THE UNITED ARAB EMIRATES
MINISTRY OF AGRICULTURE AND FISHERIES
WATER AND SOIL DIRECTORATE

AL BASSIERAH DAM PROJECT

REPORT
ON
FINAL DESIGN

VOL. II

APPENDIX

JAPAN INTERNATIONAL COOPERATION AGENCY

NOVEMBER, 1981

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MEASURES AND GLOSSARIES

MEASURES

Length

mm	millimeter (s)
cm	centimeter (s)
m	meter (s)
km	kilometer (s)

Area

sq.cm, cm^2	square centimeter (s)
sq.m, m^2	square meter (s)
sq.km, km^2	square kilometer (s)
ha	hectare

Capacity

ℓ, lit	liter
cu.m, m^3	cubic meter
MCM, $10^6 m^3$	million cubic meter
barrel	31.5 gallon (U.S) = 36 gallon (U.K)
gallon	4.546 ℓ (U.K) = 3.785 ℓ (U.S)

Weight

g	gram (s)
kg	kilogram (s)
ton, m.t	metric ton

Others

kw	kilo. watt
MW	mega. watt
%	percent
°C	degree centigrade

GLOSSARIES

DAO	Dibba Agriculture Office
ERD	Eastern Regional Department
FAO	Food and Agriculture Organization
MAF	Ministry of Agriculture and Fisheries
MEW	Ministry of Electricity and Water
UAE	United Arab Emirates
UNESCO	United Nation Educational, Scientific and Cultural Organization
USBR	United States Department of Interior, Bureau of Reclamation
ETO	Reference crop evaporation
ET crop	Crop evapo-transpiration

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IV. STABILITY ANALYSIS AGAINST SLIDING FAILURE

Stability Analysis Against Sliding Failure

Stability analysis against sliding failure has been carried out by applying the slice method to the slip circle surface. The safety factor is obtained by the following formula:

$$S.F = \frac{\Sigma\{C \cdot \ell + (N - Ne - U + Np + Wn) \times \tan\phi\}}{\Sigma(T + Te - Tp + Wt)}$$

Where, S.F; safety factor

C; cohesion of materials on slip circle of each slice

ℓ; arc length of slip circle of each slice

N; normal force acting on slip circle of each slice

Ne; normal force of earthquake load acting on slip circle of each slice

U; pore pressure acting on slip circle of each slice

Np; normal force of hydrostatic pressure acting on slip circle of each slice

Wn; normal force of surcharge water acting on slip circle of each slice

ϕ; angle of internal friction of materials on slip circle of each slice

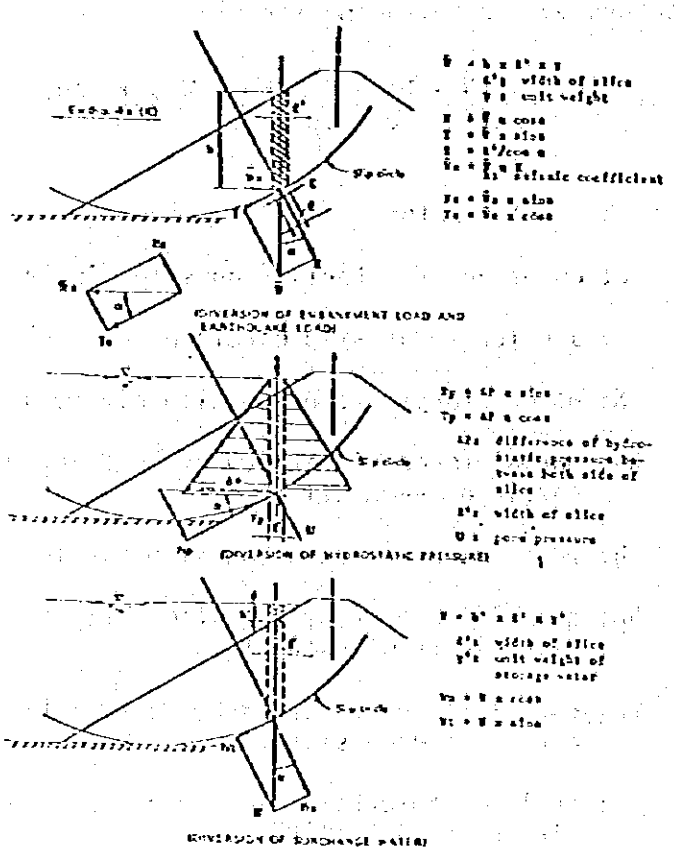
T; tangential force acting on slip circle of each slice

Te; tangential force of earthquake load acting on slip circle of each slice

Tp; tangential force of hydrostatic pressure acting on slip circle of each slice

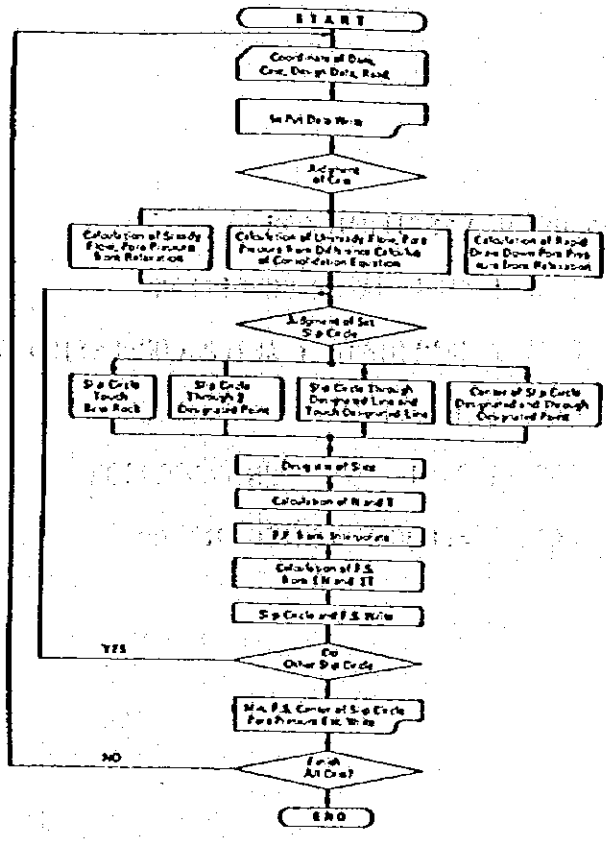
Wt; tangential force of surcharge water acting on slip circle of each slice

Division of acting loads to the normal and tangential forces is shown in the following figure.



Stability Analysis with Slip Circle Method

Allowable minimum safety factor is decided in conformity with the Design Criteria For Dams authorized by Japanese Government, that is to say, it must not be less than 1.2 in any case. The repeated computation should be made by using the above equation to gain the minimum value of the safety factor for a variety of sliding surfaces. The computation procedures, the so-called trial-and-error, can be advantageously carried out by computer operation according to the flow chart shown below.



Flow Chart of Stability Analysis by Computer

STABILITY ANALYSIS OF AL BASSIERAH DAM

TABLE 3-1 (A) CASE 1 FULL WATER CONDITION

TABLE 3-1 (B) CASE 2 IMMEDIATELY AFTER COMPLETION OF FILL

TABLE 3-1 (C) CASE 3 MIDDLE WATER CONDITION

TABLE 3-1 (D) CASE 4 RAPID DRAWDOWN CONDITION

TABLE 3-1 (E) CASE 5 FLOOD WATER CONDITION

TABLE 3-1 (A) STABILITY ANALYSIS OF AL BASSIERAH DAM

CASE 1 FULL WATER CONDITION

1-1 UPSTREAM SLOPE

1-2 DOWNSTREAM SLOPE

***** STABILITY ANALYSIS OF U.A.E AL BASSIERAH DAM *****

CASE 1	ZONE NO.	UNIT WEIGHT	FAI	COHESION
	1	2.250	38.000	0.000
	2	1.980	38.000	0.000
	3	2.300	36.000	0.000
	4	2.040	36.000	0.000
	5	2.300	36.000	0.000
	6	2.040	36.000	0.000
	7	2.040	36.000	0.000
	8	1.980	38.000	0.000

K=0.100

CASE 1 COORDINATE OF ZONES

ZONE NO. 1	-47.580 106.400	-23.500 115.000	-14.000 115.000
	-27.890 105.730		
ZONE NO. 2	-23.500 115.000	-2.500 122.500	0.000 122.500
	0.010 122.000	-1.500 122.000	-3.750 120.500
	-5.750 120.500	-14.000 115.000	
ZONE NO. 3	-27.890 105.730	-14.000 115.000	-12.000 115.000
	-25.980 105.670		
ZONE NO. 4	-14.000 115.000	-5.750 120.500	-3.750 120.500
	-12.000 115.000		
ZONE NO. 5	-25.980 105.670	-12.000 115.000	-10.000 114.100
	-7.000 114.000	0.000 113.300	15.000 110.200
	22.200 108.200	31.500 102.000	0.000 104.800
ZONE NO. 6	-12.000 115.000	-3.750 120.500	-1.500 122.000
	0.010 122.000	1.500 122.000	6.750 118.500
	22.200 108.200	15.000 110.200	0.000 113.300
	-7.000 114.000	-10.000 114.100	
ZONE NO. 7	31.500 102.000	22.200 108.200	6.750 118.500
	8.750 118.500	32.000 103.000	51.250 103.000
	53.750 102.000		
ZONE NO. 8	32.000 103.000	8.750 118.500	6.750 118.500
	1.500 122.000	0.010 122.000	0.000 122.500
	2.500 122.500	51.250 103.000	

***POTENTIAL DISTRIBUTION *** CASE 1

Y= 2 XB= 2XE=42

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	17.998	17.995	17.988	17.979
17.965	17.945	17.919	17.883	17.836	17.774
17.695	17.595	17.469	17.313	17.123	16.894
16.622	16.304	15.935	15.513	15.035	14.499
13.906	13.253	12.541	11.768	10.933	10.032
9.057	7.996	6.824	5.510	4.000	

Y= 3 XB= 2XE=42

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	17.992	17.982
17.968	17.948	17.921	17.886	17.838	17.777
17.697	17.597	17.471	17.316	17.126	16.899
16.629	16.313	15.947	15.529	15.056	14.528
13.943	13.301	12.603	11.848	11.037	10.170
9.243	8.251	7.174	6.000	6.000	

Y= 4 XB= 2XE=41

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	17.989
17.975	17.954	17.925	17.887	17.837	17.773
17.690	17.587	17.458	17.299	17.108	16.879
16.610	16.297	15.938	15.530	15.072	14.563
14.004	13.396	12.738	12.032	11.282	10.496
9.685	8.891	8.000	8.000		

Y= 5 XB= 2XE=40

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	18.000
18.000	17.972	17.938	17.896	17.842	17.772
17.685	17.576	17.442	17.279	17.082	16.851
16.580	16.271	15.920	15.526	15.089	14.610
14.091	13.537	12.941	12.295	11.599	10.876
10.000	10.000	10.000			

Y= 6 XB= 3XE=38

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	18.000
18.000	17.964	17.922	17.865	17.792	17.700
17.587	17.449	17.280	17.077	16.838	16.563
16.254	15.916	15.543	15.128	14.670	14.188
13.745	13.279	12.725	12.000	12.000	12.000

Y= 7 XB= 5XE=36

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	18.000
18.000	17.927	17.848	17.757	17.648	17.514
17.366	17.138	16.883	16.580	16.248	15.951
15.637	15.258	14.748	14.000	14.000	14.000
14.000	14.000				

Y= 8 XB= 8XE=32

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	17.932
17.863	17.785	17.685	17.552	17.365	17.090
16.670	16.000	16.000	16.000	16.000	16.000
16.000					

Y= 9 XB=11XE=27

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	

PORE PRESSURE DISTRIBUTION CASE 1

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	13.998	13.995	13.988	13.979
13.965	13.945	13.919	13.883	13.836	13.774
13.695	13.595	13.469	13.313	13.123	12.894
12.622	12.304	11.935	11.513	11.035	10.499
9.906	9.253	8.541	7.768	6.933	6.032
5.057	3.996	2.824	1.510	0.000	

12.000	12.000	12.000	12.000	12.000	12.000
12.000	12.000	12.000	12.000	11.992	11.982
11.968	11.948	11.921	11.886	11.838	11.777
11.697	11.597	11.471	11.316	11.126	10.899
10.629	10.313	9.947	9.529	9.056	8.528
7.943	7.301	6.603	5.848	5.037	4.170
3.243	2.251	1.174	0.000	0.000	

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.000	10.000	10.000	9.989
9.975	9.954	9.925	9.887	9.837	9.773
9.690	9.587	9.458	9.299	9.108	8.879
8.610	8.297	7.938	7.530	7.072	6.563
6.004	5.396	4.738	4.032	3.282	2.496
1.685	0.891	0.000	0.000		

8.000	8.000	8.000	8.000	8.000	8.000
8.000	8.000	8.000	8.000	8.000	8.000
8.000	7.972	7.938	7.896	7.842	7.772
7.685	7.576	7.442	7.279	7.082	6.851
6.580	6.271	5.920	5.526	5.089	4.610
4.091	3.537	2.941	2.295	1.599	0.876
0.000	0.000	0.000			

6.000	6.000	6.000	6.000	6.000	6.000
6.000	6.000	6.000	6.000	6.000	6.000
6.000	5.964	5.922	5.865	5.792	5.700
5.587	5.449	5.280	5.077	4.838	4.563
4.254	3.916	3.543	3.128	2.670	2.188
1.745	1.279	0.725	0.000	0.000	0.000

4.000	4.000	4.000	4.000	4.000	4.000
4.000	4.000	4.000	4.000	4.000	4.000
4.000	3.927	3.848	3.757	3.648	3.514
3.346	3.138	2.883	2.580	2.248	1.951
1.637	1.258	0.748	0.000	0.000	0.000
0.000	0.000				

2.000	2.000	2.000	2.000	2.000	2.000
2.000	2.000	2.000	2.000	2.000	1.932
1.863	1.785	1.685	1.552	1.365	1.070
0.670	0.000	0.000	0.000	0.000	0.000
0.000					

0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	

*** UPSTREAM SIDE WITH FULL WATER LEVEL ***
K=0.100 WL= 115.000

CASE 1-1

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-10.000	125.000	19.853	396.395	174.272	2.275
-10.000	130.000	24.850	456.209	201.384	2.265
-10.000	135.000	29.847	501.243	208.878	2.400
-15.000	125.000	19.684	329.931	181.290	1.820
-15.000	130.000	24.682	392.778	221.484	1.774
-15.000	135.000	29.679	440.511	233.728	1.885
-15.000	140.000	34.676	479.051	239.220	2.003
-15.000	145.000	39.673	512.704	243.360	2.107
-20.000	125.000	19.516	259.034	161.610	1.603
-20.000	130.000	24.514	317.181	209.845	1.512
-20.000	135.000	29.511	366.581	232.256	1.578
-20.000	140.000	34.508	408.169	244.683	1.668
-20.000	145.000	39.505	444.064	252.467	1.759
-20.000	150.000	44.502	475.433	257.129	1.849
-20.000	155.000	49.499	501.855	259.444	1.934
-25.000	125.000	19.348	194.110	130.882	1.483
-25.000	130.000	24.346	239.835	171.513	1.398
-25.000	135.000	29.343	284.729	203.226	1.401
-25.000	140.000	34.340	326.113	224.447	1.453
-25.000	145.000	39.337	363.099	238.595	1.522
-25.000	150.000	44.334	396.198	248.445	1.595
-25.000	155.000	49.331	425.253	255.176	1.667
-25.000	160.000	54.329	451.221	259.016	1.742
-25.000	165.000	59.326	474.437	261.272	1.816
-30.000	125.000	19.180	137.394	95.118	1.444
-30.000	130.000	24.178	170.579	122.907	1.388
-30.000	135.000	29.175	204.837	151.221	1.355
-30.000	140.000	34.172	241.433	176.810	1.350
-30.000	145.000	39.169	276.485	200.289	1.380
-30.000	150.000	44.166	309.639	217.625	1.423
-30.000	155.000	49.163	339.893	229.976	1.478
-30.000	160.000	54.161	367.510	238.577	1.540
-30.000	165.000	59.158	391.828	244.070	1.605
-30.000	170.000	64.155	415.280	249.280	1.666
-30.000	175.000	69.152	435.955	252.517	1.726
-35.000	125.000	19.012	90.874	60.779	1.495
-35.000	130.000	24.009	114.716	79.823	1.437
-35.000	135.000	29.007	137.490	99.875	1.377
-35.000	140.000	34.004	163.553	120.858	1.353
-35.000	145.000	39.001	190.969	142.511	1.340
-35.000	150.000	43.998	220.799	164.492	1.342
-35.000	155.000	48.995	249.938	182.791	1.367
-35.000	160.000	53.993	278.249	198.395	1.402
-35.000	165.000	58.990	304.242	209.749	1.451
-35.000	170.000	63.987	327.922	218.297	1.502
-35.000	175.000	68.984	350.567	225.601	1.554
-40.000	130.000	23.841	64.896	45.372	1.430
-40.000	135.000	28.839	80.606	56.932	1.416
-40.000	140.000	33.836	98.833	70.601	1.400
-40.000	145.000	38.833	119.372	85.874	1.390
-40.000	150.000	43.830	139.291	101.835	1.368
-40.000	155.000	48.827	161.545	119.821	1.348
-40.000	160.000	53.824	186.580	138.011	1.352
-40.000	165.000	58.822	211.026	154.705	1.364
-40.000	170.000	63.819	235.613	169.250	1.392
-40.000	175.000	68.816	259.159	181.717	1.426
-45.000	140.000	33.668	45.102	32.201	1.401
-45.000	145.000	38.665	57.049	41.168	1.386
-45.000	150.000	43.662	70.732	51.079	1.385
-45.000	155.000	48.659	86.921	62.920	1.381
-45.000	160.000	53.656	104.918	75.732	1.385
-45.000	165.000	58.654	124.798	89.618	1.393
-45.000	170.000	63.651	143.619	105.369	1.363
-45.000	175.000	68.648	165.098	120.964	1.365
-50.000	150.000	43.494	21.899	15.908	1.377
-50.000	155.000	48.491	29.427	21.296	1.382
-50.000	160.000	53.488	39.333	28.574	1.377
-50.000	165.000	58.486	50.985	36.923	1.381
-50.000	170.000	63.483	64.559	46.584	1.386
-50.000	175.000	68.480	80.192	57.551	1.393

F.S.-MIN.

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-35.000	145.000	39.001	190.969	142.511	1.340

CRITICAL CIRCLE

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-35.000	147.500	41.500	205.833	153.656	1.340
-37.500	142.500	36.418	140.952	103.511	1.362
-37.500	145.000	38.917	152.640	112.691	1.354
-37.500	147.500	41.416	164.603	122.368	1.345

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

-35.000	147.500	41.500	205.833	153.656	1.340
(N=	444.788	T= 141.777	NE= 14.178	IE= 44.479)	
(NP=	15.008	TP= 27.736	PP= 248.013	SL= 0.000)	
(WN=	78.487	WT= -4.863	WW= 79.200	)	

DAM KIBAN-MEN: (-47.580,106.400) (0.000,104.800)

*** DOWNSTREAM SIDE WITH FULL WATER LEVEL ***
K=0.100 WL= 115.000
CASE 1-2

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
10.000	125.000	21.006	474.769	186.939	2.540
10.000	130.000	25.986	538.904	199.775	2.698
10.000	135.000	30.967	586.893	208.083	2.820
15.000	125.000	21.449	448.753	207.726	2.160
15.000	130.000	26.429	515.178	240.513	2.142
15.000	135.000	31.409	567.252	251.826	2.253
15.000	140.000	36.390	610.113	257.887	2.366
15.000	145.000	41.370	645.628	261.486	2.469
20.000	125.000	21.891	405.901	198.931	2.040
20.000	130.000	26.872	476.425	254.875	1.869
20.000	135.000	31.852	534.177	278.080	1.921
20.000	140.000	36.833	580.599	289.839	2.003
20.000	145.000	41.813	620.470	296.277	2.094
20.000	150.000	46.793	653.803	299.467	2.183
20.000	155.000	51.774	684.459	301.447	2.271
25.000	125.000	22.334	366.283	200.634	1.826
25.000	130.000	27.315	430.404	254.124	1.694
25.000	135.000	32.295	489.336	285.042	1.717
25.000	140.000	37.275	539.295	305.301	1.766
25.000	145.000	42.256	583.315	316.828	1.841
25.000	150.000	47.236	620.930	324.007	1.916
25.000	155.000	52.216	653.354	328.079	1.991
25.000	160.000	57.197	682.002	329.965	2.067
25.000	165.000	62.177	708.146	331.663	2.136
30.000	125.000	22.777	317.482	175.647	1.807
30.000	130.000	27.757	373.776	225.244	1.659
30.000	135.000	32.738	429.124	266.008	1.613
30.000	140.000	37.718	480.848	298.210	1.612
30.000	145.000	42.698	526.807	318.717	1.653
30.000	150.000	47.679	566.409	331.846	1.707
30.000	155.000	52.659	602.713	340.607	1.770
30.000	160.000	57.639	634.942	346.198	1.834
30.000	165.000	62.620	663.059	349.121	1.899
30.000	170.000	67.600	689.216	351.567	1.960
30.000	175.000	72.580	712.271	352.691	2.020
35.000	125.000	23.000	259.650	150.978	1.720
35.000	130.000	28.000	307.421	191.988	1.601
35.000	135.000	33.000	354.749	227.138	1.562
35.000	140.000	38.000	402.744	261.348	1.541
35.000	145.000	43.000	449.262	290.751	1.545
35.000	150.000	48.000	493.581	313.824	1.573
35.000	155.000	53.000	534.270	331.049	1.614
35.000	160.000	58.000	571.047	343.463	1.663
35.000	165.000	63.000	603.811	352.109	1.715
35.000	170.000	68.000	633.418	357.819	1.770
35.000	175.000	73.000	661.249	361.966	1.827
40.000	125.000	23.000	191.630	119.250	1.607
40.000	130.000	28.000	228.447	145.738	1.568
40.000	135.000	33.000	265.023	172.992	1.532
40.000	140.000	38.000	305.012	200.983	1.518
40.000	145.000	43.000	346.395	230.209	1.505
40.000	150.000	48.000	389.227	260.490	1.494
40.000	155.000	53.000	429.926	284.838	1.509
40.000	160.000	58.000	468.812	305.287	1.536
40.000	165.000	63.000	504.989	321.169	1.572
40.000	170.000	68.000	538.300	333.174	1.616
40.000	175.000	73.000	568.564	341.728	1.664
45.000	130.000	28.000	152.158	97.187	1.566
45.000	135.000	33.000	184.093	117.328	1.569
45.000	140.000	38.000	217.766	139.935	1.556
45.000	145.000	43.000	248.529	163.830	1.517
45.000	150.000	48.000	281.519	188.935	1.490
45.000	155.000	53.000	318.947	214.908	1.484
45.000	160.000	58.000	357.416	241.650	1.479
45.000	165.000	63.000	396.813	264.463	1.493
45.000	170.000	68.000	429.406	284.268	1.511
45.000	175.000	73.000	462.842	299.707	1.544
50.000	140.000	38.000	126.843	82.796	1.532
50.000	145.000	43.000	153.597	100.025	1.536
50.000	150.000	48.000	183.007	119.222	1.535
50.000	155.000	53.000	216.667	139.681	1.537
50.000	160.000	58.000	242.534	161.587	1.501
50.000	165.000	63.000	275.903	185.609	1.486
50.000	170.000	68.000	310.338	210.175	1.477
50.000	175.000	73.000	345.525	232.399	1.487
55.000	150.000	48.000	89.406	59.095	1.513
55.000	155.000	53.000	111.559	73.425	1.519
55.000	160.000	58.000	136.196	89.377	1.524
55.000	165.000	63.000	163.499	107.235	1.525
55.000	170.000	68.000	192.447	126.454	1.522
55.000	175.000	73.000	220.987	147.133	1.502

F.S.-MIN.

50.000	170.000	68.000	310.338	210.175	1.477

CRITICAL CIRCLE

47.500	167.500	65.500	353.025	238.361	1.481
47.500	170.000	68.000	371.493	249.946	1.486
47.500	172.500	70.500	387.302	259.347	1.493
50.000	167.500	65.500	294.024	198.115	1.484
50.000	170.000	68.000	310.338	210.175	1.477
50.000	172.500	70.500	328.149	221.774	1.480
52.500	167.500	65.500	233.734	155.822	1.500
52.500	170.000	68.000	249.402	167.400	1.490
52.500	172.500	70.500	266.598	179.322	1.487

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

50.000	170.000	68.000	310.338	210.175	1.477

(N= 437.812 T= 167.446 NE= 16.745 TE= 43.781)
(NP= 0.488 TP= 1.051 PP= 2.795 SL= 0.000)
(WN= 0.000 WT= 0.000 WW= 0.000)

DAM KIBAN-MEN: (53.750,102.000) (31.500,102.000)
(0.000,104.800)

TABLE 3-1 (B) STABILITY ANALYSIS OF AL BASSIERAH DAM

CASE 2 IMMEDIATELY AFTER COMPLETION OF FILL

2-1 UPSTREAM SLOPE

2-2 DOWNSTREAM SLOPE

***** STABILITY ANALYSIS OF U.A.E AL BASSIERAH DAM *****

CASE 2	ZONE NO.	UNIT WEIGHT	FAI	COHESION
	1	1.980	38.000	0.000
	2	2.040	36.000	0.000
	3	2.040	36.000	0.000
	4	2.040	36.000	0.000
	5	1.980	38.000	0.000

K=0.050

CASE 2 COORDINATE OF ZONES

ZONE NO. 1	-47.580 106.400	-2.500 122.500	0.000 122.500	
	0.010 122.000	-1.500 122.000	-3.750 120.500	
	-5.750 120.500	-27.890 105.730		
ZONE NO. 2	-27.890 105.730	-5.750 120.500	-3.750 120.500	
	-25.980 105.670			
ZONE NO. 3	-25.980 105.670	-3.750 120.500	-1.500 122.000	
	0.010 122.000	1.500 122.000	6.750 118.500	
	31.500 102.000	0.000 104.800		
ZONE NO. 4	31.500 102.000	6.750 118.500	8.750 118.500	
	32.000 103.000	51.250 103.000	53.750 102.000	
ZONE NO. 5	32.000 103.000	8.750 118.500	6.750 118.500	
	1.500 122.000	0.010 122.000	0.000 122.500	
	2.500 122.500	51.250 103.000		

*** UPSTREAM SIDE WITH IMMEDIATELY AFTER COMPLETION OF FILL ***
K=0.050 WL= 0.000

CASE 2-1

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-10.000	125.000	19.853	506.898	128.286	3.951
-10.000	130.000	24.850	581.663	150.257	3.871
-10.000	135.000	29.847	638.345	153.800	4.150
-15.000	125.000	19.684	438.951	147.223	2.982
-15.000	130.000	24.682	516.122	182.266	2.832
-15.000	135.000	29.679	574.679	190.825	3.012
-15.000	140.000	34.676	622.320	193.414	3.218
-15.000	145.000	39.673	663.804	195.084	3.403
-20.000	125.000	19.516	361.590	141.179	2.561
-20.000	130.000	24.514	433.051	185.153	2.339
-20.000	135.000	29.511	493.294	203.928	2.419
-20.000	140.000	34.508	543.052	212.804	2.552
-20.000	145.000	39.505	586.144	217.594	2.694
-20.000	150.000	44.502	623.978	219.677	2.840
-20.000	155.000	49.499	656.100	219.935	2.983
-25.000	125.000	19.348	284.643	122.166	2.330
-25.000	130.000	24.346	342.511	160.150	2.139
-25.000	135.000	29.343	397.505	188.799	2.105
-25.000	140.000	34.340	447.518	206.948	2.162
-25.000	145.000	39.337	491.814	218.083	2.255
-25.000	150.000	44.334	530.943	225.019	2.360
-25.000	155.000	49.331	564.955	228.925	2.468
-25.000	160.000	54.329	595.514	230.072	2.588
-25.000	165.000	59.326	623.255	230.235	2.707
-30.000	125.000	19.180	212.378	96.156	2.209
-30.000	130.000	24.178	256.266	122.364	2.094
-30.000	135.000	29.175	299.351	148.363	2.018
-30.000	140.000	34.172	344.307	173.239	1.987
-30.000	145.000	39.169	386.550	191.989	2.013
-30.000	150.000	44.166	426.015	206.644	2.062
-30.000	155.000	49.163	461.927	216.440	2.134
-30.000	160.000	54.161	494.626	222.534	2.223
-30.000	165.000	59.158	523.322	225.636	2.319
-30.000	170.000	64.155	550.693	228.484	2.410
-30.000	175.000	69.152	574.674	229.424	2.505
-35.000	125.000	19.012	147.385	67.731	2.176
-35.000	130.000	24.009	181.281	85.987	2.108
-35.000	135.000	29.007	211.284	104.568	2.021
-35.000	140.000	34.004	244.811	123.705	1.979
-35.000	145.000	39.001	278.469	143.260	1.944
-35.000	150.000	43.998	314.750	163.134	1.929
-35.000	155.000	48.995	349.623	179.144	1.952
-35.000	160.000	53.993	383.221	192.407	1.992
-35.000	165.000	58.990	414.096	201.582	2.054
-35.000	170.000	63.987	442.252	208.078	2.125
-35.000	175.000	68.984	469.021	213.379	2.198
-40.000	130.000	23.841	106.614	52.640	2.025
-40.000	135.000	28.839	130.236	64.524	2.018
-40.000	140.000	33.836	155.698	77.691	2.004
-40.000	145.000	38.833	182.939	91.947	1.990
-40.000	150.000	43.830	208.450	106.548	1.956
-40.000	155.000	48.827	236.041	122.966	1.920
-40.000	160.000	53.824	266.451	139.362	1.912
-40.000	165.000	58.822	295.346	154.144	1.916
-40.000	170.000	63.819	324.554	166.775	1.946
-40.000	175.000	68.816	352.616	177.491	1.987
-45.000	140.000	33.668	74.840	38.333	1.952
-45.000	145.000	38.665	92.841	47.796	1.942
-45.000	150.000	43.662	112.264	57.660	1.947
-45.000	155.000	48.659	133.913	68.971	1.942
-45.000	160.000	53.656	157.188	80.979	1.941
-45.000	165.000	58.654	182.257	93.869	1.942
-45.000	170.000	63.651	205.565	108.265	1.899
-45.000	175.000	68.648	231.193	122.302	1.890
-50.000	150.000	43.494	36.381	19.035	1.911
-50.000	155.000	48.491	48.874	25.453	1.920
-50.000	160.000	53.488	63.578	33.206	1.915
-50.000	165.000	58.486	79.830	41.612	1.918
-50.000	170.000	63.483	98.085	51.133	1.918
-50.000	175.000	68.480	118.151	61.586	1.918

F.S.-MIN.

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-45.000	175.000	68.648	231.193	122.302	1.890

CRITICAL CIRCLE

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-42.500	172.500	66.233	278.259	145.517	1.912
-42.500	175.000	68.732	291.909	151.586	1.926
-42.500	177.500	71.231	305.350	157.129	1.943
-45.000	172.500	66.149	218.764	115.046	1.902
-45.000	175.000	68.648	231.193	122.302	1.890
-45.000	177.500	71.147	244.142	128.466	1.900
-47.500	172.500	66.065	162.134	83.980	1.931
-47.500	175.000	68.564	173.659	90.615	1.916
-47.500	177.500	71.063	185.640	97.521	1.904

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

-45.000	175.000	68.648	231.193	122.302	1.890
(N=	309.948	T= 106.805	NE= 5.340	TE= 15.497)	
(NP=	0.000	TP= 0.000	PP= 0.000	SL= 0.000)	
(WN=	0.000	WT= 0.000	WW= 0.000	)	

DAM KIBAN-MENI (-47.580,106.400) (0.000,104.800)

*** DOWNSTREAM SIDE WITH IMMEDIATELY AFTER COMPLETION OF FILL ***
K=0.050 WL= 0.000

CASE 2-2

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
10.000	125.000	21.006	584.881	166.523	3.392
10.000	130.000	25.986	638.808	177.087	3.607
10.000	135.000	30.967	698.676	182.773	3.823
15.000	125.000	21.449	527.094	192.500	2.738
15.000	130.000	26.429	605.258	222.187	2.724
15.000	135.000	31.409	667.286	231.299	2.885
15.000	140.000	36.390	719.083	235.530	3.053
15.000	145.000	41.370	762.515	237.073	3.216
20.000	125.000	21.891	468.138	186.961	2.504
20.000	130.000	26.872	550.288	240.591	2.287
20.000	135.000	31.852	617.775	261.605	2.361
20.000	140.000	36.833	672.956	271.361	2.480
20.000	145.000	41.813	720.873	275.963	2.612
20.000	150.000	46.793	761.711	277.500	2.745
20.000	155.000	51.774	799.276	277.626	2.879
25.000	125.000	22.334	411.524	190.625	2.159
25.000	130.000	27.315	485.416	241.532	2.010
25.000	135.000	32.295	552.984	269.797	2.050
25.000	140.000	37.275	611.648	288.565	2.120
25.000	145.000	42.256	663.700	298.516	2.223
25.000	150.000	47.236	708.859	304.189	2.330
25.000	155.000	52.216	748.399	306.829	2.439
25.000	160.000	57.197	783.769	307.318	2.550
25.000	165.000	62.177	816.501	307.555	2.655
30.000	125.000	22.777	345.162	164.336	2.100
30.000	130.000	27.757	409.637	212.149	1.931
30.000	135.000	32.738	473.097	250.974	1.885
30.000	140.000	37.718	532.675	281.286	1.894
30.000	145.000	42.698	585.981	300.046	1.953
30.000	150.000	47.679	633.157	312.153	2.028
30.000	155.000	52.659	676.719	319.884	2.116
30.000	160.000	57.639	715.936	324.507	2.206
30.000	165.000	62.620	750.721	326.492	2.299
30.000	170.000	67.600	783.271	327.897	2.389
30.000	175.000	72.580	812.419	327.983	2.477
35.000	125.000	23.000	271.615	137.557	1.975
35.000	130.000	28.000	325.247	177.132	1.836
35.000	135.000	33.000	378.544	210.684	1.797
35.000	140.000	38.000	433.253	243.668	1.778
35.000	145.000	43.000	486.753	271.857	1.790
35.000	150.000	48.000	537.786	293.513	1.832
35.000	155.000	53.000	585.051	309.395	1.891
35.000	160.000	58.000	628.589	320.883	1.959
35.000	165.000	63.000	668.228	328.858	2.032
35.000	170.000	68.000	704.616	333.973	2.110
35.000	175.000	73.000	739.013	337.412	2.190
40.000	125.000	23.000	195.305	105.984	1.843
40.000	130.000	28.000	233.990	130.595	1.792
40.000	135.000	33.000	273.291	156.161	1.750
40.000	140.000	38.000	317.097	182.847	1.734
40.000	145.000	43.000	362.786	210.559	1.723
40.000	150.000	48.000	410.423	239.311	1.715
40.000	155.000	53.000	456.362	262.527	1.738
40.000	160.000	58.000	500.798	281.974	1.776
40.000	165.000	63.000	542.467	296.869	1.827
40.000	170.000	68.000	581.169	307.906	1.887
40.000	175.000	73.000	616.944	315.732	1.954
45.000	130.000	28.000	155.107	86.715	1.789
45.000	135.000	33.000	187.677	104.731	1.792
45.000	140.000	38.000	222.114	125.088	1.776
45.000	145.000	43.000	253.997	146.905	1.729
45.000	150.000	48.000	288.815	170.118	1.698
45.000	155.000	53.000	329.110	194.484	1.692
45.000	160.000	58.000	370.800	219.487	1.689
45.000	165.000	63.000	411.905	240.873	1.710
45.000	170.000	68.000	450.463	259.398	1.737
45.000	175.000	73.000	488.288	273.935	1.783
50.000	140.000	38.000	129.380	74.144	1.745
50.000	145.000	43.000	156.670	89.588	1.749
50.000	150.000	48.000	186.678	106.823	1.748
50.000	155.000	53.000	218.985	125.178	1.749
50.000	160.000	58.000	247.459	144.883	1.708
50.000	165.000	63.000	281.965	166.729	1.691
50.000	170.000	68.000	318.116	189.293	1.681
50.000	175.000	73.000	355.524	209.763	1.695
55.000	150.000	48.000	91.232	53.052	1.720
55.000	155.000	53.000	113.830	65.905	1.727
55.000	160.000	58.000	138.962	80.214	1.732
55.000	165.000	63.000	166.820	96.252	1.733
55.000	170.000	68.000	196.360	113.498	1.730
55.000	175.000	73.000	225.404	132.046	1.707
F.S.-MIN. 50.000	170.000	68.000	318.116	189.293	1.681
CRITICAL CIRCLE					
47.500	167.500	65.500	364.626	215.750	1.690
47.500	170.000	68.000	384.418	226.379	1.698
47.500	172.500	70.500	401.907	235.156	1.709
50.000	167.500	65.500	301.035	178.286	1.688
50.000	170.000	68.000	318.116	189.293	1.681
50.000	172.500	70.500	336.901	199.929	1.685
52.500	167.500	65.500	238.460	139.803	1.706
52.500	170.000	68.000	254.490	150.234	1.694
52.500	172.500	70.500	272.081	160.962	1.690

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

50.000	170.000	68.000	318.116	189.293	1.681

(N= 437.727 T= 167.407 NE= 8.370 TE= 21.886)
(NP= 0.000 TP= 0.000 PP= 0.000 SL= 0.000)
(WN= 0.000 WT= 0.000 WR= 0.000)

DAM KIBAN-MEN: (73.750,102.000) (31.500,102.000)
(0.000,104.800)

TABLE 3-1 (C) STABILITY ANALYSIS OF AL BASSIERAH DAM

CASE 3 MIDDLE WATER CONDITION UPSTREAM SLOPE

***** STABILITY ANALYSIS OF U.A.E AL BASSIERAH DAM *****

CASE 3	ZONE NO.	UNIT WEIGHT	FAI	COHESION
	1	2.250	38.000	0.000
	2	1.980	38.000	0.000
	3	2.300	36.000	0.000
	4	2.040	38.000	0.000
	5	2.300	36.000	0.000
	6	2.040	36.000	0.000
	7	2.040	36.000	0.000
	8	1.980	38.000	0.000

K=0.100

CASE 3 COORDINATE OF ZONES

ZONE NO. 1	-47.580 106.400	-34.700 111.000	-20.000 111.000
	-27.890 105.730		
ZONE NO. 2	-34.700 111.000	-2.500 122.500	0.000 122.500
	0.010 122.000	-1.500 122.000	-3.750 120.500
	-5.750 120.500	-20.000 111.000	
ZONE NO. 3	-27.890 105.730	-20.000 111.000	-18.000 111.000
	-25.980 105.670		
ZONE NO. 4	-20.000 111.000	-5.750 120.500	-3.750 120.500
	-18.000 111.000		
ZONE NO. 5	-25.980 105.670	-18.000 111.000	-16.000 110.500
	-10.000 110.300	0.000 109.400	10.000 108.100
	26.250 105.500	31.500 102.000	0.000 104.800
ZONE NO. 6	-18.000 111.000	-3.750 120.500	-1.500 122.000
	0.010 122.000	1.500 122.000	6.750 118.500
	26.250 105.500	10.000 108.100	0.000 109.400
	-10.000 110.300	-16.000 110.500	
ZONE NO. 7	31.500 102.000	26.250 105.500	6.750 118.500
	8.750 118.500	32.000 103.000	51.250 103.000
	53.750 102.000		
ZONE NO. 8	32.000 103.000	8.750 118.500	6.750 118.500
	1.500 122.000	0.010 122.000	0.000 122.500
	2.500 122.500	51.250 103.000	

***POTENTIAL DISTRIBUTION *** CASE 3

Y= 2 XB= 2XE=42

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	13.999	13.997	13.995
13.990	13.984	13.974	13.961	13.942	13.916
13.881	13.835	13.774	13.697	13.599	13.478
13.330	13.153	12.942	12.695	12.409	12.079
11.703	11.279	10.805	10.281	9.702	9.058
8.331	7.500	6.533	5.389	4.000	

Y= 3 XB= 2XE=42

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	13.998	13.995
13.991	13.985	13.975	13.962	13.942	13.916
13.880	13.833	13.771	13.691	13.590	13.465
13.313	13.133	12.921	12.675	12.393	12.070
11.702	11.289	10.830	10.330	9.793	9.207
8.554	7.815	6.968	6.000	6.000	

Y= 4 XB= 2XE=41

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	13.997
13.993	13.986	13.976	13.962	13.942	13.914
13.875	13.824	13.755	13.666	13.552	13.411
13.239	13.039	12.815	12.572	12.305	12.006
11.660	11.268	10.829	10.368	9.962	9.560
9.126	8.621	8.000	8.000		

Y= 5 XB= 2XE=40

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	13.992	13.981	13.967	13.947	13.920
13.883	13.830	13.759	13.662	13.532	13.363
13.147	12.887	12.605	12.380	12.167	11.938
11.659	11.293	10.777	10.000	10.000	10.000
10.000	10.000	10.000			

Y= 6 XB= 3XE=35

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	13.991	13.981	13.968	13.949	13.923
13.886	13.831	13.751	13.633	13.453	13.175
12.731	12.000	12.000	12.000	12.000	12.000
12.000	12.000	12.000			

Y= 7 XB= 5XE=28

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000

PORE PRESSURE DISTRIBUTION CASE 3

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.000	9.999	9.997	9.995
9.990	9.984	9.974	9.961	9.942	9.916
9.881	9.835	9.774	9.697	9.599	9.478
9.330	9.153	8.942	8.695	8.409	8.079
7.703	7.279	6.805	6.281	5.702	5.058
4.331	3.500	2.533	1.389	0.000	

8.000	8.000	8.000	8.000	8.000	8.000
8.000	8.000	8.000	8.000	7.998	7.995
7.991	7.985	7.975	7.962	7.942	7.916
7.880	7.833	7.771	7.691	7.590	7.465
7.313	7.133	6.921	6.675	6.393	6.070
5.702	5.289	4.830	4.330	3.793	3.207
2.554	1.815	0.968	0.000	0.000	

6.000	6.000	6.000	6.000	6.000	6.000
6.000	6.000	6.000	6.000	6.000	5.997
5.993	5.986	5.976	5.962	5.942	5.914
5.875	5.824	5.755	5.666	5.552	5.411
5.239	5.039	4.815	4.572	4.305	4.006
3.660	3.268	2.829	2.368	1.962	1.560
1.126	0.621	0.000	0.000		

4.000	4.000	4.000	4.000	4.000	4.000
4.000	4.000	4.000	4.000	4.000	4.000
4.000	3.992	3.981	3.967	3.947	3.920
3.883	3.830	3.759	3.662	3.532	3.363
3.147	2.887	2.605	2.380	2.167	1.938
1.659	1.293	0.777	0.000	0.000	0.000
0.000	0.000	0.000			

2.000	2.000	2.000	2.000	2.000	2.000
2.000	2.000	2.000	2.000	2.000	2.000
2.000	1.991	1.981	1.968	1.949	1.923
1.886	1.831	1.751	1.633	1.453	1.175
0.731	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000			

0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000

*** UPSTREAM SIDE WITH MIDDLE WATER LEVEL ***
K=0.100 WL= 111.000

CASE 3

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-10.000	125.000	19.853	448.020	167.379	2.677
-10.000	130.000	24.850	515.464	195.855	2.632
-10.000	135.000	29.847	566.195	203.876	2.777
-15.000	125.000	19.684	379.762	179.870	2.111
-15.000	130.000	24.682	448.095	221.017	2.027
-15.000	135.000	29.679	500.188	234.155	2.136
-15.000	140.000	34.676	542.253	240.791	2.252
-15.000	145.000	39.673	578.838	245.932	2.354
-20.000	125.000	19.516	304.233	167.897	1.812
-20.000	130.000	24.514	366.802	217.717	1.685
-20.000	135.000	29.511	419.750	240.428	1.746
-20.000	140.000	34.508	463.846	252.620	1.836
-20.000	145.000	39.505	502.067	260.340	1.929
-20.000	150.000	44.502	535.531	264.908	2.022
-20.000	155.000	49.499	564.244	267.372	2.110
-25.000	125.000	19.348	230.391	142.908	1.612
-25.000	130.000	24.346	280.999	184.760	1.521
-25.000	135.000	29.343	329.829	216.617	1.522
-25.000	140.000	34.340	374.329	237.880	1.574
-25.000	145.000	39.337	414.170	251.864	1.644
-25.000	150.000	44.334	449.455	261.169	1.721
-25.000	155.000	49.331	480.129	267.106	1.798
-25.000	160.000	54.329	507.657	270.320	1.878
-25.000	165.000	59.326	532.491	272.180	1.956
-30.000	125.000	19.180	164.137	109.397	1.500
-30.000	130.000	24.178	202.153	138.006	1.465
-30.000	135.000	29.175	240.494	166.854	1.441
-30.000	140.000	34.172	280.673	194.510	1.443
-30.000	145.000	39.169	318.817	215.815	1.477
-30.000	150.000	44.166	354.919	233.044	1.523
-30.000	155.000	49.163	387.645	245.092	1.582
-30.000	160.000	54.161	417.491	253.341	1.648
-30.000	165.000	59.158	443.680	258.349	1.717
-30.000	170.000	64.155	466.620	262.940	1.782
-30.000	175.000	69.152	490.539	265.510	1.848
-35.000	125.000	19.012	108.028	73.271	1.474
-35.000	130.000	24.009	136.992	93.493	1.465
-35.000	135.000	29.007	163.124	114.221	1.428
-35.000	140.000	34.004	192.995	135.624	1.423
-35.000	145.000	39.001	223.597	157.552	1.419
-35.000	150.000	43.998	256.541	179.729	1.427
-35.000	155.000	48.995	288.680	198.172	1.457
-35.000	160.000	53.993	319.441	213.614	1.495
-35.000	165.000	58.990	347.950	224.945	1.547
-35.000	170.000	63.987	373.814	233.327	1.602
-35.000	175.000	68.984	398.556	240.481	1.657
-40.000	130.000	23.841	76.049	53.977	1.409
-40.000	135.000	28.839	96.026	67.240	1.428
-40.000	140.000	33.836	118.196	82.005	1.441
-40.000	145.000	38.833	142.470	98.080	1.453
-40.000	150.000	43.830	165.226	114.563	1.442
-40.000	155.000	48.827	190.245	133.020	1.430
-40.000	160.000	53.824	218.219	151.605	1.439
-40.000	165.000	58.822	244.876	168.455	1.454
-40.000	170.000	63.819	272.023	183.205	1.485
-40.000	175.000	68.816	297.898	195.801	1.521
-45.000	140.000	33.668	53.499	38.020	1.407
-45.000	145.000	38.665	68.805	48.495	1.419
-45.000	150.000	43.662	85.827	59.604	1.440
-45.000	155.000	48.659	105.009	72.254	1.453
-45.000	160.000	53.656	125.989	85.771	1.469
-45.000	165.000	58.654	148.800	100.289	1.484
-45.000	170.000	63.651	170.020	116.485	1.460
-45.000	175.000	68.648	193.569	132.376	1.462
-50.000	150.000	43.494	25.816	18.295	1.411
-50.000	155.000	48.491	36.326	25.293	1.436
-50.000	160.000	53.488	48.872	33.718	1.449
-50.000	165.000	58.486	63.241	43.057	1.469
-50.000	170.000	63.483	79.446	53.582	1.483
-50.000	175.000	68.480	97.690	65.275	1.497

F.S.-MIN.

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-45.000	140.000	33.668	53.499	38.020	1.407

CRITICAL CIRCLE

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-42.500	137.500	31.253	74.541	52.594	1.417
-42.500	140.000	33.752	83.551	58.619	1.425
-42.500	142.500	36.250	93.175	65.196	1.429
-45.000	137.500	31.169	46.570	33.274	1.400
-45.000	140.000	33.668	53.499	38.020	1.407
-45.000	142.500	36.166	60.979	43.199	1.412
-47.500	137.500	31.085	24.010	17.310	1.387
-47.500	140.000	33.584	28.807	20.749	1.388
-47.500	142.500	36.082	34.143	24.471	1.395

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-47.500	137.500	31.085	24.010	17.310	1.387

(N= 52.519 T= 18.000 NE= 1.800 TE= 5.252)
(NP= 2.990 TP= 9.942 PP= 47.744 SL= 0.000)
(WN= 24.774 WT= 4.001 WW= 25.200)

DAM KIBAN-MEN: (-47.580,106.400) (0.000,104.800)

TABLE 3-1 (D) STABILITY ANALYSIS OF AL BASSIERAH DAM

CASE 4 RAPID DRAWDOWN CODITION UPSTREAM SLOPE

4-1 F.W.L TO M.W.L

4-2 F.W.L TO L.W.L

***** STABILITY ANALYSIS OF U.A.E AL BASSIERAH DAM *****

CASE 4-1	ZONE NO.	UNIT WEIGHT	FAI	COHESION
	1	2.250	38.000	0.000
	2	1.980	38.000	0.000
	3	2.300	36.000	0.000
	4	2.040	36.000	0.000
	5	2.300	36.000	0.000
	6	2.040	36.000	0.000
	7	2.040	36.000	0.000
	8	1.980	38.000	0.000

K=0.100

CASE 4-1 COORDINATE OF ZONES

ZONE NO. 1	-47.580 106.400	-34.700 111.000	-23.500 115.000
	-14.000 115.000	-27.890 105.730	
ZONE NO. 2	-23.500 115.000	-2.500 122.500	0.000 122.500
	0.010 122.000	-1.500 122.000	-3.750 120.500
	-5.750 120.500	-14.000 115.000	
ZONE NO. 3	-27.890 105.730	-14.000 115.000	-12.000 115.000
	-25.980 105.670		
ZONE NO. 4	-14.000 115.000	-5.750 120.500	-3.750 120.500
	-12.000 115.000		
ZONE NO. 5	-25.980 105.670	-12.000 115.000	-10.000 114.100
	-7.000 114.000	0.000 113.300	15.000 110.200
	22.200 108.200	31.500 102.000	0.000 104.800
ZONE NO. 6	-12.000 115.000	-3.750 120.500	-1.500 122.000
	0.010 122.000	1.500 122.000	6.750 118.500
	22.200 108.200	15.000 110.200	0.000 113.300
	-7.000 114.000	-10.000 114.100	
ZONE NO. 7	31.500 102.000	22.200 108.200	6.750 118.500
	8.750 118.500	32.000 103.000	51.250 103.000
	53.750 102.000		
ZONE NO. 8	32.000 103.000	8.750 118.500	6.750 118.500
	1.500 122.000	0.010 122.000	0.000 122.500
	2.500 122.500	51.250 103.000	

***POTENTIAL DISTRIBUTION *** CASE 4-1

Y= 2 XB= 2XE=42

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.151	14.344	14.645	14.998
15.373	15.755	16.139	16.522	16.906	17.296
17.695	17.595	17.339	17.071	16.785	16.476
16.140	15.772	15.389	14.928	14.446	13.922
13.354	12.739	12.076	11.361	10.590	9.756
8.849	7.852	6.739	5.475	4.000	

Y= 3 XB= 2XE=42

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.414	14.826
15.235	15.643	16.049	16.455	16.862	17.275
17.697	17.597	17.342	17.077	16.795	16.490
16.158	15.794	15.396	14.960	14.485	13.969
13.410	12.807	12.159	11.462	10.715	9.915
9.057	8.131	7.116	6.000	6.000	

Y= 4 XB= 2XE=41

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.428
14.830	15.279	15.746	16.221	16.703	17.192
17.690	17.587	17.341	17.086	16.810	16.513
16.190	15.836	15.450	15.030	14.573	14.080
13.549	12.980	12.371	11.722	11.035	10.314
9.567	8.831	8.000	8.000		

Y= 5 XB= 2XE=40

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.627	15.229	15.825	16.434	17.056
17.685	17.576	17.346	17.102	16.839	16.553
16.242	15.903	15.535	15.137	14.707	14.246
13.757	13.242	12.693	12.102	11.466	10.805
10.000	10.000	10.000			

Y= 6 XB= 3XE=38

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.638	15.278	16.056	16.875	17.700
17.587	17.379	17.152	16.902	16.627	16.326
16.001	15.657	15.289	14.888	14.455	14.005
13.595	13.167	12.662	12.000	12.000	12.000

Y= 7 XB= 5XE=36

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	15.446	16.657	17.757	17.648	17.471
17.269	17.035	16.782	16.451	16.119	15.826
15.523	15.165	14.691	14.000	14.000	14.000
14.000	14.000				

Y= 8 XB= 8XE=32

16.000	16.000	16.000	16.000	16.000	16.000
16.000	16.000	16.000	16.000	16.000	16.998
17.863	17.785	17.667	17.520	17.326	17.051
16.643	16.000	16.000	16.000	16.000	16.000
16.000					

Y= 9 XB=11XE=27

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	

PORE PRESSURE DISTRIBUTION CASE 4-1

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.151	10.344	10.645	10.998
11.373	11.755	12.139	12.522	12.906	13.296
13.695	13.595	13.339	13.071	12.785	12.476
12.140	11.772	11.369	10.928	10.446	9.922
9.354	8.739	8.076	7.361	6.590	5.756
4.849	3.852	2.739	1.475	0.000	

8.000	8.000	8.000	8.000	8.000	8.000
8.000	8.000	8.000	8.000	8.414	8.826
9.235	9.643	10.049	10.455	10.862	11.275
11.697	11.597	11.342	11.077	10.795	10.490
10.158	9.794	9.396	8.960	8.485	7.969
7.410	6.807	6.159	5.462	4.715	3.916
3.057	2.131	1.116	0.000	0.000	

6.000	6.000	6.000	6.000	6.000	6.000
6.000	6.000	6.000	6.000	6.000	6.428
6.830	7.279	7.746	8.221	8.703	9.192
9.690	9.587	9.341	9.084	8.810	8.513
8.190	7.836	7.450	7.030	6.573	6.080
5.549	4.980	4.371	3.722	3.035	2.314
1.567	0.831	0.000	0.000		

4.000	4.000	4.000	4.000	4.000	4.000
4.000	4.000	4.000	4.000	4.000	4.000
4.000	4.627	5.229	5.825	6.434	7.056
7.685	7.576	7.346	7.102	6.839	6.553
6.242	5.903	5.535	5.137	4.707	4.246
3.757	3.242	2.693	2.102	1.466	0.805
0.000	0.000	0.000			

2.000	2.000	2.000	2.000	2.000	2.000
2.000	2.000	2.000	2.000	2.000	2.000
2.000	2.638	3.278	4.056	4.875	5.700
5.587	5.379	5.152	4.902	4.627	4.326
4.001	3.657	3.289	2.888	2.455	2.005
1.595	1.167	0.682	0.000	0.000	0.000

0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.446	2.657	3.757	3.648	3.471
3.269	3.035	2.762	2.451	2.119	1.826
1.523	1.165	0.691	0.000	0.000	0.000
0.000	0.000				

0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.998
1.863	1.785	1.667	1.520	1.326	1.051
0.643	0.000	0.000	0.000	0.000	0.000
0.000					

0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	

*** UPSTREAM SIDE RAPIDE DRAWDOWN ***

CASE 4-1 K=0.100 WL= 111.000

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-10.000	125.000	19.853	417.211	158.277	2.636
-10.000	130.000	24.850	481.456	186.023	2.588
-10.000	135.000	29.847	530.069	194.395	2.727
-15.000	125.000	19.684	356.009	166.921	2.133
-15.000	130.000	24.682	421.750	208.939	2.019
-15.000	135.000	29.679	471.285	222.657	2.117
-15.000	140.000	34.676	510.731	229.737	2.223
-15.000	145.000	39.673	544.823	235.335	2.315
-20.000	125.000	19.516	288.225	154.130	1.870
-20.000	130.000	24.514	346.656	204.194	1.698
-20.000	135.000	29.511	396.788	227.683	1.743
-20.000	140.000	34.508	438.703	240.941	1.821
-20.000	145.000	39.505	474.891	249.362	1.904
-20.000	150.000	44.502	506.535	254.527	1.990
-20.000	155.000	49.499	533.225	257.253	2.073
-25.000	125.000	19.348	224.561	134.777	1.666
-25.000	130.000	24.346	270.353	174.420	1.550
-25.000	135.000	29.343	315.296	205.611	1.533
-25.000	140.000	34.340	356.748	226.526	1.575
-25.000	145.000	39.337	393.835	240.481	1.638
-25.000	150.000	44.334	427.046	250.198	1.707
-25.000	155.000	49.331	456.212	256.825	1.776
-25.000	160.000	54.329	482.303	260.589	1.851
-25.000	165.000	59.326	505.673	262.805	1.924
-30.000	125.000	19.180	169.886	113.089	1.502
-30.000	130.000	24.178	204.166	137.429	1.486
-30.000	135.000	29.175	237.995	162.709	1.463
-30.000	140.000	34.172	274.244	188.202	1.457
-30.000	145.000	39.169	309.072	208.283	1.484
-30.000	150.000	44.166	342.056	224.607	1.523
-30.000	155.000	49.163	372.205	236.204	1.576
-30.000	160.000	54.161	399.759	244.220	1.637
-30.000	165.000	59.158	424.039	249.241	1.701
-30.000	170.000	64.155	447.475	254.065	1.761
-30.000	175.000	69.152	468.147	256.974	1.822
-35.000	125.000	19.012	113.847	78.980	1.441
-35.000	130.000	24.009	144.559	99.892	1.447
-35.000	135.000	29.007	171.142	120.408	1.421
-35.000	140.000	34.004	199.732	139.911	1.428
-35.000	145.000	39.001	227.138	158.988	1.429
-35.000	150.000	43.998	256.708	178.689	1.437
-35.000	155.000	48.995	285.474	195.198	1.462
-35.000	160.000	53.993	313.379	209.363	1.497
-35.000	165.000	58.990	339.108	219.615	1.544
-35.000	170.000	63.987	362.572	227.277	1.595
-35.000	175.000	68.984	385.053	233.858	1.647
-40.000	130.000	23.841	79.814	57.866	1.379
-40.000	135.000	28.839	101.293	72.032	1.406
-40.000	140.000	33.836	124.870	87.456	1.428
-40.000	145.000	38.833	150.446	104.032	1.446
-40.000	150.000	43.830	173.902	120.649	1.441
-40.000	155.000	48.827	198.433	138.318	1.435
-40.000	160.000	53.824	224.858	155.450	1.447
-40.000	165.000	58.822	249.076	170.590	1.460
-40.000	170.000	63.819	273.613	183.745	1.489
-40.000	175.000	68.816	296.828	194.913	1.523
-45.000	140.000	33.668	58.358	40.705	1.385
-45.000	145.000	38.665	72.841	51.952	1.402
-45.000	150.000	43.662	91.044	63.719	1.429
-45.000	155.000	48.659	111.297	76.861	1.448
-45.000	160.000	53.656	133.347	90.831	1.468
-45.000	165.000	58.654	157.108	105.696	1.486
-45.000	170.000	63.651	178.737	121.891	1.466
-45.000	175.000	68.648	202.266	137.582	1.470
-50.000	150.000	43.494	27.163	19.428	1.398
-50.000	155.000	48.491	38.706	27.211	1.422
-50.000	160.000	53.488	52.179	36.229	1.440
-50.000	165.000	58.486	67.509	46.108	1.464
-50.000	170.000	63.483	84.648	57.121	1.482
-50.000	175.000	68.480	103.823	69.251	1.499

F.S.-MIN. -40.000	130.000	23.841	79.814	57.866	1.379

CRITICAL CIRCLE

-37.500	127.500	21.427	97.853	69.877	1.400
-37.500	130.000	23.925	110.356	78.115	1.413
-37.500	132.500	26.424	123.262	86.380	1.427
-40.000	127.500	21.363	69.416	50.651	1.370
-40.000	130.000	23.841	79.814	57.866	1.379
-40.000	132.500	26.340	90.261	64.863	1.392
-42.500	127.500	21.259	44.932	32.735	1.373
-42.500	130.000	23.757	52.620	38.494	1.367
-42.500	132.500	26.256	60.986	44.536	1.369

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

-42.500	130.000	23.757	52.620	38.494	1.367

(N= 109.386 T= 36.648 NE= 3.665 TE= 10.939)
(NP= 3.938 TP= 9.025 PP= 67.318 SL= 0.000)
(WN= 25.026 WT= -0.088 WW= 25.200)

DAM KIBAN-MEN1 (-47.580,106.400) (0.000,104.800)

***** STABILITY ANALYSIS OF U.A.E AL BASSIERAH DAM *****

CASE 4-2	ZONE NO.	UNIT WEIGHT	FAI	COHESION
	1	2.250	38.000	0.000
	2	1.980	38.000	0.000
	3	2.300	36.000	0.000
	4	2.040	36.000	0.000
	5	2.300	36.000	0.000
	6	2.040	36.000	0.000
	7	2.040	36.000	0.000
	8	1.980	38.000	0.000

K=0.100

CASE 4-2 COORDINATE OF ZONES

ZONE NO. 1	-47.580 106.400	-45.900 107.000	-23.500 115.000
	-14.000 115.000	-27.890 105.730	
ZONE NO. 2	-23.500 115.000	-2.500 122.500	0.000 122.500
	0.010 122.000	-1.500 122.000	-3.750 120.500
	-5.750 120.500	-14.000 115.000	
ZONE NO. 3	-27.890 105.730	-14.000 115.000	-12.000 115.000
	-25.980 105.670		
ZONE NO. 4	-14.000 115.000	-5.750 120.500	-3.750 120.500
	-12.000 115.000		
ZONE NO. 5	-25.980 105.670	-12.000 115.000	-10.000 114.100
	-7.000 114.000	0.000 113.300	15.000 110.200
	22.200 108.200	31.500 102.000	0.000 104.800
ZONE NO. 6	-12.000 115.000	-3.750 120.500	-1.500 122.000
	0.010 122.000	1.500 122.000	6.750 118.500
	22.200 108.200	15.000 110.200	0.000 113.300
	-7.000 114.000	-10.000 114.100	
ZONE NO. 7	31.500 102.000	22.200 108.200	6.750 118.500
	6.750 118.500	32.000 103.000	51.250 103.000
	53.750 102.000		
ZONE NO. 8	32.000 103.000	6.750 118.500	6.750 118.500
	1.500 122.000	0.010 122.000	0.000 122.500
	2.500 122.500	51.250 103.000	

***POTENTIAL DISTRIBUTION *** CASE 4-2

Y= 2 XB= 2XE=42

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.256	10.597	11.149	11.824
12.575	13.374	14.206	15.058	15.925	16.804
17.695	17.595	17.315	17.024	16.718	16.392
16.041	15.662	15.251	14.806	14.324	13.803
13.240	12.634	11.981	11.278	10.520	9.700
8.807	7.823	6.722	5.468	4.000	

Y= 3 XB= 2XE=42

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.000	10.000	10.747	11.526
12.338	13.190	14.069	14.962	15.865	16.776
17.697	17.597	17.319	17.031	16.729	16.407
16.061	15.686	15.281	14.842	14.367	13.853
13.301	12.706	12.068	11.384	10.650	9.864
9.020	8.107	7.105	6.000	6.000	

Y= 4 XB= 2XE=41

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.000	10.000	10.000	10.827
11.650	12.629	13.651	14.673	15.684	16.687
17.690	17.587	17.320	17.043	16.751	16.439
16.103	15.740	15.348	14.925	14.469	13.979
13.454	12.894	12.296	11.659	10.985	10.277
9.543	8.819	8.000	8.000		

Y= 5 XB= 2XE=40

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.000	10.000	10.000	10.000
10.000	11.676	13.077	14.317	15.474	16.589
17.685	17.576	17.329	17.068	16.791	16.493
16.172	15.826	15.454	15.055	14.627	14.170
13.688	13.181	12.642	12.063	11.439	10.790
10.000	10.000	10.000			

Y= 6 XB= 3XE=38

12.000	12.000	12.000	12.000	12.000	12.000
12.000	12.000	12.000	12.000	12.000	12.000
12.000	13.219	14.302	15.437	16.573	17.700
17.587	17.366	17.127	16.868	16.584	16.277
15.948	15.603	15.235	14.838	14.410	13.967
13.564	13.144	12.649	12.000	12.000	12.000

Y= 7 XB= 5XE=36

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
14.000	15.370	16.600	17.757	17.648	17.463
17.255	17.015	16.738	16.425	16.092	15.799
15.499	15.146	14.679	14.000	14.000	14.000
14.000	14.000				

Y= 8 XB= 8XE=32

16.000	16.000	16.000	16.000	16.000	16.000
16.000	16.000	16.000	16.000	16.000	16.993
17.863	17.785	17.664	17.515	17.318	17.044
16.637	16.000	16.000	16.000	16.000	16.000
16.000					

Y= 9 XB=11XE=27

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	18.000	18.000	

PORE PRESSURE DISTRIBUTION CASE 4-2

6.000	6.000	6.000	6.000	6.000	6.000
6.000	6.000	6.256	6.597	7.149	7.824
8.575	9.374	10.206	11.058	11.925	12.804
13.695	13.595	13.315	13.024	12.718	12.392
12.081	11.662	11.251	10.806	10.324	9.803
9.240	8.634	7.981	7.278	6.520	5.700
4.807	3.823	2.722	1.468	0.000	
4.000	4.000	4.000	4.000	4.000	4.000
4.000	4.000	4.000	4.000	4.747	5.526
6.338	7.190	8.069	8.962	9.865	10.776
11.697	11.597	11.319	11.031	10.729	10.407
10.061	9.686	9.281	8.862	8.367	7.853
7.301	6.706	6.068	5.384	4.650	3.864
3.020	2.107	1.105	0.000	0.000	
2.000	2.000	2.000	2.000	2.000	2.000
2.000	2.000	2.000	2.000	2.000	2.827
3.650	4.629	5.651	6.673	7.684	8.687
9.690	9.587	9.320	9.043	8.751	8.439
8.103	7.740	7.348	6.925	6.469	5.979
5.454	4.894	4.296	3.659	2.985	2.277
1.543	0.819	0.000	0.000		
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.676	3.077	4.317	5.474	6.589
7.685	7.576	7.329	7.068	6.791	6.493
6.172	5.826	5.454	5.055	4.627	4.170
3.688	3.181	2.642	2.063	1.439	0.790
0.000	0.000	0.000			
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.219	2.302	3.437	4.573	5.700
5.587	5.366	5.127	4.868	4.584	4.277
3.948	3.603	3.235	2.838	2.410	1.967
1.564	1.144	0.649	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	1.370	2.600	3.757	3.648	3.463
3.255	3.015	2.738	2.425	2.092	1.799
1.499	1.146	0.679	0.000	0.000	0.000
0.000	0.000				
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.993
1.863	1.785	1.664	1.515	1.318	1.044
0.637	0.000	0.000	0.000	0.000	0.000
0.000					
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	

*** UPSTREAM SIDE RAPIDE DRAWDOWN ***

CASE 4-2 K=0.100 WL= 107.000

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-10.000	125.000	19.853	426.316	152.255	2.800
-10.000	130.000	24.850	494.184	178.735	2.765
-10.000	135.000	29.847	546.187	186.346	2.931
-15.000	125.000	19.684	375.720	156.859	2.395
-15.000	130.000	24.682	446.438	197.834	2.257
-15.000	135.000	29.679	499.805	211.207	2.366
-15.000	140.000	34.676	542.933	217.846	2.492
-15.000	145.000	39.673	580.322	223.300	2.599
-20.000	125.000	19.516	320.903	143.272	2.240
-20.000	130.000	24.514	384.000	192.552	1.994
-20.000	135.000	29.511	437.942	216.125	2.026
-20.000	140.000	34.508	482.749	229.741	2.101
-20.000	145.000	39.505	521.464	238.492	2.187
-20.000	150.000	44.502	555.410	243.971	2.277
-20.000	155.000	49.499	583.738	247.197	2.361
-25.000	125.000	19.348	269.568	128.080	2.105
-25.000	130.000	24.346	318.616	167.695	1.900
-25.000	135.000	29.343	366.134	199.089	1.839
-25.000	140.000	34.340	409.628	220.201	1.860
-25.000	145.000	39.337	448.476	236.341	1.914
-25.000	150.000	44.336	482.956	244.370	1.976
-25.000	155.000	49.331	512.997	251.358	2.041
-25.000	160.000	54.329	540.191	255.294	2.116
-25.000	165.000	59.326	564.480	257.716	2.190
-30.000	125.000	19.180	220.788	115.356	1.914
-30.000	130.000	24.178	258.490	139.559	1.852
-30.000	135.000	29.175	294.356	164.560	1.789
-30.000	140.000	34.172	332.418	189.731	1.752
-30.000	145.000	39.169	368.477	209.546	1.758
-30.000	150.000	44.166	402.218	225.731	1.782
-30.000	155.000	49.163	433.016	237.169	1.826
-30.000	160.000	54.161	461.237	245.000	1.883
-30.000	165.000	59.158	486.045	249.891	1.945
-30.000	170.000	64.155	509.808	254.645	2.002
-30.000	175.000	69.152	530.749	257.497	2.061
-35.000	125.000	19.012	157.965	86.892	1.818
-35.000	130.000	24.009	193.717	108.354	1.788
-35.000	135.000	29.007	223.861	129.051	1.735
-35.000	140.000	34.004	255.251	148.414	1.720
-35.000	145.000	39.001	284.431	167.286	1.700
-35.000	150.000	43.998	315.582	186.705	1.690
-35.000	155.000	48.995	345.430	202.816	1.703
-35.000	160.000	53.993	374.281	216.564	1.728
-35.000	165.000	58.990	400.750	226.402	1.770
-35.000	170.000	63.987	424.764	233.701	1.818
-35.000	175.000	68.984	447.629	239.927	1.866
-40.000	130.000	23.841	113.497	67.419	1.683
-40.000	135.000	28.839	138.830	81.989	1.693
-40.000	140.000	33.836	165.857	97.658	1.698
-40.000	145.000	38.833	194.496	114.313	1.701
-40.000	150.000	43.830	220.880	131.030	1.686
-40.000	155.000	48.827	247.825	148.703	1.667
-40.000	160.000	53.824	276.392	165.723	1.668
-40.000	165.000	58.822	302.355	180.760	1.673
-40.000	170.000	63.819	328.516	193.696	1.696
-40.000	175.000	68.816	353.092	204.608	1.726
-45.000	140.000	33.668	80.410	48.894	1.645
-45.000	145.000	38.665	100.016	60.523	1.653
-45.000	150.000	43.662	120.916	72.451	1.669
-45.000	155.000	48.659	143.849	85.818	1.676
-45.000	160.000	53.656	168.350	99.919	1.685
-45.000	165.000	58.654	194.498	114.910	1.693
-45.000	170.000	63.651	218.389	131.201	1.665
-45.000	175.000	68.648	244.106	146.958	1.661
-50.000	150.000	43.494	40.157	24.265	1.655
-50.000	155.000	48.491	54.000	32.473	1.663
-50.000	160.000	53.488	69.967	41.999	1.666
-50.000	165.000	58.486	87.408	52.152	1.676
-50.000	170.000	63.483	106.843	63.530	1.682
-50.000	175.000	68.480	127.973	75.848	1.687

F.S.-MIN.

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-45.000	140.000	33.668	80.410	48.894	1.645

CRITICAL CIRCLE

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-42.500	137.500	31.253	109.528	65.843	1.663
-42.500	140.000	33.752	120.784	72.315	1.670
-42.500	142.500	36.250	132.680	79.406	1.671
-45.000	137.500	31.169	71.304	43.466	1.640
-45.000	140.000	33.668	80.410	48.894	1.645
-45.000	142.500	36.166	89.990	54.600	1.648
-47.500	137.500	31.085	39.006	23.830	1.637
-47.500	140.000	33.584	45.768	27.992	1.635
-47.500	142.500	36.082	52.958	32.342	1.637

CRITICAL SLIP CIRCLE AND ITS COMPONENT

-47.500	140.000	33.584	45.768	27.992	1.635
(N=	62.658	T= 21.890	NE= 2.189	TE= 6.266)	
(NP=	0.017	TP= 0.164	PP= 1.890	SL= 0.000)	
(WN=	0.000	WT= 0.000	WW= 0.000	)	

DAN KIBAN-MEN: (-47.580,106.400) (0.000,104.800)

TABLE 3-1 (E) STABILITY ANALYSIS OF AL BASSIERAH DAM

CASE 5 FLOOD WATER CONDITION

5-1 UPSTREAM SLOPE

5-2 DOWNSTREAM SLOPE

***** STABILITY ANALYSIS OF U.A.E AL BASSIERAH DAM *****

CASE 5	ZONE NO.	UNIT WEIGHT	FAI	COHESION
	1	2.250	38.000	0.000
	2	1.980	38.000	0.000
	3	2.300	38.000	0.000
	4	2.300	36.000	0.000
	5	2.040	36.000	0.000
	6	2.040	36.000	0.000
	7	1.980	38.000	0.000

K=0.000

CASE 5 COORDINATE OF ZONES

ZONE NO. 1	-47.580 106.400	-8.100 120.500	-5.750 120.500
	-27.890 105.730		
ZONE NO. 2	-8.100 120.500	-2.500 122.500	0.000 122.500
	0.010 122.000	-1.500 122.000	-3.750 120.500
	-5.750 120.500		
ZONE NO. 3	-27.890 105.730	-5.750 120.500	-3.750 120.500
	-25.980 105.670		
ZONE NO. 4	-25.980 105.670	-3.750 120.500	-2.000 119.400
	0.000 119.000	2.000 118.300	9.000 115.800
	14.700 113.200	31.500 102.000	0.000 104.800
ZONE NO. 5	-3.750 120.500	-1.500 122.000	0.010 122.000
	1.500 122.000	6.750 118.500	14.700 113.200
	9.000 115.800	2.000 118.300	0.000 119.000
	-2.000 119.400		
ZONE NO. 6	31.500 102.000	14.700 113.200	6.750 118.500
	6.750 118.500	32.000 103.000	51.250 103.000
	53.750 102.000		
ZONE NO. 7	32.000 103.000	8.750 118.500	6.750 118.500
	1.500 122.000	0.010 122.000	0.000 122.500
	2.500 122.500	51.250 103.000	

***POTENTIAL DISTRIBUTION *** CASE 5

Y= 2 XB= 2XE=42

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	21.988	21.970	21.935
21.886	21.821	21.738	21.631	21.499	21.336
21.138	20.901	20.619	20.290	19.908	19.472
18.977	18.422	17.805	17.127	16.389	15.591
14.735	13.825	12.864	11.855	10.802	9.709
8.581	7.433	6.303	5.293	4.000	

Y= 3 XB= 2XE=42

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	22.000	22.000	21.957
21.905	21.839	21.755	21.649	21.517	21.354
21.157	20.921	20.640	20.312	19.932	19.497
19.004	18.451	17.637	17.162	16.426	15.631
14.779	13.873	12.916	11.911	10.861	9.766
8.616	7.377	6.000	6.000	6.000	

Y= 4 XB= 2XE=40

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	22.000	22.000	22.000
21.947	21.885	21.799	21.690	21.555	21.390
21.190	20.952	20.671	20.343	19.964	19.531
19.042	18.494	17.887	17.220	16.495	15.712
14.875	13.985	13.046	12.065	11.052	10.033
9.066	8.000	8.000			

Y= 5 XB= 2XE=39

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	21.891	21.768	21.625	21.454
21.250	21.008	20.724	20.395	20.017	19.587
19.104	18.565	17.969	17.318	16.611	15.851
15.039	14.175	13.258	12.277	11.204	10.000
10.000	10.000				

Y= 6 XB= 5XE=37

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	22.000	22.000	22.000
21.877	21.743	21.568	21.357	21.109	20.821
20.490	20.114	19.689	19.213	18.687	18.108
17.478	16.800	16.076	15.311	14.515	13.697
12.898	12.000	12.000			

Y= 7 XB= 8XE=36

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	22.000	22.000	21.777
21.540	21.280	20.987	20.654	20.280	19.862
19.398	18.887	18.329	17.724	17.072	16.378
15.643	14.895	14.000	14.000	14.000	

Y= 8 XB=10XE=34

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	22.000	21.770	21.533
21.243	20.911	20.542	20.134	19.686	19.199
18.671	18.096	17.471	16.812	16.000	16.000
16.000					

Y= 9 XB=13XE=32

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000	21.641	21.285	20.916
20.521	20.093	19.635	19.185	18.669	18.000
18.000	18.000				

Y=10 XB=16XE=30

22.000	22.000	22.000	22.000	22.000	22.000
22.000	21.682	21.378	21.038	20.608	20.000
20.000	20.000	20.000			

Y=11 XB=19XE=27

22.000	22.000	22.000	22.000	22.000	22.000
22.000	22.000	22.000			

PORE PRESSURE DISTRIBUTION CASE 5

18.000	18.000	18.000	18.000	18.000	18.000
18.000	18.000	18.000	17.988	17.970	17.935
17.886	17.821	17.738	17.631	17.499	17.336
17.138	16.901	16.619	16.290	15.908	15.472
14.977	14.422	13.805	13.127	12.389	11.591
10.735	9.825	8.864	7.855	6.802	5.709
4.581	3.433	2.303	1.293	0.000	

16.000	16.000	16.000	16.000	16.000	16.000
16.000	16.000	16.000	16.000	16.000	15.957
15.905	15.839	15.755	15.649	15.517	15.354
15.157	14.921	14.640	14.312	13.932	13.497
13.004	12.451	11.837	11.162	10.426	9.631
8.779	7.873	6.916	5.911	4.861	3.766
2.616	1.377	0.000	0.000	0.000	

14.000	14.000	14.000	14.000	14.000	14.000
14.000	14.000	14.000	14.000	14.000	14.000
13.947	13.885	13.799	13.690	13.555	13.390
13.190	12.952	12.671	12.343	11.964	11.531
11.042	10.494	9.887	9.220	8.495	7.712
6.875	5.985	5.046	4.065	3.052	2.033
1.066	0.000	0.000			

12.000	12.000	12.000	12.000	12.000	12.000
12.000	12.000	12.000	12.000	12.000	12.000
12.000	12.000	11.891	11.768	11.625	11.454
11.250	11.008	10.724	10.395	10.017	9.587
9.104	8.565	7.969	7.318	6.611	5.851
5.039	4.175	3.258	2.277	1.204	0.000
0.000	0.000				

10.000	10.000	10.000	10.000	10.000	10.000
10.000	10.000	10.000	10.000	10.000	10.000
9.877	9.743	9.568	9.357	9.109	8.821
8.490	8.114	7.689	7.213	6.687	6.108
5.478	4.800	4.076	3.311	2.515	1.697
0.898	0.000	0.000			

8.000	8.000	8.000	8.000	8.000	8.000
8.000	8.000	8.000	8.000	8.000	7.777
7.540	7.280	6.987	6.654	6.280	5.862
5.398	4.887	4.329	3.724	3.072	2.378
1.643	0.895	0.000	0.000	0.000	

6.000	6.000	6.000	6.000	6.000	6.000
6.000	6.000	6.000	6.000	5.770	5.533
5.243	4.911	4.542	4.134	3.686	3.199
2.671	2.096	1.471	0.812	0.000	0.000
0.000					

4.000	4.000	4.000	4.000	4.000	4.000
4.000	4.000	4.000	3.641	3.285	2.916
2.521	2.093	1.635	1.185	0.669	0.000
0.000	0.000				

2.000	2.000	2.000	2.000	2.000	2.000
2.000	1.682	1.378	1.038	0.608	0.000
0.000	0.000	0.000			

0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000			

*** UPSTREAM SIDE WITH FLOOD WATER LEVEL ***
K=0.000 WL= 120.500

CASE 5-1

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-10.000	125.000	19.853	375.219	93.247	4.024
-10.000	130.000	24.850	435.861	110.779	3.935
-10.000	135.000	29.847	480.227	110.421	4.349
-15.000	125.000	19.684	314.243	102.382	3.069
-15.000	130.000	24.682	376.780	131.889	2.857
-15.000	135.000	29.679	423.553	136.921	3.093
-15.000	140.000	34.676	461.842	137.126	3.368
-15.000	145.000	39.673	494.968	136.227	3.633
-20.000	125.000	19.516	249.726	91.476	2.730
-20.000	130.000	24.514	306.940	128.691	2.385
-20.000	135.000	29.511	355.023	143.243	2.478
-20.000	140.000	34.508	394.916	149.087	2.649
-20.000	145.000	39.505	429.466	151.492	2.835
-20.000	150.000	44.502	460.094	151.930	3.028
-20.000	155.000	49.499	486.265	151.002	3.220
-25.000	125.000	19.348	190.535	73.278	2.600
-25.000	130.000	24.346	234.670	103.895	2.259
-25.000	135.000	29.343	277.959	127.033	2.188
-25.000	140.000	34.340	317.834	141.252	2.250
-25.000	145.000	39.337	353.469	149.661	2.362
-25.000	150.000	44.334	385.301	154.579	2.493
-25.000	155.000	49.331	412.694	156.609	2.635
-25.000	160.000	54.329	437.213	156.482	2.794
-25.000	165.000	59.326	459.752	155.690	2.953
-30.000	125.000	19.180	138.921	54.789	2.536
-30.000	130.000	24.178	169.784	72.209	2.351
-30.000	135.000	29.175	201.775	91.574	2.203
-30.000	140.000	34.172	237.022	112.127	2.114
-30.000	145.000	39.169	270.703	127.249	2.127
-30.000	150.000	44.166	302.392	138.665	2.181
-30.000	155.000	49.163	331.332	146.004	2.269
-30.000	160.000	54.161	357.931	150.490	2.378
-30.000	165.000	59.158	381.068	152.293	2.502
-30.000	170.000	64.155	403.346	153.886	2.621
-30.000	175.000	69.152	422.605	153.805	2.748
-35.000	125.000	19.012	94.750	36.971	2.563
-35.000	130.000	24.009	117.264	47.801	2.453
-35.000	135.000	29.007	137.934	59.583	2.315
-35.000	140.000	34.004	161.963	72.811	2.224
-35.000	145.000	39.001	187.373	87.474	2.142
-35.000	150.000	43.998	216.136	103.702	2.084
-35.000	155.000	48.995	244.180	116.682	2.093
-35.000	160.000	53.993	271.393	127.271	2.132
-35.000	165.000	58.990	296.204	134.142	2.208
-35.000	170.000	63.987	318.776	138.735	2.298
-35.000	175.000	68.984	340.650	142.616	2.389
-40.000	130.000	23.841	68.434	28.851	2.372
-40.000	135.000	28.839	83.632	35.408	2.362
-40.000	140.000	33.836	100.208	42.865	2.338
-40.000	145.000	38.833	118.604	51.550	2.301
-40.000	150.000	43.830	136.896	61.494	2.226
-40.000	155.000	48.827	157.600	73.518	2.144
-40.000	160.000	53.824	181.370	86.320	2.101
-40.000	165.000	58.822	204.847	98.276	2.084
-40.000	170.000	63.819	228.508	108.342	2.109
-40.000	175.000	68.816	251.337	116.745	2.153
-45.000	140.000	33.668	48.072	21.123	2.276
-45.000	145.000	38.665	59.641	26.356	2.263
-45.000	150.000	43.662	72.139	31.806	2.268
-45.000	155.000	48.659	86.224	38.207	2.257
-45.000	160.000	53.656	102.031	45.585	2.238
-45.000	165.000	58.654	119.976	54.200	2.214
-45.000	170.000	63.651	137.957	64.967	2.123
-45.000	175.000	68.648	158.276	75.823	2.087
-50.000	150.000	43.494	23.379	10.521	2.222
-50.000	155.000	48.491	31.404	14.059	2.234
-50.000	160.000	53.488	40.854	18.348	2.227
-50.000	165.000	58.486	51.301	22.991	2.231
-50.000	170.000	63.483	63.095	28.302	2.229
-50.000	175.000	68.480	76.545	34.534	2.217

F.S.-MIN.

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-35.000	150.000	43.998	216.136	103.702	2.084

CRITICAL CIRCLE

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
-32.500	147.500	41.584	244.630	116.057	2.108
-32.500	150.000	44.082	260.207	123.216	2.112
-32.500	152.500	46.581	275.190	129.103	2.132
-35.000	147.500	41.500	201.555	95.566	2.109
-35.000	150.000	43.998	216.136	103.702	2.084
-35.000	152.500	46.497	229.918	109.912	2.092
-37.500	147.500	41.416	161.618	74.426	2.172
-37.500	150.000	43.914	173.823	81.054	2.145
-37.500	152.500	46.413	187.322	88.833	2.109

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

-35.000	150.000	43.998	216.136	103.702	2.084

(N= 484.748 T= 158.923 NE= 0.000 TE= 0.000)
(NP= 38.830 TP= 69.229 PP= 465.889 SL= 0.000)
(WN= 232.488 WT= 14.008 WW= 237.600)

DAM KIBAN-NENI (-47.580,106.400) (0.000,104.800)

*** DOWNSTREAM SIDE WITH FLOOD WATER LEVEL ***
K=0.000 WL= 120.500

CASE 5-2

X	Y	R	RESISTING.F.	SLIDING.F.	F.S.
10.000	125.000	21.006	478.869	85.470	5.603
10.000	130.000	25.986	537.749	85.766	6.270
10.000	135.000	30.967	584.718	85.158	6.866
15.000	125.000	21.449	464.371	118.617	3.915
15.000	130.000	26.429	528.964	134.921	3.921
15.000	135.000	31.409	578.008	135.169	4.276
15.000	140.000	36.390	618.048	133.250	4.638
15.000	145.000	41.370	650.948	130.352	4.994
20.000	125.000	21.891	427.194	125.596	3.401
20.000	130.000	26.872	498.602	165.881	3.006
20.000	135.000	31.852	554.317	176.135	3.147
20.000	140.000	36.833	597.667	177.010	3.376
20.000	145.000	41.813	634.380	174.820	3.629
20.000	150.000	46.793	665.094	171.553	3.877
20.000	155.000	51.774	693.024	167.573	4.136
25.000	125.000	22.334	391.228	143.292	2.730
25.000	130.000	27.315	457.269	182.904	2.500
25.000	135.000	32.295	515.410	200.528	2.570
25.000	140.000	37.275	563.816	209.330	2.693
25.000	145.000	42.256	605.111	210.344	2.877
25.000	150.000	47.236	639.794	208.743	3.065
25.000	155.000	52.216	669.392	205.552	3.257
25.000	160.000	57.197	695.508	201.608	3.450
25.000	165.000	62.177	719.325	197.685	3.639
30.000	125.000	22.777	343.404	133.897	2.565
30.000	130.000	27.757	402.181	172.142	2.336
30.000	135.000	32.738	458.982	200.789	2.286
30.000	140.000	37.718	510.738	221.210	2.309
30.000	145.000	42.698	555.345	230.872	2.405
30.000	150.000	47.679	593.100	234.296	2.531
30.000	155.000	52.659	626.888	234.075	2.678
30.000	160.000	57.639	656.550	232.049	2.829
30.000	165.000	62.620	682.274	228.584	2.985
30.000	170.000	67.600	705.986	225.205	3.135
30.000	175.000	72.580	726.869	221.285	3.285
35.000	125.000	23.000	277.852	120.310	2.309
35.000	130.000	28.000	331.793	154.991	2.141
35.000	135.000	33.000	382.304	181.400	2.108
35.000	140.000	38.000	432.595	206.168	2.098
35.000	145.000	43.000	480.051	225.371	2.130
35.000	150.000	48.000	523.970	238.187	2.200
35.000	155.000	53.000	563.606	245.765	2.293
35.000	160.000	58.000	598.455	249.009	2.403
35.000	165.000	63.000	628.982	249.299	2.523
35.000	170.000	68.000	656.503	247.872	2.649
35.000	175.000	73.000	682.032	245.428	2.779
40.000	125.000	23.000	198.776	92.497	2.149
40.000	130.000	28.000	238.204	114.364	2.083
40.000	135.000	33.000	279.428	138.061	2.024
40.000	140.000	38.000	325.644	162.980	1.998
40.000	145.000	43.000	371.808	186.916	1.989
40.000	150.000	48.000	417.415	209.721	1.990
40.000	155.000	53.000	459.213	225.702	2.035
40.000	160.000	58.000	498.100	237.537	2.097
40.000	165.000	63.000	533.505	245.123	2.176
40.000	170.000	68.000	565.024	248.762	2.271
40.000	175.000	73.000	593.103	249.582	2.376
45.000	130.000	28.000	158.057	76.242	2.073
45.000	135.000	33.000	191.251	92.126	2.076
45.000	140.000	38.000	226.363	110.166	2.055
45.000	145.000	43.000	258.811	129.499	1.999
45.000	150.000	48.000	295.071	150.742	1.957
45.000	155.000	53.000	337.716	173.525	1.946
45.000	160.000	58.000	380.578	195.721	1.944
45.000	165.000	63.000	420.629	212.595	1.979
45.000	170.000	68.000	456.010	225.314	2.024
45.000	175.000	73.000	489.469	233.702	2.094
50.000	140.000	38.000	131.918	65.492	2.014
50.000	145.000	43.000	159.743	79.151	2.018
50.000	150.000	48.000	190.349	94.424	2.016
50.000	155.000	53.000	223.292	110.668	2.018
50.000	160.000	58.000	252.259	128.096	1.969
50.000	165.000	63.000	287.702	147.691	1.948
50.000	170.000	68.000	325.867	168.685	1.932
50.000	175.000	73.000	364.977	187.219	1.949
55.000	150.000	48.000	93.058	47.010	1.980
55.000	155.000	53.000	116.101	58.385	1.989
55.000	160.000	58.000	141.728	71.052	1.995
55.000	165.000	63.000	170.142	85.268	1.995
55.000	170.000	68.000	200.273	100.543	1.992
55.000	175.000	73.000	229.841	116.960	1.965

F.S.-MIN.					
50.000	170.000	68.000	325.867	168.685	1.932

CRITICAL CIRCLE

47.500	167.500	65.500	374.277	192.464	1.945
47.500	170.000	68.000	394.123	201.388	1.957
47.500	172.500	70.500	411.188	208.198	1.975
50.000	167.500	65.500	307.759	158.430	1.943
50.000	170.000	68.000	325.867	168.685	1.932
50.000	172.500	70.500	345.574	178.413	1.937
52.500	167.500	65.500	243.135	123.751	1.965
52.500	170.000	68.000	259.472	132.998	1.951
52.500	172.500	70.500	277.457	142.550	1.946

****
CRITICAL SLIP CIRCLE AND ITS COMPONENT
****

50.000	170.000	68.000	325.867	168.685	1.932

(N= 440.223 T= 168.863 NE= 0.000 TE= 0.000)
(NP= 0.106 TP= 0.179 PP= 0.412 SL= 0.000)
(WN= 0.000 WT= 0.000 WW= 0.000)

DAM KIBAN-MEN: (53.750,102.000) (31.500,102.000)
(0.000,104.800)

STRESS ANALYSIS OF CONDUIT

TABLE 3-2(A) Basic Data of Conduit

*** MATERIAL MODULUS ***

	UNIT WEIGHT	COHESION	FRICTION ANGLE	POISSON'S RATIO	MODULUS OF DEFORMATION
CONCRETE	2.300	230.000	0.000	0.200	2000000.000
SAND & GRAVEL	2.040	0.000	36.000	0.300	50000.000

TABLE 3-2(B) Displacement of Calculation Points

STEP= 1

NODE DISPLACEMENT UNIT:METER

	(X)	(Y)							
1)	-0.0000	-0.0000	2)	-0.0000	-0.0000	3)	0.0000	-0.0000	4)	-0.0000	-0.0000
5)	0.0000	-0.0000	6)	-0.0000	-0.0000	7)	0.0000	-0.0000	8)	-0.0000	-0.0007
9)	-0.0000	-0.0007	10)	-0.0001	-0.0009	11)	0.0000	-0.0009	12)	-0.0000	-0.0014
13)	0.0000	-0.0014	14)	0.0000	-0.0014	15)	0.0000	-0.0014	16)	0.0000	-0.0018
17)	0.0000	-0.0018	18)	0.0000	-0.0018	19)	-0.0000	-0.0021	20)	0.0001	-0.0020
21)	0.0000	-0.0019	22)	0.0000	-0.0018	23)	0.0000	-0.0018	24)	-0.0000	-0.0028
25)	0.0000	-0.0028	26)	0.0001	-0.0028	27)	0.0001	-0.0025	28)	-0.0000	-0.0019
29)	-0.0000	-0.0019	30)	0.0000	-0.0019	31)	0.0000	-0.0019	32)	0.0000	-0.0018
33)	0.0000	-0.0018	34)	0.0000	-0.0018	35)	-0.0000	-0.0019	36)	-0.0000	-0.0019
37)	-0.0000	-0.0019	38)	-0.0000	-0.0019	39)	-0.0000	-0.0019	40)	0.0000	-0.0019
41)	-0.0000	-0.0019	42)	0.0000	-0.0020	43)	-0.0000	-0.0019	44)	-0.0000	-0.0019

TABLE 3-2(C) Distribution of Stress (1)

STEP= 1

UNIT OF STRESS : TON/M2----(+) TENSION, (-) COMPRESSION
UNIT OF ANGLE : DEGREE----DIRECTION OF LEFT TO HORIZONTAL PLANE

(ELEMENT)	(COORDINATES-X,Y)		SIGMA-X	SIGMA-Y	TAU-XY	SIGMA-1	SIGMA-3	ANGLE	SAFETY FACTOR
(1, 1)	4.91	4.75	-44.088	-32.537	-21.334	-16.209	-60.416	127.4	10.41
(1, 2)	4.93	4.57	-18.113	-19.083	-17.540	-1.051	-36.145	135.8	13.11
(1, 3)	4.95	4.39	32.545	2.413	-5.695	33.585	1.373	169.4	14.28
(1, 4)	4.58	4.75	-8.441	-39.376	-10.968	-4.947	-42.869	162.3	12.13
(1, 5)	4.68	4.57	-3.019	-29.674	-14.531	3.370	-36.063	156.3	11.47
(1, 6)	4.76	4.41	7.081	-15.781	-18.520	17.414	-26.114	150.8	10.57
(1, 7)	4.26	4.73	21.724	-39.683	-7.659	22.439	-60.397	174.7	5.55
(1, 8)	4.42	4.49	1.944	-41.713	-19.592	7.491	-67.259	164.2	4.15
(1, 9)	4.57	4.28	-20.546	-63.452	-34.578	-1.353	-82.845	151.0	5.44
(2, 1)	4.08	4.66	34.618	-44.815	5.569	35.007	-45.204	4.0	5.73
(2, 2)	4.29	4.41	10.599	-41.167	-16.314	14.133	-64.701	167.8	5.84
(2, 3)	4.46	4.18	-31.919	-77.042	-44.633	-4.449	-104.492	148.4	4.60
(2, 4)	3.80	4.48	15.333	-41.361	19.734	21.526	-47.553	17.4	6.64
(2, 5)	4.07	4.25	0.306	-69.035	-9.217	1.310	-70.239	172.4	4.41
(2, 6)	4.33	4.03	-23.139	-106.910	-46.166	-2.689	-127.360	156.1	3.69
(2, 7)	3.52	4.29	-4.529	-37.446	35.430	18.079	-60.054	32.5	5.89
(2, 8)	3.87	4.06	-12.144	-75.409	5.729	-11.629	-75.923	5.1	7.15
(2, 9)	4.22	3.83	-23.344	-129.103	-28.934	-15.945	-136.501	165.7	3.82
(3, 1)	3.50	4.03	-25.104	-86.086	26.689	-15.073	-96.117	20.6	5.68
(3, 2)	3.85	3.85	-21.333	-95.289	10.284	-19.929	-96.693	7.8	5.99
(3, 3)	4.20	3.67	-20.619	-136.633	-9.727	-19.809	-137.443	175.2	3.91
(3, 4)	3.70	3.35	-27.514	-98.879	18.292	-23.099	-103.293	13.6	5.74
(3, 5)	3.98	3.35	-28.940	-95.032	16.897	-24.870	-99.101	13.5	6.20
(3, 6)	4.27	3.35	-41.441	-135.284	18.139	-38.057	-138.668	10.6	4.57
(3, 7)	3.91	2.67	-29.787	-112.971	9.425	-28.732	-114.025	6.4	5.39
(3, 8)	4.15	2.88	-30.257	-93.162	22.100	-23.269	-100.150	17.5	5.98
(3, 9)	4.39	3.09	-35.927	-95.652	41.898	-14.338	-117.241	27.3	4.47
(4, 1)	4.08	2.47	-17.729	-91.135	-0.114	-17.729	-91.135	179.9	6.27
(4, 2)	4.29	2.73	-31.457	-72.227	19.744	-23.463	-80.221	22.0	8.10
(4, 3)	4.50	2.98	-52.826	-62.726	45.017	-12.487	-103.065	41.9	5.08
(4, 4)	4.48	2.46	-46.485	-54.101	11.544	-38.137	-62.449	35.9	18.92
(4, 5)	4.60	2.67	-44.516	-32.377	19.655	-17.876	-59.018	53.6	11.18
(4, 6)	4.72	2.89	-40.856	-6.700	25.024	6.518	-54.074	62.2	7.59
(4, 7)	4.68	2.46	-79.902	-34.649	24.334	-22.555	-91.995	65.3	6.62
(4, 8)	4.91	2.65	-66.494	-31.034	24.082	-18.859	-78.669	63.2	7.69
(4, 9)	4.94	2.85	-35.996	-18.368	6.884	-16.016	-38.368	71.0	20.58
(5, 1)	0.26	2.67	-15.407	-39.912	0.376	-15.401	-39.918	0.9	1.45
(5, 2)	0.26	3.60	-14.868	-39.395	0.408	-14.861	-39.401	1.0	1.42
(5, 3)	0.26	4.53	-15.482	-39.371	-0.120	-15.481	-39.371	179.7	1.48
(5, 4)	1.17	2.67	-15.659	-38.560	0.750	-15.635	-38.605	1.9	1.52
(5, 5)	1.17	3.60	-14.749	-39.474	0.675	-14.731	-39.493	1.4	1.41
(5, 6)	1.17	4.53	-14.992	-40.862	0.039	-14.992	-40.862	0.1	1.39
(5, 7)	2.09	2.67	-15.397	-36.514	1.459	-15.495	-36.615	4.0	1.59
(5, 8)	2.09	3.60	-14.316	-38.819	1.276	-14.249	-38.886	3.0	1.39
(5, 9)	2.09	4.53	-14.187	-41.619	0.532	-14.177	-41.629	1.1	1.31

Distribution of Stress (2)

STEP= 1

UNIT OF STRESS : TON/M2----(+) TENSION, (-) COMPRESSION
UNIT OF ANGLE : DEGREE----DIRECTION OF LEFT TO HORIZONTAL PLANE

(ELEMENT)	(COORDINATES-X,Y)		SIGMA-X	SIGMA-Y	TAU-XY	SIGMA-1	SIGMA-3	ANGLE	SAFETY FACTOR
(6, 1)	2.52	2.66	-16.153	-36.450	2.291	-15.898	-36.706	6.4	1.63
(6, 2)	2.49	3.57	-16.869	-38.891	1.651	-16.756	-39.004	3.9	1.43
(6, 3)	2.47	4.48	-10.914	-40.132	1.753	-10.809	-40.236	3.4	1.12
(6, 4)	3.09	2.64	-15.064	-33.592	-3.082	-14.565	-34.092	170.8	1.60
(6, 5)	2.98	3.47	-16.186	-34.840	1.286	-16.087	-34.939	4.4	2.02
(6, 6)	2.87	4.31	-20.411	-34.427	9.039	-15.981	-38.857	26.1	1.56
(6, 7)	3.67	2.62	-10.317	-21.909	-9.514	-4.973	-27.254	150.7	0.93 NG
(6, 8)	3.47	3.38	-16.544	-17.122	0.133	-16.515	-17.152	12.4	33.99
(6, 9)	3.28	4.14	-23.473	-7.240	16.826	3.325	-34.038	57.9	0.53 NG
(7, 1)	0.26	0.27	-16.465	-37.659	-0.210	-16.463	-37.661	179.4	1.64
(7, 2)	0.26	1.20	-17.070	-38.661	-0.218	-17.066	-38.663	179.4	1.66
(7, 3)	0.26	2.13	-15.686	-36.897	0.211	-15.686	-36.899	0.5	1.53
(7, 4)	1.17	0.27	-17.198	-39.079	-0.608	-17.181	-39.096	178.4	1.65
(7, 5)	1.17	1.20	-17.688	-38.811	-0.164	-17.686	-38.812	179.6	1.72
(7, 6)	1.17	2.13	-16.390	-37.777	0.717	-16.366	-37.801	1.9	1.62
(7, 7)	2.09	0.27	-18.002	-40.664	-1.153	-17.944	-40.723	177.1	1.66
(7, 8)	2.09	1.20	-18.376	-39.126	-0.257	-18.373	-39.129	179.3	1.78
(7, 9)	2.09	2.13	-16.964	-36.821	1.075	-16.905	-36.879	3.1	1.73
(8, 1)	2.52	0.27	-17.697	-40.089	-0.904	-17.660	-40.126	177.7	1.65
(8, 2)	2.52	1.20	-18.080	-38.702	1.186	-18.012	-38.770	3.3	1.76
(8, 3)	2.52	2.13	-16.960	-36.671	2.341	-16.686	-36.945	6.7	1.70
(8, 4)	3.12	0.27	-17.598	-40.135	-1.936	-17.433	-40.300	175.1	1.62
(8, 5)	3.12	1.20	-18.391	-40.650	-2.037	-18.206	-40.835	174.8	1.68
(8, 6)	3.12	2.13	-17.680	-40.521	-3.074	-17.273	-40.928	172.5	1.58
(8, 7)	3.73	0.27	-19.691	-45.761	-2.877	-19.575	-46.077	173.7	1.59
(8, 8)	3.73	1.20	-21.093	-48.179	-5.169	-20.140	-49.132	169.6	1.54
(8, 9)	3.73	2.13	-20.791	-49.952	-8.397	-18.546	-52.197	165.0	1.35
(9, 1)	4.02	0.27	-18.873	-47.873	-1.937	-18.744	-48.002	176.2	1.47
(9, 2)	4.02	1.20	-16.852	-49.045	-0.557	-16.843	-49.054	179.0	1.31
(9, 3)	4.02	2.13	-20.770	-52.761	1.788	-20.670	-52.861	3.2	1.47
(9, 4)	4.45	0.27	-19.603	-49.288	-1.153	-19.558	-49.333	177.8	1.49
(9, 5)	4.45	1.20	-17.439	-49.135	-0.467	-17.432	-49.142	179.2	1.35
(9, 6)	4.45	2.13	-21.213	-51.526	1.185	-21.167	-51.573	2.2	1.54
(9, 7)	4.88	0.27	-20.275	-50.568	-0.437	-20.268	-50.575	179.2	1.50
(9, 8)	4.88	1.20	-17.968	-49.090	-0.444	-17.961	-49.096	179.2	1.36
(9, 9)	4.88	2.13	-21.598	-50.156	0.514	-21.589	-50.166	1.0	1.61

TABLE 4-1. List of Equipment

Equipment	No	Specifications
Bulldozer	12	21 t
Scraper	8	12 m^3
Tractor	6	21 t
Backhoe shovel	1	1.2 m^3
Wheel type Loader	4	2.0 m^3
Vibrating rollor	2	11 t
Dump truck	14	11 t
Truck crane	2	13 t
Agitator truck	3	3.0 m^3
Water truck	4	6,000 ℓ
Crawler drill	2	2.0 t
Drill (H)	2	30 kg
" (L)	3	15 kg
Pick hammer	5	7 kg
Air compresser	3	100 ps
Vibrating compactor	2	4 ps
Mixing plant	1	0.5 m^3
Concrete vibrator	4	4 ps
Generator (A)	1	75 KVA
Generator (B)	3	100 KVA
Mixer	1	0.2 m^3

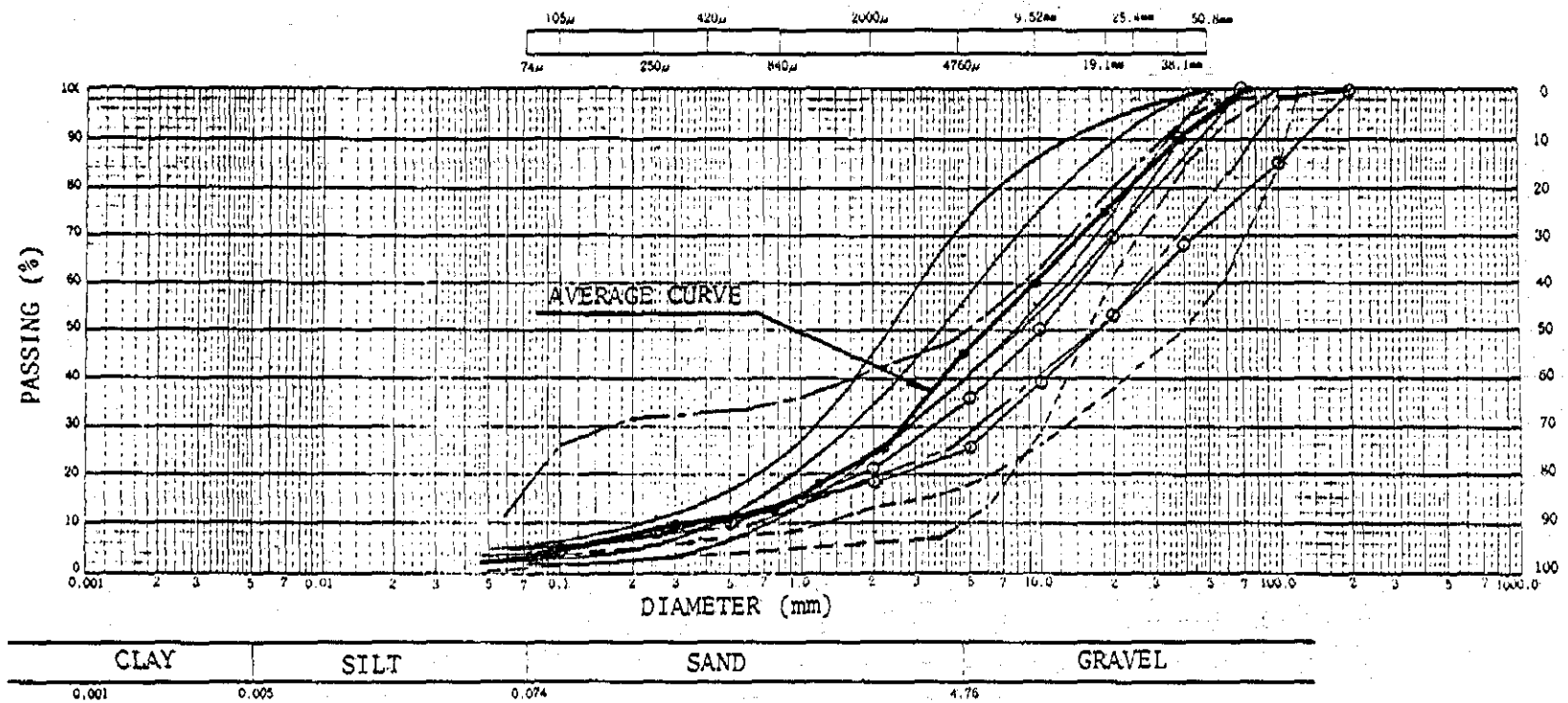
TABLE 4-2. Cost of Al Bassirah Dam Project

(Unit: 1,000 Dirhams)

Description	Unit	Quantities	Amount
1. Direction Construction Cost			
1) DAM BODY			
Stripping	cu.m	110,000	850
Common Excavation	"	56,000	260
Rock Excavation	"	400	70
Embankment (S/G)	"	370,000	5,510
" (Rock)	"	210,000	5,260
" (Filter)	"	59,000	1,290
" (Riprap)	"	41,000	1,470
Concrete	"	300	90
Others			85
Sub-total			14,885
2) SPILLWAY			
Rock Excavation	cu.m	73,000	1,630
Reinforced Concrete	"	2,000	750
Gabion	"	5,500	950
Others			250
Sub-total			3,580
3) CONDUIT			
Earth Works	cu.m	5,100	30
Concrete Works	"	700	730
Gabion	"	2,600	450
Others			80
Sub-total			1,290
4) TOTAL			19,755
2. Administrative and Engineering Expenditures			
5) Administrative Expenses (5% of (4))			988
6) Engineering Expenses (10% of (4))			1,976
7) TOTAL			2,964
3. Contingency			
8) Contingency (15% of (4))			2,964
GRAND TOTAL [(4) + (7) + (8)]			25,683

FIGURE 3-1 GRAIN-SIZE DISTRIBUTION CURVES

(RIVER BED MATERIAL)



NOTE:

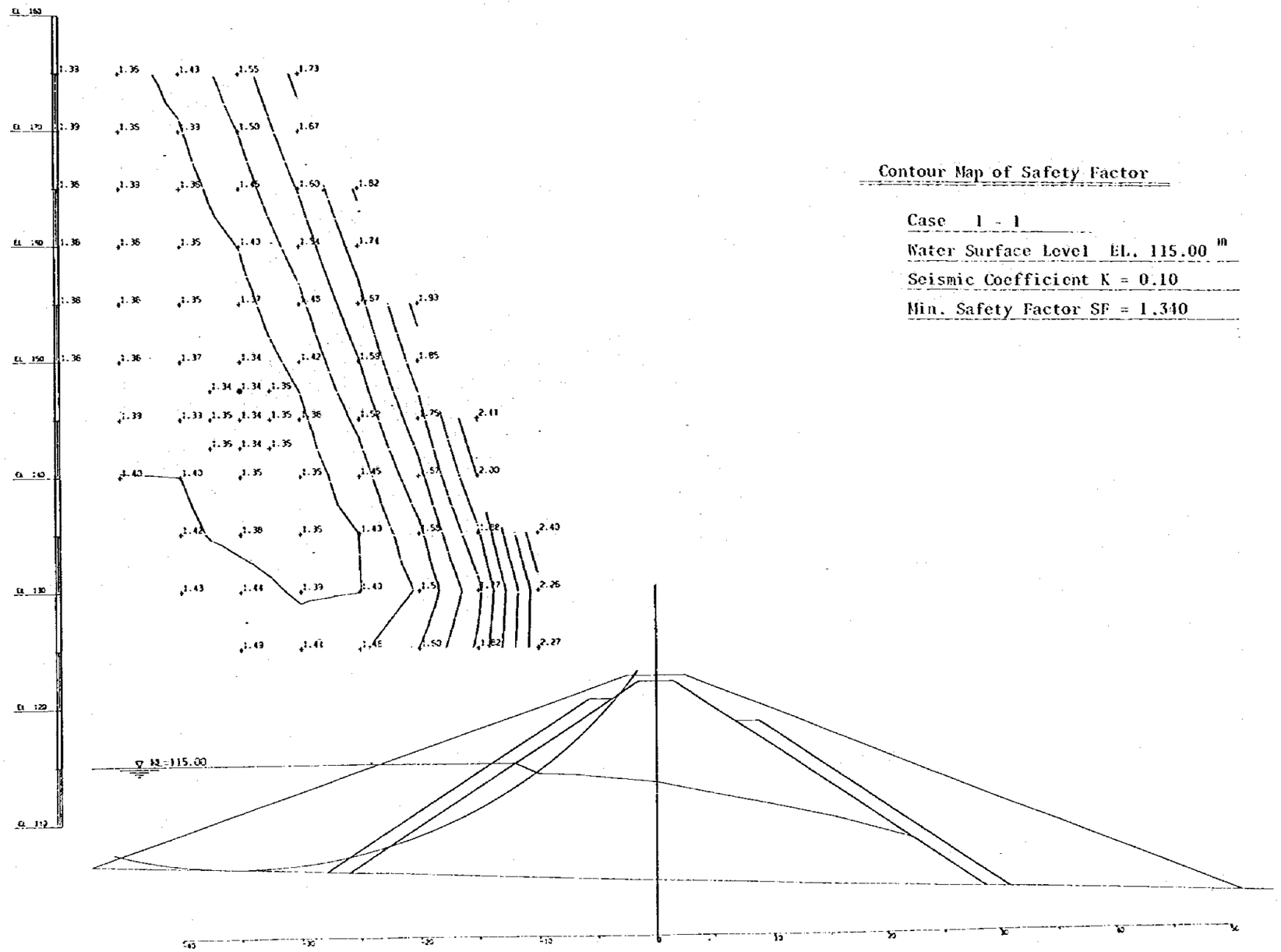
——— Wadi Al Bassierah Dam

– – – – Wadi Bih Dam

——·—— Wadi Ham Dam

——○—— Representative Dam in Japan

FIGURE 3-2 (a) Full Water Condition (Upstream Slope)



Contour Map of Safety Factor

Case 1 - 1

Water Surface Level EL. 115.00 m

Seismic Coefficient K = 0.10

Min. Safety Factor SF = 1.340

FIGURE 3-2 (b) Full Water Condition (Downstream Slope)

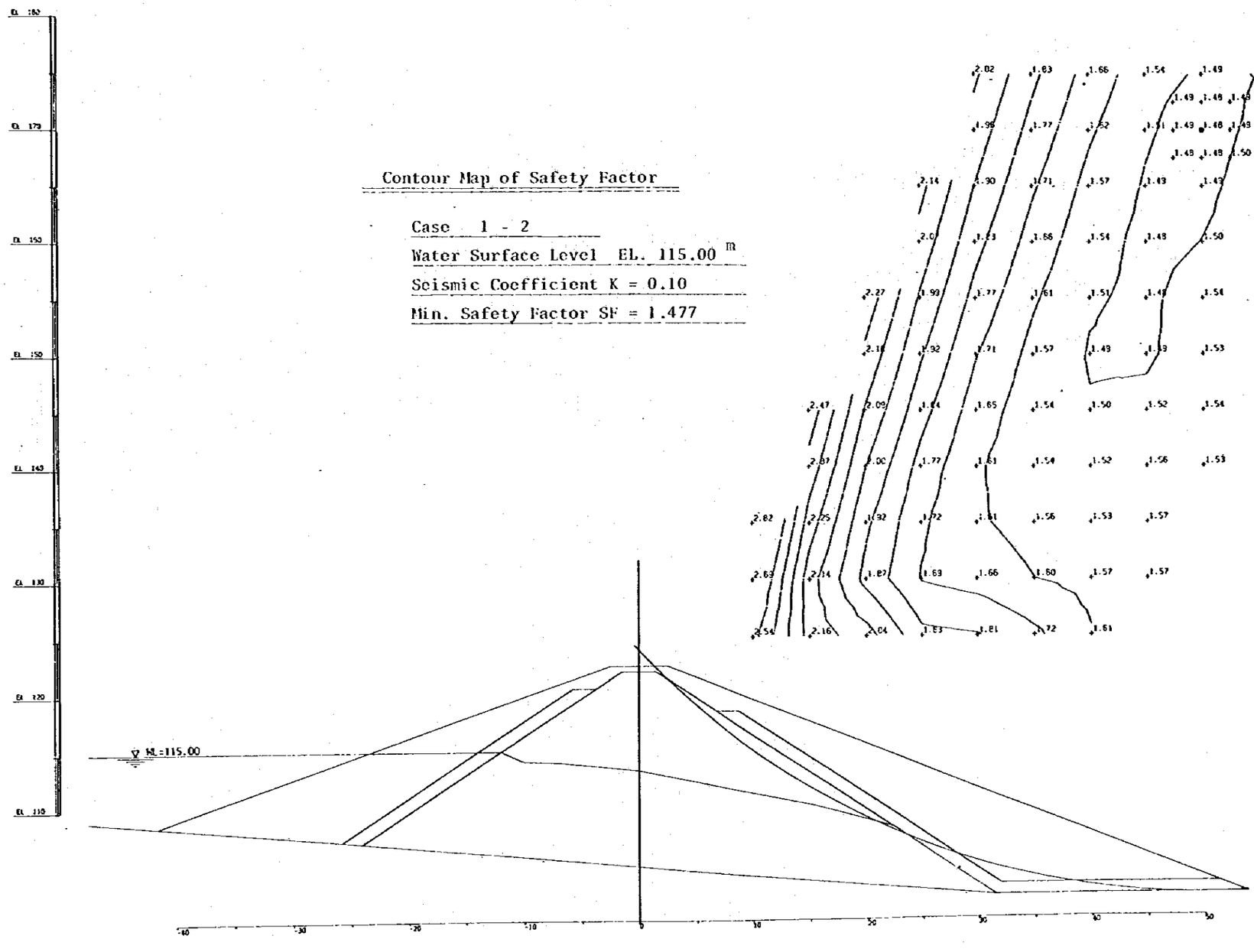
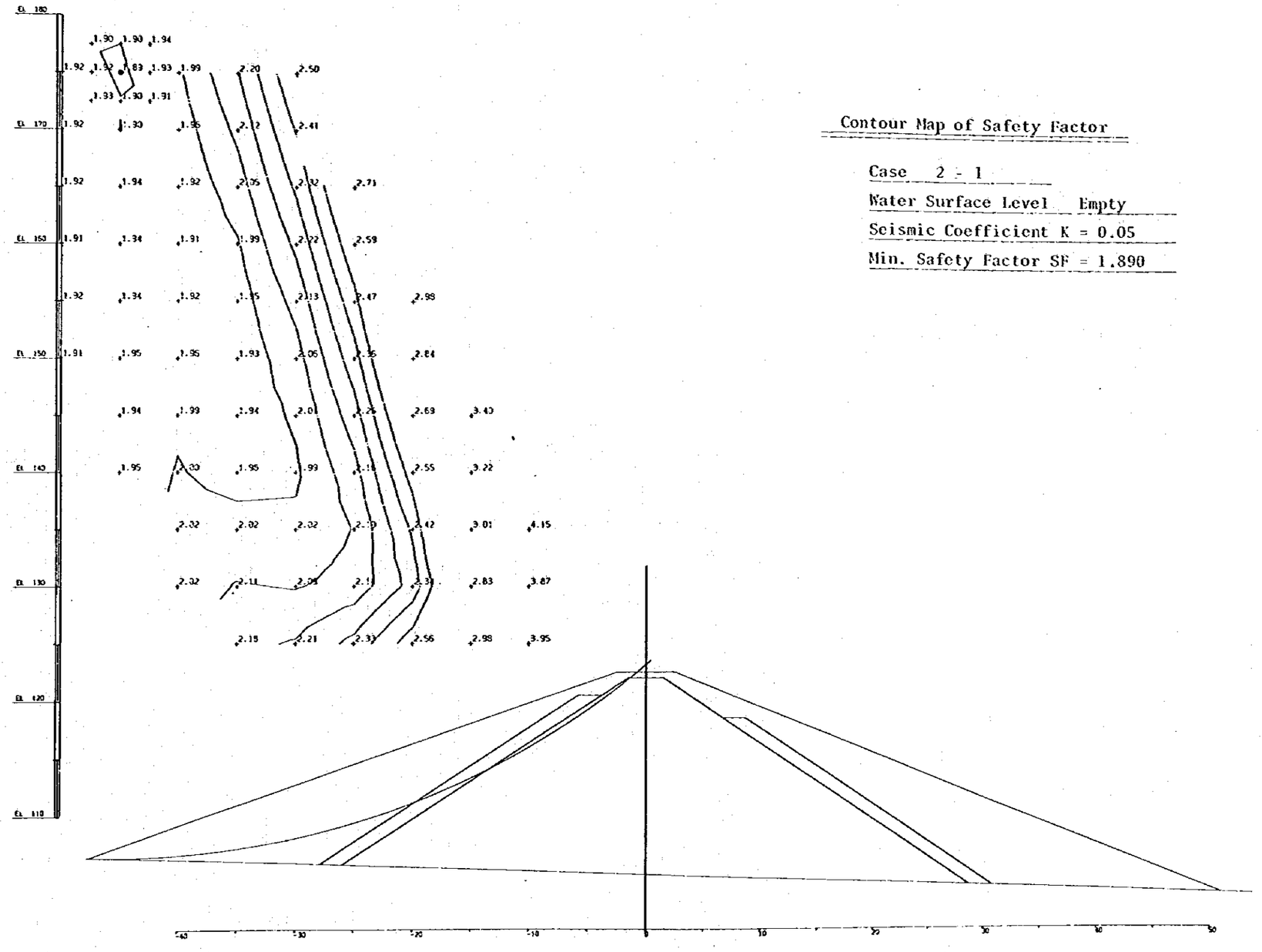


FIGURE 3-2 (c) Immediately After Completion of Fill (Upstream Slope)



Contour Map of Safety Factor

Case 2 - 1

Water Surface Level Empty

Seismic Coefficient K = 0.05

Min. Safety Factor SF = 1.890

FIGURE 3-2 (d) Immediately After Completion of Fill (Downstream Slope)

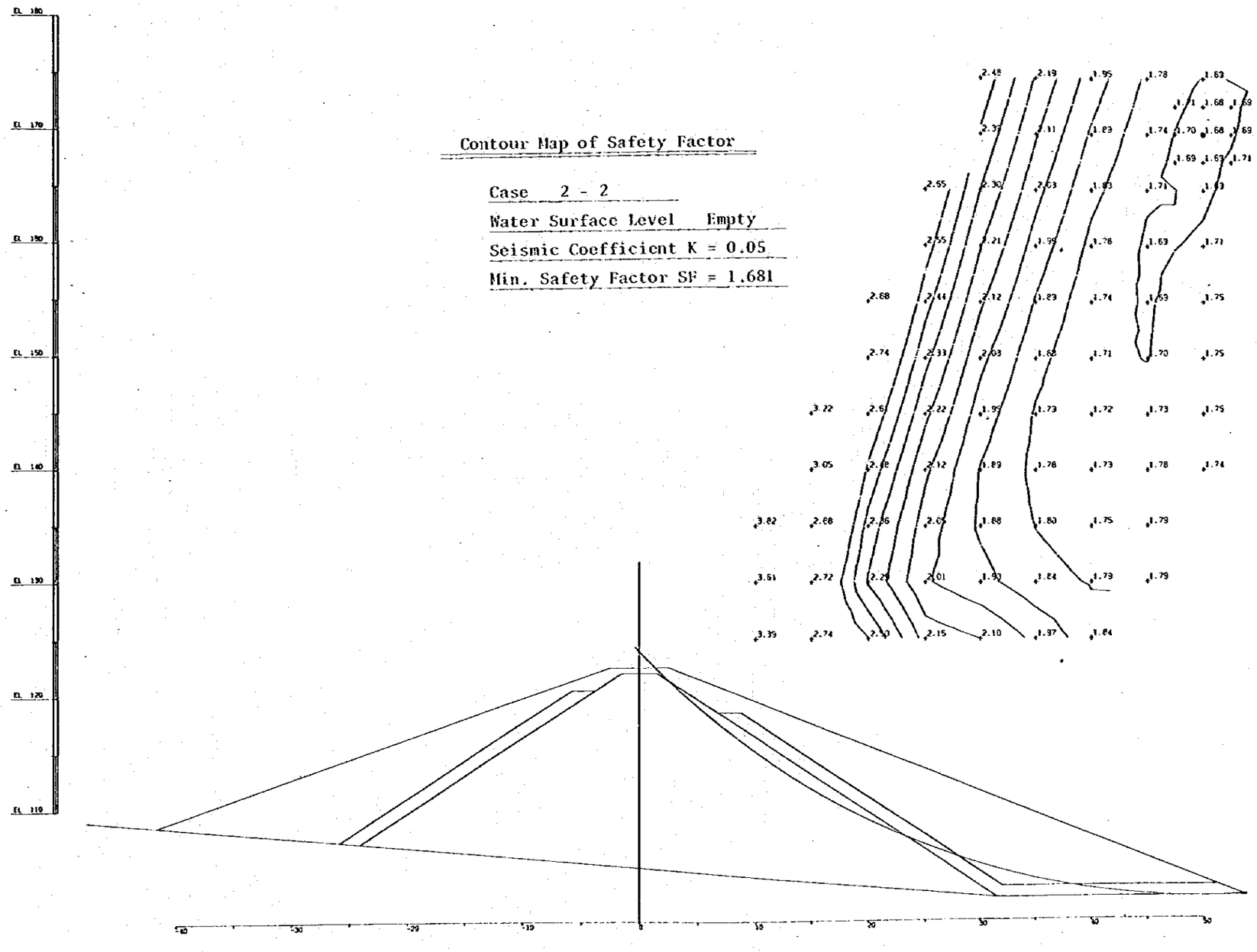
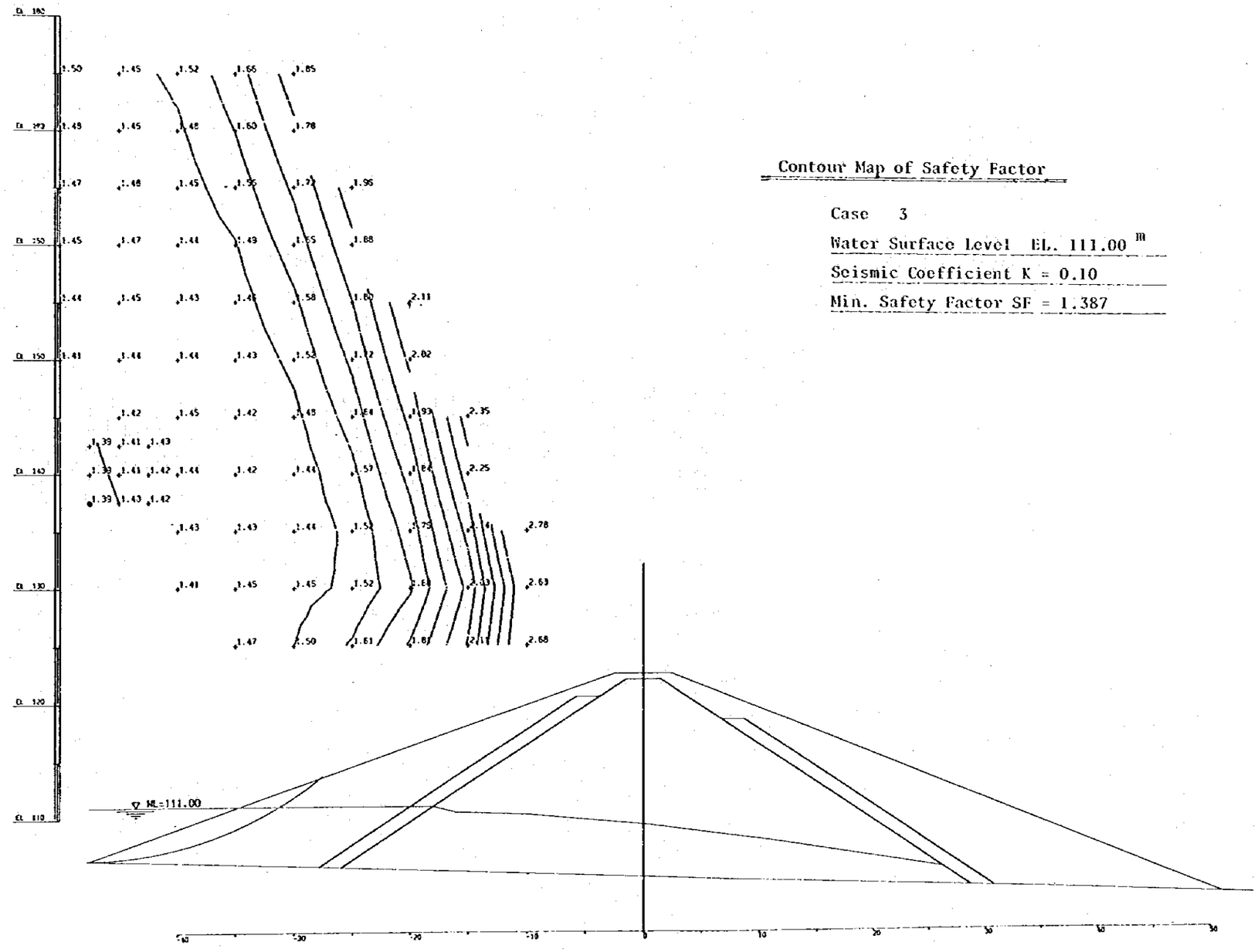


FIGURE 3-2 (e) Middle Water Condition (Upstream Slope)



Contour Map of Safety Factor

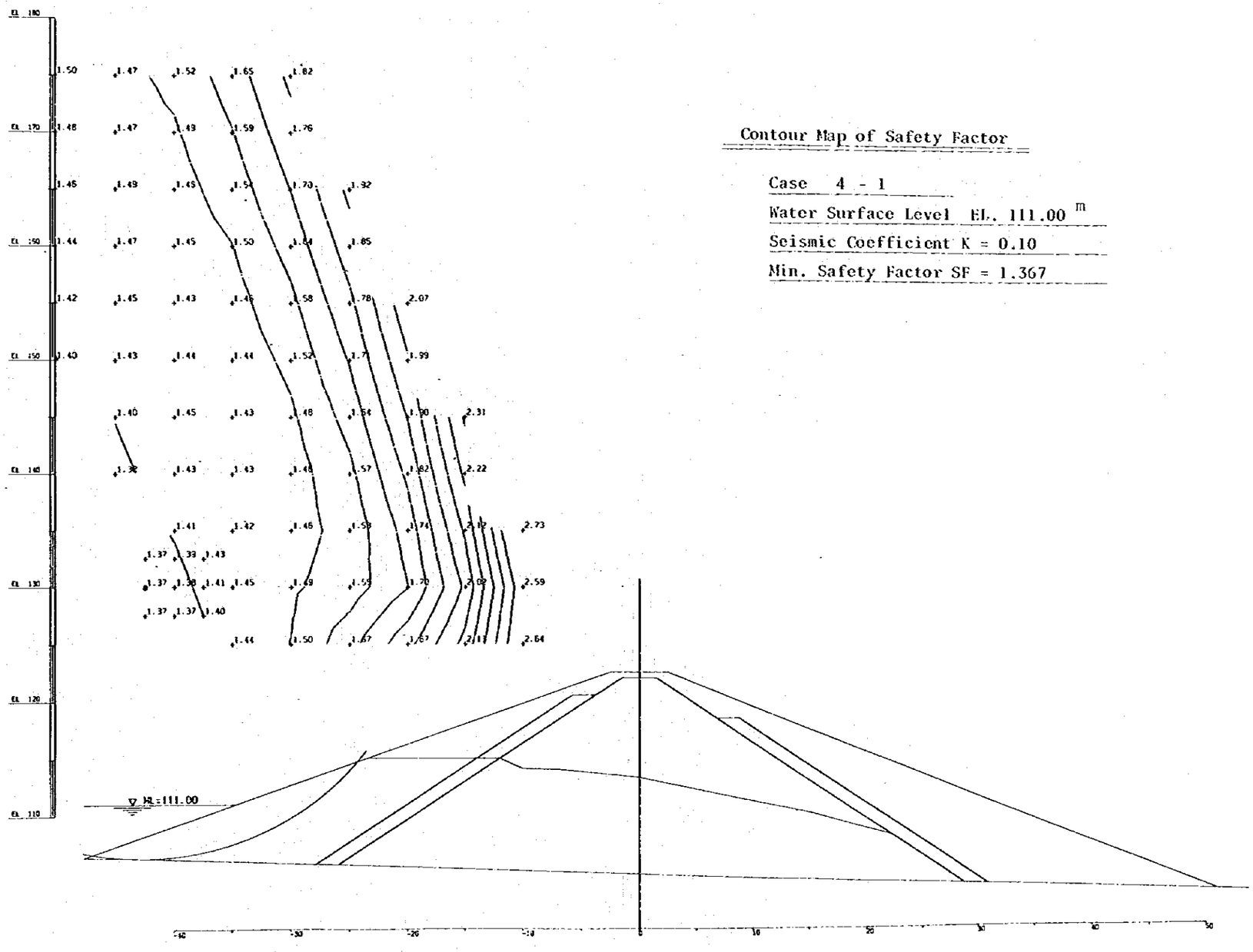
Case 3

Water Surface Level EL. 111.00 m

Seismic Coefficient K = 0.10

Min. Safety Factor SF = 1.387

FIGURE 3-2 (f) Rapid Drawdown (Upstream Slope) F.W.L. to M.W.L.



Contour Map of Safety Factor

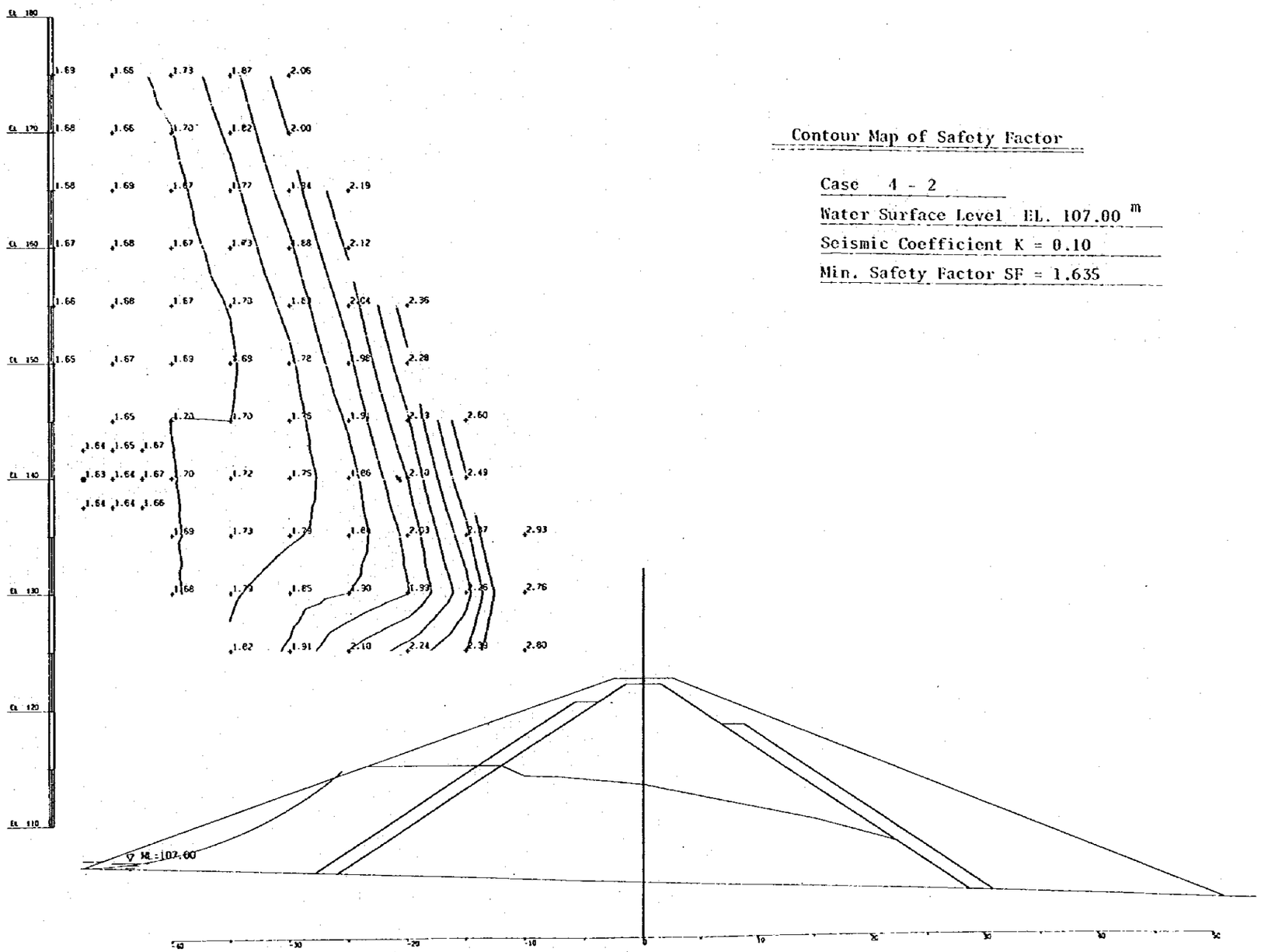
Case 4 - 1

Water Surface Level El. 111.00 m

Seismic Coefficient K = 0.10

Min. Safety Factor SF = 1.367

FIGURE 3-2 (g) Rapid Drawdown (Upstream Slope) F.W.L. to L.W.L.



Contour Map of Safety Factor

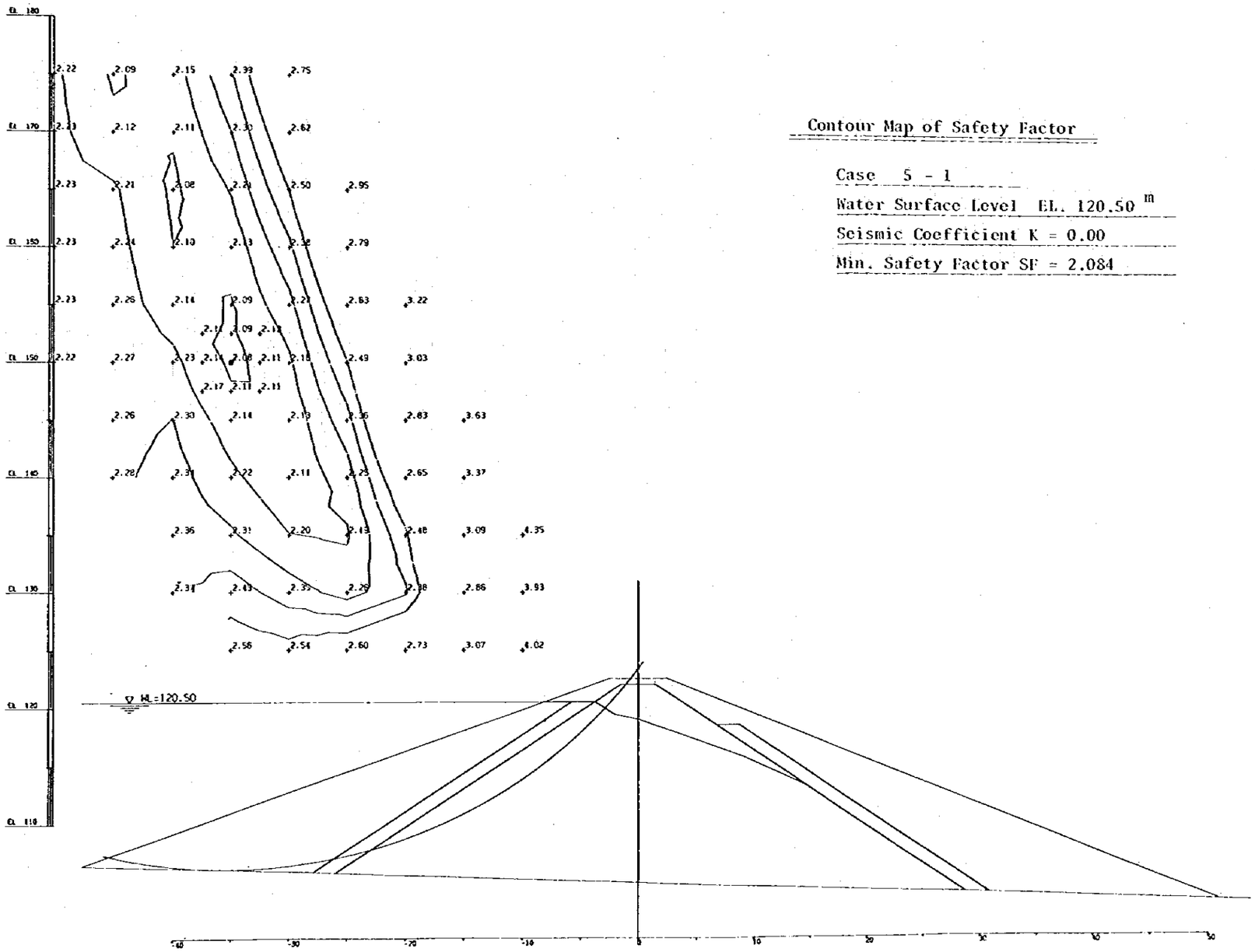
Case 4 - 2

Water Surface Level EL. 107.00 m

Seismic Coefficient K = 0.10

Min. Safety Factor SF = 1.635

FIGURE 3-2 (h) Flood Water Condition (Upstream Slope)



Contour Map of Safety Factor

Case 5 - 1

Water Surface Level EL. 120.50 m

Seismic Coefficient K = 0.00

Min. Safety Factor SF = 2.084

FIGURE 3-2 (i) Flood Water Condition (Downsteam Slope)

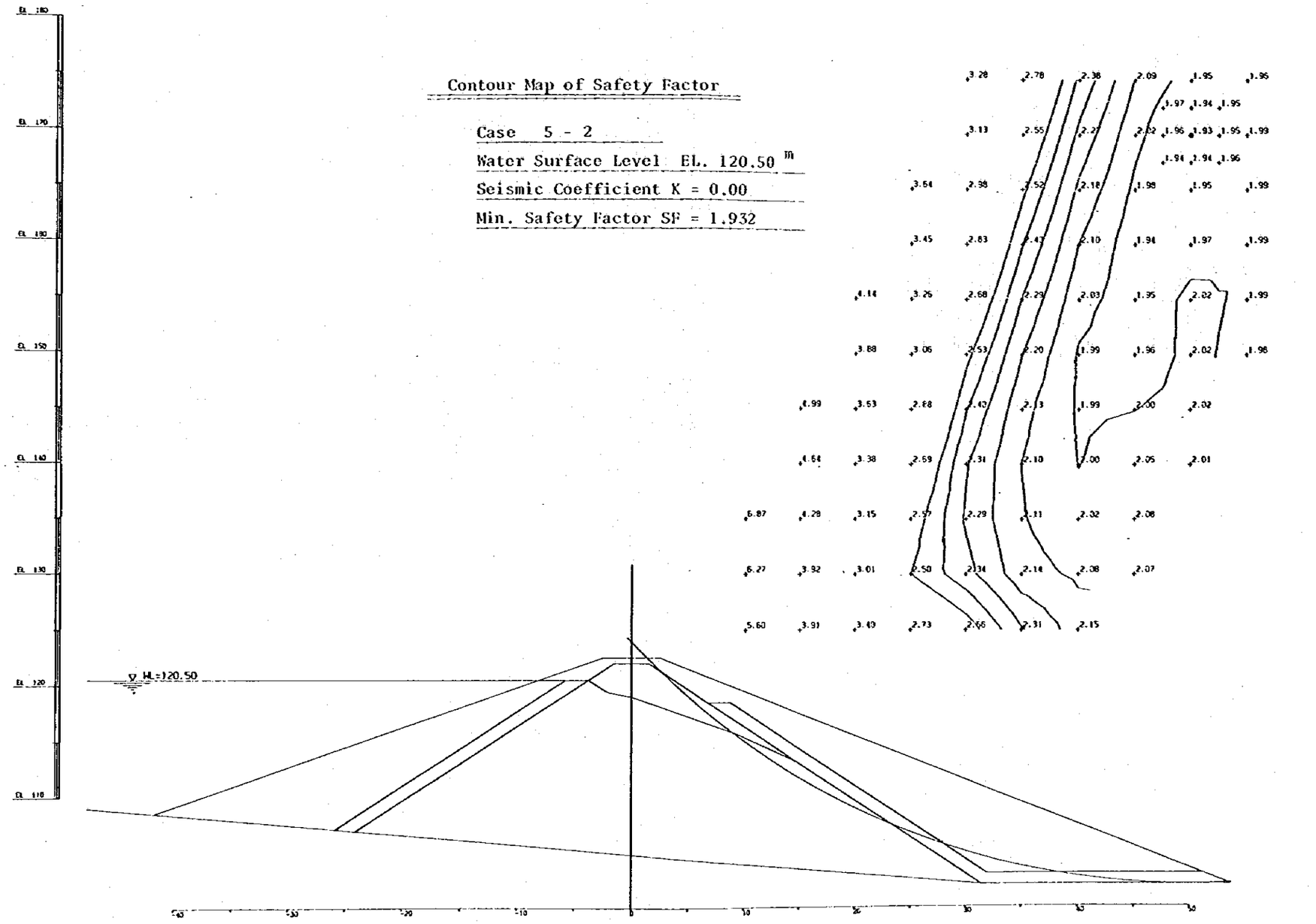
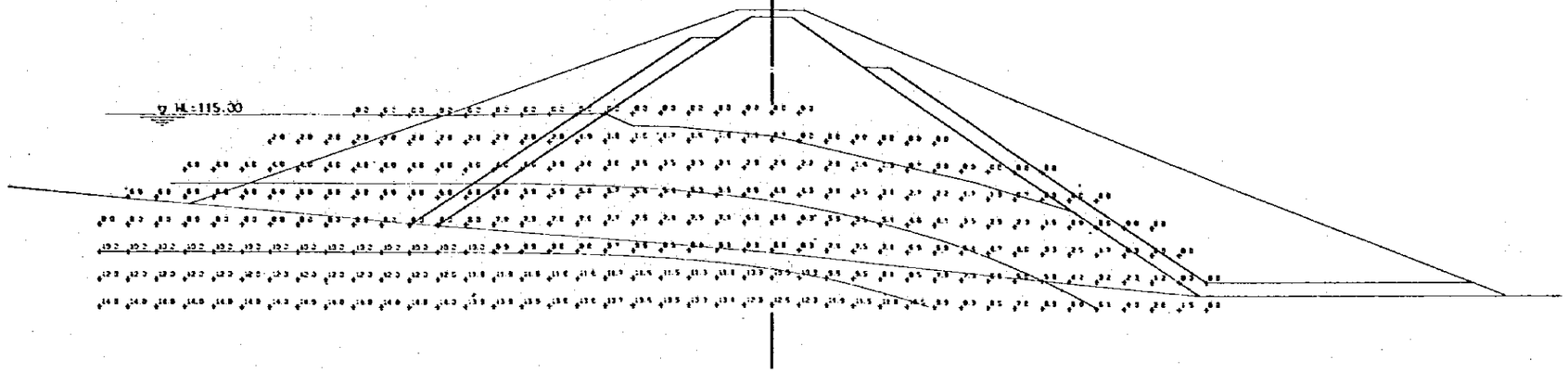
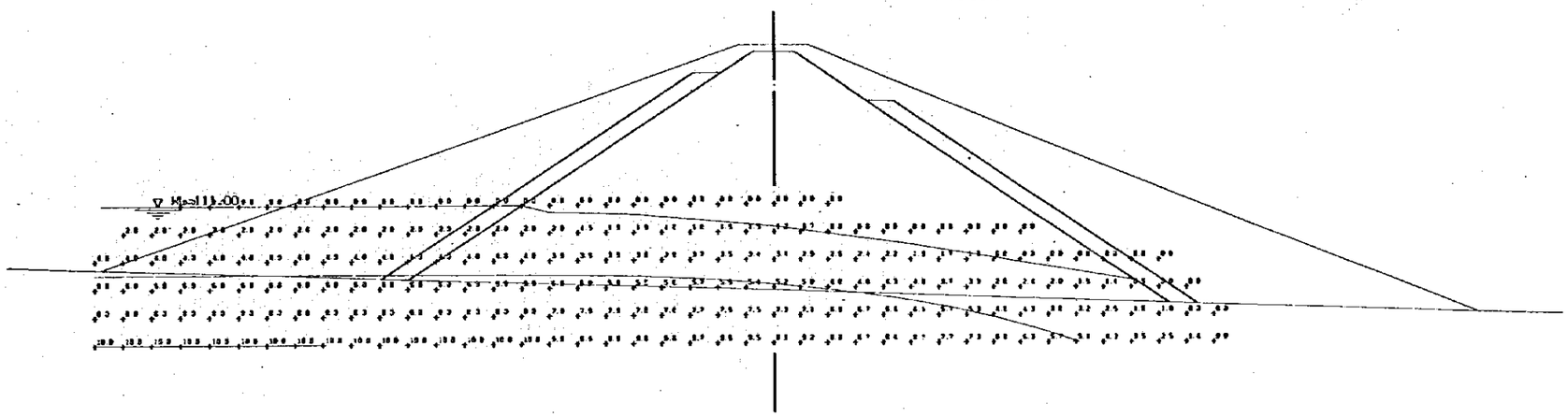


FIGURE 3-2 (j) Distribution of Pore Pressure

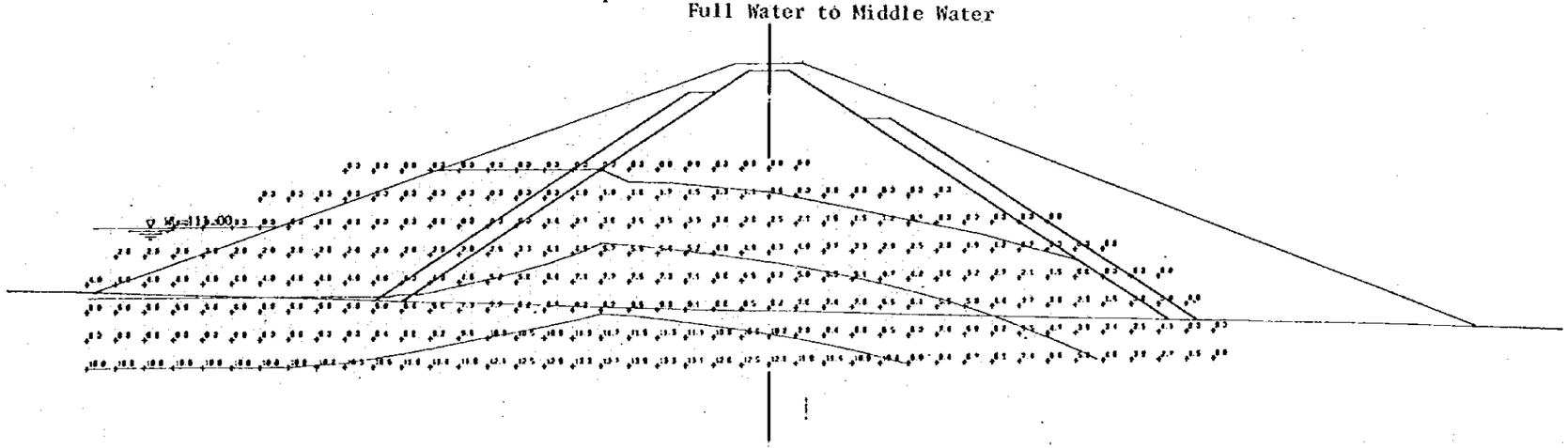
Case 1 Full Water Condition



Case 3 Middle Water Condition

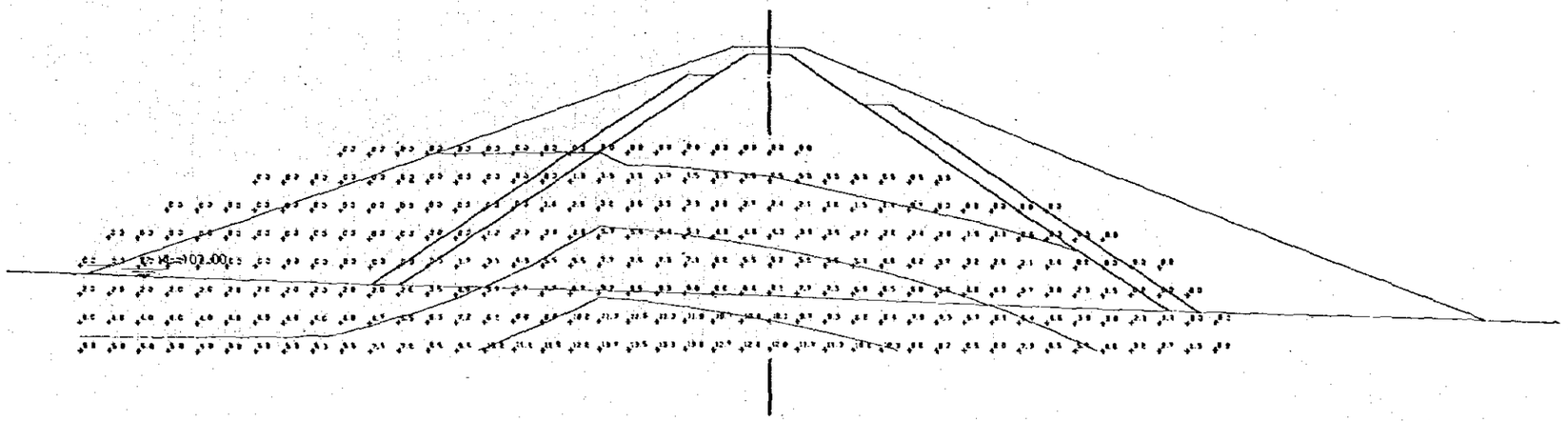


Case 4-1 Rapid Drawdown
Full Water to Middle Water



Case 4-2 Rapid Drawdown

Full Water to Low Water



Case 5 Flood Water Condition

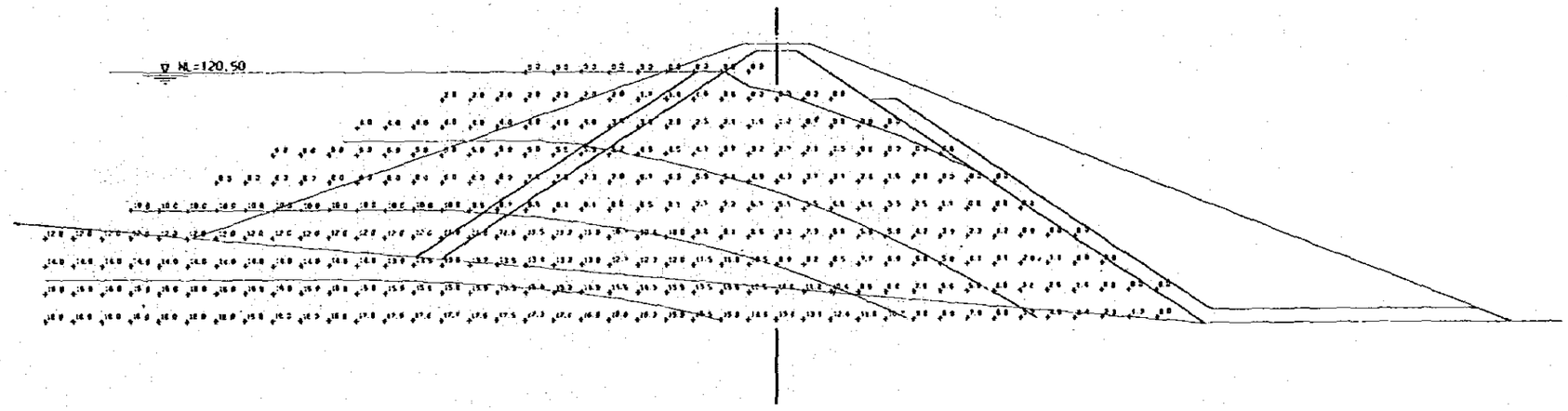
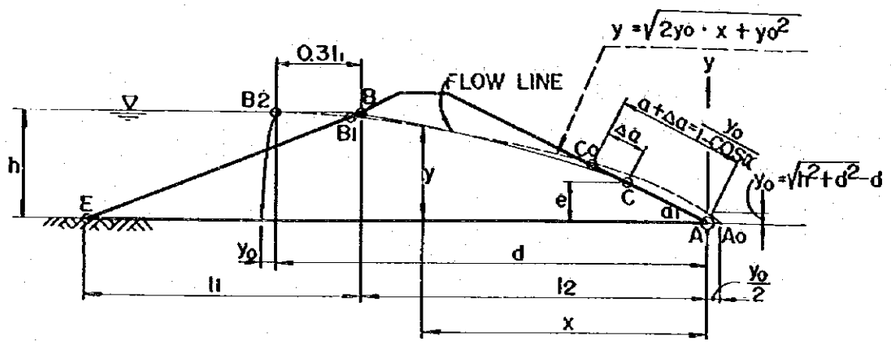


FIGURE 3-3 PHREATIC LINE



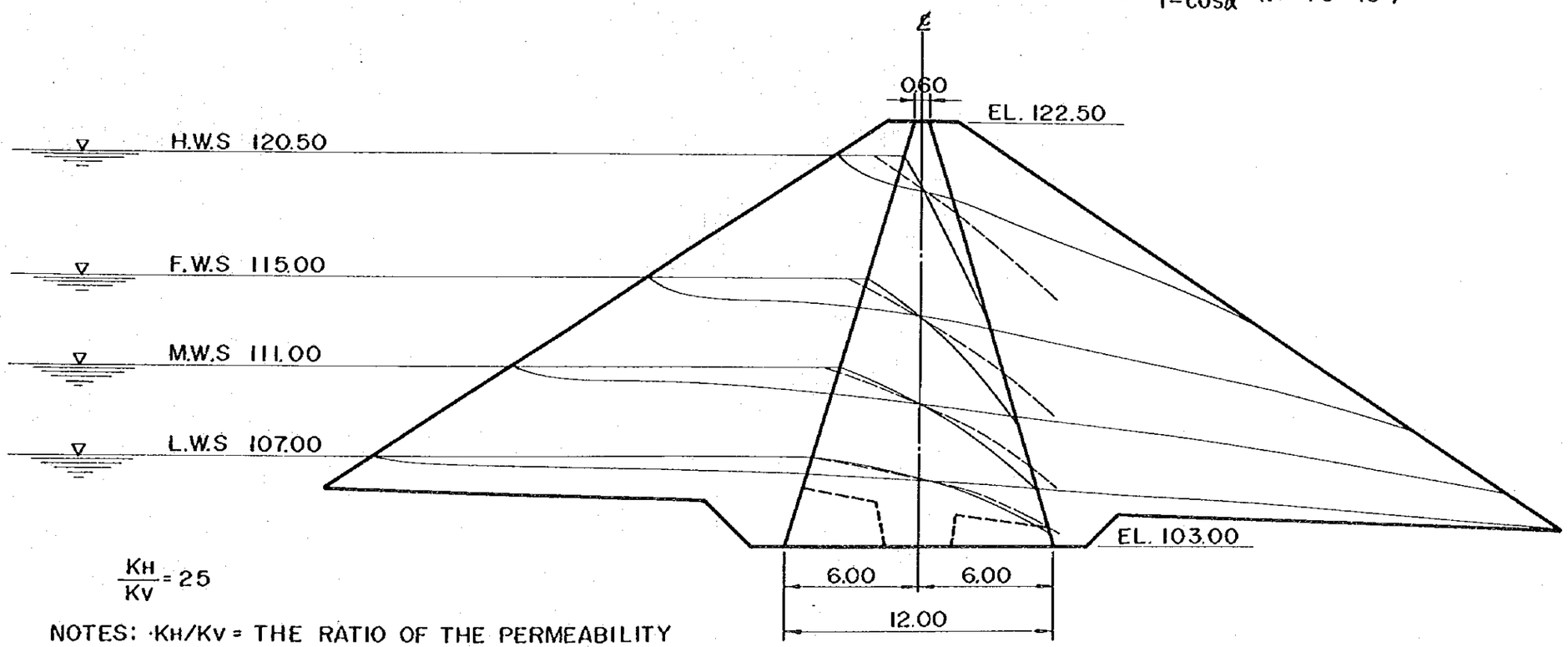
A. CASAGRANDE METHOD

W.L.	h	l1	l2	d	$y=\sqrt{2y_0x+y_0^2}$	y_0	$a+\Delta a$
EL. 120.50	17.5	5.25	6.75	8.325	$y=\sqrt{22.1x+122.10}$	11.05	15.51
EL. 115.00	12.0	3.60	8.40	9.480	$y=\sqrt{11.62x+33.76}$	5.81	8.15
EL. 111.00	8.0	2.40	9.60	10.320	$y=\sqrt{5.48x+7.51}$	2.74	3.84
EL. 107.00	4.0	1.20	10.8	11.160	$y=\sqrt{1.40x+0.49}$	0.70	0.98

NOTES: $d = 0.3l_1 + l_2$

$y_0 = \sqrt{h^2+d^2} - d$

$a+\Delta a = \frac{y_0}{1-\cos\alpha}$ $(\alpha = 73°-18')$

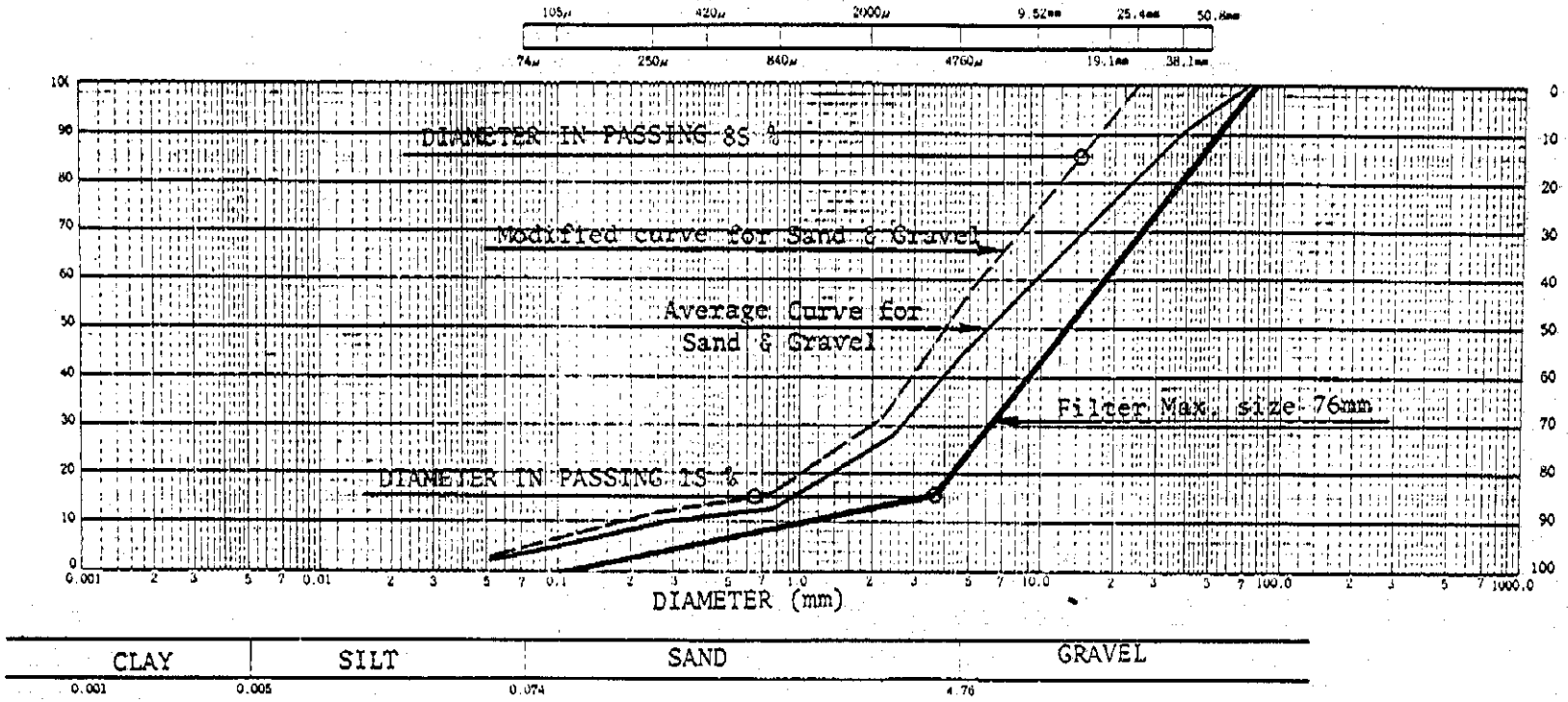


$\frac{K_H}{K_V} = 25$

NOTES: K_H/K_V = THE RATIO OF THE PERMEABILITY COEFFICIENTS IN THE HORIZONTAL AND VERTICAL DIRECTIONS.

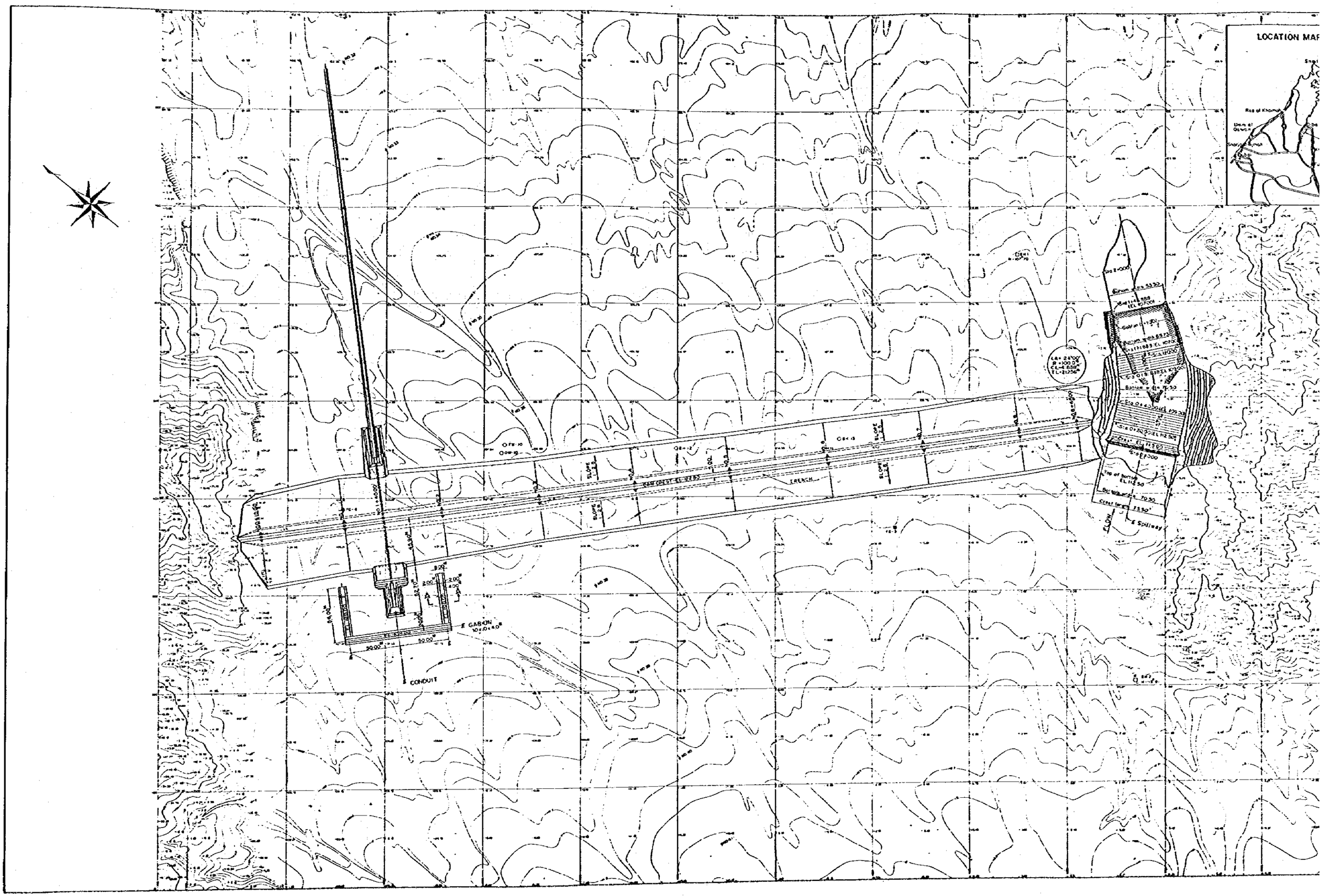
REDUCED SCALE $\sqrt{K_V/K_H} = 1/5$

FIGURE 3-4 GRAIN-SIZE DISTRIBUTION CURVE FOR FILTER



1.- F15/B15=3.6/0.65=5.54 > 5 ..... OK

2.- F15/B85=3.6/14.2=0.25 < 5 ..... OK


LOCATION MAP
Ras al Khaimah
Umm al Qaiwain
Sharjah
Ajman
Dubai
DAM CREST EL 92.50
TRENCH
SLOPE
Sta 2+000
Bottom width 53.50
Gabion (1+1.50)
Bottom width 65.75
Bottom width 70.50
Sta 0+400.00 EL 109.50
Sta 0+200.00 EL 112.50
Crest EL 115.00
Sta 0+000
Top of bottom EL 112.50
Bottom width 70.50
Crest length 73.50'
FLOW
℄ Spillway
IA= 24°00'
R =100.0
CL=41.888
TL=21.256
A
A
2.00
2.00
4.00
9.00
43.90
52.70
30.00
50.00
64.00
℄ GABION 10x2.0x4.0
℄ CONDUIT

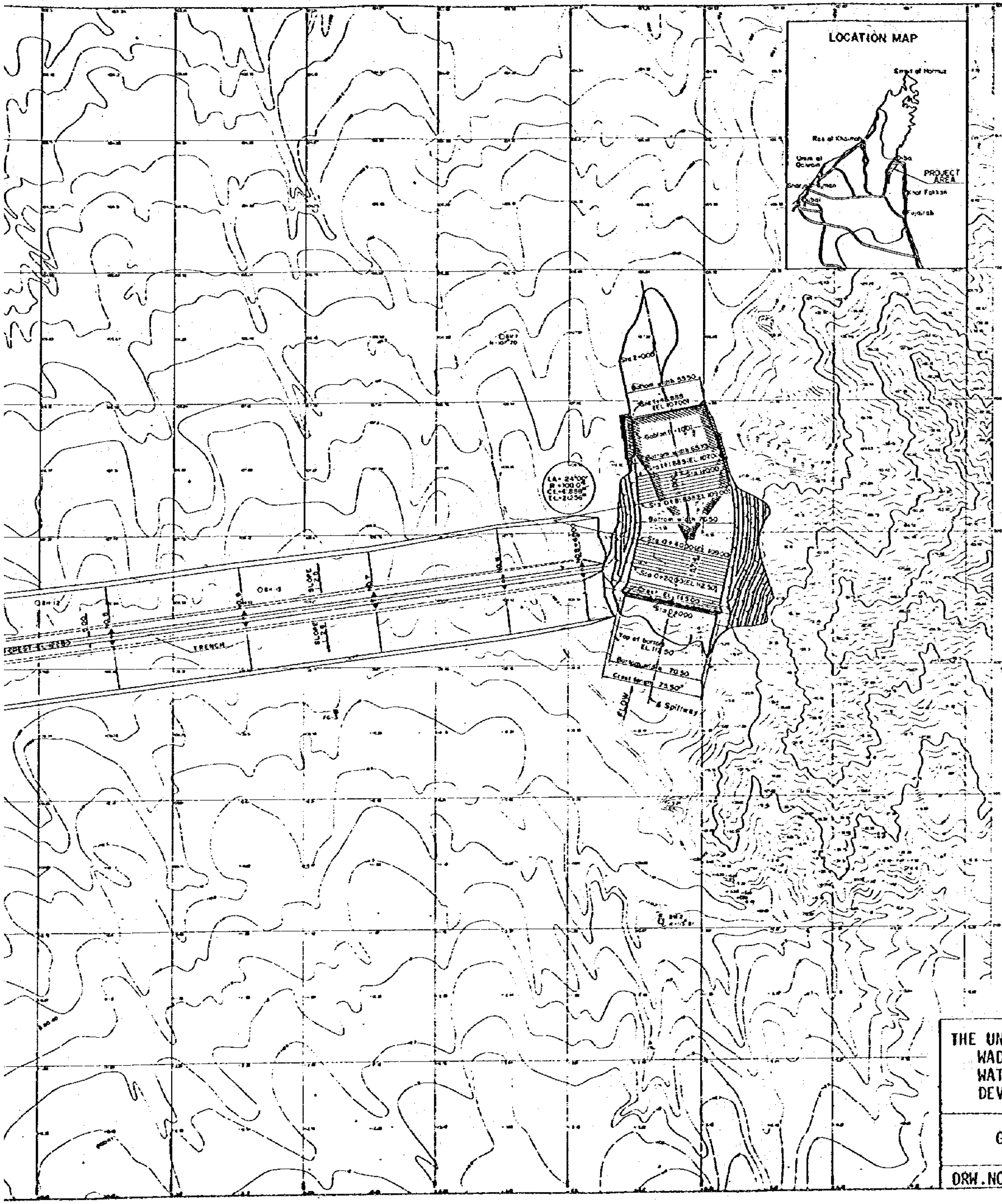


TABLE OF DIMENSIONS

GENERAL	LOCATION	DIBBA IN AL FUJEIRA IN THE U.A.E
	RIVER	WADI AL BASSIERAH
	GEOLOGY OF DAM SITE	RIGHT ABUTMENT SERPENTINITE; LEFT ABUTMENT QUARTZ SCHIST
RESERVOIR	CATCHMENT AREA	122 KM²
	F W S AREA	700,000 M²
	F W S	EL.11500 M
	EFFECTIVE CAPACITY	2,500,000 M³
DAM BODY	TYPE	ROOK-FILL
	HEIGHT	1950 M
	CREST LENGTH	88350 M
	CREST WIDTH	50 M
	CREST EL	EL.12250~12280 M
	LOWEST TRENCH EL	EL.10300 M
	VOLUME	669,000 M³
SPILLWAY	TYPE	CHUTE TYPE WITHOUT GATE
	DESIGN FLOOD	2,310 M³/SEC
	CREST EL	EL.11500 M
CONDUIT	NO	1
	DIA	1,420 MM
	MAX OUT-FLOW	M³/SEC

BENCH MARK

BENCH MARK	ELEVATION IN M
NO 1	EL.107.70
NO 2	EL.113.91

NOTES

1. ALL STATIONS, ELEVATIONS AND DIMENSIONS ARE GIVEN IN METERS
2. THE STATION NUMBERS ARE READ FROM LEFT BANK TO RIGHT BANK.
3. DAM CREST ELEVATION ON THIS DRAWING ARE INCLUDING EXTRA BANKING (MAX. EXTRA BANKING IS 30cm)

0 10 20 30 40 50 100m

SCALE

LEGEND

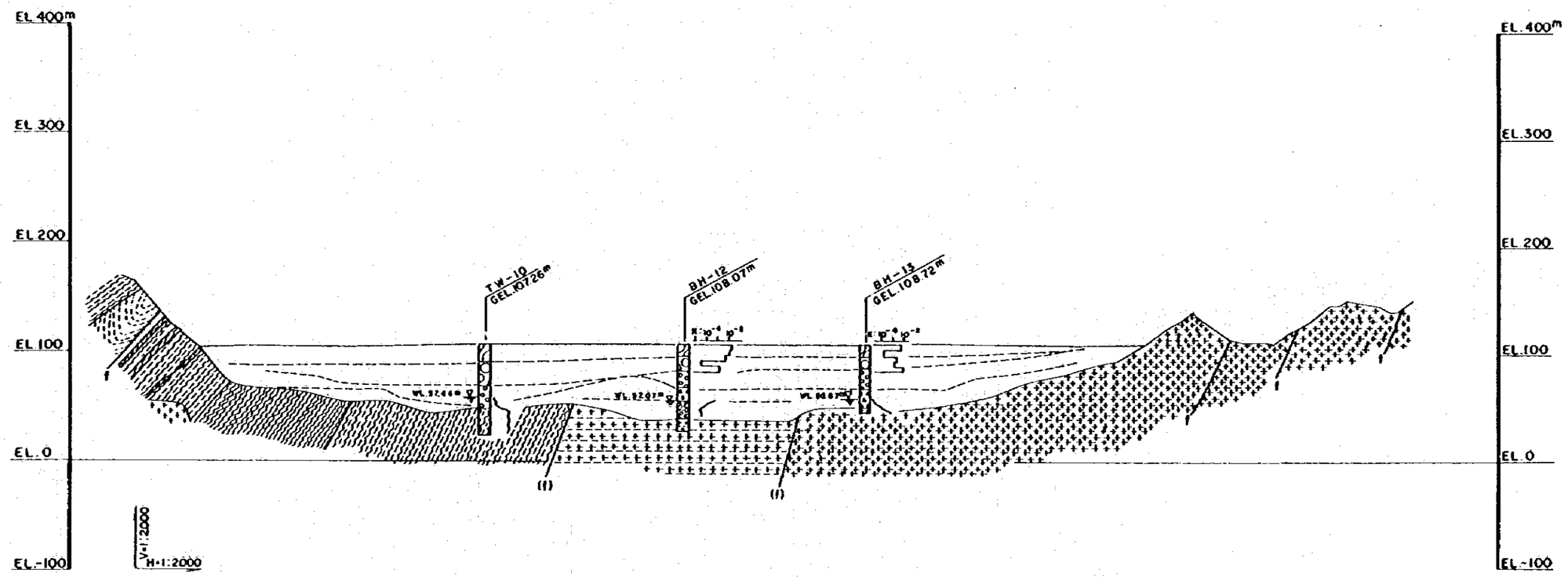
- POWER POST
- FLOOD GAUGE
- TEST WELL
- BENCH MARK
- BENCH MARK FOR PROPOSED DAM AXIS
- SUPPLEMENTARY CONTOURLINE

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

General Plan

DRW.NO. D 1 | JICA

GEOLOGICAL PROFILE ALONG THE DAM AXIS



LEGEND

- RECENT WADIBED DEPOSIT
- LOWER TERRACE DEPOSIT
- UPPER TERRACE DEPOSIT
- TALUS DEPOSIT
- OLD TERRACE DEPOSIT (CONGLOMERATE FORMATION)
- SERPENTINITE
- SERPENTINITE/CLAY
- QUARTZ SCHIST/OTHER SCHISTS
- GREEN SCHIST
- QUARTZ SCHIST
- FAULT
- FAULT (ASSUMED)
- GEOLOGICAL BOUNDARY

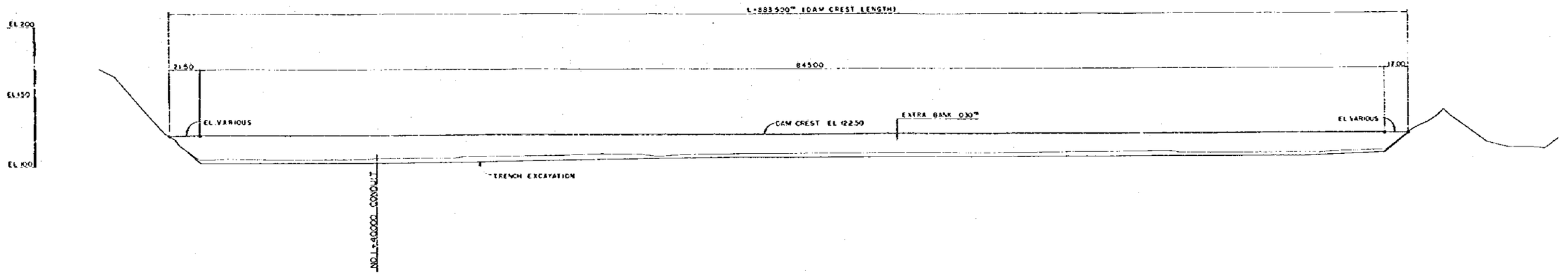
TW TEST WELL
BH BORE HOLE

0 500 1000m
SCALE 1:20000

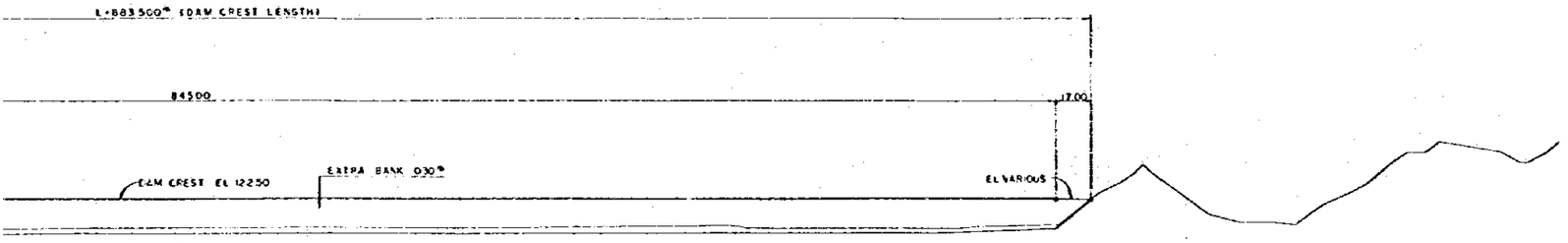
THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Geological Profile
along the Dam Axis

DRW.NO. D 2 | JICA



DAM CREST ELEVATION	122.500	122.590	122.800	122.800	122.800	122.800	122.800	122.800	122.800	122.800	122.800	122.800	122.600	122.500	
TRENCH EXCAVATION ELEVATION	-	-	103.000	103.000	103.000	103.000	105.000	106.000	106.000	106.000	106.000	106.000	108.000	123.500	
GROUND ELEVATION	122.500	115.500	105.000	105.000	106.000	106.000	108.500	108.500	108.500	108.500	109.500	108.000	110.000	122.500	137.000
TOTAL DISTANCE	0.000	10.000	25.000	110.000	150.000	210.000	310.000	410.000	510.000	610.000	710.000	810.000	870.000	887.000	910.000
DISTANCE	0.000	10.000	15.000	85.000	40.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	60.000	17.000	20.000
STATION	-6.500	NO.0	+15.000	NO.1	+40.000	NO.2	NO.3	NO.4	NO.5	NO.6	NO.7	NO.8	+60.000	+77.000	NO.9



NO.4	100.000	410.000	108.500	104.000	122.800			
NO.5	100.000	310.000	108.500	104.000	122.800			
NO.6	100.000	60.000	108.500	104.000	122.800			
NO.7	100.000	710.000	109.500	106.000	122.800			
NO.8	100.000	810.000	108.000	104.000	122.800			
+60000	60.000	870.000	110.000	108.000	122.800			
+77000	17.000	887.000	122.500	108.000	122.900			
NO.9	20.000	910.000	137.000	123.500				
NO.10	100.000	1010.000	125.700					

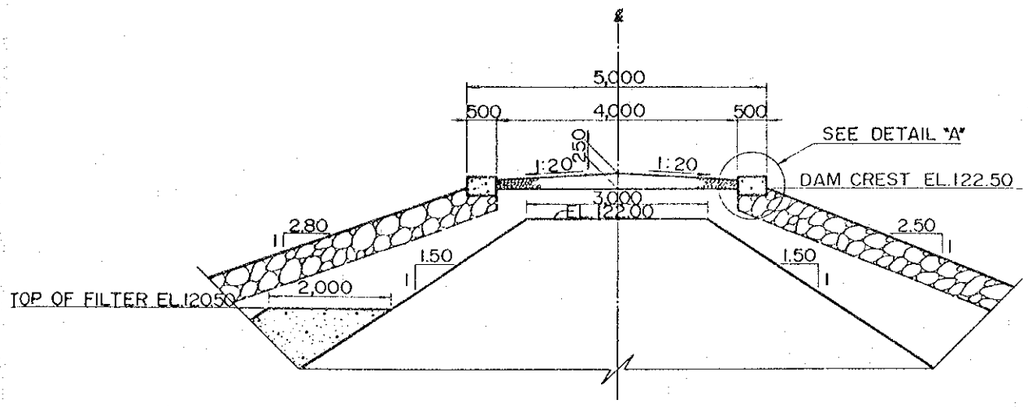
NOTE : ALL DIMENSIONS ARE GIVEN IN METER

0 20 60cm
SCALE 1:1000

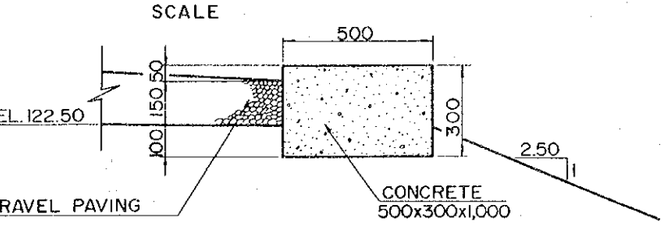
THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Longitudinal Profile of Dam Axis

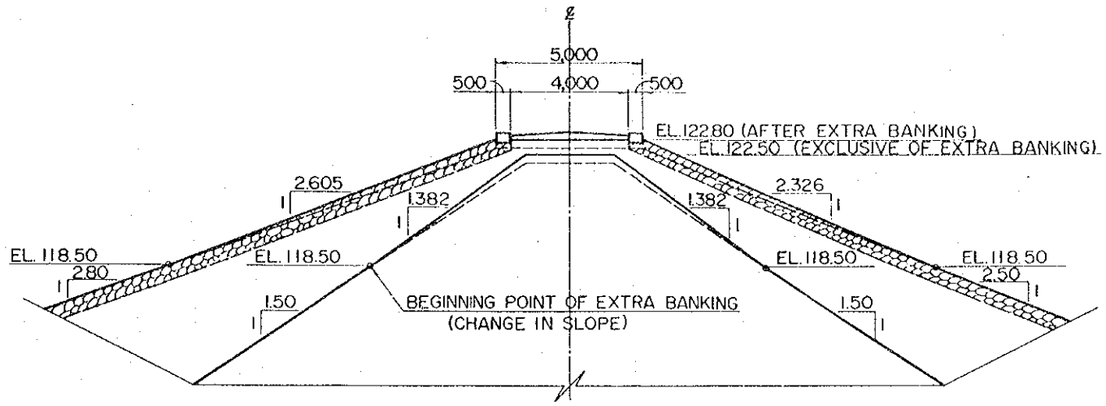
DRW.NO. D 3 | JICA



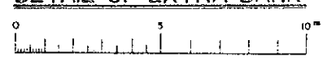
DETAIL OF CREST



SCALE

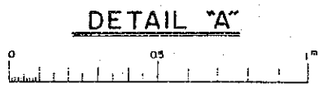


DETAIL OF EXTRA BANK

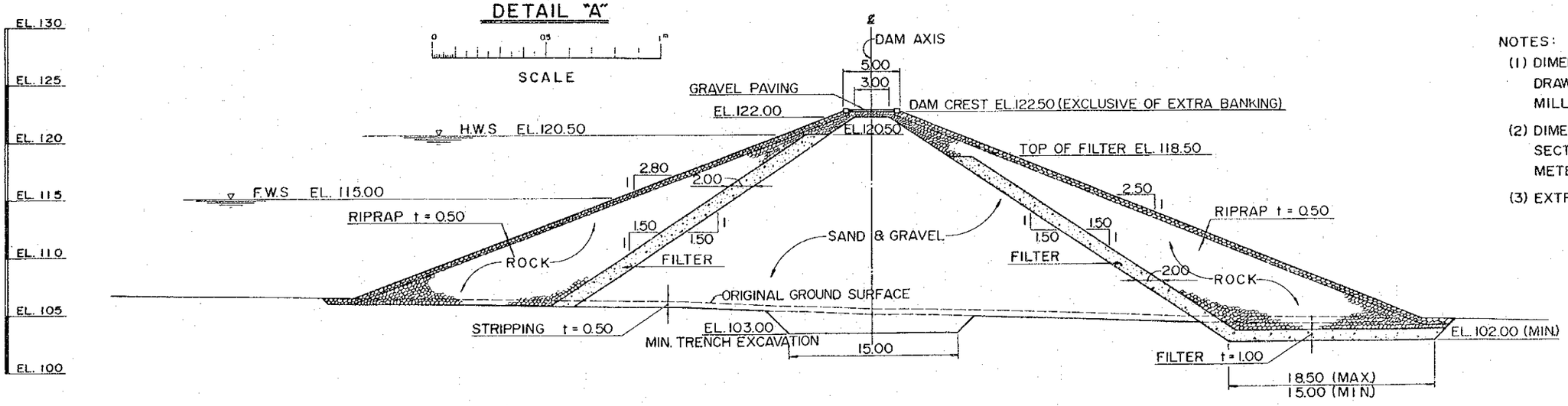


SCALE

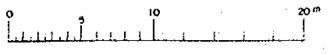
DETAIL "A"



SCALE



TYPICAL SECTION



SCALE

NOTES:

(1) DIMENSIONS OF DETAIL DRAWINGS ARE GIVEN IN MILLIMETER.

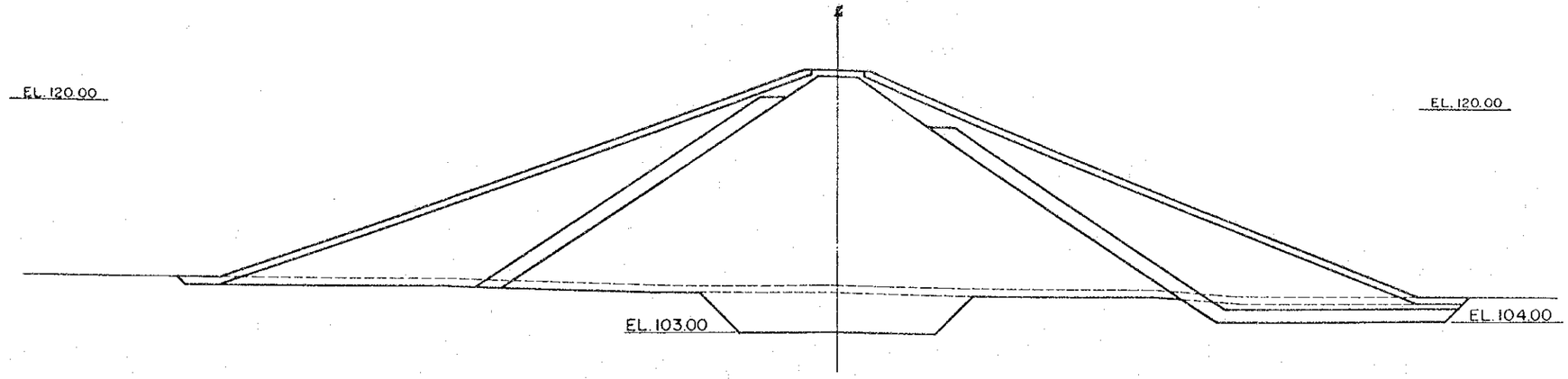
(2) DIMENSIONS OF TYPICAL SECTION ARE GIVEN IN METER.

(3) EXTRA BANKING IS MAX. 30cm

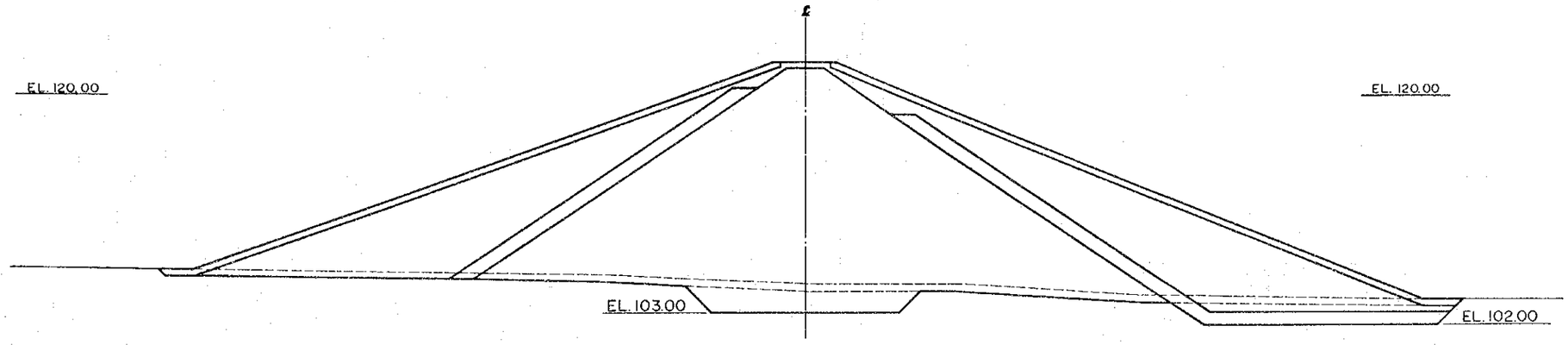
THE UNITED ARAB·EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Typical Section

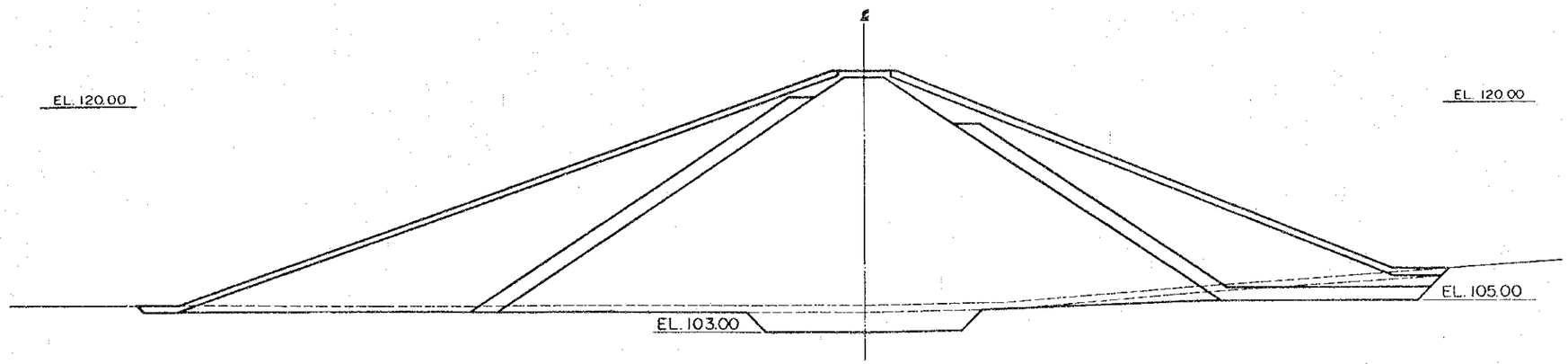
DRW.NO. D 4	JICA



NO. 2



NO. 1



NO. 0+15.000

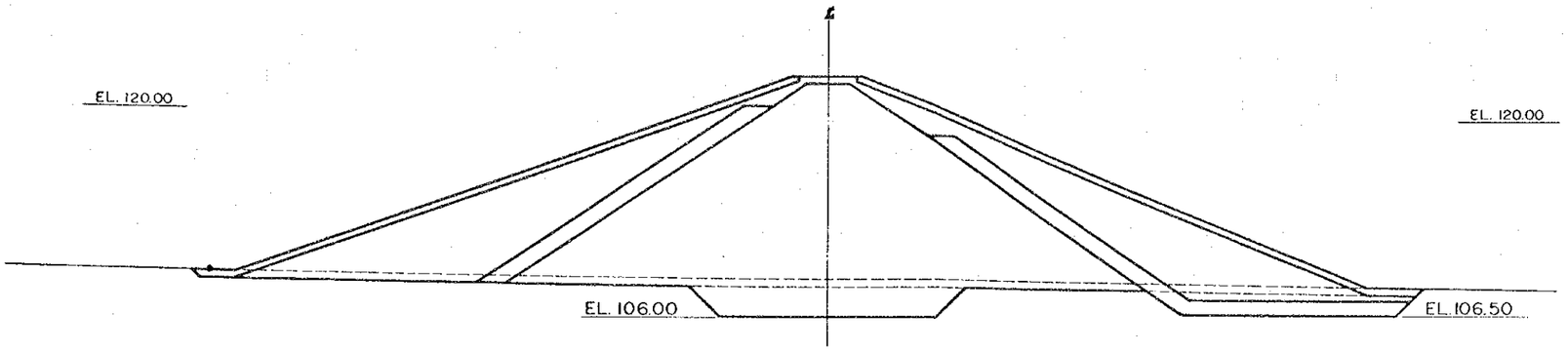
NOTES

ALL ELEVATIONS ARE GIVEN IN METERS.

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Cross Section (1)

DRW.NO. D 5 | JICA



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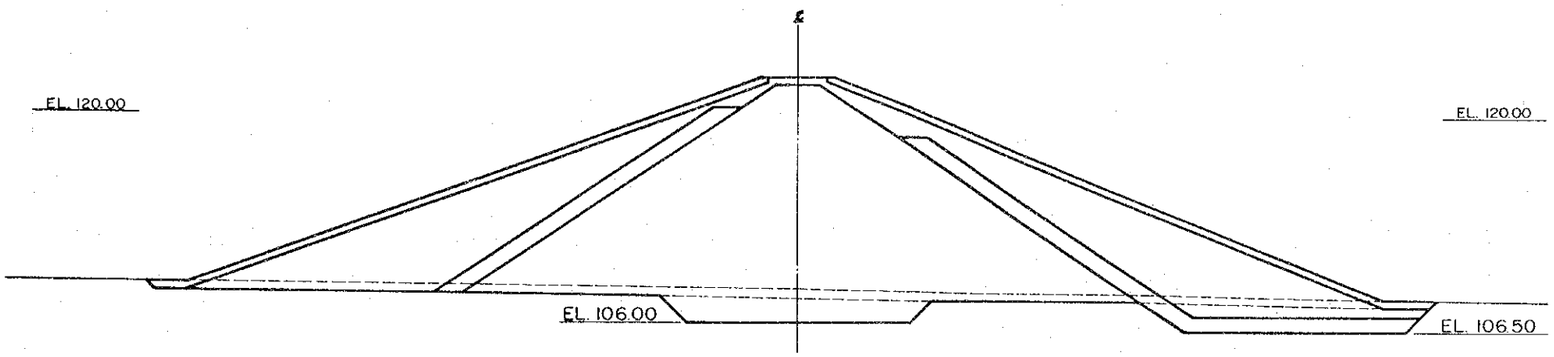

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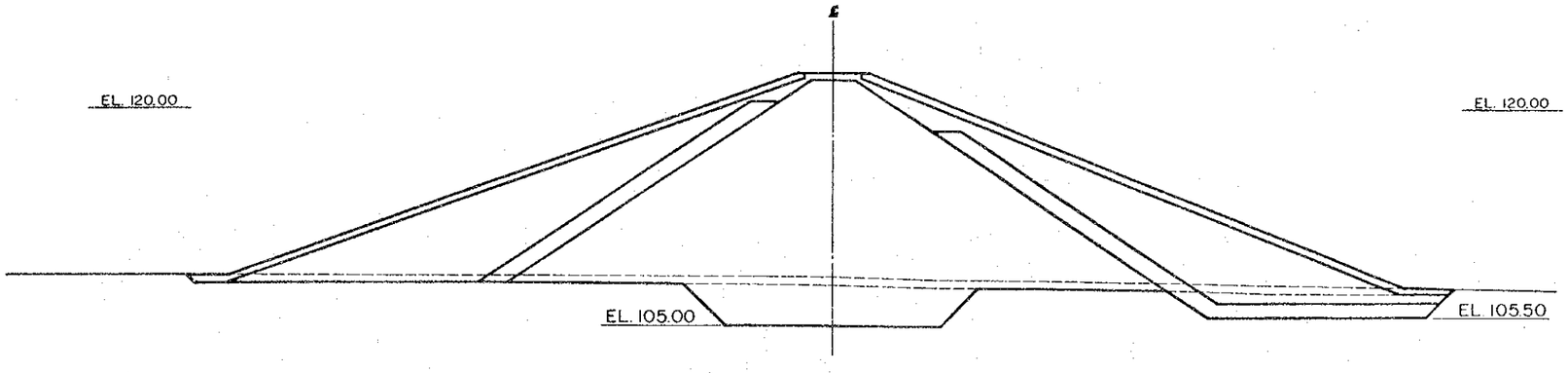


NO. 3

NOTES

ALL ELEVATIONS ARE GIVEN IN METERS.

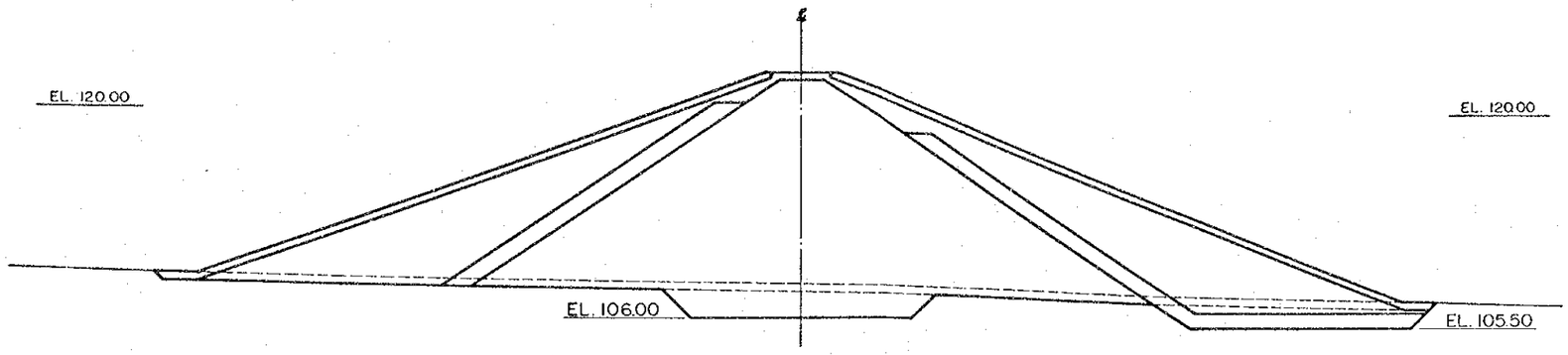
0 5 10 20m

SCALE

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Cross Section (2)

DRW. NO. D 6	JICA



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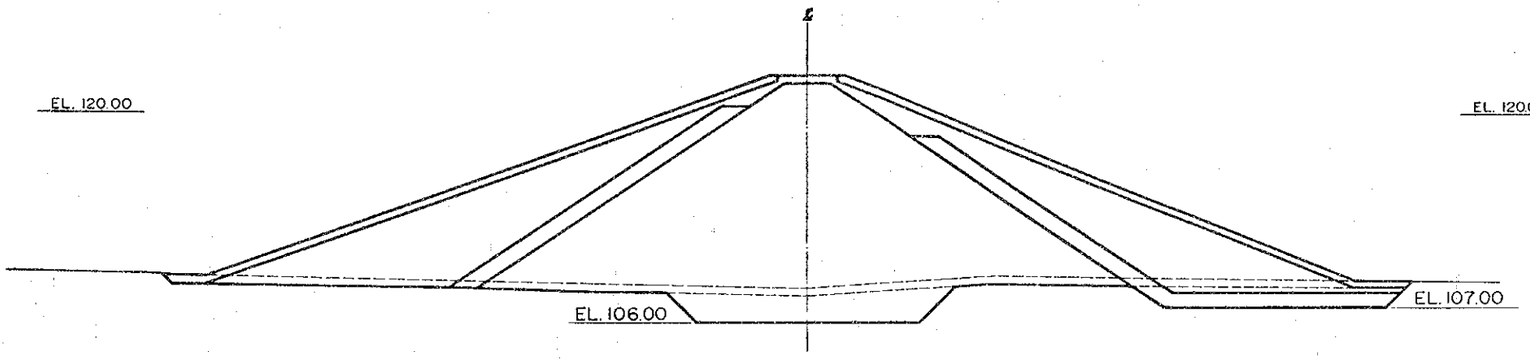

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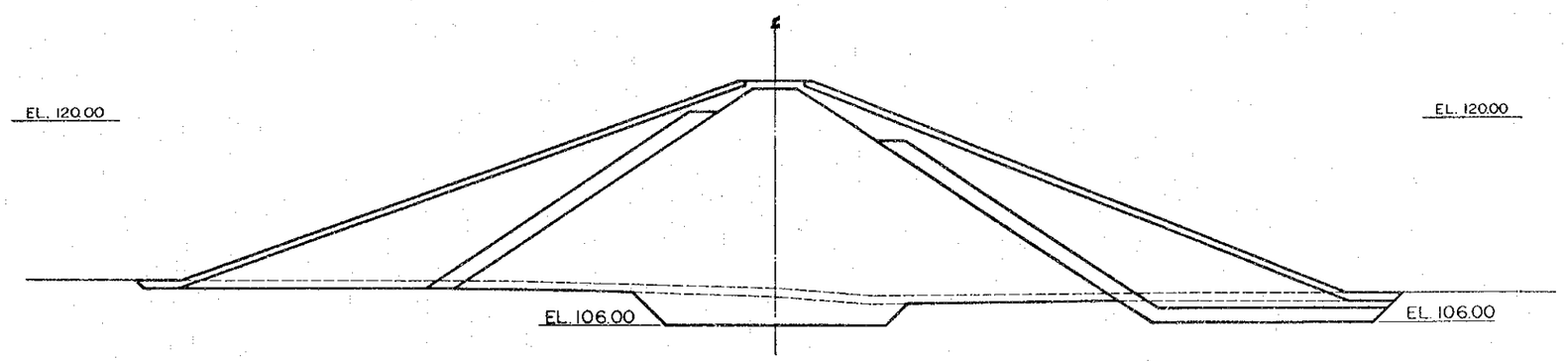
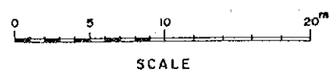


NO. 6

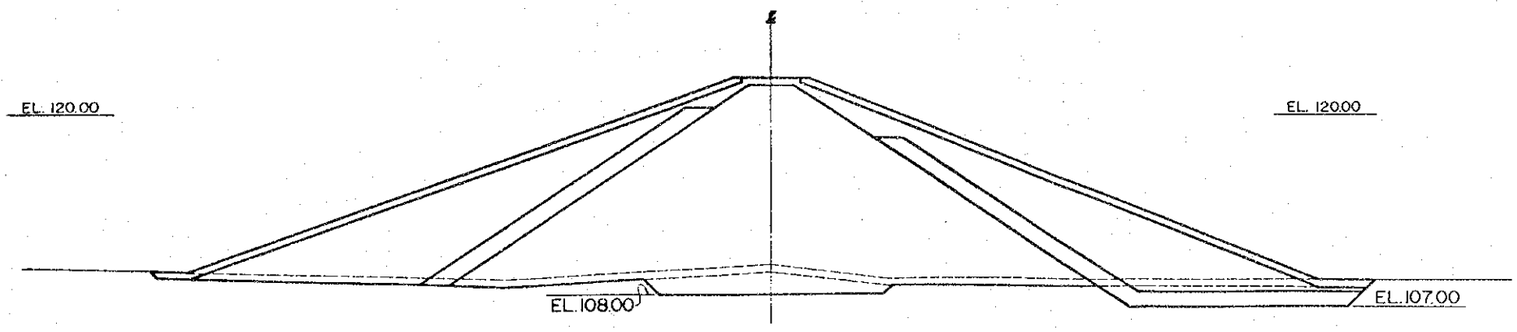
NOTES
ALL ELEVATIONS ARE GIVEN IN METERS.



THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Cross Section (3)

DRW.NO. D 7	JICA



NO.8+60.000

NOTES

ALL ELEVATIONS ARE GIVEN IN METERS.

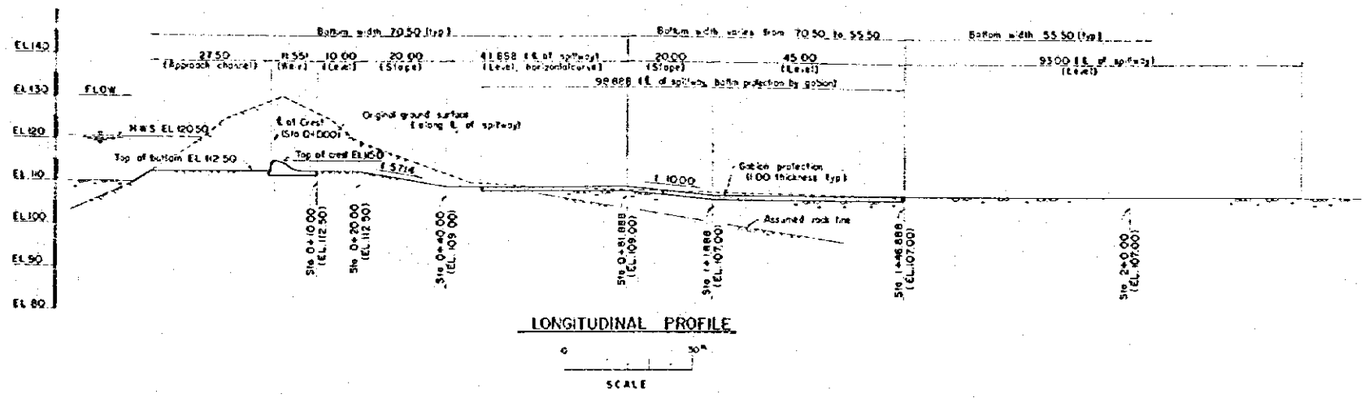
0 5 10 20m

SCALE

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Cross Section (4)

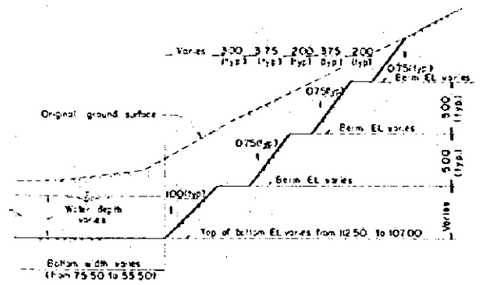
DRW.NO. D 8 | JICA



LONGITUDINAL PROFILE

0 30m

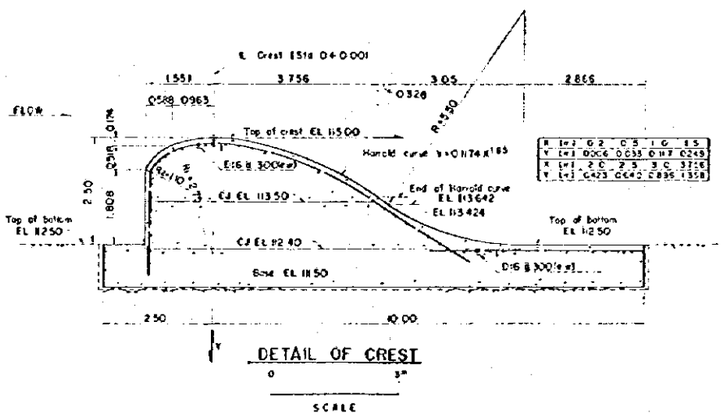
SCALE



TYPICAL SLOPE EXCAVATION

0 3m

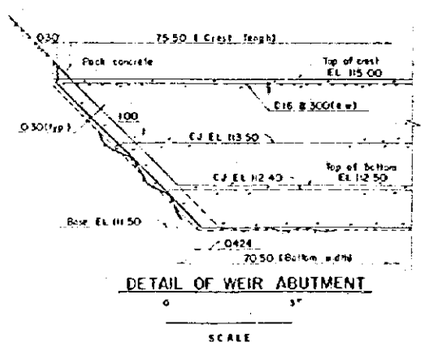
SCALE



DETAIL OF CREST

0 3m

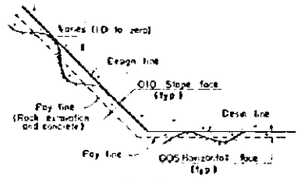
SCALE



DETAIL OF WEIR ABUTMENT

0 3m

SCALE



DETAIL OF PAYLINE

(Not to scale)

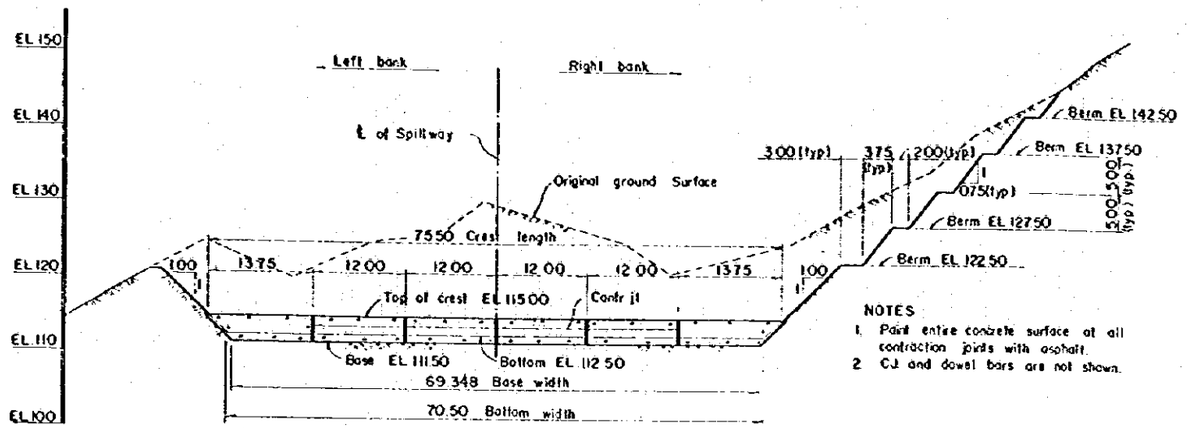
NOTES

1 All stations and elevations are given in meters
2 All dimensions are in meters
3 All bars diameter are shown in millimeters
4 Standard abbreviations are as follows.
Sta. Station, EL. Elevation
C.J. Construction joint
Const.jt. Contraction joint
typ. Typical, e.w: Each way

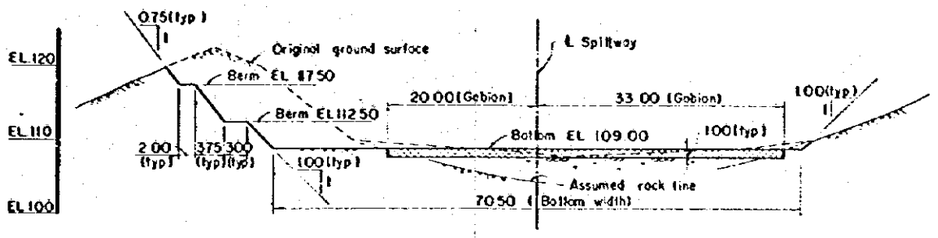
THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Spillway
(Profile & Detail)

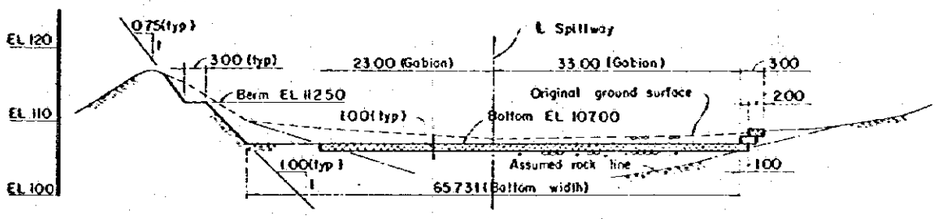
DRW.NO. D 9 | JICA



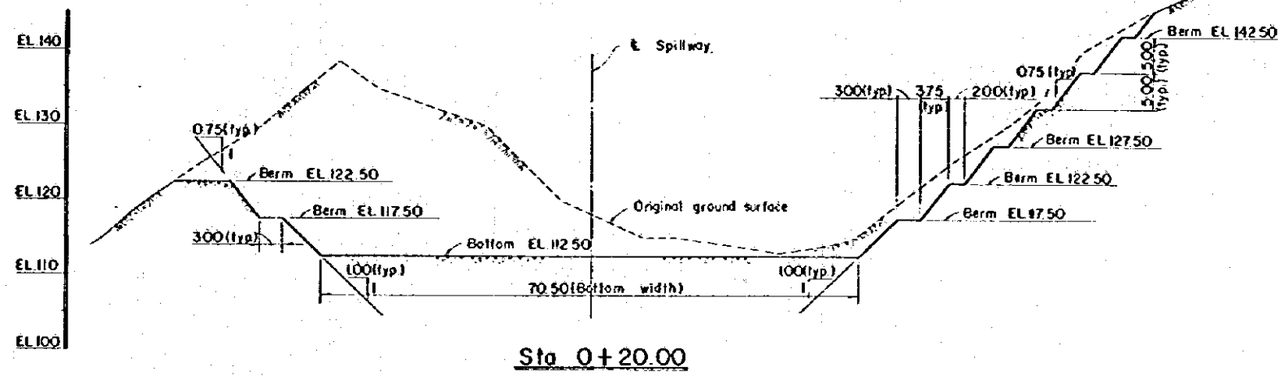
Sta 0+0.00



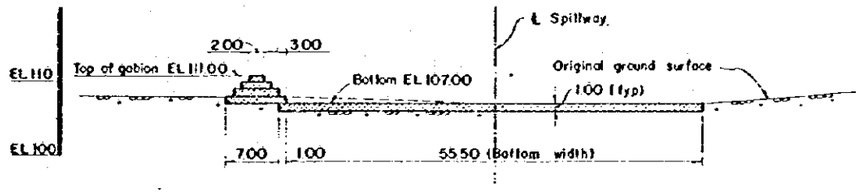
Sta 0+81.888



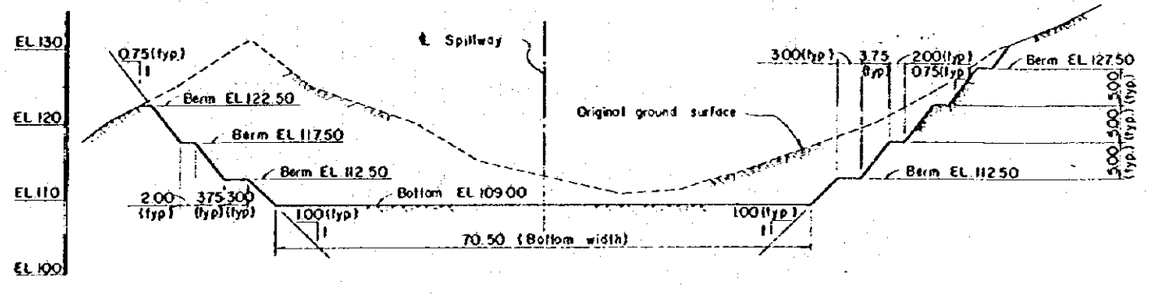
Sta 1+1.888



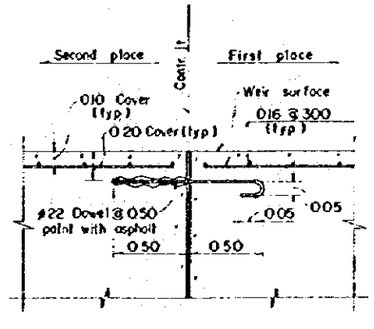
Sta 0+20.00



Sta 1+46.888



Sta 0+40.00



DETAIL OF DOWEL BAR
(Not to scale)

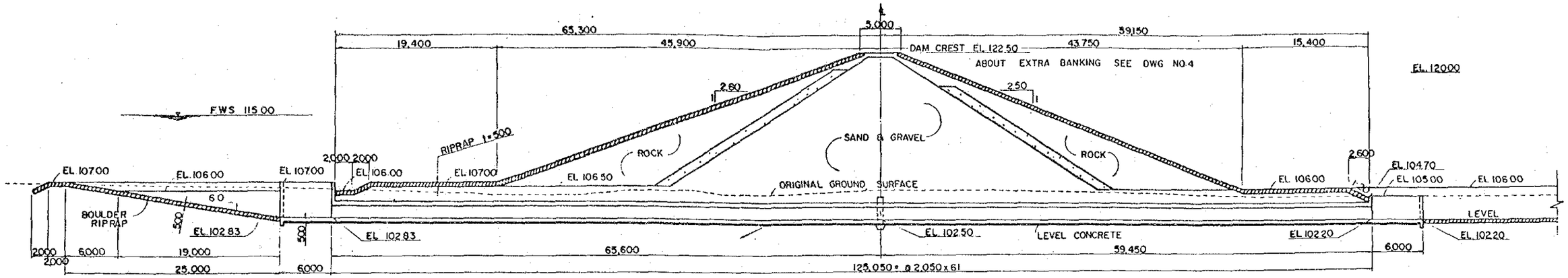
NOTES
1. All stations and elevations are in meters
2. All dimensions are in meters
3. All bars diameter are in millimeters

0 300m
(Except as noted)

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Spillway
(Cross Section)

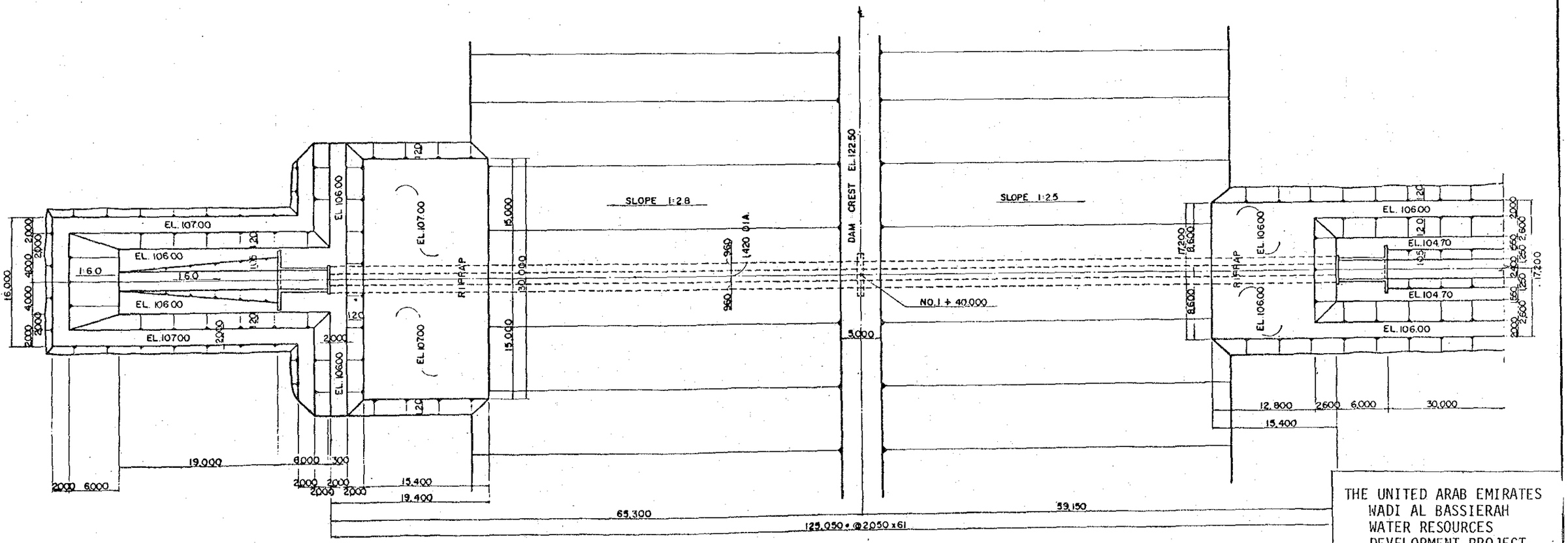
DRW.NO. D 10 | JICA



LONGITUDINAL SECTION

NOTES : ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.

ALL ELEVATIONS ARE IN METERS



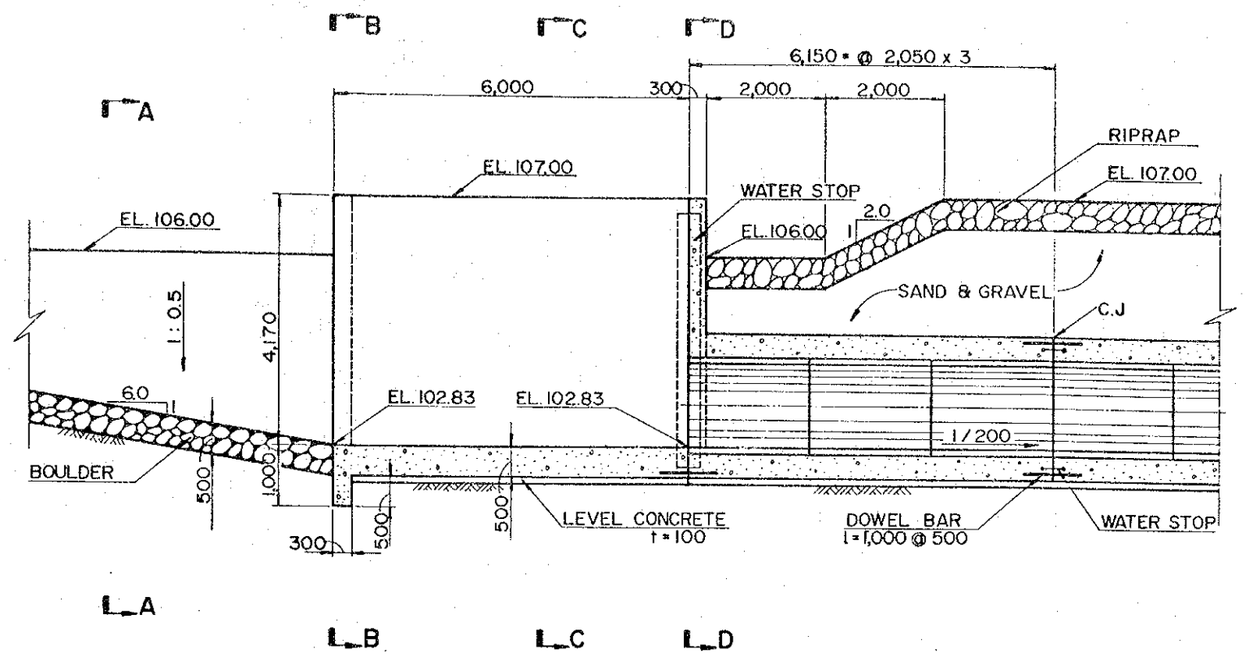
PLAN

SCALE

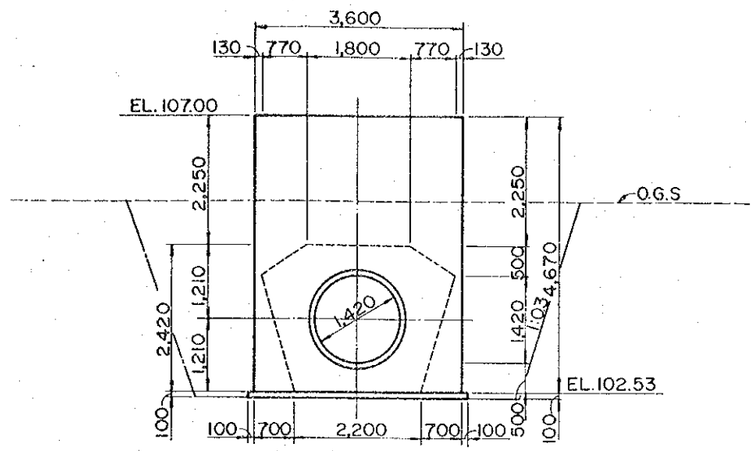
THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Conduit Works
(Plan & Profile)

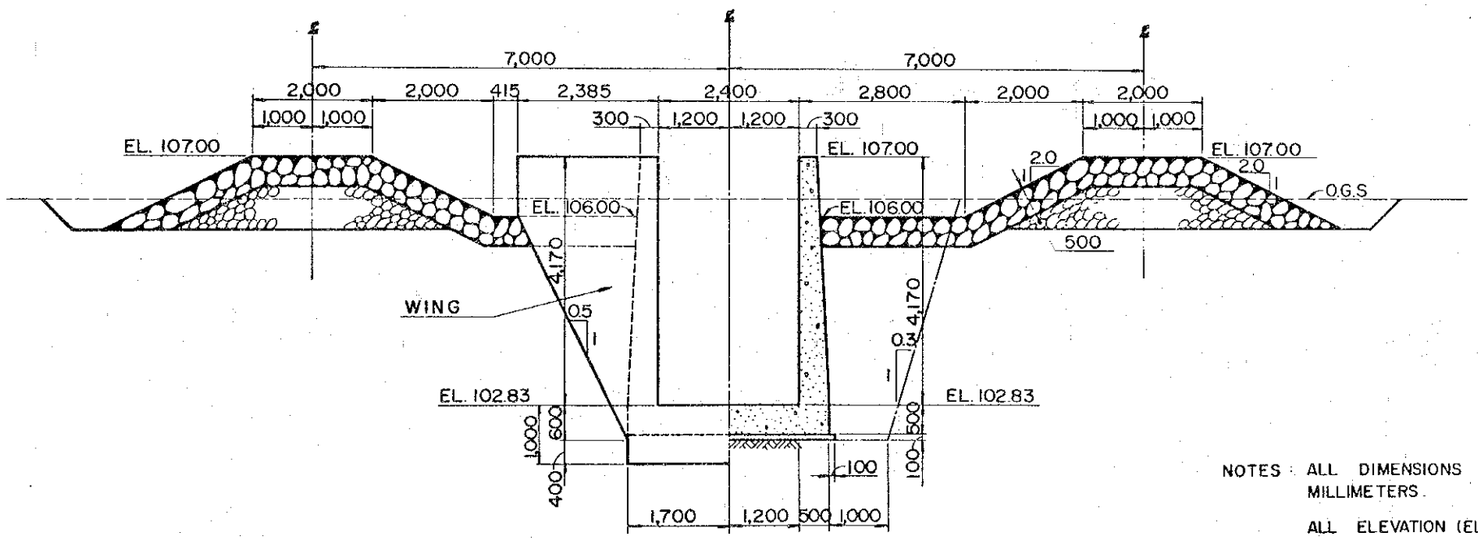
DRW.NO. D 11 | JICA



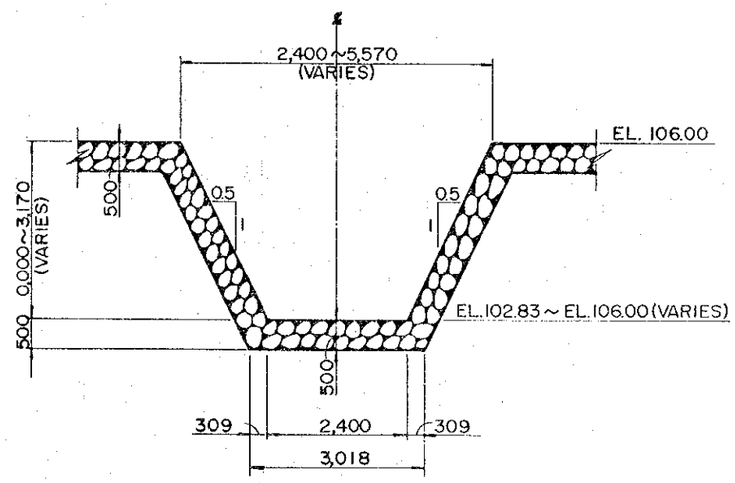
INLET PROFILE



SECTION D – D



SECTION B – B SECTION C – C



SECTION A – A

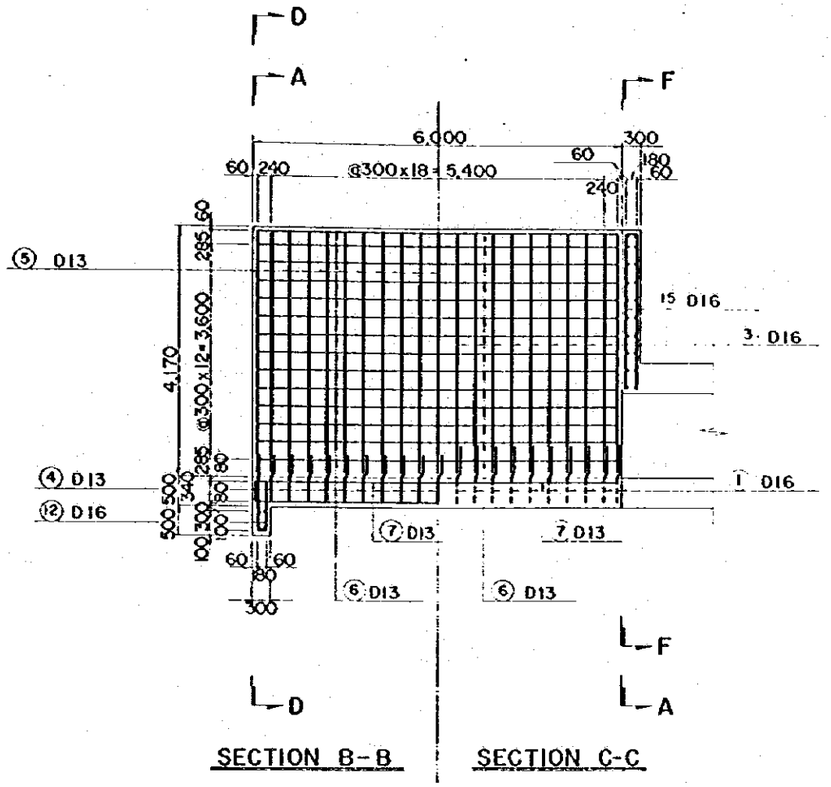
NOTES : ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.

ALL ELEVATION (EL.) ARE IN METERS.

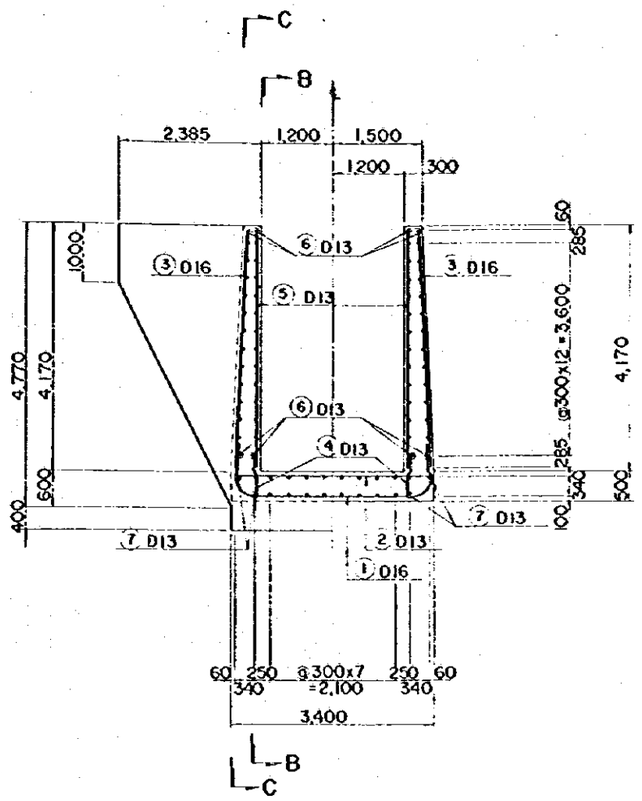
0 1 2 3 4 5m

SCALE

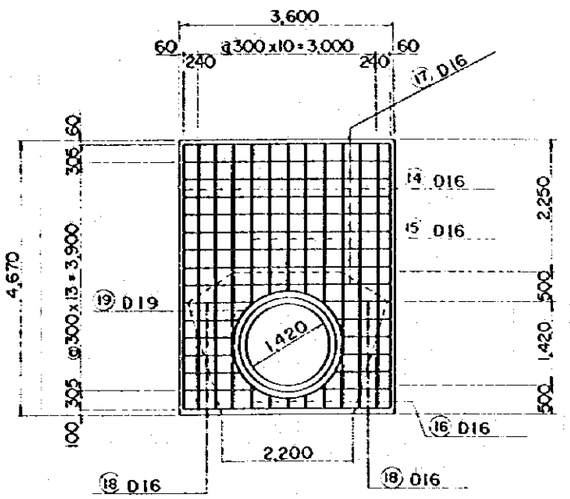
THE UNITED ARAB EMIRATES WADI AL BASSIERAH WATER RESOURCES DEVELOPMENT PROJECT
Inlet Works of Conduit
DRW.NO. D 12 | JICA



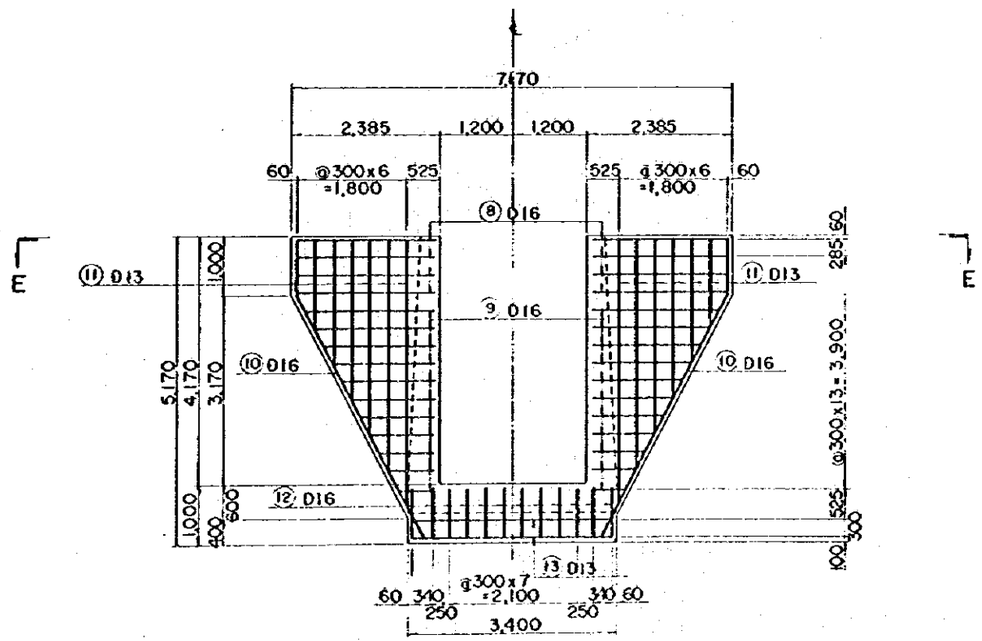
SECTION B-B SECTION C-C



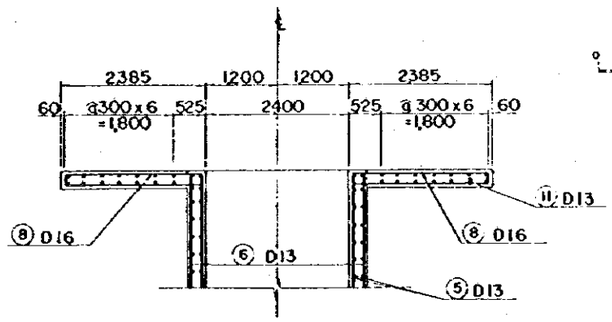
SECTION A-A



SECTION F-F



SECTION D-D



SECTION E-E

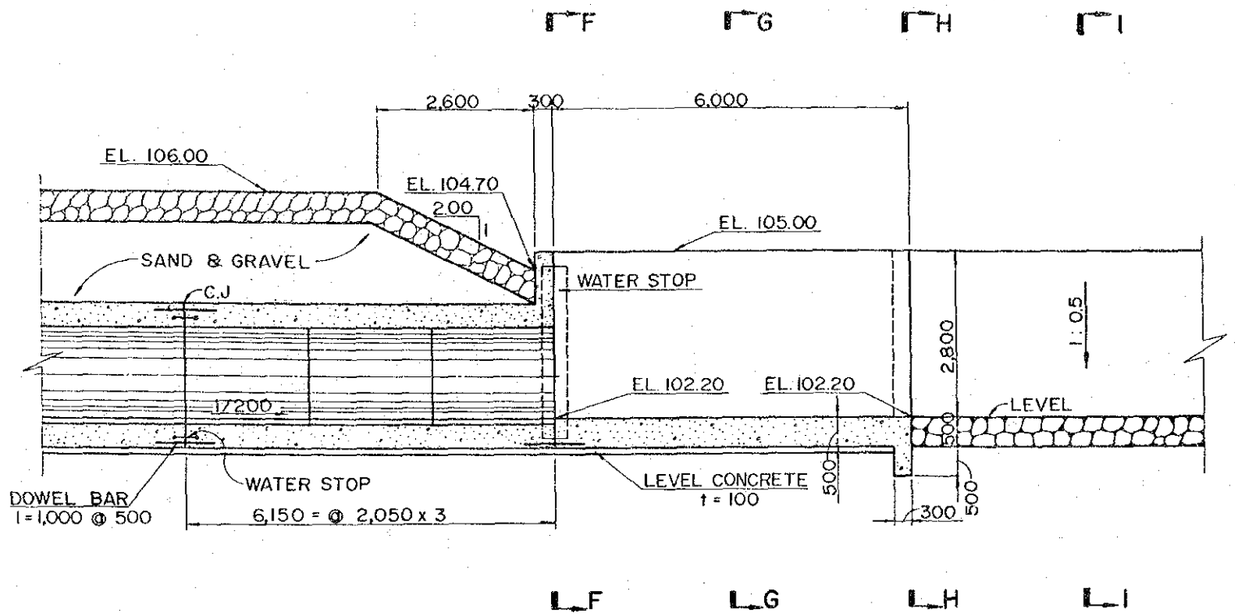
SCALE

NOTES : ALL DIMENSIONS ARE GIVEN IN MILLIMETERS

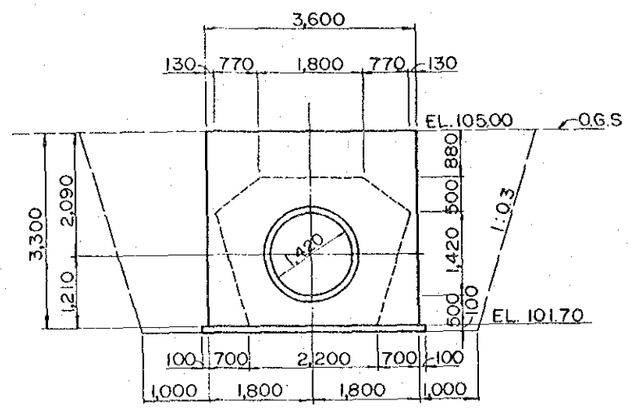
THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Reinforcement of
Inlet Works

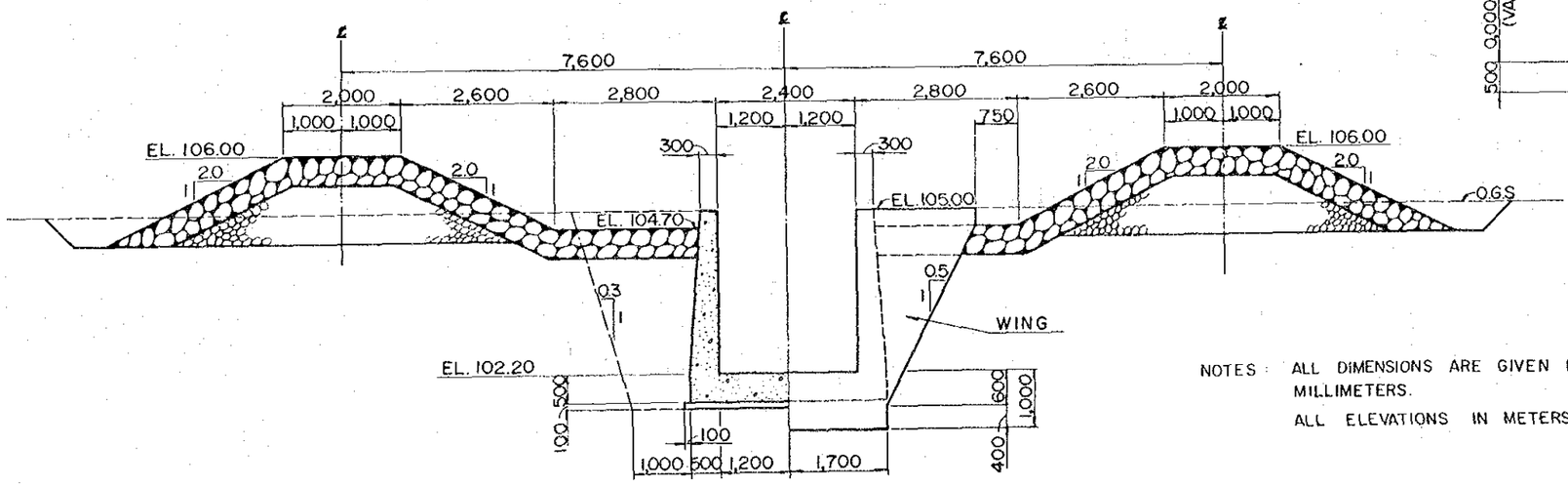
DRW.NO. D 13 | JICA

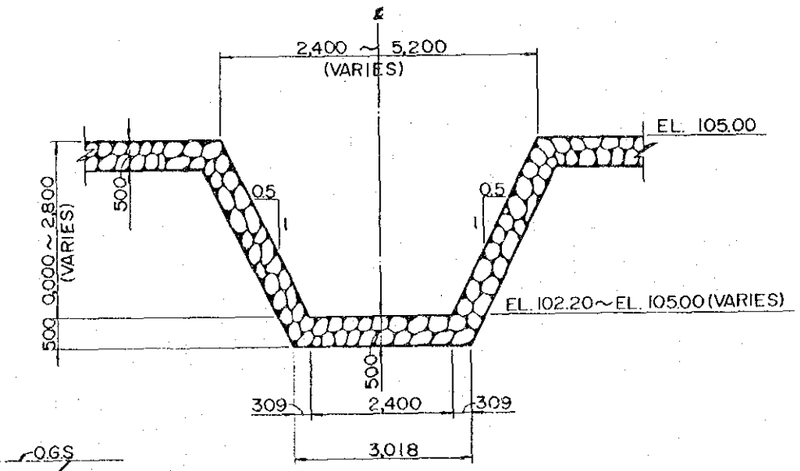


OUTLET PROFILE



SECTION F-F





SECTION I-I

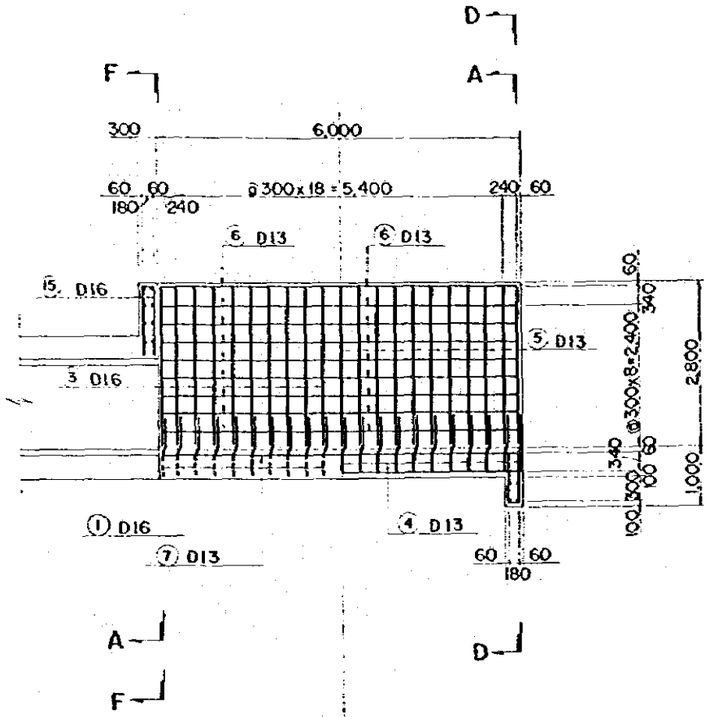
NOTES: ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.
ALL ELEVATIONS IN METERS.

SCALE

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

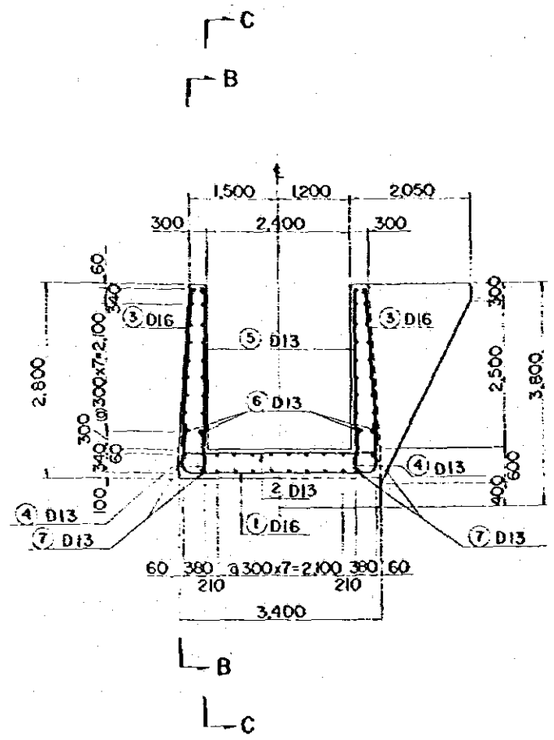
Outlet Works of Conduit

DRW. NO. D 14 | JICA

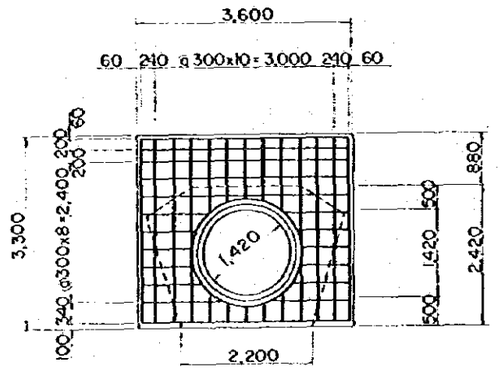


SECTION B-B

SECTION C-C



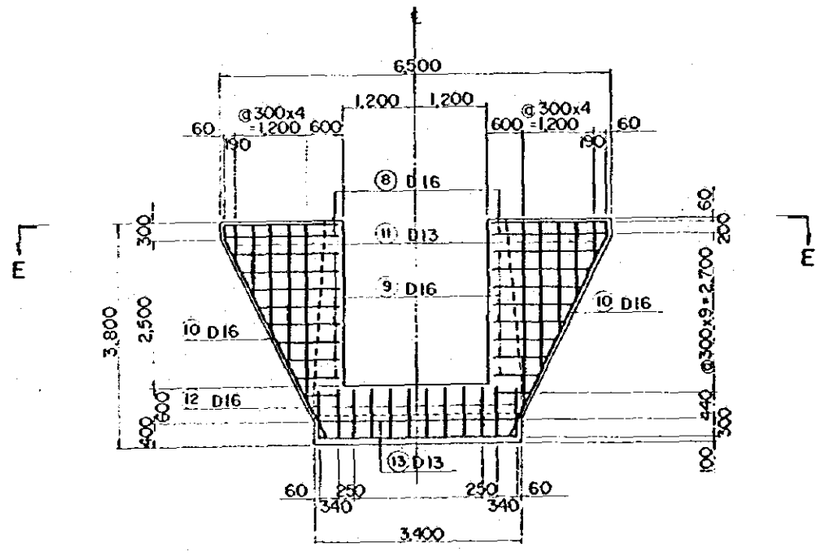
SECTION A-A



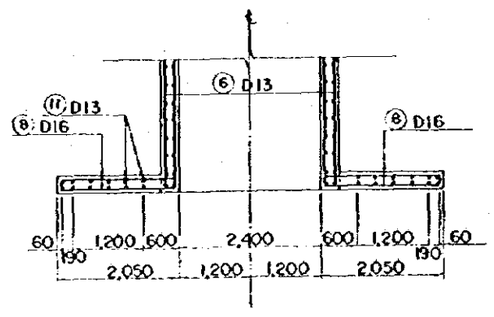
SECTION F-F

SCALE

NOTES : ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.



SECTION D-D

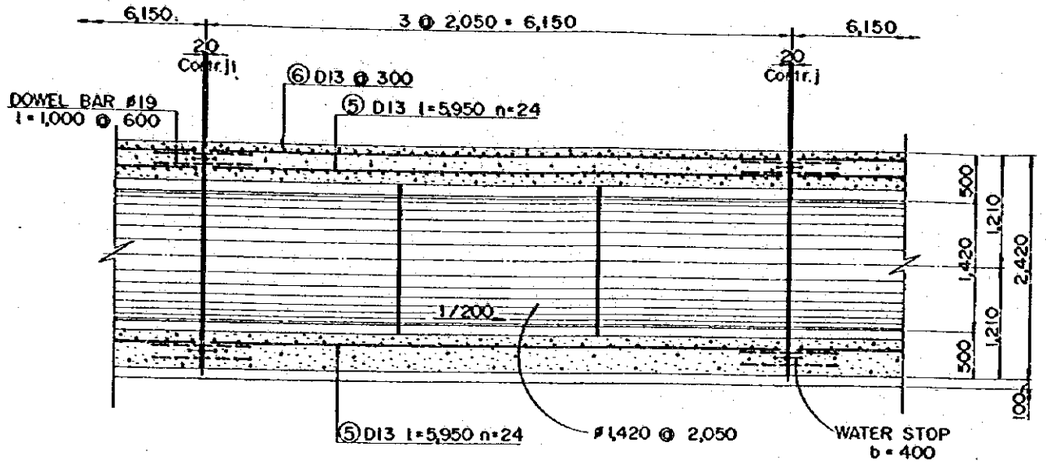


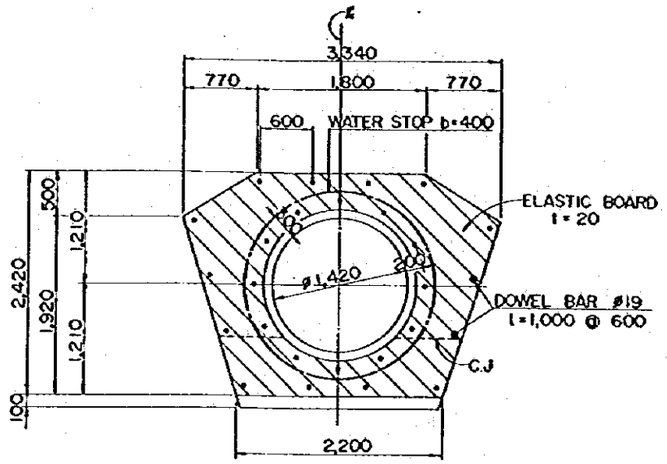
SECTION E-E

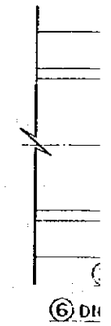
THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

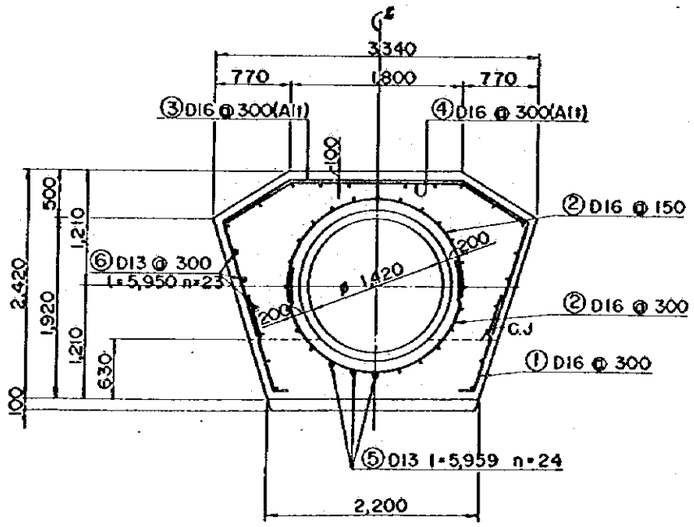
Reinforcement of
Outlet Works

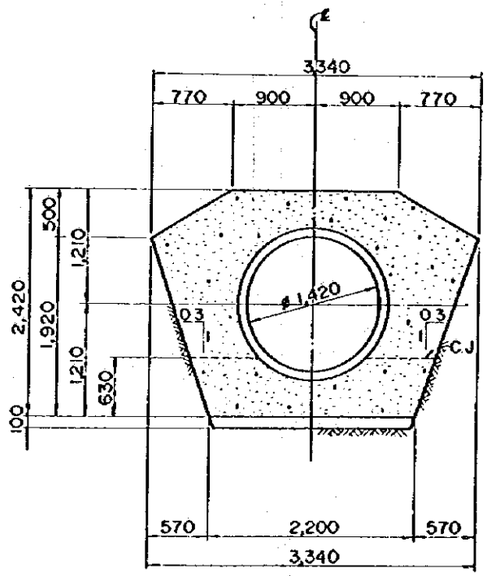
DRW.NO. D 15 | JICA

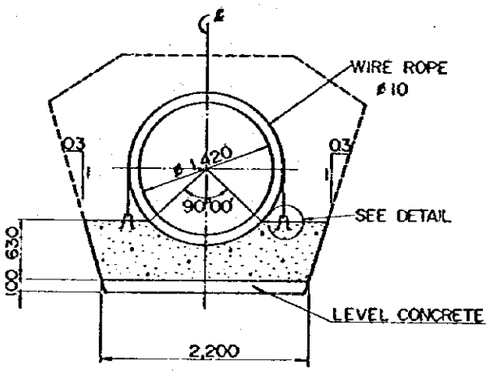


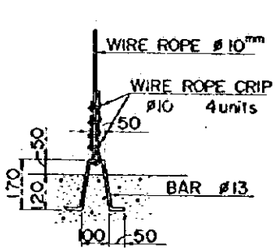




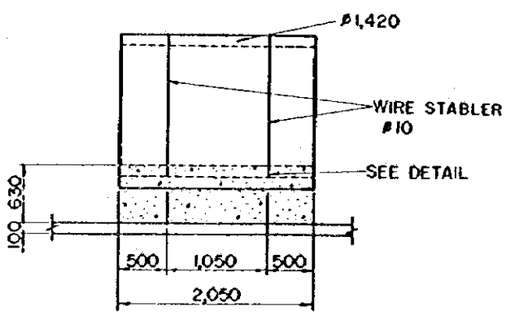


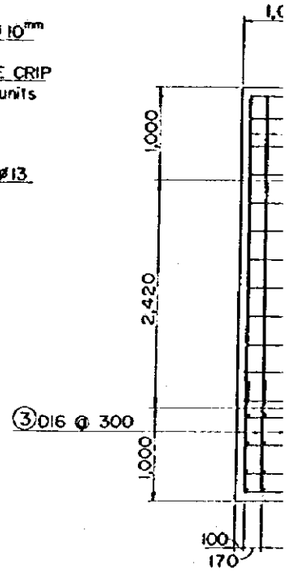


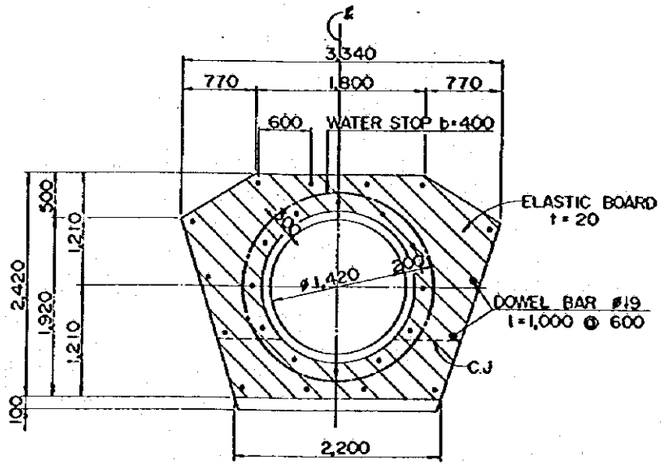


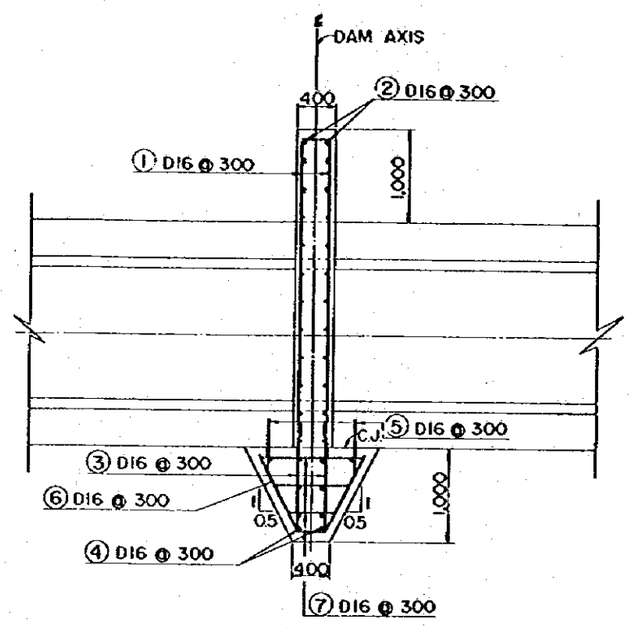


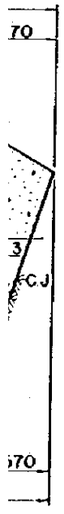
DETAIL
SCALE 1:10

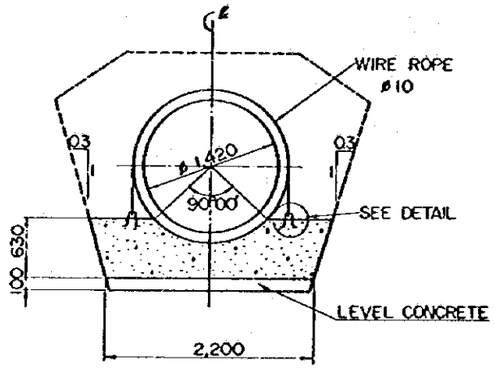


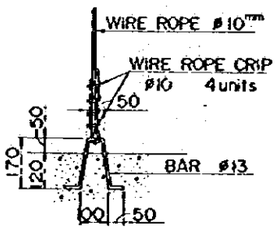




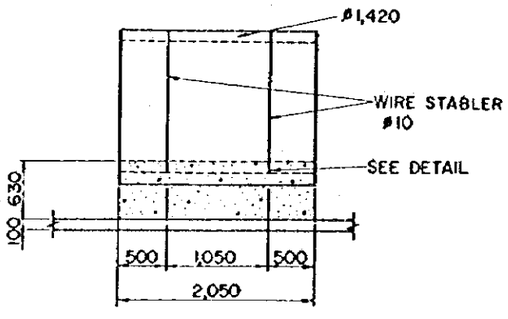


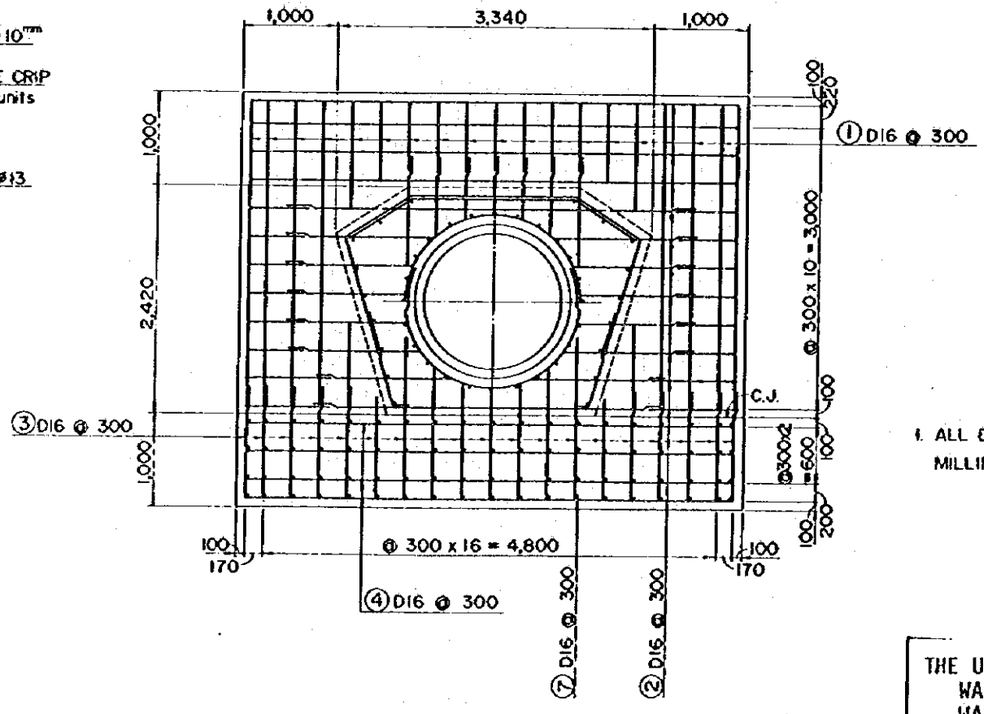






DETAIL
SCALE 1:10





NOTES

1. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS.

THE UNITED ARAB EMIRATES
WADI AL BASSIERAH
WATER RESOURCES
DEVELOPMENT PROJECT

Detail of Conduit

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