



DEPARTEMEN PENDIDIKAN DAN KEBUDAYAAN  
**LABORATORIUM MEKANIKA TANAH**  
 JURUSAN TEKNIK SIPIL, FAKULTAS TEKNIK  
 UNIVERSITAS SRIWIJAYA

Project: Pengeroban Rutin & Perangulangan  
 Keadaan Darurat Jalan & Jembatan  
 No Bor: 2, 00m - 4,00 m  
 Lokasi: Pasir Putih (F) Sakti - P. (man)  
 Sta: 328+300

Dikaji oleh: Herman  
 Diperiksa oleh: Indra Ch. Sun. Ms  
 Tanggal: 08 Juni 2003

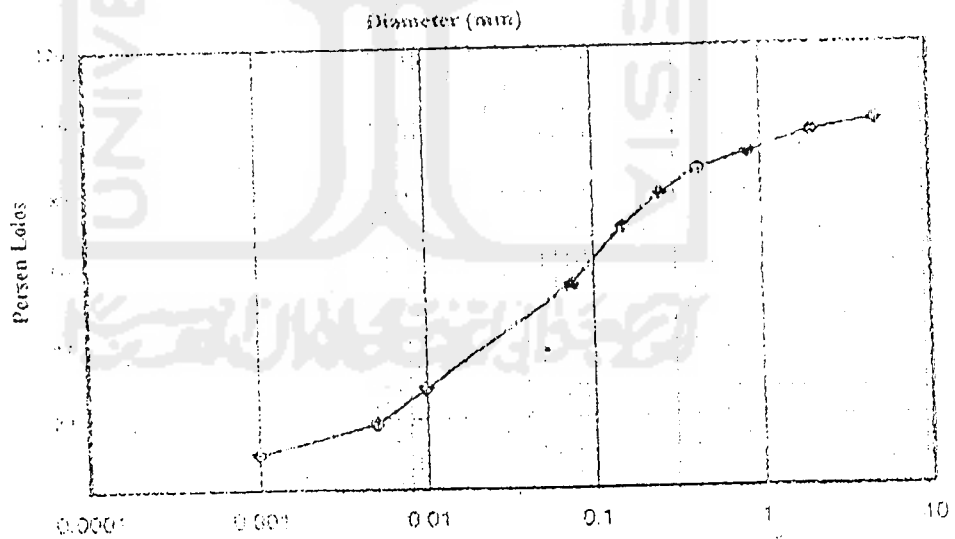
**ANALISA SARINGAN**  
 ( SIEVE ANALYSIS )

Fraisi kasar: halus

Berat Tanah Kering  $W = 368.17$  gram

Saringan no	Diameter Isih (mm)	Berat Tanah Tertahan (gram)	Kumulatif Tertahan (gram)	Kumulatif Tertahan %	Lolos %	Keterangan
4	4.760	0.00	0.00	0.00	100.00	
10	2.000	10.45	10.45	2.74	97.16	
20	0.840	21.45	31.90	8.66	91.34	
40	0.420	16.99	48.89	13.28	86.72	
60	0.250	25.29	74.68	20.28	79.72	
100	0.149	34.56	109.24	29.67	70.33	
200	0.074	56.87	166.11	45.12	54.88	
PAN	0.010	99.32	265.23	72.04	27.93	
	0.005	31.00			18.73	Hydrometer
	0.001	68.44			10.34	

Grafik Analisis Saringan





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JURUSAN TEKNIK SIPIL FAKULTAS TEKNIK  
UNIVERSITAS SRIWIJAYA

Proyek : Pengeroban Ruam & Penanggulangan  
Keadaan Darurat Jalan & Jembatan  
No Bor : 600 - 800 m  
Lokasi : Pasir Putih (Tj Sakti - P Timur)  
Sta : 328+800

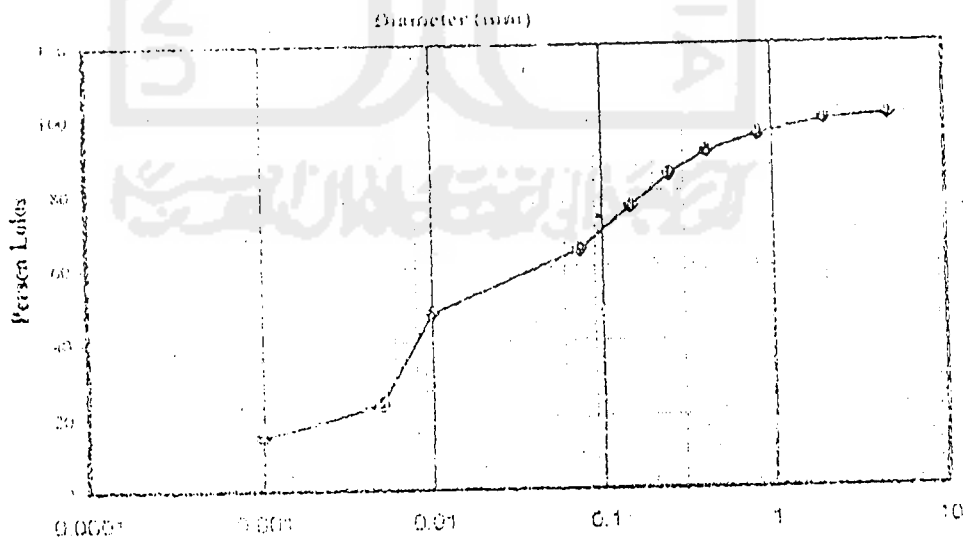
Dilaksanakan : Hernan  
Diperiksa : Ir Indra Ch San, MS  
Tanggal : 08 Juni 2003

ANALISA SARINGAN  
(SIEVE ANALYSIS)

Fraksi kasar bahan Berat Tanah Kering W = 402.91 gram

Saringan no	Diameter (mm)	Berat Tertahan (gram)	Kumulatif Tertahan (gram)	Kumulatif Tertahan (%)	Lolos (%)	Keterangan
4	4.750	0.00	0.00	0.00	100.00	
10	2.000	4.56	4.56	1.13	98.87	
20	0.840	16.12	20.68	5.13	94.87	
40	0.420	17.22	37.90	9.41	90.59	
60	0.250	24.36	62.26	15.50	84.50	
100	0.149	35.23	97.49	24.23	75.77	
200	0.075	45.39	142.88	35.61	64.39	
PAK	0.010	67.34	310.82	52.32	47.68	
	0.005	93.44			23.33	hydrometer
	0.001	98.65			14.36	

Grafik Analisis Saringan





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JURUSAN TEKNIK SIPIL, FAKULTAS TEKNIK  
UNIVERSITAS SRIWIJAYA

PERCOBAAN KONSOLIDASI DAN PENURUNAN TANAH

Proyek : Pengendalian Rutin dan Pemeliharaan  
Keadaan Darurat Jalan dan Jembatan  
Lokasi : Bukit Simpur, Pasir Putih (Tj. Sakti-P. Timun)  
Sta : 328 + 800

Dikerjakan : Herman  
Diperiksa : Ir. Indra Cb. San, MS  
Tanggal : 10 Juni 2003

Ring	2.00 - 4.00	6.00 - 8.00
Dalam muka tanah	Pasir kelepungan	Pasir kelepungan
Jenis tanah		
1. Berat ring + tanah basah (gr)	478,56	555,37
2. Berat ring (gr)	230,30	230,30
3. Berat tanah basah (1) - (2) (gr)	298,26	325,07
4. Berat bahan kering (gr)	142,29	258,07
5. Volume tanah basah (cm <sup>3</sup> )	163,98	163,98
6. Volume tanah kering (4)/(11) (cm <sup>3</sup> )	53,69	97,57
7. Berat volume tanah kering (4)/(5) (gr/cm <sup>3</sup> )	0,868	1,577
8. (5) - (6) (gr)	110,29	66,41
9. Angka Pori $\frac{(12)}{100 - (12)}$	3,054	0,681
10. Air dalam bahan kering (%)	109,61	25,86
11. Berat jenis	2,650	2,645
12. Pori dari tanah basah (8)/(5) x 100	67,26	40,50
13. Berat volume tanah basah (3)/(5) (gr/cm <sup>3</sup> )	1,819	1,982
14. Derajat kejenuhan $\frac{(3 - 4) \times 100}{(8)}$	109	109





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JURUSAN TEKNIK SIPIL FAKULTAS TEKNIK  
UNIVERSITAS SRIWIJAYA

PERCOBAAN KONSOLIDASI DAN PENURUNAN TANAH

Proyek : Pengendalian Rutin dan Penanggulangan  
Keadaan Darurat Jalan dan Jembatan  
Lokasi : Sungai Manna, Pasir Putih (Tj. Sakti-P. Timun)  
Sta : 328 + 800

Dikerjakan : Herman  
Diperiksa : Ir. Indra Cb. San, MS  
Tanggal : 10 Juni 2003

Ring	2.00 - 4.0'	6.00 - 8.00
Dalam muka tanah	Lempung kepasiran	Lempung kepasiran
Jenis tanah		
1. Berat ring + tanah basah (gr)	465,84	530,60
2. Berat ring (gr)	230,30	230,30
3. Berat tanah basah (1) - (2) (gr)	235,54	300,30
4. Berat bahan kering (gr)	128,11	250,20
5. Volume tanah basah (cm <sup>3</sup> )	163,98	163,98
6. Volume tanah kering (4)/(11) (cm <sup>3</sup> )	48,34	94,50
7. Berat volume tanah kering (4)/(5) (gr/cm <sup>3</sup> )	0,781	1,526
8. (5) - (6) (cm <sup>3</sup> )	115,64	69,39
9. Angka Pori $\frac{(12)}{100 - (12)}$	2,392	0,734
10. Air dalam bahan kering (%)	83,85	26,92
11. Berat jenis	2,650	2,645
12. Pori dari tanah basah $(8)/(5) \times 100$	70,52	42,52
13. Berat volume tanah basah (3)/(5) (gr/cm <sup>3</sup> )	1,436	1,831
14. Derajat kejenuhan $\frac{(3 - 4) \times 100}{(8)}$	92,9	72,2





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**PERCOBAAN GESER LANGSUNG**

Proyek : Pengendalian Rutin dan Penanggulangan  
 Keadaan Darurat Jalan dan Jembatan  
 No. Bor : 6.00-8.00  
 Lokasi : Sungai Manna, Pasir Putih (Tj. Sakti-P. Timun)  
 Sta : 328 + 800

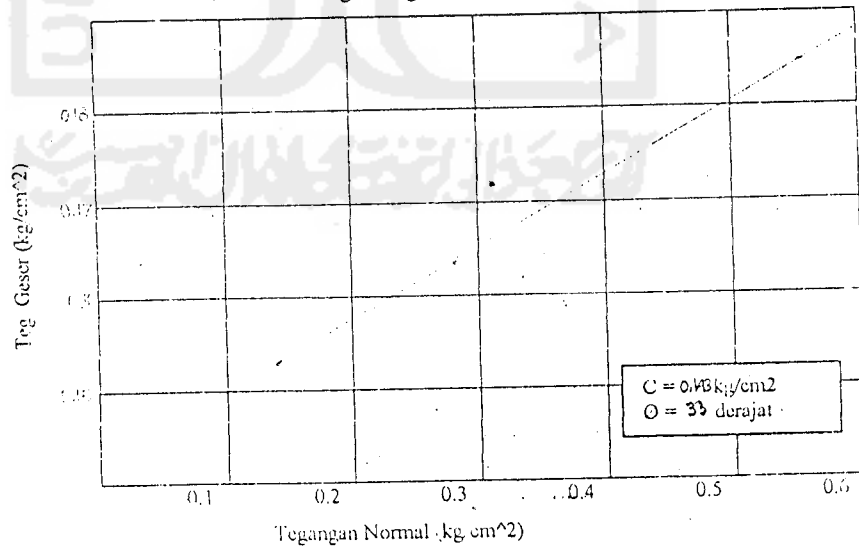
Dikejakan : Herman  
 Diperiksa : Ir. Indra Cb. San, MS  
 Tanggal : 9 Juni 2003

Diameter contoh : 6.00 cm  
 Luas contoh : 28.27 cm<sup>2</sup>  
 Tinggi contoh : 3.00 cm

Volume contoh V : 84.82 cm<sup>3</sup>  
 Proving Ring K : 0.44 kg/cm<sup>2</sup>

Waktu (detik)	P <sub>1</sub> = 4 kg σ <sub>1</sub> = 0,1415 kg/cm <sup>2</sup>			P <sub>2</sub> = 8 kg σ <sub>2</sub> = 0,2829 kg/cm <sup>2</sup>			P <sub>3</sub> = 16 kg σ <sub>3</sub> = 0,5659 kg/cm <sup>2</sup>		
	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser
15	5.00	0.81	0.0711	9.00	1.25	0.0806	12.00	1.78	0.0934
30	12.00	1.22	0.0997	15.38	2.82	0.1132	18.50	2.13	0.1045
45	16.90	3.58	0.1125	18.50	3.80	0.1256	20.54	3.42	0.1162
60	18.50	4.30	0.1345	21.54	4.93	0.1452	23.17	5.75	0.1306
75	19.69	4.92	0.1538	23.08	5.77	0.1638	24.63	6.15	0.1845
90	19.69	4.92	0.1538	23.08	5.77	0.1638	24.63	6.15	0.1845
105	15.38	3.26	0.1012	18.40	3.69	0.1211	20.84	3.57	0.1178
120									
150									
180									
210									
240									
270									
300									
Tegangan geser max			0.1538	0.1638			0.1845		

Grafik Hubungan Teg. Geser dan Teg. Normal





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PERCOBAAN GESER LANGSUNG

Proyek : Pengendalian Rutin dan Penanggulangan Keadaan Darurat Jalan dan Jembatan  
 No. Bor : 2.00-4.00  
 Lokasi : Sungai Manna, Pasir Putih (Tj. Sakti-P.Timun)  
 Sta : 328 + 800

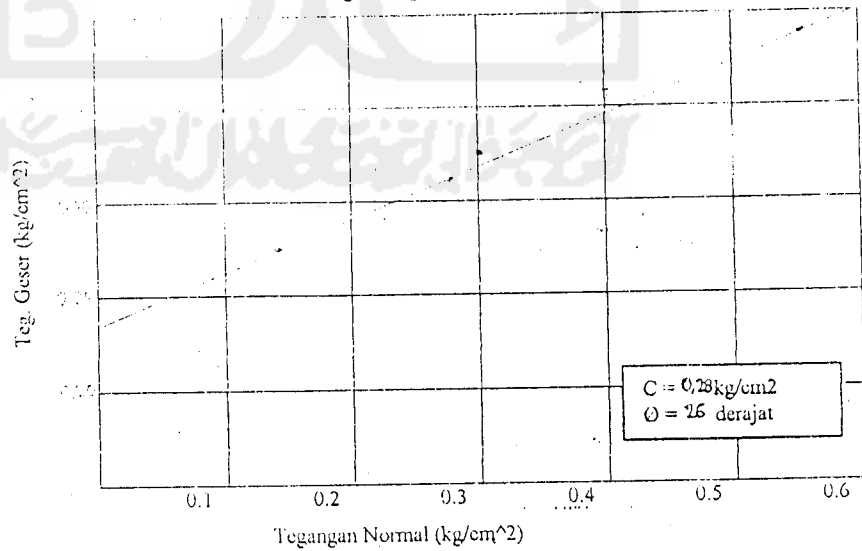
Dikerjakan : Herman  
 Diperiksa : Ir. Indra Cb. San MS  
 Tanggal : 9 Juni 2003

Diameter contoh : 6.00 cm  
 Luas contoh : 28.27 cm<sup>2</sup>  
 Tinggi contoh : 3.00 cm

Volume contoh V : 84.82 cm<sup>3</sup>  
 Proving Ring K : 0.44 kg/cm<sup>2</sup>

Waktu (detik)	P <sub>1</sub> = 4 kg σ <sub>1</sub> = 0,1415 kg/cm <sup>2</sup>			P <sub>1</sub> = 8 kg σ <sub>1</sub> = 0,2829 kg/cm <sup>2</sup>			P <sub>1</sub> = 16 kg σ <sub>1</sub> = 0,5659 kg/cm <sup>2</sup>			
	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	
15	5.00	1.24	0.0742	6.00	1.39	0.1402	7.00	1.49	0.1656	
30	6.50	2.66	0.0953	8.00	2.26	0.1688	8.80	2.48	0.1849	
45	8.00	4.58	0.1162	10.40	5.64	0.2013	10.50	4.14	0.2063	
60	11.20	7.13	0.1495	12.00	6.02	0.2436	12.70	5.37	0.2285	
75	12.00	7.94	0.2258	13.60	7.63	0.3024	15.20	7.86	0.2713	
90	12.80	8.23	0.2560	14.40	8.47	0.3125	16.60	9.20	0.3447	
105	12.80	8.23	0.2560	16.80	10.80	0.3360	17.60	10.21	0.3623	
120				16.80	10.80	0.3360	19.20	12.35	0.3840	
150							19.20	12.35	0.3840	
180										
210										
240										
270										
300										
Tegangan geser max			0.2560				0.3360	0.3840		

Grafik Hubungan Teg. Geser dan Teg. Normal





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 UNIVERSITAS SRIWIJAYA

**PERCOBAAN GESER LANGSUNG**

Proyek : Pengendalian Rutin dan Penanggulangan Keadaan Darurat Jalan dan Jembatan  
 No. Bor : 6.00-8.00  
 Lokasi : Bukit Simpur, Pasir Putih (Tj. Sakti-P.Timun)  
 Sta : 328 + 800

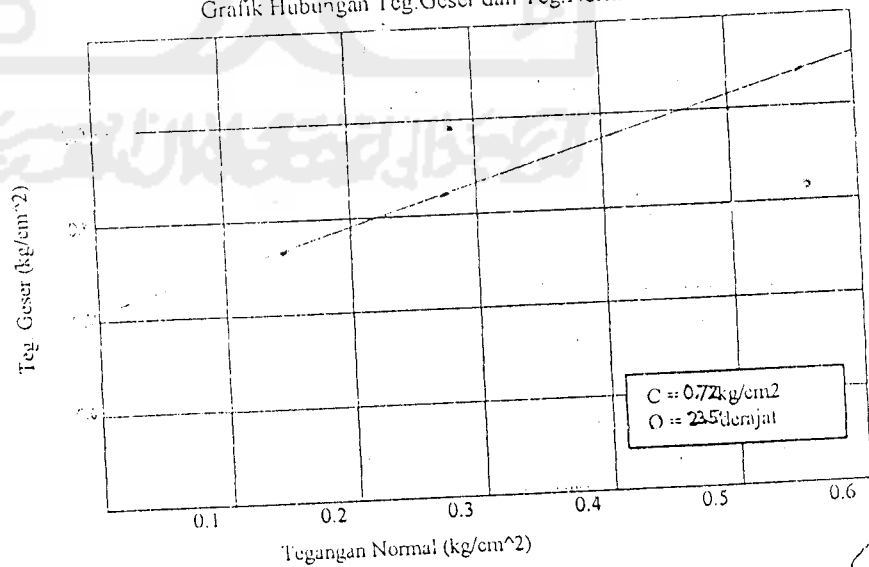
Dikerjakan : Herman  
 Diperiksa : Ir. Indra Cb. San, MS  
 Tanggal : 9 Juni 2003

Diameter contoh : 6.00 cm  
 Luas contoh : 28.27 cm<sup>2</sup>  
 Tinggi contoh : 3.00 cm

Volume contoh V : 84.82 cm<sup>3</sup>  
 Proving Ring K : 0.14 kg/cm<sup>2</sup>

Waktu (detik)	P <sub>1</sub> = 4 kg σ <sub>v</sub> = 0,1415 kg/cm <sup>2</sup>			P <sub>2</sub> = 8 kg σ <sub>v</sub> = 0,2829 kg/cm <sup>2</sup>			P <sub>3</sub> = 16 kg σ <sub>v</sub> = 0,5659 kg/cm <sup>2</sup>			
	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	
15	6.00	2.61	0.0934	7.00	3.08	0.1089	13.00	5.72	0.2023	
30	7.00	3.08	0.1089	12.50	5.50	0.1943	15.20	6.69	0.2365	
45	8.00	3.52	0.1245	16.00	7.04	0.2498	19.46	6.72	0.2871	
60	12.00	5.28	0.1867	23.00	10.12	0.3579	22.67	14.37	0.5086	
75	18.00	6.31	0.2231	24.60	10.67	0.3617	36.94	16.87	0.6086	
90	25.70	6.93	0.2443	25.50	11.22	0.3968	49.40	17.78	0.6287	
105	26.63	10.73	0.4150	32.00	14.08	0.4980	48.60	21.38	0.7563	
120	27.12	11.93	0.4220	42.12	18.53	0.6555	52.30	23.01	0.8139	
150	28.30	12.24	0.5656	46.27	20.36	0.7200	55.00	25.13	0.8891	
180	38.45	16.92	0.5984	53.65	23.61	0.8349	60.34	26.55	0.9390	
210	45.68	20.30	0.7109	53.65	23.61	0.8349	60.34	26.55	0.9390	
240	46.56	20.49	0.7216							
270	49.56	21.81	0.7712							
300	49.56	21.81	0.7712							
Tegangan geser max			0.7712				0.8349	0.9390		

Grafik Hubungan Teg. Geser dan Teg. Normal







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**PERCOBAAN GESER LANGSUNG**

Proyek : Pengendalian Rutin dan Penanggulangan  
 Keadaan Darurat Jalan dan Embatan  
 No. Bor : 2.00-4.00  
 Lokasi : Bukit Simpur, Pasir Putih (Tj. Sakti-P.Timun)  
 Sta : 328 + 800

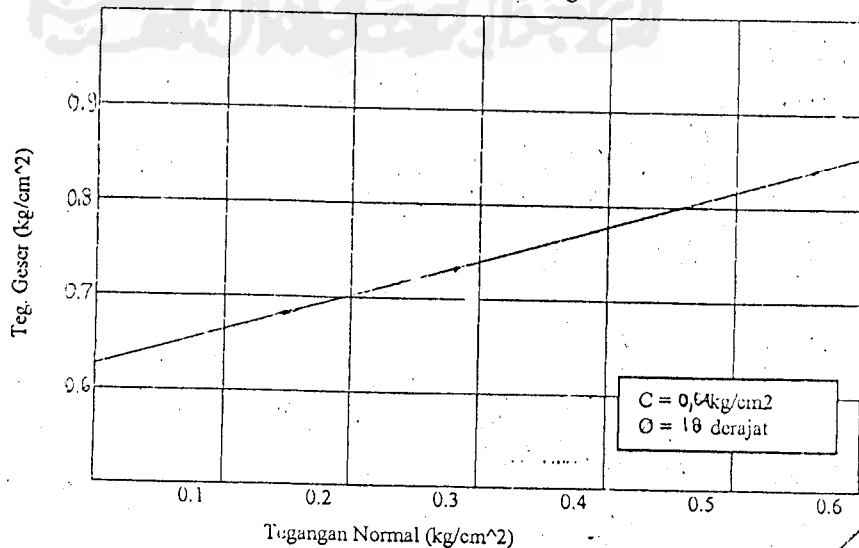
Dikerjakan : Herman  
 Diperiksa : Ir. Indra Ch. San, MS  
 Tanggal : 9 Juni 2003

Diameter contoh : 6.00 cm  
 Luas contoh : 28.27 cm<sup>2</sup>  
 Tinggi contoh : 3.00 cm

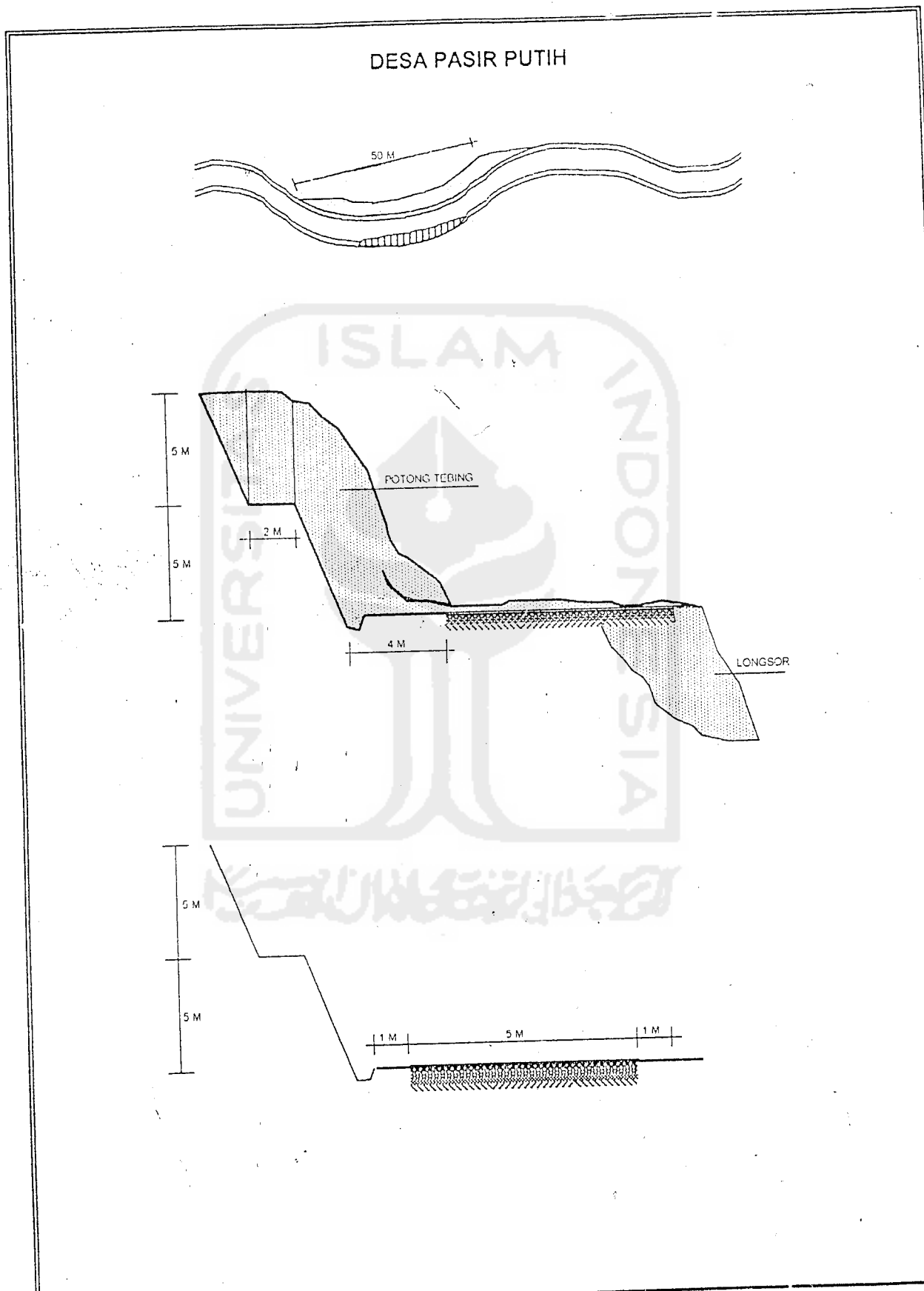
Volume contoh V : 84.82 cm<sup>3</sup>  
 Proving Ring K : 0.44 kg/cm<sup>2</sup>

Waktu (detik)	P <sub>1</sub> = 4 kg σ <sub>1</sub> = 0,1415 kg/cm <sup>2</sup>			P <sub>2</sub> = 8 kg σ <sub>2</sub> = 0,2829 kg/cm <sup>2</sup>			P <sub>3</sub> = 16 kg σ <sub>3</sub> = 0,5659 kg/cm <sup>2</sup>			
	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	
	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser	
15	4.00	1.76	0.0612	8.00	3.52	0.1245	10.00	4.40	0.1556	
30	5.00	2.20	0.0778	12.00	5.28	0.1865	13.00	5.72	0.2023	
45	7.00	3.08	0.1089	15.00	6.60	0.2334	17.00	7.48	0.2646	
60	8.00	6.16	0.2179	21.00	9.24	0.3268	25.00	11.00	0.3890	
75	12.00	8.36	0.2955	24.35	10.71	0.3780	34.00	14.96	0.5291	
90	24.00	10.56	0.3735	26.70	11.75	0.4155	35.45	15.60	0.5517	
105	25.00	12.32	0.4347	29.00	12.76	0.4315	45.34	19.05	0.7056	
120	26.00	12.44	0.4046	35.00	15.40	0.5447	47.68	20.98	0.7420	
150	28.12	12.37	0.4376	37.00	16.28	0.5758	53.14	23.38	0.8270	
180	30.45	13.40	0.4735	44.00	19.36	0.6847	53.14	23.38	0.8270	
210	32.50	14.34	0.3072	47.44	20.88	0.7384				
240	34.30	15.12	0.5347							
270	35.24	15.51	0.5484							
300	39.10	18.25	0.6094							
330	44.28	19.48	0.6891							
360	44.28	19.48	0.6891							
Tegangan geser maksimum			0.6891				0.7384			

Grafik Hubungan Teg. Geser dan Teg. Normal



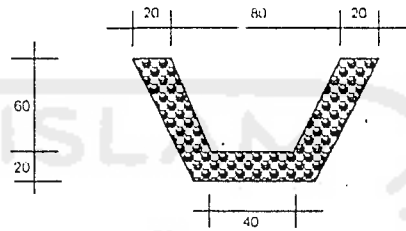
11



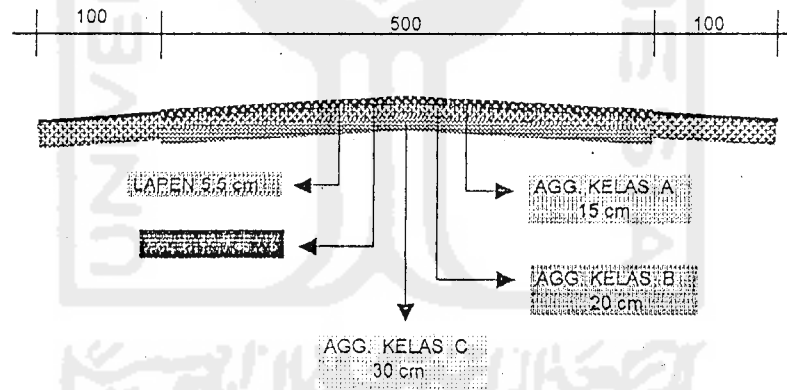
Skala	: Not Scale	FARAF	<b>KETERANGAN</b> PEKERJAAN POTONG TEBING DESA PASIR PUTIH KABUPATEN LAHAT
Di Gambar	: Ass. Teknik		
Direncanakan	: Ass. Teknik		
Diperiksa	: Pimpro		
Disetujui	: Kasubdis BPPT		
PROYEK PENGENDALIAN RUTIN DAN PENANGGULANGAN			LEMBAR

# DESA PASIR PUTIH

## SIRING PASANGAN



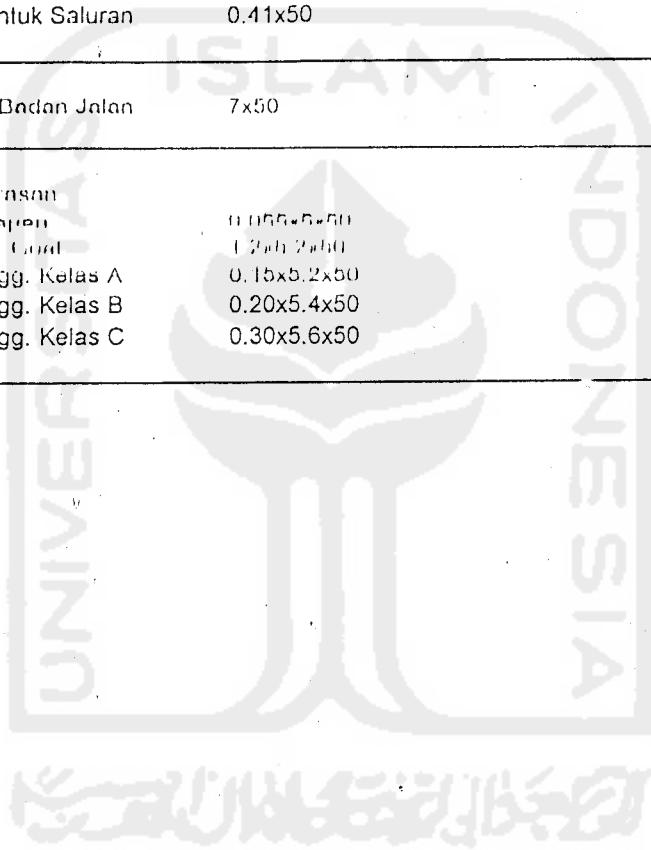
## PERKERASAN JALAN

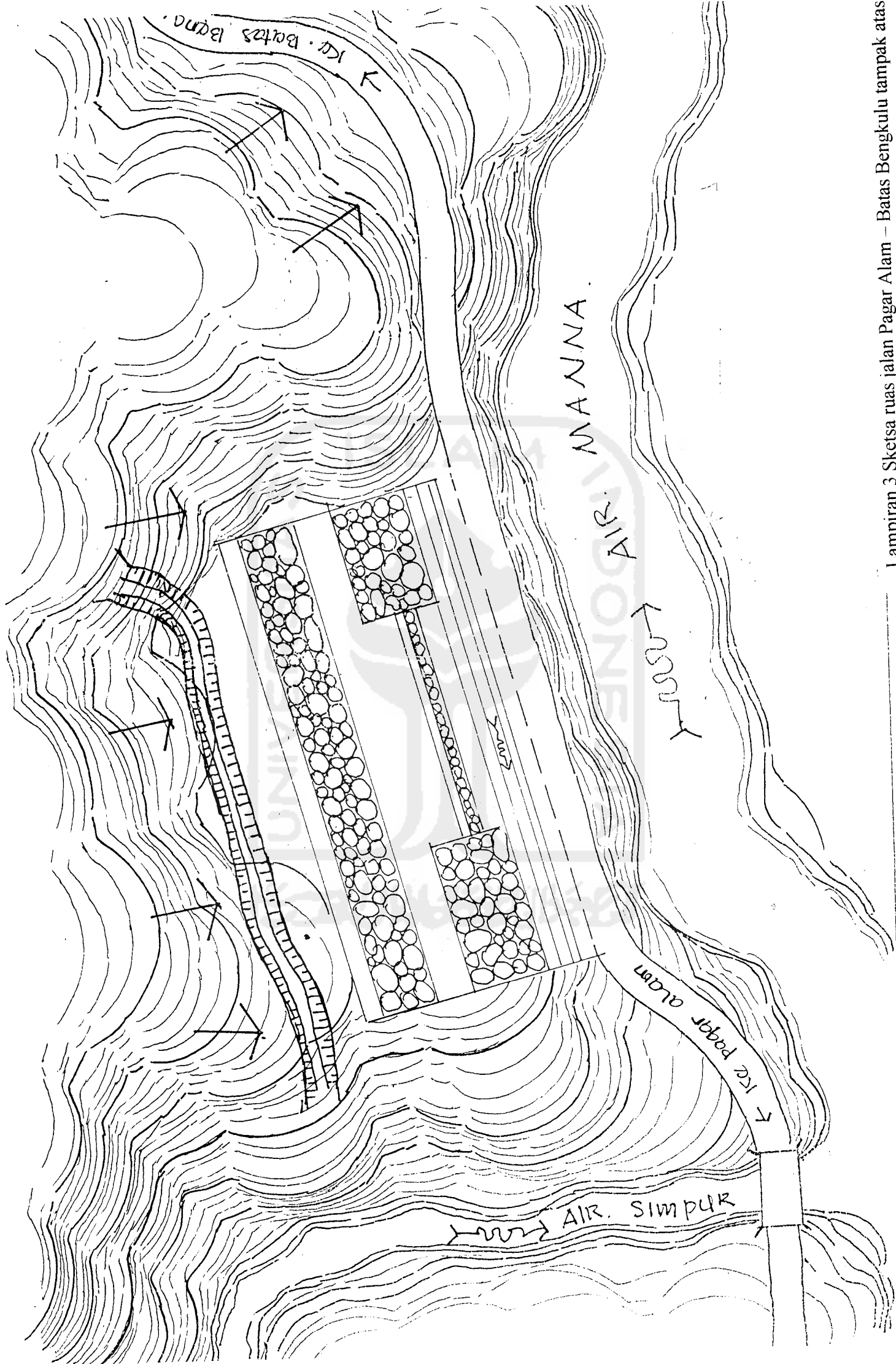


Skala	: Not Scale	FARAF	KETERANGAN
Di Gambar	: Ass. Teknik		PEKERJAAN SALURAN DAN REKONDISI JALAN
Direncanakan	: Ass. Teknik		DESA PASIR PUTIH
Diperiksa	: Pimpro		KABUPATEN LAHAT
Disetujui	: Kasubdis BPPT		
PROYEK PENGENDALIAN RUTIN DAN PENANGGULANGAN KEADAAN DARURAT JALAN DAN JEMBATAN SUM.SEL 'A. 2002			LEMBAR KE
DINAS PU BINA MARGA PROPINSI SUMATERA SELATAN			2

PERHITUNGAN VOLUME  
DESA PASIR PUTIH

> Pek. Galian		
Potong Tebing		
Gal. Biasa	86.217x50x0.9	3879.765 m <sup>3</sup>
Gal. Padas	86.217x50x0.1	431.085 m <sup>3</sup>
Gal. Saluran	$((1.2+0.7)/2) \times 50$	47.5 m <sup>3</sup>
> Pek. Pas. Batu		
Untuk Saluran	0.41x50	20.5 m <sup>3</sup>
> Ponglapan Badan Jalan		
	7x50	350 m <sup>3</sup>
> Pek. Perkerasan		
Lapen	0.055x5x50	13.75 m <sup>3</sup>
P. Land	1.2x5x50	30 m <sup>3</sup>
Agg. Kelas A	0.15x5.2x50	39 m <sup>3</sup>
Agg. Kelas B	0.20x5.4x50	54 m <sup>3</sup>
Agg. Kelas C	0.30x5.6x50	84 m <sup>3</sup>

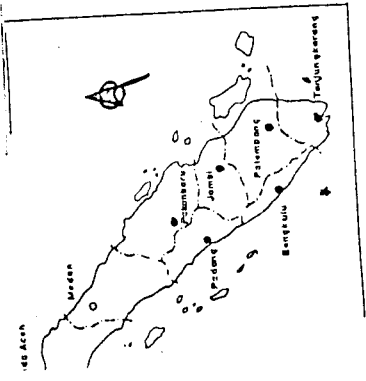
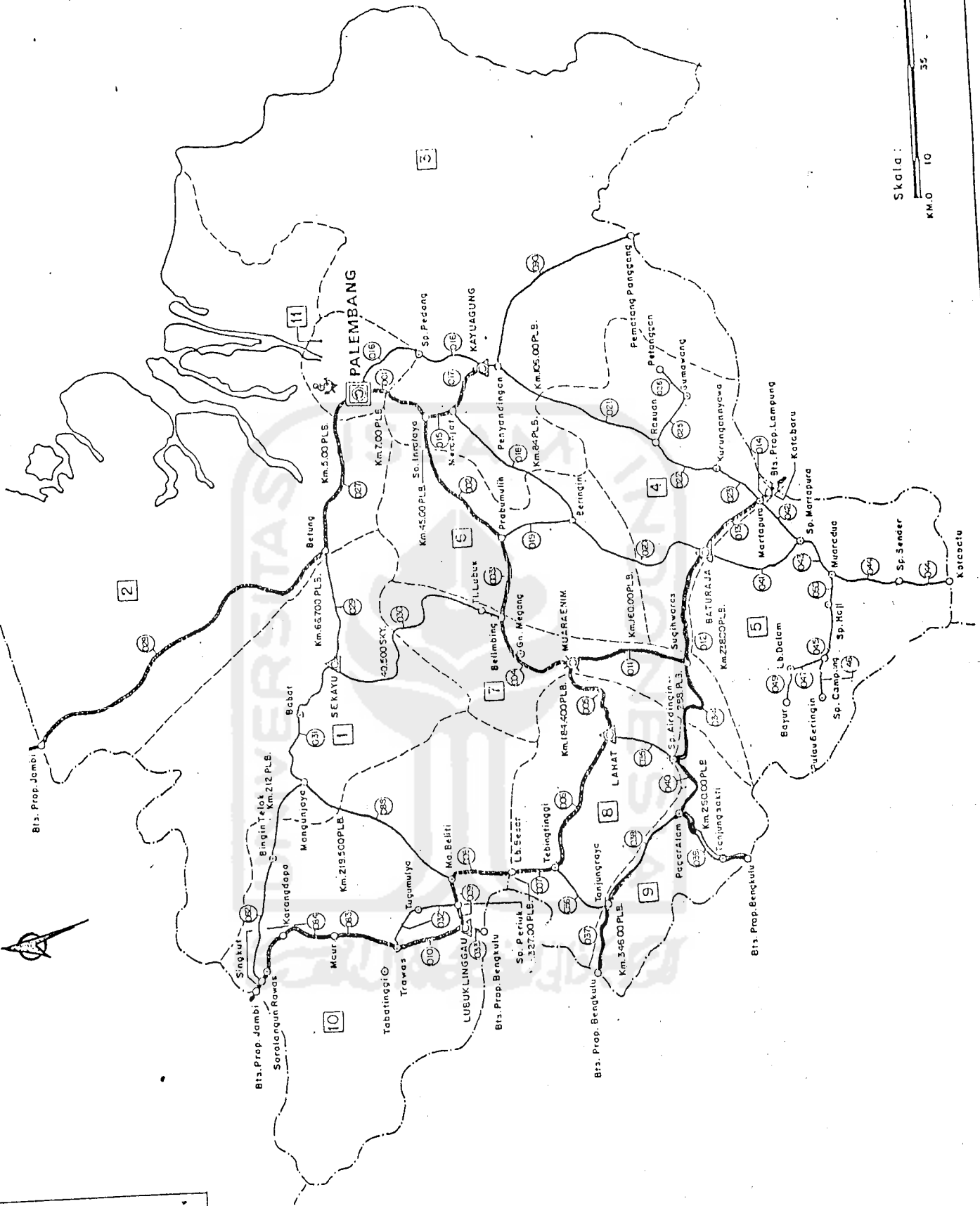




Lampiran 3 Sketsa ruas jalan Pagar Alam – Batas Bengkulu tampak atas

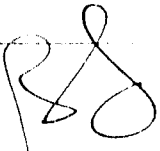

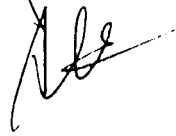



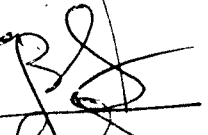

**PETA WEWENANG PEMBINAAN JALAN NASIONAL DAN PROFINSI DALAM PELITA V**

**Lampiran 4 Peta Wewenang Pembinaan Jalan propinsi Sumatera Selatan**



Skala :  
 KM.0 10 20 35

## CATATAN KONSULTASI TUGAS AKHIR

NO	TANGGAL	CATATAN KONSULTASI	TANDA TANGAN
	14-Apr	Pertemuan konsultasi Pasukan di dasar teori ketada lugu	
	25-Apr 03	✓ Proposal Aceh di lembul tahun pd pemb II	
	25/4 2003	Kelompok USDA dicores daftar pasrah pemerintah jenis kelayak - proyek - cara penyusunan	
	30/4 2003	Dapat Summar Proposal Min DP-I	
	9/8 2003	Dapat uang min DP-I	
		hitung dg variabel kantar a	
		<del>kembali konsultasi</del> pd Pemb. Dua	
	30/12 03	dilanjutkan ke DP I	
	1/13-04	- Pertanyaan di beri tanda lempapri intisari	
	7/1-04	Aceh untuk disidangkan	

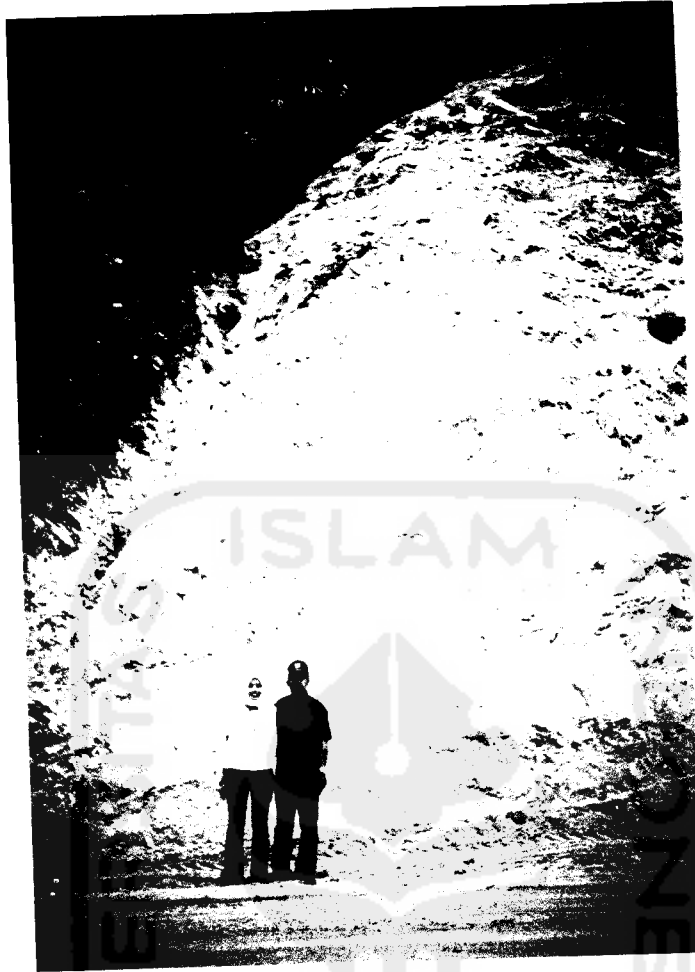


Longsoran Lereng Bukit Simpur yang ditimbun ke Tebing Sungai Manna



Aliran sungai di kaki Tebing Sungai Manna





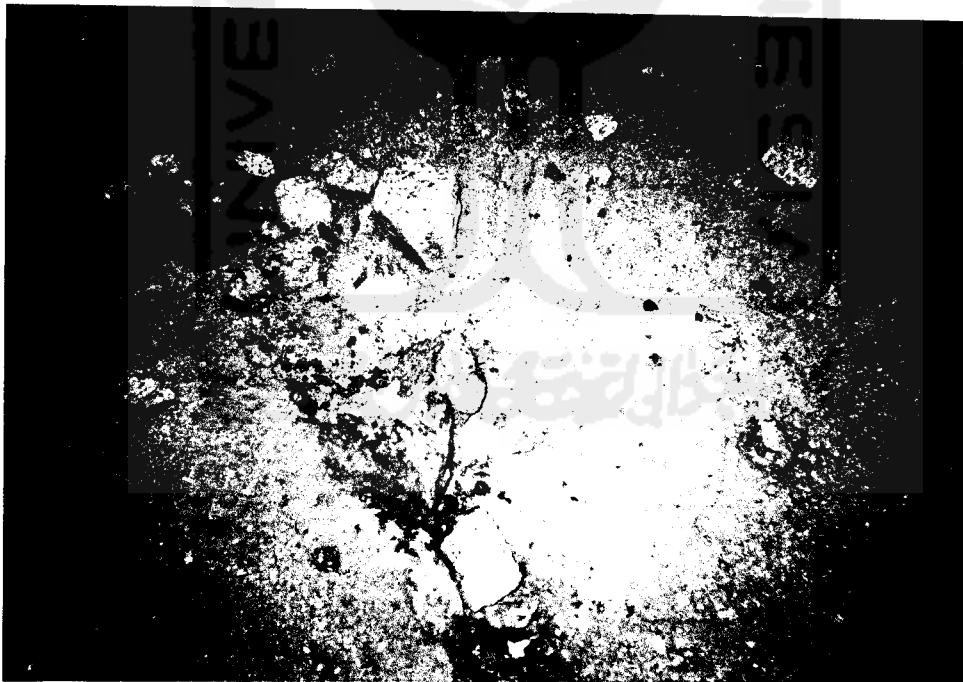
Ketinggian Lereng Bukit Simpur



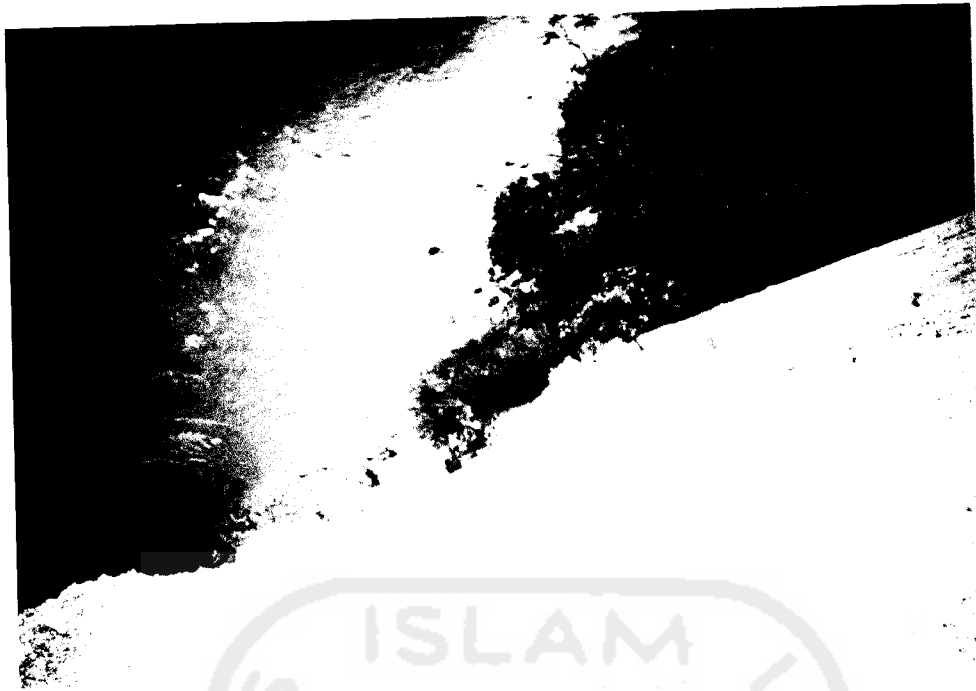
Drainasi jalan yang tertimbun longsor Lereng Bukit Simpur



Kondisi permukaan Lereng Bukit Simpur setelah longsor



Tanah Lereng Bukit Simpur yang membatu



Tebing Sungai Manna yang tertimbun longsor Lereng Bukit Simpurn



Bukit yang sejajar Tebing Sungai Manna

SUMMARY OF CALCULATION  
CENTER OF ROTATION Sungai Manna (h=15m)

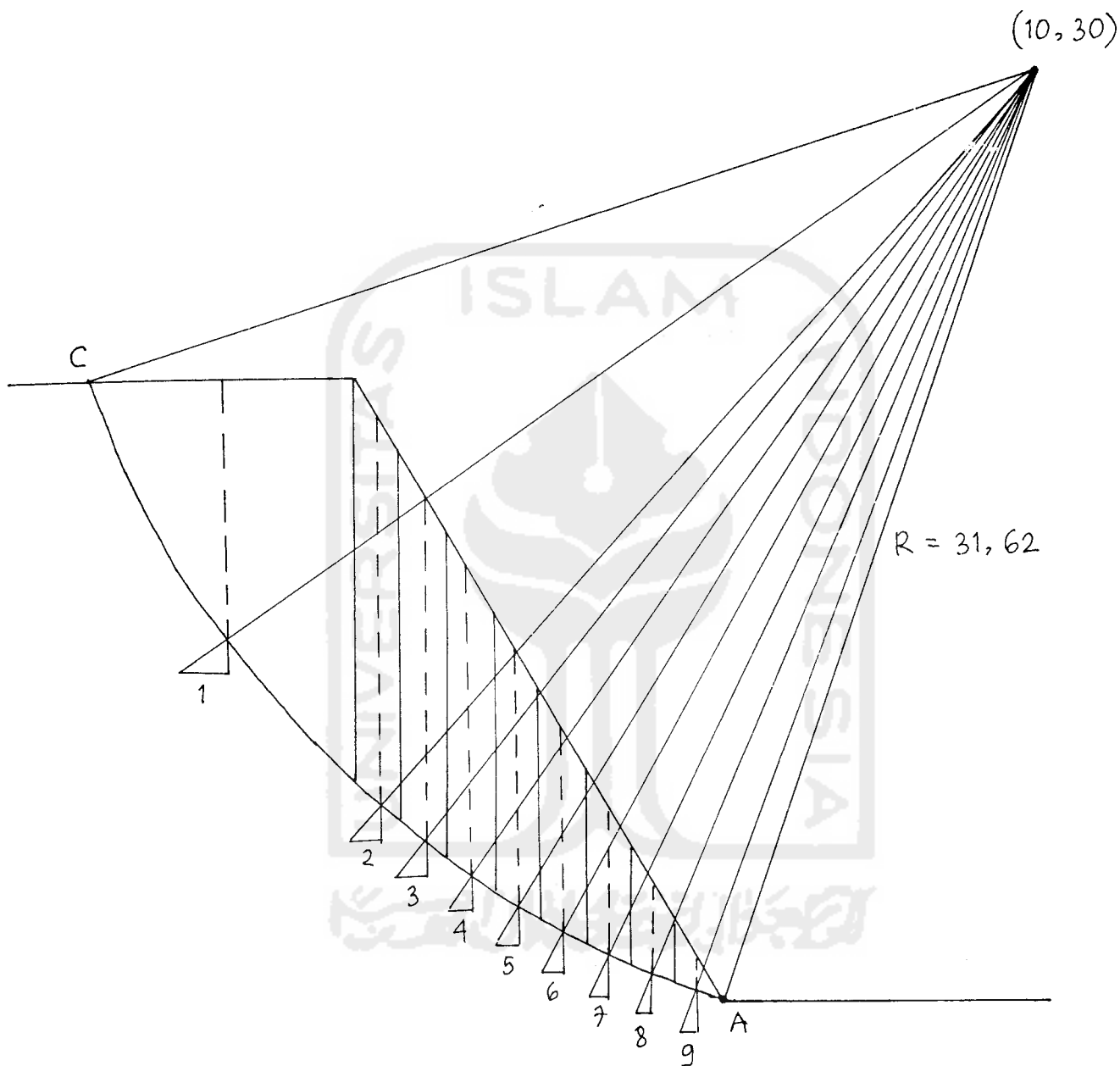
No	X COORD	Y COORD	RADIUS	θ	LAC
1	-15.00	15.00	21.21	45	16.668
2	-14.00	15.00	20.52		0.000
3	-13.00	15.00	19.85		0.000
4	-12.00	15.00	19.21		0.000
5	-11.00	15.00	18.60		0.000
6	-10.00	15.00	18.03		0.000
7	-9.00	15.00	17.49		0.000
8	-8.00	15.00	17.00		0.000
9	-7.00	15.00	16.55		0.000
10	-6.00	15.00	16.16		0.000
11	-5.00	15.00	15.81	45	12.423
12	-15.00	16.00	21.93	45	17.041
13	-14.00	16.00	21.26		0.000
14	-13.00	16.00	20.62		0.000
15	-12.00	16.00	20.00		0.000
16	-11.00	16.00	19.42		0.000
17	-10.00	16.00	18.87		0.000
18	-9.00	16.00	18.36		0.000
19	-8.00	16.00	17.89		0.000
20	-7.00	16.00	17.46		0.000
21	-6.00	16.00	17.09		0.000
22	-5.00	16.00	16.76	69	20.195
23	-15.00	17.00	22.67	44	17.418
24	-14.00	17.00	22.02		0.000
25	-13.00	17.00	21.40		0.000
26	-12.00	17.00	20.81		0.000
27	-11.00	17.00	20.25		0.000
28	-10.00	17.00	19.72		0.000
29	-9.00	17.00	19.24		0.000
30	-8.00	17.00	18.79		0.000
31	-7.00	17.00	18.38		0.000
32	-6.00	17.00	18.03		0.000
33	-5.00	17.00	17.72	67	20.730
34	-15.00	18.00	23.43	43	17.592
35	-14.00	18.00	22.80		0.000
36	-13.00	18.00	22.20		0.000
37	-12.00	18.00	21.63		0.000
38	-11.00	18.00	21.10		0.000
39	-10.00	18.00	20.59		0.000
40	-9.00	18.00	20.12		0.000
41	-8.00	18.00	19.70		0.000
42	-7.00	18.00	19.31		0.000
43	-6.00	18.00	18.97		0.000
44	-5.00	18.00	18.68	65	21.202
45	-15.00	19.00	24.21	42	17.752
46	-14.00	19.00	23.60		0.000
47	-13.00	19.00	23.02		0.000
48	-12.00	19.00	22.47		0.000
49	-11.00	19.00	21.95		0.000
50	-10.00	19.00	21.47		0.000
51	-9.00	19.00	21.02		0.000
52	-8.00	19.00	20.62		0.000
53	-7.00	19.00	20.25		0.000
54	-6.00	19.00	19.92		0.000
55	-5.00	19.00	19.65	65	22.298
56	-15.00	20.00	25.00	42	18.333
57	-14.00	20.00	24.41		0.000
58	-13.00	20.00	23.85		0.000
59	-12.00	20.00	23.32		0.000
60	-11.00	20.00	22.83		0.000
61	-10.00	20.00	22.36		0.000

No	X COORD	Y COORD	RADIUS	θ	LAC
62	-9.00	20.00	21.93		0.000
63	-8.00	20.00	21.54		0.000
64	-7.00	20.00	21.19		0.000
65	-6.00	20.00	20.88		0.000
66	-5.00	20.00	20.62	62	22.317
67	-15.00	21.00	25.81	41	18.475
68	-14.00	21.00	25.24		0.000
69	-13.00	21.00	24.70		0.000
70	-12.00	21.00	24.19		0.000
71	-11.00	21.00	23.71		0.000
72	-10.00	21.00	23.26		0.000
73	-9.00	21.00	22.85		0.000
74	-8.00	21.00	22.47		0.000
75	-7.00	21.00	22.14		0.000
76	-6.00	21.00	21.84		0.000
77	-5.00	21.00	21.59	60	22.615
78	-15.00	22.00	26.63	41	19.062
79	-14.00	22.00	26.08		0.000
80	-13.00	22.00	25.55		0.000
81	-12.00	22.00	25.06		0.000
82	-11.00	22.00	24.60		0.000
83	-10.00	22.00	24.17		0.000
84	-9.00	22.00	23.77		0.000
85	-8.00	22.00	23.41		0.000
86	-7.00	22.00	23.09		0.000
87	-6.00	22.00	22.80		0.000
88	-5.00	22.00	22.56	59	23.241
89	-15.00	23.00	27.46	40	19.178
90	-14.00	23.00	26.93		0.000
91	-13.00	23.00	26.42		0.000
92	-12.00	23.00	25.94		0.000
93	-11.00	23.00	25.50		0.000
94	-10.00	23.00	25.08		0.000
95	-9.00	23.00	24.70		0.000
96	-8.00	23.00	24.35		0.000
97	-7.00	23.00	24.04		0.000
98	-6.00	23.00	23.77		0.000
99	-5.00	23.00	23.54	58	23.836
100	-15.00	24.00	28.30	39	19.272
101	-14.00	24.00	27.78		0.000
102	-13.00	24.00	27.29		0.000
103	-12.00	24.00	26.83		0.000
104	-11.00	24.00	26.40		0.000
105	-10.00	24.00	26.00		0.000
106	-9.00	24.00	25.63		0.000
107	-8.00	24.00	25.30		0.000
108	-7.00	24.00	25.00		0.000
109	-6.00	24.00	24.74		0.000
110	-5.00	24.00	24.52	57	24.399
111	-15.00	25.00	29.15	39	19.853
112	-14.00	25.00	28.65		0.000
113	-13.00	25.00	28.18		0.000
114	-12.00	25.00	27.73		0.000
115	-11.00	25.00	27.31		0.000
116	-10.00	25.00	26.93		0.000
117	-9.00	25.00	26.57		0.000
118	-8.00	25.00	26.25		0.000
119	-7.00	25.00	25.96		0.000
120	-6.00	25.00	25.71		0.000
121	-5.00	25.00	25.50	47	20.922

SUMMARY OF CALCULATION  
 CENTER OF ROTATION Bukit Simpur (h=20m)

No	X COORD	Y COORD	RADIUS	θ	LAC
1	-20.00	20.00	28.28	44	21.730
2	-19.00	20.00	27.59		0.000
3	-18.00	20.00	26.91		0.000
4	-17.00	20.00	26.25		0.000
5	-16.00	20.00	25.61		0.000
6	-15.00	20.00	25.00		0.000
7	-14.00	20.00	24.41		0.000
8	-13.00	20.00	23.85		0.000
9	-12.00	20.00	23.32		0.000
10	-11.00	20.00	22.83		0.000
11	-10.00	20.00	22.36	64	24.987
12	-20.00	21.00	29.00	44	22.279
13	-19.00	21.00	28.32		0.000
14	-18.00	21.00	27.66		0.000
15	-17.00	21.00	27.02		0.000
16	-16.00	21.00	26.40		0.000
17	-15.00	21.00	25.81		0.000
18	-14.00	21.00	25.24		0.000
19	-13.00	21.00	24.70		0.000
20	-12.00	21.00	24.19		0.000
21	-11.00	21.00	23.71		0.000
22	-10.00	21.00	23.26	62	25.179
23	-20.00	22.00	29.73	44	22.842
24	-19.00	22.00	29.07		0.000
25	-18.00	22.00	28.43		0.000
26	-17.00	22.00	27.80		0.000
27	-16.00	22.00	27.20		0.000
28	-15.00	22.00	26.63		0.000
29	-14.00	22.00	26.08		0.000
30	-13.00	22.00	25.55		0.000
31	-12.00	22.00	25.06		0.000
32	-11.00	22.00	24.60		0.000
33	-10.00	22.00	24.17	60	25.317
34	-20.00	23.00	30.48	40	21.287
35	-19.00	23.00	29.83		0.000
36	-18.00	23.00	29.21		0.000
37	-17.00	23.00	28.60		0.000
38	-16.00	23.00	28.02		0.000
39	-15.00	23.00	27.46		0.000
40	-14.00	23.00	26.93		0.000
41	-13.00	23.00	26.42		0.000
42	-12.00	23.00	25.94		0.000
43	-11.00	23.00	25.50		0.000
44	-10.00	23.00	25.08	60	26.274
45	-20.00	24.00	31.24	42	22.910
46	-19.00	24.00	30.61		0.000
47	-18.00	24.00	30.00		0.000
48	-17.00	24.00	29.41		0.000
49	-16.00	24.00	28.84		0.000
50	-15.00	24.00	28.30		0.000
51	-14.00	24.00	27.78		0.000
52	-13.00	24.00	27.29		0.000
53	-12.00	24.00	26.83		0.000
54	-11.00	24.00	26.40		0.000
55	-10.00	24.00	26.00	59	26.557
56	-20.00	25.00	32.02	43	23.758
57	-19.00	25.00	31.40		0.000
58	-18.00	25.00	30.81		0.000
59	-17.00	25.00	30.23		0.000
60	-16.00	25.00	29.68		0.000
61	-15.00	25.00	29.15		0.000

No	X COORD	Y COORD	RADIUS	θ	LAC
62	-14.00	25.00	28.65		0.000
63	-13.00	25.00	28.18		0.000
64	-12.00	25.00	27.73		0.000
65	-11.00	25.00	27.31		0.000
66	-10.00	25.00	26.93	57	26.798
67	-20.00	26.00	32.80	42	24.055
68	-19.00	26.00	32.20		0.000
69	-18.00	26.00	31.62		0.000
70	-17.00	26.00	31.06		0.000
71	-16.00	26.00	30.53		0.000
72	-15.00	26.00	30.02		0.000
73	-14.00	26.00	29.53		0.000
74	-13.00	26.00	29.07		0.000
75	-12.00	26.00	28.64		0.000
76	-11.00	26.00	28.23		0.000
77	-10.00	26.00	27.86	57	27.724
78	-20.00	27.00	33.60	42	24.347
79	-19.00	27.00	33.02		0.000
80	-18.00	27.00	32.45		0.000
81	-17.00	27.00	31.91		0.000
82	-16.00	27.00	31.38		0.000
83	-15.00	27.00	30.89		0.000
84	-14.00	27.00	30.41		0.000
85	-13.00	27.00	29.97		0.000
86	-12.00	27.00	29.55		0.000
87	-11.00	27.00	29.15	54	27.489
88	-10.00	27.00	28.79	56	28.153
89	-20.00	28.00	34.41	41	24.633
90	-19.00	28.00	33.84		0.000
91	-18.00	28.00	33.29		0.000
92	-17.00	28.00	32.76		0.000
93	-16.00	28.00	32.25		0.000
94	-15.00	28.00	31.76		0.000
95	-14.00	28.00	31.30		0.000
96	-13.00	28.00	30.87		0.000
97	-12.00	28.00	30.46		0.000
98	-11.00	28.00	30.08		0.000
99	-10.00	28.00	29.73	55	28.552
100	-20.00	29.00	35.23	41	25.219
101	-19.00	29.00	34.67		0.000
102	-18.00	29.00	34.13		0.000
103	-17.00	29.00	33.62		0.000
104	-16.00	29.00	33.12		0.000
105	-15.00	29.00	32.65		0.000
106	-14.00	29.00	32.20		0.000
107	-13.00	29.00	31.78		0.000
108	-12.00	29.00	31.38		0.000
109	-11.00	29.00	31.02		0.000
110	-10.00	29.00	30.68	54	28.923
111	-20.00	30.00	36.06	40	25.182
112	-19.00	30.00	35.51		0.000
113	-18.00	30.00	34.99		0.000
114	-17.00	30.00	34.48		0.000
115	-16.00	30.00	34.00		0.000
116	-15.00	30.00	33.54		0.000
117	-14.00	30.00	33.11		0.000
118	-13.00	30.00	32.70		0.000
119	-12.00	30.00	32.31		0.000
120	-11.00	30.00	31.95		0.000
121	-10.00	30.00	31.62	53	29.264



Gambar Irisan Lereng Bukit Simpur

## Perhitungan kelongsoran Bukit Simpurn dengan sudut kemiringan 60

1.  $X=10$   $y=20$   $R=22.36$

$b = 0.8$   $\theta = 64$

$c = 0.68$

$\varphi = 20.785$

LAC = 24.987

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	0.8	81.0	3.6	5.475	0.156	0.988	0.856	5.407
2	1.44	70.0	7.2	19.710	0.342	0.940	6.741	18.521
3	1.44	60.0	7.4	20.257	0.500	0.866	10.129	17.543
4	1.44	53.5	7.0	19.162	0.595	0.804	11.398	15.404
5	1.44	48.0	6.2	16.972	0.669	0.743	11.357	12.613
6	1.44	44.5	5.2	14.235	0.713	0.701	10.153	9.977
7	1.44	38.0	4.0	10.950	0.788	0.616	8.629	6.741
8	1.44	33.5	2.6	7.117	0.834	0.552	5.935	3.928
9	1.44	29.0	0.8	2.190	0.875	0.485	1.915	1.062
							67.113	91.196

$$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T}$$

SF = 0.466

2.  $X=10$   $y=21$   $R=23.26$

$b = 1.6$   $\theta = 49$

$c = 0.68$

$\varphi = 20.785$

LAC = 25.179

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	1.60	74.5	5.0	15.208	0.267	0.964	4.064	14.655
2	1.44	64.5	7.8	21.352	0.431	0.903	9.192	19.272
3	1.44	57.0	8.0	21.900	0.545	0.839	11.927	18.366
4	1.44	50.5	7.4	20.257	0.636	0.772	12.885	15.631
5	1.44	46.0	6.4	17.520	0.695	0.719	12.170	12.603
6	1.44	41.0	5.4	14.782	0.755	0.656	11.156	9.698
7	1.44	36.0	4.2	11.497	0.809	0.588	9.301	6.758
8	1.44	32.0	3.6	9.855	0.848	0.530	8.357	5.222
9	1.44	27.0	0.8	2.190	0.891	0.454	1.951	0.994
							81.005	103.199

$$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T}$$

SF = 0.464

3. X = 10 y = 22 R = 24.17

b = 2.6  $\theta = 60$

c = 0.68

LAC = 25.317

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	2.60	71.0	6.2	30.644	0.326	0.946	9.977	28.975
2	1.44	59.5	9.0	24.637	0.508	0.862	12.504	21.228
3	1.44	53.5	8.6	23.542	0.595	0.804	14.003	18.924
4	1.44	48.0	8.0	21.900	0.669	0.743	14.654	16.275
5	1.44	43.0	7.2	19.710	0.731	0.682	14.415	13.442
6	1.44	39.0	5.6	15.330	0.777	0.629	11.913	9.647
7	1.44	35.0	4.4	12.045	0.819	0.574	9.366	6.909
8	1.44	30.0	2.8	7.665	0.866	0.500	6.638	3.832
9	1.44	26.0	1.0	2.737	0.899	0.438	2.460	1.200
							96.431	120.432

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.447$$

4. X = 10 y = 23 R = 25.08

b = 4.6  $\theta = 60$

c = 0.68

LAC = 26.274

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	3.40	68.5	6.2	40.073	0.367	0.930	14.687	37.285
2	1.44	57.0	9.8	26.827	0.545	0.839	14.611	22.499
3	1.44	50.5	9.0	24.637	0.636	0.772	15.671	19.010
4	1.44	48.0	8.4	22.994	0.669	0.743	15.386	17.088
5	1.44	41.5	7.2	19.710	0.749	0.663	14.762	13.060
6	1.44	37.0	5.8	15.877	0.799	0.602	12.680	9.555
7	1.44	33.0	4.2	11.497	0.839	0.545	9.642	6.262
8	1.44	29.0	2.6	7.117	0.875	0.485	6.225	3.451
9	1.44	25.0	0.8	2.190	0.906	0.423	1.985	0.926
							105.649	129.135

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.449$$



5.  $X=10$   $y=24$   $R=26.00$

$b = 4.2$   $\theta = 58.5$

$c = 0.68$

$\phi = 20.785$

LAC = 26.557

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	4.20	66.0	6.6	52.696	0.407	0.914	21.433	48.140
2	1.44	53.0	10.0	27.374	0.602	0.799	13.474	21.862
3	1.44	48.0	9.4	25.732	0.369	0.743	17.218	19.123
4	1.44	46.0	8.4	22.994	0.695	0.719	15.973	16.541
5	1.44	39.0	7.4	20.257	0.777	0.629	15.743	12.748
6	1.44	35.0	6.0	16.425	0.819	0.574	13.454	9.421
7	1.44	32.0	4.4	12.045	0.848	0.530	10.215	6.383
8	1.44	28.0	2.8	7.65	0.883	0.469	6.768	3.598
9	1.44	25.0	1.0	2.737	0.906	0.423	2.481	1.157
							119.759	138.973

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.457$$

6.  $X=20$   $y=25$   $R=32.02$

$b = 0.2$   $\theta = 42.5$

$c = 0.68$

$\phi = 20.785$

LAC = 23.758

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	0.20	81.0	0.2	0.076	0.156	0.988	0.012	0.075
2	1.44	75.0	2.6	7.117	0.259	0.966	1.842	6.875
3	1.44	67.0	4.0	10.950	0.391	0.921	4.278	10.079
4	1.44	61.0	4.4	12.045	0.485	0.875	5.839	10.535
5	1.44	56.0	4.2	11.497	0.559	0.829	6.429	9.532
6	1.44	52.0	3.8	10.402	0.616	0.788	6.404	8.197
7	1.44	49.5	3.2	8.760	0.649	0.760	5.689	6.661
8	1.44	44.0	2.2	6.022	0.719	0.695	4.332	4.183
9	1.44	40.0	0.8	2.190	0.766	0.643	1.678	1.408
							36.504	57.545

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.522$$

7. X = 10 y = 25 R = 26.93

b = 4.8  $\theta = 57$

c = 0.68

LAC = 26.798

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	4.80	63.5	7.0	63.874	0.446	0.895	28.500	57.163
2	1.44	51.5	10.4	28.469	0.623	0.783	17.723	22.280
3	1.44	46.5	9.8	26.827	0.688	0.725	18.466	19.460
4	1.44	42.0	8.8	24.089	0.743	0.669	17.902	16.119
5	1.44	38.0	7.4	20.257	0.788	0.616	15.963	12.471
6	1.44	35.0	6.0	16.425	0.819	0.574	13.454	9.421
7	1.44	31.0	4.6	12.592	0.857	0.515	10.794	6.485
8	1.44	28.0	2.8	7.665	0.883	0.469	6.768	3.598
9	1.44	24.0	0.8	2.190	0.914	0.407	2.001	0.891
							131.570	147.889

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.461$$

8. X = 20 y = 26 R = 32.80

b = 0.6  $\theta = 42$

c = 0.68

LAC = 24.055

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	0.60	77.0	1.8	2.053	0.225	0.974	0.462	2.000
2	1.44	71.5	3.6	9.855	0.317	0.948	3.127	9.346
3	1.44	65.0	5.2	14.235	0.423	0.906	6.016	12.901
4	1.44	58.5	5.0	13.687	0.522	0.853	7.152	11.670
5	1.44	54.0	4.4	12.045	0.588	0.809	7.080	9.744
6	1.44	50.0	4.0	10.950	0.643	0.766	7.038	8.388
7	1.44	46.0	2.8	7.665	0.695	0.719	5.324	5.514
8	1.44	42.5	1.8	4.927	0.737	0.676	3.633	3.329
9	1.44	39.0	0.6	1.642	0.777	0.629	1.276	1.034
							41.108	63.926

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.500$$

9. X = 10 y = 26 R = 27.86

b = 5.4  $\theta = 57$

c = 0.68

LAC = 27.724

$\phi = 20.785$

Pias	B	$\alpha$	H	W	cos $\alpha$	sin $\alpha$	N	T
1	0.60	77.0	1.8	2.053	0.225	0.974	0.462	2.000
2	1.44	71.5	3.6	9.855	0.317	0.948	3.127	9.346
3	1.44	65.0	5.2	14.235	0.423	0.906	6.016	12.901
4	1.44	58.5	5.0	13.687	0.522	0.853	7.152	11.670
5	1.44	54.0	4.4	12.045	0.588	0.809	7.080	9.744
6	1.44	50.0	4.0	10.950	0.643	0.766	7.038	8.388
7	1.44	46.0	2.8	7.665	0.695	0.719	5.324	5.514
8	1.44	42.5	1.8	4.927	0.737	0.676	3.633	3.329
9	1.44	39.0	0.6	1.642	0.777	0.629	1.276	1.034
							41.108	63.926

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.539$$

10. X = 20 y = 27 R = 33.60

b = 1.2  $\theta = 45$

c = 0.68

LAC = 24.347

$\phi = 20.785$

Pias	B	$\alpha$	H	W	cos $\alpha$	sin $\alpha$	N	T
1	1.20	74.0	2.4	5.475	0.276	0.961	1.509	5.263
2	1.44	67.5	4.8	13.140	0.383	0.924	5.028	12.140
3	1.44	62.0	5.2	14.235	0.469	0.883	6.683	12.568
4	1.44	58.0	5.3	14.508	0.530	0.848	7.688	12.304
5	1.44	53.0	4.6	12.592	0.602	0.799	7.578	10.057
6	1.44	49.0	2.0	5.475	0.656	0.755	3.592	4.132
7	1.44	45.5	3.2	8.760	0.701	0.713	6.140	6.248
8	1.44	42.0	1.8	4.927	0.743	0.669	3.662	3.297
9	1.44	38.0	0.6	1.642	0.788	0.616	1.294	1.011
							43.174	67.019

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.492$$

11. X = 11 y = 27 R = 29.15

b = 5.6  $\theta = 54$

c = 0.68

LAC = 27.489

sdt = 20.785

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	5.60	61.0	7.2	76.648	0.485	0.875	37.160	67.038
2	1.44	49.0	10.6	29.017	0.656	0.755	19.037	21.899
3	1.44	45.0	10.0	27.371	0.707	0.707	19.357	19.357
4	1.44	41.0	9.0	24.637	0.755	0.656	18.594	16.163
5	1.44	37.0	7.8	21.352	0.799	0.602	17.052	12.850
6	1.44	33.5	6.2	16.972	0.834	0.552	14.153	9.368
7	1.44	30.0	4.6	12.592	0.866	0.500	10.905	6.296
8	1.44	27.0	2.8	7.665	0.891	0.454	6.829	3.480
9	1.44	24.0	0.6	1.642	0.914	0.407	1.500	0.668
							144.587	157.119

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.468$$

12. X = 10 y = 27 R = 28.79

b = 6.4  $\theta = 56$

c = 0.68

LAC = 28.153

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	6.40	60.0	7.6	92.465	0.500	0.866	46.232	80.077
2	1.44	47.0	11.8	32.302	0.682	0.731	22.030	23.624
3	1.44	43.0	10.4	28.469	0.731	0.682	20.821	19.416
4	1.44	39.0	9.2	25.184	0.777	0.629	19.572	15.849
5	1.44	35.0	7.8	21.352	0.819	0.574	17.491	12.247
6	1.44	33.0	6.2	16.972	0.839	0.545	14.234	9.244
7	1.44	29.0	4.6	12.592	0.875	0.485	11.013	6.105
8	1.44	25.0	2.8	7.665	0.906	0.423	6.947	3.239
9	1.44	22.0	1.0	2.737	0.927	0.375	2.538	1.025
							160.878	170.826

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.470$$

13. X = 20 y = 28 R = 34.41

b = 1.8  $\theta = 41$

c = 0.68

LAC = 24.633

$\phi = 20.785$

Pias	B	$\alpha$	H	W	cos $\alpha$	sin $\alpha$	N	T
1	1.80	72.0	3.4	11.634	0.309	0.951	3.595	11.065
2	1.44	65.0	5.4	14.782	0.423	0.906	6.247	13.397
3	1.44	59.0	5.8	15.877	0.515	0.857	8.177	13.609
4	1.44	55.0	5.6	15.330	0.574	0.819	8.793	12.557
5	1.44	51.0	5.0	13.687	0.629	0.777	8.614	10.637
6	1.44	48.5	4.2	11.497	0.663	0.749	7.618	8.611
7	1.44	43.0	3.4	9.307	0.731	0.682	6.807	6.348
8	1.44	41.0	2.0	5.475	0.755	0.656	4.132	3.592
9	1.44	38.0	0.7	1.916	0.788	0.616	1.510	1.180
							55.493	80.996

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.467$$

14. X = 10 y = 28 R = 29.73

b = 7.2  $\theta = 55$

c = 0.68

LAC = 28.552

$\phi = 20.785$

Pias	B	$\alpha$	H	W	cos $\alpha$	sin $\alpha$	N	T
1	7.20	57.5	8.0	109.498	0.537	0.843	58.833	92.349
2	1.44	46.5	11.8	32.302	0.688	0.725	22.235	23.431
3	1.44	40.5	10.6	29.017	0.760	0.649	22.065	18.845
4	1.44	37.0	9.3	25.458	0.799	0.602	20.332	15.321
5	1.44	33.0	7.8	21.352	0.839	0.545	17.907	11.629
6	1.44	30.0	5.8	15.877	0.866	0.500	13.750	7.939
7	1.44	27.0	4.4	12.045	0.891	0.454	10.732	5.468
8	1.44	24.0	2.8	7.665	0.914	0.407	7.002	3.118
9	1.44	21.5	1.0	2.737	0.930	0.367	2.547	1.003
							175.403	179.103

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.480$$

15. X = 20 y = 29 R = 33.23

b = 2.4  $\theta = 41$

c = 0.68

LAC = 25.219

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	2.40	7.0	4.4	20.075	0.993	0.122	19.925	2.446
2	1.44	61.5	6.6	18.067	0.477	0.879	8.621	15.878
3	1.44	57.0	6.5	17.793	0.545	0.839	9.691	14.923
4	1.44	53.5	5.8	15.877	0.595	0.804	9.444	12.763
5	1.44	49.5	5.4	14.782	0.649	0.760	9.600	11.240
6	1.44	46.0	4.4	12.045	0.695	0.719	8.367	8.664
7	1.44	42.5	3.2	8.760	0.737	0.676	6.458	5.918
8	1.44	39.5	2.0	5.475	0.772	0.636	4.225	3.482
9	1.44	36.0	0.6	1.642	0.809	0.588	1.329	0.965
							77.660	76.280

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.611$$

16. X = 10 y = 29 R = 30.68

b = 7.6  $\theta = 54$

c = 0.68

LAC = 28.923

$\phi = 20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	7.6	56.5	8.0	115.581	0.552	0.834	63.793	96.381
2	1.44	46.5	11.8	32.302	0.688	0.725	22.235	23.431
3	1.44	40.0	10.8	29.564	0.766	0.643	22.648	19.004
4	1.44	36.5	9.4	25.732	0.804	0.595	20.685	15.306
5	1.44	33.0	8.0	21.900	0.839	0.545	18.366	11.927
6	1.44	30.0	6.4	17.520	0.866	0.500	15.172	8.760
7	1.44	26.5	4.8	13.140	0.895	0.446	11.759	5.863
8	1.44	23.0	3.0	8.212	0.921	0.391	7.559	3.209
9	1.44	20.0	1.0	2.737	0.940	0.342	2.572	0.936
							184.791	184.817

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.486$$

17.  $x=20$   $y=30$   $R=36.06$

$b=3$   $\theta=40$

$c=0.68$

LAC = 25.182

$\phi=20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	3	67.5	4.0	22.812	0.383	0.924	8.730	21.076
2	1.44	59.0	7.4	23.257	0.515	0.857	10.433	17.364
3	1.44	56.0	7.0	19.152	0.559	0.829	10.715	15.886
4	1.44	51.5	6.6	18.067	0.623	0.783	11.247	14.139
5	1.44	48.0	5.6	15.330	0.669	0.743	10.258	11.392
6	1.44	45.0	4.8	13.140	0.707	0.707	9.291	9.291
7	1.44	41.0	3.5	9.581	0.755	0.656	7.231	6.286
8	1.44	38.0	2.0	5.475	0.788	0.616	4.314	* 3.371
9	1.44	35.0	0.6	1.642	0.819	0.574	1.345	0.942
							73.565	99.747

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.452$$

18.  $X=10$   $y=30$   $R=31.62$

$b=8.2$   $\theta=60$

$c=0.68$

LAC = 29.264

$\phi=20.785$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	8.1	53.5	9.1	140.123	0.595	0.804	83.348	112.639
2	1.44	42.0	12.8	35.039	0.743	0.669	26.039	23.446
3	1.44	38.0	11.8	32.302	0.788	0.616	25.454	19.887
4	1.44	35.7	9.8	26.827	0.812	0.584	21.786	15.655
5	1.44	32.0	8.5	23.268	0.848	0.530	19.733	12.330
6	1.44	29.2	6.6	18.067	0.873	0.488	15.771	8.814
7	1.44	25.8	4.8	13.140	0.900	0.435	11.830	5.719
8	1.44	23.0	2.8	7.665	0.921	0.391	7.056	2.995
9	1.44	20.0	0.9	2.464	0.940	0.342	2.315	0.843
							213.332	202.327

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T}$$

$$SF = 0.499$$

## Perhitungan kelongsoran Sungai Manna dengan sudut kemiringan 70

1.  $X=15$   $y=15$   $R=21.21$

$b = 0.7$   $\theta = 45$

$c = 0.2115$

$\varphi = 29.50$

$LAC = 16.668$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	0.7	79.0	4.0	4.574	0.191	0.982	0.873	4.490
2	1.1	70.0	5.9	10.601	0.342	0.940	3.626	9.962
3	1.1	63.0	5.2	9.344	0.454	0.891	4.242	8.325
4	1.1	57.0	4.1	7.367	0.545	0.839	4.012	6.179
5	1.1	52.0	2.5	4.492	0.616	0.788	2.766	3.540
6	1.1	47.0	1.0	1.797	0.682	0.731	1.225	1.314
							16.744	33.810

$$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T} = 0.384$$

2.  $X=5$   $y=15$   $R=15.81$

$b = 5.3$   $\theta = 45$

$c = 0.2115$

$\varphi = 29.50$

$LAC = 12.243$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	5.3	56.5	8.7	75.321	0.552	0.834	41.572	62.809
2	1.1	39.0	10.8	19.406	0.777	0.629	15.081	12.213
3	1.1	34.0	8.5	15.273	0.829	0.559	12.662	8.541
4	1.1	30.0	6.3	11.320	0.866	0.500	9.804	5.660
5	1.1	25.0	3.8	6.828	0.906	0.423	6.188	2.886
6	1.1	21.0	1.3	2.336	0.934	0.358	2.181	0.837
							87.488	92.945

$$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T} = 0.560$$

3.  $X=15$   $y=16$   $R=21.93$

$b = 1.5$   $\theta = 44.5$

$c = 0.2115$

$\varphi = 29.50$

$LAC = 17.041$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	1.5	75.0	4.7	11.516	0.259	0.966	2.981	11.124
2	1.1	65.5	6.7	12.039	0.415	0.910	4.992	10.955
3	1.1	59.5	5.5	9.883	0.508	0.862	5.016	8.515
4	1.1	54.0	4.4	7.906	0.588	0.809	4.647	6.396
5	1.1	50.0	2.7	4.851	0.643	0.766	3.118	3.716
6	1.1	45.5	0.9	1.617	0.701	0.713	1.133	1.153
							21.888	41.860

$$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T} = 0.382$$



4.  $X=5$   $y=16$   $R=16.76$

$b = 6.3$   $\theta = 69$

$c = 0.2115$

$\phi = 29.50$

$LAC = 20.195$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	6.3	55.0	8.7	89.532	0.574	0.819	51.354	73.340
2	1.1	37.0	11.0	19.765	0.799	0.602	15.785	11.895
3	1.1	32.0	8.8	15.812	0.848	0.530	13.410	8.379
4	1.1	28.0	6.5	11.680	0.883	0.469	10.312	5.483
5	1.1	23.5	3.9	7.008	0.917	0.399	6.426	2.794
6	1.1	19.5	1.4	2.516	0.943	0.334	2.371	0.840
							99.659	102.732

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.590$

5.  $X=15$   $y=17$   $R=22.67$

$b = 2$   $\theta = 44$

$c = 0.2115$

$\phi = 29.50$

$LAC = 17.418$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	2	72.0	5.2	16.988	0.309	0.951	5.250	16.157
2	1.1	60.5	7.2	12.937	0.492	0.870	6.371	11.260
3	1.1	56.0	6.0	10.781	0.559	0.829	6.029	8.938
4	1.1	51.0	4.5	8.086	0.629	0.777	5.089	6.284
5	1.1	47.5	2.8	5.031	0.676	0.737	3.399	3.709
6	1.1	44.0	1.0	1.797	0.719	0.695	1.293	1.248
							27.429	47.596

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.403$

6.  $X=5$   $y=17$   $R=17.72$

$b = 7$   $\theta = 67$

$c = 0.2115$

$\phi = 29.50$

$LAC = 20.730$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	7.0	53.0	8.8	100.624	0.602	0.799	60.557	80.362
2	1.1	35.0	11.0	19.765	0.819	0.574	16.191	11.337
3	1.1	31.0	8.7	15.633	0.857	0.515	13.400	8.051
4	1.1	26.0	6.2	11.140	0.899	0.438	10.013	4.884
5	1.1	22.5	3.8	6.828	0.924	0.383	6.308	2.613
6	1.1	19.0	1.2	2.156	0.946	0.326	2.039	0.702
							108.507	107.949

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.609$

7.  $X=15$   $y=18$   $R=23.43$

$b=2.6$   $\theta=43$

$c=0.2115$

$\varphi=29.50$

$LAC=17.592$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	2.6	69.0	5.3	22.510	0.358	0.934	8.067	21.015
2	1.1	57.5	8.0	14.375	0.537	0.843	7.724	12.124
3	1.1	53.0	6.5	11.680	0.602	0.799	7.029	9.328
4	1.1	46.0	4.9	8.805	0.695	0.719	6.116	6.333
5	1.1	45.0	3.1	5.570	0.707	0.707	3.939	3.939
6	1.1	41.0	1.0	1.797	0.755	0.656	1.356	1.179
							34.230	53.917

$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T} = 0.428$

8.  $X=5$   $y=18$   $R=18.68$

$b=7.9$   $\theta=65$

$c=0.2115$

$\varphi=29.50$

$LAC=21.202$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	7.9	51.0	8.7	112.270	0.629	0.777	70.654	87.251
2	1.1	32.0	11.1	19.945	0.848	0.530	16.914	10.569
3	1.1	28.5	8.8	15.812	0.879	0.477	13.896	7.545
4	1.1	25.0	6.4	11.500	0.906	0.423	10.422	4.860
5	1.1	21.0	3.9	7.008	0.934	0.358	6.542	2.511
6	1.1	18.0	1.3	2.336	0.951	0.309	2.222	0.722
							120.651	113.458

$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T} = 0.641$

9.  $X=15$   $y=19$   $R=24.41$

$b=3.5$   $\theta=42$

$c=0.2115$

$\varphi=29.50$

$LAC=17.752$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	3.5	67.0	5.7	32.588	0.391	0.921	12.733	29.998
2	1.1	55.5	8.2	14.734	0.566	0.824	8.346	12.143
3	1.1	50.5	6.7	12.039	0.636	0.772	7.658	9.290
4	1.1	47.0	5.0	8.984	0.682	0.731	6.127	6.571
5	1.1	43.0	3.0	5.391	0.731	0.682	3.942	3.676
6	1.1	40.0	1.0	1.797	0.766	0.643	1.376	1.155
							40.183	62.832

$SF = \frac{(LAC \times c) + \sum N \tan \varphi}{\sum T} = 0.422$

10.  $X=5$   $y=19$   $R=19.65$

$b=7.9$   $\theta = 65$

$c = 0.2115$

$LAC = 22.298$

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	7.9	51.0	8.8	113.561	0.629	0.777	71.466	88.253
2	1.1	32.5	11.8	21.203	0.843	0.537	17.882	11.392
3	1.1	28.0	8.9	15.992	0.883	0.469	14.120	7.508
4	1.1	25.0	6.3	11.320	0.906	0.423	10.260	4.784
5	1.1	21.0	3.8	6.828	0.934	0.358	6.375	2.447
6	1.1	17.5	1.3	2.336	0.954	0.301	2.228	0.702
							122.330	115.087

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.642$

11.  $X=15$   $y=20$   $R=25$

$b=4$   $\theta = 42$

$c = 0.2115$

$LAC = 18.333$

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	4.0	64.5	6.0	39.204	0.431	0.903	16.878	35.385
2	1.1	53.0	8.7	15.633	0.602	0.799	9.408	12.485
3	1.1	49.0	6.9	12.398	0.656	0.755	8.134	9.357
4	1.1	45.4	5.1	9.164	0.702	0.712	6.434	6.525
5	1.1	41.5	3.3	5.930	0.749	0.663	4.441	3.929
6	1.1	39.0	1.2	2.156	0.777	0.629	1.676	1.357
							46.971	69.038

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.441$

12.  $X=5$   $y=20$   $R=20.62$

$b=9.5$   $\theta = 62$

$c = 0.2115$

$LAC = 22.317$

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	9.5	58.0	8.8	136.561	0.530	0.848	72.366	115.810
2	1.1	30.0	11.5	20.664	0.866	0.500	17.895	10.332
3	1.1	26.0	9.1	16.351	0.899	0.438	14.696	7.168
4	1.1	22.5	6.4	11.500	0.924	0.383	10.624	4.401
5	1.1	19.0	3.9	7.008	0.946	0.326	6.626	2.281
6	1.1	16.5	1.3	2.336	0.959	0.284	2.240	0.663
							124.448	140.656

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.534$

13. X = 15 y = 21 R = 25.81

b = 4.5  $\theta = 41$

c = 0.2115

$\phi = 29.50$

LAC = 18.475

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	4.5	62.0	6.0	44.105	0.469	0.883	20.706	38.942
2	1.1	51.0	8.8	15.812	0.629	0.777	9.951	12.288
3	1.1	47.0	7.1	12.758	0.682	0.731	8.701	9.330
4	1.1	44.0	5.3	9.523	0.719	0.695	6.850	6.615
5	1.1	40.0	3.1	5.570	0.766	0.643	4.267	3.580
6	1.1	37.0	1.1	1.977	0.799	0.602	1.579	1.190
							52.054	71.946

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.464$$

14. X = 5 y = 21 R = 21.59

b = 10  $\theta = 60$

c = 0.2115

$\phi = 29.50$

LAC = 22.615

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	10.0	46.0	9.0	147.015	0.695	0.719	102.125	105.754
2	1.1	29.5	11.4	20.484	0.870	0.492	17.828	10.087
3	1.1	24.5	9.2	16.531	0.910	0.415	15.043	6.855
4	1.1	21.0	6.4	11.500	0.934	0.358	10.736	4.121
5	1.1	19.0	3.8	6.828	0.946	0.326	6.456	2.223
6	1.1	15.0	1.4	2.516	0.966	0.259	2.430	0.651
							154.618	129.691

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.711$$

15. X = 15 y = 22 R = 26.63

b = 5  $\theta = 41$

c = 0.2115

$\phi = 29.50$

LAC = 19.062

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	5.0	60.5	6.2	50.639	0.492	0.870	24.936	44.074
2	1.1	49.0	8.8	15.812	0.656	0.755	10.374	11.934
3	1.1	45.5	7.0	12.578	0.701	0.713	8.816	8.971
4	1.1	42.0	5.2	9.344	0.743	0.669	6.944	6.252
5	1.1	40.5	3.2	5.750	0.760	0.649	4.372	3.734
6	1.1	37.0	1.0	1.797	0.799	0.602	1.435	1.081
							56.876	76.046

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.476$$

16.  $X = 5$   $y = 22$   $R = 22.56$

$b = 11$   $\theta = 59$

$c = 0.2115$

$\phi = 29.50$

$LAC = 23.241$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	11.0	45.0	9.0	161.717	0.707	0.707	114.351	114.351
2	1.1	26.5	11.6	20.843	0.895	0.446	18.654	9.300
3	1.1	23.0	9.2	16.531	0.921	0.391	15.217	6.459
4	1.1	20.5	6.6	11.859	0.937	0.350	11.108	4.153
5	1.1	17.5	4.0	7.187	0.954	0.301	6.855	2.161
6	1.1	14.5	1.4	2.516	0.968	0.250	2.435	0.630
							168.620	137.055

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.732$

17.  $X = 15$   $y = 23$   $R = 27.46$

$b = 5.6$   $\theta = 40$

$c = 0.2115$

$\phi = 29.50$

$LAC = 19.178$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	5.6	58.0	6.6	60.374	0.530	0.848	31.993	51.200
2	1.1	47.0	9.0	16.172	0.682	0.731	11.029	11.827
3	1.1	43.5	6.8	12.219	0.725	0.688	8.863	8.411
4	1.1	40.5	5.2	9.341	0.760	0.649	7.105	6.068
5	1.1	38.0	3.2	5.750	0.788	0.616	4.531	3.540
6	1.1	34.0	1.0	1.797	0.829	0.559	1.490	1.005
							65.011	82.051

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.498$

18.  $X = 5$   $y = 23$   $R = 23.54$

$b = 11.6$   $\theta = 58$

$c = 0.2115$

$\phi = 29.50$

$LAC = 23.836$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	11.6	44.0	9.0	170.537	0.719	0.695	122.674	118.465
2	1.1	27.0	11.6	20.843	0.891	0.454	18.572	9.463
3	1.1	23.0	9.4	16.890	0.921	0.391	15.548	6.600
4	1.1	20.0	6.6	11.859	0.940	0.342	11.144	4.056
5	1.1	17.0	4.0	7.187	0.956	0.292	6.873	2.101
6	1.1	14.0	0.8	1.437	0.970	0.242	1.395	0.348
							176.206	141.033

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.743$

19. X = 15 y = 24 R = 28.30

b = 11.6  $\theta = 58$

c = 0.2115

LAC = 19.272

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	6.2	57.0	6.4	64.817	0.545	0.839	35.302	54.360
2	1.1	45.0	9.4	16.890	0.707	0.707	11.943	11.943
3	1.1	42.0	7.4	13.297	0.743	0.669	9.881	8.897
4	1.1	40.0	5.4	9.703	0.766	0.643	7.433	6.237
5	1.1	36.0	3.4	6.109	0.809	0.588	4.943	3.591
6	1.1	34.0	1.0	1.797	0.829	0.559	1.490	1.005
							70.992	86.034

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.514$$

20. X = 5 y = 24 R = 24.52

b = 12.2  $\theta = 57$

c = 0.2115

LAC = 24.399

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	12.2	42.5	9.0	179.358	0.737	0.676	132.237	121.173
2	1.1	24.0	11.6	20.843	0.914	0.407	19.041	8.478
3	1.1	21.5	9.4	16.890	0.930	0.367	15.715	* 6.190
4	1.1	19.0	6.6	11.859	0.946	0.326	11.213	3.861
5	1.1	16.5	4.2	7.547	0.959	0.284	7.236	2.143
6	1.1	13.5	1.4	2.516	0.972	0.233	2.446	0.587
							187.889	142.432

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.783$$

21. X = 15 y = 25 R = 29.15

b = 6.8  $\theta = 39$

c = 0.2115

LAC = 19.853

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	6.8	56.0	6.4	71.090	0.559	0.829	39.753	58.936
2	1.1	43.0	9.0	16.172	0.731	0.682	11.827	11.029
3	1.1	40.0	7.0	12.578	0.766	0.643	9.635	8.085
4	1.1	38.0	5.2	9.344	0.788	0.616	7.363	5.753
5	1.1	36.0	3.2	5.750	0.809	0.588	4.652	3.380
6	1.1	33.0	0.8	1.437	0.839	0.545	1.206	0.783
							74.436	87.965

$$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.526$$

22.  $X=5$   $y=25$   $R=25.50$

$b = 9.4$   $\theta = 47$

$c = 0.2115$

$LAC = 20.922$

$\phi = 29.50$

Pias	B	$\alpha$	H	W	$\cos \alpha$	$\sin \alpha$	N	T
1	9.4	49.0	7.6	116.697	0.653	0.755	76.560	88.073
2	1.1	34.0	10.6	19.047	0.829	0.559	15.790	10.651
3	1.1	31.0	8.6	15.453	0.857	0.515	13.246	7.959
4	1.1	28.0	6.0	10.781	0.833	0.469	9.519	5.061
5	1.1	26.0	3.8	6.828	0.899	0.438	6.137	2.993
6	1.1	23.0	1.0	1.797	0.921	0.391	1.654	0.702
							122.907	115.439

$SF = \frac{(LAC \times c) + \sum N \tan \phi}{\sum T} = 0.641$



Tabel 2 Hitungan Stabilitas Tebing Sungai Manna dengan Metode Irisan

No	Centre of rotation		Radius	Safety Factor
	x coord	y coord		
1.	15	15	21.21	0.384
2.	5	15	15.81	0.560
3.	15	16	21.93	0.382
4.	5	16	16.76	0.590
5.	15	17	22.67	0.400
6.	5	17	17.72	0.609
7.	15	18	23.43	0.428
8.	5	18	18.68	0.641
9.	15	19	24.41	0.422
10.	5	19	19.65	0.642
11.	15	20	25.00	0.441
12.	5	20	20.62	0.534
13.	15	21	25.81	0.464
14.	5	21	21.59	0.711
15.	15	22	26.63	0.476
16.	5	22	22.56	0.732
17.	15	23	27.46	0.498
18.	5	23	23.54	0.743
19.	15	24	28.30	0.514
20.	5	24	24.52	0.783
21.	15	25	29.15	0.526
22.	5	25	25.50	0.641

→ Kritis