	0.67	1.2	397	595	50	--	--	--	--	--	--	--	--	--	--	--
24.20	16	22	2////	0.96	2.56	0.70	1.2	413	619	52	--	--	--	--	--	--	--	--	--	--	--
24.40	16	24	2////	0.96	2.58	0.70	1.2	413	619	52	--	--	--	--	--	--	--	--	--	--	--
24.60	17	23	2////	0.97	2.60	0.72	1.3	428	642	54	--	--	--	--	--	--	--	--	--	--	--
24.80	17	25	2////	0.97	2.62	0.72	1.3	428	643	54	--	--	--	--	--	--	--	--	--	--	--
25.00	18	25	2////	0.98	2.64	0.75	1.3	443	665	56	--	--	--	--	--	--	--	--	--	--	--
25.20	18	25	2////	0.98	2.66	0.75	1.3	443	665	56	--	--	--	--	--	--	--	--	--	--	--
25.40	18	27	2////	0.98	2.68	0.75	1.3	444	665	56	--	--	--	--	--	--	--	--	--	--	--
25.60	16	24	2////	0.96	2.70	0.70	1.2	414	621	52	--	--	--	--	--	--	--	--	--	--	--
25.80	15	22	2////	0.95	2.72	0.67	1.1	398	598	50	--	--	--	--	--	--	--	--	--	--	--
26.00	16	24	2////	0.96	2.74	0.70	1.1	415	622	52	--	--	--	--	--	--	--	--	--	--	--
26.20	19	28	2////	0.99	2.76	0.78	1.3	459	688	58	--	--	--	--	--	--	--	--	--	--	--
26.40	12	18	2////	0.92	2.77	0.57	0.9	343	514	45	--	--	--	--	--	--	--	--	--	--	--
26.60	8	12	2////	0.86	2.79	0.40	0.6	240	360	35	--	--	--	--	--	--	--	--	--	--	--
26.80	9	15	2////	0.88	2.81	0.45	0.6	270	405	38	--	--	--	--	--	--	--	--	--	--	--
27.00	11	16	2////	0.91	2.83	0.54	0.8	322	483	42	--	--	--	--	--	--	--	--	--	--	--
27.20	11	16	2////	0.91	2.85	0.54	0.8	322	483	42	--	--	--	--	--	--	--	--	--	--	--
27.40	11	16	2////	0.91	2.86	0.54	0.8	322	483	42	--	--	--	--	--	--	--	--	--	--	--
27.60	10	30	4/-:	0.86	2.88	0.50	0.7	300	450	40	--	28	31	35	38	25	26	--	17	25	30
27.80	7	26	2////	0.84	2.90	0.35	0.4	210	315	32	--	--	--	--	--	--	--	--	--	--	--
28.00	8	17	2////	0.86	2.91	0.40	0.5	240	360	35	--	--	--	--	--	--	--	--	--	--	--
28.20	10	8	2////	0.90	2.93	0.50	0.7	300	450	40	--	--	--	--	--	--	--	--	--	--	--
28.40	62	22	4/-:	1.02	2.95	2.07	4.0	824	1236	186	29	32	35	37	40	28	32	0.056	103	155	186
28.60	88	20	4/-:	1.04	2.97	2.93	6.2	780	1170	264	41	34	36	39	41	30	33	0.082	147	220	264
28.80	124	29	4/-:	1.07	3.00	4.13	9.4	716	1074	372	53	35	38	40	42	32	35	0.111	207	310	372
29.00	236	30	4/-:	1.13	3.02	7.87	20.8	1337	2006	708	75	38	40	42	44	36	39	0.173	393	590	708
29.20	250	--	3:::	1.15	3.04	--	--	--	--	--	76	39	40	42	44	36	39	0.178	417	625	750

PROVA PENETROMETRICA DINAMICA
DIAGRAMMA RESISTENZA DINAMICA PUNTA

DIN 1VOT

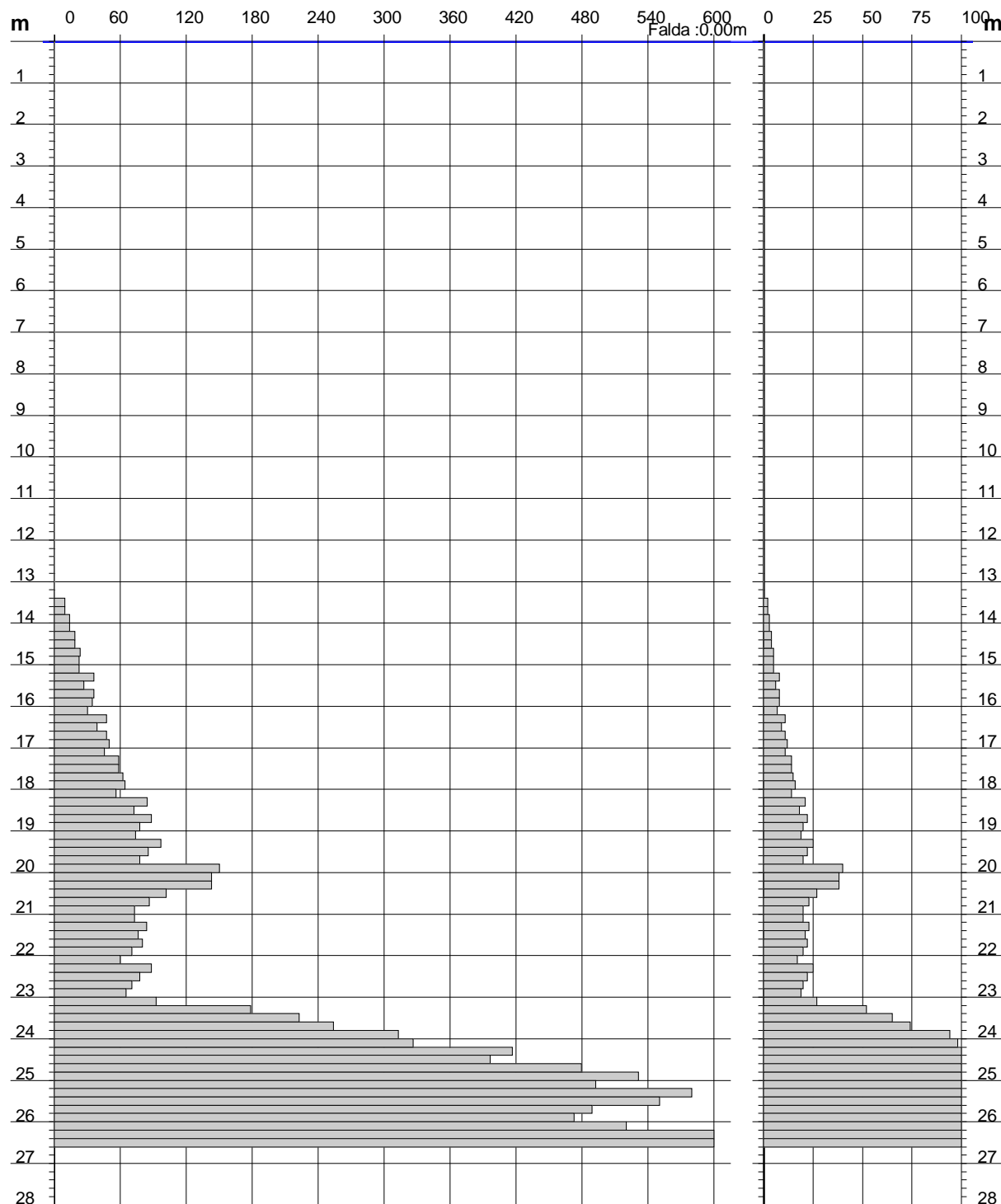
Scala 1: 150

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrausanas piestātne (akvatorija)
- località : 1. mulins Ventspils brīvosta

- data : 26.09.2005
- quota inizio : abs.atzime: -13.0 m
- prof. falda : 0.00 m da quota inizio

Rpd (kg/cm²) Resistenza dinamica alla punta, formula "Olandese"

N = N(20) n° colpi d = 20



PROVA PENETROMETRICA DINAMICA
DIAGRAMMA RESISTENZA DINAMICA PUNTA

DIN 2VOT

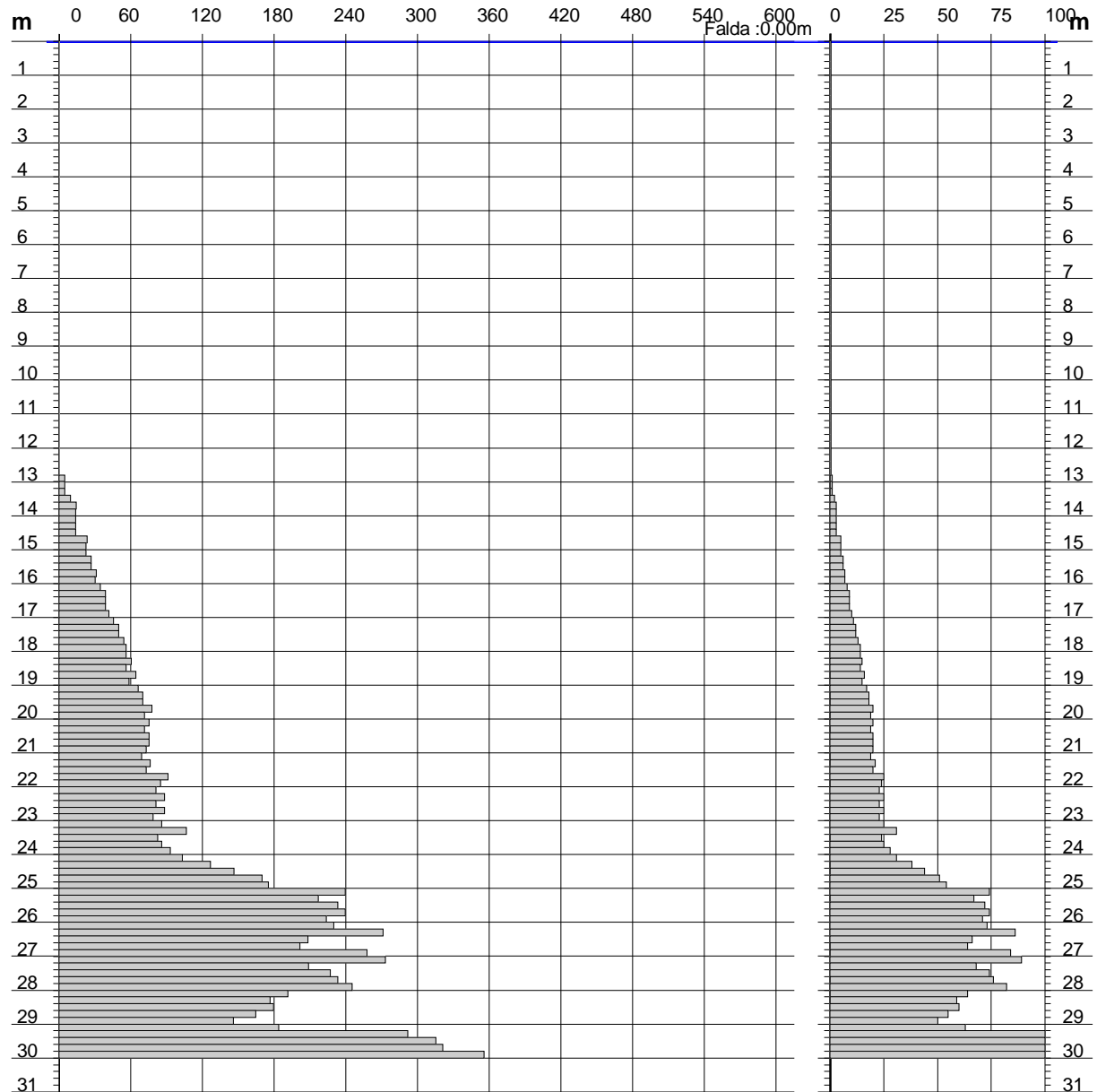
Scala 1: 200

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrausanas piestātne (akvatorija)
- località : 1. mulins Ventspils brīvosta

- data : 30.09.2005
- quota inizio : abs.atzime: -12.7 m
- prof. falda : 0.00 m da quota inizio

Rpd (kg/cm²) Resistenza dinamica alla punta, formula "Olandese"

N = N(20) n° colpi d = 20



PROVA PENETROMETRICA DINAMICA
DIAGRAMMA RESISTENZA DINAMICA PUNTA

DIN 3VOT

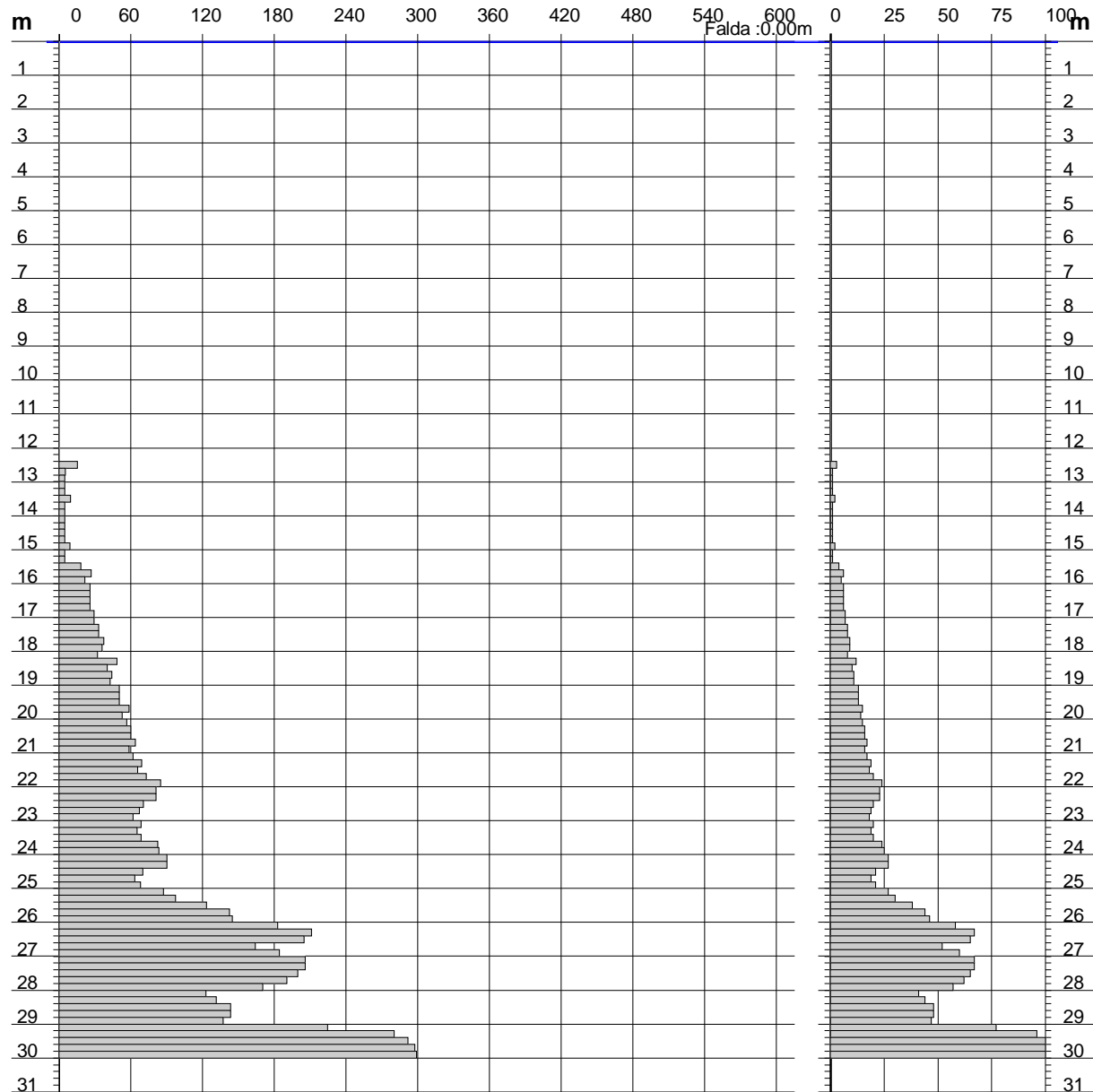
Scala 1: 200

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrašanas piestātne (akvatorija)
- località : 1. mulins Ventspils brīvosta

- data : 30.09.2005
- quota inizio : abs.atzime: -12.4 m
- prof. falda : 0.00 m da quota inizio

Rpd (kg/cm²) Resistenza dinamica alla punta, formula "Olandese"

N = N(20) n° colpi d = 20



PROVA PENETROMETRICA DINAMICA DIAGRAMMA RESISTENZA DINAMICA PUNTA

DIN 4VOT

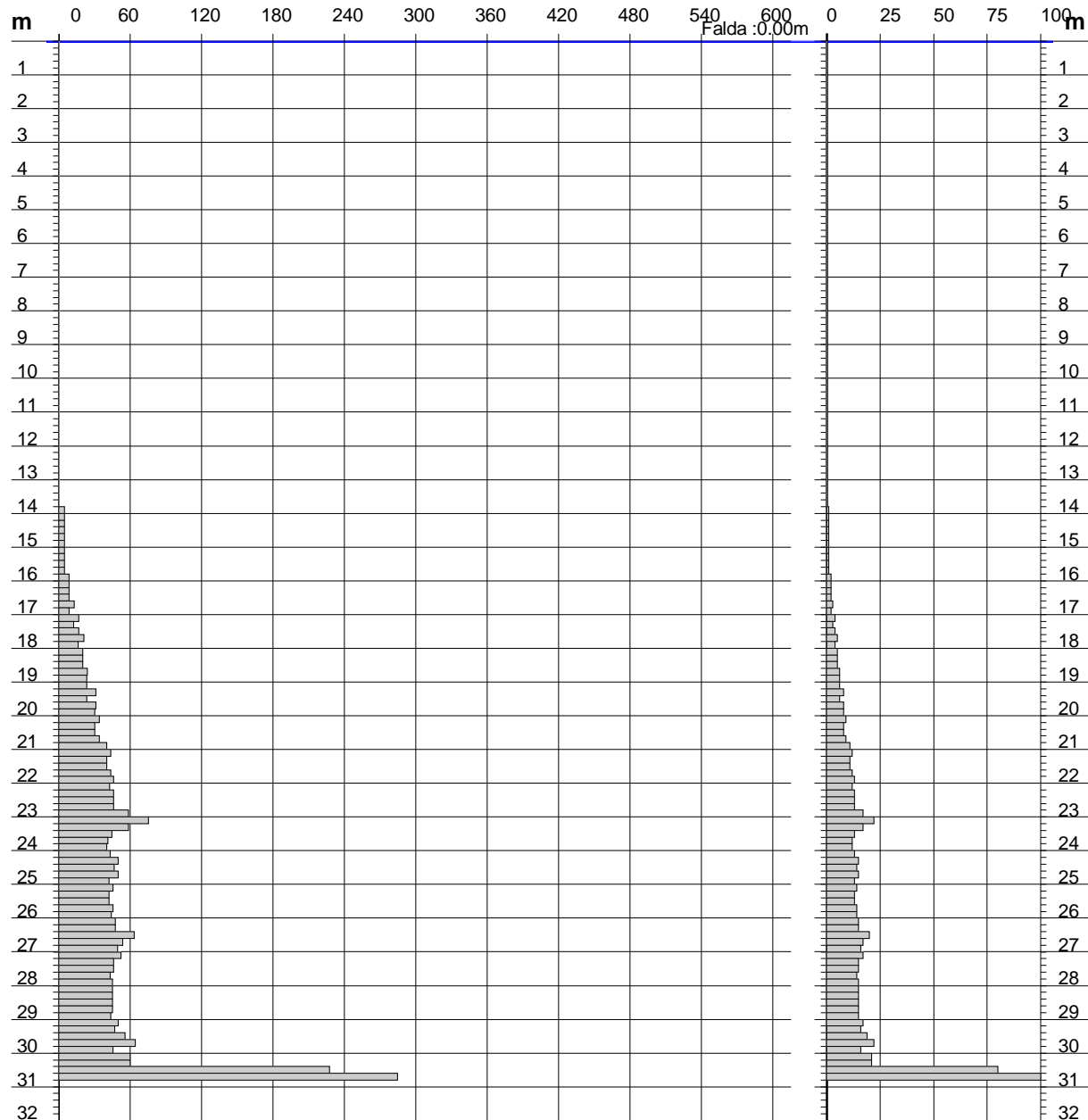
Scala 1: 200

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrausanas piestātne (akvatorija)
- località : 1. mulins Ventspils brīvosta

- data : 29.09.2005
- quota inizio : abs.atzime: -12.6 m
- prof. falda : 0.00 m da quota inizio

Rpd (kg/cm²) Resistenza dinamica alla punta, formula "Olandese"

N = N(20) n° colpi d = 20



PROVA PENETROMETRICA DINAMICA DIAGRAMMA RESISTENZA DINAMICA PUNTA

DIN 5VOT

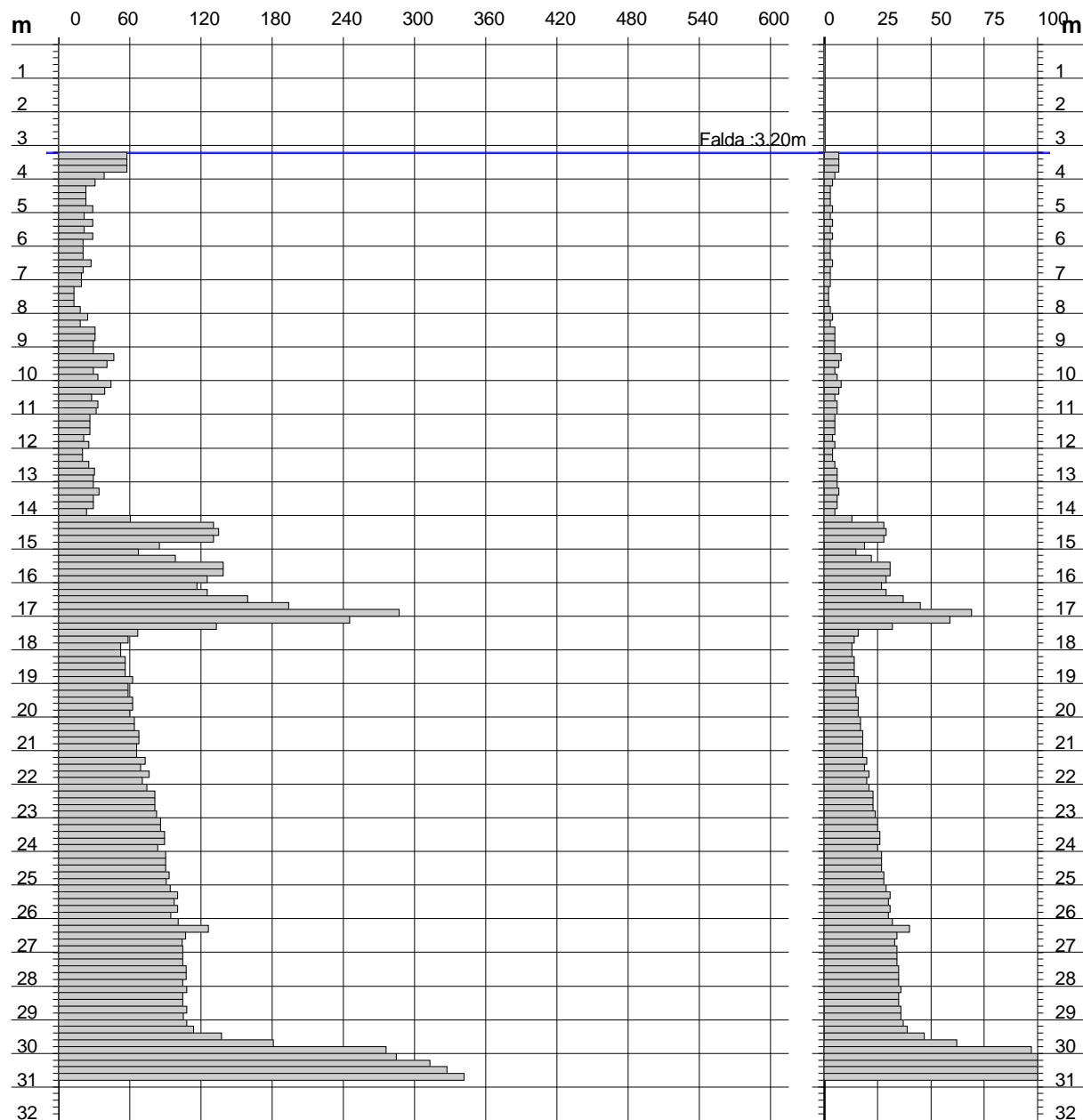
Scala 1: 200

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrašanas piestātne (sauszeme)
- località : 1. mulins Ventspils brīvosta

- data : 29.09.2005
- quota inizio : abs.atzime: +3.2 m
- prof. falda : 3.20 m da quota inizio

Rpd (kg/cm²) Resistenza dinamica alla punta, formula "Olandese"

N = N(20) n° colpi d = 20



PENETROMETRO DINAMICO IN USO : DPSH (S. Heavy)

Classificazione ISSMFE (1988) dei penetrometri dinamici		
TIPO	Sigla riferimento	Peso Massa Battente M (kg)
Leggero	DPL (Light)	$M \leq 10$
Medio	DPM (Medium)	$10 < M < 40$
Pesante	DPH (Heavy)	$40 \leq M < 60$
Super pesante	DPSH (Super Heavy)	$M \geq 60$

CARATTERISTICHE TECNICHE : DPSH (S. Heavy)

PESO MASSA BATTENTE	M = 63.50 kg
ALTEZZA CADUTA LIBERA	H = 0.75 m
PESO SISTEMA BATTUTA	Ms = 1.00 kg
DIAMETRO PUNTA CONICA	D = 51.00 mm
AREA BASE PUNTA CONICA	A = 20.43 cm ²
ANGOLO APERTURA PUNTA	$\alpha = 90^\circ$
LUNGHEZZA DELLE ASTE	La = 1.00 m
PESO ASTE PER METRO	Ma = 6.31 kg
PROF. GIUNZIONE 1 ^a ASTA	P1 = 0.80 m
AVANZAMENTO PUNTA	$\delta = 0.20$ m
NUMERO DI COLPI PUNTA	N = N(20) \Rightarrow Relativo ad un avanzamento di 20 cm
RIVESTIMENTO / FANGHI	SI
ENERGIA SPECIFICA x COLPO	Q = (MH)/(A δ) = 11.66 kg/cm ² (prova SPT : Qspt = 7.83 kg/cm ²)
COEFF.TEORICO DI ENERGIA	$\beta_t = Q/Q_{spt} = 1.489$ (teoricamente : Nspt = β_t N)

Valutazione resistenza dinamica alla punta Rpd [funzione del numero di colpi N] (FORMULA OLANDESE) :

$$R_{pd} = M^2 H / [A e (M+P)] = M^2 H N / [A d (M+P)]$$

Rpd = resistenza dinamica punta [area A]
e = infissione per colpo = δ / N

M = peso massa battente (altezza caduta H)
P = peso totale aste e sistema battuta

UNITA' di MISURA (conversioni)

1 kg/cm² = 0.098067 MPa
1 MPa = 1 MN/m² = 10.197 kg/cm²
1 bar = 1.0197 kg/cm² = 0.1 MPa
1 kN = 0.001 MN = 101.97 kg

PROVA PENETROMETRICA DINAMICA ELABORAZIONE STATISTICA

DIN 1VOT

- committente :	SIA "Juras projekts"	- data :	26.09.2005
- lavoro :	oglu parkrausanas piestatne (akvatorija)	- quota inizio :	abs.atzime: -13.0 m
- località :	1. mulins Ventspils brivosta	- prof. falda :	0.00 m da quota inizio
- note :	ligums Nr. 341JP092005_2005.g.20.09.	- pagina :	1

n°	Profondità (m)		PARAMETRO	ELABORAZIONE STATISTICA							VCA	β	Nspt
				M	min	Max	½(M+min)	s	M-s	M+s			
1	0.00	13.40	N	0.0	0	0	0.0	----	----	----	0	1.49	0
			Rpd	0.0	0	0	0.0	----	----	----	0		
2	13.40	15.20	N	3.7	2	5	2.8	1.2	2.4	4.9	4	1.49	6
			Rpd	16.9	10	23	13.3	5.3	11.6	22.3	18		
3	15.20	16.20	N	7.4	6	8	6.7	----	----	----	7	1.49	10
			Rpd	32.6	27	36	29.7	----	----	----	31		
4	16.20	19.80	N	16.3	9	25	12.7	4.7	11.6	21.0	16	1.49	24
			Rpd	65.8	39	97	52.3	16.9	48.9	82.7	65		
5	19.80	20.40	N	38.7	38	40	38.3	----	----	----	39	1.49	58
			Rpd	145.3	143	150	144.0	----	----	----	146		
6	20.40	23.20	N	21.9	17	27	19.4	2.9	18.9	24.8	22	1.49	33
			Rpd	78.5	60	101	69.2	11.2	67.3	89.7	79		
7	23.20	24.00	N	71.3	52	94	61.6	----	----	----	71	1.49	106
			Rpd	241.9	178	313	210.1	----	----	----	241		
8	24.00	26.60	N	163.9	98	260	131.0	46.9	117.0	210.8	164	1.49	244
			Rpd	528.7	326	819	427.5	141.7	387.0	670.4	529		

M: valore medio min: valore minimo Max: valore massimo s: scarto quadratico medio
N: numero Colpi Punta prova penetrometrica dinamica (avanzamento $\delta = 20$ cm) Rpd: resistenza dinamica alla punta (kg/cm²)
 β : Coefficiente correlazione con prova SPT (valore teorico $\beta_t = 1.49$) Nspt: numero colpi prova SPT (avanzamento $\delta = 20$ cm)

PROVA PENETROMETRICA DINAMICA ELABORAZIONE STATISTICA

DIN 2VOT

- committente : SIA "Juras projekts"
 - lavoro : ogļu parkrausanas piestatne (akvatorija)
 - località : 1. muls Ventspils brīvosta
 - note : līgums Nr. 341JP092005_2005.g.20.09.

- data : 30.09.2005
 - quota inizio : abs.atzime: -12.7 m
 - prof. falda : 0.00 m da quota inizio
 - pagina : 1

n°	Profondità (m)		PARAMETRO	ELABORAZIONE STATISTICA						VCA	β	Nspt	
				M	min	Max	½(M+min)	s	M-s				M+s
1	0.00	12.80	N	0.0	0	0	0.0	----	----	----	0	1.49	0
			Rpd	0.0	0	0	0.0	----	----	----	0		
2	12.80	14.60	N	2.2	1	3	1.6	1.0	1.3	3.2	2	1.49	3
			Rpd	10.5	5	15	7.7	4.5	6.0	15.0	10		
3	14.60	16.80	N	6.9	5	9	6.0	1.6	5.3	8.5	7	1.49	10
			Rpd	30.4	22	39	26.4	6.6	23.8	36.9	31		
4	16.80	23.80	N	19.1	10	31	14.6	4.9	14.2	24.1	19	1.49	28
			Rpd	71.1	42	106	56.3	14.4	56.7	85.5	71		
5	23.80	28.80	N	64.2	28	89	46.1	16.3	47.9	80.4	64	1.49	95
			Rpd	201.4	93	273	147.3	48.5	152.9	249.9	201		
6	28.80	30.00	N	92.7	50	125	71.3	29.4	63.2	122.1	93	1.49	138
			Rpd	268.8	146	356	207.3	84.0	184.8	352.7	270		

M: valore medio min: valore minimo Max: valore massimo s: scarto quadratico medio

N: numero Colpi Punta prova penetrometrica dinamica (avanzamento $\delta = 20$ cm) Rpd: resistenza dinamica alla punta (kg/cm²) β : Coefficiente correlazione con prova SPT (valore teorico $\beta_t = 1.49$) Nspt: numero colpi prova SPT (avanzamento $\delta = 20$ cm)

PROVA PENETROMETRICA DINAMICA ELABORAZIONE STATISTICA

DIN 3VOT

- committente : SIA "Juras projekts"
- lavoro : ogļu parkrausanas piestatne (akvatorija)
- località : 1. muls Ventspils brīvosta
- note : līgums Nr. 341JP092005_2005.g.20.09.

- data : 30.09.2005
- quota inizio : abs.atzime: -12.4 m
- prof. falda : 0.00 m da quota inizio
- pagina : 1

n°	Profondità (m)		PARAMETRO	ELABORAZIONE STATISTICA						VCA	β	Nspt	
				M	min	Max	½(M+min)	s	M-s				M+s
1	0.00	12.40	N	0.0	0	0	0.0	----	----	----	0	1.49	0
			Rpd	0.0	0	0	0.0	----	----	----	0		
2	12.40	15.40	N	1.3	1	3	1.1	0.6	0.7	1.9	1	1.49	1
			Rpd	6.0	5	15	5.3	3.0	3.0	9.0	5		
3	15.40	18.20	N	6.8	4	9	5.4	1.5	5.3	8.3	7	1.49	10
			Rpd	28.6	18	37	23.2	5.5	23.1	34.0	29		
4	18.20	25.00	N	18.1	10	27	14.1	4.6	13.5	22.7	18	1.49	27
			Rpd	64.7	40	90	52.4	13.3	51.4	78.0	64		
5	25.00	29.00	N	51.7	27	67	39.3	12.3	39.3	64.0	52	1.49	77
			Rpd	159.6	87	211	123.5	37.6	122.0	197.2	161		
6	29.00	30.00	N	96.0	77	105	86.5	----	----	----	96	1.49	143
			Rpd	278.5	225	299	251.5	----	----	----	279		

M: valore medio min: valore minimo Max: valore massimo s: scarto quadratico medio

N: numero Colpi Punta prova penetrometrica dinamica (avanzamento $\delta = 20$ cm) Rpd: resistenza dinamica alla punta (kg/cm²) β : Coefficiente correlazione con prova SPT (valore teorico $\beta_t = 1.49$) Nspt: numero colpi prova SPT (avanzamento $\delta = 20$ cm)

PROVA PENETROMETRICA DINAMICA ELABORAZIONE STATISTICA

DIN 4VOT

- committente : SIA "Juras projekts"
 - lavoro : ogļu parkrausanas piestātne (akvatorija)
 - località : 1. muls Ventspils brīvostā
 - note : līgums Nr. 341JP092005_2005.g.20.09.

- data : 29.09.2005
 - quota inizio : abs.atzime: -12.6 m
 - prof. falda : 0.00 m da quota inizio
 - pagina : 1

n°	Profondità (m)		PARAMETRO	ELABORAZIONE STATISTICA						VCA	β	Nspt	
				M	min	Max	½(M+min)	s	M-s				M+s
1	0.00	12.60	N	0.0	0	0	0.0	----	----	----	0	1.49	0
			Rpd	0.0	0	0	0.0	----	----	----	0		
2	12.60	13.80	N	0.0	0	0	0.0	----	----	----	0	1.49	0
			Rpd	0.0	0	0	0.0	----	----	----	0		
3	13.80	15.80	N	1.0	1	1	1.0	----	1.0	1.0	1	1.49	1
			Rpd	4.6	5	5	4.5	0.1	4.5	4.7	5		
4	15.80	18.60	N	3.4	2	5	2.7	1.3	2.1	4.7	3	1.49	4
			Rpd	14.2	8	21	11.2	5.0	9.2	19.2	13		
5	18.60	30.40	N	13.6	6	22	9.8	3.9	9.6	17.5	14	1.49	21
			Rpd	44.3	23	75	33.8	10.2	34.1	54.5	46		
6	30.40	30.80	N	90.0	80	100	85.0	----	----	----	90	1.49	134
			Rpd	256.1	228	285	241.9	----	----	----	256		

M: valore medio min: valore minimo Max: valore massimo s: scarto quadratico medio

N: numero Colpi Punta prova penetrometrica dinamica (avanzamento $\delta = 20$ cm) Rpd: resistenza dinamica alla punta (kg/cm²) β : Coefficiente correlazione con prova SPT (valore teorico $\beta_t = 1.49$) Nspt: numero colpi prova SPT (avanzamento $\delta = 20$ cm)

PROVA PENETROMETRICA DINAMICA ELABORAZIONE STATISTICA

DIN 5VOT

- committente : SIA "Juras projekts"
 - lavoro : ogļu parkrausanas pietatne (sauszeme)
 - località : 1. muls Ventspils brīvosta
 - note : priekšsūbsana līdz 3.2 m dziļuma

- data : 29.09.2005
 - quota inizio : abs.atzime: +3.2 m
 - prof. falda : 3.20 m da quota inizio
 - pagina : 1

n°	Profondità (m)		PARAMETRO	ELABORAZIONE STATISTICA						VCA	β	Nspt	
				M	min	Max	½(M+min)	s	M-s				M+s
1	0.00	3.20	N	0.0	0	0	0.0	----	----	----	0	1.49	0
			Rpd	0.0	0	0	0.0	----	----	----	0		
2	3.20	14.00	N	4.7	2	8	3.3	1.6	3.1	6.2	5	1.49	7
			Rpd	28.3	13	58	20.6	10.1	18.2	38.4	30		
3	14.00	17.60	N	31.1	13	69	22.0	14.4	16.6	45.5	31	1.49	46
			Rpd	135.3	61	287	97.9	58.7	76.6	194.0	135		
4	17.60	19.20	N	14.1	13	16	13.6	1.0	13.1	15.1	14	1.49	21
			Rpd	56.4	52	62	54.3	3.3	53.2	59.7	56		
5	19.20	21.20	N	16.9	15	18	16.0	1.1	15.8	18.0	17	1.49	25
			Rpd	63.7	58	68	60.9	3.1	60.6	66.7	64		
6	21.20	29.40	N	29.5	19	40	24.2	5.8	23.7	35.3	30	1.49	45
			Rpd	94.7	69	126	81.9	13.1	81.7	107.8	96		
7	29.40	30.80	N	93.0	47	120	70.0	27.8	65.2	120.8	93	1.49	138
			Rpd	265.7	137	342	201.4	77.4	188.3	343.2	266		

M: valore medio min: valore minimo Max: valore massimo s: scarto quadratico medio

N: numero Colpi Punta prova penetrometrica dinamica (avanzamento $\delta = 20$ cm) Rpd: resistenza dinamica alla punta (kg/cm²) β : Coefficiente correlazione con prova SPT (valore teorico $\beta_t = 1.49$) Nspt: numero colpi prova SPT (avanzamento $\delta = 20$ cm)

Characteristic value of the physical-mechanical properties of soil regarding to CPT and DPSH results.

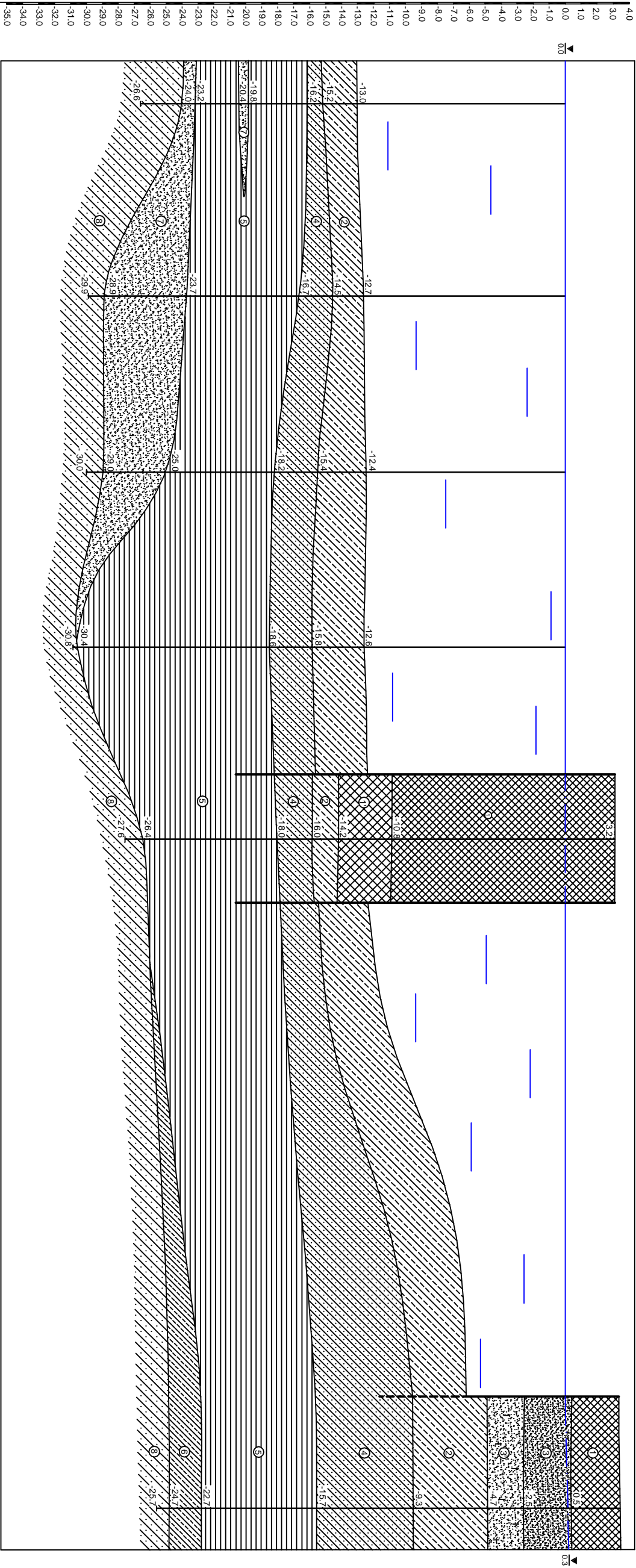
Layer #	Soil properties Soil description	Static and dynamic point resistance, MPa		Number of blows			Friction angle, degree	Cohesion kPa	Undrained shear strength, kPa	Deformation modulus, MPa	Density g/cm ³	Slope angle, ratio
		q_c (CPT)	R_{pd}^i (DPSH)	N_{20} (20 cm)	N_{20}^i (20 cm)	N_{spt} (30 cm)	j_n	c_n	C_u	E_o	r_n^*	*
1	FILL: fine SAND, loose to medium dense, with gravel, pebble and construction waste.	4.1	1.5	5.0	2.4	3.3	27	1	-	12	1.85	-
1 ^l	FILL: fine SAND, medium dense to dense.	9.2	4.6	32.0	10.0	14.8	31	2	-	20	1.92	1:3
2	SANDY CLAY, soft to firm, with mud admixing and rare sand interlayers. ($I_L=0.6 / I_P=9.0$)*	1.1	0.9	2.7	2.7	4.0	15	21	40	7	1.86	1:4
3	fine SAND, dense to very dense, with gravel and pebble	19.6	-	-	-	47.0	38	5	-	58	2.05	1:3
3 ^l	silty SAND, medium dense to dense.	9.4	-	-	-	28.0	34	3	-	28	1.95	1:4
4	CLAYEY SAND, plastic, with sand interlayers ($I_L=1.2 / I_P=5.5$)*	1.5	1.3	6.0	3.2	5.0	20	18	60	7	1.92	1:4
5	CLAY, firm to stiff. ($I_L=0.6 / I_P=18.0$)*	1.7	2.0	18.0	6.1	9.1	19	36	70	8	1.93	-
6	SANDY CLAY, soft to firm. ($I_L=0.5 / I_P=7.0$)*	0.9	-	-	-	4.0	17	24	40	6	2.00	-
7	Silty SAND, medium dense.	8.0	5.0	62.1	16.7	24.9	30	4	-	25	1.90	-
8	CLAYEY SAND, very stiff to hard. ($I_L=0.4 / I_P=4.0$)*	16.0	8.4	112.0	30.2	45.0	36	28	250	64	2.20	-

Note:
 R_{pd}^i - corrected dynamic point resistance;

 N_{20}^i - corrected number of blows;

 $N_{20}^i = N_{20} \times K_1 \times K_2$, where: N_{20} – measured number of blows for penetration interval of 20 cm;
 $K_1=0.46...0.64$ – coefficient of energy losses due to elastic deformation of drive rods;
 $K_2=0.59...0.84$ – coefficient of energy losses due to skin friction of drive rods;

* - by results of earlier executed investigation on close sites.



Punkta Nr.	DZ1	DZ2	DZ3	DZ4	DZ5	SZ1
Abs.augst. atzime, m	-13.0	-12.7	-12.4	12.6	3.2	3.5
Pedās abs. atzime, m	-26.6	-29.9	-30.0	-30.8	-27.6	-25.7
Attālums, m	60.0	55.0	55.0	60.0	210.0	
Datums	26.09.05	30.09.05	30.09.05	29.09.05	29.09.05	27.09.05

Pasūtītājs:

SIA "Jūras projekts"

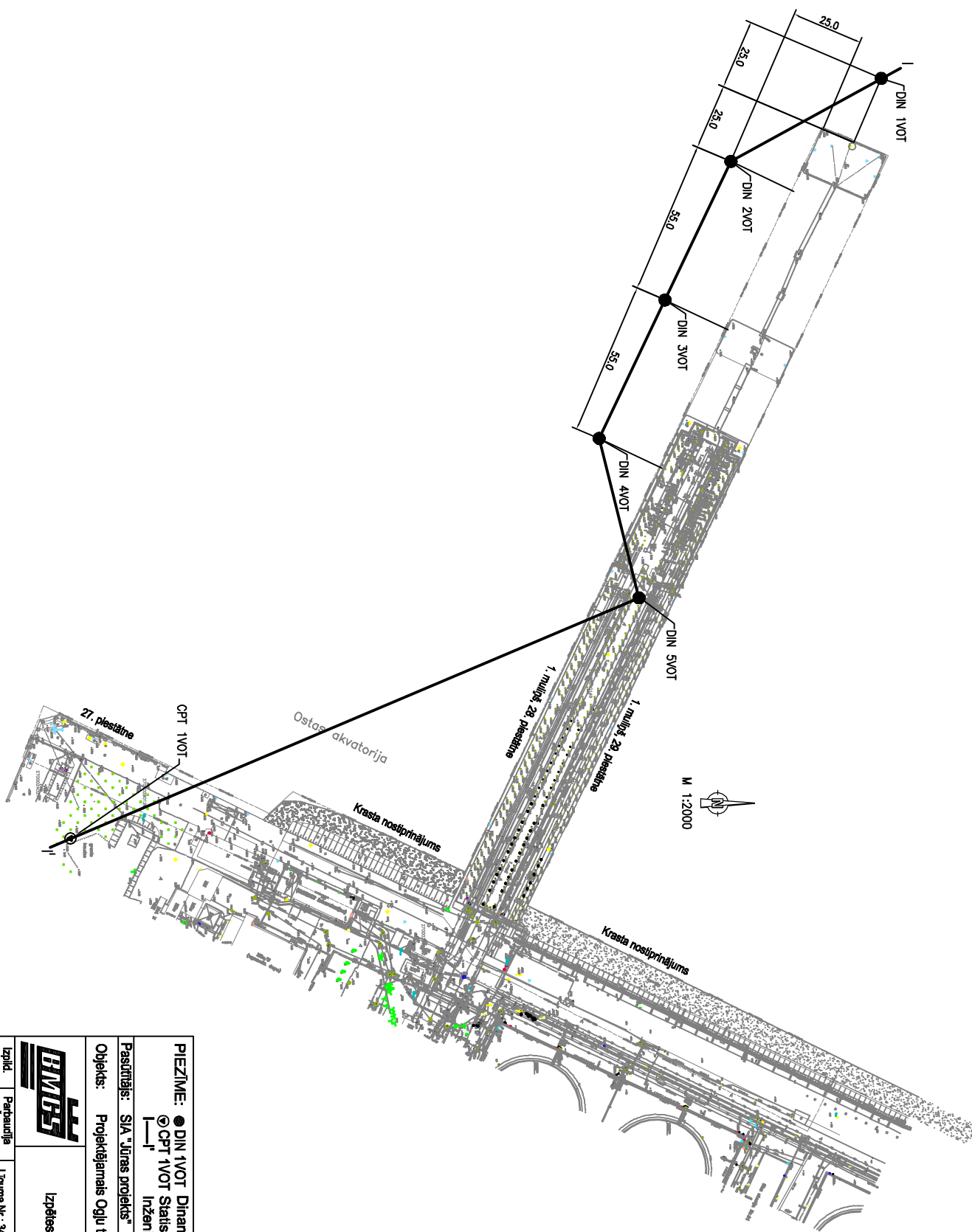
Objekts:

Projektējamais ogļu pātkraušanas termināls,
Ventspils brīvostā, Ventspils



Inženierģeoloģiskais griezumš 1-1'

Izpid.	Pārbaudīja	Mērogs hor.	Mērogs vert.	Līguma Nr.	Datums	Etaps	Lpp.
1. zēģis	V. Zaspulis	1 : 1000	1 : 200	341.1P/09.05.05	20.10.05	Skicē projekts	1



PIEZĪME: ● DIN 1VOT Dinamiskās zondēšanas punkts un tā numurs
 ○ CPT 1VOT Statiskās zondēšanas punkts un tā numurs
 — Inženierģeoloģiskā griezumā līnija

Pasūtītājs: SIA "Jūras projekts"

Objekts: Projektējamais Ogļu termināls Ventpils brīvošā, Ventpils.



Izpētes punktu izvietojuma plāns

Izstrādātājs	Parakstīja	Līguma Nr.:	Datums	Esas	Lpp.
I. Zeps	V. Zepins	341JP082005	24.10.2005	Sīdai, proj.	1

Geotechnical investigations:

- onshore
- offshore

In Situ testing:

- CPTU (piezocone with pore pressure measurement)
 - q_c up to 50 MPa
 - f_s up to 0.5 MPa
 - U_2 up to 2.5 MPa
 - sounding depth up to 60 m
- CPT-Begemann (mechanical cone)
 - q_c up to 100 MPa
 - f_s up to 1.0 MPa
 - sounding depth up to 40 m
- DPSH (dynamic penetration super heavy)
 - sounding depth up to 50 m
- SPT (standard penetration test)
 - sounding depth up to 30 m
- FVT(field vane test)
 - sounding depth up to 30 m
- PLT (plate loading test): crushed stone pavement, embankment etc.
- pocket penetrometer for express analyses of soil samples (CONTROLS, Italy)
- torvane for express analyses of soil samples (CONTROLS, Italy)
- registered software for tests data processing and interpretation

Laboratory testing

- physical-mechanical properties of soils
- oedometer apparatus
- triaxial apparatus

Drilling and sampling

- rotary coring up to 100 m
- auger drilling up to 50 m
- undisturbed sampling by pushing thin-walled Shelby-sampler

Methods and standards

- Latvijas būvnormatīvs LBN 005-99
- Eurocode 7: geotechnical design. ENV 1997.
- British Standard Code of practice for site investigations. BS 5930
- British Standard Methods of test for Soils for civil engineering purposes. BS 1377
- СНиП, ГОСТ

Reports

- Latvian
- English
- Russian

Equipment

- Static-dynamic penetrometer **PAGANI TG-73/220** (Italy), selfpropelled, anchoring type
 - ▼ pushing force up to 220 kN
 - ▲ pulling force up to 300 kN
- Drill rig **NORDMEYER DSB-1/3.5** (Germany), drilling depth up to 150 m, geological and water wells drilling.
- Drill rig **KLEMM KR-802** (Germany), micropiling, injection piling and anchoring.
- Tension and testing apparatus **ISCHEBECK RCH 603/1003** for injection piles and anchors (Germany).
- Testing apparatus **IFCO-ITS** (Holland), integrity and depth of both prefabricated and cast-in-place foundation piles.

Our clients: Free economical zone of Liepaja Authority, Free port of Ventspils Authority, TEBODIN-Latvia, Witteveen+Bos (Holland), Hidroprojekta (Lithuania), Skanska (Estonia), Lenmorniiprojekt (Russia), Latvijas gaze, Latvenergo, RE & RE, PBLC, IBNA, CMC Baltic, Juras Projekts, Celuprojekts, Rupnicprojekts, DC Projekts, Pilsetsprojekts, Siltumselektroprojekts, Transbuvprojekts, Venceb, Strek etc.

We have all necessary documents for activities in the Baltic states and Russia.



JSC BMGS manager:

V.Zagulin