LAMPIRAN A
KOORDINAT BIDANG KEKAR

Tabel A.1 Koordinat Bidang Kekar Pada Setiap *Scanline*

No	Lokasi Pengukuran	Sumbu X	Sumbu Y
1	*Scanline* 1	07°47’43.6”	110°08’17.7”
2	*Scanline* 2	07°47’43.8”	110°08’17.3”
3	*Scanline* 3	07°47’43.9”	110°08’45.5”

LAMPIRAN B

PERHITUNGAN RQD

Scanline 1

JV = $\frac{1}{6}+\frac{1}{51}+\frac{1}{92}+\frac{1}{73}+\frac{1}{189}+\frac{1}{4}+\frac{1}{421}+\frac{1}{30}+\frac{1}{55}+\frac{1}{113}+\frac{1}{159}+\frac{1}{67}$

= 0,57

RQD = 100 – 3,3 × 0,57

= 98,1 %

Scanline 2

JV = $\frac{1}{8}+\frac{1}{60}+\frac{1}{17}+\frac{1}{18}+\frac{1}{15}+\frac{1}{15}$

= 0,34

RQD = 100 – 3,3 ×0,34

= 98,8%

Scanline 3

JV = $\frac{1}{0,45}+\frac{1}{1,81}+\frac{1}{0,35}+\frac{1}{2,1}+\frac{1}{0,45}+\frac{1}{1,81}+\frac{1}{0,35}+\frac{1}{2,1}+\frac{1}{0,45}+\frac{1}{1,81}+\frac{1}{0,35}+\frac{1}{2,1}+\frac{1}{0,45}+\frac{1}{1,81}+\frac{1}{0,35}+\frac{1}{2,1}+\frac{1}{0,45}$

= 8,7

RQD = 115 – 3,3 × 8,4

= 87,28 %

LAMPIRAN C
PENGAMATAN JARAK KEKAR

Tabel C.1 Pengamatan Jarak Kekar *Scanline* 1

No	Kekar	Jarak Kekar
1	1 ke 2	6
2	2 ke 3	51
3	3 ke 4	92
4	4 ke 5	73
5	5 ke 6	189
6	6 ke 7	4
7	7 ke 8	42
8	8 ke 9	30
9	9 ke 10	55
10	10 ke 11	113
11	11 ke 12	159
12	12 ke 13	67
Rata-rata		0,7

Tabel C.2 Pengamatan Jarak Kekar *Scaneline* 2

No	Kekar	Jarak Kekar
1	1 ke 2	8
2	2 ke 3	60
3	3 ke 4	17
4	4 ke 5	18
5	5 ke 6	15
6	6 ke 7	150
Rata-rata		0,44

Tabel C.3 Pengamatan Jarak Kekar *Scankine* 3

No	Kekar	Jarak Kekar
1	1 ke 2	1,78
2	2 ke 3	2
3	3 ke 4	2,4
4	4 ke 5	1,9
5	5 ke 6	1,5
6	6 ke 7	2,1
7	7 ke 8	3
8	8 ke 9	2,7
9	9 ke 10	1,4
10	10 ke 11	2
11	11 ke 12	2,3
12	12 ke 13	2,9
13	13 ke 14	3
14	14 ke 15	2,5
15	15 ke 16	1,7
16	16 ke 17	2,3
17	17 ke 18	3,4
Rata-rata		0,023

LAMPIRAN D

HASIL PENGAMATAN KONDISI KEKAR

Tabel D. 1 Hasil pengamatan Kondisi Kekar pada *Scanline* 1

No	Kemenerusan (cm)	Bobot	Bukaan (mm)	Bobot	Kekerasan	Bobot	Isian	Bobot	Pelapukan	Bobot	Bobot Total
1	2	6	0,2	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
2	13	6	0,1	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
3	25	6	0,4	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
4	16	6	0,2	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	24
5	18	6	0,6	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
6	26	6	0,7	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
7	25	6	0,5	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
8	30	6	1	5	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	27
9	41	6	0,5	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
10	57	6	0,7	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
11	60	6	0,8	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26
12	24	6	0,4	4	Sangat Keras	5	Tidak ada	6	Tidak Lapuk	5	26

Tabel D. 2 Hasil pengamatan Kondisi Kekar pada *Scanline* 2

No	Kemenerusan (cm)	Bobot	Bukaan (mm)	Bobot	Kekerasan	Bobot	Isian	Bobot	Pelapukan	Bobot	Bobot Total
1	40	6	2	5	Agak Kasar	3	Tidak ada	6	Agak lapuk	5	25
2	37	6	0,5	4	Agak Kasar	3	Tidak ada	6	Agak Lapuk	5	24
3	19	6	0,5	4	Kasar	5	Tidak ada	6	Agak Lapuk	5	26
4	22	6	0,5	4	Agak Kasar	3	Tidak ada	6	Agak lapuk	5	26
5	32	6	0,4	4	Agak Kasar	3	Tidak ada	6	Agak Lapuk	5	24
6	30	6	0,7	4	Agak Kasar	3	Tidak ada	6	Agak Lapuk	5	24
7	45	6	0.5	4	Kasar	5	Tidak ada	6	Agak Lapuk	5	26

Tabel D. 3 Hasil pengamatan Kondisi Kekar pada *Scanline* 3

No	Kemenerusan (cm)	Bobot	Bukaan (mm)	Bobot	Kekerasan	Bobot	Isian	Bobot	Pelapukan	Bobot	Bobot Total
1	1,2	6	2	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
2	0,81	6	1	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
3	1,27	6	2	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
4	0,90	6	3	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
5	1,31	6	1	1	Agak Kasar	3	Tidak ada	6	Tidak Lapuk	5	20
6	1,2	6	2	1	Agak Kasar	3	Tidak ada	6	Tidak Lapuk	5	20
7	1,18	6	2	1	Agak Kasar	3	Tidak ada	6	Tidak Lapuk	5	20
8	1,20	6	1	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
9	1,24	6	2	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
10	1,22	6	2	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
11	1,08	6	2	1	Kasar	5	Tidak ada	6	Tidak Lapuk	5	23
12	0,80	6	1	1	Agak Kasar	3	Tidak ada	6	Tidak Lapuk	5	20
13	1,22	6	1	1	Agak Kasar	3	Tidak ada	6	Agak Lapuk	5	20
14	1,5	6	1	1	Agak Kasar	3	Tidak ada	6	Agak Lapuk	5	20
15	1,22	6	3	1	Agak Kasar	3	Tidak ada	6	Agak Lapuk	5	20
16	1,8	6	1	1	Kasar	5	Tidak Ada	6	Agak Lapuk	5	23
17	1,5	6	2	1	Kasar	5	Tidak Ada	6	Agak Lapuk	5	23

LAMPIRAN E
KONDISI AIR TANAH

Tabel E.1 Kondisi Air Tanah *Scanline* 1

No	Kondisi Air Tanah	Bobot
1	Kering	15
2	Kering	15
3	Kering	15
4	Kering	15
5	Kering	15
6	Kering	15
7	Kering	15
8	Kering	15
9	Kering	15
10	Kering	15
11	Kering	15
12	Kering	15
Rata-rata		15

Tabel E.2 Kondisi Air Tanah *Scaneline* 2

No	Kondisi Air Tanah	Bobot
1	Kering	15
2	Kering	15
3	Kering	15
4	Kering	15
5	Kering	15
6	Kering	15
7	Kering	15
Rata-rata		15

Tabel E.3 Kondisi Air Tanah *Scankine* 3

No	Kondisi Air Tanah	Bobot
1	Kering	15
2	Kering	15
3	Kering	15
4	Kering	15
5	Kering	15
6	Kering	15
7	Kering	15
8	Kering	15
9	Kering	15
10	Kering	15
11	Kering	15
12	Kering	15
13	Kering	15
14	Kering	15
15	Kering	15
16	Kering	15
17	Kering	15
Rata-rata		15

LAMPIRAN F

PARAMETER SMR (*SLOPE MASS RATING)*

Tabel F.1 Parameter *Slope Mass Rating Scanline* 1

No	Arah Kekar	Kemiringan Kekar	Arah Lereng	Kerimiringan Lereng
1	N 224° E	56°	N 225° E	45°
2	N 222° E	9°	N 225° E	45°
3	N 274° E	19°	N 225° E	45°
4	N 280° E	28°	N 225° E	45°
5	N 270° E	40°	N 225° E	45°
6	N 183° E	12°	N 225° E	45°
7	N 270° E	30°	N 225° E	
8	N 252° E	32°	N 225° E	45°
9	N 254° E	22°	N 225° E	45°
10	N 231° E	64°	N 225° E	45°
11	N 244° E	12°	N 225° E	45°
12	N 218° E	72°	N 225° E	45°
13	N 286° E	49°	N 225° E	45°

Tabel F.2 Parameter *Slope Mass Rating Scanline* 2

No	Arah Kekar	Kemiringan Kekar	Arah Lereng	Kerimiringan Lereng
1	N 239° E	79°	N 308° E	88°
2	N 234° E	75°	N 308° E	88°
3	N 340° E	74°	N 308° E	88°
4	N 240° E	71°	N 308° E	88°
5	N 175° E	10°	N 308° E	88°

6	N 165° E	25°	N 308° E	88°
7	N 195° E	45°	N 308° E	88°

Tabel F.3 Parameter *Slope Mass Rating Scanline* 3

No	Arah Kekar	Kemiringan Kekar	Arah Lereng	Kerimiringan Lereng
1	N 190° E	70°	N 320° E	83°
2	N 185° E	85°	N 320° E	83°
3	N 100 E	75°	N 320° E	83°
4	N 190 E	82°	N 320° E	83°
5	N 175 E	80°	N 320° E	83°
6	N 79 E	75°	N 320° E	83°
7	N 252° E	77°	N 320° E	83°
8	N 188° E	66°	N 320° E	83°
9	N 200° E	51°	N 320° E	83°
10	N 160° E	83°	N 320° E	83°
11	N 46° E	80°	N 320° E	83°
12	N 127° E	82°	N 320° E	83°
13	N 205° E	35°	N 320° E	83°
14	N 195° E	65°	N 320° E	83°
15	N 116° E	62°	N 320° E	83°
16	N 144° E	81°	N 320° E	83°
17	N 150° E	31°	N 320° E	83°

LAMPIRAN G

PERHITUNGAN *SLOPE MASS RATING* BIDANG (SMR)

G.1. Perhitungan SMR pada *Scanline* 1

G.1.1

F1 = αj – αs = 224 – 225 = -1 = 1

F2 = βj = 56 = 1

F3 = βj – βs = 56 – 45 = 11 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82+ (1× 1 × 0) + 0

= 82

G.1.2

F1 = P = αj – αs = 222 – 225 = -3 = 1

F2 = P = βj = 4 = 0,15

F3 = P = βj – βs = 4 – 45 = -41 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 0,15 × (-60) + 0

= 73

G.1.3

F1 = P = αj – αs = 274 – 225 = 49 = 0,15

F2 = P = βj = 19 = 0,15

F3 = P = βj – βs = 19 – 45 = -26 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,15 × (-60) + 0

= 80,65

G.1.4

F1	=	αj – αs	= 280 – 225	= 55	= 0,15
F2	=	βj	= 28	= 0,4	
F3	=	βj – βs	= 28 – 45	= -17	= -60
F4	=	0			

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,4 × (-60) + 0

= 78,4

G.1.5

F1 =	P	= αj – αs	= 270 – 225	= 45	= 0,15
F2 =	P	= βj	= 40	= 0,85	
F3 =	P	= βj – βs	= 40– 45	= -5	= -50
F4 =	0				

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,85 × (-50) + 0

= 75,6

G.1.6

F1 =	P	= αj – αs	= 183 – 225	= -42	= 1
F2 =	P	= βj	= 12	= 1	
F3 =	P	= βj – βs	= 12 – 45	= -33	= -60
F4 =	0				

SMR = RMR_{basic} + (FI × F2 × F3) + F4

=82+ (1 × 1 × (-60) + 0

= 22

G.1.7

F1	=	αj – αs	= 270 – 225	= 45	= 0,15
F2	=	βj	= 30	= 0,7	
F3	=	βj – βs	= 30 – 45	= -15	= -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,7 × (-60) + 0

= 75,7

G.1.8

F1 = P = αj – αs = 252 – 225 = 27 = 0,4

F2 = P = βj = 32 = 0,7

F3 = P = βj – βs = 32 – 45 = -13 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,4 × 0,7 × (-60) + 0

= 65,2

G.1.9

F1 = P = αj – αs = 254 – 225 = 29 = 0,4

F2 = P = βj = 22 = 0,4

F3 = P = βj – βs = 22 – 45 = -23 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,4 × 0,4 × (-60) + 0

= 72,4

G.1.10

F1 = αj – αs = 231 – 225 = 6 = 0,85

F2 = βj = 64 = 1

F3 = βj – βs = 64 – 45 = 19 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,85 × 1 × 0) + 0

= 82

G.1.11

F1 = P = αj – αs = 244 – 225 = 19 = 0.7

F2 = P = βj = 12 = 0,15

F3 = P = βj – βs = 12 – 45 = -33 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,7 × 0,15 × (-60) + 0

= 75,7

G.1.12

F1 = P = αj – αs = 218 – 225 = -7 = 1

F2 = P = βj = 72 = 1

F3 = P = βj – βs = 72 – 45 = 27 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

G.2. Perhitungan SMR pada *Scanline* 2

G.2.1

F1 = P = αj – αs = 239 – 305 = -69 = 1

F2 = P = βj = 79 = 1

F3 = P = βj – βs = 79 – 88 = -9 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-60) + 0

= 14

G.2.2

F1 = P = αj – αs = 234 – 308 = -74 = 1

F2 = P = βj = 75 = 1

F3 = P = βj – βs = 75 – 88 = -13 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-60) + 0

= 14

G.2.3

F1 = P = αj – αs = 340 – 308 = 32 = 0,15

F2 = P = βj = 84 = 1

F3 = P = βj – βs = 84 – 88 = -4 = -50

F4 = 0

SMR = RMR_{basic} – (FI × F2 × F3) + F4

= 74 + (0,15 × 1 × (-50) + 0

= 66,5

G.2.4

F1 = P = αj – αs = 340 – 308 = 32 = 0,15

F2 = P = βj = 71 = 1

F3 = P = βj – βs = 71 – 88 = -17 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (0,15 × 1 × (-60) + 0

= 65

G.2.5

F1 = P = αj – αs = 175 – 308 = -133 = 1

F2 = P = βj = 10 = 0,15

F3 = P = βj – βs = 10 – 88 = -78 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 0,15 × (-60) + 0

= 65

G.2.6

F1 = P = αj – αs = 165 – 308 = -143 = 1

F2 = P = βj = 25 = 0,4

F3 = P = βj – βs = 25 – 88 = -63 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 0,4 × (-60) + 0

= 50

G.2.7

F1 = P = αj – αs = 195 – 308 = -113 = 1

F2 = P = βj = 45 = 0,85

F3 = P = βj – βs = 45 – 88 = -43 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 0,85 × (-60) + 0

= 23

G.3. Perhitungan SMR pada *Scanline* 3

G.3.1

F1 = P = αj – αs = 190 – 320 = -130 = 1

F2 = P = βj = 70 = 1

F3 = P = βj – βs = 70 – 85 = -5 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.2

F1 = P = αj – αs = 185 – 320 = -135 = 1

F2 = P = βj = 83 = 1

F3 = P = βj – βs = 83 – 85 = -2 =0,50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-0,50) + 0

= 19

G.3.3

F1 = P = αj – αs = 100 – 320 = -220`= 1

F2 = P = βj = 75 = 1

F3 = P = βj – βs = 75 – 85 = -1- = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.4

F1 = P = αj – αs = 190 – 320 = -130 = 1

F2 = P = βj = 82 = 1

F3 = P = βj – βs = 82 – 85 = -3 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.5

F1 = αj – αs = 175 – 320 = -145 = 1

F2 = βj = 80 = 1

F3 = βj – βs = 80 – 85 = -5 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.6

F1 = P = αj – αs = 79 – 320 = -241 = 1

F2 = P = βj = 75 = 1

F3 = P = βj – βs = 75 – 85 = -10 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.7

F1 = P = αj – αs = 252 – 320 = -68 = 1

F2 = P = βj = 77 = 1

F3 = P = βj – βs = 77 – 85 = -8 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.8

F1 = αj – αs = 188 – 320 = -132 = 1

F2 = βj = 66 = 1

F3 = βj – βs = 66 – 85 = -19 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

G.3.9

F1 = P = αj – αs = 200 – 320 = -120 =1

F2 = P = βj = 51 = 1

F3 = P = βj – βs = 51 – 85 = -34 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

G.3.10

F1 = P = αj – αs = 160 – 320 = -160 = 1

F2 = P = βj = 83 = 1

F3 = P = βj – βs = 83 – 85 = -2 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.11

F1 = αj – αs = 46 – 320 = -314 = 1

F2 = βj = 80 = 1

F3 = βj – βs = 80 – 85 = -5 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

G.3.12

F1 = P = αj – αs = 127 – 320 = -193 = 1

F2 = P = βj = 82 = 1

F3 = P = βj – βs = 82 – 85 = -53 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

G.3.13

F1 = P = αj – αs = 205 – 320 = -115 = 1

F2 = P = βj = 35 = 0,7

F3 = P = βj – βs = 35 – 85 = -50 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 0,7 × (-60) + 0

= 111

G.3.14

F1 = αj – αs = 195 – 320 = -125 = 1

F2 = βj = 65 = 1

F3 = βj – βs = 65 – 85 = -20 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

G.3.15

F1 = P = αj – αs = 116 – 320 = -204 = 1

F2 = P = βj = 62 = 1

F3 = P = βj – βs = 62 – 85 = -23 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

G.3.16

F1 = P = αj – αs = 144 – 320 = -170 = 1

F2 = P = βj = 81 = 1

F3 = P = βj – βs = 81 – 85 = -4 = 0,50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (0,50) + 0

= 59,5

G.3.17

F1 = P = αj – αs = 150 – 320 = -170 = 1

F2 = P = βj = 31 = 0,7

F3 = P = βj – βs = 31 – 320 = -289 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × -60) + 0

= 27

LAMPIRAN H

PERHITUNGAN *SLOPE MASS RATING* TOPLING (SMR)

H.1. Perhitungan SMR pada *Scanline* 1

H.1.1

F1 = $\alpha j - \alpha s$ = 224 – 225 - 180˚ = -181 = 1

F2 = βj = 1

F3 = $\beta j + \beta s$ = 56 + 45 = 101 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

H.1.2

F1 = P = $\alpha j - \alpha s$ = 222 – 225 - 180˚ = -183 = 1

F2 = P = βj = 1

F3 = P = $\beta j + \beta s$ = 4 + 45 = 49 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

H.1.3

F1 = P = $\alpha j - \alpha s$ = 274 – 225 - 180˚ = -131 = 1

F2 = P = βj = 1

F3 = P = $\beta j + \beta s$ = 82 + 45 = 64 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

G.1.4

F1 = αj – αs = 280 – 225- 180˚ = -125 = 1

F2 = βj = 1

F3 = βj – βs = 28 + 45 = 73 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 1 × 0) + 0

= 82

G.1.5

F1 = P = αj – αs = 270 – 225 - 180˚ = -135 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 40 + 45 = 85 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1× 0) + 0

= 82

G.1.6

F1 = P = αj – αs = 183 – 225 - 180˚ = -222 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 12 + 45 = 57 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

=82+ (1 × 1 × 0) + 0

= 82

G.1.7

F1 = αj – αs = 270 – 225 - 180˚ = -135 =1

F2 = βj = 0

F3 = βj – βs = 30 + 45 = 75 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1× 0 × 0) + 0

= 82

G.1.8

F1 = P = αj – αs = 252 – 225 - 180˚ = -153 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 32 + 45 = 77 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1× 0) + 0

= 65,2

G.1.9

F1 = P = αj – αs = 254 – 225 - 180˚ = -151 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 22 + 45 = 67 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1× 0) + 0

= 82

G.1.10

F1 = αj – αs = 231 – 225 - 180˚ = -174 = 1

F2 = βj = 1

F3 = βj – βs = 64 + 45 = 109 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

G.1.11

F1 = P = $\alpha j - \alpha s$ = 244 – 225 - 180˚ = -161 = 1

F2 = P = βj = 1

F3 = P = $\beta j - \beta s$ = 12 + 45 = 57 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

G.1.12

F1 = P = $\alpha j - \alpha s$ = 218 – 225 - 180˚ = -187 = 1

F2 = P = βj = 1

F3 = P = $\beta j - \beta s$ = 72 + 45 = 117 = -6

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × (-6) + 0

= 76

G.2. Perhitungan SMR pada *Scanline* 2

G.2.1

F1 = P = $\alpha j - \alpha s$ = 239 – 305 - 180˚ = -249 = 1

F2 = P = βj = 1

F3 = P = $\beta j - \beta s$ = 79 + 88 = 167 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-25) + 0

= 49

G.2.2

F1 = P = αj – αs = 234 – 308 - 180˚ = -254 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 75 + 88 = 163 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-25) + 0

= 49

G.2.3

F1 = P = αj – αs = 340 – 308 - 180˚ = -148 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 84 + 88 = 172 = -25

F4 = 0

SMR = RMR_{basic} – (FI × F2 × F3) + F4

= 74 + (1× 1 × (-25) + 0

= 49

G.2.4

F1 = P = αj – αs = 340 – 308 - 180˚ = -148 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 71 + 88 = 159 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-25) + 0

= 49

G.2.5

F1 = P = αj – αs = 175 – 308 - 180˚ = -313 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 10 + 88 = 98 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-25) + 0

= 74

G.2.6

F1 = P = αj – αs = 165 – 308 - 180˚ = -323 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 25 + 88 = 113 = -6

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-6) + 0

= 68

G.2.7

F1 = P = αj – αs = 195 – 308 - 180˚ = -293 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 45 + 88 = 133 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-25) + 0

= 49

G.3. Perhitungan SMR pada *Scanline* 3

G.3.1

F1 = P = αj – αs = 190 – 320 - 180˚ = -310 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 70 + 85 = 155 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.2

F1 = P = αj – αs = 185 – 320 - 180˚ = -315 = 1

F2 = P = βj = 1

F3 = P = βj + βs = 83 + 85 = 168 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.3

F1 = P = αj – αs = 100 – 320 - 180˚ = -400`= 1

F2 = P = βj = 1

F3 = P = βj – βs = 75 + 85 = 160 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.4

F1 = P = αj – αs = 190 – 320 - 180˚ = -310 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 82 + 85 = 167 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.5

F1 = αj – αs = 175 – 320 - 180˚ = -325 = 1

F2 = βj = 80 = 1

F3 = βj – βs = 80 + 85 = 165 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.6

F1 = P = αj – αs = 79 – 320 - 180˚ = -421 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 75 + 85 = 160 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.7

F1 = P = αj – αs = 252 – 320- 180˚ = -248= 1

F2 = P = βj = 1

F3 = P = βj – βs = 77 + 85 = 162 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.8

F1 = αj – αs = 188 – 320 - 180˚ = -312 = 1

F2 = βj = 1

F3 = βj – βs = 66 + 85 = 151 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.9

F1 = P = αj – αs = 200 – 320 - 180˚ = -300 =1

F2 = P = βj = 1

F3 = P = βj – βs = 51 + 85 = 135 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.10

F1 = P = αj – αs = 160 – 320- 180˚ = -340 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 83 + 85 = 168 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.11

F1 = αj – αs = 46 – 320- 180˚ = -454 = 1

F2 = βj = 80 = 1

F3 = βj – βs = 80 + 85 = 165 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.12

F1 = P = αj – αs = 127 – 320- 180˚ = -373 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 82 + 85 = 167 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.13

F1 = P = αj – αs = 205 – 320- 180˚ = -295 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 35 + 85 = 120 = -6

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-6) + 0

= 63

G.3.14

F1 = αj – αs = 195 – 320 - 180˚ = -305 = 1

F2 = βj = 65 = 1

F3 = βj – βs = 65 + 85 = 150 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.15

F1 = P = αj – αs = 116 – 320 - 180˚ = -384 = 1

F2 = P = βj = 1

F3 = P = βj – βs = 62 + 85 = 147 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.16

F1 = P = $\alpha j - \alpha s$ = 144 – 320 - 180˚ = -356 = 1

F2 = P = βj = 81 = 1

F3 = P = $\beta j - \beta s$ = 81 + 85 = 166 = -25

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-25) + 0

= 44

G.3.17

F1 = P = $\alpha j - \alpha s$ = 150 – 320 - 180˚ = -350 = 1

F2 = P = βj = 1

F3 = P = $\beta j - \beta s$ = 31 + 85 = 116 = -6

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × -6) + 0

= 63

LAMPIRAN I

PERHITUNGAN *SLOPE MASS RATING* BAJI (SMR)

J.1. Perhitungan SMR pada *Scanline* 1

J.1.1

F1 = αj – αs = 224 – 225 = -1 = 1

F2 = βj = 56 = 1

F3 = βj – βs = 56 – 45 = 11 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82+ (1× 1 × 0) + 0

= 82

J.1.2

F1 = P = αj – αs = 222 – 225 = -3 = 1

F2 = P = βj = 4 = 0,15

F3 = P = βj – βs = 4 – 45 = -41 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 0,15 × (-60) + 0

= 73

J.1.3

F1 = P = αj – αs = 274 – 225 = 49 = 0,15

F2 = P = βj = 19 = 0,15

F3 = P = βj – βs = 19 – 45 = -26 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,15 × (-60) + 0

= 80,65

J.1.4

F1	=	αj – αs	= 280 – 225	= 55	= 0,15
F2	=	βj	= 28	= 0,4	
F3	=	βj – βs	= 28 – 45	= -17	= -60
F4	=	0			

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,4 × (-60) + 0

= 78,4

J.1.5

F1 =	P	= αj – αs	= 270 – 225	= 45	= 0,15
F2 =	P	= βj	= 40	= 0,85	
F3 =	P	= βj – βs	= 40– 45	= -5	= -50
F4 =	0				

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,85 × (-50) + 0

= 75,6

J.1.6

F1 =	P	= αj – αs	= 183 – 225	= -42	= 1
F2 =	P	= βj	= 12	= 1	
F3 =	P	= βj – βs	= 12 – 45	= -33	= -60
F4 =	0				

SMR = RMR_{basic} + (FI × F2 × F3) + F4

=82+ (1 × 1 × (-60) + 0

= 22

J.1.7

F1	=	αj – αs	= 270 – 225	= 45	= 0,15
F2	=	βj	= 30	= 0,7	
F3	=	βj – βs	= 30 – 45	= -15	= -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,15 × 0,7 × (-60) + 0

= 75,7

J.1.8

F1 = P = αj – αs = 252 – 225 = 27 = 0,4

F2 = P = βj = 32 = 0,7

F3 = P = βj – βs = 32 – 45 = -13 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,4 × 0,7 × (-60) + 0

= 65,2

J.1.9

F1 = P = αj – αs = 254 – 225 = 29 = 0,4

F2 = P = βj = 22 = 0,4

F3 = P = βj – βs = 22 – 45 = -23 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,4 × 0,4 × (-60) + 0

= 72,4

J.1.10

F1 = αj – αs = 231 – 225 = 6 = 0,85

F2 = βj = 64 = 1

F3 = βj – βs = 64 – 45 = 19 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,85 × 1 × 0) + 0

= 82

J.1.11

F1 = P = αj – αs = 244 – 225 = 19 = 0.7

F2 = P = βj = 12 = 0,15

F3 = P = βj – βs = 12 – 45 = -33 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (0,7 × 0,15 × (-60) + 0

= 75,7

J.1.12

F1 = P = αj – αs = 218 – 225 = -7 = 1

F2 = P = βj = 72 = 1

F3 = P = βj – βs = 72 – 45 = 27 = 0

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 82 + (1 × 1 × 0) + 0

= 82

J.2. Perhitungan SMR pada *Scanline* 2

J.2.1

F1 = P = αj – αs = 239 – 305 = -69 = 1

F2 = P = βj = 79 = 1

F3 = P = βj – βs = 79 – 88 = -9 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-60) + 0

= 14

J.2.2

F1 = P = αj – αs = 234 – 308 = -74 = 1

F2 = P = βj = 75 = 1

F3 = P = βj – βs = 75 – 88 = -13 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 1 × (-60) + 0

= 14

J.2.3

F1 = P = αj – αs = 340 – 308 = 32 = 0,15

F2 = P = βj = 84 = 1

F3 = P = βj – βs = 84 – 88 = -4 = -50

F4 = 0

SMR = RMR_{basic} – (FI × F2 × F3) + F4

= 74 + (0,15 × 1 × (-50) + 0

= 66,5

J.2.4

F1 = P = αj – αs = 340 – 308 = 32 = 0,15

F2 = P = βj = 71 = 1

F3 = P = βj – βs = 71 – 88 = -17 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (0,15 × 1 × (-60) + 0

= 65

J.2.5

F1 = P = αj – αs = 175 – 308 = -133 = 1

F2 = P = βj = 10 = 0,15

F3 = P = βj – βs = 10 – 88 = -78 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 0,15 × (-60) + 0

= 65

J.2.6

F1 = P = αj – αs = 165 – 308 = -143 = 1

F2 = P = βj = 25 = 0,4

F3 = P = βj – βs = 25 – 88 = -63 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 0,4 × (-60) + 0

= 50

J.2.7

F1 = P = αj – αs = 195 – 308 = -113 = 1

F2 = P = βj = 45 = 0,85

F3 = P = βj – βs = 45 – 88 = -43 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 74 + (1 × 0,85 × (-60) + 0

= 23

J.3. Perhitungan SMR pada *Scanline* 3

J.3.1

F1 = P = αj – αs = 190 – 320 = -130 = 1

F2 = P = βj = 70 = 1

F3 = P = βj – βs = 70 – 85 = -5 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.2

F1 = P = αj – αs = 185 – 320 = -135 = 1

F2 = P = βj = 83 = 1

F3 = P = βj – βs = 83 – 85 = -2 =0,50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-0,50) + 0

= 19

J.3.3

F1 = P = αj – αs = 100 – 320 = -220`= 1

F2 = P = βj = 75 = 1

F3 = P = βj – βs = 75 – 85 = -1- = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.4

F1 = P = αj – αs = 190 – 320 = -130 = 1

F2 = P = βj = 82 = 1

F3 = P = βj – βs = 82 – 85 = -3 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.5

F1 = αj – αs = 175 – 320 = -145 = 1

F2 = βj = 80 = 1

F3 = βj – βs = 80 – 85 = -5 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.6

F1 = P = αj – αs = 79 – 320 = -241 = 1

F2 = P = βj = 75 = 1

F3 = P = βj – βs = 75 – 85 = -10 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.7

F1 = P = αj – αs = 252 – 320 = -68 = 1

F2 = P = βj = 77 = 1

F3 = P = βj – βs = 77 – 85 = -8 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.8

F1 = αj – αs = 188 – 320 = -132 = 1

F2 = βj = 66 = 1

F3 = βj – βs = 66 – 85 = -19 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

J.3.9

F1 = P = αj – αs = 200 – 320 = -120 =1

F2 = P = βj = 51 = 1

F3 = P = βj – βs = 51 – 85 = -34 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

J.3.10

F1 = P = αj – αs = 160 – 320 = -160 = 1

F2 = P = βj = 83 = 1

F3 = P = βj – βs = 83 – 85 = -2 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.11

F1 = αj – αs = 46 – 320 = -314 = 1

F2 = βj = 80 = 1

F3 = βj – βs = 80 – 85 = -5 = -50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-50) + 0

= 19

J.3.12

F1 = P = αj – αs = 127 – 320 = -193 = 1

F2 = P = βj = 82 = 1

F3 = P = βj – βs = 82 – 85 = -53 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

J.3.13

F1 = P = αj – αs = 205 – 320 = -115 = 1

F2 = P = βj = 35 = 0,7

F3 = P = βj – βs = 35 – 85 = -50 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 0,7 × (-60) + 0

= 111

J.3.14

F1 = αj – αs = 195 – 320 = -125 = 1

F2 = βj = 65 = 1

F3 = βj – βs = 65 – 85 = -20 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

J.3.15

F1 = P = αj – αs = 116 – 320 = -204 = 1

F2 = P = βj = 62 = 1

F3 = P = βj – βs = 62 – 85 = -23 = -60

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (-60) + 0

= 9

J.3.16

F1 = P = αj – αs = 144 – 320 = -170 = 1

F2 = P = βj = 81 = 1

F3 = P = βj – βs = 81 – 85 = -4 = 0,50

F4 = 0

SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × (0,50) + 0

= 59,5

J.3.17

F1 = P = αj – αs = 150 – 320 = -170 = 1

F2 = P = βj = 31 = 0,7

F3 = P = βj – βs = 31 – 320 = -289 = -60

F4 = 0

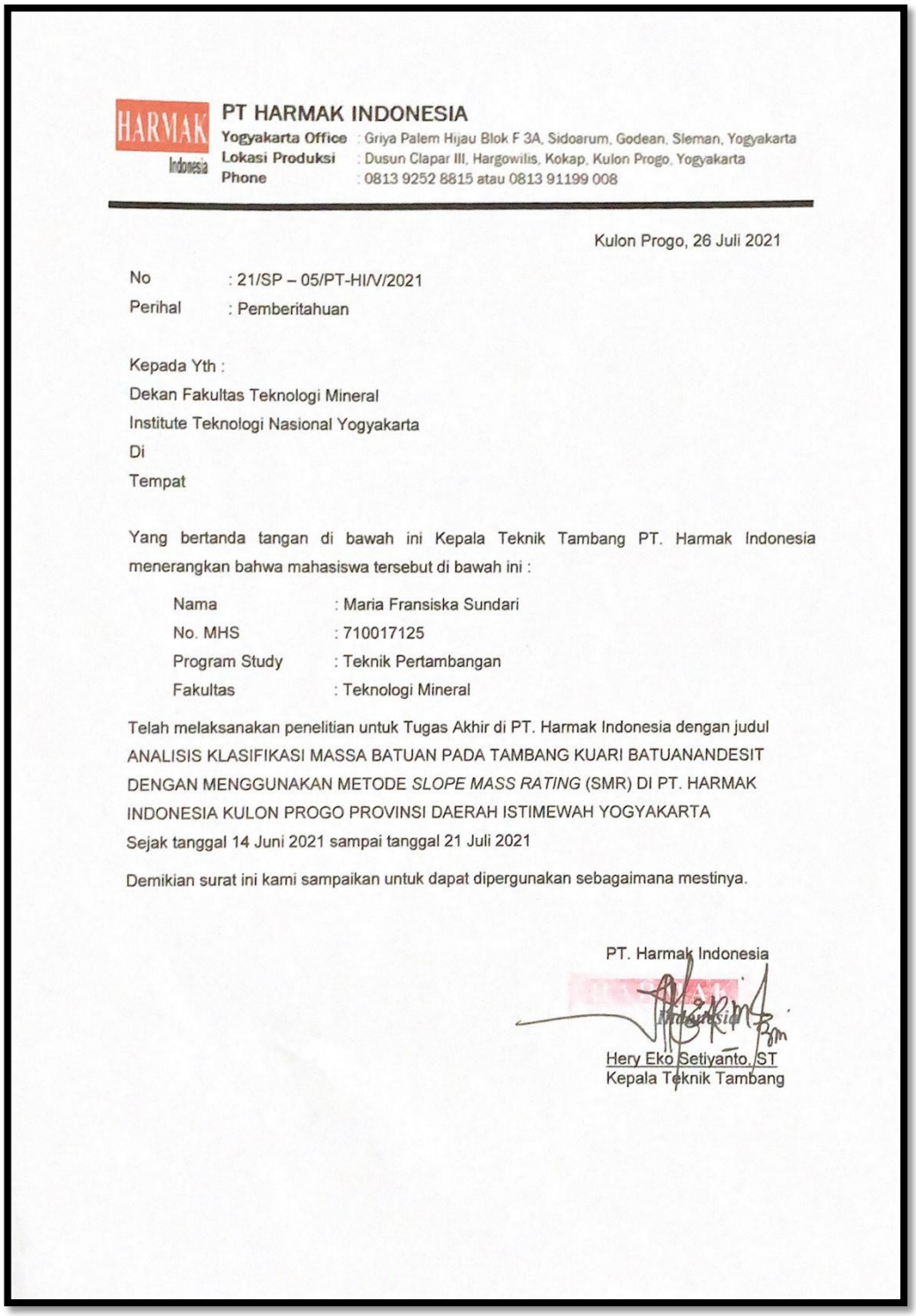
SMR = RMR_{basic} + (FI × F2 × F3) + F4

= 69 + (1 × 1 × -60) + 0

= 27

LAMPIRAN J

KETERANGAN KULIAH PRAKTEK



PT HARMAK INDONESIA
Yogyakarta Office : Griya Palem Hijau Blok F 3A, Sidoarum, Godean, Sleman, Yogyakarta
Lokasi Produksi : Dusun Clapar III, Hargowilis, Kokap, Kulon Progo, Yogyakarta
Phone : 0813 9252 8815 atau 0813 91199 008

Kulon Progo, 26 Juli 2021

No : 21/SP – 05/PT-HI/V/2021
Perihal : Pemberitahuan

Kepada Yth :
Dekan Fakultas Teknologi Mineral
Institute Teknologi Nasional Yogyakarta
Di
Tempat

Yang bertanda tangan di bawah ini Kepala Teknik Tambang PT. Harmak Indonesia menerangkan bahwa mahasiswa tersebut di bawah ini :

Nama	: Maria Fransiska Sundari
No. MHS	: 710017125
Program Study	: Teknik Pertambangan
Fakultas	: Teknologi Mineral

Telah melaksanakan penelitian untuk Tugas Akhir di PT. Harmak Indonesia dengan judul ANALISIS KLASIFIKASI MASSA BATUAN PADA TAMBANG KUARI BATUANANDESIT DENGAN MENGGUNAKAN METODE *SLOPE MASS RATING* (SMR) DI PT. HARMAK INDONESIA KULON PROGO PROVINSI DAERAH ISTIMEWAH YOGYAKARTA
Sejak tanggal 14 Juni 2021 sampai tanggal 21 Juli 2021

Demikian surat ini kami sampaikan untuk dapat dipergunakan sebagaimana mestinya.

PT. Harmak Indonesia

Hery Eko Setiyanto, ST
Kepala Teknik Tambang