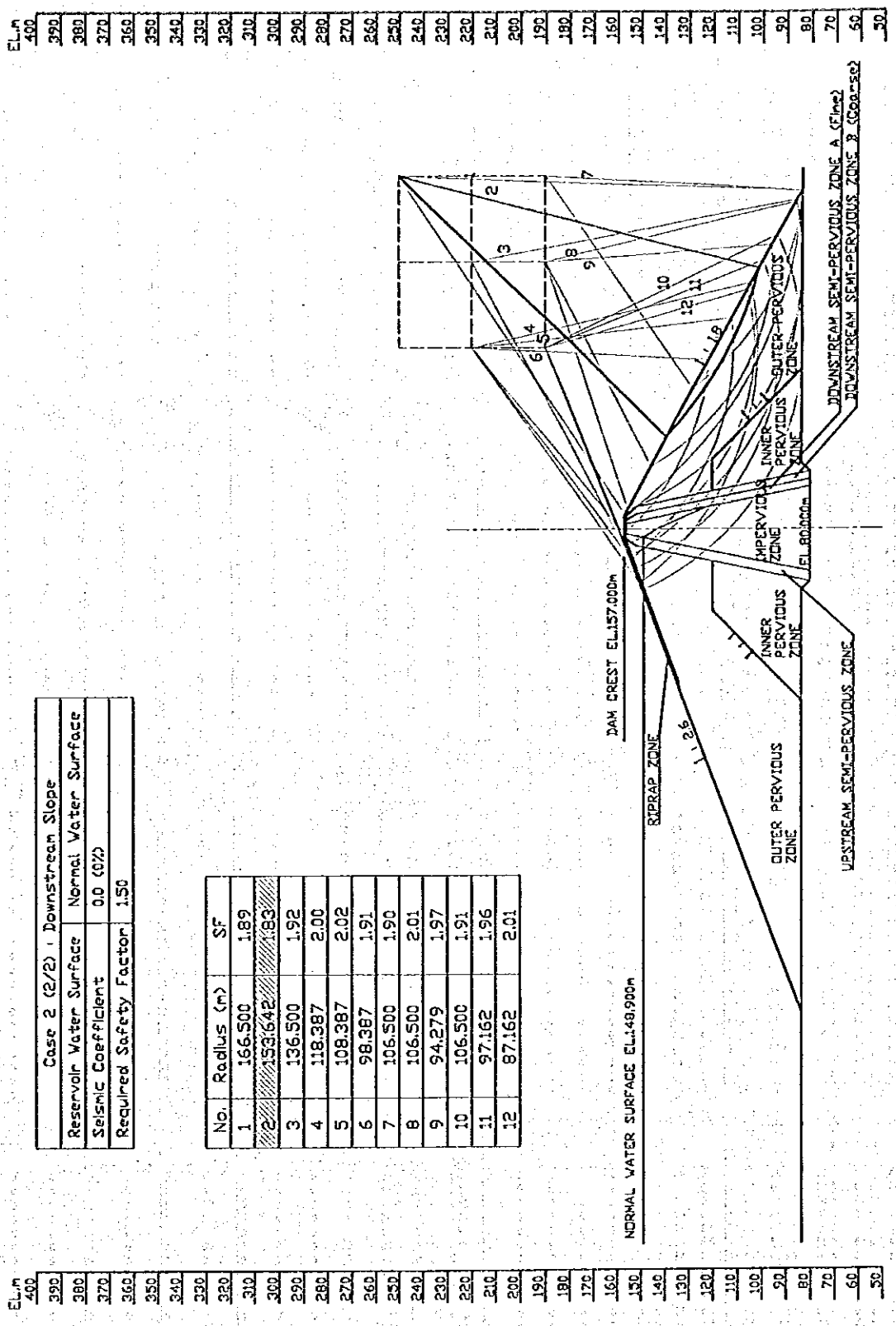


Case 2 (2/2) : Downstream Slope	
Reservoir Water Surface	Normal Water Surface
Seismic Coefficient	0.0 (0%)
Required Safety Factor	1.50

No.	Radius (m)	SF
1	166.500	1.89
2	153.642	1.83
3	136.500	1.92
4	118.387	2.00
5	108.387	2.02
6	98.387	1.91
7	106.500	1.90
8	106.500	2.01
9	94.279	1.97
10	106.500	1.91
11	97.162	1.96
12	87.162	2.01

Case 2 (2/2) : Downstream Slope

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 2 (2/2) : Downstream Slope | Slip Circle No. 1 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.60	9.83	3.79	0	45	1.00	0	0	0	0	0	21	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	16.43	4.31	0	45	1.00	0	0	0	0	0	61	0	8	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	23.03	5.10	0	45	1.00	0	0	0	0	0	98	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	29.63	6.16	0	45	1.00	0	0	0	0	0	130	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	6.60	36.23	7.49	0	45	1.00	0	0	0	0	0	158	0	35	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	6.60	42.83	9.10	2.6	42	0.90	0	0	0	0	0	182	0	48	0	0	0	0	0	0	0	0	0	0	0	17.7
7	1.94	2.16	6.60	49.43	11.01	2.6	42	0.90	0	0	0	0	0	201	0	63	0	0	0	0	0	0	0	0	0	0	0	17.5
8	1.94	2.16	6.60	56.03	13.21	2.6	42	0.90	0	0	0	0	0	216	0	77	0	0	0	0	0	0	0	0	0	0	0	18.2
9	1.94	2.16	6.60	62.63	15.73	2.6	42	0.90	0	0	0	0	0	228	0	92	0	0	0	0	0	0	0	0	0	0	0	18.4
10	1.94	2.16	6.60	69.23	18.58	2.6	42	0.90	0	0	0	0	0	232	0	106	0	0	0	0	0	0	0	0	0	0	0	18.8
11	1.94	2.16	6.60	75.83	21.77	2.6	42	0.90	0	0	0	0	0	232	0	119	0	0	0	0	0	0	0	0	0	0	0	19.2
12	1.94	2.16	6.60	82.43	25.34	2.6	42	0.90	0	0	0	0	0	228	0	130	0	0	0	0	0	0	0	0	0	0	0	19.7
13	1.94	2.16	6.60	89.03	29.30	2.6	42	0.90	0	0	0	0	0	218	0	138	0	0	0	0	0	0	0	0	0	0	0	20.2
14	1.94	2.16	6.60	95.63	33.70	0	45	1.00	0	0	0	0	0	204	0	143	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	6.60	102.23	38.58	0	45	1.00	0	0	0	0	0	184	0	143	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	6.60	108.83	43.99	0	45	1.00	0	0	0	0	0	160	0	138	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.60	115.43	50.01	0	45	1.00	0	0	0	0	0	130	0	125	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.60	122.03	56.73	0	45	1.00	0	0	0	0	0	96	0	104	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.60	128.63	64.28	0	45	1.00	0	0	0	0	0	58	0	71	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	5.88	134.87	72.37	0	45	1.00	0	0	0	0	0	17	0	24	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.894		> 1.20 ··· OK			0	0	0	0	0	3,052	0	1,600	0	0	0	0	0	0	0	0	0	0	0	150.1

Case 2 (2/2) : Downstream Slope | Slip Circle No. 2 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.50	39.82	21.61	0	45	1.00	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.50	43.32	22.59	0	45	1.00	0	0	0	0	0	10	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.50	46.82	23.66	0	45	1.00	0	0	0	0	0	15	0	5	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.50	50.32	24.83	0	45	1.00	0	0	0	0	0	20	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.50	53.82	26.09	0	45	1.00	0	0	0	0	0	24	0	9	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.50	57.32	27.45	0	45	1.00	0	0	0	0	0	28	0	11	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.50	60.82	28.91	0	45	1.00	0	0	0	0	0	30	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.50	64.32	30.47	0	45	1.00	0	0	0	0	0	32	0	15	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.50	67.82	32.14	0	45	1.00	0	0	0	0	0	34	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.50	71.32	33.91	0	45	1.00	0	0	0	0	0	34	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.50	74.82	35.81	0	45	1.00	0	0	0	0	0	34	0	19	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.50	78.32	37.82	0	45	1.00	0	0	0	0	0	33	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.50	81.82	39.96	0	45	1.00	0	0	0	0	0	32	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.50	85.32	42.22	0	45	1.00	0	0	0	0	0	29	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.50	88.82	44.63	0	45	1.00	0	0	0	0	0	26	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	3.50	92.32	47.19	0	45	1.00	0	0	0	0	0	22	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.50	95.82	49.90	0	45	1.00	0	0	0	0	0	18	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	3.50	99.32	52.77	0	45	1.00	0	0	0	0	0	12	0	11	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	3.50	102.82	55.83	0	45	1.00	0	0	0	0	0	7	0	8	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.70	105.42	58.23	0	45	1.00	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.831		> 1.20 ··· OK			0	0	0	0	0	445	0	243	0	0	0	0	0	0	0	0	0	0	0	0.0

Case 2 (2/2) : Downstream Slope | Slip Circle No. 3 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.30	14.99	4.97	0	45	1.00	0	0	0	0	0	60	0	-9	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	9.30	24.29	3.92	0	45	1.00	0	0	0	0	0	172	0	-14	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	9.30	33.59	3.51	2.6	42	0.90	0	0	0	0	0	273	0	-3	0	0	0	0	0	0	0	0	0	0	0	24.1
4	1.94	2.16	9.30	42.89	3.73	2.6	42	0.90	0	0	0	0	0	362	0	21	0	0	0	0	0	0	0	0	0	0	0	24.1
5	1.94	2.16	9.30	52.19	4.59	2.6	42	0.90	0	0	0	0	0	437	0	55	0	0	0	0	0	0	0	0	0	0	0	24.3
6	1.94	2.16	9.30	61.49	6.10	2.6	42	0.90	0	0	0	0	0	497	0	98	0	0	0	0	0	0	0	0	0	0	0	24.6
7	1.94	2.16	9.30	70.79	8.28	2.6	42	0.90	0	0	0	0	0	541	0	147	0	0	0	0	0	0	0	0	0	0	0	25.0
8	1.94	2.16	9.30	80.09	11.16	2.6	42	0.90	0	0	0	0	0	568	0	199	0	0	0	0	0	0	0	0	0	0	0	25.5
9	1.94	2.16	9.30	89.39	14.81	2.6	42	0.90	0	0	0	0	0	577	0	251	0	0	0	0	0	0	0	0	0	0	0	25.3
10	1.94	2.16	9.30	98.69	19.27	2.4	40	0.84	0	0	0	0	0	567	0	299	0	0	0	0	0	0	0	0	0	0	0	25.8
11	1.94	2.16	9.30	107.99	24.66	2.4	40	0.84	0	0	0	0	0	539	0	341	0	0	0	0	0	0	0	0	0	0	0	26.7
12	1.94	2.16	9.30	117.29	31.10	2.4	40	0.84	0	0	0	0	0	490	0	371	0	0	0	0	0	0	0	0	0	0	0	28.3
13	1.94	2.16	8.55	125.22	37.56	2.4	40	0.84	0	0	0	0	0	305	0	289	0	0	0	0	0	0	0	0	0	0	0	21.2
14	1.93	2.16	7.53	132.25	44.22	0	35	0.70	0	0	0	0	0	298	0	303	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.95	2.16	2.35	137.18	49.51	1	25	0.47	0	0	0	0	0	81	0	92	0	0	0	0	0	0	0	0	0	0	0	3.5
16	2.07	2.19	8.87	142.70	56.14	1	25	0.47	0	0	0	0	0	232	-19	298	14	0	0	48	0	0	0	0	0	0	0	14.1
17	2.10	2.22	1.06	147.57	62.80	1	25	0.47	0	0	0	0	0	18	8	27	-5	0	0	11	0	0	0	0	0	0	0	1.9
18	2.03	2.27	3.05	149.63	65.89	0	35	0.70	0	0	0	0	0	37	12	58	-6	0	0	18	0	0	0	0	0	0	0	0.0
19	1.94	2.16	0.38	151.34	68.60	0	45	1.00	0	0	0	0	0	3	0	5	-0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	3.30	153.17	71.67	0	45	1.00	0	0	0	0	0	11	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.917		> 1.20 ··· OK			0	0	0	0	0	6,069	1	2,827	1	0	0	77	0	0	0	0	0	0	0	295.1

Case 2 (2/2) : Downstream Slope | Slip Circle No. 4 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.60	47.38	23.80	0	45	1.00	0	0	0	0	0	32	0	-6	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	53.98	22.70	0	45	1.00	0	0	0	0	0	92	0	-13	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	60.58	21.99	0	45	1.00	0	0	0	0	0	149	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	67.18	21.65	2.6	42	0.90	0	0	0	0	0	201	0	-5	0	0	0	0	0	0	0	0	0	0	0	17.1
5	1.94	2.16	6.60	73.78	21.67	2.6	42	0.90	0	0	0	0	0	247	0	8	0	0	0	0	0	0	0	0	0	0	0	17.1
6	1.94	2.16	6.60	80.38	22.07	2.6	42	0.90	0	0	0	0	0	288	0	25	0	0	0	0	0	0	0	0	0	0	0	17.2
7	1.94	2.16	6.60	86.98	22.84	2.6	42	0.90	0	0	0	0	0	323	0	43	0	0	0	0	0	0	0	0	0	0	0	17.3
8	1.94	2.16	6.60	93.58	23.98	2.6	42	0.90	0	0	0	0	0	351	0	71	0	0	0	0	0	0	0	0	0	0	0	17.4
9	1.94	2.16	6.60	100.18	25.52	2.6	42	0.90	0	0	0	0	0	373	0	98	0	0	0	0	0	0	0	0	0	0	0	17.7
10	1.94	2.16	6.60	106.78	27.47	2.4	40	0.84	0	0	0	0	0	388	0	127	0	0	0	0	0	0	0	0	0	0	0	18.9
11	1.94	2.16	6.60	113.38	29.85	2.4	40	0.84	0	0	0	0	0	395	0	155	0	0	0	0	0	0	0	0	0	0	0	17.2
12	1.94	2.16	6.60	119.98	32.68	2.4	40	0.84	0	0	0	0	0	394	0	184	0	0	0	0	0	0	0	0	0	0	0	17.7
13	1.94	2.16	4.43	125.49	35.42	2.4	40	0.84	0	0	0	0	0	280	0	139	0	0	0	0	0	0	0	0	0	0	0	12.2
14	1.94	2.16	6.82	131.12	38.61	0	35	0.70	0	0	0	0	0	388	0	234	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.92	2.19	0.38	134.71	40.86	1	25	0.47	0	0	0	0	0	29	-1	13	1	0	0	0	0	0	0	0	0	0	0	0.4
16	2.02	2.19	12.15	140.96	45.24	1	25	0.47	0	0	0	0	0	641	-105	480	140	0	0	154	0	0	0	0	0	0	0	15.5
17	2.06	2.23	3.19	148.63	51.50	1	25	0.47	0	0	0	0	0	132	33	118	-37	0	0	74	0	0	0	0	0	0	0	4.3
18	1.95	2.23	3.36	151.91	54.52	0	35	0.70	0	0	0	0	0	110	32	105	-33	0	0	87	0	0	0	0	0	0	0	0.0
19	1.94	2.16	11.07	159.12	62.07	0	45	1.00	0	0	0	0	0	164	61	188	-53	0	0	107	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.11	165.21	69.64	0	45	1.00	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.997		> 1.20 ··· OK			0	0	0	0	0	4,950	20	1,957	18	0	0	403	0	0	0	0	0	0	0	187.8

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 2 (2/2) : Downstream Slope	Slip Circle No. 5	Reservoir Water Surface	Normal Water Surface : EL.143.900m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.80	60.99	31.99	0	45	1.00	0	0	0	0	0	21	0	-2	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.80	66.79	31.66	0	45	1.00	0	0	0	0	0	81	0	-2	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.80	72.59	31.64	0	45	1.00	0	0	0	0	0	93	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.80	78.39	31.94	0	45	1.00	0	0	0	0	0	130	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.80	84.19	32.55	2.6	42	0.90	0	0	0	0	0	159	0	21	0	0	0	0	0	0	0	0	0	0	0	15.2
6	1.94	2.16	5.80	89.99	33.47	2.6	42	0.90	0	0	0	0	0	183	0	34	0	0	0	0	0	0	0	0	0	0	0	15.3
7	1.94	2.16	5.80	95.79	34.73	2.6	42	0.90	0	0	0	0	0	202	0	49	0	0	0	0	0	0	0	0	0	0	0	15.5
8	1.94	2.16	5.80	101.59	36.32	2.6	42	0.90	0	0	0	0	0	217	0	66	0	0	0	0	0	0	0	0	0	0	0	15.7
9	1.94	2.16	5.80	107.39	38.26	2.6	42	0.90	0	0	0	0	0	226	0	83	0	0	0	0	0	0	0	0	0	0	0	16.0
10	1.94	2.16	5.80	113.19	40.59	2.6	42	0.90	0	0	0	0	0	230	0	100	0	0	0	0	0	0	0	0	0	0	0	16.4
11	1.94	2.16	5.80	118.99	43.31	2.6	42	0.90	0	0	0	0	0	229	0	115	0	0	0	0	0	0	0	0	0	0	0	16.8
12	1.94	2.16	5.80	124.79	46.48	2.6	42	0.90	0	0	0	0	0	222	0	130	0	0	0	0	0	0	0	0	0	0	0	17.4
13	1.94	2.16	2.63	129.03	49.10	2.6	42	0.90	0	0	0	0	0	99	0	64	0	0	0	0	0	0	0	0	0	0	0	8.3
14	1.93	2.16	7.03	133.89	52.45	0	35	0.70	0	0	0	0	0	240	0	175	0	0	0	0	0	0	0	0	0	0	0	0.0
15	2.00	2.16	4.23	139.52	56.85	1	25	0.47	0	0	0	0	0	131	0	109	0	0	0	0	0	0	0	0	0	0	0	5.5
16	2.11	2.19	5.40	144.34	61.12	1	25	0.47	0	0	0	0	0	133	-9	125	10	0	0	19	0	0	0	0	0	0	0	7.4
17	2.11	2.23	0.85	147.47	64.19	1	25	0.47	0	0	0	0	0	18	3	17	-3	0	0	6	0	0	0	0	0	0	0	1.2
18	2.03	2.27	3.29	149.54	66.37	0	35	0.70	0	0	0	0	0	48	6	52	-6	0	0	12	0	0	0	0	0	0	0	0.0
19	1.94	2.16	0.63	151.50	68.54	0	45	1.00	0	0	0	0	0	6	0	7	-0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.26	153.94	71.43	0	45	1.00	0	0	0	0	0	18	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.023			> 1.20 ··· OK			0	0	0	0	0	2,658	1	1,180	1	0	0	37	0	0	0	0	0	0	0	150.7

Case 2 (2/2) : Downstream Slope	Slip Circle No. 6	Reservoir Water Surface	Normal Water Surface : EL.143.900m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.60	76.95	41.86	0	45	1.00	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.60	80.55	42.18	0	45	1.00	0	0	0	0	0	18	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.60	84.15	42.64	0	45	1.00	0	0	0	0	0	28	0	4	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.60	87.75	43.23	0	45	1.00	0	0	0	0	0	38	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.60	91.35	43.98	0	45	1.00	0	0	0	0	0	46	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.60	94.95	44.83	0	45	1.00	0	0	0	0	0	54	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.60	98.55	45.85	0	45	1.00	0	0	0	0	0	60	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.60	102.15	47.01	0	45	1.00	0	0	0	0	0	64	0	22	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.60	105.75	48.34	0	45	1.00	0	0	0	0	0	68	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.60	109.35	49.82	0	45	1.00	0	0	0	0	0	70	0	31	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.60	112.95	51.48	0	45	1.00	0	0	0	0	0	71	0	34	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.60	116.55	53.32	0	45	1.00	0	0	0	0	0	70	0	38	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.60	120.15	55.35	0	45	1.00	0	0	0	0	0	68	0	41	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.60	123.75	57.59	0	45	1.00	0	0	0	0	0	65	0	43	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.60	127.35	60.05	0	45	1.00	0	0	0	0	0	61	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.17	131.23	62.99	0	45	1.00	0	0	0	0	0	63	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.64	135.14	66.21	0	35	0.70	0	0	0	0	0	47	0	41	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.93	2.16	3.13	138.83	69.70	0	35	0.70	0	0	0	0	0	33	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
19	2.09	2.16	4.12	142.75	73.77	1	25	0.47	0	0	0	0	0	19	0	20	0	0	0	0	0	0	0	0	0	0	0	6.1
20	2.11	2.16	0.76	145.19	78.55	0	35	0.70	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.913			> 1.20 ··· OK			0	0	0	0	0	954	0	483	0	0	0	0	0	0	0	0	0	0	0	6.1

Case 2 (2/2) : Downstream Slope	Slip Circle No. 7	Reservoir Water Surface	Normal Water Surface : EL.143.900m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	8.68	3.85	0	45	1.00	0	0	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.00	12.68	4.26	0	45	1.00	0	0	0	0	0	21	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.00	16.68	4.81	0	45	1.00	0	0	0	0	0	34	0	5	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.00	20.68	5.53	0	45	1.00	0	0	0	0	0	45	0	9	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.00	24.68	6.40	0	45	1.00	0	0	0	0	0	55	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.00	28.68	7.43	0	45	1.00	0	0	0	0	0	64	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.00	32.68	8.64	0	45	1.00	0	0	0	0	0	70	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.00	36.68	10.01	0	45	1.00	0	0	0	0	0	75	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.00	40.68	11.57	0	45	1.00	0	0	0	0	0	79	0	33	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.00	44.68	13.32	0	45	1.00	0	0	0	0	0	81	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.00	48.68	15.28	0	45	1.00	0	0	0	0	0	81	0	42	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.00	52.68	17.44	0	45	1.00	0	0	0	0	0	80	0	45	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.00	56.68	19.83	0	45	1.00	0	0	0	0	0	77	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.00	60.68	22.48	0	45	1.00	0	0	0	0	0	72	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.00	64.68	25.39	0	45	1.00	0	0	0	0	0	65	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.00	68.68	28.60	0	45	1.00	0	0	0	0	0	57	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.00	72.68	32.15	0	45	1.00	0	0	0	0	0	47	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.00	76.68	36.09	0	45	1.00	0	0	0	0	0	35	0	36	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.00	80.68	40.45	0	45	1.00	0	0	0	0	0	22	0	26	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.04	84.70	45.44	0	45	1.00	0	0	0	0	0	8	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.897			> 1.20 ··· OK			0	0	0	0	0	1,075	0	567	0	0	0	0	0	0	0	0	0	0	0	0.0

Case 2 (2/2) : Downstream Slope	Slip Circle No. 8	Reservoir Water Surface	Normal Water Surface : EL.143.900m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.30	14.31	5.53	0	45	1.00	0	0	0	0	0	29	0	-6	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.30	20.61	4.48	0	45	1.00	0	0	0	0	0	84	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.30	26.91	3.81	0	45	1.00	0	0	0	0	0	138	0	-10	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.30	33.21	3.51	2.6	42	0.90	0	0	0	0	0	183	0	-3	0	0	0	0	0	0	0	0	0	0	0	16.3
5	1.94	2.16	6.30	39.51	3.60	2.6	42	0.90	0	0	0	0	0	224	0	10	0	0	0	0	0	0	0	0	0	0	0	16.3
6	1.94	2.16	6.30	45.81	4.05	2.6	42	0.90	0	0	0	0	0	260	0	27	0	0	0	0	0	0	0	0	0	0	0	16.4
7	1.94	2.16	6.30	52.11	4.88	2.6	42	0.90	0	0	0	0	0	290	0	47	0	0	0	0	0	0	0	0	0	0	0	16.5
8	1.94	2.16	6.30	58.41	6.11	2.6	42	0.90	0	0	0	0	0	314	0	71	0	0	0	0	0	0	0	0	0	0	0	16.7
9	1.94	2.16	6.30	64.71	7.73	2.6	42	0.90	0	0	0	0	0	331	0	95	0	0	0	0	0	0	0	0	0	0	0	17.0
10	1.94	2.16	6.30	71.01	9.77	2.6	42	0.90	0	0	0	0	0	341	0	123	0	0	0	0	0	0	0	0	0	0	0	17.3
11	1.94	2.16	6.30	77.31	12.27	2.6	42	0.90	0	0	0	0	0	344	0	149	0	0	0	0	0	0	0	0	0	0	0	17.8
12	1.94	2.16	6.30	83.61	15.24	2.6	42	0.90	0	0	0	0	0	339	0	174	0	0	0	0	0	0	0	0	0	0	0	18.3
13	1.94	2.16	6.30	89.91	18.75	2.6	42	0.90	0	0	0	0	0	327	0	197	0	0	0	0	0	0	0	0	0	0	0	19.0
14	1.94	2.16	6.30	96.21	22.85	2.6	42	0.90	0	0	0	0	0	306	0	215	0	0	0	0	0	0	0	0	0	0	0	19.9
15	1.94	2.16	6.30	102.51	27.63	2.6	42	0.90	0	0	0	0	0	277	0	227	0	0	0	0	0	0	0	0	0	0	0	21.1
16	1.94	2.16	6.30	108.81	33.23	2.6	42	0.90	0	0	0	0	0	240	0	231	0	0	0	0	0	0	0	0	0	0	0	22.6
17	1.94	2.16	6.30	115.11	39.83	0	43	0.93	0	0	0	0	0	194	0	222	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.30	121.41	47.75	0	45	1.00	0	0	0	0	0	141	0	195	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.30	127.71	57.59	0	45	1.00	0	0	0	0	0	80	0	142	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.85	133.29	69.00	0	45	1.00	0	0	0	0	0	18	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.014			> 1.20 ··· OK			0	0	0	0	0	4,450	0	2,133	0	0	0	0	0	0	0	0	0	0	0	235.5

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 2 (2/2) : Downstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.50	30.93	15.81	0	45	1.00	0	0	0	0	0	12	0	-1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.50	35.43	15.72	0	45	1.00	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.50	39.93	15.65	0	45	1.00	0	0	0	0	0	55	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.50	44.43	16.19	0	45	1.00	0	0	0	0	0	74	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.50	48.93	16.76	0	45	1.00	0	0	0	0	0	90	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.50	53.43	17.54	0	45	1.00	0	0	0	0	0	104	0	21	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.50	57.93	18.55	0	45	1.00	0	0	0	0	0	115	0	29	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.50	62.43	19.80	2.6	42	0.90	0	0	0	0	0	124	0	38	0	0	0	0	0	0	0	0	0	0	0	12.2
9	1.94	2.16	4.50	66.93	21.29	2.6	42	0.90	0	0	0	0	0	131	0	47	0	0	0	0	0	0	0	0	0	0	0	12.4
10	1.94	2.16	4.50	71.43	23.04	2.6	42	0.90	0	0	0	0	0	134	0	56	0	0	0	0	0	0	0	0	0	0	0	12.6
11	1.94	2.16	4.50	75.93	25.07	2.6	42	0.90	0	0	0	0	0	135	0	65	0	0	0	0	0	0	0	0	0	0	0	12.9
12	1.94	2.16	4.50	80.43	27.39	0	45	1.00	0	0	0	0	0	132	0	73	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.50	84.93	30.03	0	45	1.00	0	0	0	0	0	127	0	79	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.50	89.43	33.02	0	45	1.00	0	0	0	0	0	119	0	84	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.50	93.93	36.41	0	45	1.00	0	0	0	0	0	108	0	86	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.50	98.43	40.25	0	45	1.00	0	0	0	0	0	93	0	85	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.50	102.93	44.62	0	45	1.00	0	0	0	0	0	76	0	79	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.50	107.43	49.65	0	45	1.00	0	0	0	0	0	56	0	67	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.50	111.93	55.50	0	45	1.00	0	0	0	0	0	34	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.03	116.19	62.08	0	45	1.00	0	0	0	0	0	10	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.565			> 1.20 ··· OK			0	0	0	0	0	1,763	0	896	0	0	0	0	0	0	0	0	0	0	0	50.1

Case 2 (2/2) : Downstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

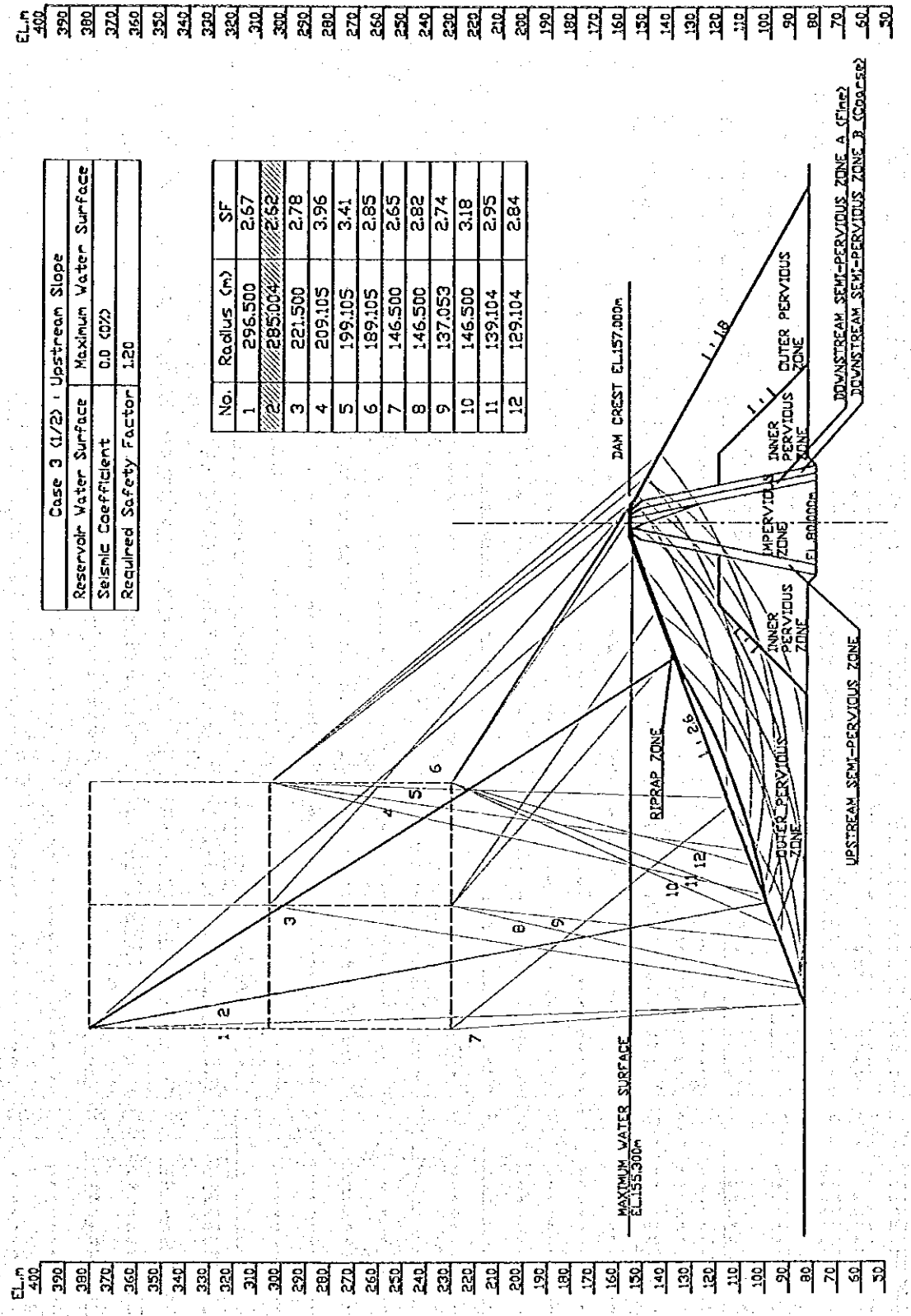
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.90	28.55	11.90	0	45	1.00	0	0	0	0	0	56	0	-24	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.90	36.45	8.92	0	45	1.00	0	0	0	0	0	185	0	-55	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.90	44.35	6.64	2.6	42	0.90	0	0	0	0	0	268	0	-65	0	0	0	0	0	0	0	0	0	0	0	21.1
4	1.94	2.16	7.90	52.25	4.99	2.6	42	0.90	0	0	0	0	0	353	0	-61	0	0	0	0	0	0	0	0	0	0	0	20.8
5	1.94	2.16	7.90	60.15	3.96	2.6	42	0.90	0	0	0	0	0	450	0	-42	0	0	0	0	0	0	0	0	0	0	0	20.5
6	1.94	2.16	7.90	68.05	3.52	11.8	37	0.75	0	0	0	0	0	525	0	-10	0	0	0	0	0	0	0	0	0	0	0	93.6
7	1.94	2.16	7.90	75.95	3.67	11.8	37	0.75	0	0	0	0	0	590	0	33	0	0	0	0	0	0	0	0	0	0	0	93.7
8	1.94	2.16	7.90	83.85	4.40	11.2	35	0.70	0	0	0	0	0	641	0	84	0	0	0	0	0	0	0	0	0	0	0	89.1
9	1.94	2.16	7.90	91.75	5.74	11.2	35	0.70	0	0	0	0	0	679	0	142	0	0	0	0	0	0	0	0	0	0	0	90.2
10	1.94	2.16	7.90	99.65	7.31	11.2	35	0.70	0	0	0	0	0	701	0	203	0	0	0	0	0	0	0	0	0	0	0	92.0
11	1.94	2.16	7.90	107.55	10.34	11.2	35	0.70	0	0	0	0	0	709	0	267	0	0	0	0	0	0	0	0	0	0	0	94.4
12	1.94	2.16	7.90	115.45	13.68	11.2	35	0.70	0	0	0	0	0	699	0	330	0	0	0	0	0	0	0	0	0	0	0	97.7
13	1.94	2.16	4.63	121.71	16.90	11.2	35	0.70	0	0	0	0	0	398	0	221	0	0	0	0	0	0	0	0	0	0	0	59.2
14	1.79	2.16	6.88	127.47	20.33	0	35	0.70	0	0	0	0	0	524	0	336	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.93	2.19	3.98	132.50	24.06	1	25	0.47	0	0	0	0	0	316	-85	231	116	0	0	42	0	0	0	0	0	0	0	4.9
16	2.02	2.19	12.15	140.98	30.59	1	25	0.47	0	0	0	0	0	838	-254	793	265	0	0	403	0	0	0	0	0	0	0	16.3
17	2.02	2.22	5.29	149.69	39.34	1	25	0.47	0	0	0	0	0	285	132	321	-117	0	0	235	0	0	0	0	0	0	0	8.0
18	1.94	2.21	3.18	153.92	44.43	0	35	0.70	0	0	0	0	0	129	78	185	-61	0	0	126	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.40	158.72	51.08	0	45	1.00	0	0	0	0	0	165	141	248	-94	0	0	203	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.53	165.18	62.22	0	45	1.00	0	0	0	0	0	52	72	103	-36	0	0	82	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.918			> 1.20 ··· OK			0	0	0	0	0	8,600	84	3,220	93	0	0	1,101	0	0	0	0	0	0	0	801.3

Case 2 (2/2) : Downstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.30	38.56	18.07	0	45	1.00	0	0	0	0	0	45	0	-15	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.30	45.86	15.88	0	45	1.00	0	0	0	0	0	132	0	-34	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.30	53.16	14.31	2.6	42	0.90	0	0	0	0	0	212	0	-37	0	0	0	0	0	0	0	0	0	0	0	19.2
4	1.94	2.16	7.30	60.45	13.31	2.6	42	0.90	0	0	0	0	0	288	0	-28	0	0	0	0	0	0	0	0	0	0	0	19.0
5	1.94	2.16	7.30	67.76	12.68	2.6	42	0.90	0	0	0	0	0	351	0	-8	0	0	0	0	0	0	0	0	0	0	0	18.9
6	1.94	2.16	7.30	75.06	12.97	2.6	42	0.90	0	0	0	0	0	405	0	21	0	0	0	0	0	0	0	0	0	0	0	18.9
7	1.94	2.16	7.30	82.36	13.63	2.6	42	0.90	0	0	0	0	0	451	0	58	0	0	0	0	0	0	0	0	0	0	0	19.1
8	1.94	2.16	7.30	89.66	14.85	11.2	35	0.70	0	0	0	0	0	485	0	100	0	0	0	0	0	0	0	0	0	0	0	83.3
9	1.94	2.16	7.30	95.95	16.65	11.2	35	0.70	0	0	0	0	0	508	0	146	0	0	0	0	0	0	0	0	0	0	0	84.9
10	1.94	2.16	7.30	104.26	19.08	11.2	35	0.70	0	0	0	0	0	515	0	194	0	0	0	0	0	0	0	0	0	0	0	87.2
11	1.94	2.16	7.30	111.56	22.18	11.2	35	0.70	0	0	0	0	0	510	0	241	0	0	0	0	0	0	0	0	0	0	0	90.3
12	1.94	2.16	7.30	118.85	26.02	2.4	40	0.84	0	0	0	0	0	490	0	285	0	0	0	0	0	0	0	0	0	0	0	20.5
13	1.94	2.16	4.07	124.55	29.59	2.4	40	0.84	0	0	0	0	0	259	0	178	0	0	0	0	0	0	0	0	0	0	0	12.0
14	1.94	2.16	7.13	130.15	33.69	0	35	0.70	0	0	0	0	0	419	0	330	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.92	2.19	1.18	134.30	37.16	1	25	0.47	0	0	0	0	0	64	-8	57	9	0	0	4	0	0	0	0	0	0	0	1.6
16	2.02	2.19	12.15	140.98	43.83	1	25	0.47	0	0	0	0	0	578	-111	618	104	0	0	204	0	0	0	0	0	0	0	17.8
17	2.07	2.23	2.84	148.46	52.69	1	25	0.47	0	0	0	0	0	89	51	121	-37	0	0	78	0	0	0	0	0	0	0	4.8
18	1.96	2.24	3.06	151.41	56.97	0	35	0.70	0	0	0	0	0	88	47	104	-30	0	0	66	0	0	0	0	0	0	0	0.0
19	1.94	2.16	5.10	155.49	63.83	0	45	1.00	0	0	0	0	0	52	40	93	-21	0	0	51	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.69	158.88	70.75	0	45	1.00	0	0	0	0	0	3	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.555			> 1.20 ··· OK			0	0	0	0	0	5,918	18	2,429	24	0	0	403	0	0	0	0	0	0	0	497.6

Case 2 (2/2) : Downstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Normal Water Surface : EL.148.900m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.50

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.40	49.48	25.29	0	45	1.00	0	0	0	0	0	22	0	-5	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.40	54.88	24.18	0	45	1.00	0	0	0	0	0	65	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.40	60.28	23.38	0	45	1.00	0	0	0	0	0	105	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.40	65.68	22.95	2.6	42	0.90	0	0	0	0	0	142	0	-7	0	0	0	0	0	0	0	0	0	0	0	14.0
5	1.94	2.16	5.40	71.08	22.84	2.6	42	0.90	0	0	0	0	0	174	0	2	0	0	0	0	0	0	0	0	0	0	0	14.0
6	1.94	2.16	5.40	76.49	23.08	2.6	42	0.90	0	0	0	0	0	203	0	15	0	0	0	0	0	0	0	0	0	0	0	14.0
7	1.94	2.16	5.40	81.88	23.65	2.6	42	0.90	0	0	0	0	0	227	0	31	0	0	0	0	0	0	0	0	0	0	0	14.1
8	1.94	2.16	5.40	87.28	24.57	2.6	42	0.90	0	0	0	0	0	246	0	50	0	0	0	0	0	0	0	0	0	0	0	14.3
9	1.94	2.16	5.40	92.68	25.84	2.6	42	0.90	0	0	0	0	0	259	0	70	0	0	0	0	0	0	0	0	0	0	0	14.5
10	1.94	2.16	5.40	98.08	27.48	2.6	42	0.90	0	0	0	0	0	268	0	91	0	0	0	0	0	0	0	0	0	0	0	14.8
11	1.94	2.16	5.40	103.48	29.52	2.6	42	0.90	0	0	0	0	0	270	0	113	0	0	0	0	0	0	0	0	0	0	0	15.1
12	1.94	2.16	5.40	108.88	31.99	2.4	40	0.84	0	0	0	0	0	267	0	133	0	0	0	0	0	0	0	0	0	0	0	14.7
13	1.94	2.16	5.40	114.28	34.92	2.4	40	0.84	0	0	0	0	0	258	0	152	0	0	0	0	0	0	0	0	0	0	0	15.2
14	1.94	2.16	5.40	119.68	38.38	2.4	40	0.84	0	0	0	0	0	242	0	168	0	0	0	0	0	0	0	0	0	0	0	16.0
15	1.94	2.16	5.40	125.08	42.45	2.6	42	0.90	0	0	0	0	0	220	0	179	0	0	0	0	0	0	0	0	0	0	0	18.0
16	1.94	2.16	1.90	128.73	45.59	2.6	42	0.90	0	0	0	0	0	70	0	64	0	0	0	0	0	0	0	0	0	0	0	6.6
17	1.93	2.16	7.83	133.49	50.28	0	35	0.70	0	0	0	0	0	241	0	256	0	0	0	0	0	0	0	0	0	0	0	0.0
18	2.05	2.16	9.69	142.15	61.09	1	25	0.47	0	0	0	0	0	177	0	282	0	0	0	0	0	0	0	0	0	0	0	17.3
19	2.06	2.16	2.23	148.11	71.32	0	35	0.70	0	0	0	0	0	12	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.16	149.81	74.96	0	45	1.00	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.012			> 1.20 ··· OK			0	0	0	0	0	3,470	0	1,577	0	0	0	0	0	0	0	0	0	0	0	202.8



Case 3 (1/2) : Upstream Slope	
Reservoir Water Surface	Maximum Water Surface
Seismic Coefficient	0.0 (0%)
Required Safety Factor	1.20

No.	Radius (m)	SF
1	296.500	2.67
2	285.004	2.62
3	221.500	2.78
4	209.105	3.96
5	199.105	3.41
6	189.105	2.85
7	146.500	2.65
8	146.500	2.82
9	137.053	2.74
10	146.500	3.18
11	139.104	2.95
12	129.104	2.84

Case 3 (1/2) : Upstream Slope

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - Ne) \cdot \tan\phi]}{\Sigma\,(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 3 (1/2) : Upstream Slope | Slip Circle No. 1 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	OL
1	1.94	2.16	9.50	14.25	3.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	656	2	33	-33	0	0	680	0.0
2	1.94	2.16	9.50	23.75	4.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	722	4	58	-54	0	0	675	0.0
3	1.94	2.16	9.50	33.25	5.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	741	8	84	-74	0	0	665	0.0
4	1.94	2.16	9.50	42.75	6.60	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	753	14	110	-94	0	0	660	0.0
5	1.94	2.16	9.50	52.25	8.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	758	20	136	-112	0	0	648	0.0
6	1.94	2.16	9.50	61.75	10.00	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	755	28	161	-129	0	0	634	0.0
7	1.94	2.16	9.50	71.25	12.15	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	745	35	184	-144	0	0	618	0.0
8	1.94	2.16	9.50	80.75	14.71	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	727	44	206	-157	0	0	598	0.0
9	1.94	2.16	9.50	90.25	17.57	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	702	53	224	-167	0	0	576	0.0
10	1.94	2.16	9.50	99.75	20.78	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	670	62	239	-174	0	0	550	0.0
11	1.94	2.16	9.50	109.25	24.36	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	631	71	250	-178	0	0	521	0.0
12	1.94	2.16	9.50	118.75	28.32	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	584	78	255	-179	0	0	487	0.0
13	1.94	2.16	9.50	128.25	32.63	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	531	84	255	-175	0	0	449	0.0
14	1.94	2.16	9.50	137.75	37.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	470	88	247	-167	0	0	406	0.0
15	1.94	2.16	9.50	147.25	42.65	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	403	89	231	-154	0	0	357	0.0
16	1.94	2.16	9.50	156.75	48.32	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	330	84	205	-136	0	0	302	0.0
17	1.94	2.16	9.50	166.25	54.49	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	250	75	169	-111	0	0	239	0.0
18	1.94	2.16	9.50	175.75	61.20	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	165	58	121	-79	0	0	166	0.0
19	1.94	2.16	9.50	185.25	68.49	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	74	32	59	-40	0	0	83	0.0
20	1.94	2.16	1.54	190.77	73.02	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	3	2	3	-2	0	0	5	0.0
Result of Calculation				SF = 2.658		> 1.20 ··· OK			0	0	0	0	0	0	0	0	0	0	0	0	10,111	632	3,230	-2,361	0	0	9,322	0.0

Case 3 (1/2) : Upstream Slope | Slip Circle No. 2 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	OL
1	1.94	2.16	5.00	53.41	20.04	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	274	10	52	-52	0	0	281	0.0
2	1.94	2.16	5.00	58.41	21.04	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	274	12	57	-56	0	0	277	0.0
3	1.94	2.16	5.00	63.41	22.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	272	13	62	-59	0	0	273	0.0
4	1.94	2.16	5.00	68.41	23.33	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	269	15	67	-62	0	0	268	0.0
5	1.94	2.16	5.00	73.41	24.61	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	265	17	71	-65	0	0	262	0.0
6	1.94	2.16	5.00	78.41	25.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	260	19	74	-68	0	0	256	0.0
7	1.94	2.16	5.00	83.41	27.47	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	254	21	78	-70	0	0	250	0.0
8	1.94	2.16	5.00	88.41	29.05	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	247	23	81	-72	0	0	243	0.0
9	1.94	2.16	5.00	93.41	30.74	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	239	25	83	-73	0	0	235	0.0
10	1.94	2.16	5.00	98.41	32.52	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	230	27	85	-74	0	0	228	0.0
11	1.94	2.16	5.00	103.41	34.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	219	29	85	-74	0	0	219	0.0
12	1.94	2.16	5.00	108.41	36.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	208	30	85	-74	0	0	210	0.0
13	1.94	2.16	5.00	113.41	38.53	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	196	32	85	-73	0	0	200	0.0
14	1.94	2.16	5.00	118.41	40.76	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	182	33	83	-72	0	0	190	0.0
15	1.94	2.16	5.00	123.41	43.10	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	168	33	81	-70	0	0	179	0.0
16	1.94	2.16	5.00	128.41	45.56	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	153	34	77	-67	0	0	167	0.0
17	1.94	2.16	5.00	133.41	48.15	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	136	34	72	-64	0	0	154	0.0
18	1.94	2.16	5.00	138.41	50.86	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	119	33	66	-59	0	0	140	0.0
19	1.94	2.16	5.00	143.41	53.70	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	101	32	59	-54	0	0	125	0.0
20	1.94	2.16	4.22	148.02	56.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	70	25	43	-41	0	0	93	0.0
Result of Calculation				SF = 2.621		> 1.20 ··· OK			0	0	0	0	0	0	0	0	0	0	0	0	4,135	499	1,445	-1,299	0	0	4,251	0.0

Case 3 (1/2) : Upstream Slope | Slip Circle No. 3 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	OL
1	1.94	2.16	13.50	22.70	5.19	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	994	14	-124	117	0	0	954	0.0
2	1.94	2.16	13.50	36.20	3.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,118	4	-70	60	0	0	965	0.0
3	1.94	2.16	13.50	49.70	3.50	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,214	0	-2	1	0	0	969	0.0
4	1.94	2.16	13.50	63.20	3.89	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,281	3	78	-57	0	0	966	0.0
5	1.94	2.16	13.50	76.70	5.11	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,320	14	160	-114	0	0	954	35.2
6	1.94	2.16	13.50	90.20	7.18	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,328	31	245	-167	0	0	935	35.6
7	1.94	2.16	13.50	103.70	10.11	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,306	53	326	-213	0	0	907	36.0
8	1.94	2.16	13.50	117.20	13.94	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,254	80	399	-251	0	0	869	36.7
9	1.94	2.16	13.50	130.70	18.72	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,171	109	458	-278	0	0	820	37.5
10	1.94	2.16	13.50	144.20	24.53	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,059	137	497	-291	0	0	757	38.6
11	1.94	2.16	13.50	157.70	31.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	917	160	510	-288	0	0	678	0.0
12	1.94	2.16	15.57	172.23	40.28	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	846	189	560	-301	0	0	654	0.0
13	1.94	2.16	15.57	187.81	51.59	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	581	183	462	-230	0	0	472	0.0
14	1.94	2.16	0.19	195.69	58.15	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	5	2	5	-2	0	0	4	0.0
15	1.94	2.26	4.69	198.13	60.32	0	35	0.70	0	0	0	0	0	124	42	112	-47	0	0	94	0	0	0	0	0	0	0	0.0
16	2.07	2.23	2.57	201.76	63.65	1	25	0.47	0	0	0	0	0	55	19	52	-20	0	0	41	0	0	0	0	0	0	0	3.5
17	2.11	2.19	3.00	204.54	66.32	1	25	0.47	0	0	0	0	0	49	38	48	-39	0	0	22	0	0	0	0	0	0	0	4.2
18	2.05	2.16	2.34	207.22	68.97	1	25	0.47	0	0	0	0	0	27	0	27	0	0	0	0	0	0	0	0	0	0	0	3.3
19	1.93	2.16	3.68	210.23	72.07	0	35	0.70	0	0	0	0	0	24	0	25	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.19	212.68	74.66	0	45	1.00	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.775		> 1.20 ··· OK			0	0	0	0	0	282	99	266	-103	0	0	157	14,395	989	3,505	-2,016	0	0	10,905	230.7

Case 3 (1/2) : Upstream Slope | Slip Circle No. 4 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	OL
1	1.94	2.16	10.00	59.41	19.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	578	21	-114	108	0	0	565	0.0
2	1.94	2.16	10.00	69.41	18.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	664	12	-98	84	0	0	578	0.0
3	1.94	2.16	10.00	79.41	16.91	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	738	6	-73	57	0	0	587	0.0
4	1.94	2.16	10.00	89.41	16.16	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	802	2	-41	30	0	0	592	0.0
5	1.94	2.16	10.00	99.41	15.90	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	853	0	-2	2	0	0	594	0.0
6	1.94	2.16	10.00	109.41	16.11	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	892	1	40	-27	0	0	593	25.9
7	1.94	2.16	10.00	119.41	16.80	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	919	5	85	-54	0	0	588	28.0
8	1.94	2.16	10.00	129.41	17.97	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	933	11	132	-81	0	0	579	28.2
9	1.94	2.16	10.00	139.41	19.64	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	934	20	179	-105	0	0	567	26.4
10	1.94	2.16	10.00	149.41	21.82	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	922	31	224	-126	0	0	550	26.7
11	1.94	2.16	10.00	159.41	24.51	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	896	43	266	-144	0	0	530	25.3
12	1.94	2.16	10.00	169.41	27.75	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	858	56	302	-158	0	0	504	25.8
13	1.94	2.16	10.00	179.41	31.56	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	806	68	331	-166	0	0	473	26.3
14	1.94	2.16	6.95	187.89	35.26	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	523	54	242	-117	0	0	307	18.6
15	1.94	2.19	4.42	193.57	38.00	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	319	37	159	-74	0	0	184	0.0
16	2.01	2.24	7.28	199.41	41.04	1	25	0.47	0	0	0	0	0	508	64	275	-118	0	0	282	0	0	0	0	0	0	0	8.3
17	2.00	2.19	8.81	207.85	45.85	1	25	0.47	0	0	0	0	0	538	268	324	-448	0	0	181	0	0	0	0	0	0	0	11.2
18	1.93	2.16	5.30	215.30	50.56	0	35	0.70	0	0	0	0	0	201	0	133	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	8.24	222.07	55.22	0	45	1.00	0	0	0	0	0	197	0	142	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	7.31	229.84	61.09	0	45	1.00	0	0	0	0	0	55	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 3.958		> 1.20 ··· OK			0	0	0	0	0	1,500	332	917	-584	0	0	463	11,636	387	1,633	-771	0	0	7,790	246.6

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 3 (1/2) : Upstream Slope | Slip Circle No. 5 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.50	77.10	27.22	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	480	6	-54	53	0	0	460	0.0
2	1.94	2.16	9.50	86.60	26.35	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	541	2	-38	31	0	0	466	0.0
3	1.94	2.16	9.50	96.10	25.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	590	0	-12	9	0	0	469	0.0
4	1.94	2.16	9.50	105.60	25.97	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	630	0	18	-13	0	0	469	0.0
5	1.94	2.16	9.50	115.10	26.47	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	658	3	50	-35	0	0	465	0.0
6	1.94	2.16	9.50	124.60	27.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	678	7	84	-58	0	0	458	0.0
7	1.94	2.16	9.50	134.10	28.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	682	13	118	-76	0	0	448	0.0
8	1.94	2.16	9.50	143.60	30.73	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	677	21	152	-93	0	0	434	25.2
9	1.94	2.16	9.50	153.10	33.10	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	650	30	183	-107	0	0	416	25.5
10	1.94	2.16	9.50	162.60	35.99	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	632	39	209	-117	0	0	393	25.9
11	1.94	2.16	9.50	172.10	39.41	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	593	48	230	-123	0	0	366	26.4
12	1.94	2.16	9.50	181.60	43.38	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	543	56	244	-124	0	0	332	0.0
13	1.94	2.16	7.52	190.10	47.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	385	48	198	-95	0	0	235	0.0
14	1.94	2.16	1.92	194.82	49.92	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	93	13	50	-23	0	0	55	0.0
15	1.94	2.23	2.58	197.07	51.16	0	35	0.70	0	0	0	0	0	123	17	69	-30	0	0	71	0	0	0	0	0	0	0	0.0
16	2.02	2.23	4.83	200.70	53.24	1	25	0.47	0	0	0	0	0	213	31	125	-52	0	0	120	0	0	0	0	0	0	0	5.4
17	2.07	2.19	6.20	206.14	55.54	1	25	0.47	0	0	0	0	0	229	116	144	-181	0	0	76	0	0	0	0	0	0	0	7.3
18	1.95	2.16	1.30	209.89	58.97	1	25	0.47	0	0	0	0	0	38	0	25	0	0	0	0	0	0	0	0	0	0	0	1.8
19	1.93	2.16	5.27	213.18	61.19	0	35	0.70	0	0	0	0	0	119	0	82	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	8.27	219.95	66.08	0	45	1.00	0	0	0	0	0	70	0	53	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 3.409		> 1.20 ··· OK			0	0	0	0	0	792	181	499	-263	0	0	287	7,840	285	1,431	-370	0	0	5,457	117.4

Case 3 (1/2) : Upstream Slope | Slip Circle No. 6 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.00	97.61	35.91	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	330	0	-4	4	0	0	315	0.0
2	1.94	2.16	8.00	105.61	35.98	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	357	0	11	-9	0	0	315	0.0
3	1.94	2.16	8.00	113.61	36.39	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	378	2	27	-22	0	0	312	0.0
4	1.94	2.16	8.00	121.61	37.13	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	392	4	45	-35	0	0	307	0.0
5	1.94	2.16	8.00	129.61	38.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	399	7	63	-46	0	0	300	0.0
6	1.94	2.16	8.00	137.61	39.67	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	400	12	81	-57	0	0	291	0.0
7	1.94	2.16	8.00	145.61	41.48	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	393	18	98	-65	0	0	279	0.0
8	1.94	2.16	8.00	153.61	43.65	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	380	21	112	-72	0	0	264	0.0
9	1.94	2.16	8.00	161.61	46.21	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	360	26	124	-76	0	0	246	0.0
10	1.94	2.16	8.00	169.61	49.17	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	333	30	132	-77	0	0	225	0.0
11	1.94	2.16	8.00	177.61	52.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	299	34	135	-75	0	0	200	0.0
12	1.94	2.16	8.00	185.61	56.38	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	259	35	132	-69	0	0	170	0.0
13	1.94	2.16	8.17	192.69	60.17	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	168	26	95	-46	0	0	107	0.0
14	1.94	2.16	0.67	198.11	62.14	0	45	1.00	0	0	0	0	0	16	3	10	-4	0	0	10	0	0	0	0	0	0	0	0.0
15	1.94	2.23	4.56	198.73	63.71	0	35	0.70	0	0	0	0	0	109	17	67	-28	0	0	62	0	0	0	0	0	0	0	0.0
16	2.10	2.23	2.03	202.02	65.78	1	25	0.47	0	0	0	0	0	42	7	27	-10	0	0	23	0	0	0	0	0	0	0	2.4
17	2.11	2.19	2.83	204.45	67.35	1	25	0.47	0	0	0	0	0	49	22	32	-33	0	0	15	0	0	0	0	0	0	0	3.4
18	2.07	2.16	2.54	207.14	69.17	1	25	0.47	0	0	0	0	0	34	0	23	0	0	0	0	0	0	0	0	0	0	0	3.1
19	1.93	2.16	4.33	210.60	71.61	0	35	0.70	0	0	0	0	0	35	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.79	213.69	73.83	0	45	1.00	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.853		> 1.20 ··· OK			0	0	0	0	0	289	43	187	-75	0	0	110	4,451	213	1,050	-644	0	0	3,331	8.9

Case 3 (1/2) : Upstream Slope | Slip Circle No. 7 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	11.99	3.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	287	2	24	-23	0	0	286	0.0
2	1.94	2.16	4.00	15.99	4.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	290	3	32	-31	0	0	285	0.0
3	1.94	2.16	4.00	19.99	4.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	292	5	40	-38	0	0	284	0.0
4	1.94	2.16	4.00	23.99	5.48	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	293	8	49	-45	0	0	283	0.0
5	1.94	2.16	4.00	27.99	6.20	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	292	10	57	-53	0	0	282	0.0
6	1.94	2.16	4.00	31.99	7.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	290	13	65	-60	0	0	280	0.0
7	1.94	2.16	4.00	35.99	7.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	287	17	73	-66	0	0	278	0.0
8	1.94	2.16	4.00	39.99	9.06	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	283	21	80	-72	0	0	275	0.0
9	1.94	2.16	4.00	43.99	10.26	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	278	25	87	-78	0	0	273	0.0
10	1.94	2.16	4.00	47.99	11.58	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	271	29	94	-83	0	0	270	0.0
11	1.94	2.16	4.00	51.99	13.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	263	34	100	-88	0	0	266	0.0
12	1.94	2.16	4.00	55.99	14.62	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	254	38	105	-93	0	0	263	0.0
13	1.94	2.16	4.00	59.99	16.34	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	244	43	109	-97	0	0	258	0.0
14	1.94	2.16	4.00	63.99	18.21	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	232	48	113	-100	0	0	254	0.0
15	1.94	2.16	4.00	67.99	20.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	219	54	115	-102	0	0	249	0.0
16	1.94	2.16	4.00	71.99	22.41	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	206	59	116	-104	0	0	243	0.0
17	1.94	2.16	4.00	75.99	24.75	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	191	64	116	-105	0	0	237	0.0
18	1.94	2.16	4.00	79.99	27.26	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	175	68	114	-105	0	0	229	0.0
19	1.94	2.16	4.00	83.99	29.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	157	73	110	-104	0	0	221	0.0
20	1.94	2.16	4.54	88.28	33.07	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	157	87	118	-116	0	0	240	0.0
Result of Calculation				SF = 2.654		> 1.20 ··· OK			0	0	0	0	0	0	0	0	0	0	0	0	4,931	700	1,718	-1,564	0	0	5,257	0.0

Case 3 (1/2) : Upstream Slope | Slip Circle No. 8 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.60	21.99	6.20	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	535	20	-104	100	0	0	535	0.0
2	1.94	2.16	7.60	29.59	4.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	585	10	-82	75	0	0	540	0.0
3	1.94	2.16	7.60	37.19	4.06	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	629	4	-55	47	0	0	543	0.0
4	1.94	2.16	7.60	44.79	3.59	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	665	1	-24	19	0	0	545	0.0
5	1.94	2.16	7.60	52.39	3.52	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	692	0	11	-9	0	0	546	0.0
6	1.94	2.16	7.60	59.99	3.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	718	3	49	-37	0	0	544	0.0
7	1.94	2.16	7.60	67.59	4.56	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	721	8	87	-65	0	0	542	0.0
8	1.94	2.16	7.60	75.19	5.68	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	723	16	126	-91	0	0	537	20.0
9	1.94	2.16	7.60	82.79	7.22	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	716	27	164	-116	0	0	531	20.2
10	1.94	2.16	7.60	90.39	9.18	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	700	40	201	-139	0	0	523	20.5
11	1.94	2.16	7.60	97.99	11.58	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	675	55	234	-159	0	0	513	20.8
12	1.94	2.16	7.60	105.59	14.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	641	72	263	-175	0	0	500	0.0
13	1.94	2.16	7.60	113.19	17.83	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	599	90	288	-188	0	0	484	0.0
14	1.94	2.16	7.60	120.79	21.74	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	547	109	302	-197	0	0	465	0.0
15	1.94	2.16	7.60	128.39	26.24	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	487	128	309	-200	0	0	441	0.0
16	1.94	2.16	7.60	135.99	31.39	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	419	142	304	-198	0	0	412	0.0
17	1.94	2.16	7.60	143.59	37.29	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	344	153	286	-185	0	0	375	0.0
18	1.94	2.16	7.60	151.19	44.06	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	262	157	250	-164	0	0	328	0.0
19	1.94	2.16	7.60	158.79	51.83	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	173	147	192	-132	0	0	266	0.0
20	1.94	2.16	6.85	166.01	60.54	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	78	104	101	-80	0	0	166	0.0
Result of Calculation				SF = 2.818		> 1.20 ··· OK			0	0	0	0	0	0	0	0	0	0	0	0	10,904	1,282	2,899	-1,683	0	0	9,336	81.5

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 3 (1/2) : Upstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.90	38.55	13.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	373	3	-31	30	0	0	356	0.0
2	1.94	2.16	5.90	44.45	13.06	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	395	1	-16	15	0	0	368	0.0
3	1.94	2.16	5.90	50.38	12.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	412	0	1	-1	0	0	368	0.0
4	1.94	2.16	5.90	56.28	13.09	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	425	1	19	-17	0	0	367	0.0
5	1.94	2.16	5.90	62.18	13.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	434	3	39	-32	0	0	366	0.0
6	1.94	2.16	5.90	68.08	14.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	439	6	58	-48	0	0	364	0.0
7	1.94	2.16	5.90	73.98	15.06	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	440	11	78	-62	0	0	361	0.0
8	1.94	2.16	5.90	79.88	16.24	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	437	17	98	-76	0	0	357	0.0
9	1.94	2.16	5.90	85.78	17.70	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	429	24	116	-89	0	0	352	0.0
10	1.94	2.16	5.90	91.68	19.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	417	32	133	-100	0	0	345	0.0
11	1.94	2.16	5.90	97.58	21.47	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	401	41	148	-110	0	0	339	0.0
12	1.94	2.16	5.90	103.48	23.81	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	380	50	161	-119	0	0	330	0.0
13	1.94	2.16	5.90	109.38	26.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	356	60	171	-125	0	0	320	0.0
14	1.94	2.16	5.90	115.28	29.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	327	70	177	-129	0	0	307	0.0
15	1.94	2.16	5.90	121.18	32.88	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	294	79	179	-130	0	0	293	0.0
16	1.94	2.16	5.90	127.08	36.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	257	87	175	-128	0	0	276	0.0
17	1.94	2.16	5.90	132.98	40.92	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	217	93	165	-123	0	0	255	0.0
18	1.94	2.16	5.90	138.88	45.67	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	173	97	148	-113	0	0	230	0.0
19	1.94	2.16	5.90	144.78	51.00	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	127	95	121	-99	0	0	198	0.0
20	1.94	2.16	4.22	149.85	56.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	61	64	65	-60	0	0	120	0.0
Result of Calculation				SF = 2.740		> 1.20 ··· OK			0	0	0	0	0	0	0	0	0	0	0	0	6,798	832	2,007	-1,515	0	0	6,282	0.0

Case 3 (1/2) : Upstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

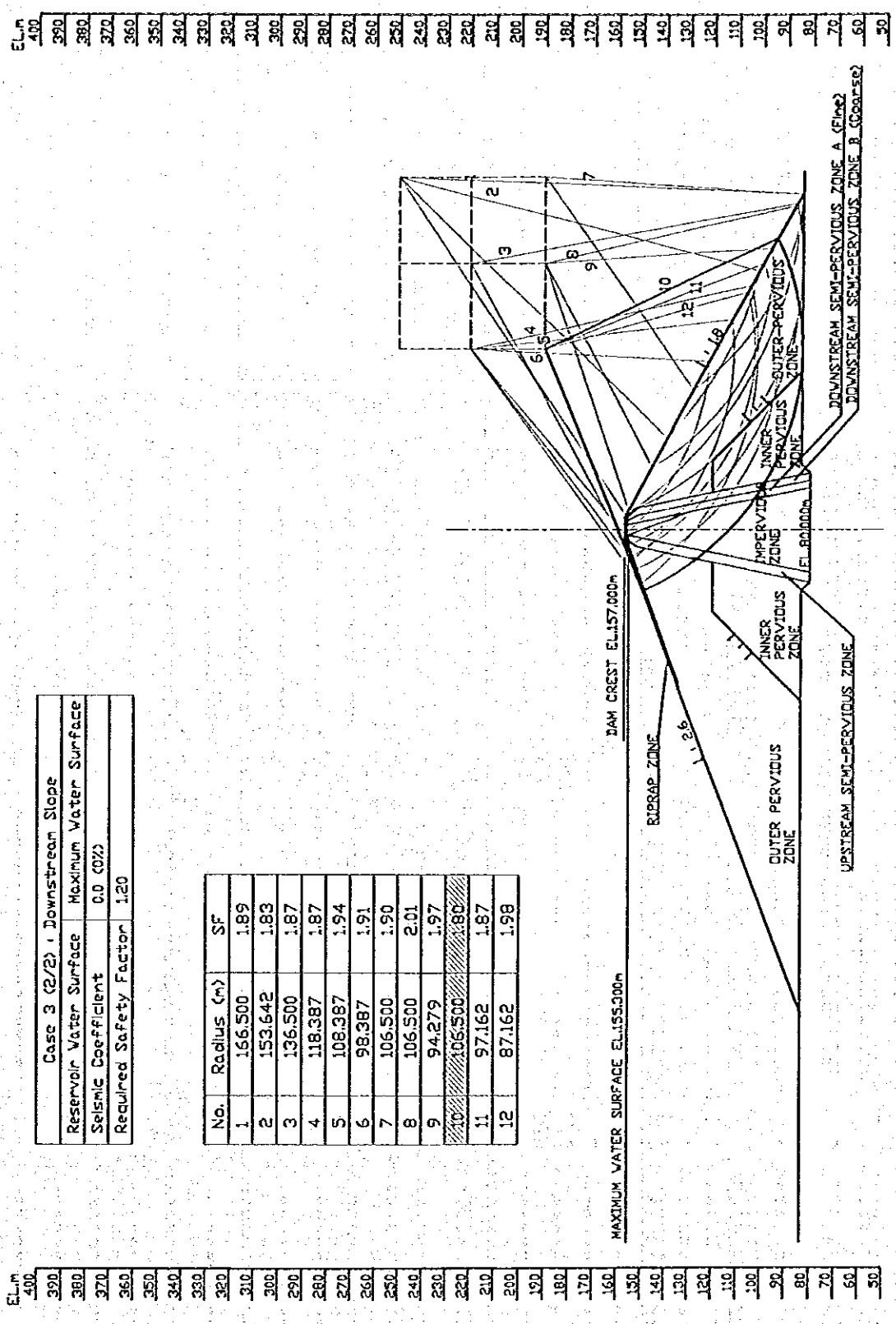
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	11.15	45.74	13.52	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	635	68	-271	250	0	0	739	0.0
2	1.94	2.16	11.15	57.89	9.68	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	857	63	-257	210	0	0	764	0.0
3	1.94	2.16	11.15	69.04	6.81	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	955	35	-215	161	0	0	781	0.0
4	1.94	2.16	11.15	80.19	4.65	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,112	14	-152	106	0	0	793	29.1
5	1.94	2.16	11.15	91.34	3.76	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,203	3	-71	47	0	0	799	28.9
6	1.94	2.16	11.15	102.49	3.52	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,264	0	22	-14	0	0	800	28.9
7	1.94	2.16	11.15	113.64	4.14	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,300	1	122	-74	0	0	797	29.0
8	1.94	2.16	11.15	124.79	5.61	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,306	23	224	-131	0	0	788	29.3
9	1.94	2.16	11.11	135.92	7.97	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,278	46	323	-183	0	0	771	29.7
10	1.94	2.16	9.91	146.43	11.05	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	1,097	67	367	-202	0	0	671	25.4
11	1.94	2.16	9.91	156.34	14.77	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	1,035	95	431	-231	0	0	650	28.1
12	1.94	2.16	9.91	166.25	19.33	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	952	127	483	-251	0	0	622	27.0
13	1.94	2.16	9.91	176.16	24.85	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	848	158	516	-260	0	0	585	28.2
14	1.94	2.16	9.91	186.07	31.45	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	725	185	526	-255	0	0	537	29.8
15	1.94	2.19	4.76	193.40	37.14	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	302	98	250	-116	0	0	236	0.0
16	2.01	2.22	7.28	199.41	42.39	1	25	0.47	0	0	0	0	0	404	149	374	-162	0	0	324	0	0	0	0	0	0	0	9.9
17	2.04	2.19	7.73	206.90	49.83	1	25	0.47	0	0	0	0	0	304	316	325	-288	0	0	186	0	0	0	0	0	0	0	11.3
18	1.93	2.18	0.67	211.10	54.51	1	25	0.47	0	0	0	0	0	19	0	22	0	0	0	0	0	0	0	0	0	0	0	1.0
19	1.93	2.18	4.81	213.85	57.80	0	35	0.70	0	0	0	0	0	100	0	124	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.18	6.50	219.50	65.25	0	45	1.00	0	0	0	0	0	48	0	68	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 3.175		> 1.20 ··· OK			0	0	0	0	0	876	466	912	-458	0	0	490	14,970	1,019	2,297	-641	0	0	10,335	333.6

Case 3 (1/2) : Upstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	11.00	55.76	17.79	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	650	64	-213	197	0	0	666	0.0
2	1.94	2.16	11.00	67.76	14.68	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	790	37	-188	155	0	0	655	0.0
3	1.94	2.16	11.00	78.76	12.53	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	906	16	-140	105	0	0	899	0.0
4	1.94	2.16	11.00	89.76	11.27	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	998	4	-74	52	0	0	706	28.6
5	1.94	2.16	11.00	100.76	10.90	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,064	0	6	-4	0	0	708	28.5
6	1.94	2.16	11.00	111.76	11.39	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,102	5	93	-59	0	0	705	28.6
7	1.94	2.16	11.00	122.76	12.77	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,112	19	184	-113	0	0	697	28.9
8	1.94	2.16	11.00	133.76	15.05	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,093	40	274	-161	0	0	683	29.4
9	1.94	2.16	11.00	144.76	18.29	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,045	69	355	-202	0	0	662	30.1
10	1.94	2.16	11.00	155.76	22.56	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	968	102	424	-233	0	0	633	29.2
11	1.94	2.16	11.00	166.76	27.98	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	862	137	471	-250	0	0	594	30.5
12	1.94	2.16	11.00	177.76	34.66	2.4	40	0.84	0	0	0	0	0	0	0	0	0	0	0	0	727	168	490	-250	0	0	539	32.2
13	1.94	2.16	10.10	188.31	42.52	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	526	173	432	-210	0	0	428	0.0
14	1.94	2.18	2.43	194.57	47.59	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	105	42	97	-45	0	0	90	0.0
15	1.94	2.23	2.51	197.04	50.33	0	35	0.70	0	0	0	0	0	102	43	99	-44	0	0	88	0	0	0	0	0	0	0	0.0
16	2.02	2.23	4.75	200.67	54.00	1	25	0.47	0	0	0	0	0	167	77	175	-73	0	0	146	0	0	0	0	0	0	0	6.8
17	2.10	2.19	4.91	205.50	59.33	1	25	0.47	0	0	0	0	0	121	133	141	-115	0	0	71	0	0	0	0	0	0	0	7.5
18	1.99	2.18	1.61	208.78	63.27	1	25	0.47	0	0	0	0	0	27	0	34	0	0	0	0	0	0	0	0	0	0	0	2.6
19	1.93	2.18	4.72	211.92	67.40	0	35	0.70	0	0	0	0	0	47	0	63	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.18	1.98	215.27	72.14	0	45	1.00	0	0	0	0	0	4	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.954		> 1.20 ··· OK			0	0	0	0	0	469	252	520	-231	0	0	304	11,950	875	2,213	-1,017	0	0	8,497	282.9

Case 3 (1/2) : Upstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.30	70.76	24.25	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	494	25	-115	108	0	0	487	0.0
2	1.94	2.16	9.30	80.06	22.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	575	12	-90	78	0	0	498	0.0
3	1.94	2.16	9.30	89.36	21.34	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	640	3	-53	41	0	0	504	0.0
4	1.94	2.16	9.30	98.66	20.90	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	690	0	-7	5	0	0	506	0.0
5	1.94	2.16	9.30	107.96	21.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	722	2	45	-31	0	0	505	0.0
6	1.94	2.16	9.30	117.26	22.05	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	737	9	99	-66	0	0	500	24.3
7	1.94	2.16	9.30	126.56	23.66	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	734	21	154	-99	0	0	491	24.8
8	1.94	2.16	9.30	135.86	25.97	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	713	37	206	-127	0	0	478	25.1
9	1.94	2.16	9.30	145.16	29.05	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	674	56	251	-150	0	0	459	25.7
10	1.94	2.16	9.30	154.46	32.64	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	618	77	287	-186	0	0	434	0.0
11	1.94	2.16	9.30	163.76	37.74	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	541	98	307	-173	0	0	402	0.0
12	1.94	2.16	9.30	173.06	43.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	448	115	308	-167	0	0	358	0.0
13	1.94	2.16	9.30	182.36	50.57	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	340	121	281	-147	0	0	299	0.0
14	1.94	2.16	8.78	191.39	58.81	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	209	103	209	-102	0	0	205	0.0
15	1.94	2.16	1.14	196.35	64.07	0	45	1.00	0	0	0	0	0	19	11	21	-10	0	0	19	0	0	0	0	0	0	0	0.0
16	1.99	2.23	5.28	199.56	67.81	0	35	0.70	0	0	0	0	0	66	36	80	-30	0	0	61	0	0	0	0	0	0	0	0.0
17	2.11	2.24	0.84	202.82	71.66	1	25	0.47	0	0	0	0	0	8	3	8	-2	0	0	5	0	0	0	0	0	0	0	1.4
18	2.11	2.19	0.84	203.46	72.77	1	25	0.47	0	0	0	0	0	5	4	6	-3	0	0	2	0	0	0	0	0	0	0	1.4
19	2.11	2.16	1.98	204.87	74.70	1	25	0.47	0	0	0	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	3.4
20	2.11	2.16	0.82	206.17	78.55	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.842		> 1.20 ··· OK			0	0	0	0	0	101	54	123	-45	0	0	88	8,131	679	1,883	-999	0	0	8,124	105.3



Case 3 (2/2) : Downstream Slope

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 3 (2/2) : Downstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.50	30.93	15.81	0	45	1.00	0	0	0	0	0	12	0	-1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.50	35.43	15.72	0	45	1.00	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.50	39.93	15.85	0	45	1.00	0	0	0	0	0	55	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.50	44.43	16.19	0	45	1.00	0	0	0	0	0	74	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.50	48.93	16.76	0	45	1.00	0	0	0	0	0	90	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.50	53.43	17.54	0	45	1.00	0	0	0	0	0	104	0	21	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.50	57.93	18.55	0	45	1.00	0	0	0	0	0	115	0	29	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.50	62.43	19.80	2.6	42	0.90	0	0	0	0	0	124	0	38	0	0	0	0	0	0	0	0	0	0	0	12.2
9	1.94	2.16	4.50	66.93	21.29	2.6	42	0.90	0	0	0	0	0	131	0	47	0	0	0	0	0	0	0	0	0	0	0	12.4
10	1.94	2.16	4.50	71.43	23.04	2.6	42	0.90	0	0	0	0	0	134	0	56	0	0	0	0	0	0	0	0	0	0	0	12.6
11	1.94	2.16	4.50	75.93	25.07	2.6	42	0.90	0	0	0	0	0	135	0	65	0	0	0	0	0	0	0	0	0	0	0	12.9
12	1.94	2.16	4.50	80.43	27.39	0	45	1.00	0	0	0	0	0	132	0	73	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.50	84.93	30.03	0	45	1.00	0	0	0	0	0	127	0	79	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.50	89.43	33.02	0	45	1.00	0	0	0	0	0	119	0	84	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.50	93.93	36.41	0	45	1.00	0	0	0	0	0	108	0	86	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.50	98.43	40.25	0	45	1.00	0	0	0	0	0	93	0	85	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.50	102.93	44.62	0	45	1.00	0	0	0	0	0	76	0	79	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.50	107.43	49.85	0	45	1.00	0	0	0	0	0	56	0	67	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.50	111.93	55.50	0	45	1.00	0	0	0	0	0	34	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.03	116.19	62.08	0	45	1.00	0	0	0	0	0	10	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.965		> 1.20 ··· OK			0	0	0	0	0	1,763	0	856	0	0	0	0	0	0	0	0	0	0	0	50.1

Case 3 (2/2) : Downstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.50	28.85	11.77	0	45	1.00	0	0	0	0	0	65	0	-27	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	8.50	37.35	8.63	0	45	1.00	0	0	0	0	0	190	0	-61	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	8.50	45.85	6.28	2.6	42	0.90	0	0	0	0	0	308	0	-72	0	0	0	0	0	0	0	0	0	0	0	22.6
4	1.94	2.16	8.50	54.35	4.66	2.6	42	0.90	0	0	0	0	0	416	0	-62	0	0	0	0	0	0	0	0	0	0	0	22.3
5	1.94	2.16	8.50	62.85	3.74	2.6	42	0.90	0	0	0	0	0	513	0	-35	0	0	0	0	0	0	0	0	0	0	0	22.1
6	1.94	2.16	8.50	71.35	3.51	11.8	37	0.75	0	0	0	0	0	595	0	8	0	0	0	0	0	0	0	0	0	0	0	100.6
7	1.94	2.16	8.50	79.85	3.55	11.2	35	0.70	0	0	0	0	0	663	0	62	0	0	0	0	0	0	0	0	0	0	0	95.4
8	1.94	2.16	8.50	88.35	5.09	11.2	35	0.70	0	0	0	0	0	715	0	125	0	0	0	0	0	0	0	0	0	0	0	96.5
9	1.94	2.16	8.50	96.85	6.94	11.2	35	0.70	0	0	0	0	0	748	0	195	0	0	0	0	0	0	0	0	0	0	0	99.2
10	1.94	2.16	8.50	105.35	9.54	11.2	35	0.70	0	0	0	0	0	762	0	268	0	0	0	0	0	0	0	0	0	0	0	100.7
11	1.94	2.16	8.50	113.85	12.94	11.2	35	0.70	0	0	0	0	0	756	0	341	0	0	0	0	0	0	0	0	0	0	0	104.3
12	1.94	2.16	5.93	121.06	16.54	11.2	35	0.70	0	0	0	0	0	512	0	280	0	0	0	0	0	0	0	0	0	0	0	75.5
13	1.94	2.16	6.88	127.47	20.33	0	35	0.70	0	0	0	0	0	568	0	364	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.92	2.19	5.15	133.48	24.49	1	25	0.47	0	0	0	0	0	407	-143	302	193	0	0	70	0	0	0	0	0	0	0	6.4
15	2.00	2.19	9.70	140.91	30.54	1	25	0.47	0	0	0	0	0	715	-377	638	422	0	0	404	0	0	0	0	0	0	0	13.0
16	2.01	2.22	6.57	149.05	38.63	1	25	0.47	0	0	0	0	0	372	158	412	-178	0	0	358	0	0	0	0	0	0	0	9.8
17	1.84	2.22	0.69	152.68	42.87	0	35	0.70	0	0	0	0	0	31	21	39	-17	0	0	35	0	0	0	0	0	0	0	0.0
18	1.94	2.19	2.50	154.27	44.88	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	101	78	130	-60	0	0	124	0.0
19	1.84	2.16	6.48	158.75	51.13	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	177	156	268	-130	0	0	283	0.0
20	1.94	2.16	6.47	165.21	62.28	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	66	150	131	-75	0	0	189	0.0
Result of Calculation				SF = 1.798		> 1.20 ··· OK			0	0	0	0	0	8,337	-301	2,776	419	0	0	867	344	424	529	-266	0	0	595	757.5

Case 3 (2/2) : Downstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt (t/m3)	γsat (t/m3)	b (m)	x (center) (m)	y (center) (m)	C (t/m2)	φ (Deg)	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.30	38.56	18.07	0	45	1.00	0	0	0	0	0	45	0	-15	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.30	45.86	15.88	0	45	1.00	0	0	0	0	0	132	0	-34	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.30	53.16	14.31	2.6	42	0.90	0	0	0	0	0	212	0	-37	0	0	0	0	0	0	0	0	0	0	0	19.2
4	1.94	2.16	7.30	60.46	13.31	2.6	42	0.90	0	0	0	0	0	288	0	-28	0	0	0	0	0	0	0	0	0	0	0	19.0
5	1.94	2.16	7.30	67.76	12.86	2.6	42	0.90	0	0	0	0	0	351	0	-8	0	0	0	0	0	0	0	0	0	0	0	18.9
6	1.94	2.16	7.30	75.06	12.97	2.6	42	0.90	0	0	0	0	0	406	0	21	0	0	0	0	0	0	0	0	0	0	0	18.9
7	1.94	2.16	7.30	82.36	13.63	2.6	42	0.90	0	0	0	0	0	451	0	58	0	0	0	0	0	0	0	0	0	0	0	19.1
8	1.94	2.16	7.30	89.66	14.85	11.2	35	0.70	0	0	0	0	0	485	0	100	0	0	0	0	0	0	0	0	0	0	0	83.3
9	1.94	2.16	7.30	96.98	16.65	11.2	35	0.70	0	0	0	0	0	506	0	145	0	0	0	0	0	0	0	0	0	0	0	84.9
10	1.94	2.16	7.30	104.26	19.08	11.2	35	0.70	0	0	0	0	0	515	0	194	0	0	0	0	0	0	0	0	0	0	0	87.2
11	1.94	2.16	7.30	111.56	22.18	11.2	35	0.70	0	0	0	0	0	510	0	241	0	0	0	0	0	0	0	0	0	0	0	90.3
12	1.94	2.16	7.30	118.86	26.02	2.4	40	0.84	0	0	0	0	0	490	0	285	0	0	0	0	0	0	0	0	0	0	0	20.5
13	1.94	2.16	4.07	124.55	29.59	2.4	40	0.84	0	0	0	0	0	259	0	176	0	0	0	0	0	0	0	0	0	0	0	12.0
14	1.94	2.16	7.13	130.15	33.89	0	35	0.70	0	0	0	0	0	419	0	330	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.92	2.19	2.35	134.88	37.68	1	25	0.47	0	0	0	0	0	127	-31	114	35	0	0	15	0	0	0	0	0	0	0	3.2
16	1.98	2.19	4.85	138.48	41.08	1	25	0.47	0	0	0	0	0	253	-93	252	93	0	0	98	0	0	0	0	0	0	0	6.8
17	2.10	2.19	4.85	143.34	46.26	1	25	0.47	0	0	0	0	0	212	-123	244	107	0	0	166	0	0	0	0	0	0	0	7.4
18	2.02	2.22	4.12	147.82	51.83	1	25	0.47	0	0	0	0	0	137	103	183	-72	0	0	181	0	0	0	0	0	0	0	8.9
19	1.94	2.22	3.14	151.45	57.03	0	35	0.70	0	0	0	0	0	71	74	110	-48	0	0	105	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.71	156.37	65.50	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	60	113	117	-58	0	0	143	0.0
Result of Calculation				SF = 1.888		> 1.20 ··· OK			0	0	0	0	0	5,868	-70	2,331	110	0	0	545	60	113	117	-58	0	0	143	497.7

Case 3 (2/2) : Downstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.60	50.08	25.15	0	45	1.00	0	0	0	0	0	33	0	-8	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	56.68	23.86	0	45	1.00	0	0	0	0	0	96	0	-15	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	63.28	23.10	0	45	1.00	0	0	0	0	0	154	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	69.88	22.84	2.6	42	0.90	0	0	0	0	0	205	0	-0	0	0	0	0	0	0	0	0	0	0	0	17.1
5	1.94	2.16	6.60	76.48	23.08	2.6	42	0.90	0	0	0	0	0	248	0	18	0	0	0	0	0	0	0	0	0	0	0	17.1
6	1.94	2.16	6.60	83.08	23.82	2.6	42	0.90	0	0	0	0	0	283	0	43	0	0	0	0	0	0	0	0	0	0	0	17.3
7	1.94	2.16	6.60	89.68	25.09	2.6	42	0.90	0	0	0	0	0	309	0	71	0	0	0	0	0	0	0	0	0	0	0	17.5
8	1.94	2.16	6.60	96.28	26.89	2.6	42	0.90	0	0	0	0	0	325	0	103	0	0	0	0	0	0	0	0	0	0	0	17.9
9	1.94	2.16	6.60	102.88	29.28	2.6	42	0.90	0	0	0	0	0	331	0	135	0	0	0	0	0	0	0	0	0	0	0	18.5
10	1.94	2.16	6.60	109.48	32.29	2.4	40	0.84	0	0	0	0	0	326	0	165	0	0	0	0	0	0	0	0	0	0	0	18.0
11	1.94	2.16	6.60	116.08	36.01	2.4	40	0.84	0	0	0	0	0	309	0	193	0	0	0	0	0	0	0	0	0	0	0	18.9
12	1.94	2.16	6.60	122.68	40.58	2.4	40	0.84	0	0	0	0	0	282	0	214	0	0	0	0	0	0	0	0	0	0	0	20.1
13	1.94	2.16	3.70	127.83	44.78	2.6	42	0.90	0	0	0	0	0	141	0	125	0	0	0	0	0	0	0	0	0	0	0	12.8
14	1.93	2.16	7.63	133.49	50.28	0	35	0.70	0	0	0	0	0	241	0	256	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	1.59	138.10	55.59	1	25	0.47	0	0	0	0	0	41	0	51	0	0	0	0	0	0	0	0	0	0	0	2.5
16	2.06	2.19	6.87	142.33	61.38	1	25	0.47	0	0	0	0	0	126	-29	187	20	0	0	52	0	0	0	0	0	0	0	12.3
17	2.11	2.22	1.23	146.38	68.00	1	25	0.47	0	0	0	0	0	12	14	21	-8	0	0	19	0	0	0	0	0	0	0	2.6
18	2.00	2.26	2.23	148.11	71.32	0	35	0.70	0	0	0	0	0	12	16	25	-8	0	0	20	0	0	0	0	0	0	0	0.0
19	1.94	2.16	0.73	149.59	74.47	0	45	1.00	0	0	0	0	0	1	1	3	-1	0	0	1	0	0	0	0	0	0	0	0.0
20	1.94	2.16	0.43	150.17	75.80	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.977		> 1.20 ··· OK			0	0	0	0	0	3,473	2	1,575	3	0	0	91	0	0	0	0	0	0	0	192.7

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 3 (2/2) : Downstream Slope	Slip Circle No. 5	Reservoir Water Surface	Maximum Water Surface : EL.155.300m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.80	60.93	31.93	0	45	1.00	0	0	0	0	0	21	0	-2	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.80	66.79	31.65	0	45	1.00	0	0	0	0	0	61	0	-2	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.80	72.59	31.64	0	45	1.00	0	0	0	0	0	93	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.80	78.39	31.84	0	45	1.00	0	0	0	0	0	130	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.80	84.19	32.55	2.6	42	0.90	0	0	0	0	0	159	0	21	0	0	0	0	0	0	0	0	0	0	0	15.2
6	1.94	2.16	5.80	89.99	33.47	2.6	42	0.90	0	0	0	0	0	183	0	34	0	0	0	0	0	0	0	0	0	0	0	15.3
7	1.94	2.16	5.80	95.79	34.73	2.6	42	0.90	0	0	0	0	0	202	0	49	0	0	0	0	0	0	0	0	0	0	0	15.5
8	1.94	2.16	5.80	101.59	36.32	2.6	42	0.90	0	0	0	0	0	217	0	66	0	0	0	0	0	0	0	0	0	0	0	15.7
9	1.94	2.16	5.80	107.39	38.26	2.6	42	0.90	0	0	0	0	0	226	0	83	0	0	0	0	0	0	0	0	0	0	0	15.0
10	1.94	2.16	5.80	113.19	40.59	2.6	42	0.90	0	0	0	0	0	230	0	100	0	0	0	0	0	0	0	0	0	0	0	16.4
11	1.94	2.16	5.80	118.93	43.31	2.6	42	0.90	0	0	0	0	0	229	0	118	0	0	0	0	0	0	0	0	0	0	0	16.8
12	1.94	2.16	5.80	124.79	46.48	2.6	42	0.90	0	0	0	0	0	222	0	130	0	0	0	0	0	0	0	0	0	0	0	17.4
13	1.94	2.16	2.69	129.03	49.10	2.6	42	0.90	0	0	0	0	0	99	0	64	0	0	0	0	0	0	0	0	0	0	0	8.3
14	1.93	2.16	7.03	133.89	52.45	0	35	0.70	0	0	0	0	0	240	0	175	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	1.35	138.08	55.66	1	25	0.47	0	0	0	0	0	43	0	35	0	0	0	0	0	0	0	0	0	0	0	1.7
16	2.05	2.19	7.00	142.28	59.21	1	25	0.47	0	0	0	0	0	195	-55	174	81	0	0	60	0	0	0	0	0	0	0	9.4
17	2.09	2.23	2.13	145.83	63.55	1	25	0.47	0	0	0	0	0	45	18	45	-18	0	0	36	0	0	0	0	0	0	0	3.0
18	1.94	2.24	3.29	149.54	68.37	0	35	0.70	0	0	0	0	0	50	23	55	-21	0	0	43	0	0	0	0	0	0	0	0.0
19	1.94	2.16	1.84	152.10	69.24	0	45	1.00	0	0	0	0	0	17	10	19	-8	0	0	17	0	0	0	0	0	0	0	0.0
20	1.94	2.16	3.05	154.55	72.18	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	12	9	14	-7	0	0	15	0.0
Result of Calculation				SF = 1.644		> 1.20 ··· OK			0	0	0	0	0	2,868	-4	1,176	14	0	0	155	12	9	14	-7	0	0	15	150.7

Case 3 (2/2) : Downstream Slope	Slip Circle No. 6	Reservoir Water Surface	Maximum Water Surface : EL.155.300m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.60	76.95	41.85	0	45	1.00	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.60	80.55	42.18	0	45	1.00	0	0	0	0	0	18	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.60	84.15	42.64	0	45	1.00	0	0	0	0	0	28	0	4	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.60	87.75	43.23	0	45	1.00	0	0	0	0	0	38	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.60	91.35	43.96	0	45	1.00	0	0	0	0	0	46	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.60	94.95	44.83	0	45	1.00	0	0	0	0	0	54	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.60	98.55	45.85	0	45	1.00	0	0	0	0	0	60	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.60	102.15	47.01	0	45	1.00	0	0	0	0	0	64	0	22	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.60	105.75	48.34	0	45	1.00	0	0	0	0	0	68	0	26	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.60	109.35	49.82	0	45	1.00	0	0	0	0	0	70	0	31	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.60	112.95	51.48	0	45	1.00	0	0	0	0	0	71	0	34	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.60	116.55	53.32	0	45	1.00	0	0	0	0	0	70	0	38	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.60	120.15	55.35	0	45	1.00	0	0	0	0	0	68	0	41	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.60	123.75	57.59	0	45	1.00	0	0	0	0	0	65	0	43	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.60	127.35	60.05	0	45	1.00	0	0	0	0	0	61	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.17	131.23	62.99	0	45	1.00	0	0	0	0	0	63	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.84	135.14	66.27	0	35	0.70	0	0	0	0	0	47	0	41	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.93	2.16	3.73	138.83	69.70	0	35	0.70	0	0	0	0	0	38	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
19	2.08	2.16	4.12	142.75	73.72	1	25	0.47	0	0	0	0	0	19	0	20	0	0	0	0	0	0	0	0	0	0	0	8.1
20	2.11	2.16	0.78	145.19	78.55	0	35	0.70	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.913		> 1.20 ··· OK			0	0	0	0	0	954	0	433	0	0	0	0	0	0	0	0	0	0	0	8.1

Case 3 (2/2) : Downstream Slope	Slip Circle No. 7	Reservoir Water Surface	Maximum Water Surface : EL.155.300m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	8.68	3.85	0	45	1.00	0	0	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.00	12.68	4.25	0	45	1.00	0	0	0	0	0	21	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.00	16.68	4.81	0	45	1.00	0	0	0	0	0	34	0	5	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.00	20.68	5.53	0	45	1.00	0	0	0	0	0	45	0	9	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.00	24.68	6.40	0	45	1.00	0	0	0	0	0	55	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.00	28.68	7.43	0	45	1.00	0	0	0	0	0	64	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.00	32.68	8.64	0	45	1.00	0	0	0	0	0	70	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.00	36.68	10.01	0	45	1.00	0	0	0	0	0	75	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.00	40.68	11.57	0	45	1.00	0	0	0	0	0	79	0	33	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.00	44.68	13.32	0	45	1.00	0	0	0	0	0	81	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.00	48.68	15.28	0	45	1.00	0	0	0	0	0	81	0	42	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.00	52.68	17.44	0	45	1.00	0	0	0	0	0	80	0	45	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.00	56.68	19.83	0	45	1.00	0	0	0	0	0	77	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.00	60.68	22.48	0	45	1.00	0	0	0	0	0	72	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.00	64.68	25.39	0	45	1.00	0	0	0	0	0	65	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.00	68.68	28.60	0	45	1.00	0	0	0	0	0	57	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.00	72.68	32.15	0	45	1.00	0	0	0	0	0	47	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.00	76.68	36.09	0	45	1.00	0	0	0	0	0	35	0	36	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.00	80.68	40.48	0	45	1.00	0	0	0	0	0	22	0	26	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.04	84.70	45.44	0	45	1.00	0	0	0	0	0	8	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.897		> 1.20 ··· OK			0	0	0	0	0	1,075	0	557	0	0	0	0	0	0	0	0	0	0	0	0.0

Case 3 (2/2) : Downstream Slope	Slip Circle No. 8	Reservoir Water Surface	Maximum Water Surface : EL.155.300m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.30	14.31	5.53	0	45	1.00	0	0	0	0	0	29	0	-8	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.30	20.61	4.48	0	45	1.00	0	0	0	0	0	84	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.30	26.91	3.81	0	45	1.00	0	0	0	0	0	139	0	-10	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.30	33.21	3.51	2.6	42	0.90	0	0	0	0	0	183	0	-3	0	0	0	0	0	0	0	0	0	0	0	16.3
5	1.94	2.16	6.30	39.51	3.60	2.6	42	0.90	0	0	0	0	0	224	0	10	0	0	0	0	0	0	0	0	0	0	0	16.3
6	1.94	2.16	6.30	45.81	4.05	2.6	42	0.90	0	0	0	0	0	260	0	27	0	0	0	0	0	0	0	0	0	0	0	16.4
7	1.94	2.16	6.30	52.11	4.88	2.6	42	0.90	0	0	0	0	0	290	0	47	0	0	0	0	0	0	0	0	0	0	0	16.5
8	1.94	2.16	6.30	58.41	6.11	2.6	42	0.90	0	0	0	0	0	314	0	71	0	0	0	0	0	0	0	0	0	0	0	16.7
9	1.94	2.16	6.30	64.71	7.73	2.6	42	0.90	0	0	0	0	0	331	0	95	0	0	0	0	0	0	0	0	0	0	0	17.0
10	1.94	2.16	6.30	71.01	9.77	2.6	42	0.90	0	0	0	0	0	341	0	123	0	0	0	0	0	0	0	0	0	0	0	17.3
11	1.94	2.16	6.30	77.31	12.27	2.6	42	0.90	0	0	0	0	0	344	0	149	0	0	0	0	0	0	0	0	0	0	0	17.8
12	1.94	2.16	6.30	83.61	15.24	2.6	42	0.90	0	0	0	0	0	333	0	174	0	0	0	0	0	0	0	0	0	0	0	18.3
13	1.94	2.16	6.30	89.91	18.75	2.6	42	0.90	0	0	0	0	0	327	0	197	0	0	0	0	0	0	0	0	0	0	0	19.0
14	1.94	2.16	6.30	95.21	22.85	2.6	42	0.90	0	0	0	0	0	305	0	215	0	0	0	0	0	0	0	0	0	0	0	19.9
15	1.94	2.16	6.30	102.51	27.63	2.6	42	0.90	0	0	0	0	0	277	0	227	0	0	0	0	0	0	0	0	0	0	0	21.1
16	1.94	2.16	6.30	108.81	33.23	2.4	40	0.84	0	0	0	0	0	240	0	231	0	0	0	0	0	0	0	0	0	0	0	21.2
17	1.94	2.16	6.30	115.11	39.83	0	43	0.93	0	0	0	0	0	194	0	222	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.30	121.41	47.75	0	45	1.00	0	0	0	0	0	141	0	195	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.30	127.71	57.53	0	45	1.00	0	0	0	0	0	80	0	142	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.85	133.29	69.00	0	45	1.00	0	0	0	0	0	18	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.007		> 1.20 ··· OK			0	0	0	0	0	4,450	0	2,138	0	0	0	0	0	0	0	0	0	0	0	234.1

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 3 (2/2) : Downstream Slope | Slip Circle No. 1 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.60	9.83	3.19	0	45	1.00	0	0	0	0	0	21	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	16.43	4.31	0	45	1.00	0	0	0	0	0	61	0	6	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	23.03	5.10	0	45	1.00	0	0	0	0	0	98	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	29.63	6.16	0	45	1.00	0	0	0	0	0	130	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	6.60	36.23	7.45	0	45	1.00	0	0	0	0	0	158	0	35	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	6.60	42.83	9.10	2.6	42	0.90	0	0	0	0	0	182	0	48	0	0	0	0	0	0	0	0	0	0	0	17.7
7	1.94	2.16	6.60	49.43	11.01	2.6	42	0.90	0	0	0	0	0	201	0	63	0	0	0	0	0	0	0	0	0	0	0	17.9
8	1.94	2.16	6.60	56.03	13.21	2.6	42	0.90	0	0	0	0	0	218	0	77	0	0	0	0	0	0	0	0	0	0	0	18.2
9	1.94	2.16	6.60	62.63	15.73	2.6	42	0.90	0	0	0	0	0	226	0	92	0	0	0	0	0	0	0	0	0	0	0	18.4
10	1.94	2.16	6.60	69.23	18.58	2.6	42	0.90	0	0	0	0	0	232	0	106	0	0	0	0	0	0	0	0	0	0	0	18.8
11	1.94	2.16	6.60	75.83	21.77	2.6	42	0.90	0	0	0	0	0	232	0	119	0	0	0	0	0	0	0	0	0	0	0	19.2
12	1.94	2.16	6.60	82.43	25.34	2.6	42	0.90	0	0	0	0	0	228	0	130	0	0	0	0	0	0	0	0	0	0	0	19.7
13	1.94	2.16	6.60	89.03	29.30	2.6	42	0.90	0	0	0	0	0	218	0	138	0	0	0	0	0	0	0	0	0	0	0	20.2
14	1.94	2.16	6.60	95.63	33.70	0	45	1.00	0	0	0	0	0	204	0	143	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	6.60	102.23	38.58	0	45	1.00	0	0	0	0	0	184	0	143	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	6.60	108.83	43.99	0	45	1.00	0	0	0	0	0	160	0	138	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.60	115.43	50.01	0	45	1.00	0	0	0	0	0	130	0	125	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.60	122.03	56.73	0	45	1.00	0	0	0	0	0	95	0	104	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.60	128.63	64.28	0	45	1.00	0	0	0	0	0	58	0	71	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	5.68	134.87	72.37	0	45	1.00	0	0	0	0	0	17	0	24	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.894			> 1.20 ··· OK			0	0	0	0	0	3,052	0	1,600	0	0	0	0	0	0	0	0	0	0	0	150.1

Case 3 (2/2) : Downstream Slope | Slip Circle No. 2 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

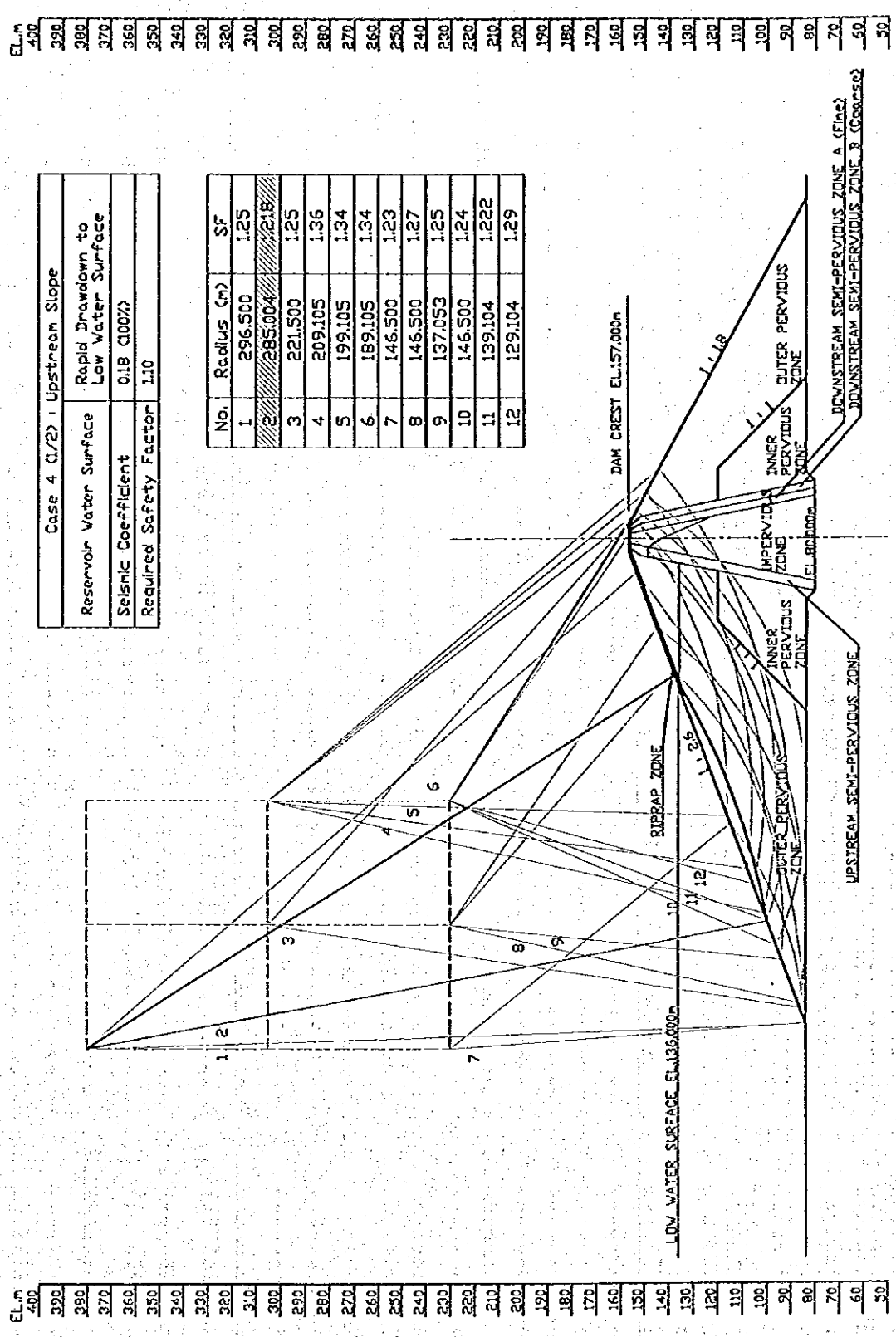
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.50	39.82	21.61	0	45	1.00	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.50	43.32	22.59	0	45	1.00	0	0	0	0	0	10	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.50	46.82	23.66	0	45	1.00	0	0	0	0	0	15	0	5	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.50	50.32	24.83	0	45	1.00	0	0	0	0	0	20	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.50	53.82	26.09	0	45	1.00	0	0	0	0	0	24	0	9	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.50	57.32	27.45	0	45	1.00	0	0	0	0	0	28	0	11	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.50	60.82	28.51	0	45	1.00	0	0	0	0	0	30	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.50	64.32	30.47	0	45	1.00	0	0	0	0	0	32	0	15	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.50	67.82	32.14	0	45	1.00	0	0	0	0	0	34	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.50	71.32	33.91	0	45	1.00	0	0	0	0	0	34	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.50	74.82	35.81	0	45	1.00	0	0	0	0	0	34	0	19	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.50	78.32	37.82	0	45	1.00	0	0	0	0	0	33	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.50	81.82	39.96	0	45	1.00	0	0	0	0	0	32	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.50	85.32	42.22	0	45	1.00	0	0	0	0	0	29	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.50	88.82	44.63	0	45	1.00	0	0	0	0	0	26	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	3.50	92.32	47.19	0	45	1.00	0	0	0	0	0	22	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.50	95.82	49.90	0	45	1.00	0	0	0	0	0	18	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	3.50	99.32	52.77	0	45	1.00	0	0	0	0	0	12	0	11	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	3.50	102.82	55.83	0	45	1.00	0	0	0	0	0	7	0	8	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.70	105.42	58.23	0	45	1.00	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.831			> 1.20 ··· OK			0	0	0	0	0	445	0	243	0	0	0	0	0	0	0	0	0	0	0	0.0

Case 3 (2/2) : Downstream Slope | Slip Circle No. 3 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.05	14.87	4.99	0	45	1.00	0	0	0	0	0	57	0	-8	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	9.05	23.92	3.95	0	45	1.00	0	0	0	0	0	163	0	-13	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	9.05	32.97	3.52	2.6	42	0.90	0	0	0	0	0	260	0	-4	0	0	0	0	0	0	0	0	0	0	0	23.4
4	1.94	2.16	9.05	42.02	3.68	2.6	42	0.90	0	0	0	0	0	345	0	18	0	0	0	0	0	0	0	0	0	0	0	23.5
5	1.94	2.16	9.05	51.07	4.45	2.6	42	0.90	0	0	0	0	0	417	0	49	0	0	0	0	0	0	0	0	0	0	0	23.6
6	1.94	2.16	9.05	60.12	5.83	2.6	42	0.90	0	0	0	0	0	476	0	89	0	0	0	0	0	0	0	0	0	0	0	23.8
7	1.94	2.16	9.05	69.17	7.85	2.6	42	0.90	0	0	0	0	0	520	0	134	0	0	0	0	0	0	0	0	0	0	0	24.2
8	1.94	2.16	9.05	78.22	10.52	2.6	42	0.90	0	0	0	0	0	549	0	183	0	0	0	0	0	0	0	0	0	0	0	24.7
9	1.94	2.16	9.05	87.27	13.90	2.6	42	0.90	0	0	0	0	0	561	0	232	0	0	0	0	0	0	0	0	0	0	0	25.4
10	1.94	2.16	9.05	96.32	18.05	2.4	40	0.84	0	0	0	0	0	556	0	280	0	0	0	0	0	0	0	0	0	0	0	24.6
11	1.94	2.16	9.05	105.37	23.04	2.4	40	0.84	0	0	0	0	0	534	0	321	0	0	0	0	0	0	0	0	0	0	0	25.7
12	1.94	2.16	9.05	114.42	28.58	2.4	40	0.84	0	0	0	0	0	494	0	353	0	0	0	0	0	0	0	0	0	0	0	27.0
13	1.94	2.16	9.55	123.72	36.26	2.4	40	0.84	0	0	0	0	0	457	0	391	0	0	0	0	0	0	0	0	0	0	0	30.5
14	1.94	2.16	3.73	130.35	42.53	0	35	0.70	0	0	0	0	0	158	0	152	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.93	2.16	3.80	134.12	46.15	0	35	0.70	0	0	0	0	0	143	0	151	0	0	0	0	0	0	0	0	0	0	0	0.0
16	2.00	2.19	9.74	140.89	53.56	1	25	0.47	0	0	0	0	0	293	-88	380	72	0	0	116	0	0	0	0	0	0	0	15.4
17	2.08	2.22	2.34	148.93	61.88	1	25	0.47	0	0	0	0	0	45	37	64	-26	0	0	55	0	0	0	0	0	0	0	4.1
18	1.94	2.24	3.05	149.63	65.89	0	35	0.70	0	0	0	0	0	39	37	60	-24	0	0	53	0	0	0	0	0	0	0	0.0
19	1.94	2.16	1.86	152.09	69.84	0	45	1.00	0	0	0	0	0	12	14	20	-9	0	0	20	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.80	153.92	72.59	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	4	6	7	-4	0	0	8	0.0
Result of Calculation			SF = 1.871			> 1.20 ··· OK			0	0	0	0	0	6,076	0	2,834	13	0	0	244	4	6	7	-4	0	0	8	296.0

Case 3 (2/2) : Downstream Slope | Slip Circle No. 4 | Reservoir Water Surface | Maximum Water Surface : EL.155.300m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.80	47.58	23.68	0	45	1.00	0	0	0	0	0	44	0	-8	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.80	55.78	22.47	0	45	1.00	0	0	0	0	0	128	0	-15	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.80	63.58	21.79	2.6	42	0.90	0	0	0	0	0	204	0	-11	0	0	0	0	0	0	0	0	0	0	0	20.2
4	1.94	2.16	7.80	71.38	21.62	2.6	42	0.90	0	0	0	0	0	273	0	3	0	0	0	0	0	0	0	0	0	0	0	20.2
5	1.94	2.16	7.80	79.18	21.97	2.6	42	0.90	0	0	0	0	0	332	0	26	0	0	0	0	0	0	0	0	0	0	0	20.3
6	1.94	2.16	7.80	86.98	22.84	2.6	42	0.90	0	0	0	0	0	382	0	55	0	0	0	0	0	0	0	0	0	0	0	20.4
7	1.94	2.16	7.80	94.78	24.23	2.6	42	0.90	0	0	0	0	0	421	0	90	0	0	0	0	0	0	0	0	0	0	0	20.7
8	1.94	2.16	7.80	102.58	26.18	2.4	40	0.84	0	0	0	0	0	448	0	128	0	0	0	0	0	0	0	0	0	0	0	19.7
9	1.94	2.16	7.80	110.38	28.71	2.4	40	0.84	0	0	0	0	0	464	0	168	0	0	0	0	0	0	0	0	0	0	0	20.2
10	1.94	2.16	7.80	118.18	31.86	2.4	40	0.84	0	0	0	0	0	467	0	208	0	0	0	0	0	0	0	0	0	0	0	20.7
11	1.94	2.16	5.63	124.89	35.11	2.4	40	0.84	0	0	0	0	0	332	0	174	0	0	0	0	0	0	0	0	0	0	0	15.4
12	1.94	2.16	6.82	131.12	38.61	0	35	0.70	0	0	0	0	0	388	0	234	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.92	2.19	1.53	135.29	41.25	1	25	0.47	0	0	0	0	0	84	-12	56	18	0	0	8	0	0	0	0	0	0	0	1.8
14	1.96	2.19	4.85	138.48	43.43	1	25	0.47	0	0	0	0	0	271	-73	192	103	0	0	71	0	0	0	0	0	0	0	5.9
15	2.10	2.19	4.85	143.33	47.06	1	25	0.47	0	0	0	0	0	247	-122	195	154	0	0	134	0	0	0	0	0	0	0	6.2
16	2.02	2.22	4.47	148.00	50.94	1	25	0.47	0	0	0	0	0	193	63	169	-72	0	0	144	0	0	0	0	0	0	0	5.9
17	1.94	2.22	2.79	151.83	54.25	0	35	0.70	0	0	0	0	0	96	39	92	-40	0	0	81	0	0	0	0	0	0	0	0.0
18	1.94	2.17	0.57	153.30	55.88	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	17	8	17	-8	0	0	15	0.0
19	1.94	2.16	6.09	156.63	59.31	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	137	76	147	-73	0	0	143	0.0
20	1.94	2.16	6.09	162.72	66.39	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	56	54	71	-42	0	0	87	0.0
Result of Calculation			SF = 1.871			> 1.20 ··· OK			0	0	0	0	0	4,774	-106	1,755	164	0	0	437	210	138	235	-121	0	0	246	197.1



Case 4 (1/2) : Upstream Slope

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 4 (1/2) : Upstream Slope | Slip Circle No. 1 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.50	14.25	3.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	513	1	25	-24	0	6	496	0.0
2	1.94	2.16	9.50	23.75	4.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	540	3	43	-39	1	17	491	0.0
3	1.94	2.16	9.50	33.25	5.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	559	6	63	-54	3	27	484	0.0
4	1.94	2.16	9.50	42.75	6.60	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	572	10	83	-68	5	36	474	0.0
5	1.94	2.16	9.50	52.25	8.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	577	14	103	-80	8	43	462	0.0
6	1.94	2.16	9.50	61.75	10.00	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	576	19	123	-91	11	50	447	0.0
7	1.94	2.16	9.50	71.25	12.19	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	567	25	140	-100	14	55	429	0.0
8	1.94	2.16	9.50	80.75	14.71	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	551	30	156	-107	16	58	408	0.0
9	1.94	2.16	9.50	90.25	17.57	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	528	36	169	-111	19	60	383	0.0
10	1.94	2.16	9.50	99.75	20.78	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	498	40	178	-113	22	61	355	0.0
11	1.94	2.16	9.50	109.25	24.36	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	460	44	182	-111	24	61	323	0.0
12	1.94	2.16	9.50	118.75	28.32	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	418	46	182	-105	26	59	287	0.0
13	1.94	2.16	9.50	128.25	32.67	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	365	46	175	-96	27	55	246	0.0
14	1.94	2.16	9.50	137.75	37.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	308	43	161	-82	27	51	199	0.0
15	1.94	2.16	3.11	144.05	40.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	87	13	48	-23	9	15	54	0.0
16	1.94	2.16	11.50	151.35	45.04	0	45	1.00	0	0	0	0	0	276	37	164	-83	30	50	145	0	0	0	0	0	0	0	0.0
17	1.94	2.16	11.35	162.78	52.18	0	45	1.00	0	0	0	0	0	200	15	131	-23	24	36	51	0	0	0	0	0	0	0	0.0
18	1.94	2.16	7.70	172.30	58.70	0	45	1.00	0	0	0	0	0	92	0	66	0	12	17	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	7.70	180.00	64.39	0	45	1.00	0	0	0	0	0	57	-0	44	0	8	10	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	7.68	187.69	70.47	0	45	1.00	0	0	0	0	0	20	0	16	0	3	4	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.250			> 1.20 ··· OK			0	0	0	0	0	645	53	421	-66	76	116	196	7,116	376	1,832	-1,203	211	655	5,539	0.0

Case 4 (1/2) : Upstream Slope | Slip Circle No. 2 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.26	53.54	20.07	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	189	7	36	-36	0	1	192	0.0
2	1.94	2.16	5.26	58.80	21.13	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	188	8	40	-38	1	3	187	0.0
3	1.94	2.16	5.26	64.06	22.29	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	187	9	43	-40	1	5	182	0.0
4	1.94	2.16	5.26	69.32	23.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	184	10	45	-42	2	6	176	0.0
5	1.94	2.16	5.26	74.58	24.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	180	12	49	-43	2	7	169	0.0
6	1.94	2.16	5.26	79.84	26.41	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	175	13	51	-44	2	8	162	0.0
7	1.94	2.16	5.26	85.10	28.00	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	168	14	53	-44	3	9	154	0.0
8	1.94	2.16	5.26	90.36	29.70	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	160	15	54	-44	3	10	146	0.0
9	1.94	2.16	5.26	95.62	31.51	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	152	15	54	-43	4	10	137	0.0
10	1.94	2.16	5.26	100.88	33.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	142	16	54	-42	4	10	127	0.0
11	1.94	2.16	5.26	106.14	35.50	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	130	16	52	-40	4	10	116	0.0
12	1.94	2.16	5.26	111.40	37.67	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	118	16	50	-38	4	10	105	0.0
13	1.94	2.16	5.26	116.66	39.96	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	104	15	47	-35	4	9	92	0.0
14	1.94	2.16	5.26	121.92	42.39	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	90	14	42	-31	4	8	79	0.0
15	1.94	2.16	5.26	127.18	44.94	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	74	13	37	-26	4	7	65	0.0
16	1.94	2.16	5.26	132.44	47.64	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	57	11	30	-20	3	6	50	0.0
17	1.94	2.16	5.26	137.70	50.47	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	39	8	21	-14	2	4	33	0.0
18	1.94	2.16	5.27	142.96	53.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	20	4	11	-7	2	3	16	0.0
19	1.94	2.16	1.68	146.44	55.49	0	45	1.00	0	0	0	0	0	2	0	1	-0	0	0	1	0	0	0	0	0	0	0	0.0
20	1.94	2.16	2.65	148.70	56.86	0	45	1.00	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.218			> 1.20 ··· OK			0	0	0	0	0	4	0	2	-0	0	1	1	2,355	216	769	-624	49	128	2,189	0.0

Case 4 (1/2) : Upstream Slope | Slip Circle No. 3 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	16.20	24.05	5.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	899	11	-106	97	-3	26	832	0.0
2	1.94	2.16	16.20	40.25	3.71	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,067	2	-47	37	-3	74	848	0.0
3	1.94	2.16	16.20	56.45	3.59	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,189	1	35	-25	3	114	849	0.0
4	1.94	2.16	16.20	72.65	4.68	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,263	9	130	-85	15	148	836	0.0
5	1.94	2.16	16.20	88.85	8.93	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,287	25	229	-139	30	189	807	42.6
6	1.94	2.16	16.20	105.05	10.45	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,260	47	323	-183	47	183	782	43.3
7	1.94	2.16	16.20	121.25	15.27	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,193	72	402	-212	64	187	697	44.3
8	1.94	2.16	16.25	137.47	21.50	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,058	95	455	-221	78	182	610	45.8
9	1.94	2.16	12.00	151.63	28.18	0	45	1.00	0	0	0	0	0	688	79	355	-153	64	124	374	0	0	0	0	0	0	0	0.0
10	1.94	2.16	12.00	163.80	34.85	0	45	1.00	0	0	0	0	0	609	77	364	-129	65	110	294	0	0	0	0	0	0	0	0.0
11	1.94	2.16	12.00	175.80	42.55	0	45	1.00	0	0	0	0	0	508	62	350	-91	63	91	194	0	0	0	0	0	0	0	0.0
12	1.94	2.16	11.58	187.39	51.26	0	45	1.00	0	0	0	0	0	376	28	297	-33	54	68	68	0	0	0	0	0	0	0	0.0
13	1.94	2.16	2.41	194.39	57.03	0	45	1.00	0	0	0	0	0	63	0	54	0	10	11	0	0	0	0	0	0	0	0	0.0
14	1.94	2.27	2.17	198.68	59.02	0	35	0.70	0	0	0	0	0	55	-28	48	30	9	10	13	0	0	0	0	0	0	0	0.0
15	2.03	2.27	2.71	199.12	61.21	0	35	0.70	0	0	0	0	0	66	13	60	-14	11	12	28	0	0	0	0	0	0	0	0.0
16	2.09	2.23	1.29	201.12	63.05	1	25	0.47	0	0	0	0	0	28	5	28	-5	5	5	10	0	0	0	0	0	0	0	1.8
17	2.11	2.19	2.04	202.78	64.63	1	25	0.47	0	0	0	0	0	39	9	37	-10	7	7	7	0	0	0	0	0	0	0	2.8
18	2.09	2.18	4.59	206.10	67.85	1	25	0.47	0	0	0	0	0	82	0	82	0	11	11	0	0	0	0	0	0	0	0	6.5
19	1.93	2.18	3.68	210.23	72.07	0	35	0.70	0	0	0	0	0	24	0	25	0	5	4	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.19	212.68	74.66	0	45	1.00	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.254			> 1.20 ··· OK			0	0	0	0	0	2,520	245	1,681	-405	303	454	988	9,205	262	1,421	-732	231	1,081	8,241	187.1

Case 4 (1/2) : Upstream Slope | Slip Circle No. 4 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	13.50	61.16	19.53	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	545	17	-103	91	-4	21	501	0.0
2	1.94	2.16	13.50	74.66	17.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	692	8	-84	83	-7	59	524	0.0
3	1.94	2.16	13.50	88.16	16.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	812	2	-46	30	-5	93	538	0.0
4	1.94	2.16	13.50	101.66	15.90	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	905	0	7	-4	1	122	541	35.0
5	1.94	2.16	13.50	115.16	16.45	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	968	3	70	-39	11	146	535	35.1
6	1.94	2.16	13.50	128.66	17.87	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,000	10	138	-71	23	184	520	35.3
7	1.94	2.16	10.19	140.50	19.86	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	758	14	150	-71	26	133	375	26.9
8	1.94	2.16	11.44	151.32	22.29	2.6	42	0.90	0	0	0	0	0	855	24	216	-94	39	154	397	0	0	0	0	0	0	0	30.8
9	1.94	2.16	11.44	162.76	25.54	2.4	40	0.84	0	0	0	0	0	858	33	270	-104	49	154	364	0	0	0	0	0	0	0	29.1
10	1.94	2.16	11.44	174.20	29.50	2.4	40	0.84	0	0	0	0	0	840	41	319	-107	57	151	323	0	0	0	0	0	0	0	29.7
11	1.94	2.16	11.44	185.64	34.24	2.4	40	0.84	0	0	0	0	0	802	46	360	-102	65	144	272	0	0	0	0	0	0	0	30.5
12	1.94	2.21	3.82	193.27	37.85	0	35	0.70	0	0	0	0	0	259	15	129	-31	23	47	77	0	0	0	0	0	0	0	0.0
13	1.94	2.27	0.63	195.49	38.97	0	35	0.70	0	0	0	0	0	43	-24	22	43	4	8	13	0	0	0	0	0	0	0	0.0
14	1.94	2.26	1.95	196.78	39.64	1	25	0.47	0	0	0	0	0	135	-99	70	189	13	24	54	0	0	0	0	0	0	0	2.2
15	2.05	2.22	4.00	199.76	41.23	1	25	0.47	0	0	0	0	0	273	29	148	-53	27	49	126	0	0	0	0	0	0	0	4.6
16	2.05	2.19	9.81	206.68	45.14	1	25	0.47	0	0	0	0	0	586	180	336	-304	80	102	151	0	0	0	0	0	0	0	11.4
17	1.94	2.19	1.09	212.11	48.49	1	25	0.47	0	0	0	0	0	49	0	31	0	8	9	0	0	0	0	0	0	0	0	1.3
18	1.93	2.16	5.30	215.30	50.56	0	35	0.70	0	0	0	0	0	201	0	133	0	24	36	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	8.89	221.40	54.74	0	45	1.00	0	0	0	0	0	175	0	124	0	22	31	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	8.65	229.17	60.56	0	45	1.00	0	0	0	0	0	78	0	61	0	11	14	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.362			> 1.20 ··· OK			0	0	0	0	0	5,133	245	2,220	-559	400	924	1,777	5,880	53	132	0	44	737	3,535	271.6

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 4 (1/2) : Upstream Slope | Slip Circle No. 5 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.20	76.95	27.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	288	4	-34	31	-1	8	265	0.0
2	1.94	2.16	9.20	83.15	28.38	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	344	1	-24	19	-2	24	273	0.0
3	1.94	2.16	9.20	95.35	25.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	391	0	-9	6	-1	38	277	0.0
4	1.94	2.16	9.20	104.55	25.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	429	0	10	-6	1	51	277	0.0
5	1.94	2.16	9.20	113.75	26.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	457	1	32	-19	4	62	273	0.0
6	1.94	2.16	9.20	122.95	27.22	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	476	4	55	-31	8	71	267	0.0
7	1.94	2.16	9.20	132.15	28.51	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	485	7	73	-41	13	79	255	0.0
8	1.94	2.16	8.88	141.17	30.20	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	466	10	98	-47	17	81	234	0.0
9	1.94	2.16	8.66	150.43	32.39	2.8	42	0.90	0	0	0	0	0	510	15	134	-58	24	92	235	0	0	0	0	0	0	0	25.9
10	1.94	2.16	9.65	160.09	35.18	2.8	42	0.90	0	0	0	0	0	513	19	162	-60	29	92	210	0	0	0	0	0	0	0	26.2
11	1.94	2.16	9.65	169.74	38.51	2.8	42	0.90	0	0	0	0	0	504	22	189	-59	34	91	179	0	0	0	0	0	0	0	26.1
12	1.94	2.16	9.65	179.39	42.41	2.8	42	0.90	0	0	0	0	0	483	23	210	-52	38	87	142	0	0	0	0	0	0	0	27.3
13	1.94	2.16	9.65	189.04	46.91	2.8	42	0.90	0	0	0	0	0	443	19	224	-39	40	81	97	0	0	0	0	0	0	0	27.9
14	1.94	2.21	1.32	194.52	49.76	0	35	0.70	0	0	0	0	0	58	2	31	-4	6	11	9	0	0	0	0	0	0	0	0.0
15	1.94	2.27	3.18	196.77	50.99	0	35	0.70	0	0	0	0	0	143	-62	80	111	14	28	42	0	0	0	0	0	0	0	0.0
16	2.06	2.23	3.40	200.06	52.86	1	25	0.47	0	0	0	0	0	154	16	89	-27	16	28	63	0	0	0	0	0	0	0	3.9
17	2.11	2.19	5.89	204.71	55.65	1	25	0.47	0	0	0	0	0	229	59	141	-98	25	41	52	0	0	0	0	0	0	0	6.9
18	2.00	2.16	2.89	209.10	58.44	1	25	0.47	0	0	0	0	0	90	0	59	0	11	16	0	0	0	0	0	0	0	0	3.5
19	1.93	2.16	5.27	213.18	61.19	0	35	0.70	0	0	0	0	0	119	0	82	0	15	21	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	8.27	219.95	66.08	0	45	1.00	0	0	0	0	0	70	0	53	0	10	13	0	0	0	0	0	0	0	0	0.0
Result of Calculation						SF = 1.338			> 1.20 ··· OK					0	0	0	0	0	0	0	3,323	114	1,455	-284	262	593	1,030	143.3

Case 4 (1/2) : Upstream Slope | Slip Circle No. 6 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.67	97.94	35.91	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	192	0	-2	2	-0	6	174	0.0
2	1.94	2.16	8.67	106.61	36.01	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	223	0	8	-6	1	17	173	0.0
3	1.94	2.16	8.67	115.28	36.51	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	247	1	20	-14	2	26	170	0.0
4	1.94	2.16	8.67	123.95	37.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	262	3	33	-20	4	34	162	0.0
5	1.94	2.16	8.67	132.62	38.73	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	269	5	47	-26	7	41	152	0.0
6	1.94	2.16	8.64	141.28	40.46	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	267	7	60	-29	10	45	138	0.0
7	1.94	2.16	7.85	149.53	42.50	0	45	1.00	0	0	0	0	0	243	8	66	-28	12	44	109	0	0	0	0	0	0	0	0.0
8	1.94	2.16	7.85	157.38	44.81	0	45	1.00	0	0	0	0	0	245	8	73	-27	14	44	92	0	0	0	0	0	0	0	0.0
9	1.94	2.16	7.85	165.23	47.50	0	45	1.00	0	0	0	0	0	243	8	83	-23	16	44	71	0	0	0	0	0	0	0	0.0
10	1.94	2.16	7.85	173.08	50.58	0	45	1.00	0	0	0	0	0	233	7	93	-16	18	42	46	0	0	0	0	0	0	0	0.0
11	1.94	2.16	7.85	180.93	54.09	0	45	1.00	0	0	0	0	0	218	3	102	-6	18	39	16	0	0	0	0	0	0	0	0.0
12	1.94	2.16	5.80	187.75	57.49	0	45	1.00	0	0	0	0	0	147	0	77	0	14	26	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	5.80	193.55	60.66	0	45	1.00	0	0	0	0	0	135	0	77	0	14	24	0	0	0	0	0	0	0	0	0.0
14	1.94	2.27	1.31	197.11	62.73	0	1.9	0.03	0	0	0	0	0	30	-9	18	14	3	5	4	0	0	0	0	0	0	0	0.0
15	2.03	2.22	3.25	199.38	64.12	0	1.9	0.03	0	0	0	0	0	74	5	45	-8	8	13	18	0	0	0	0	0	0	0	0.0
16	2.10	2.23	0.75	201.38	65.37	1	25	0.47	0	0	0	0	0	16	1	10	-1	2	3	3	0	0	0	0	0	0	0	0.9
17	2.11	2.19	1.46	202.43	65.08	1	25	0.47	0	0	0	0	0	28	3	18	-5	3	5	3	0	0	0	0	0	0	0	1.7
18	2.09	2.16	5.19	205.81	68.27	1	25	0.47	0	0	0	0	0	78	0	53	0	10	14	0	0	0	0	0	0	0	0	6.3
19	1.93	2.16	4.38	210.60	71.61	0	35	0.70	0	0	0	0	0	35	0	25	0	5	6	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.79	213.63	73.89	0	45	1.00	0	0	0	0	0	3	0	2	0	0	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation						SF = 1.339			> 1.20 ··· OK					0	0	0	0	0	0	0	1,728	34	760	-93	137	311	362	1,450	15	165	-93	24	170	969	8.9

Case 4 (1/2) : Upstream Slope | Slip Circle No. 7 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	11.99	3.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	210	1	17	-17	0	1	209	0.0
2	1.94	2.16	4.00	15.99	4.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	213	2	23	-23	0	3	208	0.0
3	1.94	2.16	4.00	19.99	4.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	216	4	30	-28	1	4	206	0.0
4	1.94	2.16	4.00	23.99	5.43	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	217	5	36	-33	1	6	205	0.0
5	1.94	2.16	4.00	27.99	6.20	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	218	7	42	-38	1	7	203	0.0
6	1.94	2.16	4.00	31.99	7.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	215	10	48	-43	2	8	201	0.0
7	1.94	2.16	4.00	35.99	7.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	212	12	54	-47	2	9	198	0.0
8	1.94	2.16	4.00	39.99	9.06	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	209	15	59	-51	3	9	195	0.0
9	1.94	2.16	4.00	43.99	10.26	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	204	17	64	-55	3	10	192	0.0
10	1.94	2.16	4.00	47.99	11.58	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	198	20	69	-58	4	10	188	0.0
11	1.94	2.16	4.00	51.99	13.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	191	23	72	-61	4	10	184	0.0
12	1.94	2.16	4.00	55.99	14.62	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	183	26	76	-63	4	10	179	0.0
13	1.94	2.16	4.00	59.99	16.34	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	173	29	78	-65	4	10	174	0.0
14	1.94	2.16	4.00	63.99	18.21	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	163	32	79	-66	4	9	168	0.0
15	1.94	2.16	4.00	67.99	20.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	151	35	79	-65	4	8	162	0.0
16	1.94	2.16	4.00	71.99	22.41	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	138	37	78	-66	4	7	154	0.0
17	1.94	2.16	4.00	75.99	24.75	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	125	39	76	-65	4	6	146	0.0
18	1.94	2.16	4.00	79.99	27.26	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	110	41	72	-63	3	5	137	0.0
19	1.94	2.16	4.00	83.99	29.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	94	42	66	-60	2	3	127	0.0
20	1.94	2.16	4.54	88.26	33.07	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	87	47	65	-63	1	1	131	0.0
Result of Calculation						SF = 1.227			> 1.20 ··· OK					0	0	0	0	0	0	0	3,525	445	1,183	-1,031	51	136	3,566	0.0

Case 4 (1/2) : Upstream Slope | Slip Circle No. 8 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.00	22.19	6.16	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	413	15	-80	76	-1	7	406	0.0
2	1.94	2.16	8.00	30.19	4.85	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	468	8	-64	55	-3	21	413	0.0
3	1.94	2.16	8.00	38.19	3.98	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	514	3	-42	34	-3	33	418	0.0
4	1.94	2.16	8.00	46.19	3.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	551	0	-14	11	-1	44	420	0.0
5	1.94	2.16	8.00	54.19	3.56	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	580	0	17	-12	2	54	420	0.0
6	1.94	2.16	8.00	62.19	4.01	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	599	3	50	-35	5	62	417	0.0
7	1.94	2.16	8.00	70.19	4.90	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	608	8	85	-58	9	68	413	0.0
8	1.94	2.16	8.00	78.19	6.24	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	608	15	119	-77	14	73	406	0.0
9	1.94	2.16	8.00	86.19	8.04	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	598	24	152	-95	19	78	395	0.0
10	1.94	2.16	8.00	94.19	10.32	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	578	35	183	-110	24	77	383	0.0
11	1.94	2.16	8.00	102.19	13.11	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	548	47	209	-122	29	75	367	0.0
12	1.94	2.16	8.00	110.19	16.43	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	508	59	229	-130	33	74	347	0.0
13	1.94	2.16	8.00	118.19	20.34	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	459	70	241	-133	36	69	322	0.0
14	1.94	2.16	8.00	126.19	24.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	400	79	244	-130	38	63	292	0.0
15	1.94	2.16	8.00	134.19	30.11	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	333	84	234	-119	38	55	253	0.0
16	1.94	2.16	7.41	141.69	35.90	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	241	75	194	-93	34	42	191	0.0
17	1.94	2.16	5.60	148.40	41.47	0	45	1.00	0	0	0	0	0	139	49	126	-54	23	25	109	0	0	0	0	0	0	0	0.0
18	1.94	2.16	5.60	154.00	46.82	0	45	1.00	0	0	0	0	0	103	37	104	-36	19	19	72	0	0	0	0	0	0	0	0.0
19	1.94	2.16	5.51	159.58	52.77	0	45	1.00	0	0	0	0	0	64	15	72	-13	13	12	26	0	0	0	0	0	0	0	0.0
20	1.94	2.16	7.07	165.90	60.40	0	45	1.00	0	0	0	0	0	29	0	37	0	7	5	0	0	0	0	0	0	0	0	0.0
Result of Calculation						SF = 1.272			> 1.20 ··· OK					0	0	0	0	0	0	0	335	101	339	-104	61	60	208	8,004	523	1,756	-936	275	893	5,854	0.0

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - Ne) \cdot \tan\phi\,]}{\Sigma\,(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 4 (1/2) : Upstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.11	39.68	13.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	270	2	-22	21	-0	3	261	0.0
2	1.94	2.16	6.11	44.79	13.05	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	292	0	-11	10	-0	10	263	0.0
3	1.94	2.16	6.11	50.90	12.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	310	0	2	-2	0	16	263	0.0
4	1.94	2.16	6.11	57.01	13.13	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	324	1	17	-13	1	21	262	0.0
5	1.94	2.16	6.11	63.12	13.58	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	334	2	32	-25	2	25	260	0.0
6	1.94	2.16	6.11	69.23	14.30	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	339	5	48	-36	4	29	257	0.0
7	1.94	2.16	6.11	75.34	15.31	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	340	9	64	-46	6	32	253	0.0
8	1.94	2.16	6.11	81.45	16.60	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	336	13	79	-55	8	34	247	0.0
9	1.94	2.16	6.11	87.56	18.19	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	328	18	93	-63	10	35	240	0.0
10	1.94	2.16	6.11	93.67	20.09	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	315	24	106	-70	12	35	231	0.0
11	1.94	2.16	6.11	99.78	22.31	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	298	29	116	-75	14	36	221	0.0
12	1.94	2.16	6.11	105.89	24.86	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	276	35	123	-78	15	34	208	0.0
13	1.94	2.16	6.11	112.00	27.77	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	251	40	127	-78	16	32	193	0.0
14	1.94	2.16	6.11	118.11	31.07	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	220	43	126	-76	17	30	176	0.0
15	1.94	2.16	6.11	124.22	34.78	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	186	45	120	-70	17	28	154	0.0
16	1.94	2.16	6.11	130.33	38.96	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	149	44	107	-61	16	21	129	0.0
17	1.94	2.16	6.11	136.44	43.65	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	107	39	87	-48	13	16	97	0.0
18	1.94	2.16	6.10	142.55	48.91	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	63	27	57	-29	9	10	59	0.0
19	1.94	2.16	4.14	147.67	53.85	0	45	1.00	0	0	0	0	0	18	6	18	-6	3	3	12	0	0	0	0	0	0	0	0.0
20	1.94	2.16	2.27	150.87	57.22	0	45	1.00	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.253		> 1.20 ··· OK			0	0	0	0	0	20	6	21	-6	4	4	12	4,736	375	1,273	-793	161	448	3,776	0.0

Case 4 (1/2) : Upstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

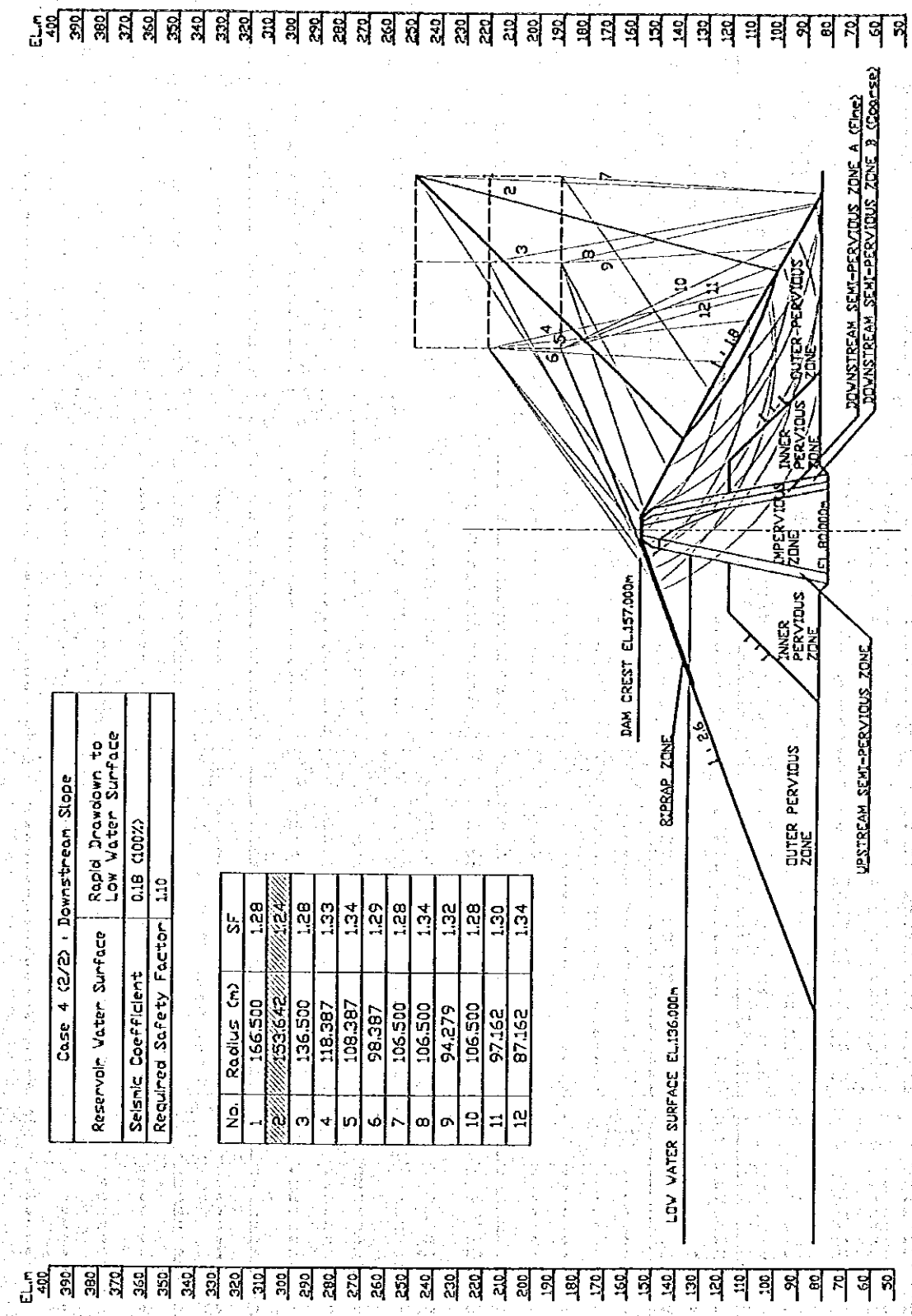
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	13.10	47.72	13.15	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	558	77	-229	200	-9	25	601	0.0
2	1.94	2.16	13.10	60.82	8.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	808	46	-224	165	-20	71	641	0.0
3	1.94	2.16	13.10	73.92	5.84	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	934	21	-178	117	-20	113	668	34.5
4	1.94	2.16	13.10	87.02	4.08	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,122	5	-100	60	-13	149	683	34.1
5	1.94	2.16	13.10	100.12	3.50	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,220	0	1	-1	0	178	688	33.9
6	1.94	2.16	13.10	113.22	4.10	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,274	6	115	-61	18	200	683	34.1
7	1.94	2.16	13.10	126.32	5.88	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,264	22	234	-118	39	214	667	34.5
8	1.94	2.16	12.73	139.23	8.65	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,215	45	338	-161	59	213	623	34.2
9	1.94	2.16	11.40	151.30	12.78	2.4	40	0.84	0	0	0	0	0	1,042	64	390	-172	70	188	524	0	0	0	0	0	0	0	29.6
10	1.94	2.16	11.40	162.70	17.60	2.4	40	0.84	0	0	0	0	0	986	88	457	-187	84	177	493	0	0	0	0	0	0	0	30.7
11	1.94	2.16	11.40	174.10	23.62	2.4	40	0.84	0	0	0	0	0	897	109	526	-186	95	161	428	0	0	0	0	0	0	0	32.1
12	1.94	2.16	11.22	185.41	30.97	2.4	40	0.84	0	0	0	0	0	763	117	548	-163	99	137	343	0	0	0	0	0	0	0	33.6
13	1.94	2.21	4.18	193.10	35.69	0	35	0.70	0	0	0	0	0	249	42	205	-50	37	45	103	0	0	0	0	0	0	0	0.0
14	1.94	2.27	0.64	195.50	38.90	0	35	0.70	0	0	0	0	0	37	-32	32	37	6	7	16	0	0	0	0	0	0	0	0.0
15	1.94	2.26	1.95	196.79	40.03	1	25	0.47	0	0	0	0	0	112	-127	59	144	18	20	62	0	0	0	0	0	0	0	2.6
16	2.05	2.22	4.00	199.76	42.71	1	25	0.47	0	0	0	0	0	218	66	203	-71	36	39	143	0	0	0	0	0	0	0	5.5
17	2.08	2.19	3.86	205.69	48.55	1	25	0.47	0	0	0	0	0	329	213	343	-204	62	59	136	0	0	0	0	0	0	0	11.3
18	1.95	2.16	1.83	210.53	53.84	1	25	0.47	0	0	0	0	0	54	0	62	0	11	10	0	0	0	0	0	0	0	0	2.8
19	1.93	2.16	4.81	213.85	57.80	0	35	0.70	0	0	0	0	0	100	0	124	0	22	18	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.50	219.50	65.25	0	45	1.00	0	0	0	0	0	48	0	68	0	12	9	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.240		> 1.20 ··· OK			0	0	0	0	0	4,836	540	3,065	-852	552	870	2,237	8,506	221	-42	202	54	1,164	5,254	35.3

Case 4 (1/2) : Upstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	11.80	57.16	17.66	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	487	45	-158	139	-6	19	476	0.0
2	1.94	2.16	11.80	68.96	14.40	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	640	25	-147	110	-12	54	504	0.0
3	1.94	2.16	11.80	80.76	12.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	767	10	-107	71	-12	89	521	0.0
4	1.94	2.16	11.80	92.56	11.10	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	864	2	-45	28	-6	112	531	30.6
5	1.94	2.16	11.80	104.36	10.56	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	930	1	29	-17	4	134	532	30.6
6	1.94	2.16	11.80	116.16	11.84	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	954	7	113	-61	18	150	525	30.6
7	1.94	2.16	11.80	127.55	13.73	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	964	21	198	-100	33	159	509	31.2
8	1.94	2.16	11.74	139.73	16.69	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	926	39	276	-132	48	162	482	31.7
9	1.94	2.16	11.55	151.58	20.81	2.4	40	0.84	0	0	0	0	0	893	62	356	-155	64	161	451	0	0	0	0	0	0	0	31.3
10	1.94	2.16	11.55	163.53	26.25	2.4	40	0.84	0	0	0	0	0	825	83	423	-162	78	148	397	0	0	0	0	0	0	0	32.6
11	1.94	2.16	11.55	175.48	33.15	2.4	40	0.84	0	0	0	0	0	719	95	464	-147	84	129	322	0	0	0	0	0	0	0	34.6
12	1.94	2.16	11.91	187.40	41.78	0	45	1.00	0	0	0	0	0	573	84	463	-105	83	103	213	0	0	0	0	0	0	0	0.0
13	1.94	2.21	1.83	194.27	47.71	0	35	0.70	0	0	0	0	0	73	9	68	-10	12	13	21	0	0	0	0	0	0	0	0.0
14	1.94	2.27	2.58	195.47	49.78	0	35	0.70	0	0	0	0	0	101	-91	97	95	17	18	45	0	0	0	0	0	0	0	0.0
15	1.97	2.27	0.53	198.03	51.31	0	35	0.70	0	0	0	0	0	21	7	20	-7	4	4	13	0	0	0	0	0	0	0	0.0
16	2.06	2.23	3.47	200.03	53.33	1	25	0.47	0	0	0	0	0	123	40	128	-39	23	22	77	0	0	0	0	0	0	0	5.0
17	2.11	2.19	4.67	204.09	57.73	1	25	0.47	0	0	0	0	0	128	71	144	-63	26	23	48	0	0	0	0	0	0	0	7.0
18	2.05	2.16	3.14	207.59	62.32	1	25	0.47	0	0	0	0	0	59	0	73	0	13	11	0	0	0	0	0	0	0	0	5.0
19	1.93	2.16	4.72	211.92	67.40	0	35	0.70	0	0	0	0	0	47	0	63	0	11	8	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.98	215.27	72.14	0	45	1.00	0	0	0	0	0	4	0	7	0	1	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.222		> 1.20 ··· OK			0	0	0	0	0	3,565	350	2,306	-592	415	642	1,588	6,542	149	158	39	66	876	4,078	27.0.4

Case 4 (1/2) : Upstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.85	70.53	24.30	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	301	15	-11	64	-2	9	288	0.0
2	1.94	2.16	8.85	79.38	22.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	373	8	-60	47	-4	27	300	0.0
3	1.94	2.16	8.85	88.23	21.43	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	432	3	-40	28	-4	43	307	0.0
4	1.94	2.16	8.85	97.08	20.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	479	0	-11	7	-1	56	310	0.0
5	1.94	2.16	8.85	105.93	21.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	511	1	24	-14	3	68	310	0.0
6	1.94	2.16	8.85	114.78	21.74	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	530	4	61	-35	9	77	305	0.0
7	1.94	2.16	8.85	123.63	23.08	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	533	10	99	-53	15	83	298	0.0
8	1.94	2.16	8.85	132.48	25.05	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	523	18	136	-69	22	88	283	0.0
9	1.94	2.16	8.70	141.25	27.86	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	488	27	165	-79	29	85	260	0.0
10	1.94	2.16	8.60	149.90	30.93	0	45	1.00	0	0	0	0	0	455	35	191	-83	34	82	233	0	0	0	0	0	0	0	0.0
11	1.94	2.16	8.60	158.50	34.81	0	45	1.00	0	0	0	0	0	423	42	215	-82	39	76	202	0	0	0	0	0	0	0	0.0
12	1.94	2.16	8.60	167.10	39.70	0	45	1.00	0	0	0	0	0	376	44	228	-72	41	68	163	0	0	0	0	0	0	0	0.0
13	1.94	2.16	8.60	175.70	45.42	0	45	1.00	0	0	0	0	0	315	38	228	-53	41	57	111	0	0	0	0	0	0	0	0.0
14	1.94	2.16	8.50	184.25	52.17	0	45	1.00	0	0	0	0	0	239	18	206	-29	37	43	41	0	0	0	0	0	0	0	0.0
15	1.94	2.16	8.43	192.71	60.15	0	45	1.00	0	0	0	0	0	159	0	164	0	30	29	0	0	0	0	0	0	0	0	0.0
16	1.94	2.27	0.84	197.34	65.19	0	35	0.70	0	0	0	0	0	12	-4	13	3	2	2	2	0	0	0	0	0	0	0	0.0
17	2.02	2.27	2.69	199.11	67.26	0	35	0.70	0	0	0	0	0	33	4	40	-3	7	6	7	0	0	0	0	0	0	0	0.0
18	2.09	2.16	1.75	201.33	70.00	0	35	0.70	0	0	0	0	0	18	0	20	0	4	3	0	0	0	0	0	0	0	0	0.0
19	2.11	2.16	3.66	204.03	73.55	1	25	0.47	0	0	0	0	0	16	0	21	0	4	3	0	0	0	0	0	0	0	0	0.0
20	2.11	2.16	0.62	206.17	76.55	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6.2
Result of Calculation				SF = 1.292		> 1.20 ··· OK			0	0	0	0	0	2,044	116	1,328	-310	239	368	759	4,171	84	303	-104	67	535	2,690	6.2



Case 4 (2/2) : Downstream Slope	
Reservoir Water Surface	Rapid Drawdown to Low Water Surface
Seismic Coefficient	0.18 (100%)
Required Safety Factor	1.10

No.	Radius (m)	SF
1	166.500	1.28
2	153.642	1.24
3	136.500	1.28
4	118.387	1.33
5	108.387	1.34
6	98.387	1.29
7	106.500	1.28
8	106.500	1.34
9	94.279	1.32
10	106.500	1.28
11	97.162	1.30
12	87.162	1.34

Case 4 (2/2) : Downstream Slope

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - Ne) \cdot \tan\phi]}{\Sigma\,(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 4 (2/2) : Downstream Slope | Slip Circle No. 1 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.60	9.83	3.79	0	45	1.00	0	0	0	0	0	21	0	1	0	0	4	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	16.43	4.31	0	45	1.00	0	0	0	0	0	61	0	6	0	1	11	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	23.03	5.10	0	45	1.00	0	0	0	0	0	99	0	14	0	2	18	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	29.63	6.16	0	45	1.00	0	0	0	0	0	130	0	23	0	4	23	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	6.60	36.23	7.49	0	45	1.00	0	0	0	0	0	158	0	35	0	6	28	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	6.60	42.83	9.10	0	45	1.00	0	0	0	0	0	182	0	48	0	9	33	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	6.60	49.43	11.01	2.6	42	0.90	0	0	0	0	0	201	0	63	0	11	36	0	0	0	0	0	0	0	0	17.9
8	1.94	2.16	6.60	56.03	13.21	2.6	42	0.90	0	0	0	0	0	216	0	77	0	14	39	0	0	0	0	0	0	0	0	18.2
9	1.94	2.16	6.60	62.63	15.73	2.6	42	0.90	0	0	0	0	0	226	0	92	0	17	41	0	0	0	0	0	0	0	0	18.4
10	1.94	2.16	6.60	69.23	18.58	2.6	42	0.90	0	0	0	0	0	232	0	106	0	19	42	0	0	0	0	0	0	0	0	18.8
11	1.94	2.16	6.60	75.83	21.77	2.6	42	0.90	0	0	0	0	0	232	0	119	0	21	42	0	0	0	0	0	0	0	0	19.2
12	1.94	2.16	6.60	82.43	25.34	2.6	42	0.90	0	0	0	0	0	228	0	130	0	23	41	0	0	0	0	0	0	0	0	19.7
13	1.94	2.16	6.60	89.03	29.30	0	45	1.00	0	0	0	0	0	218	0	138	0	25	39	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	6.60	95.63	33.70	0	45	1.00	0	0	0	0	0	204	0	143	0	26	37	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	6.60	102.23	38.58	0	45	1.00	0	0	0	0	0	184	0	143	0	26	33	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	6.60	108.83	43.59	0	45	1.00	0	0	0	0	0	160	0	138	0	25	29	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.60	115.43	50.01	0	45	1.00	0	0	0	0	0	130	0	125	0	23	23	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.60	122.03	56.73	0	45	1.00	0	0	0	0	0	95	0	104	0	19	17	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.60	128.63	64.28	0	45	1.00	0	0	0	0	0	58	0	71	0	13	11	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	5.88	134.87	72.37	0	45	1.00	0	0	0	0	0	17	0	24	0	4	3	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.281		> 1.20 ··· OK			0	0	0	0	0	3,052	0	1,800	0	288	549	0	0	0	0	0	0	0	0	112.2

Case 4 (2/2) : Downstream Slope | Slip Circle No. 2 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.50	39.82	21.61	0	45	1.00	0	0	0	0	0	3	0	1	0	0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.50	43.32	22.59	0	45	1.00	0	0	0	0	0	10	0	3	0	1	2	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.50	46.82	23.66	0	45	1.00	0	0	0	0	0	15	0	5	0	1	3	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.50	50.32	24.83	0	45	1.00	0	0	0	0	0	20	0	7	0	1	4	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.50	53.82	26.09	0	45	1.00	0	0	0	0	0	24	0	9	0	2	4	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.50	57.32	27.45	0	45	1.00	0	0	0	0	0	28	0	11	0	2	5	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.50	60.82	28.91	0	45	1.00	0	0	0	0	0	30	0	13	0	2	5	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.50	64.32	30.47	0	45	1.00	0	0	0	0	0	32	0	15	0	3	6	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.50	67.82	32.14	0	45	1.00	0	0	0	0	0	34	0	17	0	3	6	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.50	71.32	33.91	0	45	1.00	0	0	0	0	0	34	0	18	0	3	6	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.50	74.82	35.81	0	45	1.00	0	0	0	0	0	34	0	19	0	3	6	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.50	78.32	37.82	0	45	1.00	0	0	0	0	0	33	0	20	0	4	6	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.50	81.82	39.98	0	45	1.00	0	0	0	0	0	32	0	20	0	4	6	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.50	85.32	42.22	0	45	1.00	0	0	0	0	0	29	0	20	0	4	5	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.50	88.82	44.63	0	45	1.00	0	0	0	0	0	26	0	18	0	3	5	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	3.50	92.32	47.19	0	45	1.00	0	0	0	0	0	22	0	17	0	3	4	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.50	95.82	49.90	0	45	1.00	0	0	0	0	0	18	0	14	0	3	3	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	3.50	99.32	52.77	0	45	1.00	0	0	0	0	0	12	0	11	0	2	2	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	3.50	102.82	55.83	0	45	1.00	0	0	0	0	0	7	0	6	0	1	1	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.70	105.42	58.23	0	45	1.00	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.242		> 1.20 ··· OK			0	0	0	0	0	445	0	243	0	44	80	0	0	0	0	0	0	0	0	0.0

Case 4 (2/2) : Downstream Slope | Slip Circle No. 3 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.30	14.59	4.97	0	45	1.00	0	0	0	0	0	60	0	-9	0	-2	11	0	0	0	0	0	0	0	0	0
2	1.94	2.16	9.30	24.29	3.52	0	45	1.00	0	0	0	0	0	172	0	-14	0	-2	31	0	0	0	0	0	0	0	0	0
3	1.94	2.16	9.30	33.59	3.51	2.6	42	0.90	0	0	0	0	0	273	0	-3	0	-1	49	0	0	0	0	0	0	0	0	24
4	1.94	2.16	9.30	42.89	3.73	2.6	42	0.90	0	0	0	0	0	362	0	21	0	4	65	0	0	0	0	0	0	0	0	24
5	1.94	2.16	9.30	52.19	4.59	2.6	42	0.90	0	0	0	0	0	437	0	55	0	10	79	0	0	0	0	0	0	0	0	24
6	1.94	2.16	9.30	61.49	6.10	2.6	42	0.90	0	0	0	0	0	497	0	98	0	18	89	0	0	0	0	0	0	0	0	25
7	1.94	2.16	9.30	70.79	8.28	2.6	42	0.90	0	0	0	0	0	541	0	147	0	26	97	0	0	0	0	0	0	0	0	25
8	1.94	2.16	9.30	80.09	11.16	2.6	42	0.90	0	0	0	0	0	568	0	199	0	35	102	0	0	0	0	0	0	0	0	26
9	1.94	2.16	9.30	89.39	14.81	2.6	42	0.90	0	0	0	0	0	577	0	251	0	45	104	0	0	0	0	0	0	0	0	26
10	1.94	2.16	9.30	98.69	19.27	2.4	40	0.84	0	0	0	0	0	567	0	299	0	54	102	0	0	0	0	0	0	0	0	26
11	1.94	2.16	9.30	107.99	24.66	2.4	40	0.84	0	0	0	0	0	539	0	341	0	61	97	0	0	0	0	0	0	0	0	27
12	1.94	2.16	9.30	117.29	31.10	2.4	40	0.84	0	0	0	0	0	490	0	371	0	67	88	0	0	0	0	0	0	0	0	26
13	1.94	2.16	6.55	125.22	37.56	2.4	40	0.84	0	0	0	0	0	305	0	269	0	48	55	0	0	0	0	0	0	0	0	21
14	1.93	2.16	7.53	132.25	44.22	0	35	0.70	0	0	0	0	0	298	0	303	0	55	54	0	0	0	0	0	0	0	0	0
15	1.95	2.16	2.35	137.19	49.51	1	25	0.47	0	0	0	0	0	81	0	92	0	16	15	0	0	0	0	0	0	0	0	4
16	2.07	2.19	8.67	142.70	56.14	1	25	0.47	0	0	0	0	0	232	-19	298	14	54	42	48	0	0	0	0	0	0	0	14
17	2.10	2.22	1.06	147.57	62.80	1	25	0.47	0	0	0	0	0	18	8	27	-5	5	3	11	0	0	0	0	0	0	0	2
18	2.03	2.27	2.94	149.57	65.80	0	35	0.70	0	0	0	0	0	36	12	56	-6	10	7	18	0	0	0	0	0	0	0	0
19	1.94	2.27	0.12	151.10	68.21	0	45	1.00	0	0	0	0	0	1	0	2	-0	0	0	0	0	0	0	0	0	0	0	0
20	1.94	2.16	3.66	152.99	71.36	0	45	1.00	0	0	0	0	0	14	0	24	0	4	3	0	0	0	0	0	0	0	0	0
Result of Calculation				SF = 1.281		> 1.20 ··· OK			0	0	0	0	0	6,069	1	2,826	1	509	1,092	77	0	0	0	0	0	0	0	295

Case 4 (2/2) : Downstream Slope | Slip Circle No. 4 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.80	47.98	23.68	0	45	1.00	0	0	0	0	0	44	0	-8	0	-2	8	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.80	55.78	22.47	0	45	1.00	0	0	0	0	0	128	0	-15	0	-3	23	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.80	63.58	21.79	2.6	42	0.90	0	0	0	0	0	204	0	-11	0	-2	37	0	0	0	0	0	0	0	0	20.2
4	1.94	2.16	7.80	71.38	21.62	2.6	42	0.90	0	0	0	0	0	273	0	3	0	1	49	0	0	0	0	0	0	0	0	20.2
5	1.94	2.16	7.80	79.18	21.97	2.6	42	0.90	0	0	0	0	0	332	0	26	0	5	60	0	0	0	0	0	0	0	0	20.3
6	1.94	2.16	7.80	86.98	22.84	2.6	42	0.90	0	0	0	0	0	382	0	55	0	10	69	0	0	0	0	0	0	0	0	20.4
7	1.94	2.16	7.80	94.78	24.23	2.6	42	0.90	0	0	0	0	0	421	0	90	0	16	76	0	0	0	0	0	0	0	0	20.7
8	1.94	2.16	7.80	102.58	26.18	2.4	40	0.84	0	0	0	0	0	448	0	128	0	23	81	0	0	0	0	0	0	0	0	19.7
9	1.94	2.16	7.80	110.38	28.71	2.4	40	0.84	0	0	0	0	0	464	0	168	0	30	83	0	0	0	0	0	0	0	0	20.2
10	1.94	2.16	7.80	118.18	31.86	2.4	40	0.84	0	0	0	0	0	467	0	208	0	37	84	0	0	0	0	0	0	0	0	20.7
11	1.94	2.16	5.63	124.89	35.11	2.4	40	0.84	0	0	0	0	0	332	0	174	0	31	60	0	0	0	0	0	0	0	0	15.4
12	1.94	2.16	6.82	131.12	38.61	0	35	0.70	0	0	0	0	0	388	0	234	0	42	70	0	0	0	0	0	0	0	0	0.0
13	1.92	2.19	0.38	134.71	40.86	1	25	0.47	0	0	0	0	0	20	-1	13	1	2	4	0	0	0	0	0	0	0	0	0.4
14	1.97	2.19	6.08	137.92	43.04	1	25	0.47	0	0	0	0	0	337	-39	236	56	42	61	50	0	0	0	0	0	0	0	7.4
15	2.11	2.19	6.08	144.00	47.59	1	25	0.47	0	0	0	0	0	300	-67	240	83	43	54	119	0	0	0	0	0	0	0	7.8
16	2.06	2.23	3.19	148.64	51.50	1	25	0.47	0	0	0	0	0	132	33	118	-37	21	24	74	0	0	0	0	0	0	0	4.3
17	1.98	2.27	0.81	150.64	53.32	0	35	0.70	0	0	0	0	0	30	8	27	-9	5	5	17	0	0	0	0	0	0	0	0.0
18	1.94	2.27	2.55	152.31	54.91	0	35	0.70	0	0	0	0	0	78	80	75	-83	14	14	27	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.09	158.83	59.31	0	45	1.00	0	0	0	0	0	118	0	126	0	23	21	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.09	162.72	66.39	0	45	1.00	0	0	0	0	0	38	0	48	0	9	7	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.326		> 1.20 ··· OK			0	0	0	0	0	4,934	14	1,935	12	348	888	287	0	0	0	0	0	0	0	197.7

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 4 (2/2) : Downstream Slope | Slip Circle No. 5 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.80	60.99	31.99	0	45	1.00	0	0	0	0	0	21	0	-2	0	-0	4	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.80	66.79	31.66	0	45	1.00	0	0	0	0	0	61	0	-2	0	-0	11	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.80	72.59	31.64	0	45	1.00	0	0	0	0	0	98	0	2	0	0	18	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.80	78.39	31.94	0	45	1.00	0	0	0	0	0	130	0	10	0	2	23	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.80	84.19	32.55	2.6	42	0.90	0	0	0	0	0	159	0	21	0	4	29	0	0	0	0	0	0	0	0	15.2
6	1.94	2.16	5.80	89.99	33.47	2.6	42	0.90	0	0	0	0	0	183	0	34	0	6	33	0	0	0	0	0	0	0	0	15.3
7	1.94	2.16	5.80	95.79	34.73	2.6	42	0.90	0	0	0	0	0	202	0	49	0	9	35	0	0	0	0	0	0	0	0	15.5
8	1.94	2.16	5.80	101.59	36.32	2.6	42	0.90	0	0	0	0	0	217	0	66	0	12	33	0	0	0	0	0	0	0	0	15.7
9	1.94	2.16	5.80	107.39	38.26	2.6	42	0.90	0	0	0	0	0	228	0	83	0	15	41	0	0	0	0	0	0	0	0	16.0
10	1.94	2.16	5.80	113.19	40.59	2.6	42	0.90	0	0	0	0	0	230	0	100	0	18	41	0	0	0	0	0	0	0	0	16.4
11	1.94	2.16	5.80	118.99	43.31	2.6	42	0.90	0	0	0	0	0	229	0	116	0	21	41	0	0	0	0	0	0	0	0	16.8
12	1.94	2.16	5.80	124.79	46.48	2.6	42	0.90	0	0	0	0	0	222	0	130	0	23	40	0	0	0	0	0	0	0	0	17.4
13	1.94	2.16	2.69	129.03	49.10	2.6	42	0.90	0	0	0	0	0	99	0	64	0	12	18	0	0	0	0	0	0	0	0	8.3
14	1.93	2.16	7.03	133.89	52.45	0	35	0.70	0	0	0	0	0	240	0	175	0	32	43	0	0	0	0	0	0	0	0	0.0
15	2.00	2.16	4.23	139.52	56.85	1	25	0.47	0	0	0	0	0	131	0	109	0	20	24	0	0	0	0	0	0	0	0	5.5
16	2.11	2.19	5.40	144.34	61.12	1	25	0.47	0	0	0	0	0	133	-9	125	10	22	24	13	0	0	0	0	0	0	0	7.4
17	2.10	2.23	0.85	147.47	64.19	1	25	0.47	0	0	0	0	0	16	3	17	-3	3	3	6	0	0	0	0	0	0	0	1.2
18	2.03	2.27	3.15	149.47	65.29	0	35	0.70	0	0	0	0	0	46	6	50	-6	9	8	12	0	0	0	0	0	0	0	0.0
19	1.94	2.27	0.14	151.11	68.11	0	45	1.00	0	0	0	0	0	1	0	2	-0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.89	153.83	71.05	0	45	1.00	0	0	0	0	0	24	0	29	0	5	4	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.340		> 1.20 ··· OK			0	0	0	0	0	2,668	1	1,180	1	212	480	31	0	0	0	0	0	0	0	150.7

Case 4 (2/2) : Downstream Slope | Slip Circle No. 6 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.60	76.95	41.86	0	45	1.00	0	0	0	0	0	6	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.60	80.55	42.16	0	45	1.00	0	0	0	0	0	18	0	2	0	0	3	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.60	84.15	42.64	0	45	1.00	0	0	0	0	0	28	0	4	0	1	5	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.60	87.75	43.23	0	45	1.00	0	0	0	0	0	38	0	7	0	1	7	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.60	91.35	43.95	0	45	1.00	0	0	0	0	0	45	0	10	0	2	8	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.60	94.95	44.83	0	45	1.00	0	0	0	0	0	54	0	14	0	3	10	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.60	98.55	45.85	0	45	1.00	0	0	0	0	0	60	0	18	0	3	11	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.60	102.15	47.01	0	45	1.00	0	0	0	0	0	64	0	22	0	4	12	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.60	105.75	48.34	0	45	1.00	0	0	0	0	0	68	0	26	0	5	12	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.60	109.35	49.82	0	45	1.00	0	0	0	0	0	70	0	31	0	5	13	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.60	112.95	51.48	0	45	1.00	0	0	0	0	0	71	0	34	0	6	13	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.60	116.55	53.32	0	45	1.00	0	0	0	0	0	70	0	38	0	7	13	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.60	120.15	55.35	0	45	1.00	0	0	0	0	0	68	0	41	0	7	12	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.60	123.75	57.59	0	45	1.00	0	0	0	0	0	65	0	43	0	8	12	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.60	127.35	60.05	0	45	1.00	0	0	0	0	0	61	0	44	0	8	11	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.17	131.23	62.99	0	45	1.00	0	0	0	0	0	83	0	50	0	9	11	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.64	135.14	66.27	0	35	0.70	0	0	0	0	0	47	0	41	0	7	8	0	0	0	0	0	0	0	0	0.0
18	1.93	2.16	3.73	138.83	69.70	0	35	0.70	0	0	0	0	0	33	0	37	0	7	7	0	0	0	0	0	0	0	0	0.0
19	2.03	2.16	4.12	142.75	73.77	1	25	0.47	0	0	0	0	0	19	0	20	0	4	3	0	0	0	0	0	0	0	0	6.1
20	2.11	2.18	0.75	145.19	76.55	0	35	0.70	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.268		> 1.20 ··· OK			0	0	0	0	0	954	0	483	0	87	172	0	0	0	0	0	0	0	0	6.1

Case 4 (2/2) : Downstream Slope | Slip Circle No. 7 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	8.68	3.85	0	45	1.00	0	0	0	0	0	7	0	1	0	0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.00	12.68	4.26	0	45	1.00	0	0	0	0	0	21	0	3	0	0	4	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.00	16.68	4.81	0	45	1.00	0	0	0	0	0	34	0	5	0	1	6	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.00	20.68	5.53	0	45	1.00	0	0	0	0	0	45	0	9	0	2	8	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.00	24.68	6.40	0	45	1.00	0	0	0	0	0	55	0	13	0	2	10	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.00	28.68	7.43	0	45	1.00	0	0	0	0	0	64	0	18	0	3	11	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.00	32.68	8.64	0	45	1.00	0	0	0	0	0	70	0	23	0	4	13	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.00	36.68	10.01	0	45	1.00	0	0	0	0	0	75	0	28	0	5	14	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.00	40.68	11.57	0	45	1.00	0	0	0	0	0	79	0	33	0	6	14	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.00	44.68	13.32	0	45	1.00	0	0	0	0	0	81	0	37	0	7	15	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.00	48.68	15.28	0	45	1.00	0	0	0	0	0	81	0	42	0	8	15	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.00	52.68	17.44	0	45	1.00	0	0	0	0	0	80	0	45	0	8	14	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.00	56.68	19.83	0	45	1.00	0	0	0	0	0	77	0	48	0	9	14	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.00	60.68	22.48	0	45	1.00	0	0	0	0	0	72	0	50	0	9	13	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.00	64.68	25.39	0	45	1.00	0	0	0	0	0	65	0	50	0	9	12	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.00	68.68	28.60	0	45	1.00	0	0	0	0	0	57	0	48	0	9	10	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.00	72.68	32.15	0	45	1.00	0	0	0	0	0	47	0	44	0	8	8	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.00	76.68	36.09	0	45	1.00	0	0	0	0	0	35	0	36	0	7	6	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.00	80.68	40.48	0	45	1.00	0	0	0	0	0	22	0	26	0	5	4	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.04	84.70	45.44	0	45	1.00	0	0	0	0	0	8	0	10	0	2	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.260		> 1.20 ··· OK			0	0	0	0	0	1,075	0	567	0	102	194	0	0	0	0	0	0	0	0	0.0

Case 4 (2/2) : Downstream Slope | Slip Circle No. 8 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.30	14.31	5.53	0	45	1.00	0	0	0	0	0	29	0	-6	0	-1	5	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.30	20.61	4.48	0	45	1.00	0	0	0	0	0	84	0	-12	0	-2	15	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.30	26.91	3.81	0	45	1.00	0	0	0	0	0	136	0	-10	0	-2	24	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.30	33.21	3.51	2.6	42	0.90	0	0	0	0	0	183	0	-3	0	-1	33	0	0	0	0	0	0	0	0	16.3
5	1.94	2.16	6.30	39.51	3.60	2.6	42	0.90	0	0	0	0	0	224	0	10	0	2	40	0	0	0	0	0	0	0	0	16.3
6	1.94	2.16	6.30	45.81	4.05	2.6	42	0.90	0	0	0	0	0	260	0	27	0	5	47	0	0	0	0	0	0	0	0	16.4
7	1.94	2.16	6.30	52.11	4.88	2.6	42	0.90	0	0	0	0	0	290	0	47	0	9	52	0	0	0	0	0	0	0	0	16.5
8	1.94	2.16	6.30	58.41	6.11	2.6	42	0.90	0	0	0	0	0	314	0	71	0	13	57	0	0	0	0	0	0	0	0	16.7
9	1.94	2.16	6.30	64.71	7.73	2.6	42	0.90	0	0	0	0	0	331	0	95	0	17	60	0	0	0	0	0	0	0	0	17.0
10	1.94	2.16	6.30	71.01	9.77	2.6	42	0.90	0	0	0	0	0	341	0	123	0	22	61	0	0	0	0	0	0	0	0	17.3
11	1.94	2.16	6.30	77.31	12.27	2.6	42	0.90	0	0	0	0	0	344	0	149	0	27	62	0	0	0	0	0	0	0	0	17.8
12	1.94	2.16	6.30	83.61	15.24	2.6	42	0.90	0	0	0	0	0	339	0	174	0	31	61	0	0	0	0	0	0	0	0	18.3
13	1.94	2.16	6.30	89.91	18.75	2.6	42	0.90	0	0	0	0	0	327	0	197	0	35	59	0	0	0	0	0	0	0	0	19.0
14	1.94	2.16	6.30	96.21	22.85	2.6	42	0.90	0	0	0	0	0	306	0	215	0	39	55	0	0	0	0	0	0	0	0	19.9
15	1.94	2.16	6.30	102.51	27.63	2.6	42	0.90	0	0	0	0	0	277	0	227	0	41	50	0	0	0	0	0	0	0	0	21.1
16	1.94	2.16	6.30	108.81	33.23	0	43	0.93	0	0	0	0	0	240	0	231	0	42	43	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.30	115.11	39.83	0	43	0.93	0	0	0	0	0	194	0	222	0	40	35	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.30	121.41	47.75	0	45	1.00	0	0	0	0	0	141	0	195	0	35	25	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.30	127.71	57.59	0	45	1.00	0	0	0	0	0	80	0	142	0	28	14	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.85	133.29	69.00	0	45	1.00	0	0	0	0	0	18	0	44	0	8	3	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.338		> 1.20 ··· OK			0	0	0	0	0	4,450	0	2,138	0	335	803	0	0	0	0	0	0	0	0	212.8

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 4 (2/2) : Downstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.50	30.93	15.81	0	45	1.00	0	0	0	0	0	12	0	-1	0	-0	2	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.50	35.43	15.72	0	45	1.00	0	0	0	0	0	35	0	0	0	0	6	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.50	39.93	15.65	0	45	1.00	0	0	0	0	0	55	0	3	0	1	10	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.50	44.43	16.19	0	45	1.00	0	0	0	0	0	74	0	7	0	1	13	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.50	48.93	16.78	0	45	1.00	0	0	0	0	0	90	0	13	0	2	16	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.50	53.43	17.54	0	45	1.00	0	0	0	0	0	104	0	21	0	4	19	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.50	57.93	18.55	0	45	1.00	0	0	0	0	0	115	0	29	0	5	21	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.50	62.43	19.80	0	45	1.00	0	0	0	0	0	124	0	38	0	7	22	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.50	66.93	21.29	0	45	1.00	0	0	0	0	0	131	0	47	0	8	23	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.50	71.43	23.04	0	45	1.00	0	0	0	0	0	134	0	56	0	10	24	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.50	75.93	25.07	0	45	1.00	0	0	0	0	0	135	0	65	0	12	24	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.50	80.43	27.39	0	45	1.00	0	0	0	0	0	132	0	73	0	13	24	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.50	84.93	30.03	0	45	1.00	0	0	0	0	0	127	0	79	0	14	23	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.50	89.43	33.02	0	45	1.00	0	0	0	0	0	119	0	84	0	15	21	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.50	93.93	36.41	0	45	1.00	0	0	0	0	0	108	0	86	0	15	19	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.50	98.43	40.25	0	45	1.00	0	0	0	0	0	93	0	85	0	15	17	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.50	102.93	44.62	0	45	1.00	0	0	0	0	0	78	0	79	0	14	14	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.50	107.43	49.65	0	45	1.00	0	0	0	0	0	58	0	67	0	12	10	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.50	111.93	55.50	0	45	1.00	0	0	0	0	0	34	0	48	0	9	6	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.03	116.19	62.08	0	45	1.00	0	0	0	0	0	10	0	17	0	3	2	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.320			> 1.20 ··· OK			0	0	0	0	0	1,763	0	895	0	181	317	0	0	0	0	0	0	0	0	0.0

Case 4 (2/2) : Downstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

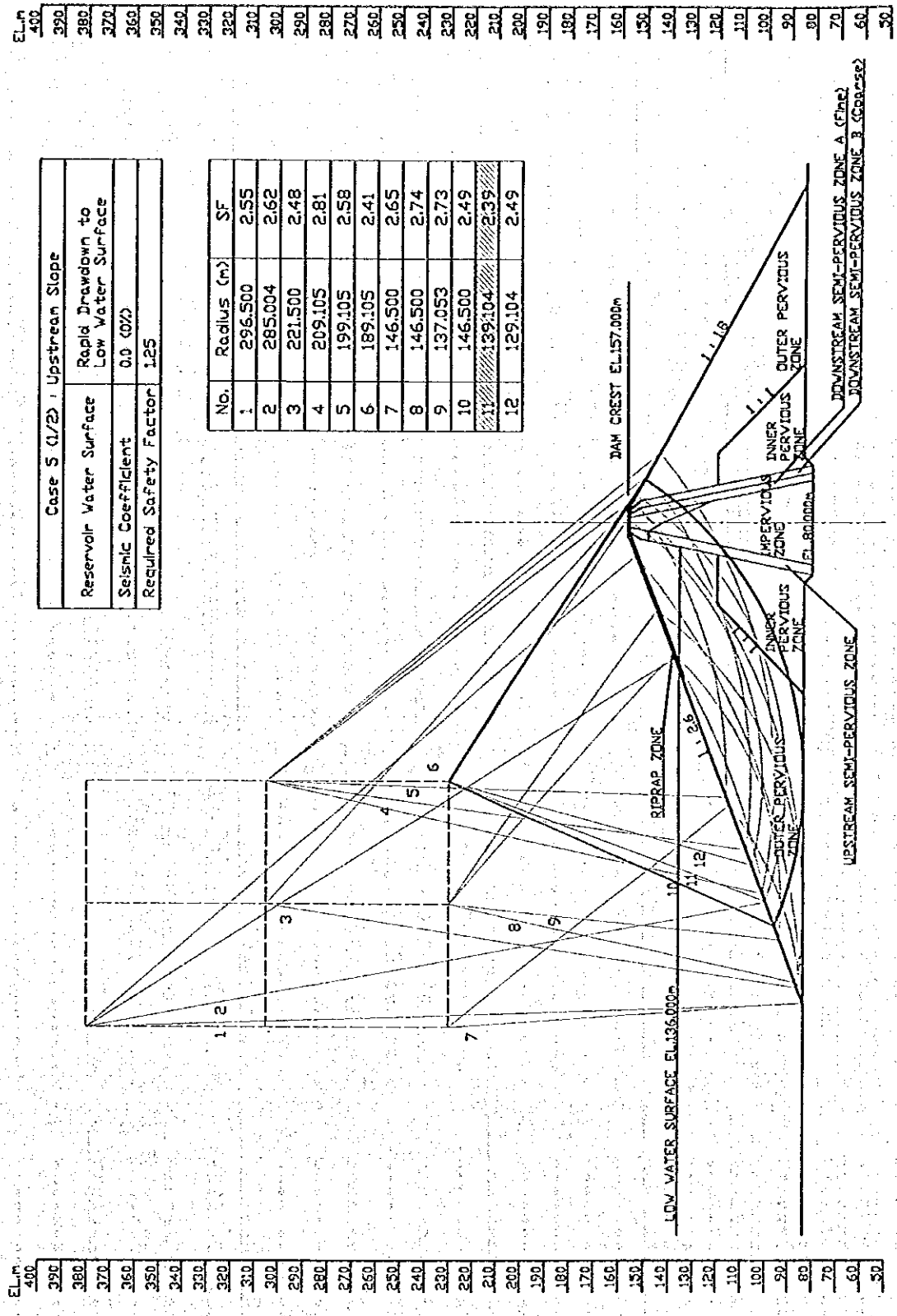
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	10.20	29.70	11.42	0	45	1.00	0	0	0	0	0	93	0	-38	0	-7	17	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	10.20	39.90	7.84	2.6	42	0.90	0	0	0	0	0	272	0	-80	0	-14	49	0	0	0	0	0	0	0	0	27.5
3	1.94	2.16	10.20	50.10	5.38	2.6	42	0.90	0	0	0	0	0	436	0	-83	0	-15	79	0	0	0	0	0	0	0	0	26.9
4	1.94	2.16	10.20	60.30	3.94	2.6	42	0.90	0	0	0	0	0	582	0	-53	0	-10	105	0	0	0	0	0	0	0	0	26.5
5	1.94	2.16	10.20	70.50	3.50	11.8	37	0.75	0	0	0	0	0	706	0	3	0	1	127	0	0	0	0	0	0	0	0	120.8
6	1.94	2.16	10.20	80.70	4.04	11.2	35	0.70	0	0	0	0	0	803	0	81	0	15	145	0	0	0	0	0	0	0	0	114.6
7	1.94	2.16	10.20	90.90	5.57	11.2	35	0.70	0	0	0	0	0	872	0	174	0	31	157	0	0	0	0	0	0	0	0	116.3
8	1.94	2.16	10.20	101.10	8.14	11.2	35	0.70	0	0	0	0	0	909	0	277	0	50	164	0	0	0	0	0	0	0	0	119.2
9	1.94	2.16	10.20	111.30	11.83	11.2	35	0.70	0	0	0	0	0	912	0	384	0	69	164	0	0	0	0	0	0	0	0	123.7
10	1.94	2.16	7.83	120.21	16.08	11.2	35	0.70	0	0	0	0	0	662	0	354	0	64	119	0	0	0	0	0	0	0	0	98.7
11	1.94	2.16	6.68	127.47	20.33	0	35	0.70	0	0	0	0	0	588	0	364	0	65	102	0	0	0	0	0	0	0	0	0.0
12	1.93	2.19	3.98	132.90	24.09	1	25	0.47	0	0	0	0	0	316	-85	231	116	42	57	42	0	0	0	0	0	0	0	4.9
13	1.97	2.19	6.08	137.93	27.97	1	25	0.47	0	0	0	0	0	471	-131	390	159	70	85	171	0	0	0	0	0	0	0	7.9
14	2.11	2.19	6.08	144.00	33.41	1	25	0.47	0	0	0	0	0	412	-122	398	128	72	74	249	0	0	0	0	0	0	0	8.5
15	2.05	2.22	4.00	149.04	38.62	1	25	0.47	0	0	0	0	0	224	59	248	-90	45	40	180	0	0	0	0	0	0	0	6.0
16	1.94	2.26	1.25	151.69	41.67	1	25	0.47	0	0	0	0	0	61	147	73	-123	13	11	48	0	0	0	0	0	0	0	2.0
17	1.94	2.27	1.29	152.98	43.24	0	35	0.70	0	0	0	0	0	55	100	68	-81	12	10	33	0	0	0	0	0	0	0	0.0
18	1.94	2.22	1.90	154.57	45.23	0	35	0.70	0	0	0	0	0	69	21	90	-16	16	12	33	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.28	158.66	50.99	0	45	1.00	0	0	0	0	0	150	37	226	-25	41	27	54	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.65	165.12	62.10	0	45	1.00	0	0	0	0	0	50	0	98	0	18	9	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.289			> 1.20 ··· OK			0	0	0	0	0	8,622	67	3,205	67	577	1,552	811	0	0	0	0	0	0	0	801.6

Case 4 (2/2) : Downstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.85	38.84	17.97	0	45	1.00	0	0	0	0	0	52	0	-18	0	-3	9	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.85	46.69	15.68	0	45	1.00	0	0	0	0	0	152	0	-37	0	-7	27	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.85	54.54	14.08	2.6	42	0.90	0	0	0	0	0	244	0	-39	0	-7	44	0	0	0	0	0	0	0	0	20.6
4	1.94	2.16	7.85	62.39	13.14	2.6	42	0.90	0	0	0	0	0	327	0	-28	0	-5	59	0	0	0	0	0	0	0	0	20.4
5	1.94	2.16	7.85	70.24	12.84	2.6	42	0.90	0	0	0	0	0	399	0	1	0	0	72	0	0	0	0	0	0	0	0	20.3
6	1.94	2.16	7.85	78.09	13.18	2.6	42	0.90	0	0	0	0	0	458	0	38	0	7	83	0	0	0	0	0	0	0	0	20.4
7	1.94	2.16	7.85	85.94	14.15	2.6	42	0.90	0	0	0	0	0	505	0	84	0	15	91	0	0	0	0	0	0	0	0	20.8
8	1.94	2.16	7.85	93.79	15.79	11.2	35	0.70	0	0	0	0	0	538	0	135	0	24	97	0	0	0	0	0	0	0	0	90.5
9	1.94	2.16	7.85	101.64	18.13	2.4	40	0.84	0	0	0	0	0	552	0	190	0	34	99	0	0	0	0	0	0	0	0	20.2
10	1.94	2.16	7.85	109.49	21.22	2.4	40	0.84	0	0	0	0	0	551	0	245	0	44	99	0	0	0	0	0	0	0	0	20.9
11	1.94	2.16	7.85	117.34	25.15	2.4	40	0.84	0	0	0	0	0	532	0	297	0	53	95	0	0	0	0	0	0	0	0	21.8
12	1.94	2.16	5.32	123.92	29.17	2.4	40	0.84	0	0	0	0	0	341	0	227	0	41	61	0	0	0	0	0	0	0	0	15.5
13	1.94	2.16	7.13	130.15	33.69	0	35	0.70	0	0	0	0	0	419	0	330	0	59	75	0	0	0	0	0	0	0	0	0.0
14	1.92	2.19	1.18	134.30	37.16	1	25	0.47	0	0	0	0	0	64	-8	57	9	10	12	4	0	0	0	0	0	0	0	1.6
15	1.97	2.19	6.08	137.93	40.53	1	25	0.47	0	0	0	0	0	318	-55	311	56	56	57	78	0	0	0	0	0	0	0	8.5
16	2.11	2.19	6.08	144.00	47.04	1	25	0.47	0	0	0	0	0	254	-56	298	48	54	48	148	0	0	0	0	0	0	0	9.4
17	2.07	2.23	2.84	148.48	52.89	1	25	0.47	0	0	0	0	0	89	51	121	-37	22	18	78	0	0	0	0	0	0	0	4.8
18	2.00	2.27	1.18	150.46	55.54	0	35	0.70	0	0	0	0	0	29	19	43	-13	8	5	28	0	0	0	0	0	0	0	0.0
19	1.94	2.27	1.90	151.99	57.87	0	35	0.70	0	0	0	0	0	37	66	59	-42	11	7	22	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.78	156.33	65.43	0	45	1.00	0	0	0	0	0	52	0	101	0	18	9	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.300			> 1.20 ··· OK			0	0	0	0	0	5,911	17	2,418	21	435	1,064	357	0	0	0	0	0	0	0	295.6

Case 4 (2/2) : Downstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.18 (100%) | Required Safety Factor | 1.10

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.40	49.48	25.29	0	45	1.00	0	0	0	0	0	22	0	-5	0	-1	4	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.40	54.88	24.16	0	45	1.00	0	0	0	0	0	65	0	-12	0	-2	12	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.40	60.28	23.38	0	45	1.00	0	0	0	0	0	105	0	-12	0	-2	19	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.40	65.68	22.95	2.6	42	0.90	0	0	0	0	0	142	0	-7	0	-1	26	0	0	0	0	0	0	0	0	14.0
5	1.94	2.16	5.40	71.08	22.84	2.6	42	0.90	0	0	0	0	0	174	0	2	0	0	31	0	0	0	0	0	0	0	0	14.0
6	1.94	2.16	5.40	76.48	23.08	2.6	42	0.90	0	0	0	0	0	203	0	15	0	3	36	0	0	0	0	0	0	0	0	14.0
7	1.94	2.16	5.40	81.88	23.65	2.6	42	0.90	0	0	0	0	0	227	0	31	0	6	41	0	0	0	0	0	0	0	0	14.1
8	1.94	2.16	5.40	87.28	24.57	2.6	42	0.90	0	0	0	0	0	246	0	50	0	9	44	0	0	0	0	0	0	0	0	14.3
9	1.94	2.16	5.40	92.68	25.84	2.6	42	0.90	0	0	0	0	0	259	0	70	0	13	47	0	0	0	0	0	0	0	0	14.5
10	1.94	2.16	5.40	98.08	27.48	2.6	42	0.90	0	0	0	0	0	268	0	91	0	18	48	0	0	0	0	0	0	0	0	14.8
11	1.94	2.16	5.40	103.48	29.52	2.6	42	0.90	0	0	0	0	0	270	0	113	0	20	49	0	0	0	0	0	0	0	0	15.1
12	1.94	2.16	5.40	108.88	31.59	2.4	40	0.84	0	0	0	0	0	267	0	133	0	24	48	0	0	0	0	0	0	0	0	14.7
13	1.94	2.16	5.40	114.28	34.92	2.4	40	0.84	0	0	0	0	0	258	0	152	0	27	45	0	0	0	0	0	0	0	0	15.2
14	1.94	2.16	5.40	119.68	38.38	2.4	40	0.84	0	0	0	0	0	242	0	168	0	30	44	0	0	0	0	0	0	0	0	16.0
15	1.94	2.16	5.40	125.08	42.45	2.6	42	0.90	0	0	0	0	0	220	0	179	0	32	40	0	0	0	0	0	0	0	0	16.0
16	1.94	2.16	1.90	128.73	45.59	0	45	1.00	0	0	0	0	0	70	0	84	0	12	13	0	0	0	0	0	0	0	0	0.0
17	1.93	2.16	7.83	133.49	50.28	0	35	0.70	0	0	0	0	0	241	0	256	0	46	43	0	0	0	0	0	0	0	0	0.0
18	2.05	2.16	9.89	142.15	61.09	1	25	0.47	0	0	0	0	0	177	0	262	0	47	32	0	0	0	0	0	0	0	0	17.3
19	2.06	2.16	2.23	148.11	71.32	0	35	0.70	0	0	0	0	0	12	0	23	0	4	2	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.18	149.81	74.96	0	45	1.00	0	0	0	0	0	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.341			> 1.20 ··· OK			0	0	0	0	0	3,470	0	1,577	0	284	625	0	0	0	0	0	0	0	0	196.0



Case 5 (1/2) : Upstream Slope

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 5 (1/2) : Upstream Slope	Slip Circle No. 1	Reservoir Water Surface	Low Water Surface : EL.136.000m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.25

No. of Slice	γt	γsat	b	x	y	C	ϕ	$\tan\phi$	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.50	14.25	3.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	513	1	25	-24	0	0	456	0.0
2	1.94	2.16	9.50	23.75	4.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	540	3	43	-39	0	0	491	0.0
3	1.94	2.16	9.50	33.25	5.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	559	6	63	-54	0	0	484	0.0
4	1.94	2.16	9.50	42.75	6.60	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	572	10	83	-68	0	0	474	0.0
5	1.94	2.16	9.50	52.25	8.14	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	577	14	103	-80	0	0	462	0.0
6	1.94	2.16	9.50	61.75	10.00	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	576	19	123	-91	0	0	447	0.0
7	1.94	2.16	9.50	71.25	12.19	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	567	25	140	-100	0	0	429	0.0
8	1.94	2.16	9.50	80.75	14.71	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	551	30	156	-107	0	0	408	0.0
9	1.94	2.16	9.50	90.25	17.57	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	528	36	169	-111	0	0	383	0.0
10	1.94	2.16	9.50	99.75	20.78	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	498	40	178	-113	0	0	355	0.0
11	1.94	2.16	9.50	109.25	24.36	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	460	44	182	-111	0	0	323	0.0
12	1.94	2.16	9.50	118.75	28.32	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	418	46	182	-105	0	0	287	0.0
13	1.94	2.16	9.50	128.25	32.67	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	365	46	175	-96	0	0	245	0.0
14	1.94	2.16	9.50	137.75	37.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	308	43	161	-82	0	0	199	0.0
15	1.94	2.16	3.11	144.05	40.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	87	13	48	-23	0	0	54	0.0
16	1.94	2.16	11.50	151.35	45.04	0	45	1.00	0	0	0	0	0	275	37	164	-63	0	0	145	0	0	0	0	0	0	0	0.0
17	1.94	2.16	11.35	162.78	52.18	0	45	1.00	0	0	0	0	0	200	15	131	-23	0	0	51	0	0	0	0	0	0	0	0.0
18	1.94	2.16	7.70	172.30	58.70	0	45	1.00	0	0	0	0	0	92	0	66	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	7.70	180.00	64.39	0	45	1.00	0	0	0	0	0	57	-0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	7.68	187.69	70.47	0	45	1.00	0	0	0	0	0	20	0	16	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.547		> 1.20 ··· OK			0	0	0	0	0	845	53	421	-86	0	0	195	7,116	376	1,832	-1,203	0	0	5,539	0.0

Case 5 (1/2) : Upstream Slope	Slip Circle No. 2	Reservoir Water Surface	Low Water Surface : EL.136.000m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.25

No. of Slice	γt	γsat	b	x	y	C	ϕ	$\tan\phi$	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.26	53.54	20.07	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	183	7	36	-36	0	0	192	0.0
2	1.94	2.16	5.26	58.80	21.13	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	188	8	40	-39	0	0	187	0.0
3	1.94	2.16	5.26	64.06	22.29	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	187	9	43	-40	0	0	182	0.0
4	1.94	2.16	5.26	69.32	23.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	184	10	46	-42	0	0	176	0.0
5	1.94	2.16	5.26	74.58	24.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	180	12	49	-43	0	0	169	0.0
6	1.94	2.16	5.26	79.84	26.41	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	175	13	51	-44	0	0	162	0.0
7	1.94	2.16	5.26	85.10	28.00	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	168	14	53	-44	0	0	154	0.0
8	1.94	2.16	5.26	90.35	29.70	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	160	15	54	-44	0	0	145	0.0
9	1.94	2.16	5.26	95.62	31.51	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	152	15	54	-43	0	0	137	0.0
10	1.94	2.16	5.26	100.88	33.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	142	16	54	-42	0	0	127	0.0
11	1.94	2.16	5.26	106.14	35.50	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	130	16	52	-40	0	0	116	0.0
12	1.94	2.16	5.26	111.40	37.67	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	118	16	50	-38	0	0	105	0.0
13	1.94	2.16	5.26	116.66	39.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	104	15	47	-35	0	0	92	0.0
14	1.94	2.16	5.26	121.92	42.39	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	90	14	42	-31	0	0	79	0.0
15	1.94	2.16	5.26	127.18	44.94	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	74	13	37	-26	0	0	65	0.0
16	1.94	2.16	5.26	132.44	47.64	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	57	11	30	-20	0	0	50	0.0
17	1.94	2.16	5.26	137.70	50.47	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	39	8	21	-14	0	0	33	0.0
18	1.94	2.16	5.27	142.96	53.45	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	20	4	11	-7	0	0	16	0.0
19	1.94	2.16	1.68	145.44	55.49	0	45	1.00	0	0	0	0	0	2	0	1	-0	0	0	1	0	0	0	0	0	0	0	0.0
20	1.94	2.16	2.85	148.70	56.66	0	45	1.00	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.617		> 1.20 ··· OK			0	0	0	0	0	4	0	2	-0	0	0	1	2,355	216	769	-624	0	0	2,189	0.0

Case 5 (1/2) : Upstream Slope	Slip Circle No. 3	Reservoir Water Surface	Low Water Surface : EL.136.000m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.25

No. of Slice	γt	γsat	b	x	y	C	ϕ	$\tan\phi$	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	16.20	24.05	5.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	899	11	-105	97	0	0	832	0.0
2	1.94	2.16	16.20	40.25	3.71	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,067	2	-47	37	0	0	848	0.0
3	1.94	2.16	16.20	56.45	3.59	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	1,189	1	35	-25	0	0	849	0.0
4	1.94	2.16	16.20	72.65	4.86	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,283	9	130	-85	0	0	836	42.2
5	1.94	2.16	16.20	88.85	6.93	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,287	25	229	-139	0	0	807	42.6
6	1.94	2.16	16.20	105.05	10.45	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,260	47	323	-183	0	0	762	43.3
7	1.94	2.16	16.20	121.25	15.27	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,183	72	402	-212	0	0	697	44.3
8	1.94	2.16	16.25	137.47	21.50	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,058	95	455	-221	0	0	610	45.8
9	1.94	2.16	12.00	151.60	28.18	2.6	42	0.90	0	0	0	0	0	688	79	355	-153	0	0	374	0	0	0	0	0	0	0	35.0
10	1.94	2.16	12.00	163.60	34.85	2.6	42	0.90	0	0	0	0	0	609	77	364	-129	0	0	294	0	0	0	0	0	0	0	36.2
11	1.94	2.16	12.00	175.60	42.55	0	45	1.00	0	0	0	0	0	508	62	350	-91	0	0	194	0	0	0	0	0	0	0	0.0
12	1.94	2.16	11.58	187.39	51.26	0	45	1.00	0	0	0	0	0	376	26	297	-33	0	0	68	0	0	0	0	0	0	0	0.0
13	1.94	2.16	2.41	194.39	57.03	0	45	1.00	0	0	0	0	0	63	0	54	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.27	2.17	196.68	59.02	0	35	0.70	0	0	0	0	0	55	-26	48	30	0	0	13	0	0	0	0	0	0	0	0.0
15	2.03	2.27	2.11	199.12	61.21	0	35	0.70	0	0	0	0	0	66	13	60	-14	0	0	28	0	0	0	0	0	0	0	0.0
16	2.09	2.23	1.29	201.12	63.05	1	25	0.47	0	0	0	0	0	28	5	26	-5	0	0	10	0	0	0	0	0	0	0	1.6
17	2.11	2.19	2.04	202.78	64.63	1	25	0.47	0	0	0	0	0	39	9	37	-10	0	0	7	0	0	0	0	0	0	0	2.8
18	2.09	2.16	4.59	206.10	67.85	1	25	0.47	0	0	0	0	0	62	0	62	0	0	0	0	0	0	0	0	0	0	0	6.5
19	1.93	2.16	3.68	210.23	72.07	0	35	0.70	0	0	0	0	0	24	0	25	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.19	212.66	74.66	0	45	1.00	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.481		> 1.20 ··· OK			0	0	0	0	0	2,520	245	1,681	-405	0	0	988	9,205	262	1,421	-732	0	0	6,241	300.5

Case 5 (1/2) : Upstream Slope	Slip Circle No. 4	Reservoir Water Surface	Low Water Surface : EL.136.000m	Seismic Coefficient	0.00 (0%)	Required Safety Factor	1.25

No. of Slice	γt	γsat	b	x	y	C	ϕ	$\tan\phi$	above the water surface N	T	Ne	Te	U	Include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	13.50	61.16	19.53	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	545	17	-103	91	0	0	501	0.0
2	1.94	2.16	13.50	74.66	17.44	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	852	8	-84	63	0	0	524	0.0
3	1.94	2.16	13.50	88.16	18.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	812	2	-46	30	0	0	538	0.0
4	1.94	2.16	13.50	101.66	15.90	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	905	0	7	-4	0	0	541	35.0
5	1.94	2.16	13.50	115.16	18.45	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	968	3	70	-39	0	0	535	35.1
6	1.94	2.16	13.50	128.66	17.87	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,000	10	138	-71	0	0	520	35.3
7	1.94	2.16	10.19	140.50	19.88	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	758	14	150	-71	0	0	375	28.9
8	1.94	2.16	11.44	151.32	22.29	2.6	42	0.90	0	0	0	0	0	855	24	216	-94	0	0	397	0	0	0	0	0	0	0	30.6
9	1.94	2.16	11.44	162.76	25.54	2.4	40	0.84	0	0	0	0	0	858	33	270	-104	0	0	364	0	0	0	0	0	0	0	29.1
10	1.94	2.16	11.44	174.20	29.50	2.4	40	0.84	0	0	0	0	0	840	41	319	-107	0	0	323	0	0	0	0	0	0	0	29.7
11	1.94	2.16	11.44	185.64	34.24	2.4	40	0.84	0	0	0	0	0	802	48	360	-102	0	0	272	0	0	0	0	0	0	0	30.5
12	1.94	2.21	3.82	193.27	37.85	0	35	0.70	0	0	0	0	0	259	15	129	-31	0	0	37	0	0	0	0	0	0	0	0.0
13	1.94	2.27	0.63	195.49	38.97	0	35	0.70	0	0	0	0	0	43	-24	22	47	0	0	13	0	0	0	0	0	0	0	0.0
14	1.94	2.26	1.95	196.78	39.64	1	25	0.47	0	0	0	0	0	135	-99	70	189	0	0	54	0	0	0	0	0	0	0	2.2
15	2.05	2.22	4.00	199.78	41.23	1	25	0.47	0	0	0	0	0	273	29	148	-53	0	0	126	0	0	0	0	0	0	0	4.6
16	2.05	2.19	9.81	206.86	45.14	1	25	0.47	0	0	0	0	0	566	180	336	-304	0	0	151	0	0	0	0	0	0	0	11.4
17	1.94	2.19	1.09	212.11	48.49	1	25	0.47	0	0	0	0	0	49	0	31	0	0	0	0	0	0	0	0	0	0	0	1.3
18	1.93	2.16	5.30	215.30	50.59	0	35	0.70	0	0	0	0	0	201	0	133	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.89	221.40	54.74	0	45	1.00	0	0	0	0	0	175	0	124	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	8.65	229.17	60.56	0	45	1.00	0	0	0	0	0	78	0	61	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.810		> 1.20 ··· OK			0	0	0	0	0	5,133	245	2,220	-558	0	0	1,777	5,680	53	132	0	0	0	3,535	271.6

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - N_e) \cdot \tan\phi\,]}{\Sigma\,(T + T_e)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
φ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 5 (1/2) : Upstream Slope | Slip Circle No. 5 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	include the water surface N solid	include the water surface N water	include the water surface T solid	include the water surface T water	include the water surface Ne	include the water surface Te	include the water surface U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	under the water surface Ne	under the water surface Te	under the water surface U	CL
1	1.94	2.16	9.20	76.95	27.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	288	4	-34	31	0	0	266	0.0
2	1.94	2.16	9.20	86.15	26.38	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	344	1	-24	19	0	0	273	0.0
3	1.94	2.16	9.20	95.35	25.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	331	0	-9	8	0	0	277	0.0
4	1.94	2.16	9.20	104.55	25.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	429	0	10	-6	0	0	277	0.0
5	1.94	2.16	9.20	113.75	26.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	457	1	32	-19	0	0	273	0.0
6	1.94	2.16	9.20	122.95	27.22	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	476	4	55	-31	0	0	267	0.0
7	1.94	2.16	9.20	132.15	28.51	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	485	7	79	-41	0	0	256	0.0
8	1.94	2.16	8.85	141.17	30.20	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	458	10	98	-47	0	0	234	23.4
9	1.94	2.16	9.66	150.43	32.39	2.6	42	0.90	0	0	0	0	0	510	15	134	-58	0	0	235	0	0	0	0	0	0	0	25.9
10	1.94	2.16	9.65	160.09	35.18	2.6	42	0.90	0	0	0	0	0	513	19	182	-60	0	0	210	0	0	0	0	0	0	0	26.2
11	1.94	2.16	9.65	169.74	38.51	2.6	42	0.90	0	0	0	0	0	504	22	189	-59	0	0	179	0	0	0	0	0	0	0	26.7
12	1.94	2.16	9.65	179.39	42.41	2.6	42	0.90	0	0	0	0	0	493	23	210	-52	0	0	142	0	0	0	0	0	0	0	27.3
13	1.94	2.16	9.65	189.04	46.91	2.6	42	0.90	0	0	0	0	0	449	19	224	-39	0	0	97	0	0	0	0	0	0	0	27.9
14	1.94	2.21	1.32	194.52	49.76	0	35	0.70	0	0	0	0	0	58	2	31	-4	0	0	9	0	0	0	0	0	0	0	0.0
15	1.94	2.27	3.18	195.77	50.99	0	35	0.70	0	0	0	0	0	143	-62	60	111	0	0	42	0	0	0	0	0	0	0	0.0
16	2.05	2.23	3.40	200.05	52.88	1	25	0.47	0	0	0	0	0	154	16	89	-27	0	0	63	0	0	0	0	0	0	0	3.9
17	2.11	2.19	5.89	204.71	55.65	1	25	0.47	0	0	0	0	0	229	59	141	-96	0	0	52	0	0	0	0	0	0	0	8.9
18	2.00	2.16	2.89	209.10	58.44	1	25	0.47	0	0	0	0	0	90	0	59	0	0	0	0	0	0	0	0	0	0	0	3.5
19	1.93	2.16	5.27	213.18	61.19	0	35	0.70	0	0	0	0	0	119	0	82	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	8.27	219.95	65.08	0	45	1.00	0	0	0	0	0	70	0	59	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation						: SF = 2.579			> 1.20 ··· OK					0	0	0	0	0	0	0	3,323	114	1,455	-284	0	0	1,030	3,334	27	208	-88	0	0	2,122	171.7

Case 5 (1/2) : Upstream Slope | Slip Circle No. 6 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	include the water surface N solid	include the water surface N water	include the water surface T solid	include the water surface T water	include the water surface Ne	include the water surface Te	include the water surface U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	under the water surface Ne	under the water surface Te	under the water surface U	CL
1	1.94	2.16	8.87	97.94	35.91	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	192	0	-2	2	0	0	174	0.0
2	1.94	2.16	8.87	106.81	36.01	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	223	0	8	-6	0	0	173	0.0
3	1.94	2.16	8.87	115.28	36.51	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	247	1	20	-14	0	0	170	0.0
4	1.94	2.16	8.87	123.95	37.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	252	3	33	-20	0	0	162	0.0
5	1.94	2.16	8.87	132.62	38.73	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	259	5	47	-26	0	0	152	0.0
6	1.94	2.16	8.64	141.28	40.46	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	267	7	60	-29	0	0	138	0.0
7	1.94	2.16	7.85	149.53	42.50	0	45	1.00	0	0	0	0	0	243	8	66	-28	0	0	109	0	0	0	0	0	0	0	0.0
8	1.94	2.16	7.85	157.38	44.81	0	45	1.00	0	0	0	0	0	245	8	78	-27	0	0	92	0	0	0	0	0	0	0	0.0
9	1.94	2.16	7.85	165.23	47.50	0	45	1.00	0	0	0	0	0	243	8	89	-23	0	0	71	0	0	0	0	0	0	0	0.0
10	1.94	2.16	7.85	173.08	50.58	0	45	1.00	0	0	0	0	0	233	7	98	-16	0	0	49	0	0	0	0	0	0	0	0.0
11	1.94	2.16	7.85	180.93	54.09	0	45	1.00	0	0	0	0	0	216	3	102	-6	0	0	16	0	0	0	0	0	0	0	0.0
12	1.94	2.16	5.80	187.75	57.49	0	45	1.00	0	0	0	0	0	147	0	77	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	5.80	193.55	60.86	0	45	1.00	0	0	0	0	0	135	0	72	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.27	1.31	197.11	62.73	0	1.9	0.03	0	0	0	0	0	30	-9	18	14	0	0	4	0	0	0	0	0	0	0	0.0
15	2.03	2.27	3.25	199.38	64.12	0	1.9	0.03	0	0	0	0	0	74	5	45	-8	0	0	18	0	0	0	0	0	0	0	0.0
16	2.10	2.23	0.75	201.38	65.37	1	25	0.47	0	0	0	0	0	16	1	10	-1	0	0	3	0	0	0	0	0	0	0	0.9
17	2.11	2.19	1.46	202.43	65.08	1	25	0.47	0	0	0	0	0	28	3	18	-5	0	0	3	0	0	0	0	0	0	0	1.7
18	2.09	2.16	5.19	205.81	63.27	1	25	0.47	0	0	0	0	0	78	0	53	0	0	0	0	0	0	0	0	0	0	0	6.3
19	1.93	2.16	4.38	210.60	71.61	0	35	0.70	0	0	0	0	0	35	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.79	213.69	73.89	0	45	1.00	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation						SF = 2.408			> 1.20 ··· OK					0	0	0	0	0	0	0	1,728	34	760	-99	0	0	362	1,460	15	166	-93	0	0	569	8.9

Case 5 (1/2) : Upstream Slope | Slip Circle No. 7 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	include the water surface N solid	include the water surface N water	include the water surface T solid	include the water surface T water	include the water surface Ne	include the water surface Te	include the water surface U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	under the water surface Ne	under the water surface Te	under the water surface U	CL
1	1.94	2.16	4.00	11.99	3.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	210	1	17	-17	0	0	209	0.0
2	1.94	2.16	4.00	15.99	4.37	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	213	2	23	-23	0	0	208	0.0
3	1.94	2.16	4.00	19.99	4.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	216	4	30	-28	0	0	205	0.0
4	1.94	2.16	4.00	23.99	5.48	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	217	5	36	-33	0	0	205	0.0
5	1.94	2.16	4.00	27.99	6.20	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	216	7	42	-38	0	0	203	0.0
6	1.94	2.16	4.00	31.99	7.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	215	10	48	-43	0	0	201	0.0
7	1.94	2.16	4.00	35.99	7.99	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	212	12	54	-47	0	0	198	0.0
8	1.94	2.16	4.00	39.99	9.05	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	209	15	59	-51	0	0	195	0.0
9	1.94	2.16	4.00	43.99	10.26	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	204	17	64	-55	0	0	192	0.0
10	1.94	2.16	4.00	47.99	11.58	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	198	20	69	-58	0	0	188	0.0
11	1.94	2.16	4.00	51.99	13.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	191	23	72	-61	0	0	184	0.0
12	1.94	2.16	4.00	55.99	14.62	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	183	26	76	-63	0	0	179	0.0
13	1.94	2.16	4.00	59.99	16.34	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	173	29	78	-65	0	0	174	0.0
14	1.94	2.16	4.00	63.99	18.21	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	163	32	79	-66	0	0	168	0.0
15	1.94	2.16	4.00	67.99	20.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	151	35	79	-66	0	0	162	0.0
16	1.94	2.16	4.00	71.99	22.41	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	133	37	78	-66	0	0	154	0.0
17	1.94	2.16	4.00	75.99	24.75	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	125	39	76	-65	0	0	146	0.0
18	1.94	2.16	4.00	79.99	27.28	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	110	41	72	-63	0	0	137	0.0
19	1.94	2.16	4.00	83.99	29.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	94	42	66	-60	0	0	127	0.0
20	1.94	2.16	4.54	88.28	33.01	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	87	47	66	-63	0	0	131	0.0
Result of Calculation						SF = 2.654			> 1.20 ··· OK					0	0	0	0	0	0	0	3,525	445	1,183	-1,031	0	0	3,566	0.0

Case 5 (1/2) : Upstream Slope | Slip Circle No. 8 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	include the water surface N solid	include the water surface N water	include the water surface T solid	include the water surface T water	include the water surface Ne	include the water surface Te	include the water surface U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	under the water surface Ne	under the water surface Te	under the water surface U	CL
1	1.94	2.16	8.00	22.19	6.18	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	413	15	-80	78	0	0	406	0.0
2	1.94	2.16	8.00	30.19	4.85	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	468	8	-64	55	0	0	413	0.0
3	1.94	2.16	8.00	38.19	3.98	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	514	3	-42	34	0	0	418	0.0
4	1.94	2.16	8.00	46.19	3.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	551	0	-14	11	0	0	420	0.0
5	1.94	2.16	8.00	54.19	3.56	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	580	0	17	-12	0	0	420	0.0
6	1.94	2.16	8.00	62.19	4.01	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	599	3	50	-35	0	0	417	0.0
7	1.94	2.16	8.00	70.19	4.90	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	608	8	85	-55	0	0	413	0.0
8	1.94	2.16	8.00	78.19	6.24	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	608	15	119	-77	0	0	406	21.1
9	1.94	2.16	8.00	86.19	8.04	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	598	24	152	-95	0	0	396	21.4
10	1.94	2.16	8.00	94.19	10.32	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	578	35	183	-110	0	0	383	21.7
11	1.94	2.16	8.00	102.19	13.11	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	543	47	209	-122	0	0	367	22.2
12	1.94	2.16	8.00	110.19	16.43	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	508	59	229	-130	0	0	347	0.0
13	1.94	2.16	8.00	118.19	20.34	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	459	70	241	-133	0	0	322	0.0
14	1.94	2.16	8.00	126.19	24.87	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	400	79	244	-130	0	0	292	0.0
15	1.94	2.16	8.00	134.19	30.11	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	333	84	234	-119	0	0	253	0.0
16	1.94	2.16	7.41	141.89	35.90	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	241	75	194	-93	0	0	191	0.0
17	1.94	2.16	5.60	148.40	41.47	0	45	1.00	0	0	0	0	0	139	43	128	-54	0	0	109	0	0	0	0	0	0	0	0.0
18	1.94	2.16	5.60	154.00	46.82	0	45	1.00	0	0	0	0	0	103	37	104	-38	0	0	72	0	0	0	0	0	0	0	0.0
19	1.94	2.16	5.57	159.58	52.77	0	45	1.00	0	0	0	0	0	64	15	72	-13	0	0	26	0	0	0	0	0	0	0	0.0
20	1.94	2.16	7.07	165.90	60.40	0	45	1.00	0	0	0	0	0	29	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation						SF = 2.735			> 1.20 ··· OK					0	0	0	0	0	0	0	335	101	339	-104	0	0	208	8,004	523	1,758	-936	0	0	5,854	88.4

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 5 (1/2) : Upstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.11	33.68	13.42	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	270	2	-22	21	0	0	281	0.0
2	1.94	2.16	6.11	44.79	13.05	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	292	0	-11	10	0	0	283	0.0
3	1.94	2.16	6.11	50.90	12.95	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	310	0	2	-2	0	0	263	0.0
4	1.94	2.16	6.11	57.01	13.13	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	324	1	17	-13	0	0	262	0.0
5	1.94	2.16	6.11	63.12	13.58	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	334	2	32	-25	0	0	260	0.0
6	1.94	2.16	6.11	69.23	14.30	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	339	5	45	-36	0	0	257	0.0
7	1.94	2.16	6.11	75.34	15.31	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	340	9	64	-46	0	0	253	0.0
8	1.94	2.16	6.11	81.45	16.60	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	338	13	79	-55	0	0	247	0.0
9	1.94	2.16	6.11	87.56	18.19	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	328	18	93	-63	0	0	240	0.0
10	1.94	2.16	6.11	93.67	20.09	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	315	24	106	-70	0	0	231	0.0
11	1.94	2.16	6.11	99.78	22.31	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	298	29	116	-75	0	0	221	0.0
12	1.94	2.16	6.11	105.89	24.86	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	276	35	123	-78	0	0	208	0.0
13	1.94	2.16	6.11	112.00	27.77	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	251	40	127	-78	0	0	193	0.0
14	1.94	2.16	6.11	118.11	31.07	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	220	43	128	-78	0	0	176	0.0
15	1.94	2.16	6.11	124.22	34.78	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	188	45	120	-70	0	0	154	0.0
16	1.94	2.16	6.11	130.33	38.96	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	149	44	107	-61	0	0	129	0.0
17	1.94	2.16	6.11	136.44	43.65	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	107	39	87	-48	0	0	97	0.0
18	1.94	2.16	6.10	142.55	48.91	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	63	27	57	-29	0	0	59	0.0
19	1.94	2.16	4.14	147.67	53.85	0	45	1.00	0	0	0	0	0	18	6	18	-6	0	0	12	0	0	0	0	0	0	0	0.0
20	1.94	2.16	2.27	150.87	57.22	0	45	1.00	0	0	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.729				> 1.20 ··· OK	0	0	0	0	0	20	6	21	-6	0	0	12	4,136	375	1,273	-793	0	0	3,776	0.0

Case 5 (1/2) : Upstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

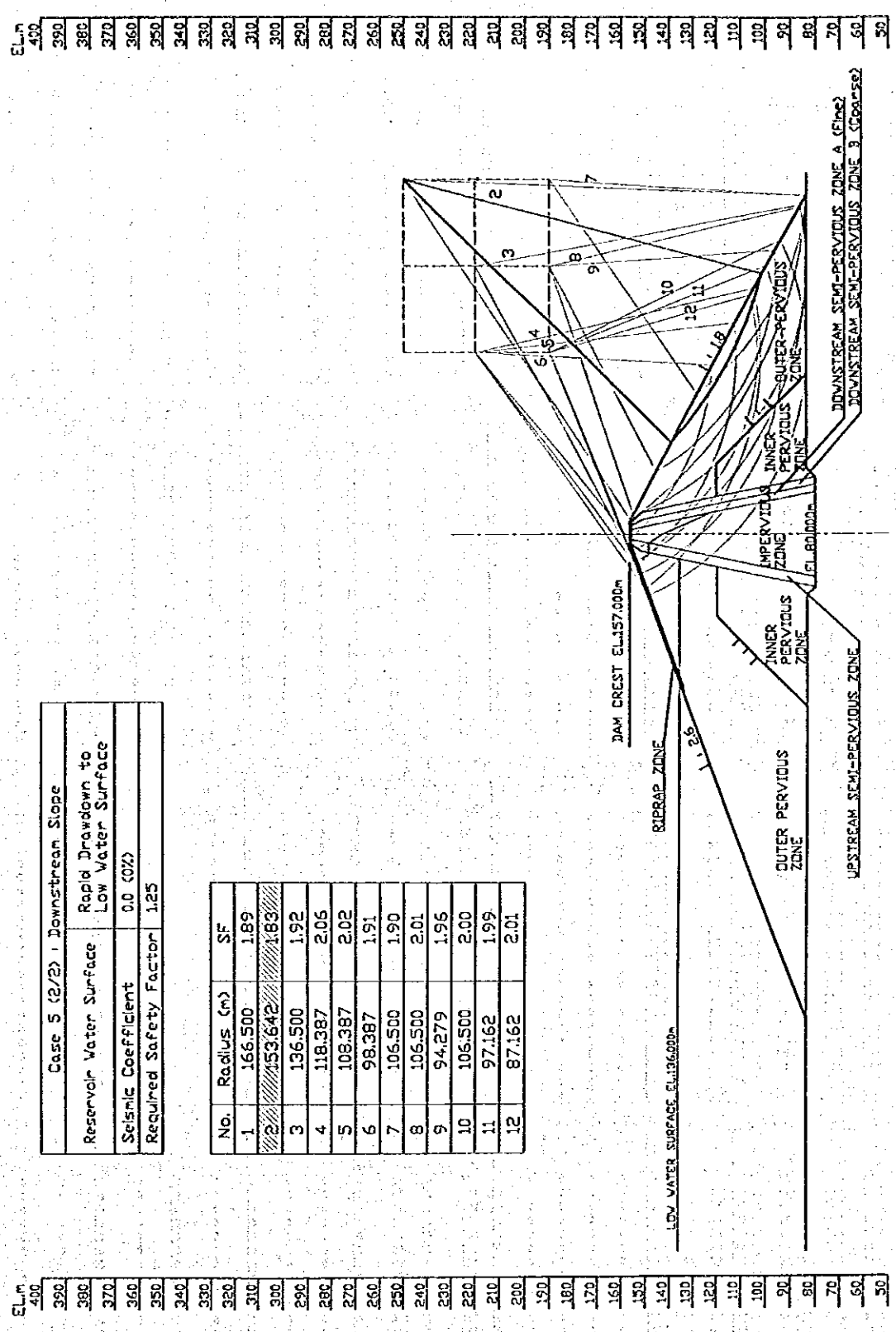
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	13.10	47.72	13.15	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	598	77	-223	200	0	0	601	0.0
2	1.94	2.16	13.10	60.82	8.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	808	48	-224	165	0	0	641	0.0
3	1.94	2.16	13.10	73.92	5.84	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	984	21	-178	117	0	0	668	0.0
4	1.94	2.16	13.10	87.02	4.08	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,122	5	-100	60	0	0	683	34.1
5	1.94	2.16	13.10	100.12	3.50	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,220	0	1	-1	0	0	688	33.9
6	1.94	2.16	13.10	113.22	4.10	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,274	6	115	-61	0	0	683	34.1
7	1.94	2.16	13.10	126.32	5.68	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,284	22	234	-118	0	0	667	34.5
8	1.94	2.16	12.73	139.23	8.65	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	1,215	45	338	-181	0	0	623	34.2
9	1.94	2.16	11.40	151.30	12.78	2.4	40	0.84	0	0	0	0	0	1,042	64	390	-172	0	0	524	0	0	0	0	0	0	0	29.6
10	1.94	2.16	11.40	162.70	17.60	2.4	40	0.84	0	0	0	0	0	986	88	457	-187	0	0	483	0	0	0	0	0	0	0	30.7
11	1.94	2.16	11.40	174.10	23.62	2.4	40	0.84	0	0	0	0	0	897	109	526	-188	0	0	426	0	0	0	0	0	0	0	32.1
12	1.94	2.16	11.22	185.41	30.97	2.4	40	0.84	0	0	0	0	0	763	117	549	-163	0	0	343	0	0	0	0	0	0	0	33.6
13	1.94	2.21	4.16	193.10	36.89	0	35	0.70	0	0	0	0	0	249	42	205	-50	0	0	103	0	0	0	0	0	0	0	0.0
14	1.94	2.27	0.64	195.50	38.90	0	35	0.70	0	0	0	0	0	37	-32	32	37	0	0	16	0	0	0	0	0	0	0	0.0
15	1.94	2.26	1.95	196.79	40.03	1	25	0.47	0	0	0	0	0	112	-127	99	144	0	0	62	0	0	0	0	0	0	0	2.6
16	2.05	2.22	4.00	199.76	42.21	1	25	0.47	0	0	0	0	0	218	68	203	-31	0	0	143	0	0	0	0	0	0	0	5.5
17	2.08	2.19	7.86	205.69	48.55	1	25	0.47	0	0	0	0	0	329	213	343	-204	0	0	138	0	0	0	0	0	0	0	11.3
18	1.98	2.16	1.83	210.53	53.84	1	25	0.47	0	0	0	0	0	54	0	62	0	0	0	0	0	0	0	0	0	0	0	2.8
19	1.93	2.16	4.81	213.85	57.80	0	35	0.70	0	0	0	0	0	100	0	124	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.50	219.50	65.25	0	45	1.00	0	0	0	0	0	48	0	68	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.494				> 1.20 ··· OK	0	0	0	0	0	4,836	540	3,065	-852	0	0	2,231	8,506	221	-42	202	0	0	5,254	318.9

Case 5 (1/2) : Upstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	11.80	57.16	17.68	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	487	45	-158	139	0	0	476	0.0
2	1.94	2.16	11.80	68.95	14.40	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	640	25	-147	110	0	0	504	0.0
3	1.94	2.16	11.80	80.76	12.23	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	787	10	-107	71	0	0	521	0.0
4	1.94	2.16	11.80	92.56	11.10	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	864	2	-48	28	0	0	531	30.6
5	1.94	2.16	11.80	104.36	10.98	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	930	1	29	-17	0	0	532	30.6
6	1.94	2.16	11.80	116.16	11.84	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	954	7	113	-61	0	0	525	30.8
7	1.94	2.16	11.80	127.95	13.73	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	954	21	198	-100	0	0	509	31.2
8	1.94	2.16	11.74	139.73	16.69	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	928	39	276	-132	0	0	482	31.7
9	1.94	2.16	11.55	151.58	20.81	2.4	40	0.84	0	0	0	0	0	893	62	355	-155	0	0	451	0	0	0	0	0	0	0	31.3
10	1.94	2.16	11.55	163.53	26.25	2.4	40	0.84	0	0	0	0	0	825	83	423	-162	0	0	397	0	0	0	0	0	0	0	32.8
11	1.94	2.16	11.55	175.48	33.15	2.4	40	0.84	0	0	0	0	0	719	95	464	-147	0	0	322	0	0	0	0	0	0	0	34.6
12	1.94	2.16	11.91	187.40	41.76	2.6	42	0.90	0	0	0	0	0	573	84	463	-105	0	0	213	0	0	0	0	0	0	0	39.8
13	1.94	2.21	1.83	194.27	47.71	0	35	0.70	0	0	0	0	0	73	9	68	-10	0	0	21	0	0	0	0	0	0	0	0.0
14	1.94	2.27	2.58	196.47	49.78	0	35	0.70	0	0	0	0	0	101	-91	97	95	0	0	45	0	0	0	0	0	0	0	0.0
15	1.97	2.27	0.53	198.03	51.31	0	35	0.70	0	0	0	0	0	21	7	20	-7	0	0	13	0	0	0	0	0	0	0	0.0
16	2.06	2.23	3.47	200.03	53.33	1	25	0.47	0	0	0	0	0	123	40	128	-39	0	0	77	0	0	0	0	0	0	0	5.0
17	2.11	2.19	4.87	204.09	57.73	1	25	0.47	0	0	0	0	0	128	71	144	-63	0	0	48	0	0	0	0	0	0	0	7.0
18	2.05	2.16	3.14	207.99	62.32	1	25	0.47	0	0	0	0	0	59	0	73	0	0	0	0	0	0	0	0	0	0	0	5.0
19	1.93	2.16	4.72	211.92	67.40	0	35	0.70	0	0	0	0	0	47	0	83	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.58	215.27	72.14	0	45	1.00	0	0	0	0	0	4	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.393				> 1.20 ··· OK	0	0	0	0	0	3,565	360	2,306	-592	0	0	1,588	6,542	149	158	39	0	0	4,078	310.0

Case 5 (1/2) : Upstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.85	70.53	24.30	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	301	15	-71	64	0	0	288	0.0
2	1.94	2.16	8.85	79.38	22.55	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	373	8	-80	47	0	0	300	0.0
3	1.94	2.16	8.85	88.23	21.43	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	432	3	-40	28	0	0	307	0.0
4	1.94	2.16	8.85	97.08	20.93	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	479	0	-11	7	0	0	310	0.0
5	1.94	2.16	8.85	105.93	21.03	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	511	1	24	-14	0	0	310	0.0
6	1.94	2.16	8.85	114.78	21.74	0	45	1.00	0	0	0	0	0	0	0	0	0	0	0	0	530	4	61	-35	0	0	305	0.0
7	1.94	2.16	8.85	123.63	23.68	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	533	10	99	-53	0	0	298	23.3
8	1.94	2.16	8.85	132.48	25.05	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	523	18	136	-69	0	0	283	23.7
9	1.94	2.16	8.70	141.25	27.66	2.6	42	0.90	0	0	0	0	0	0	0	0	0	0	0	0	488	27	165	-79	0	0	260	23.8
10	1.94	2.16	8.60	149.90	30.93	2.6	42	0.90	0	0	0	0	0	455	35	191	-83	0	0	233	0	0	0	0	0	0	0	24.2
11	1.94	2.16	8.60	158.50	34.91	2.6	42	0.90	0	0	0	0	0	423	42	215	-82	0	0	202	0	0	0	0	0	0	0	25.0
12	1.94	2.16	8.60	167.10	39.70	0	45	1.00	0	0	0	0	0	376	44	229	-72	0	0	163	0	0	0	0	0	0	0	0.0
13	1.94	2.16	8.60	175.70	45.42	0	45	1.00	0	0	0	0	0	315	38	228	-53	0	0	111	0	0	0	0	0	0	0	0.0
14	1.94	2.16	8.50	184.25	52.17	0	45	1.00	0	0	0	0	0	239	18	206	-20	0	0	41	0	0	0	0	0	0	0	0.0
15	1.94	2.16	8.43	192.71	60.15	0	45	1.00	0	0	0	0	0	159	0	164	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.27	0.84	197.34	65.19	0	35	0.70	0	0	0	0	0	12	-4	13	3	0	0	2	0	0	0	0	0	0	0	0.0
17	2.02	2.21	2.69	199.11	67.28	0	35	0.70	0	0	0	0	0	33	4	40	-3	0	0	7	0	0	0	0	0	0	0	0.0
18	2.09	2.16	1.75	201.33	70.00	0	35	0.70	0	0	0	0	0	18	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
19	2.11	2.16	3.66	204.03	73.55	1	25	0.47	0	0	0	0	0	16	0	21	0	0	0	0	0	0	0	0	0	0	0	8.2
20	2.11	2.16	0.62	206.17	76.55	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.492				> 1.20 ··· OK	0	0	0	0	0	2,044	176	1,328	-310	0	0	759	4,171	84	303	-104	0	0	2,690	126.1



Case 5 (2/2) : Downstream Slope

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 5 (2/2) : Downstream Slope | Slip Circle No. 1 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.60	9.83	3.79	0	45	1.00	0	0	0	0	0	21	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	16.43	4.31	0	45	1.00	0	0	0	0	0	61	0	6	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	23.03	5.10	0	45	1.00	0	0	0	0	0	98	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	29.63	6.16	0	45	1.00	0	0	0	0	0	130	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	6.60	36.23	7.49	0	45	1.00	0	0	0	0	0	158	0	35	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	6.60	42.83	9.10	2.6	42	0.90	0	0	0	0	0	182	0	48	0	0	0	0	0	0	0	0	0	0	0	17.7
7	1.94	2.16	6.60	49.43	11.01	2.6	42	0.90	0	0	0	0	0	201	0	63	0	0	0	0	0	0	0	0	0	0	0	17.9
8	1.94	2.16	6.60	56.03	13.21	2.6	42	0.90	0	0	0	0	0	216	0	77	0	0	0	0	0	0	0	0	0	0	0	18.2
9	1.94	2.16	6.60	62.63	15.73	2.6	42	0.90	0	0	0	0	0	226	0	92	0	0	0	0	0	0	0	0	0	0	0	18.4
10	1.94	2.16	6.60	69.23	18.58	2.6	42	0.90	0	0	0	0	0	232	0	106	0	0	0	0	0	0	0	0	0	0	0	18.6
11	1.94	2.16	6.60	75.83	21.77	2.6	42	0.90	0	0	0	0	0	232	0	119	0	0	0	0	0	0	0	0	0	0	0	19.2
12	1.94	2.16	6.60	82.43	25.34	2.6	42	0.90	0	0	0	0	0	228	0	130	0	0	0	0	0	0	0	0	0	0	0	19.7
13	1.94	2.16	6.60	89.03	29.30	2.6	42	0.90	0	0	0	0	0	218	0	138	0	0	0	0	0	0	0	0	0	0	0	20.2
14	1.94	2.16	6.60	95.63	33.70	0	45	1.00	0	0	0	0	0	204	0	143	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	6.60	102.23	38.58	0	45	1.00	0	0	0	0	0	184	0	143	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	6.60	108.83	43.99	0	45	1.00	0	0	0	0	0	160	0	138	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.60	115.43	50.01	0	45	1.00	0	0	0	0	0	130	0	125	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.60	122.03	56.73	0	45	1.00	0	0	0	0	0	96	0	104	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.60	128.63	64.28	0	45	1.00	0	0	0	0	0	58	0	71	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	5.28	134.87	72.37	0	45	1.00	0	0	0	0	0	17	0	24	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.894			> 1.20 ··· OK			0	0	0	0	0	3,052	0	1,600	0	0	0	0	0	0	0	0	0	0	0	150.1

Case 5 (2/2) : Downstream Slope | Slip Circle No. 2 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.50	39.82	21.61	0	45	1.00	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.50	43.32	22.59	0	45	1.00	0	0	0	0	0	10	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.50	46.82	23.66	0	45	1.00	0	0	0	0	0	15	0	5	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.50	50.32	24.83	0	45	1.00	0	0	0	0	0	20	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.50	53.82	26.09	0	45	1.00	0	0	0	0	0	24	0	9	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.50	57.32	27.45	0	45	1.00	0	0	0	0	0	28	0	11	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.50	60.82	28.91	0	45	1.00	0	0	0	0	0	30	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.50	64.32	30.47	0	45	1.00	0	0	0	0	0	32	0	15	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.50	67.82	32.14	0	45	1.00	0	0	0	0	0	34	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.50	71.32	33.91	0	45	1.00	0	0	0	0	0	34	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.50	74.82	35.81	0	45	1.00	0	0	0	0	0	34	0	19	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.50	78.32	37.82	0	45	1.00	0	0	0	0	0	33	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.50	81.82	39.96	0	45	1.00	0	0	0	0	0	32	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.50	85.32	42.22	0	45	1.00	0	0	0	0	0	29	0	20	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.50	88.82	44.63	0	45	1.00	0	0	0	0	0	26	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	3.50	92.32	47.19	0	45	1.00	0	0	0	0	0	22	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.50	95.82	49.90	0	45	1.00	0	0	0	0	0	18	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	3.50	99.32	52.77	0	45	1.00	0	0	0	0	0	12	0	11	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	3.50	102.82	55.83	0	45	1.00	0	0	0	0	0	7	0	6	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.70	105.42	58.23	0	45	1.00	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.831			> 1.20 ··· OK			0	0	0	0	0	445	0	243	0	0	0	0	0	0	0	0	0	0	0	0.0

Case 5 (2/2) : Downstream Slope | Slip Circle No. 3 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.30	14.99	4.97	0	45	1.00	0	0	0	0	0	60	0	-9	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	9.30	24.29	3.92	0	45	1.00	0	0	0	0	0	172	0	-14	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	9.30	33.59	3.51	2.6	42	0.90	0	0	0	0	0	273	0	-3	0	0	0	0	0	0	0	0	0	0	0	24.1
4	1.94	2.16	9.30	42.89	3.73	2.6	42	0.90	0	0	0	0	0	352	0	21	0	0	0	0	0	0	0	0	0	0	0	24.1
5	1.94	2.16	9.30	52.19	4.59	2.6	42	0.90	0	0	0	0	0	437	0	55	0	0	0	0	0	0	0	0	0	0	0	24.3
6	1.94	2.16	9.30	61.49	6.10	2.6	42	0.90	0	0	0	0	0	497	0	98	0	0	0	0	0	0	0	0	0	0	0	24.6
7	1.94	2.16	9.30	70.79	8.28	2.6	42	0.90	0	0	0	0	0	541	0	147	0	0	0	0	0	0	0	0	0	0	0	25.0
8	1.94	2.16	9.30	80.09	11.16	2.6	42	0.90	0	0	0	0	0	568	0	199	0	0	0	0	0	0	0	0	0	0	0	25.5
9	1.94	2.16	9.30	89.39	14.81	2.6	42	0.90	0	0	0	0	0	577	0	251	0	0	0	0	0	0	0	0	0	0	0	26.3
10	1.94	2.16	9.30	98.69	19.27	2.4	40	0.84	0	0	0	0	0	567	0	299	0	0	0	0	0	0	0	0	0	0	0	25.6
11	1.94	2.16	9.30	107.99	24.66	2.4	40	0.84	0	0	0	0	0	539	0	341	0	0	0	0	0	0	0	0	0	0	0	28.7
12	1.94	2.16	9.30	117.29	31.10	2.4	40	0.84	0	0	0	0	0	490	0	371	0	0	0	0	0	0	0	0	0	0	0	28.3
13	1.94	2.16	8.55	125.22	37.56	2.4	40	0.84	0	0	0	0	0	305	0	269	0	0	0	0	0	0	0	0	0	0	0	21.2
14	1.93	2.16	7.53	132.25	44.22	0	35	0.70	0	0	0	0	0	298	0	303	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.95	2.16	2.35	137.19	49.51	1	25	0.47	0	0	0	0	0	81	0	92	0	0	0	0	0	0	0	0	0	0	0	3.5
16	2.07	2.19	8.67	142.70	55.14	1	25	0.47	0	0	0	0	0	232	-19	298	14	0	0	48	0	0	0	0	0	0	0	14.1
17	2.10	2.22	1.06	147.57	62.80	1	25	0.47	0	0	0	0	0	18	8	27	-5	0	0	11	0	0	0	0	0	0	0	1.9
18	2.03	2.27	2.94	149.57	65.80	0	35	0.70	0	0	0	0	0	36	12	56	-8	0	0	16	0	0	0	0	0	0	0	0.0
19	1.94	2.27	0.12	151.10	68.21	0	45	1.00	0	0	0	0	0	1	0	2	-0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	3.68	152.99	71.36	0	45	1.00	0	0	0	0	0	14	0	24	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.917			> 1.20 ··· OK			0	0	0	0	0	6,059	1	2,828	1	0	0	77	0	0	0	0	0	0	0	295.1

Case 5 (2/2) : Downstream Slope | Slip Circle No. 4 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.80	47.58	23.68	0	45	1.00	0	0	0	0	0	44	0	-8	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.80	55.78	22.47	0	45	1.00	0	0	0	0	0	128	0	-15	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.80	63.58	21.79	2.6	42	0.90	0	0	0	0	0	204	0	-11	0	0	0	0	0	0	0	0	0	0	0	20.2
4	1.94	2.16	7.80	71.38	21.82	2.6	42	0.90	0	0	0	0	0	273	0	3	0	0	0	0	0	0	0	0	0	0	0	20.2
5	1.94	2.16	7.80	79.18	21.97	2.6	42	0.90	0	0	0	0	0	332	0	26	0	0	0	0	0	0	0	0	0	0	0	20.3
6	1.94	2.16	7.80	86.98	22.84	2.6	42	0.90	0	0	0	0	0	382	0	55	0	0	0	0	0	0	0	0	0	0	0	20.4
7	1.94	2.16	7.80	94.78	24.23	2.6	42	0.90	0	0	0	0	0	421	0	90	0	0	0	0	0	0	0	0	0	0	0	20.7
8	1.94	2.16	7.80	102.58	26.18	2.4	40	0.84	0	0	0	0	0	448	0	128	0	0	0	0	0	0	0	0	0	0	0	19.7
9	1.94	2.16	7.80	110.38	28.71	2.4	40	0.84	0	0	0	0	0	464	0	168	0	0	0	0	0	0	0	0	0	0	0	20.2
10	1.94	2.16	7.60	118.18	31.86	2.4	40	0.84	0	0	0	0	0	467	0	208	0	0	0	0	0	0	0	0	0	0	0	20.7
11	1.94	2.16	5.63	124.89	35.11	2.4	40	0.84	0	0	0	0	0	332	0	174	0	0	0	0	0	0	0	0	0	0	0	15.4
12	1.94	2.16	6.82	131.12	38.61	0	35	0.70	0	0	0	0	0	388	0	234	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.92	2.19	0.38	134.71	40.86	1	25	0.47	0	0	0	0	0	20	-1	13	1	0	0	0	0	0	0	0	0	0	0	0.4
14	1.97	2.19	6.08	137.92	43.04	1	25	0.47	0	0	0	0	0	337	-39	236	56	0	0	50	0	0	0	0	0	0	0	7.4
15	2.11	2.19	6.08	144.00	47.59	1	25	0.47	0	0	0	0	0	300	-61	240	83	0	0	119	0	0	0	0	0	0	0	7.8
16	2.06	2.23	3.19	148.64	51.50	1	25	0.47	0	0	0	0	0	132	33	118	-37	0	0	74	0	0	0	0	0	0	0	4.3
17	1.98	2.27	0.81	150.64	53.32	0	35	0.70	0	0	0	0	0	30	8	27	-6	0	0	17	0	0	0	0	0	0	0	0.0
18	1.94	2.27	2.55	152.31	54.91	0	35	0.70	0	0	0	0	0	78	80	75	-83	0	0	27	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.09	156.63	59.31	0	45	1.00	0	0	0	0	0	118	0	126	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.09	162.72	66.39	0	45	1.00	0	0	0	0	0	38	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.059			> 1.20 ··· OK			0	0	0	0	0	4,934	14	1,935	12	0	0	287	0	0	0	0	0	0	0	197.7

$$SF = \frac{\Sigma\{(C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 5 (2/2) : Downstream Slope | Slip Circle No. 5 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.80	60.99	31.99	0	45	1.00	0	0	0	0	0	21	0	-2	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.80	66.79	31.66	0	45	1.00	0	0	0	0	0	61	0	-2	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.80	72.59	31.64	0	45	1.00	0	0	0	0	0	98	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.80	78.39	31.94	0	45	1.00	0	0	0	0	0	130	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.80	84.19	32.55	2.6	42	0.90	0	0	0	0	0	159	0	21	0	0	0	0	0	0	0	0	0	0	0	15.2
6	1.94	2.16	5.80	89.99	33.47	2.6	42	0.90	0	0	0	0	0	183	0	34	0	0	0	0	0	0	0	0	0	0	0	15.3
7	1.94	2.16	5.80	95.79	34.73	2.6	42	0.90	0	0	0	0	0	202	0	49	0	0	0	0	0	0	0	0	0	0	0	15.5
8	1.94	2.16	5.80	101.59	36.32	2.6	42	0.90	0	0	0	0	0	217	0	66	0	0	0	0	0	0	0	0	0	0	0	15.7
9	1.94	2.16	5.80	107.39	38.26	2.6	42	0.90	0	0	0	0	0	226	0	83	0	0	0	0	0	0	0	0	0	0	0	16.0
10	1.94	2.16	5.80	113.19	40.59	2.6	42	0.90	0	0	0	0	0	230	0	100	0	0	0	0	0	0	0	0	0	0	0	16.4
11	1.94	2.16	5.80	118.99	43.31	2.6	42	0.90	0	0	0	0	0	229	0	118	0	0	0	0	0	0	0	0	0	0	0	16.8
12	1.94	2.16	5.80	124.79	46.46	2.6	42	0.90	0	0	0	0	0	222	0	130	0	0	0	0	0	0	0	0	0	0	0	17.4
13	1.94	2.16	2.63	129.03	43.10	2.6	42	0.90	0	0	0	0	0	99	0	64	0	0	0	0	0	0	0	0	0	0	0	8.3
14	1.93	2.16	7.03	133.89	52.45	0	35	0.70	0	0	0	0	0	240	0	175	0	0	0	0	0	0	0	0	0	0	0	0.0
15	2.00	2.16	4.23	139.52	56.85	1	25	0.47	0	0	0	0	0	131	0	109	0	0	0	0	0	0	0	0	0	0	0	5.5
16	2.11	2.19	5.40	144.34	61.12	1	25	0.47	0	0	0	0	0	133	-9	125	10	0	0	19	0	0	0	0	0	0	0	7.4
17	2.10	2.23	0.85	147.47	64.19	1	25	0.47	0	0	0	0	0	16	3	17	-3	0	0	6	0	0	0	0	0	0	0	1.2
18	2.03	2.27	3.15	149.47	66.29	0	35	0.70	0	0	0	0	0	46	6	50	-6	0	0	12	0	0	0	0	0	0	0	0.0
19	1.94	2.27	0.14	151.11	68.11	0	45	1.00	0	0	0	0	0	1	0	2	-0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.89	153.63	71.05	0	45	1.00	0	0	0	0	0	24	0	29	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.024		> 1.20 ··· OK			0	0	0	0	0	2,658	1	1,180	1	0	0	37	0	0	0	0	0	0	0	150.7

Case 5 (2/2) : Downstream Slope | Slip Circle No. 6 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.60	76.95	41.86	0	45	1.00	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.60	80.55	42.18	0	45	1.00	0	0	0	0	0	18	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.60	84.15	42.64	0	45	1.00	0	0	0	0	0	23	0	4	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.60	87.75	43.23	0	45	1.00	0	0	0	0	0	38	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.60	91.35	43.96	0	45	1.00	0	0	0	0	0	45	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.60	94.95	44.83	0	45	1.00	0	0	0	0	0	54	0	14	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.60	98.55	45.85	0	45	1.00	0	0	0	0	0	60	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.60	102.15	47.01	0	45	1.00	0	0	0	0	0	64	0	22	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.60	105.75	48.34	0	45	1.00	0	0	0	0	0	68	0	26	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.60	109.35	49.82	0	45	1.00	0	0	0	0	0	70	0	31	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.60	112.95	51.48	0	45	1.00	0	0	0	0	0	71	0	34	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.60	116.55	53.32	0	45	1.00	0	0	0	0	0	70	0	38	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.60	120.15	55.35	0	45	1.00	0	0	0	0	0	68	0	41	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.60	123.75	57.59	0	45	1.00	0	0	0	0	0	65	0	43	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.60	127.35	60.05	0	45	1.00	0	0	0	0	0	61	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.17	131.23	62.99	0	45	1.00	0	0	0	0	0	63	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.64	135.14	66.27	0	35	0.70	0	0	0	0	0	47	0	41	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.93	2.16	3.73	138.83	69.70	0	35	0.70	0	0	0	0	0	33	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
19	2.08	2.16	4.12	142.75	73.77	1	25	0.47	0	0	0	0	0	19	0	20	0	0	0	0	0	0	0	0	0	0	0	8.1
20	2.11	2.16	0.76	145.19	76.55	0	35	0.70	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.913		> 1.20 ··· OK			0	0	0	0	0	954	0	433	0	0	0	0	0	0	0	0	0	0	0	8.1

Case 5 (2/2) : Downstream Slope | Slip Circle No. 7 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	8.68	3.65	0	45	1.00	0	0	0	0	0	7	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.00	12.68	4.26	0	45	1.00	0	0	0	0	0	21	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.00	16.68	4.81	0	45	1.00	0	0	0	0	0	34	0	5	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.00	20.68	5.53	0	45	1.00	0	0	0	0	0	45	0	9	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.00	24.68	6.40	0	45	1.00	0	0	0	0	0	55	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.00	28.68	7.43	0	45	1.00	0	0	0	0	0	64	0	18	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.00	32.68	8.64	0	45	1.00	0	0	0	0	0	70	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.00	36.68	10.01	0	45	1.00	0	0	0	0	0	75	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.00	40.68	11.51	0	45	1.00	0	0	0	0	0	79	0	33	0	0	0	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.00	44.68	13.32	0	45	1.00	0	0	0	0	0	81	0	37	0	0	0	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.00	48.68	15.28	0	45	1.00	0	0	0	0	0	81	0	42	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.00	52.68	17.44	0	45	1.00	0	0	0	0	0	80	0	45	0	0	0	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.00	56.68	19.83	0	45	1.00	0	0	0	0	0	77	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.00	60.68	22.48	0	45	1.00	0	0	0	0	0	72	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.00	64.68	25.39	0	45	1.00	0	0	0	0	0	65	0	50	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.00	68.68	28.60	0	45	1.00	0	0	0	0	0	57	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.00	72.68	32.15	0	45	1.00	0	0	0	0	0	47	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.00	76.68	36.09	0	45	1.00	0	0	0	0	0	35	0	38	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.00	80.68	40.48	0	45	1.00	0	0	0	0	0	22	0	28	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.04	84.70	45.44	0	45	1.00	0	0	0	0	0	8	0	10	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.897		> 1.20 ··· OK			0	0	0	0	0	1,075	0	557	0	0	0	0	0	0	0	0	0	0	0	0.0

Case 5 (2/2) : Downstream Slope | Slip Circle No. 8 | Reservoir Water Surface | Low Water Surface : EL.138.000m | Seismic Coefficient 0.00 (0%) | Required Safety Factor 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.30	14.31	5.53	0	45	1.00	0	0	0	0	0	29	0	-6	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.30	20.61	4.48	0	45	1.00	0	0	0	0	0	84	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.30	26.91	3.81	0	45	1.00	0	0	0	0	0	135	0	-10	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.30	33.21	3.51	2.6	42	0.90	0	0	0	0	0	183	0	-3	0	0	0	0	0	0	0	0	0	0	0	16.3
5	1.94	2.16	6.30	39.51	3.60	2.6	42	0.90	0	0	0	0	0	224	0	10	0	0	0	0	0	0	0	0	0	0	0	16.3
6	1.94	2.16	6.30	45.81	4.05	2.6	42	0.90	0	0	0	0	0	260	0	27	0	0	0	0	0	0	0	0	0	0	0	16.4
7	1.94	2.16	6.30	52.11	4.88	2.6	42	0.90	0	0	0	0	0	290	0	47	0	0	0	0	0	0	0	0	0	0	0	16.5
8	1.94	2.16	6.30	58.41	6.11	2.6	42	0.90	0	0	0	0	0	314	0	71	0	0	0	0	0	0	0	0	0	0	0	16.7
9	1.94	2.16	6.30	64.71	7.73	2.6	42	0.90	0	0	0	0	0	331	0	95	0	0	0	0	0	0	0	0	0	0	0	17.0
10	1.94	2.16	6.30	71.01	9.77	2.6	42	0.90	0	0	0	0	0	341	0	123	0	0	0	0	0	0	0	0	0	0	0	17.3
11	1.94	2.16	6.30	77.31	12.27	2.6	42	0.90	0	0	0	0	0	344	0	149	0	0	0	0	0	0	0	0	0	0	0	17.8
12	1.94	2.16	6.30	83.61	15.24	2.6	42	0.90	0	0	0	0	0	339	0	174	0	0	0	0	0	0	0	0	0	0	0	18.3
13	1.94	2.16	6.30	89.91	18.75	2.6	42	0.90	0	0	0	0	0	327	0	197	0	0	0	0	0	0	0	0	0	0	0	19.0
14	1.94	2.16	6.30	96.21	22.85	2.6	42	0.90	0	0	0	0	0	308	0	215	0	0	0	0	0	0	0	0	0	0	0	19.9
15	1.94	2.16	6.30	102.51	27.63	2.6	42	0.90	0	0	0	0	0	277	0	227	0	0	0	0	0	0	0	0	0	0	0	21.1
16	1.91	2.16	6.30	108.81	33.23	2.4	40	0.84	0	0	0	0	0	240	0	231	0	0	0	0	0	0	0	0	0	0	0	21.2
17	1.94	2.16	6.30	115.11	39.83	0	43	0.93	0	0	0	0	0	194	0	222	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.30	121.41	47.35	0	45	1.00	0	0	0	0	0	141	0	195	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.30	127.71	57.59	0	45	1.00	0	0	0	0	0	80	0	142	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.85	133.29	69.00	0	45	1.00	0	0	0	0	0	18	0	44	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.007		> 1.20 ··· OK			0	0	0	0	0	4,450	0	2,138	0	0	0	0	0	0	0	0	0	0	0	234.1

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 5 (2/2) : Downstream Slope | Slip Circle No. 9 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.50	30.93	15.81	0	45	1.00	0	0	0	0	0	12	0	-1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.50	35.43	15.72	0	45	1.00	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.50	39.93	15.85	0	45	1.00	0	0	0	0	0	55	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.50	44.43	16.18	0	45	1.00	0	0	0	0	0	74	0	7	0	0	0	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.50	48.93	16.76	0	45	1.00	0	0	0	0	0	90	0	13	0	0	0	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.50	53.43	17.54	0	45	1.00	0	0	0	0	0	104	0	21	0	0	0	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.50	57.93	18.55	0	45	1.00	0	0	0	0	0	115	0	29	0	0	0	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.50	62.43	19.80	2.6	42	0.90	0	0	0	0	0	124	0	38	0	0	0	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.50	66.93	21.29	2.6	42	0.90	0	0	0	0	0	131	0	47	0	0	0	0	0	0	0	0	0	0	0	12.2
10	1.94	2.16	4.50	71.43	23.04	2.6	42	0.90	0	0	0	0	0	134	0	56	0	0	0	0	0	0	0	0	0	0	0	12.4
11	1.94	2.16	4.50	75.93	25.07	2.6	42	0.90	0	0	0	0	0	135	0	65	0	0	0	0	0	0	0	0	0	0	0	12.6
12	1.94	2.16	4.50	80.43	27.39	0	45	1.00	0	0	0	0	0	132	0	73	0	0	0	0	0	0	0	0	0	0	0	12.9
13	1.94	2.16	4.50	84.93	30.03	0	45	1.00	0	0	0	0	0	127	0	79	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.50	89.43	33.02	0	45	1.00	0	0	0	0	0	119	0	84	0	0	0	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.50	93.93	36.41	0	45	1.00	0	0	0	0	0	108	0	85	0	0	0	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.50	98.43	40.25	0	45	1.00	0	0	0	0	0	93	0	85	0	0	0	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.50	102.93	44.62	0	45	1.00	0	0	0	0	0	78	0	79	0	0	0	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.50	107.43	49.65	0	45	1.00	0	0	0	0	0	56	0	67	0	0	0	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.50	111.93	55.50	0	45	1.00	0	0	0	0	0	34	0	48	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.03	116.19	62.08	0	45	1.00	0	0	0	0	0	10	0	17	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.955				> 1.20 ··· OK	0	0	0	0	0	1,763	0	896	0	0	0	0	0	0	0	0	0	0	0	50.1

Case 5 (2/2) : Downstream Slope | Slip Circle No. 10 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

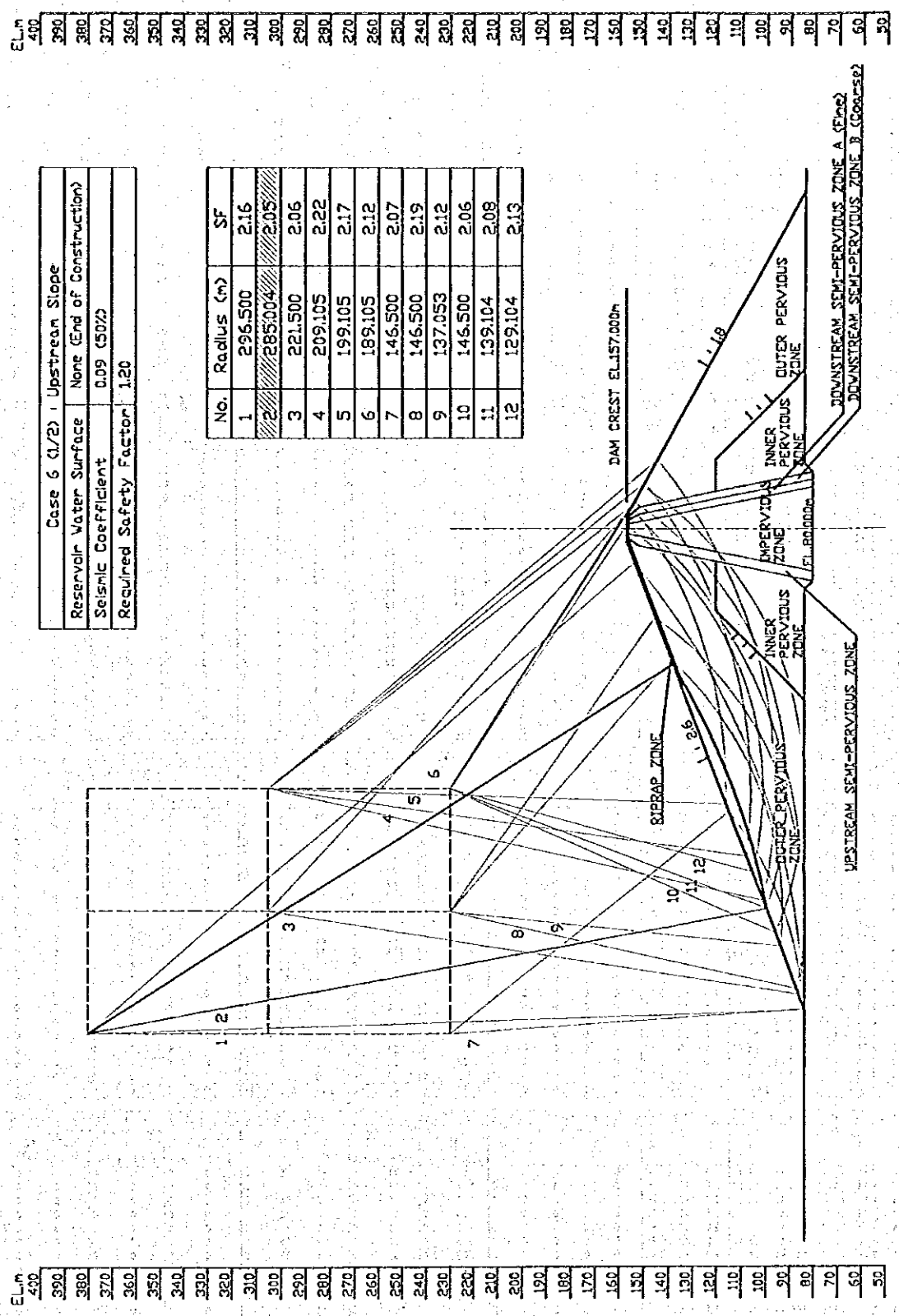
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	10.20	29.70	11.42	0	45	1.00	0	0	0	0	0	93	0	-38	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	10.20	39.90	7.84	0	45	1.00	0	0	0	0	0	272	0	-80	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	10.20	50.10	5.38	2.6	42	0.90	0	0	0	0	0	436	0	-83	0	0	0	0	0	0	0	0	0	0	0	26.9
4	1.94	2.16	10.20	60.30	3.94	2.6	42	0.90	0	0	0	0	0	582	0	-53	0	0	0	0	0	0	0	0	0	0	0	26.5
5	1.94	2.16	10.20	70.50	3.50	11.8	37	0.75	0	0	0	0	0	706	0	3	0	0	0	0	0	0	0	0	0	0	0	120.8
6	1.94	2.16	10.20	80.70	4.04	11.2	35	0.70	0	0	0	0	0	803	0	81	0	0	0	0	0	0	0	0	0	0	0	114.6
7	1.94	2.16	10.20	90.90	5.57	11.2	35	0.70	0	0	0	0	0	872	0	174	0	0	0	0	0	0	0	0	0	0	0	116.3
8	1.94	2.16	10.20	101.10	8.14	11.2	35	0.70	0	0	0	0	0	909	0	277	0	0	0	0	0	0	0	0	0	0	0	119.2
9	1.94	2.16	10.20	111.30	11.83	11.2	35	0.70	0	0	0	0	0	912	0	384	0	0	0	0	0	0	0	0	0	0	0	123.7
10	1.94	2.16	7.63	120.21	16.08	11.2	35	0.70	0	0	0	0	0	662	0	354	0	0	0	0	0	0	0	0	0	0	0	86.7
11	1.94	2.16	6.68	127.47	20.33	0	35	0.70	0	0	0	0	0	568	0	364	0	0	0	0	0	0	0	0	0	0	0	0.0
12	1.93	2.19	3.98	132.90	24.06	1	25	0.47	0	0	0	0	0	316	-85	231	116	0	0	42	0	0	0	0	0	0	0	4.9
13	1.97	2.19	6.08	137.93	27.97	1	25	0.47	0	0	0	0	0	471	-131	390	159	0	0	171	0	0	0	0	0	0	0	7.9
14	2.11	2.19	6.08	144.00	33.41	1	25	0.47	0	0	0	0	0	412	-122	398	126	0	0	249	0	0	0	0	0	0	0	8.5
15	2.05	2.22	4.00	149.04	38.62	1	25	0.47	0	0	0	0	0	224	89	248	-90	0	0	180	0	0	0	0	0	0	0	6.0
16	1.94	2.26	1.29	151.69	41.67	1	25	0.47	0	0	0	0	0	61	147	73	-123	0	0	48	0	0	0	0	0	0	0	2.0
17	1.94	2.27	1.29	152.98	43.24	0	35	0.70	0	0	0	0	0	55	100	69	-81	0	0	33	0	0	0	0	0	0	0	0.0
18	1.94	2.22	1.90	154.57	45.27	0	35	0.70	0	0	0	0	0	69	21	90	-16	0	0	33	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.28	158.68	50.59	0	45	1.00	0	0	0	0	0	150	37	226	-25	0	0	54	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.65	165.12	62.10	0	45	1.00	0	0	0	0	0	50	0	58	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.555				> 1.20 ··· OK	0	0	0	0	0	8,622	63	3,206	67	0	0	811	0	0	0	0	0	0	0	374.0

Case 5 (2/2) : Downstream Slope | Slip Circle No. 11 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.85	38.84	17.97	0	45	1.00	0	0	0	0	0	52	0	-18	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.85	46.69	15.66	0	45	1.00	0	0	0	0	0	152	0	-37	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.85	54.54	14.08	2.6	42	0.90	0	0	0	0	0	244	0	-39	0	0	0	0	0	0	0	0	0	0	0	20.6
4	1.94	2.16	7.85	62.39	13.14	2.6	42	0.90	0	0	0	0	0	327	0	-28	0	0	0	0	0	0	0	0	0	0	0	20.4
5	1.94	2.16	7.85	70.24	12.84	2.6	42	0.90	0	0	0	0	0	399	0	1	0	0	0	0	0	0	0	0	0	0	0	20.3
6	1.94	2.16	7.85	78.09	13.18	2.6	42	0.90	0	0	0	0	0	458	0	33	0	0	0	0	0	0	0	0	0	0	0	20.4
7	1.94	2.16	7.85	85.94	14.15	11.8	37	0.75	0	0	0	0	0	505	0	84	0	0	0	0	0	0	0	0	0	0	0	94.2
8	1.94	2.16	7.85	93.79	15.79	11.2	35	0.70	0	0	0	0	0	538	0	135	0	0	0	0	0	0	0	0	0	0	0	90.5
9	1.94	2.16	7.85	101.64	18.13	11.2	35	0.70	0	0	0	0	0	552	0	190	0	0	0	0	0	0	0	0	0	0	0	92.8
10	1.94	2.16	7.85	109.49	21.22	11.2	35	0.70	0	0	0	0	0	551	0	245	0	0	0	0	0	0	0	0	0	0	0	93.1
11	1.94	2.16	7.85	117.34	25.15	2.4	40	0.84	0	0	0	0	0	532	0	297	0	0	0	0	0	0	0	0	0	0	0	21.8
12	1.94	2.16	5.32	123.92	29.17	2.4	40	0.84	0	0	0	0	0	341	0	227	0	0	0	0	0	0	0	0	0	0	0	15.5
13	1.94	2.16	7.13	130.15	33.69	0	35	0.70	0	0	0	0	0	419	0	330	0	0	0	0	0	0	0	0	0	0	0	0.0
14	1.92	2.19	1.18	134.90	37.16	1	25	0.47	0	0	0	0	0	64	-8	57	9	0	0	4	0	0	0	0	0	0	0	1.6
15	1.97	2.19	6.08	137.93	40.53	1	25	0.47	0	0	0	0	0	318	-55	311	56	0	0	78	0	0	0	0	0	0	0	8.5
16	2.11	2.19	6.08	144.00	47.04	1	25	0.47	0	0	0	0	0	254	-56	298	48	0	0	148	0	0	0	0	0	0	0	9.4
17	2.07	2.23	2.84	148.46	52.69	1	25	0.47	0	0	0	0	0	89	51	121	-37	0	0	78	0	0	0	0	0	0	0	4.8
18	2.00	2.27	1.18	150.46	55.54	0	35	0.70	0	0	0	0	0	29	19	43	-13	0	0	28	0	0	0	0	0	0	0	0.0
19	1.94	2.27	1.90	151.99	57.87	0	35	0.70	0	0	0	0	0	37	66	59	-42	0	0	22	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.78	156.33	65.43	0	45	1.00	0	0	0	0	0	52	0	101	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.987				> 1.20 ··· OK	0	0	0	0	0	5,911	17	2,418	21	0	0	357	0	0	0	0	0	0	0	517.0

Case 5 (2/2) : Downstream Slope | Slip Circle No. 12 | Reservoir Water Surface | Low Water Surface : EL.136.000m | Seismic Coefficient | 0.00 (0%) | Required Safety Factor | 1.25

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.40	49.48	25.29	0	45	1.00	0	0	0	0	0	22	0	-5	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.40	54.88	24.16	0	45	1.00	0	0	0	0	0	65	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.40	60.28	23.38	0	45	1.00	0	0	0	0	0	105	0	-12	0	0	0	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.40	65.68	22.95	2.6	42	0.90	0	0	0	0	0	142	0	-7	0	0	0	0	0	0	0	0	0	0	0	14.0
5	1.94	2.16	5.40	71.08	22.84	2.6	42	0.90	0	0	0	0	0	174	0	2	0	0	0	0	0	0	0	0	0	0	0	14.0
6	1.94	2.16	5.40	76.48	23.08	2.6	42	0.90	0	0	0	0	0	203	0	15	0	0	0	0	0	0	0	0	0	0	0	14.0
7	1.94	2.16	5.40	81.88	23.65	2.6	42	0.90	0	0	0	0	0	227	0	31	0	0	0	0	0	0	0	0	0	0	0	14.1
8	1.94	2.16	5.40	87.28	24.57	2.6	42	0.90	0	0	0	0	0	246	0	50	0	0	0	0	0	0	0	0	0	0	0	14.3
9	1.94	2.16	5.40	92.68	25.84	2.6	42	0.90	0	0	0	0	0	259	0	70	0	0	0	0	0	0	0	0	0	0	0	14.5
10	1.94	2.16	5.40	98.08	27.48	2.6	42	0.90	0	0	0	0	0	268	0	91	0	0	0	0	0	0	0	0	0	0	0	14.8
11	1.94	2.16	5.40	103.48	29.52	2.6	42	0.90	0	0	0	0	0	270	0	113	0	0	0	0	0	0	0	0	0	0	0	15.1
12	1.94	2.16	5.40	108.88	31.99	2.4	40	0.84	0	0	0	0	0	267	0	133	0	0	0	0	0	0	0	0	0	0	0	14.7
13	1.94	2.16	5.40	114.28	34.92	2.4	40	0.84	0	0	0	0	0	258	0	152	0	0	0	0	0	0	0	0	0	0	0	15.2
14	1.94	2.16	5.40	119.68	38.38	2.4	40	0.84	0	0	0	0	0	242	0	168	0	0	0	0	0	0	0	0	0	0	0	16.0
15	1.94	2.16	5.40	125.08	42.45	2.6	42	0.90	0	0	0	0	0	220	0	179	0	0	0	0	0	0	0	0	0	0	0	16.0
16	1.94	2.16	1.90	128.73	45.59	2.6	42	0.90	0	0	0	0	0	70	0	64	0	0	0	0	0	0	0	0	0	0	0	6.6
17	1.93	2.16	7.63	133.49	50.28	0	35	0.70	0	0	0	0	0	241	0	259	0	0	0	0	0	0	0	0	0	0	0	0.0
18	2.05	2.16	9.69	142.15	61.09	1	25	0.47	0	0	0	0	0	177	0	282	0	0	0	0	0	0	0	0	0	0	0	17.3
19	2.06	2.16	2.23	148.11	71.32	0	35	0.70	0	0	0	0	0	12	0	23	0	0	0	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.16	149.81	74.90	0	45	1.00	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.012				> 1.20 ··· OK	0	0	0	0	0	3,470	0	1,517	0	0	0	0	0	0	0	0	0	0	0	202.6



Case 6 (1/2) : Upstream Slope

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 6 (1/2) : Upstream Slope | Slip Circle No. 1 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.10	14.05	3.83	0	45	1.00	0	0	0	0	0	28	0	1	0	0	2	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	9.10	23.15	4.40	0	45	1.00	0	0	0	0	0	79	0	6	0	1	7	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	9.10	32.25	5.26	0	45	1.00	0	0	0	0	0	125	0	14	0	1	11	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	9.10	41.35	6.40	0	45	1.00	0	0	0	0	0	166	0	23	0	2	15	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	9.10	50.45	7.82	0	45	1.00	0	0	0	0	0	202	0	35	0	3	18	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	9.10	59.56	9.54	0	45	1.00	0	0	0	0	0	231	0	47	0	4	21	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	9.10	68.66	11.56	2.6	42	0.90	0	0	0	0	0	255	0	61	0	5	23	0	0	0	0	0	0	0	0	24.2
8	1.94	2.16	9.10	77.76	13.68	2.6	45	1.00	0	0	0	0	0	273	0	74	0	7	25	0	0	0	0	0	0	0	0	24.4
9	1.94	2.16	9.10	86.86	16.51	2.6	45	1.00	0	0	0	0	0	285	0	87	0	8	26	0	0	0	0	0	0	0	0	24.7
10	1.94	2.16	9.10	95.96	19.46	2.6	45	1.00	0	0	0	0	0	292	0	100	0	9	26	0	0	0	0	0	0	0	0	24.9
11	1.94	2.16	9.10	105.07	22.74	2.6	45	1.00	0	0	0	0	0	292	0	111	0	10	26	0	0	0	0	0	0	0	0	25.2
12	1.94	2.16	9.10	114.17	26.35	2.6	45	1.00	0	0	0	0	0	286	0	119	0	11	26	0	0	0	0	0	0	0	0	25.5
13	1.94	2.16	9.10	123.27	30.34	2.6	45	1.00	0	0	0	0	0	274	0	125	0	11	25	0	0	0	0	0	0	0	0	25.9
14	1.94	2.16	9.10	132.37	34.69	0	45	1.00	0	0	0	0	0	256	0	128	0	12	23	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	9.10	141.47	39.43	0	45	1.00	0	0	0	0	0	233	0	126	0	11	21	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	9.10	150.58	44.58	0	45	1.00	0	0	0	0	0	203	0	120	0	11	18	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	9.10	159.68	50.17	0	45	1.00	0	0	0	0	0	167	0	107	0	10	15	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	9.10	168.78	56.23	0	45	1.00	0	0	0	0	0	126	0	87	0	8	11	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	9.10	177.88	62.79	0	45	1.00	0	0	0	0	0	80	0	60	0	5	7	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	9.10	186.98	69.89	0	45	1.00	0	0	0	0	0	28	0	23	0	2	2	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.162			> 1.20 ··· OK			0	0	0	0	0	3,681	0	1,454	0	131	349	0	0	0	0	0	0	0	0	174.9

Case 6 (1/2) : Upstream Slope | Slip Circle No. 2 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.00	53.41	20.04	0	45	1.00	0	0	0	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.00	58.41	21.04	0	45	1.00	0	0	0	0	0	13	0	3	0	0	1	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.00	63.41	22.14	0	45	1.00	0	0	0	0	0	21	0	5	0	0	2	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.00	68.41	23.33	0	45	1.00	0	0	0	0	0	28	0	7	0	1	3	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.00	73.41	24.61	0	45	1.00	0	0	0	0	0	34	0	9	0	1	3	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	5.00	78.41	25.99	0	45	1.00	0	0	0	0	0	39	0	11	0	1	3	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	5.00	83.41	27.47	0	45	1.00	0	0	0	0	0	43	0	13	0	1	4	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	5.00	88.41	29.05	0	45	1.00	0	0	0	0	0	46	0	15	0	1	4	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	5.00	93.41	30.74	0	45	1.00	0	0	0	0	0	48	0	16	0	1	4	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	5.00	98.41	32.52	0	45	1.00	0	0	0	0	0	48	0	18	0	2	4	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	5.00	103.41	34.42	0	45	1.00	0	0	0	0	0	48	0	19	0	2	4	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	5.00	108.41	36.42	0	45	1.00	0	0	0	0	0	47	0	19	0	2	4	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	5.00	113.41	38.53	0	45	1.00	0	0	0	0	0	45	0	20	0	2	4	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	5.00	118.41	40.76	0	45	1.00	0	0	0	0	0	42	0	19	0	2	4	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	5.00	123.41	43.10	0	45	1.00	0	0	0	0	0	38	0	18	0	2	3	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	5.00	128.41	45.56	0	45	1.00	0	0	0	0	0	33	0	17	0	2	3	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	5.00	133.41	48.15	0	45	1.00	0	0	0	0	0	27	0	14	0	1	2	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	5.00	138.41	50.86	0	45	1.00	0	0	0	0	0	20	0	11	0	1	2	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	5.00	143.41	53.70	0	45	1.00	0	0	0	0	0	12	0	7	0	1	1	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.22	148.02	56.45	0	45	1.00	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.048			> 1.20 ··· OK			0	0	0	0	0	642	0	245	0	22	58	0	0	0	0	0	0	0	0	0.0

Case 6 (1/2) : Upstream Slope | Slip Circle No. 3 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	11.30	21.60	5.33	0	45	1.00	0	0	0	0	0	65	0	-8	0	-1	6	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	11.30	32.90	4.16	0	45	1.00	0	0	0	0	0	186	0	-14	0	-1	17	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	11.30	44.20	3.58	2.6	42	0.90	0	0	0	0	0	294	0	-8	0	-1	26	0	0	0	0	0	0	0	0	29.3
4	1.94	2.16	11.30	55.50	3.57	2.6	42	0.90	0	0	0	0	0	390	0	10	0	1	35	0	0	0	0	0	0	0	0	29.3
5	1.94	2.16	11.30	66.80	4.14	2.6	42	0.90	0	0	0	0	0	471	0	36	0	3	42	0	0	0	0	0	0	0	0	29.4
6	1.94	2.16	11.30	78.10	5.29	2.6	42	0.90	0	0	0	0	0	538	0	69	0	6	48	0	0	0	0	0	0	0	0	29.5
7	1.94	2.16	11.30	89.40	7.03	2.6	42	0.90	0	0	0	0	0	590	0	107	0	10	53	0	0	0	0	0	0	0	0	29.7
8	1.94	2.16	11.30	100.70	9.38	2.6	42	0.90	0	0	0	0	0	628	0	147	0	13	56	0	0	0	0	0	0	0	0	30.1
9	1.94	2.16	11.30	112.00	12.35	2.6	42	0.90	0	0	0	0	0	647	0	189	0	17	58	0	0	0	0	0	0	0	0	30.5
10	1.94	2.16	11.30	123.30	15.98	2.6	42	0.90	0	0	0	0	0	650	0	228	0	21	59	0	0	0	0	0	0	0	0	31.0
11	1.94	2.16	11.30	134.60	20.29	2.6	42	0.90	0	0	0	0	0	638	0	264	0	24	57	0	0	0	0	0	0	0	0	31.7
12	1.94	2.16	11.30	145.90	25.34	2.6	42	0.90	0	0	0	0	0	608	0	292	0	26	55	0	0	0	0	0	0	0	0	32.5
13	1.94	2.16	11.30	157.20	31.17	2.6	42	0.90	0	0	0	0	0	552	0	311	0	28	51	0	0	0	0	0	0	0	0	33.4
14	1.94	2.16	11.30	168.50	37.86	2.6	42	0.90	0	0	0	0	0	499	0	318	0	28	45	0	0	0	0	0	0	0	0	34.6
15	1.94	2.16	11.30	179.80	45.51	2.6	42	0.90	0	0	0	0	0	420	0	304	0	27	38	0	0	0	0	0	0	0	0	36.1
16	1.94	2.16	10.15	190.52	53.78	0	45	1.00	0	0	0	0	0	297	0	244	0	22	27	0	0	0	0	0	0	0	0	0.0
17	2.03	2.16	4.88	198.03	60.23	0	35	0.70	0	0	0	0	0	117	0	105	0	9	11	0	0	0	0	0	0	0	0	0.0
18	2.10	2.16	7.52	204.43	66.21	1	25	0.47	0	0	0	0	0	129	0	125	0	11	12	125	0	0	0	0	0	0	0	11.0
19	1.93	2.16	3.68	210.23	72.07	0	35	0.70	0	0	0	0	0	24	0	25	0	2	2	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.19	212.66	74.66	0	45	1.00	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.063			> 1.20 ··· OK			0	0	0	0	0	7,752	0	2,741	0	247	693	125	0	0	0	0	0	0	0	418.1

Case 6 (1/2) : Upstream Slope | Slip Circle No. 4 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	10.00	59.41	19.87	0	45	1.00	0	0	0	0	0	57	0	-11	0	-1	5	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	10.00	69.41	18.14	0	45	1.00	0	0	0	0	0	164	0	-24	0	-2	15	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	10.00	79.41	16.91	2.6	42	0.90	0	0	0	0	0	263	0	-26	0	-2	24	0	0	0	0	0	0	0	0	26.0
4	1.94	2.16	10.00	89.41	16.16	2.6	42	0.90	0	0	0	0	0	353	0	-18	0	-2	32	0	0	0	0	0	0	0	0	25.9
5	1.94	2.16	10.00	99.41	15.90	2.6	42	0.90	0	0	0	0	0	433	0	-1	0	-0	39	0	0	0	0	0	0	0	0	25.9
6	1.94	2.16	10.00	109.41	16.11	2.6	42	0.90	0	0	0	0	0	503	0	23	0	2	45	0	0	0	0	0	0	0	0	26.0
7	1.94	2.16	10.00	119.41	16.80	2.6	42	0.90	0	0	0	0	0	563	0	52	0	5	51	0	0	0	0	0	0	0	0	26.2
8	1.94	2.16	10.00	129.41	17.97	2.6	42	0.90	0	0	0	0	0	611	0	87	0	8	55	0	0	0	0	0	0	0	0	26.4
9	1.94	2.16	10.00	139.41	19.64	2.6	42	0.90	0	0	0	0	0	647	0	124	0	11	58	0	0	0	0	0	0	0	0	121.8
10	1.94	2.16	10.00	149.41	21.82	11.8	37	0.75	0	0	0	0	0	672	0	163	0	15	60	0	0	0	0	0	0	0	0	116.6
11	1.94	2.16	10.00	159.41	24.51	11.2	35	0.70	0	0	0	0	0	684	0	203	0	18	62	0	0	0	0	0	0	0	0	25.8
12	1.94	2.16	10.00	169.41	27.75	2.4	40	0.84	0	0	0	0	0	685	0	241	0	22	62	0	0	0	0	0	0	0	0	26.3
13	1.94	2.16	10.00	179.41	31.56	2.4	40	0.84	0	0	0	0	0	672	0	278	0	25	60	0	0	0	0	0	0	0	0	18.6
14	1.94	2.16	8.95	187.89	35.26	2.4	40	0.84	0	0	0	0	0	453	0	210	0	19	41	0	0	0	0	0	0	0	0	0.0
15	1.99	2.16	4.45	193.58	38.01	0	35	0.70	0	0	0	0	0	288	0	144	0	13	28	0	0	0	0	0	0	0	0	8.4
16	2.09	2.16	7.39	199.50	41.09	1	25	0.47	0	0	0	0	0	484	0	282	0	24	44	313	0	0	0	0	0	0	0	11.0
17	2.06	2.16	9.45	207.93	45.90	1	25	0.47	0	0	0	0	0	519	0	313	0	28	47	354	0	0	0	0	0	0	0	0.0
18	1.93	2.16	5.30	215.30	50.56	0	35	0.70	0	0	0	0	0	201	0	133	0	12	18	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	8.89	221.40	54.74	0	45	1.00	0	0	0	0	0	175	0	124	0	11	16	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	8.66	229.17	60.56	0	45	1.00	0	0	0	0	0	78	0	61	0	6	7	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 2.216			> 1.20 ··· OK			0	0	0	0	0	8,505	0	2,336	0	210	766	667	0	0	0	0	0	0	0	510.5

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - Ne) \cdot \tan\phi]}{\Sigma\,(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ns : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 6 (1/2) : Upstream Slope | Slip Circle No. 5 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ns	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	8.70	76.70	27.28	0	45	1.00	0	0	0	0	0	37	0	-4	0	-0	3	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	8.70	85.40	28.43	0	45	1.00	0	0	0	0	0	108	0	-8	0	-1	10	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	8.70	94.10	25.99	0	45	1.00	0	0	0	0	0	172	0	-5	0	-0	15	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	8.70	102.80	25.91	2.6	42	0.90	0	0	0	0	0	230	0	3	0	0	21	0	0	0	0	0	0	0	0	22.5
5	1.94	2.16	8.70	111.50	28.23	2.6	42	0.90	0	0	0	0	0	281	0	16	0	1	25	0	0	0	0	0	0	0	0	22.6
6	1.94	2.16	8.70	120.20	28.92	2.6	42	0.90	0	0	0	0	0	324	0	33	0	3	29	0	0	0	0	0	0	0	0	22.6
7	1.94	2.16	8.70	128.90	28.00	2.6	42	0.90	0	0	0	0	0	350	0	53	0	5	32	0	0	0	0	0	0	0	0	22.8
8	1.94	2.16	8.70	137.60	29.48	2.6	42	0.90	0	0	0	0	0	383	0	75	0	7	35	0	0	0	0	0	0	0	0	22.9
9	1.94	2.16	8.70	146.30	31.35	2.6	42	0.90	0	0	0	0	0	409	0	98	0	9	37	0	0	0	0	0	0	0	0	23.2
10	1.94	2.16	8.70	155.00	33.64	2.6	42	0.90	0	0	0	0	0	421	0	121	0	11	38	0	0	0	0	0	0	0	0	23.4
11	1.94	2.16	8.70	163.70	36.36	2.6	42	0.90	0	0	0	0	0	425	0	144	0	13	38	0	0	0	0	0	0	0	0	23.8
12	1.94	2.16	8.70	172.40	39.52	2.6	42	0.90	0	0	0	0	0	421	0	164	0	15	38	0	0	0	0	0	0	0	0	24.2
13	1.94	2.16	8.70	181.10	43.16	2.6	42	0.90	0	0	0	0	0	408	0	182	0	16	37	0	0	0	0	0	0	0	0	24.7
14	1.94	2.16	8.42	189.65	47.22	2.6	42	0.90	0	0	0	0	0	375	0	189	0	17	34	0	0	0	0	0	0	0	0	24.4
15	2.01	2.16	4.50	198.11	50.83	0	35	0.70	0	0	0	0	0	198	0	103	0	10	18	0	0	0	0	0	0	0	0	0.0
16	2.10	2.16	6.09	201.40	53.65	1	25	0.47	0	0	0	0	0	257	0	152	0	14	23	174	0	0	0	0	0	0	0	7.1
17	2.06	2.16	6.09	207.50	57.41	1	25	0.47	0	0	0	0	0	207	0	133	0	12	19	146	0	0	0	0	0	0	0	7.2
18	1.93	2.16	5.27	213.18	61.19	0	35	0.70	0	0	0	0	0	119	0	82	0	7	11	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	3.28	217.44	64.22	0	45	1.00	0	0	0	0	0	45	0	33	0	3	4	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	5.01	221.58	67.32	0	45	1.00	0	0	0	0	0	28	0	20	0	2	2	0	0	0	0	0	0	0	0	0.0
Result of Calculation									0	0	0	0	0	5,211	0	1,588	0	143	463	320	0	0	0	0	0	0	0	271.5

SF = 2.115 > 1.20 ··· OK

Case 6 (1/2) : Upstream Slope | Slip Circle No. 6 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.50	96.85	35.92	0	45	1.00	0	0	0	0	0	17	0	-0	0	-0	2	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.50	103.38	35.92	0	45	1.00	0	0	0	0	0	48	0	1	0	0	4	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.50	109.88	36.15	0	45	1.00	0	0	0	0	0	77	0	4	0	0	7	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.50	116.38	36.60	0	45	1.00	0	0	0	0	0	102	0	9	0	1	9	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	6.50	122.88	37.28	0	45	1.00	0	0	0	0	0	125	0	15	0	1	11	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	6.50	129.38	38.19	0	45	1.00	0	0	0	0	0	144	0	23	0	2	13	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	6.50	135.88	39.33	0	45	1.00	0	0	0	0	0	160	0	31	0	3	14	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	6.50	142.38	40.70	0	45	1.00	0	0	0	0	0	173	0	40	0	4	16	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	6.50	148.85	42.32	2.6	42	0.90	0	0	0	0	0	182	0	49	0	4	16	0	0	0	0	0	0	0	0	17.4
10	1.94	2.16	6.50	155.38	44.18	2.6	42	0.90	0	0	0	0	0	188	0	57	0	5	17	0	0	0	0	0	0	0	0	17.6
11	1.94	2.16	6.50	161.85	45.90	2.6	42	0.90	0	0	0	0	0	190	0	66	0	6	17	0	0	0	0	0	0	0	0	17.8
12	1.94	2.16	6.50	168.38	43.68	2.6	42	0.90	0	0	0	0	0	189	0	73	0	7	17	0	0	0	0	0	0	0	0	18.1
13	1.94	2.16	6.50	174.85	51.34	0	45	1.00	0	0	0	0	0	184	0	79	0	7	17	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	6.50	181.38	54.23	0	45	1.00	0	0	0	0	0	176	0	84	0	8	16	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	6.50	187.85	57.54	0	45	1.00	0	0	0	0	0	164	0	85	0	8	15	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	5.34	193.78	60.79	0	45	1.00	0	0	0	0	0	124	0	71	0	6	11	0	0	0	0	0	0	0	0	0.0
17	2.04	2.16	4.56	198.73	63.71	0	35	0.70	0	0	0	0	0	101	0	62	0	6	9	0	0	0	0	0	0	0	0	0.0
18	2.10	2.16	7.40	204.71	67.53	1	25	0.47	0	0	0	0	0	123	0	82	0	7	11	83	0	0	0	0	0	0	0	8.9
19	1.93	2.16	4.38	210.60	71.61	0	35	0.70	0	0	0	0	0	35	0	28	0	2	3	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.80	213.69	73.88	0	45	1.00	0	0	0	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation									0	0	0	0	0	2,505	0	859	0	77	225	88	0	0	0	0	0	0	0	79.8

SF = 2.116 > 1.20 ··· OK

Case 6 (1/2) : Upstream Slope | Slip Circle No. 7 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	11.99	3.93	0	45	1.00	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.00	15.99	4.31	0	45	1.00	0	0	0	0	0	14	0	2	0	0	1	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.00	19.99	4.87	0	45	1.00	0	0	0	0	0	22	0	3	0	0	2	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.00	23.99	5.48	0	45	1.00	0	0	0	0	0	29	0	5	0	0	3	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.00	27.99	6.20	0	45	1.00	0	0	0	0	0	35	0	7	0	1	3	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.00	31.99	7.03	0	45	1.00	0	0	0	0	0	40	0	9	0	1	4	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.00	35.99	7.93	0	45	1.00	0	0	0	0	0	44	0	11	0	1	4	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.00	39.99	9.06	0	45	1.00	0	0	0	0	0	47	0	13	0	1	4	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.00	43.99	10.26	0	45	1.00	0	0	0	0	0	49	0	16	0	1	4	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.00	47.99	11.53	0	45	1.00	0	0	0	0	0	50	0	17	0	2	5	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.00	51.99	13.03	0	45	1.00	0	0	0	0	0	50	0	19	0	2	5	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.00	55.99	14.62	0	45	1.00	0	0	0	0	0	50	0	21	0	2	4	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.00	59.99	16.34	0	45	1.00	0	0	0	0	0	48	0	21	0	2	4	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.00	63.99	18.21	0	45	1.00	0	0	0	0	0	45	0	22	0	2	4	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.00	67.99	20.23	0	45	1.00	0	0	0	0	0	41	0	21	0	2	4	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.00	71.99	22.41	0	45	1.00	0	0	0	0	0	36	0	20	0	2	3	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.00	75.99	24.75	0	45	1.00	0	0	0	0	0	30	0	18	0	2	3	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.00	79.99	27.26	0	45	1.00	0	0	0	0	0	23	0	15	0	1	2	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.00	83.99	29.95	0	45	1.00	0	0	0	0	0	15	0	10	0	1	1	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.54	88.26	33.07	0	45	1.00	0	0	0	0	0	6	0	5	0	0	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation									0	0	0	0	0	677	0	255	0	23	61	0	0	0	0	0	0	0	0	0.0

SF = 2.070 > 1.20 ··· OK

Case 6 (1/2) : Upstream Slope | Slip Circle No. 8 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.60	21.99	6.20	0	45	1.00	0	0	0	0	0	33	0	-6	0	-1	3	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.60	29.59	4.93	0	45	1.00	0	0	0	0	0	94	0	-13	0	-1	8	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.60	37.19	4.03	0	45	1.00	0	0	0	0	0	150	0	-13	0	-1	14	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	7.60	44.79	3.59	2.6	42	0.90	0	0	0	0	0	201	0	-7	0	-1	18	0	0	0	0	0	0	0	0	19.7
5	1.94	2.16	7.60	52.39	3.52	2.6	42	0.90	0	0	0	0	0	245	0	4	0	0	22	0	0	0	0	0	0	0	0	19.7
6	1.94	2.16	7.60	59.99	3.84	2.6	42	0.90	0	0	0	0	0	283	0	19	0	2	25	0	0	0	0	0	0	0	0	19.7
7	1.94	2.16	7.60	67.59	4.56	2.6	42	0.90	0	0	0	0	0	314	0	38	0	3	28	0	0	0	0	0	0	0	0	19.8
8	1.94	2.16	7.60	75.19	5.68	2.6	42	0.90	0	0	0	0	0	338	0	59	0	5	30	0	0	0	0	0	0	0	0	20.0
9	1.94	2.16	7.60	82.79	7.22	2.6	42	0.90	0	0	0	0	0	354	0	81	0	7	32	0	0	0	0	0	0	0	0	20.2
10	1.94	2.16	7.60	90.39	9.18	2.6	42	0.90	0	0	0	0	0	363	0	104	0	9	33	0	0	0	0	0	0	0	0	20.5
11	1.94	2.16	7.60	97.99	11.58	2.6	42	0.90	0	0	0	0	0	364	0	125	0	11	33	0	0	0	0	0	0	0	0	20.8
12	1.94	2.16	7.60	105.59	14.45	2.6	42	0.90	0	0	0	0	0	357	0	145	0	13	32	0	0	0	0	0	0	0	0	21.3
13	1.94	2.16	7.60	113.19	17.83	2.6	42	0.90	0	0	0	0	0	342	0	163	0	15	31	0	0	0	0	0	0	0	0	21.8
14	1.94	2.16	7.60	120.79	21.74	2.6	42	0.90	0	0	0	0	0	319	0	176	0	16	29	0	0	0	0	0	0	0	0	22.5
15	1.94	2.16	7.60	128.39	26.24	2.6	42	0.90	0	0	0	0	0	283	0	183	0	16	26	0	0	0	0	0	0	0	0	23.3
16	1.94	2.16	7.60	135.99	31.39	2.6	45	1.00	0	0	0	0	0	250	0	181	0	16	22	0	0	0	0	0	0	0	0	24.3
17	1.94	2.16	7.60	143.59	37.29	2.6	45	1.00	0	0	0	0	0	203	0	169	0	15	18	0	0	0	0	0	0	0	0	25.6
18	1.94	2.16	7.60	151.19	44.06	2.6	45	1.00	0	0	0	0	0	150	0	143	0	13	14	0	0	0	0	0	0	0	0	27.2
19	1.94	2.16	7.60	158.79	51.88	2.6	45	1.00	0	0	0	0	0	91	0	101	0	9	8	0	0	0	0	0	0	0	0	29.4
20	1.94	2.16	6.85	165.01	60.54	2.6	45	1.00	0	0	0	0	0	27	0	35	0	3	2	0	0	0	0	0	0	0	0	29.1
Result of Calculation									0	0	0	0	0	4,765	0	1,639	0	152	429	0	0	0	0	0	0	0	0	334.9

SF = 2.187 > 1.20 ··· OK

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne) \cdot \tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 6 (1/2) : Upstream Slope | Slip Circle No. 9 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.90	38.58	13.42	0	45	1.00	0	0	0	0	0	16	0	-1	0	-0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.90	44.48	13.06	0	45	1.00	0	0	0	0	0	46	0	-2	0	-0	4	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.90	50.38	12.95	0	45	1.00	0	0	0	0	0	74	0	0	0	0	7	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.90	56.28	13.09	0	45	1.00	0	0	0	0	0	98	0	4	0	0	9	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.90	62.18	13.49	0	45	1.00	0	0	0	0	0	119	0	11	0	1	11	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	5.90	68.08	14.14	0	45	1.00	0	0	0	0	0	137	0	18	0	2	12	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	5.90	73.98	15.06	0	45	1.00	0	0	0	0	0	151	0	27	0	2	14	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	5.90	79.88	16.24	2.6	42	0.90	0	0	0	0	0	162	0	36	0	3	15	0	0	0	0	0	0	0	0	15.7
9	1.94	2.16	5.90	85.78	17.70	2.6	42	0.90	0	0	0	0	0	169	0	45	0	4	15	0	0	0	0	0	0	0	0	15.8
10	1.94	2.16	5.90	91.68	19.44	2.6	42	0.90	0	0	0	0	0	173	0	55	0	5	16	0	0	0	0	0	0	0	0	16.0
11	1.94	2.16	5.90	97.58	21.47	2.6	42	0.90	0	0	0	0	0	172	0	64	0	6	16	0	0	0	0	0	0	0	0	16.3
12	1.94	2.16	5.90	103.48	23.81	0	45	1.00	0	0	0	0	0	168	0	71	0	6	15	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	5.90	109.38	26.48	0	45	1.00	0	0	0	0	0	161	0	77	0	7	14	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	5.90	115.28	29.49	0	45	1.00	0	0	0	0	0	149	0	81	0	7	13	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	5.90	121.18	32.88	0	45	1.00	0	0	0	0	0	134	0	82	0	7	12	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	5.90	127.08	36.67	0	45	1.00	0	0	0	0	0	115	0	79	0	7	10	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	5.90	132.98	40.92	0	45	1.00	0	0	0	0	0	93	0	71	0	6	8	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	5.90	138.88	45.67	0	45	1.00	0	0	0	0	0	67	0	57	0	5	6	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	5.90	144.78	51.00	0	45	1.00	0	0	0	0	0	39	0	37	0	3	3	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.27	149.66	56.14	0	45	1.00	0	0	0	0	0	9	0	9	0	1	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.124		> 1.20 ··· OK			0	0	0	0	0	2,252	0	822	0	74	203	0	0	0	0	0	0	0	0	639.8

Case 6 (1/2) : Upstream Slope | Slip Circle No. 10 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

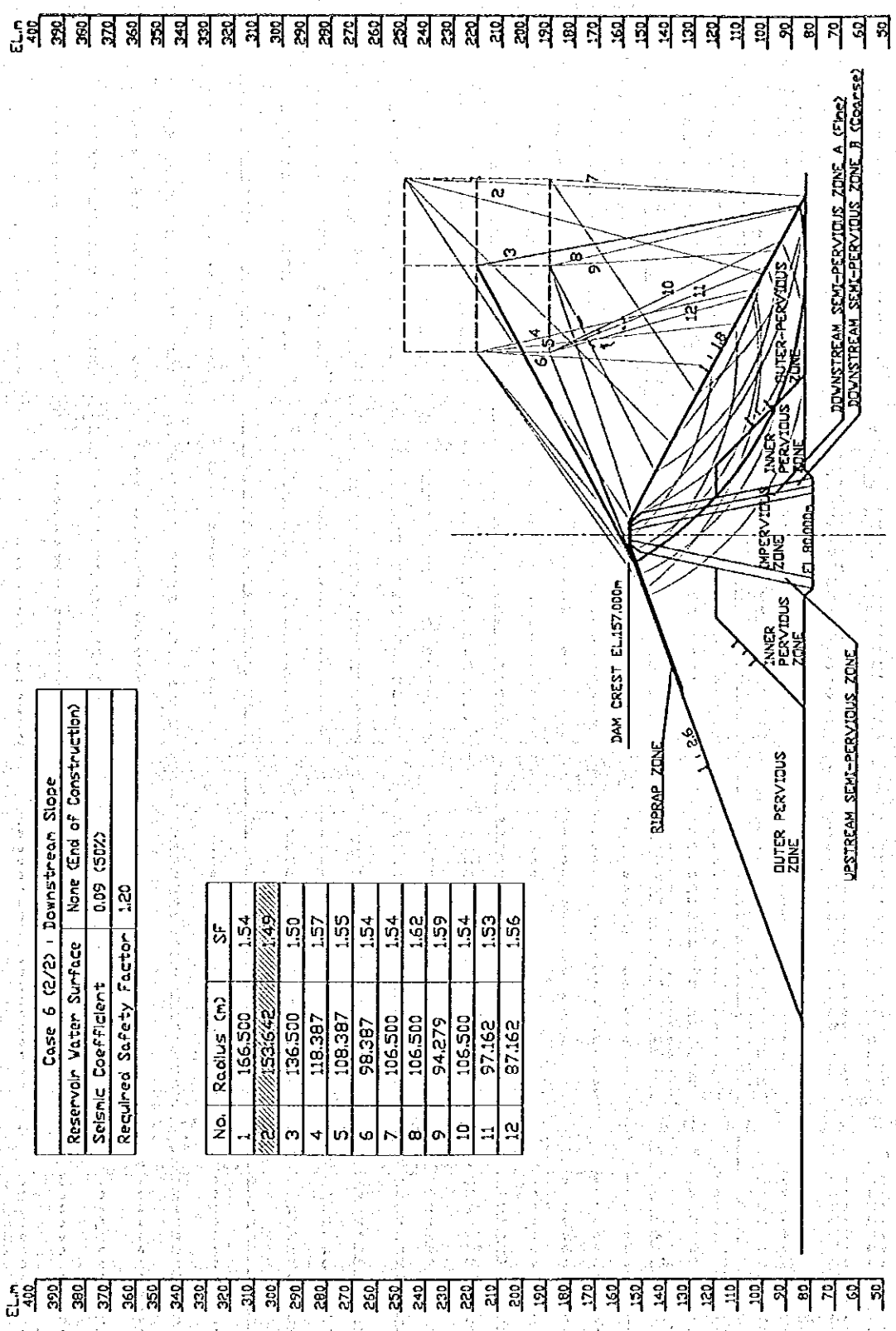
No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	10.00	46.17	13.75	0	45	1.00	0	0	0	0	0	72	0	-29	0	-3	7	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	10.00	56.17	10.21	0	45	1.00	0	0	0	0	0	211	0	-66	0	-6	19	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	10.00	66.17	7.46	2.6	42	0.90	0	0	0	0	0	340	0	-81	0	-7	31	0	0	0	0	0	0	0	0	28.6
4	1.94	2.16	10.00	76.17	5.45	2.6	42	0.90	0	0	0	0	0	456	0	-75	0	-7	41	0	0	0	0	0	0	0	0	26.2
5	1.94	2.16	10.00	86.17	4.15	2.6	42	0.90	0	0	0	0	0	560	0	-53	0	-5	50	0	0	0	0	0	0	0	0	26.0
6	1.94	2.16	10.00	96.17	3.55	11.8	37	0.75	0	0	0	0	0	648	0	-17	0	-2	58	0	0	0	0	0	0	0	0	118.4
7	1.94	2.16	10.00	106.17	3.63	11.8	37	0.75	0	0	0	0	0	721	0	30	0	3	65	0	0	0	0	0	0	0	0	118.5
8	1.94	2.16	10.00	116.17	4.39	11.8	37	0.75	0	0	0	0	0	777	0	86	0	8	70	0	0	0	0	0	0	0	0	119.1
9	1.94	2.16	10.00	126.17	5.85	11.8	37	0.75	0	0	0	0	0	814	0	148	0	13	73	0	0	0	0	0	0	0	0	120.3
10	1.94	2.16	10.00	136.17	8.03	11.8	37	0.75	0	0	0	0	0	834	0	212	0	19	75	0	0	0	0	0	0	0	0	122.2
11	1.94	2.16	10.00	146.17	10.66	11.2	35	0.70	0	0	0	0	0	833	0	277	0	25	75	0	0	0	0	0	0	0	0	117.8
12	1.94	2.16	10.00	156.17	14.69	11.2	35	0.70	0	0	0	0	0	813	0	337	0	30	73	0	0	0	0	0	0	0	0	121.0
13	1.94	2.16	10.00	166.17	19.29	11.2	35	0.70	0	0	0	0	0	772	0	391	0	35	70	0	0	0	0	0	0	0	0	125.3
14	1.94	2.16	10.00	176.17	24.86	2.4	40	0.84	0	0	0	0	0	711	0	433	0	39	64	0	0	0	0	0	0	0	0	28.4
15	1.94	2.16	9.88	186.09	31.47	2.4	40	0.84	0	0	0	0	0	620	0	451	0	41	56	0	0	0	0	0	0	0	0	29.6
16	1.99	2.16	4.79	193.42	37.15	0	35	0.70	0	0	0	0	0	274	0	227	0	20	25	0	0	0	0	0	0	0	0	0.0
17	2.09	2.16	7.39	199.51	42.48	1	25	0.47	0	0	0	0	0	358	0	359	0	32	35	350	0	0	0	0	0	0	0	10.1
18	2.07	2.16	8.24	207.32	50.28	1	25	0.47	0	0	0	0	0	310	0	334	0	30	28	335	0	0	0	0	0	0	0	12.1
19	1.93	2.16	4.81	213.65	57.80	0	35	0.70	0	0	0	0	0	100	0	124	0	11	9	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.50	219.50	65.25	0	45	1.00	0	0	0	0	0	48	0	68	0	6	4	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.061		> 1.20 ··· OK			0	0	0	0	0	0,303	0	3,156	0	284	927	655	0	0	0	0	0	0	0	1,121.8

Case 6 (1/2) : Upstream Slope | Slip Circle No. 11 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	9.50	56.01	18.04	0	45	1.00	0	0	0	0	0	61	0	-20	0	-2	6	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	9.50	65.51	15.24	0	45	1.00	0	0	0	0	0	178	0	-45	0	-4	16	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	9.50	75.01	13.16	2.6	42	0.90	0	0	0	0	0	284	0	-52	0	-5	26	0	0	0	0	0	0	0	0	25.0
4	1.94	2.16	9.50	84.51	11.76	2.6	42	0.90	0	0	0	0	0	380	0	-43	0	-4	34	0	0	0	0	0	0	0	0	24.8
5	1.94	2.16	9.50	94.01	11.03	2.6	42	0.90	0	0	0	0	0	453	0	-20	0	-2	42	0	0	0	0	0	0	0	0	24.6
6	1.94	2.16	9.50	103.51	10.94	2.6	42	0.90	0	0	0	0	0	532	0	13	0	1	48	0	0	0	0	0	0	0	0	24.6
7	1.94	2.16	9.50	113.01	11.51	2.6	42	0.90	0	0	0	0	0	588	0	55	0	5	53	0	0	0	0	0	0	0	0	24.7
8	1.94	2.16	9.50	122.51	12.73	11.8	37	0.75	0	0	0	0	0	625	0	103	0	9	56	0	0	0	0	0	0	0	0	114.0
9	1.94	2.16	9.50	132.01	14.63	11.8	37	0.75	0	0	0	0	0	648	0	153	0	14	58	0	0	0	0	0	0	0	0	115.6
10	1.94	2.16	9.50	141.51	17.23	11.8	37	0.75	0	0	0	0	0	654	0	205	0	18	59	0	0	0	0	0	0	0	0	117.8
11	1.94	2.16	9.50	151.01	20.59	2.4	40	0.84	0	0	0	0	0	643	0	253	0	23	58	0	0	0	0	0	0	0	0	24.8
12	1.94	2.16	9.50	160.51	24.75	2.4	40	0.84	0	0	0	0	0	614	0	297	0	27	55	0	0	0	0	0	0	0	0	25.8
13	1.94	2.16	9.50	170.01	29.80	2.4	40	0.84	0	0	0	0	0	567	0	330	0	30	51	0	0	0	0	0	0	0	0	26.7
14	1.94	2.16	9.50	179.51	35.86	2.4	40	0.84	0	0	0	0	0	502	0	350	0	31	45	0	0	0	0	0	0	0	0	28.1
15	1.94	2.16	9.10	188.81	42.93	2.6	42	0.90	0	0	0	0	0	403	0	334	0	30	36	0	0	0	0	0	0	0	0	30.6
16	2.01	2.16	4.84	195.82	49.17	0	35	0.70	0	0	0	0	0	188	0	179	0	16	17	0	0	0	0	0	0	0	0	0.0
17	2.10	2.16	4.91	200.75	54.08	1	25	0.47	0	0	0	0	0	163	0	171	0	15	15	171	0	0	0	0	0	0	0	7.1
18	2.08	2.16	6.35	205.38	60.37	1	25	0.47	0	0	0	0	0	142	0	168	0	15	13	171	0	0	0	0	0	0	0	9.9
19	1.93	2.16	4.72	211.52	67.40	0	35	0.70	0	0	0	0	0	47	0	63	0	6	4	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.58	215.27	72.14	0	45	1.00	0	0	0	0	0	4	0	7	0	1	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.078		> 1.20 ··· OK			0	0	0	0	0	7,665	0	2,501	0	225	692	342	0	0	0	0	0	0	0	624.0

Case 6 (1/2) : Upstream Slope | Slip Circle No. 12 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.70	69.55	24.44	0	45	1.00	0	0	0	0	0	36	0	-9	0	-1	3	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.70	77.65	22.84	0	45	1.00	0	0	0	0	0	103	0	-18	0	-2	9	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.70	85.36	21.73	0	45	1.00	0	0	0	0	0	165	0	-19	0	-2	15	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	7.70	93.06	21.08	2.6	42	0.90	0	0	0	0	0	219	0	-12	0	-1	20	0	0	0	0	0	0	0	0	20.0
5	1.94	2.16	7.70	100.76	20.90	2.6	42	0.90	0	0	0	0	0	267	0	2	0	0	24	0	0	0	0	0	0	0	0	19.9
6	1.94	2.16	7.70	108.46	21.17	2.6	42	0.90	0	0	0	0	0	306	0	20	0	2	28	0	0	0	0	0	0	0	0	20.0
7	1.94	2.16	7.70	116.16	21.91	2.6	42	0.90	0	0	0	0	0	337	0	43	0	4	30	0	0	0	0	0	0	0	0	20.1
8	1.94	2.16	7.70	123.86	23.12	2.6	42	0.90	0	0	0	0	0	360	0	68	0	6	32	0	0	0	0	0	0	0	0	20.3
9	1.94	2.16	7.70	131.56	24.81	2.6	42	0.90	0	0	0	0	0	374	0	94	0	8	34	0	0	0	0	0	0	0	0	20.6
10	1.94	2.16	7.70	139.26	27.01	2.6	42	0.90	0	0	0	0	0	378	0	121	0	11	34	0	0	0	0	0	0	0	0	20.9
11	1.94	2.16	7.70	146.96	29.24	2.6	42	0.90	0	0	0	0	0	373	0	146	0	13	34	0	0	0	0	0	0	0	0	21.4
12	1.94	2.16	7.70	154.66	33.04	2.6	42	0.90	0	0	0	0	0	358	0	187	0	15	32	0	0	0	0	0	0	0	0	22.0
13	1.94	2.16	7.70	162.36	36.95	2.6	42	0.90	0	0	0	0	0	333	0	184	0	17	30	0	0	0	0	0	0	0	0	22.8
14	1.94	2.16	7.70	170.06	41.56	2.6	42	0.90	0	0	0	0	0	299	0	193	0	17	27	0	0	0	0	0	0	0	0	23.7
15	1.94	2.16	7.70	177.76	46.94	0	45	1.00	0	0	0	0	0	256	0	193	0	17	23	0	0	0	0	0	0	0	0	0.0
16	2.01	2.16	7.70	185.46	53.23	0	45	1.00	0	0	0	0	0	210	0	185	0	17	19	0	0	0	0	0	0	0	0	0.0
17	2.10	2.16	7.62	193.11	60.57	0	45	1.00	0	0	0	0	0	152	0	158	0	14	14	0	0	0	0	0	0	0	0	0.0
18	2.11	2.16	5.28	199.58	67.81	0	35	0.70	0	0	0	0	0	83	0	77	0	7	6	0	0	0	0	0	0	0	0	0.0
19	2.05	2.16	3.68	204.03	73.55	1	25	0.47	0	0	0	0	0	15	0	21	0	2	1	22	0	0	0	0	0	0	0	6.2
20	1.94	2.16	0.62	206.17	76.55	0	35	0.70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 2.127		> 1.20 ··· OK			0	0	0	0	0	4,605	0	1,814	0	145	414	22	0	0	0	0	0	0	0	237.6



Case 6 (2/2) : Downstream Slope	
Reservoir Water Surface	None (End of Construction)
Seismic Coefficient	0.09 (50%)
Required Safety Factor	1.20

No.	Radius (m)	SF
1	166.500	1.54
2	153.642	1.49
3	136.500	1.50
4	118.387	1.57
5	108.387	1.55
6	98.387	1.54
7	106.500	1.54
8	106.500	1.62
9	94.279	1.59
10	106.500	1.54
11	97.162	1.53
12	87.162	1.56

Case 6 (2/2) : Downstream Slope

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - Ne)\tan\phi]}{\Sigma\,(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 6 (2/2) : Downstream Slope | Slip Circle No. 1 | Reservoir Water Surface: None (End of Construction) | Seismic Coefficient: 0.09 (50%) | Required Safety Factor: 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	Include the water surface N solid	Include the water surface N water	Include the water surface T solid	Include the water surface T water	Ne	Te	U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	Ne	Te	U	CL
1	1.94	2.16	6.60	9.83	3.76	0	45	1.00	0	0	0	0	0	21	0	1	0	0	2	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.60	16.43	4.31	0	45	1.00	0	0	0	0	0	61	0	6	0	1	6	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.60	23.03	5.10	0	45	1.00	0	0	0	0	0	98	0	14	0	1	9	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.60	29.63	6.16	0	45	1.00	0	0	0	0	0	130	0	23	0	2	12	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	6.60	36.23	7.49	0	45	1.00	0	0	0	0	0	158	0	35	0	3	14	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	6.60	42.83	9.10	0	45	1.00	0	0	0	0	0	182	0	48	0	4	16	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	6.60	49.43	11.01	2.6	42	0.90	0	0	0	0	0	201	0	63	0	6	18	0	0	0	0	0	0	0	0	17.5
8	1.94	2.16	6.60	56.03	13.21	2.6	42	0.90	0	0	0	0	0	216	0	77	0	7	19	0	0	0	0	0	0	0	0	18.2
9	1.94	2.16	6.60	62.63	15.73	2.6	42	0.90	0	0	0	0	0	226	0	92	0	8	20	0	0	0	0	0	0	0	0	18.4
10	1.94	2.16	6.60	69.23	18.58	2.6	42	0.90	0	0	0	0	0	232	0	106	0	10	21	0	0	0	0	0	0	0	0	18.8
11	1.94	2.16	6.60	75.83	21.77	2.6	42	0.90	0	0	0	0	0	232	0	119	0	11	21	0	0	0	0	0	0	0	0	19.2
12	1.94	2.16	6.60	82.43	25.34	2.6	42	0.90	0	0	0	0	0	228	0	130	0	12	20	0	0	0	0	0	0	0	0	19.7
13	1.94	2.16	6.60	89.03	29.30	2.6	42	0.90	0	0	0	0	0	218	0	138	0	12	20	0	0	0	0	0	0	0	0	20.2
14	1.94	2.16	6.60	95.63	33.70	0	45	1.00	0	0	0	0	0	204	0	143	0	13	18	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	6.60	102.23	38.58	0	45	1.00	0	0	0	0	0	184	0	143	0	13	17	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	6.60	108.83	43.99	0	45	1.00	0	0	0	0	0	160	0	139	0	12	14	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.60	115.43	50.01	0	45	1.00	0	0	0	0	0	130	0	125	0	11	12	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.60	122.03	56.73	0	45	1.00	0	0	0	0	0	95	0	104	0	9	9	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.60	128.63	64.28	0	45	1.00	0	0	0	0	0	58	0	71	0	6	5	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	5.88	134.87	72.37	0	45	1.00	0	0	0	0	0	17	0	24	0	2	2	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.543		> 1.20 ··· OK			0	0	0	0	0	3,052	0	1,600	0	144	275	0	0	0	0	0	0	0	0	132.4

Case 6 (2/2) : Downstream Slope | Slip Circle No. 2 | Reservoir Water Surface: None (End of Construction) | Seismic Coefficient: 0.09 (50%) | Required Safety Factor: 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	Include the water surface N solid	Include the water surface N water	Include the water surface T solid	Include the water surface T water	Ne	Te	U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	Ne	Te	U	CL
1	1.94	2.16	3.50	39.82	21.61	0	45	1.00	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.50	43.32	22.55	0	45	1.00	0	0	0	0	0	10	0	3	0	0	1	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.50	46.82	23.66	0	45	1.00	0	0	0	0	0	15	0	5	0	0	1	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.50	50.32	24.83	0	45	1.00	0	0	0	0	0	20	0	7	0	1	2	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.50	53.82	26.09	0	45	1.00	0	0	0	0	0	24	0	9	0	1	2	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.50	57.32	27.45	0	45	1.00	0	0	0	0	0	28	0	11	0	1	2	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.50	60.82	28.91	0	45	1.00	0	0	0	0	0	30	0	13	0	1	3	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.50	64.32	30.47	0	45	1.00	0	0	0	0	0	32	0	15	0	1	3	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.50	67.82	32.14	0	45	1.00	0	0	0	0	0	34	0	17	0	1	3	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.50	71.32	33.91	0	45	1.00	0	0	0	0	0	34	0	18	0	2	3	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.50	74.82	35.81	0	45	1.00	0	0	0	0	0	34	0	19	0	2	3	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.50	78.32	37.82	0	45	1.00	0	0	0	0	0	33	0	20	0	2	3	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.50	81.82	39.96	0	45	1.00	0	0	0	0	0	32	0	20	0	2	3	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.50	85.32	42.22	0	45	1.00	0	0	0	0	0	29	0	20	0	2	3	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.50	88.82	44.63	0	45	1.00	0	0	0	0	0	26	0	18	0	2	2	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	3.50	92.32	47.19	0	45	1.00	0	0	0	0	0	22	0	17	0	2	2	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.50	95.82	49.90	0	45	1.00	0	0	0	0	0	18	0	14	0	1	2	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	3.50	99.32	52.77	0	45	1.00	0	0	0	0	0	12	0	11	0	1	1	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	3.50	102.82	55.83	0	45	1.00	0	0	0	0	0	7	0	6	0	1	1	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.70	105.42	58.23	0	45	1.00	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.455		> 1.20 ··· OK			0	0	0	0	0	445	0	243	0	22	40	0	0	0	0	0	0	0	0	0.0

Case 6 (2/2) : Downstream Slope | Slip Circle No. 3 | Reservoir Water Surface: None (End of Construction) | Seismic Coefficient: 0.09 (50%) | Required Safety Factor: 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	Include the water surface N solid	Include the water surface N water	Include the water surface T solid	Include the water surface T water	Ne	Te	U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	Ne	Te	U	CL
1	1.94	2.16	8.05	14.37	5.07	0	45	1.00	0	0	0	0	0	45	0	-7	0	-1	4	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	8.05	22.42	4.08	0	45	1.00	0	0	0	0	0	130	0	-12	0	-1	12	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	8.05	30.47	3.58	0	45	1.00	0	0	0	0	0	208	0	-7	0	-1	19	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	8.05	38.52	3.55	2.6	42	0.90	0	0	0	0	0	279	0	7	0	1	25	0	0	0	0	0	0	0	0	20.9
5	1.94	2.16	8.05	46.57	3.99	2.6	42	0.90	0	0	0	0	0	340	0	29	0	3	31	0	0	0	0	0	0	0	0	20.9
6	1.94	2.16	8.05	54.62	4.92	2.6	42	0.90	0	0	0	0	0	393	0	57	0	5	35	0	0	0	0	0	0	0	0	21.1
7	1.94	2.16	8.05	62.67	6.33	2.6	42	0.90	0	0	0	0	0	436	0	90	0	8	39	0	0	0	0	0	0	0	0	21.3
8	1.94	2.16	8.05	70.72	8.26	2.6	42	0.90	0	0	0	0	0	468	0	127	0	11	42	0	0	0	0	0	0	0	0	21.6
9	1.94	2.16	8.05	78.77	10.71	2.6	42	0.90	0	0	0	0	0	489	0	166	0	15	44	0	0	0	0	0	0	0	0	22.0
10	1.94	2.16	8.05	86.82	13.72	2.6	42	0.90	0	0	0	0	0	499	0	205	0	18	45	0	0	0	0	0	0	0	0	22.5
11	1.94	2.16	8.05	94.87	17.33	2.4	40	0.84	0	0	0	0	0	498	0	242	0	22	45	0	0	0	0	0	0	0	0	21.8
12	1.94	2.16	8.05	102.92	21.60	2.4	40	0.84	0	0	0	0	0	482	0	278	0	25	43	0	0	0	0	0	0	0	0	22.6
13	1.94	2.16	8.05	110.97	26.59	2.4	40	0.84	0	0	0	0	0	455	0	305	0	27	41	0	0	0	0	0	0	0	0	23.5
14	1.94	2.16	8.05	119.02	32.42	2.4	40	0.84	0	0	0	0	0	415	0	324	0	29	37	0	0	0	0	0	0	0	0	24.8
15	1.94	2.16	5.45	125.77	38.05	2.4	40	0.84	0	0	0	0	0	251	0	224	0	20	23	0	0	0	0	0	0	0	0	17.7
16	1.93	2.16	7.53	132.25	44.22	0	35	0.70	0	0	0	0	0	298	0	303	0	27	22	0	0	0	0	0	0	0	0	0.0
17	2.00	2.16	5.58	138.81	51.37	1	25	0.47	0	0	0	0	0	186	0	218	0	20	17	220	0	0	0	0	0	0	0	8.6
18	2.11	2.16	6.50	144.85	58.98	1	25	0.47	0	0	0	0	0	147	0	199	0	18	13	208	0	0	0	0	0	0	0	11.0
19	2.05	2.16	3.05	149.63	65.89	0	35	0.70	0	0	0	0	0	36	0	56	0	5	3	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	3.66	152.99	71.36	0	45	1.00	0	0	0	0	0	14	0	24	0	2	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.493		> 1.20 ··· OK			0	0	0	0	0	8,067	0	2,826	0	254	548	429	0	0	0	0	0	0	0	280.2

Case 6 (2/2) : Downstream Slope | Slip Circle No. 4 | Reservoir Water Surface: None (End of Construction) | Seismic Coefficient: 0.09 (50%) | Required Safety Factor: 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	above the water surface T	above the water surface Ne	above the water surface Te	above the water surface U	Include the water surface N solid	Include the water surface N water	Include the water surface T solid	Include the water surface T water	Ne	Te	U	under the water surface N solid	under the water surface N water	under the water surface T solid	under the water surface T water	Ne	Te	U	CL
1	1.94	2.16	6.15	47.15	23.84	0	45	1.00	0	0	0	0	0	28	0	-5	0	-0	2	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.15	53.30	22.80	0	45	1.00	0	0	0	0	0	80	0	-11	0	-1	7	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.15	59.45	22.08	0	45	1.00	0	0	0	0	0	130	0	-12	0	-1	12	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.15	65.60	21.66	2.6	42	0.90	0	0	0	0	0	176	0	-7	0	-1	16	0	0	0	0	0	0	0	0	15.9
5	1.94	2.16	6.15	71.75	21.63	2.6	42	0.90	0	0	0	0	0	218	0	3	0	0	20	0	0	0	0	0	0	0	0	15.9
6	1.94	2.16	6.15	77.90	21.88	2.6	42	0.90	0	0	0	0	0	255	0	17	0	2	23	0	0	0	0	0	0	0	0	16.0
7	1.94	2.16	6.15	84.05	22.45	2.6	42	0.90	0	0	0	0	0	287	0	34	0	3	26	0	0	0	0	0	0	0	0	16.0
8	1.94	2.16	6.15	90.20	23.35	2.6	42	0.90	0	0	0	0	0	315	0	54	0	5	28	0	0	0	0	0	0	0	0	16.2
9	1.94	2.16	6.15	96.35	24.58	2.6	42	0.90	0	0	0	0	0	337	0	73	0	7	30	0	0	0	0	0	0	0	0	16.3
10	1.94	2.16	6.15	102.50	26.16	2.4	40	0.84	0	0	0	0	0	353	0	101	0	8	32	0	0	0	0	0	0	0	0	15.5
11	1.94	2.16	6.15	108.65	28.10	2.4	40	0.84	0	0	0	0	0	364	0	126	0	11	33	0	0	0	0	0	0	0	0	15.8
12	1.94	2.16	6.15	114.80	30.42	2.4	40	0.84	0	0	0	0	0	368	0	151	0	14	33	0	0	0	0	0	0	0	0	16.1
13	1.94	2.16	6.15	120.95	33.14	2.4	40	0.84	0	0	0	0	0	367	0	175	0	16	33	0	0	0	0	0	0	0	0	16.6
14	1.94	2.16	3.68	125.87	35.62	2.4	40	0.84	0	0	0	0	0	216	0	118	0	10	19	0	0	0	0	0	0	0	0	10.1
15	1.94	2.16	6.82	131.12	38.61	0	35	0.70	0	0	0	0	0	388	0	234	0	21	35	0	0	0	0	0	0	0	0	0.0
16	2.01	2.16	7.07	138.06	43.13	1	25	0.47	0	0	0	0	0	390	0	274	0	25	35	292	0	0	0	0	0	0	0	8.6
17	2.10	2.16	8.63	145.91	49.16	1	25	0.47	0	0	0	0	0	367	0	324	0	29	35	329	0	0	0	0	0	0	0	11.2
18	2.02	2.16	3.36	151.91	54.52	0	35	0.70	0	0	0	0	0	104	0	99	0	9	9	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.09	156.63	59.31	0	45	1.00	0	0	0	0	0	116	0	126	0	11	11	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.09	162.72	66.39	0	45	1.00	0	0	0	0	0	38	0	48	0	4	3	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.566		> 1.20 ··· OK			0	0	0	0	0	4,918	0	1,924	0	173	443	620	0	0	0	0	0	0	0	190.5

$$SF = \frac{\Sigma\,[C \cdot L + (N - U - Ne) \cdot \tan\phi]}{\Sigma\,(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x, y : X or Y Coordinate of Center of Slip Circle (m)

Case 6 (2/2) : Downstream Slope | Slip Circle No. 5 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.00	60.59	32.02	0	45	1.00	0	0	0	0	0	16	0	-1	0	-0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.00	65.59	31.70	0	45	1.00	0	0	0	0	0	45	0	-2	0	-0	4	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.00	70.59	31.61	0	45	1.00	0	0	0	0	0	74	0	0	0	0	7	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.00	75.59	31.76	0	45	1.00	0	0	0	0	0	99	0	5	0	0	9	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	5.00	80.59	32.13	0	45	1.00	0	0	0	0	0	122	0	12	0	1	11	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	5.00	85.59	32.74	2.6	42	0.90	0	0	0	0	0	142	0	21	0	2	13	0	0	0	0	0	0	0	0	13.1
7	1.94	2.16	5.00	90.59	33.59	2.6	42	0.90	0	0	0	0	0	159	0	31	0	3	14	0	0	0	0	0	0	0	0	13.2
8	1.94	2.16	5.00	95.59	34.68	2.6	42	0.90	0	0	0	0	0	174	0	42	0	4	16	0	0	0	0	0	0	0	0	13.3
9	1.94	2.16	5.00	100.59	35.02	2.6	42	0.90	0	0	0	0	0	185	0	54	0	5	17	0	0	0	0	0	0	0	0	13.5
10	1.94	2.16	5.00	105.59	37.62	2.6	42	0.90	0	0	0	0	0	193	0	67	0	6	17	0	0	0	0	0	0	0	0	13.7
11	1.94	2.16	5.00	110.59	39.50	2.6	42	0.90	0	0	0	0	0	197	0	80	0	7	18	0	0	0	0	0	0	0	0	14.0
12	1.94	2.16	5.00	115.59	41.87	2.6	42	0.90	0	0	0	0	0	195	0	92	0	8	18	0	0	0	0	0	0	0	0	14.3
13	1.94	2.16	5.00	120.59	44.14	2.6	42	0.90	0	0	0	0	0	188	0	103	0	9	18	0	0	0	0	0	0	0	0	14.6
14	1.94	2.16	5.00	125.59	45.95	2.6	42	0.90	0	0	0	0	0	190	0	114	0	10	17	0	0	0	0	0	0	0	0	15.1
15	1.94	2.16	2.29	129.23	49.23	2.6	42	0.90	0	0	0	0	0	84	0	55	0	5	8	0	0	0	0	0	0	0	0	7.1
16	1.93	2.16	7.03	133.89	52.45	0	35	0.70	0	0	0	0	0	240	0	175	0	16	22	0	0	0	0	0	0	0	0	0.0
17	2.00	2.16	4.20	139.50	56.83	1	25	0.47	0	0	0	0	0	130	0	109	0	10	12	110	0	0	0	0	0	0	0	5.5
18	2.11	2.16	6.29	144.75	61.51	1	25	0.47	0	0	0	0	0	149	0	142	0	13	13	142	0	0	0	0	0	0	0	8.7
19	2.05	2.16	3.29	149.54	66.37	0	35	0.70	0	0	0	0	0	47	0	51	0	5	4	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.89	153.63	71.05	0	45	1.00	0	0	0	0	0	24	0	29	0	3	2	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.555				> 1.20 ··· OK	0	0	0	0	0	2,656	0	1,179	0	106	240	252	0	0	0	0	0	0	0	148.0

Case 6 (2/2) : Downstream Slope | Slip Circle No. 6 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	3.60	76.95	41.83	0	45	1.00	0	0	0	0	0	6	0	0	0	0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	3.60	80.55	42.18	0	45	1.00	0	0	0	0	0	18	0	2	0	0	2	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	3.60	84.15	42.64	0	45	1.00	0	0	0	0	0	28	0	4	0	0	3	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	3.60	87.75	43.23	0	45	1.00	0	0	0	0	0	38	0	7	0	1	3	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	3.60	91.35	43.95	0	45	1.00	0	0	0	0	0	46	0	10	0	1	4	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	3.60	94.95	44.83	0	45	1.00	0	0	0	0	0	54	0	14	0	1	5	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	3.60	98.55	45.85	0	45	1.00	0	0	0	0	0	60	0	18	0	2	5	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	3.60	102.15	47.01	0	45	1.00	0	0	0	0	0	64	0	22	0	2	6	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	3.60	105.75	48.34	0	45	1.00	0	0	0	0	0	68	0	26	0	2	6	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	3.60	109.35	49.82	0	45	1.00	0	0	0	0	0	70	0	31	0	3	6	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	3.60	112.95	51.48	0	45	1.00	0	0	0	0	0	71	0	34	0	3	6	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	3.60	116.55	53.32	0	45	1.00	0	0	0	0	0	70	0	38	0	3	6	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	3.60	120.15	55.35	0	45	1.00	0	0	0	0	0	68	0	41	0	4	6	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	3.60	123.75	57.59	0	45	1.00	0	0	0	0	0	65	0	43	0	4	6	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	3.60	127.35	60.05	0	45	1.00	0	0	0	0	0	61	0	44	0	4	5	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.17	131.23	62.99	0	45	1.00	0	0	0	0	0	83	0	50	0	4	6	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	3.64	135.14	66.27	0	35	0.70	0	0	0	0	0	47	0	41	0	4	4	0	0	0	0	0	0	0	0	0.0
18	1.93	2.16	3.73	138.83	69.70	0	35	0.70	0	0	0	0	0	33	0	37	0	3	3	0	0	0	0	0	0	0	0	0.0
19	2.08	2.16	4.12	142.75	73.77	1	25	0.47	0	0	0	0	0	19	0	20	0	2	2	21	0	0	0	0	0	0	0	6.1
20	2.11	2.16	0.76	145.19	78.55	0	35	0.70	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.538				> 1.20 ··· OK	0	0	0	0	0	953	0	483	0	43	89	21	0	0	0	0	0	0	0	6.1

Case 6 (2/2) : Downstream Slope | Slip Circle No. 7 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.00	8.68	3.85	0	45	1.00	0	0	0	0	0	7	0	1	0	0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.00	12.68	4.26	0	45	1.00	0	0	0	0	0	21	0	3	0	0	2	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.00	16.68	4.81	0	45	1.00	0	0	0	0	0	34	0	5	0	0	3	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.00	20.68	5.53	0	45	1.00	0	0	0	0	0	45	0	9	0	1	4	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.00	24.68	6.40	0	45	1.00	0	0	0	0	0	55	0	13	0	1	5	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.00	28.68	7.43	0	45	1.00	0	0	0	0	0	64	0	19	0	2	6	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.00	32.68	8.64	0	45	1.00	0	0	0	0	0	70	0	23	0	2	6	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.00	36.68	10.01	0	45	1.00	0	0	0	0	0	75	0	28	0	2	7	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.00	40.68	11.57	0	45	1.00	0	0	0	0	0	79	0	33	0	3	7	0	0	0	0	0	0	0	0	0.0
10	1.94	2.16	4.00	44.68	13.32	0	45	1.00	0	0	0	0	0	81	0	37	0	3	7	0	0	0	0	0	0	0	0	0.0
11	1.94	2.16	4.00	48.68	15.28	0	45	1.00	0	0	0	0	0	81	0	42	0	4	7	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.00	52.68	17.44	0	45	1.00	0	0	0	0	0	80	0	45	0	4	7	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.00	56.68	19.83	0	45	1.00	0	0	0	0	0	77	0	48	0	4	7	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.00	60.68	22.48	0	45	1.00	0	0	0	0	0	72	0	50	0	4	6	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.00	64.68	25.39	0	45	1.00	0	0	0	0	0	65	0	50	0	4	6	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.00	68.68	28.60	0	45	1.00	0	0	0	0	0	57	0	48	0	4	5	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.00	72.68	32.15	0	45	1.00	0	0	0	0	0	47	0	44	0	4	4	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.00	76.68	35.09	0	45	1.00	0	0	0	0	0	35	0	35	0	3	3	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.00	80.68	40.48	0	45	1.00	0	0	0	0	0	22	0	28	0	2	2	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.04	84.70	45.44	0	45	1.00	0	0	0	0	0	8	0	10	0	1	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.543				> 1.20 ··· OK	0	0	0	0	0	1,075	0	567	0	51	97	0	0	0	0	0	0	0	0	0.0

Case 6 (2/2) : Downstream Slope | Slip Circle No. 8 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.30	14.31	5.53	0	45	1.00	0	0	0	0	0	29	0	-6	0	-1	3	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.30	20.61	4.45	0	45	1.00	0	0	0	0	0	84	0	-12	0	-1	8	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.30	26.91	3.81	0	45	1.00	0	0	0	0	0	136	0	-10	0	-1	12	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	6.30	33.21	3.51	2.6	42	0.90	0	0	0	0	0	183	0	-3	0	-0	16	0	0	0	0	0	0	0	0	16.3
5	1.94	2.16	6.30	39.51	3.60	2.6	42	0.90	0	0	0	0	0	224	0	10	0	1	20	0	0	0	0	0	0	0	0	16.3
6	1.94	2.16	6.30	45.81	4.05	2.6	42	0.90	0	0	0	0	0	250	0	27	0	2	23	0	0	0	0	0	0	0	0	16.4
7	1.94	2.16	6.30	52.11	4.88	2.6	42	0.90	0	0	0	0	0	290	0	47	0	4	26	0	0	0	0	0	0	0	0	16.5
8	1.94	2.16	6.30	58.41	6.11	2.6	42	0.90	0	0	0	0	0	314	0	71	0	6	28	0	0	0	0	0	0	0	0	16.7
9	1.94	2.16	6.30	64.71	7.73	2.6	42	0.90	0	0	0	0	0	331	0	95	0	9	30	0	0	0	0	0	0	0	0	17.0
10	1.94	2.16	6.30	71.01	9.77	2.6	42	0.90	0	0	0	0	0	341	0	123	0	11	31	0	0	0	0	0	0	0	0	17.3
11	1.94	2.16	6.30	77.31	12.27	2.6	42	0.90	0	0	0	0	0	344	0	149	0	13	31	0	0	0	0	0	0	0	0	17.8
12	1.94	2.16	6.30	83.61	15.24	2.6	42	0.90	0	0	0	0	0	339	0	174	0	16	31	0	0	0	0	0	0	0	0	18.3
13	1.94	2.16	6.30	89.91	18.75	2.6	42	0.90	0	0	0	0	0	327	0	197	0	18	29	0	0	0	0	0	0	0	0	19.0
14	1.94	2.16	6.30	95.21	22.85	2.6	42	0.90	0	0	0	0	0	306	0	215	0	19	28	0	0	0	0	0	0	0	0	19.9
15	1.94	2.16	6.30	102.51	27.83	2.6	42	0.90	0	0	0	0	0	277	0	227	0	20	25	0	0	0	0	0	0	0	0	21.1
16	1.94	2.16	6.30	108.81	33.23	0	43	0.93	0	0	0	0	0	240	0	231	0	21	22	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	6.30	115.11	33.83	0	43	0.93	0	0	0	0	0	194	0	222	0	20	17	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	6.30	121.41	47.75	0	45	1.00	0	0	0	0	0	141	0	195	0	18	13	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.30	127.71	57.59	0	45	1.00	0	0	0	0	0	80	0	142	0	13	7	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.88	133.29	69.00	0	45	1.00	0	0	0	0	0	18	0	44	0	4	2	0	0	0	0	0	0	0	0	0.0
Result of Calculation				SF = 1.620				> 1.20 ··· OK	0	0	0	0	0	4,450	0	2,138	0	192	401	0	0	0	0	0	0	0	0	212.8

$$SF = \frac{\Sigma\{C \cdot L + (N - U - Ne)\tan\phi\}}{\Sigma(T + Te)}$$

SF : Safety Factor

N : Normal Force Acting on Slip Circle (tf/m)
T : Tangential Force Acting on Slip Circle (tf/m)
Ne : Normal Force of Earthquake Load Acting on Slip Circle (tf/m)
Te : Tangential Force of Earthquake Load Acting on Slip Circle (tf/m)
U : Pore Pressure acting on Slip Circle (tf/m)
ϕ : Effective Internal Friction Angle on Slip Circle (°)

C : Effective Cohesion on Slip Circle (tf/m2)
L : Arc Length of Slip Circle (m)
γt : Wet Density (tf/m3)
γsat : Saturated Density of Material (tf/m3)
b : Width of Slip Circle (m)
x , y : X or Y Coordinate of Center of Slip Circle (m)

Case 6 (2/2) : Downstream Slope | Slip Circle No. 9 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	4.50	30.93	15.81	0	45	1.00	0	0	0	0	0	12	0	-1	0	-0	1	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	4.50	35.43	15.72	0	45	1.00	0	0	0	0	0	35	0	0	0	0	3	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	4.50	39.93	15.65	0	45	1.00	0	0	0	0	0	55	0	3	0	0	5	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	4.50	44.43	15.19	0	45	1.00	0	0	0	0	0	74	0	7	0	1	7	0	0	0	0	0	0	0	0	0.0
5	1.94	2.16	4.50	48.93	16.78	0	45	1.00	0	0	0	0	0	90	0	13	0	1	8	0	0	0	0	0	0	0	0	0.0
6	1.94	2.16	4.50	53.43	17.54	0	45	1.00	0	0	0	0	0	104	0	21	0	2	9	0	0	0	0	0	0	0	0	0.0
7	1.94	2.16	4.50	57.93	18.55	0	45	1.00	0	0	0	0	0	115	0	29	0	3	10	0	0	0	0	0	0	0	0	0.0
8	1.94	2.16	4.50	62.43	19.80	0	45	1.00	0	0	0	0	0	124	0	38	0	3	11	0	0	0	0	0	0	0	0	0.0
9	1.94	2.16	4.50	66.93	21.25	2.6	42	0.90	0	0	0	0	0	131	0	47	0	4	12	0	0	0	0	0	0	0	0	12.4
10	1.94	2.16	4.50	71.43	23.04	2.6	42	0.90	0	0	0	0	0	134	0	56	0	5	12	0	0	0	0	0	0	0	0	12.6
11	1.94	2.16	4.50	75.93	25.07	0	45	1.00	0	0	0	0	0	135	0	65	0	6	12	0	0	0	0	0	0	0	0	0.0
12	1.94	2.16	4.50	80.43	27.39	0	45	1.00	0	0	0	0	0	132	0	73	0	7	12	0	0	0	0	0	0	0	0	0.0
13	1.94	2.16	4.50	84.93	30.03	0	45	1.00	0	0	0	0	0	127	0	79	0	7	11	0	0	0	0	0	0	0	0	0.0
14	1.94	2.16	4.50	89.43	33.02	0	45	1.00	0	0	0	0	0	119	0	84	0	8	11	0	0	0	0	0	0	0	0	0.0
15	1.94	2.16	4.50	93.93	36.41	0	45	1.00	0	0	0	0	0	108	0	85	0	8	10	0	0	0	0	0	0	0	0	0.0
16	1.94	2.16	4.50	98.43	40.25	0	45	1.00	0	0	0	0	0	93	0	85	0	8	8	0	0	0	0	0	0	0	0	0.0
17	1.94	2.16	4.50	102.93	44.62	0	45	1.00	0	0	0	0	0	76	0	79	0	7	7	0	0	0	0	0	0	0	0	0.0
18	1.94	2.16	4.50	107.43	49.65	0	45	1.00	0	0	0	0	0	56	0	67	0	6	5	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	4.50	111.93	55.50	0	45	1.00	0	0	0	0	0	34	0	49	0	4	3	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	4.03	116.19	62.08	0	45	1.00	0	0	0	0	0	10	0	17	0	1	1	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.594			> 1.20 ··· OK			0	0	0	0	0	1,763	0	855	0	81	159	0	0	0	0	0	0	0	0	25.0

Case 6 (2/2) : Downstream Slope | Slip Circle No. 10 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	7.85	28.52	11.91	0	45	1.00	0	0	0	0	0	55	0	-23	0	-2	5	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	7.85	36.37	8.95	0	45	1.00	0	0	0	0	0	163	0	-54	0	-5	15	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	7.85	44.22	6.67	2.6	42	0.90	0	0	0	0	0	264	0	-66	0	-6	24	0	0	0	0	0	0	0	0	21.0
4	1.94	2.16	7.85	52.07	5.02	2.6	42	0.90	0	0	0	0	0	359	0	-61	0	-6	32	0	0	0	0	0	0	0	0	20.6
5	1.94	2.16	7.85	59.92	3.58	2.6	42	0.90	0	0	0	0	0	444	0	-42	0	-4	40	0	0	0	0	0	0	0	0	20.4
6	1.94	2.16	7.85	67.77	3.52	11.8	37	0.75	0	0	0	0	0	520	0	-11	0	-1	47	0	0	0	0	0	0	0	0	53.0
7	1.94	2.16	7.85	75.62	3.65	11.8	37	0.75	0	0	0	0	0	583	0	31	0	3	53	0	0	0	0	0	0	0	0	93.1
8	1.94	2.16	7.85	83.47	4.36	11.2	35	0.70	0	0	0	0	0	635	0	81	0	7	57	0	0	0	0	0	0	0	0	87.5
9	1.94	2.16	7.85	91.32	5.65	11.2	35	0.70	0	0	0	0	0	673	0	137	0	12	61	0	0	0	0	0	0	0	0	89.6
10	1.94	2.16	7.85	99.17	7.57	11.2	35	0.70	0	0	0	0	0	696	0	158	0	18	63	0	0	0	0	0	0	0	0	91.3
11	1.94	2.16	7.85	107.02	10.14	11.2	35	0.70	0	0	0	0	0	704	0	261	0	23	63	0	0	0	0	0	0	0	0	93.6
12	1.94	2.16	7.85	114.87	13.41	11.2	35	0.70	0	0	0	0	0	695	0	323	0	29	63	0	0	0	0	0	0	0	0	95.8
13	1.94	2.16	5.23	121.41	16.73	11.2	35	0.70	0	0	0	0	0	451	0	245	0	22	41	0	0	0	0	0	0	0	0	66.8
14	1.94	2.16	6.88	127.47	20.33	0	35	0.70	0	0	0	0	0	568	0	364	0	33	51	0	0	0	0	0	0	0	0	0.0
15	1.88	2.19	7.15	134.48	25.24	1	25	0.47	0	0	0	0	0	557	0	424	0	38	50	440	0	0	0	0	0	0	0	9.0
16	2.09	2.19	7.15	141.63	31.19	1	25	0.47	0	0	0	0	0	507	0	450	0	41	46	463	0	0	0	0	0	0	0	9.7
17	2.09	2.22	7.12	148.77	38.32	1	25	0.47	0	0	0	0	0	387	0	425	0	38	35	427	0	0	0	0	0	0	0	10.0
18	2.00	2.21	3.18	153.92	44.43	0	35	0.70	0	0	0	0	0	120	0	153	0	14	11	0	0	0	0	0	0	0	0	0.0
19	1.94	2.16	6.45	158.75	51.13	0	45	1.00	0	0	0	0	0	152	0	230	0	21	14	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.47	165.21	62.28	0	45	1.00	0	0	0	0	0	47	0	93	0	8	4	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.540			> 1.20 ··· OK			0	0	0	0	0	8,580	0	3,172	0	285	772	1,330	0	0	0	0	0	0	0	803.7

Case 6 (2/2) : Downstream Slope | Slip Circle No. 11 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	6.80	38.31	18.15	0	45	1.00	0	0	0	0	0	39	0	-13	0	-1	4	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	6.80	45.11	18.08	0	45	1.00	0	0	0	0	0	115	0	-30	0	-3	10	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	6.80	51.91	14.54	2.6	42	0.90	0	0	0	0	0	185	0	-35	0	-3	17	0	0	0	0	0	0	0	0	17.9
4	1.94	2.16	6.80	58.71	13.50	2.6	42	0.90	0	0	0	0	0	251	0	-29	0	-3	23	0	0	0	0	0	0	0	0	17.7
5	1.94	2.16	6.80	65.51	12.94	2.6	42	0.90	0	0	0	0	0	309	0	-14	0	-1	28	0	0	0	0	0	0	0	0	17.6
6	1.94	2.16	6.80	72.31	12.87	2.6	42	0.90	0	0	0	0	0	360	0	9	0	1	32	0	0	0	0	0	0	0	0	17.6
7	1.94	2.16	6.80	79.11	13.27	2.6	42	0.90	0	0	0	0	0	403	0	38	0	3	35	0	0	0	0	0	0	0	0	17.7
8	1.94	2.16	6.80	85.91	14.15	2.6	42	0.90	0	0	0	0	0	437	0	73	0	7	39	0	0	0	0	0	0	0	0	17.9
9	1.94	2.16	6.80	92.71	15.53	11.2	35	0.70	0	0	0	0	0	451	0	111	0	10	42	0	0	0	0	0	0	0	0	78.2
10	1.94	2.16	6.80	99.51	17.43	11.2	35	0.70	0	0	0	0	0	476	0	152	0	14	43	0	0	0	0	0	0	0	0	79.8
11	1.94	2.16	6.80	106.31	19.88	11.2	35	0.70	0	0	0	0	0	479	0	193	0	17	43	0	0	0	0	0	0	0	0	82.0
12	1.94	2.16	6.80	113.11	22.93	2.4	40	0.84	0	0	0	0	0	472	0	234	0	21	42	0	0	0	0	0	0	0	0	18.4
13	1.94	2.16	6.80	119.91	26.64	2.4	40	0.84	0	0	0	0	0	453	0	271	0	24	41	0	0	0	0	0	0	0	0	19.3
14	1.94	2.16	3.27	124.95	29.87	2.4	40	0.84	0	0	0	0	0	207	0	142	0	13	19	0	0	0	0	0	0	0	0	9.6
15	1.94	2.16	7.13	130.15	33.63	0	35	0.70	0	0	0	0	0	419	0	330	0	30	38	0	0	0	0	0	0	0	0	0.0
16	2.00	2.16	7.89	137.65	40.28	1	25	0.47	0	0	0	0	0	410	0	398	0	38	37	398	0	0	0	0	0	0	0	11.0
17	2.11	2.16	4.00	143.60	46.57	1	25	0.47	0	0	0	0	0	168	0	165	0	18	15	197	0	0	0	0	0	0	0	6.1
18	2.10	2.16	4.28	147.74	51.72	1	25	0.47	0	0	0	0	0	136	0	182	0	16	12	190	0	0	0	0	0	0	0	7.1
19	2.03	2.16	3.06	151.41	56.97	0	35	0.70	0	0	0	0	0	64	0	93	0	9	6	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	6.79	156.33	65.42	0	45	1.00	0	0	0	0	0	52	0	101	0	9	5	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.528			> 1.20 ··· OK			0	0	0	0	0	5,895	0	2,403	0	216	531	784	0	0	0	0	0	0	0	418.0

Case 6 (2/2) : Downstream Slope | Slip Circle No. 12 | Reservoir Water Surface | None (End of Construction) | Seismic Coefficient | 0.09 (50%) | Required Safety Factor | 1.20

No. of Slice	γt	γsat	b	x	y	C	φ	tanφ	above the water surface N	T	Ne	Te	U	include the water surface N solid	N water	T solid	T water	Ne	Te	U	under the water surface N solid	N water	T solid	T water	Ne	Te	U	CL
1	1.94	2.16	5.70	49.63	25.25	0	45	1.00	0	0	0	0	0	25	0	-6	0	-1	2	0	0	0	0	0	0	0	0	0.0
2	1.94	2.16	5.70	55.33	24.08	0	45	1.00	0	0	0	0	0	73	0	-12	0	-1	7	0	0	0	0	0	0	0	0	0.0
3	1.94	2.16	5.70	61.03	23.30	0	45	1.00	0	0	0	0	0	117	0	-12	0	-1	10	0	0	0	0	0	0	0	0	0.0
4	1.94	2.16	5.70	66.73	22.80	2.6	42	0.90	0	0	0	0	0	157	0	-6	0	-1	14	0	0	0	0	0	0	0	0	14.8
5	1.94	2.16	5.70	72.43	22.87	2.6	42	0.90	0	0	0	0	0	192	0	5	0	0	17	0	0	0	0	0	0	0	0	14.8
6	1.94	2.16	5.70	78.13	23.22	2.6	42	0.90	0	0	0	0	0	222	0	21	0	2	20	0	0	0	0	0	0	0	0	14.8
7	1.94	2.16	5.70	83.83	23.94	2.6	42	0.90	0	0	0	0	0	247	0	40	0	4	22	0	0	0	0	0	0	0	0	15.0
8	1.94	2.16	5.70	89.53	25.05	2.6	42	0.90	0	0	0	0	0	266	0	61	0	6	24	0	0	0	0	0	0	0	0	15.1
9	1.94	2.16	5.70	95.23	26.57	2.6	42	0.90	0	0	0	0	0	279	0	84	0	8	25	0	0	0	0	0	0	0	0	15.4
10	1.94	2.16	5.70	100.93	28.51	2.6	42	0.90	0	0	0	0	0	285	0	108	0	10	28	0	0	0	0	0	0	0	0	15.8
11	1.94	2.16	5.70	106.63	30.91	2.4	40	0.84	0	0	0	0	0	284	0	132	0	12	26	0	0	0	0	0	0	0	0	15.3
12	1.94	2.16	5.70	112.33	33.81	2.4	40	0.84	0	0	0	0	0	278	0	154	0	14	25	0	0	0	0	0	0	0	0	15.8
13	1.94	2.16	5.70	118.03	37.26	2.4	40	0.84	0	0	0	0	0	261	0	172	0	16	24	0	0	0	0	0	0	0	0	16.6
14	1.94	2.16	5.70	123.73	41.37	2.6	42	0.90	0	0	0	0	0	238	0	187	0	17	21	0	0	0	0	0	0	0	0	18.7
15	1.94	2.16	3.10	128.13	45.05	0	45	1.00	0	0	0	0	0	117	0	105	0	9	11	0	0	0	0	0	0	0	0	0.0
16	1.93	2.16	7.63	133.49	50.28	0	35	0.70	0	0	0	0	0	241	0	256	0	23	22	0	0	0	0	0	0	0	0	0.0
17	1.99	2.16	4.30	139.45	57.33	1	25	0.47	0	0	0	0	0	102	0	134	0	12	9	139	0	0	0	0	0	0	0	7.1
18	2.11	2.16	5.39	144.30	64.42	1	25	0.47	0	0	0	0	0	75	0	122	0	11	7	137	0	0	0	0	0	0	0	10.3
19	2.06	2.16	2.23	148.11	71.32	0	35	0.70	0	0	0	0	0	12	0	23	0	2	1	0	0	0	0	0	0	0	0	0.0
20	1.94	2.16	1.16	149.81	74.96	0	45	1.00	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0.0
Result of Calculation			SF = 1.556			> 1.20 ··· OK			0	0	0	0	0	3,469	0	1,571	0	141	312	276	0	0	0	0	0	0	0	189.8