Material Penunjang

Jenis Material	Model	Type	γUnsat	γsat	kx (m/day)	ky (m/day)	Eref (Kn/m2)	v	Cref (Cu)	Ø(')	Ψ
Agerat Class A 90%	MC	Drained	20,000	21,000	1,000	1,000	5,00E+04	0,200	1,000	35,000	0
Agregat Class B 60%	MC	Drained	18,000	20,000	0,806	0,806	3,50E+04	0,200	5,000	30,000	0,000
Concrete	LE	Non-porous	23,000	23,000	0	0	2,57E+07	0,150	-	-	-
Lean Concrete PBTR	LE	Non-porous	23,000	23,000	0	0	2,57E+06	0,150	-	-	-
LTP	MC	Drained	17,000	18,000	0,100	0,100	5,00E+04	0,334	-	-	-
Tanah Timbunan N 11 PBTR	MC	Drained	16,000	19,000	0,010	0,010	1,10E+04	0,300	10,000	25,000	0,000

Jenis Material	Model	Type	γUnsat	γsat	kx (m/day)	ky (m/day)	Eref (Kn/m2)	v	Cref (Cu)	Ø(')	Ψ	EA (kN/m)	EI (Kn/m2/m)	d (m)	w (Kn/m)
KGM Cluster	MC	Undrained	16,000	22,000	1,000E-02	1,000E-02	2,10E+06	0,334	85,000	30,000	0,000	-	-	-	-
KGM Plate	Elastic	-	-	-	-	-	-	0,2	-	-	-	1,06E+06	2648,394	0,173	2

NO	Konsistensi	Kedalaman (m)	N-SPT	Rata-rata N-SPT	Model	Type	γUnsat	γsat	kx (m/day)	ky (m/day)	Eref (Kn/m2)	v	Cref (Cu)	Ø(')	Ψ	cc	cs	e_init	Cr
1	Very Soft	0-13	1-4	2	SSM	Undrained	14	16	4,50E-03	4,50E-03	-	-	10	8	0	0,704	0,0704	1,2	0,32
2	Soft	13,2-18	2-4	3	SSM	Undrained	15	17,5	4,50E-03	4,50E-03	-	-	12	10	0	0,4	0,04	1	0,2
3	Medium Clay	18,2-22	5-9	6	MC	Undrained	16	18,5	4,50E-03	4,50E-03	12000	0,334	18	16	0	-	-	0,8	-
4	Stiff	22,2-24	7-13	13	MC	Undrained	17	19,5	2,20E-05	2,20E-05	26000	0,334	65	30	0	-	-	-	-
5	Medium Dense	24,2-26	14-31	25	MC	Drained	17,5	20,5	8,60E-02	8,60E-02	50000	0,3	4	30	0	-	-	0,8	-

Tabel : 3.1

Deskripsi Data Tanah

Depth	qc	fr	Rata-rata qc	Rata-rata fr	NSPT		Jenis Tanah
0	0	0					
0,2	5,5	4,07			2	Sandy silts and silt	Very Soft
0,4	5,5	2,97			2		
0,6	5,5	2,97			2		
0,8	5,5	2,97	5,5	3,08	2		
1	5,5	2,42			2		
1,2	6	2,71			3	Clayey silts and silty clays	Very Soft
1,4	4	4,04			2		
1,6	4	4,04			2		
1,8	4	4,04	4,40	3,77	2		
2	4	4			2		
2,2	3,5	4,55			2	Clayey silts and silty clays	Very Soft
2,4	3,5	4,55			2		
2,6	3,5	4,55			2		
2,8	4	4	4,00	4,11	2		
3	5,5	2,92			3		
3,2	5,5	2,92			3	Clayey silts and silty clays	Very Soft
3,4	5,5	2,92			3		
3,6	6	2,68			3		
3,8	6	2,68	5,80	2,89	3		
4	6	3,23			3		
4,2	8	2,01			4	Clayey silts and silty clays	Very Soft
4,4	5	3,18			3		
4,6	4	3,94			2		
4,8	3	5,17	4,60	3,88	2		
5	3	5,11			2		

5,2	4,5	3,49			1,5	Sandy silts and silt	Very Soft
5,4	6	2,65			2		
5,6	6	2,65			2		
5,8	6	2,65	5,40	2,98	2		
6	4,5	3,46			1,5		
6,2	4,5	3,46			2	Sandy silts and silt	Very Soft
6,4	5,5	2,86			2		
6,6	5,5	3,47			2		
6,8	6,5	2,96	5,80	3,10	2		
7	7	2,74			2		
7,2	7	2,74			2	Sandy silts and silt	Very Soft
7,4	7	2,74			2		
7,6	8	2,41			3		
7,8	6	2,62	6,70	2,67	2		
8	5,5	2,83			2		
8,2	5,5	2,83			2	Sandy silts and silt	Very Soft
8,4	4	3,81			1		
8,6	4,5	3,41			2		
8,8	4,5	3,41	4,70	3,44	2		
9	5	3,73			2		
9,2	6	3,14			2	Sandy silts and silt	Very Soft
9,4	6	3,14			2		
9,6	6	3,14			2		
9,8	8	2,39	6,80	2,84	3		
10	8	2,38			3		
10,2	7	2,7			2	Sandy silts and silt	Very Soft
10,4	7	2,7			2		
10,6	7	3,58			2		
10,8	8	3,15	7,60	2,85	3		
11	9	2,12			3		
11,2	6	3,11			2		Very Soft

11,4	6	3,11			2	Sandy silts and silt	
11,6	6	3,11			2		
11,8	6	3,11	6,40	2,96	2		
12	8	2,36			3		
12,2	7	2,21			2	Sandy silts and silt	Very Soft
12,4	5	3,02			2		
12,6	5	3,65			2		
12,8	7	2,68	6,20	3,02	2		
13	7	3,53			2		
13,2	8	3,11			3	Sandy silts and silt	soft
13,4	8	3,94			3		
13,6	9	3,52			3		
13,8	10	3,19	9,00	3,51	3		
14	10	3,79			3		
14,2	12	3,19			3	Silty Sands	soft
14,4	14	2,75			4		
14,6	11	3,47			3		
14,8	15	2,16	12,40	2,95	4		
15	10	3,17			3		
15,2	11	2,89			3	Silty Sands	soft
15,4	11	2,89			3		
15,6	12	2,66			3		
15,8	12	3,18	11,80	2,91	3		
16	13	2,94			3		
16,2	10	3,16			3	Sandy silts and silt	soft
16,4	9	3,49			3		
16,6	9	3,49			3		
16,8	8	2,32	8,60	3,37	3		
17	7	4,38			2		
17,2	8	3,87			3	Sandy silts and silt	soft
17,4	9	3,47			3		

17,6	9	4,15			3		
17,8	10	3,76	9,60	3,68	3		
18	12	3,15			4		
18,2	13	3,91			7	Clayey silts and silty clays	medium
18,4	15	5,52			8		
18,6	10	5,62			5		
18,8	10	6,88	11,60	5,51	5		
19	10	5,6			5		
19,2	12	5,78			6	clays Peat	medium
19,4	15	6,78			8		
19,6	15	9,32			8		
19,8	13	10,21	13,80	7,05	7		
20	14	3,15			7		
20,2	14	4,07			5	Sandy silts and silt	medium
20,4	17	4,14			6		
20,6	20	4,17			7		
20,8	22	3,8	19,00	4,00	7		
21	22	3,8			7		
21,2	22	4,39			7	Sandy silts and silt	medium
21,4	25	3,88			8		
21,6	27	3,36			9		
21,8	23	3,09	23,40	3,65	8		
22	20	3,53			7		
22,2	20	4,8			7	Sandy silts and silt	stiff
22,4	24	4,03			8		
22,6	27	3,59			9		
22,8	30	3,24	27,00	3,59	10		
23	34	2,3			11		
23,2	32	2,43			8	Silty Sands	stiff
23,4	30	3,24			8		
23,6	35	2,97			9		

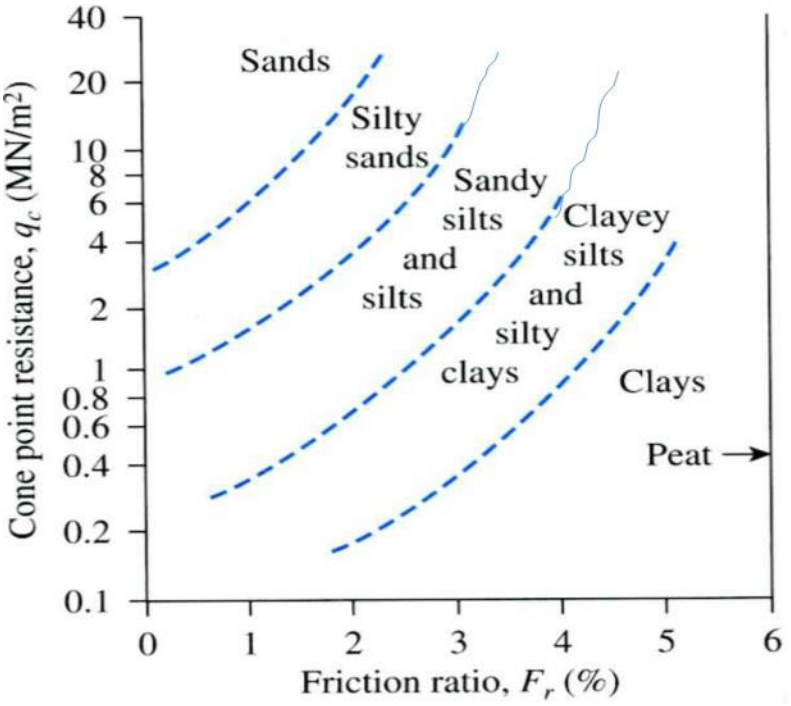
23,8	37	3,17	34,80	2,92	9		
24	40	2,78			10		
24,2	54	2,07			14	sands	Medium Dense
24,4	67	1,86			17		
24,6	70	1,88			18		
24,8	73	1,81	68,40	1,86	18		
25	78	1,69			20		
25,2	85	1,79			21	sands	Medium Dense
25,4	87	1,59			22		
25,6	94	1,9			24		
25,8	100	1,65	98,20	1,68	25		
26	125	1,48			31		
26,2	140	0					

Sand	Clay	qc/2
	Silt	qc/3
Clay	Sand	qc/4

Jenis Tanah	Nspt	
Very Soft Caly	0-2	

Stiff	*8 -15*	*100 -200*
Very stiff	*15 - 30*	*200 – 400*
Hard	*> 30*	*> 400*

Soft Clay	2 - 4	
Medium Clay	4 - 8	
Stiff Clay	8 - 15	
Very Stiff Clay	15 - 30	
Hard Clay	>30	
Jenis Tanah	Nspt	
Very Loose Sand	0 - 4	
Loose Sand	4 - 10	
Medium Dense	10 - 30	
Dense Sand	30 - 50	
Very Dense Sand	50 - 100	



Subsurface Condition	Penetration Resistance Range N	Friction Angle ϕ (deg)	Poisson Ratio (v)	Cone Penetration $q_c = 4$ N	Relatief Density Dr (%)	Young's Modulus Range E_s* (psi)	Shear Modulus Range G**(psi)
Very loose	0-4	28	0.45	0-16	0-15	0-440	0-160
Loose	4-10	28-30	0.40	16-40	15-35	440-1100	160-390
Medium	10-30	30-36	0.35	40-120	35-65	1100-3300	390-1200
Dense	30-50	36-41	0.30	120-100	65-85	3300-5500	1200-1990
Very Dense	50-100	41-45	0.20	200-400	85-100	5500-11000	1990-3900

Schmertman (1970) $E_s^* = 2q_c$ psf

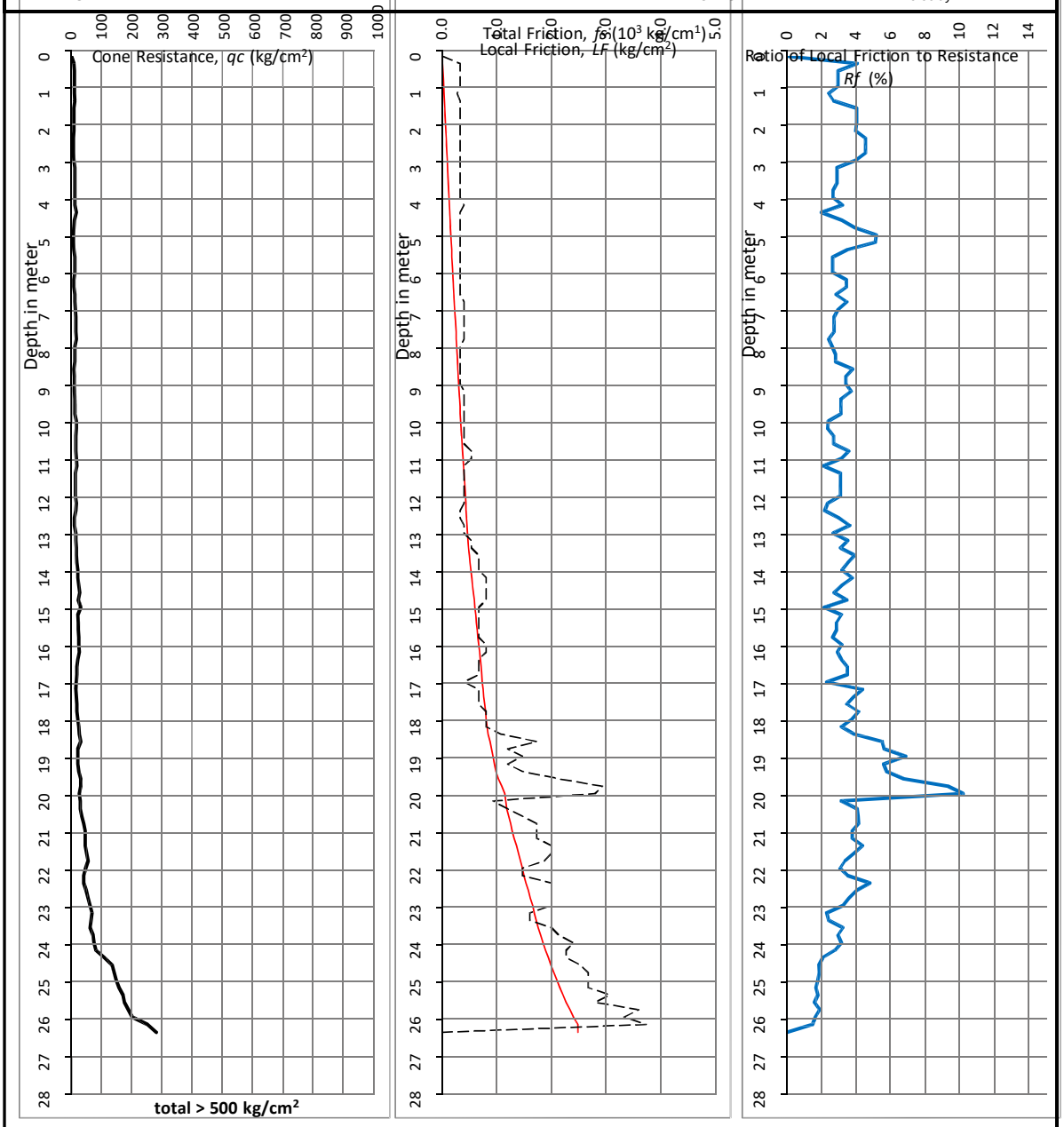
$$G^{**} = \frac{E_s}{2(1+v)}; \dim ana\ v = 0{,}5$$

GRAPH OF CONE PENETRATION TEST (CPT)

ASTM D 3441 - 98

PT. SOILENS

PROJECT	: SOIL INVESTIGATION FOR PEMALANG-BATANG TOLL ROAD				
JOB NO.	: 3389				
CLIENT	: PT. SUMBER MITRA JAYA			DATE	: 21-Sep-16
LOCATION	: PEMALANG - BATANG			WEATHER	: Clear
POINT NO.	: SO-II-5	COORDINATES	: E=344866.200, N=9232474.000	OPERATOR	: Untung Suparman
PLACE	: -	ELEVATION	: +6.021 m	DRAWN BY	: Angki Nugraha
REMARKS	: -			CHECKED BY	: Tofocidy R



Remarks:

Dutch Cone Penetrometer 10-ton Capacity :

Length of Rod	=	*100 cm*
Weight of inner Rod	=	*1400 g*
Weight of Cone	=	*700 g*
Projected area of Cone	=	*10 cm²*
Area of Friction Sleeve	=	*150 cm²*
Area of Plunger	=	*20 cm²*

DATA

JOB NO.	3389
PROJECT	SOIL INVESTIGATION FOR PEMALANG-BATANG TOLL ROAD
CLIENT	PT. SUMBER MITRA JAYA
POINT NO.	SO-II-5
LOCATION	PEMALANG - BATANG
COORDINATE	E=344866.200; N=9232474.000
ELEVATION	+6.021m
DATE	21-Sep-16
OPERATOR	
RECORDED BY	Untung Suparman
DRAWN BY	Angki Nugraha
CHECKED BY	Tofocidy R
REMARKS	CPT 10 TON CAPACITY

No.	Depth	1st Reading, M-1	2nd Reading, M-2	Local friction, LF	Total friction, fs		Cone Resistance, qc	Ratio LF/qc, Rf
	(meter)	(kg/cm2)	(kg/cm2)	(kg/cm2)	(kg/cm')	(10^3kg/cm'	(kg/cm2)	(%)
0	0,00			0.00	0	0	0	0
1	0,20	4 -		0.33	7	0.007	8.11	4,07
2	0,40	5,5	8	0.33	13	0.013	11.11	2,97
3	0,60	5,5	8	0.33	20	0.020	11.11	2,97
4	0,80	5,5	8	0.33	26	0.026	11.11	2,97
5	1,00	5,5	8	0.27	32	0.032	11.18	2,42
6	1,20	6	8	0.33	38	0.038	12.18	2,71
7	1,40	4	6.5	0.33	45	0.045	8.18	4,04
8	1,60	4	6.5	0.33	52	0.052	8.18	4,04
9	1,80	4	6.5	0.33	58	0.058	8.18	4,04
10	2,00	4	6.5	0.33	65	0.065	8.25	4,00
11	2,20	3,5	6	0.33	71	0.071	7.25	4,55
12	2,40	3,5	6	0.33	78	0.078	7.25	4,55
13	2,60	3,5	6	0.33	85	0.085	7.25	4,55
14	2,80	4	6.5	0.33	91	0.091	8.25	4,00
15	3,00	5,5	8	0.33	98	0.098	11.32	2,92
16	3,20	5,5	8	0.33	104	0.104	11.32	2,92
17	3,40	5,5	8	0.33	111	0.111	11.32	2,92
18	3,60	6	8.5	0.33	118	0.118	12.32	2,68
19	3,80	6	8.5	0.33	124	0.124	12.32	2,68
20	4,00	6	8.5	0.40	132	0.132	12.39	3,23
21	4,20	8	11	0.33	139	0.139	16.39	2,01
22	4,40	5	7.5	0.33	145	0.145	10.39	3,18
23	4,60	4	6.5	0.33	152	0.152	8.39	3,94
24	4,80	3	5.5	0.33	159	0.159	6.39	5,17
25	5,00	3	5.5	0.33	165	0.165	6.46	5,11
26	5,20	4,5	7	0.33	172	0.172	9.46	3,49
27	5,40	6	8.5	0.33	178	0.178	12.46	2,65
28	5,60	6	8.5	0.33	185	0.185	12.46	2,65
29	5,80	6	8.5	0.33	192	0.192	12.46	2,65
30	6,00	4,5	7	0.33	198	0.198	9.53	3,46
31	6,20	4,5	7	0.33	205	0.205	9.53	3,46
32	6,40	5,5	8	0.33	211	0.211	11.53	2,86
33	6,60	5,5	8	0.40	219	0.219	11.53	3,47
34	6,80	6,5	9.5	0.40	227	0.227	13.53	2,96
35	7,00	7	10	0.40	235	0.235	14.60	2,74
36	7,20	7	10	0.40	243	0.243	14.60	2,74
37	7,40	7	10	0.40	251	0.251	14.60	2,74
38	7,60	8	11	0.40	259	0.259	16.60	2,41
39	7,80	6	9	0.33	266	0.266	12.60	2,62
40	8,00	5,5	8	0.33	273	0.273	11.67	2,83
41	8,20	5,5	8	0.33	279	0.279	11.67	2,83
42	8,40	4	6.5	0.33	286	0.286	8.67	3,81

43	8,60	4,5	7	0.33	292	0.292	9.67	3,41
44	8,80	4,5	7	0.33	299	0.299	9.67	3,41
45	9,00	5	7.5	0.40	307	0.307	10.74	3,73
46	9,20	6	9	0.40	315	0.315	12.74	3,14
47	9,40	6	9	0.40	323	0.323	12.74	3,14
48	9,60	6	9	0.40	331	0.331	12.74	3,14
49	9,80	8	11	0.40	339	0.339	16.74	2,39
50	10,00	8	11	0.40	347	0.347	16.81	2,38
51	10,20	7	10	0.40	355	0.355	14.81	2,70
52	10,40	7	10	0.40	363	0.363	14.81	2,70
53	10,60	7	10	0.53	374	0.374	14.81	3,58
54	10,80	8	12	0.53	384	0.384	16.81	3,15
55	11,00	9	13	0.40	392	0.392	18.88	2,12
56	11,20	6	9	0.40	400	0.400	12.88	3,11
57	11,40	6	9	0.40	408	0.408	12.88	3,11
58	11,60	6	9	0.40	416	0.416	12.88	3,11
59	11,80	6	9	0.40	424	0.424	12.88	3,11
60	12,00	8	11	0.40	432	0.432	16.95	2,36
61	12,20	7	10	0.33	439	0.439	14.95	2,21
62	12,40	5	7.5	0.33	445	0.445	10.95	3,02
63	12,60	5	7.5	0.40	453	0.453	10.95	3,65
64	12,80	7	10	0.40	461	0.461	14.95	2,68
65	13,00	7	10	0.53	472	0.472	15.02	3,53
66	13,20	8	12	0.53	483	0.483	17.02	3,11
67	13,40	8	12	0.67	496	0.496	17.02	3,94
68	13,60	9	14	0.67	509	0.509	19.02	3,52
69	13,80	10	15	0.67	523	0.523	21.02	3,19
70	14,00	10	15	0.80	539	0.539	21.09	3,79
71	14,20	12	18	0.80	555	0.555	25.09	3,19
72	14,40	14	20	0.80	571	0.571	29.09	2,75
73	14,60	11	17	0.80	587	0.587	23.09	3,47
74	14,80	15	21	0.67	600	0.600	31.09	2,16
75	15,00	10	15	0.67	614	0.614	21.16	3,17
76	15,20	11	16	0.67	627	0.627	23.16	2,89
77	15,40	11	16	0.67	640	0.640	23.16	2,89
78	15,60	12	17	0.67	654	0.654	25.16	2,66
79	15,80	12	17	0.80	670	0.670	25.16	3,18
80	16,00	13	19	0.80	686	0.686	27.23	2,94
81	16,20	10	16	0.67	699	0.699	21.23	3,16
82	16,40	9	14	0.67	713	0.713	19.23	3,49
83	16,60	9	14	0.67	726	0.726	19.23	3,49
84	16.80	8	13	0.40	734	0.734	17.23	2,32
85	17,00	7	10	0.67	747	0.747	15.30	4,38
86	17,20	8	13	0.67	761	0.761	17.30	3,87
87	17,40	9	14	0.67	774	0.774	19.30	3,47
88	17,60	9	14	0.80	790	0.790	19.30	4,15
89	17,80	10	16	0.80	806	0.806	21.30	3,76
90	18,00	12	18	0.80	822	0.822	25.37	3,15
91	18,20	13	19	1.07	844	0.844	27.37	3,91
92	18,40	15	23	1.73	878	0.878	31.37	5,52
93	18,60	10	23	1.20	902	0.902	21.37	5,62
94	18,80	10	19	1.47	932	0.932	21.37	6,88
95	19,00	10	21	1.20	956	0.956	21.44	5,60
96	19,20	12	21	1.47	985	0.985	25.44	5,78
97	19,40	15	26	2.13	1028	1.028	31.44	6,78
98	19,60	15	31	2.93	1086	1.086	31.44	9,32
99	19,80	13	35	2.80	1142	1.142	27.44	10,21
100	20,00	14	35	0.93	1161	1.161	29.51	3,15
101	20,20	14	21	1.20	1185	1.185	29.51	4,07
102	20,40	17	26	1.47	1214	1.214	35.51	4,14

103	20,60	20	31	1.73	1249	1.249	41.51	4,17
104	20,80	22	35	1.73	1283	1.283	45.51	3,80
105	21,00	22	35	1.73	1318	1.318	45.58	3,80
106	21,20	22	35	2.00	1358	1.358	45.58	4,39

107	21,40	25	40	2.00	1398	1.398	51.58	3,88
108	21,60	27	42	1.87	1435	1.435	55.58	3,36
109	21,80	23	37	1.47	1465	1.465	47.58	3,09
110	22,00	20	31	1.47	1494	1.494	41.65	3,53
111	22,20	20	31	2.00	1534	1.534	41.65	4,80
112	22,40	24	39	2.00	1574	1.574	49.65	4,03
113	22,60	27	42	2.00	1614	1.614	55.65	3,59
114	22,80	30	45	2.00	1654	1.654	61.65	3,24
115	23,00	34	49	1. 0	1686	1.686	69.72	2,30
116	23,20	32	44	1.60	1718	1.718	65.72	2,43
117	23,40	30	42	2.00	1758	1.758	61.72	3,24
118	23,60	35	50	2.13	1801	1.801	71.72	2,97
119	23,80	37	53	2.40	1849	1.849	75.72	3,17
120	24,00	40	58	2.27	1894	1.894	81.79	2,78
121	24,20	54	71	2.27	1940	1.940	109.79	2,07
122	24,40	67	84	2.53	1990	1.990	135.79	1,86
123	24,60	70	89	2.67	2044	2.044	141.79	1,88
124	24,80	73	93	2.67	2097	2.097	147.79	1,81
125	25,00	78	98	2.67	2150	2.150	157.86	1,69
126	25,20	85	105	3.07	2212	2.212	171.86	1,79
127	25,40	87	110	2.80	2268	2.268	175.86	1,59
128	25,60	94	115	3.60	2340	2.340	189.86	1,90
129	25,80	100	127	3.33	2406	2.406	201.86	1,65
130	26,00	125	150	3.73	2481	2.481	251.93	1,48
131	26,20	140	168	0.00	2481	2.481	281.93	0,00