

2.2 Dam Embankment

SUMMARY OF EMBANKMENT CALCULATION (1/2)

Item	Unit	Quantity Original (m ³)	Quantity x 1.05 (m ³)
Dam Embankment Impervious Zone including Contact Slurry and Contact Material	m ³	113,513	119,000
Dam Embankment Semi-pervious Zone :			
in Upstream Semi-pervious Zone	m ³	31,192	33,000
in Downstream Fine Semi-pervious Zone	m ³	22,781	24,000
in Downstream Coarse Semi-pervious Zone	m ³	23,559	25,000
Dam Embankment Pervious Zone :			
in Inner Pervious Zone	m ³	91,487	96,000
in Outer Pervious Zone including Surface Treatment	m ³	471,465	495,000
in Riprap Zone	m ³	9,752	10,000
Total (excluding Road Material)	m³	763,751	802,000
Special Compaction for Dam Embankment :			
in Impervious Zone Embankment	m ³	1,470	1,540
in Upstream and Downstream Semi-pervious Zone	m ³	2,800	2,940

SUMMARY OF EMBANKMENT CALCULATION (2/2)

Sta.	Impervious			2			3			4			5			6			
	Ave. Area [m ²]	Volume [m ³]	Ave. Area [m ²]	Volume [m ³]	Ave. Area [m ²]	Volume [m ³]	Downstream Semi-perVIOUS Fine	Ave. Area [m ²]	Volume [m ³]	Downstream Semi-perVIOUS Coarse	Ave. Area [m ²]	Volume [m ³]	Upstream Inner PerVIOUS	Ave. Area [m ²]	Volume [m ³]	Downstream Inner PerVIOUS	Ave. Area [m ²]	Volume [m ³]	
50.5	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
60	75.6	37.8	45.2	214.7	32.5	16.3	32.5	154.4	37.1	18.6	37.1	176.2							
70	170.3	123.0	83.2	642.0	64.2	46.1	59.5	660.5	63.4	50.3	63.4	502.5							
80	225.6	198.0	100.2	1,079.5	73.3	66.0	72.3	659.5	76.1	69.8	76.1	697.5							
90	287.7	256.7	118.2	1,092.0	88.0	78.7	88.0	786.5	89.9	83.0	89.9	830.0							
100	464.5	376.1	188.5	1,383.5	115.2	100.1	115.2	1,001.0	120.1	105.0	120.1	1,050.0							
110	638.7	551.6	230.9	1,747.0	139.9	127.6	144.3	1,322.0	144.3	132.2	144.3	1,322.0							
120	883.6	761.2	230.9	2,109.0	169.5	154.7	174.4	1,593.5	174.4	159.4	174.4	1,593.5							
130	1,172.4	1,028.0	271.2	2,510.5	199.7	184.6	199.7	1,816.0	199.7	187.1	199.7	1,870.5							
140	1,466.5	1,319.5	306.1	2,886.5	226.9	213.3	226.9	2,269.0	226.9	215.1	226.9	2,269.0							
150	1,466.5	1,466.5	306.1	3,061.0	226.9	226.9	226.9	2,269.0	226.9	226.9	226.9	2,269.0							
160	1,331.8	1,399.2	291.3	2,987.0	214.8	220.9	214.8	2,209.5	214.8	220.9	214.8	2,209.5							
170	1,023.0	1,177.0	251.1	2,712.0	184.6	199.7	184.6	1,997.0	184.6	203.5	184.6	1,997.0							
180	754.2	888.6	210.8	2,309.5	154.4	169.5	154.4	1,695.0	154.4	174.4	154.4	1,695.0							
190	564.3	659.3	177.1	1,939.5	120.1	142.1	120.1	1,421.0	120.1	133.8	120.1	1,421.0							
200	371.1	467.0	108.3	1,577.0	100.1	115.0	100.1	1,149.5	100.1	105.0	100.1	1,149.5							
210	214.4	292.8	98.1	1,182.0	89.9	85.0	89.9	850.0	89.9	74.8	89.9	899.0							
220	137.4	175.9	72.3	852.0	52.2	60.6	52.2	605.5	52.2	65.0	52.2	650.0							
230	75.7	106.6	47.3	598.0	32.5	41.9	32.5	418.5	32.5	45.9	32.5	458.5							
240	29.2	52.5	23.0	351.5	13.8	23.2	13.8	276.5	13.8	27.7	13.8	276.5							
250.5	0.0	14.6	0.0	11.5	11.5	120.8	0.0	72.5	0.0	9.4	0.0	98.7							
TOTAL		113,513.4		31,192.5		22,781.3		23,559.4				45,776.0							45,776.0

Sta.	7			8			9			10			Total
	Upstream Outer PerVIOUS	Ave. Area [m ²]	Volume [m ³]	Downstream Outer PerVIOUS	Ave. Area [m ²]	Volume [m ³]	Riprap	Ave. Area [m ²]	Volume [m ³]	Reed Material	Ave. Area [m ²]	Volume [m ³]	
50.5	0.0			0.0			0.0			0.0			
60	155.9	78.0	740.5	165.7	82.9	787.1	19.7	9.9	93.6	7.2	3.6	34.2	2,559.8
70	174.9	165.4	1,654.0	201.8	183.8	1,837.5	33.0	26.4	263.5	7.2	7.2	72.0	6,661.5
80	217.0	196.0	1,959.5	236.4	214.1	2,141.0	33.0	33.0	330.0	7.2	7.2	72.0	8,756.0
90	267.5	282.3	2,922.5	330.3	282.9	2,828.5	49.6	41.3	413.0	7.2	7.2	72.0	11,511.0
100	350.2	388.9	3,888.5	427.2	489.3	4,893.5	64.1	56.9	568.5	7.2	7.2	72.0	18,257.0
110	432.6	470.4	4,704.0	524.6	607.6	6,076.5	64.8	64.5	644.5	7.2	7.2	72.0	23,829.5
120	519.1	561.9	5,619.0	623.9	710.9	7,109.0	65.9	65.4	653.5	7.2	7.2	72.0	29,476.0
130	624.6	692.9	6,929.5	735.7	817.8	8,178.0	66.8	66.4	663.5	7.2	7.2	72.0	35,123.0
140	746.8	825.7	8,257.0	860.7	954.2	9,542.0	67.5	67.2	671.5	7.2	7.2	72.0	40,770.0
150	881.3	973.1	9,731.0	1,007.2	1,104.4	11,044.0	67.4	67.5	674.5	7.2	7.2	72.0	46,417.0
160	1,028.5	1,133.5	11,335.0	1,164.7	1,271.7	12,717.0	67.0	67.2	672.0	7.2	7.2	72.0	52,064.0
170	1,187.1	1,304.1	13,041.0	1,335.7	1,456.7	14,567.0	67.0	66.5	665.5	7.2	7.2	72.0	57,711.0
180	1,356.6	1,489.6	14,896.0	1,520.2	1,659.2	16,592.0	67.6	66.2	662.0	7.2	7.2	72.0	63,358.0
190	1,537.1	1,689.1	16,891.0	1,718.7	1,868.7	18,688.0	66.9	66.2	662.0	7.2	7.2	72.0	69,005.0
200	1,728.6	1,903.6	19,036.0	1,932.2	2,088.2	20,882.0	66.9	66.2	662.0	7.2	7.2	72.0	74,652.0
210	1,931.1	2,133.1	21,331.0	2,161.7	2,337.7	23,377.0	66.9	66.2	662.0	7.2	7.2	72.0	80,299.0
220	2,144.6	2,388.6	23,886.0	2,417.2	2,617.2	26,172.0	66.9	66.2	662.0	7.2	7.2	72.0	85,946.0
230	2,369.1	2,659.1	26,591.0	2,691.7	2,917.7	29,177.0	66.9	66.2	662.0	7.2	7.2	72.0	91,593.0
240	2,604.6	2,944.6	29,446.0	2,987.2	3,227.2	32,272.0	66.9	66.2	662.0	7.2	7.2	72.0	97,240.0
250.5	0.0	3.8	39.4	0.0	6.9	72.5	0.0	6.7	69.8	0.0	0.0	3.6	664.7
TOTAL		260,818.9	2,109,646.6		210,192.5	9,752.4		1,388.6	765,191.9				

EMBANKMENT VOLUME CALCULATION (1/10)

Sta. 60

No.	Elevation (El., m)	1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	5.4	2.9	2.2	2.2	2.2		2.2	4.4	5.4	7.2	31.9
15	150-155	27.3	17.7	13.3	13.3	39.2		39.2	26.2	13.6		150.6
14	145-150	37.2	20.0	15.0	15.0	66.8		66.8	62.1	0.8		216.9
13	140-145	5.7	4.6	2.0	6.6	46.2		46.2	67.7			132.8
12	135-140					1.5		1.5	5.4			6.9
11	130-135											0.0
10	125-130											0.0
9	120-125											0.0
8	115-120											0.0
7	110-115											0.0
6	105-110											0.0
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		75.6	45.2	32.5	37.1	0.0	0.0	155.9	165.8	19.8	7.2	539.1

Sta. 70

No.	Elevation (El., m)	1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	5.7	3.1	2.3	2.3	2.5		2.5	4.6	5.6	7.2	33.3
15	150-155	27.3	17.8	13.3	13.3	40.4		40.4	26.8	13.7		152.6
14	145-150	37.2	20.0	15.0	15.0	96.9		96.9	62.9	13.7		260.7
13	140-145	47.2	20.0	15.0	15.0	29.9		29.9	102.2			229.3
12	135-140	52.9	22.4	14.0	17.7	5.3		5.3	5.3			117.6
11	130-135											0.0
10	125-130											0.0
9	120-125											0.0
8	115-120											0.0
7	110-115											0.0
6	105-110											0.0
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		170.3	83.3	59.6	63.3	0.0	0.0	175.0	201.8	33.0	7.2	793.5

EMBANKMENT VOLUME CALCULATION (2/10)

Sta. 80

No.	Elevation (E.L. m)	1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	6.1	3.3	2.5	2.5			2.6	4.8	5.8	7.2	34.8
15	150-155	27.4	17.8	13.3	13.3			41.0	27.3	13.6		153.7
14	145-150	37.2	20.0	15.0	15.0			97.2	63.2	13.6		261.2
13	140-145	47.2	20.0	15.0	15.0			47.3	102.3			246.8
12	135-140	57.2	20.0	15.0	15.0			26.4	26.4			160.0
11	130-135	50.5	19.1	11.5	15.2			2.4	2.4			101.1
10	125-130											0.0
9	120-125											0.0
8	115-120											0.0
7	110-115											0.0
6	105-110											0.0
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		225.6	100.2	72.3	76.0	0.0	0.0	216.9	226.4	33.0	7.2	957.6

Sta. 90

No.	Elevation (E.L. m)	1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	6.5	3.5	2.6	2.6			3.2	5.4	6.3	7.2	37.3
15	150-155	27.4	17.8	13.4	13.4			44.3	29.4	13.7		159.4
14	145-150	37.2	20.0	15.0	15.0			100.1	64.9	13.5		265.7
13	140-145	47.2	20.0	15.0	15.0			133.1	103.6	16.1		350.0
12	135-140	57.2	20.0	15.0	15.0			57.0	106.2			270.4
11	130-135	67.2	20.0	15.0	15.0			29.9	29.9			177.0
10	125-130	45.1	16.9	9.0	13.9							84.9
9	120-125											0.0
8	115-120											0.0
7	110-115											0.0
6	105-110											0.0
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		287.8	118.2	85.0	89.9	0.0	0.0	367.6	339.4	49.6	7.2	1,344.7

EMBANKMENT VOLUME CALCULATION (3/10)

Sta.100

No.	Elevation (E.L. m)	1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	6.8	3.7	2.8	2.8			3.5	5.7	6.6	7.2	39.1
15	150-155	27.4	17.9	13.4	13.4			46.4	31.1	14.4		164.0
14	145-150	37.2	20.0	15.0	15.0			104.7	67.7	13.5		273.1
13	140-145	47.2	20.0	15.0	15.0			162.3	106.2	13.5		379.2
12	135-140	57.2	20.0	15.0	15.0			213.3	144.7	13.5		478.7
11	130-135	67.2	20.0	15.0	15.0			136.3	173.5	2.7		429.7
10	125-130	77.2	20.0	15.0	15.0			54.0	68.6			249.8
9	120-125	87.2	20.0	15.0	15.0			29.8	29.8			196.8
8	115-120	57.1	16.9	9.0	13.9							96.9
7	110-115											0.0
6	105-110											0.0
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		464.5	158.5	115.2	120.1	0.0	0.0	750.3	627.3	64.2	7.2	2,307.3

Sta.110

No.	Elevation (E.L. m)	1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	7.2	3.9	2.9	2.9			3.9	6.0	6.8	7.2	40.8
15	150-155	27.4	17.9	13.4	13.4			47.4	31.8	14.4		165.7
14	145-150	37.2	20.0	15.0	15.0			107.8	70.2	14.1		279.3
13	140-145	47.2	20.0	15.0	15.0			166.6	109.2	13.4		386.4
12	135-140	57.2	20.0	15.0	15.0			223.9	147.7	13.4		492.2
11	130-135	67.2	20.0	15.0	15.0			291.9	186.1	2.7		597.9
10	125-130	77.2	20.0	15.0	15.0			323.0	224.6			674.8
9	120-125	87.2	20.0	15.0	15.0			138.3	208.2			483.7
8	115-120	97.2	20.0	15.0	15.0			46.1	46.1			243.6
7	110-115	107.2	23.8	15.0	18.8			15.2	4.2			195.2
6	105-110	26.5	5.3	3.5	4.1							39.4
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		638.7	190.9	139.8	144.2	61.3	61.3	1,302.8	988.0	64.8	7.2	3,599.0

EMBANKMENT VOLUME CALCULATION (1/10)

Sta. 120

No.	Elevation (E.L., m)	(m ³)										
		1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	7.5	4.1	3.1	3.1			4.2	6.3	7.0	7.2	42.5
15	150-155	27.5	17.9	13.5	13.5			48.4	32.5	14.4		167.7
14	145-150	37.2	20.0	15.0	15.0			109.0	71.3	14.4		281.9
13	140-145	47.2	20.0	15.0	15.0			170.8	112.3	13.8		394.1
12	135-140	57.2	20.0	15.0	15.0			239.0	151.4	13.5		501.1
11	130-135	67.2	20.0	15.0	15.0			297.5	190.4	2.7		607.8
10	125-130	77.2	20.0	15.0	15.0			357.9	229.4			714.5
9	120-125	87.2	20.0	15.0	15.0			415.6	268.4			821.2
8	115-120	97.2	20.0	15.0	15.0	98.3	75.0	265.7	232.4			818.6
7	110-115	107.2	20.0	15.0	15.0	73.3	95.0	20.9	251.4			597.8
6	105-110	117.2	20.0	15.0	15.0	46.1	74.8		270.2			558.3
5	100-105	127.2	24.3	15.0	19.3	14.7	14.7		254.4			469.6
4	95-100	20.6	1.5	3.0	3.5			169.7	114.0			207.3
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		883.6	230.8	169.6	174.4	232.4	259.5	1,919.0	2,354.1	65.8	7.2	6,296.4

Sta. 130

No.	Elevation (E.L., m)	(m ³)										
		1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	7.9	4.3	3.2	3.2			4.6	6.6	7.3	7.2	36.4
15	150-155	27.5	18.0	13.5	13.5			49.5	33.2	14.4		142.1
14	145-150	37.2	20.0	15.0	15.0			110.1	72.0	14.4		246.5
13	140-145	47.2	20.0	15.0	15.0			172.6	113.8	14.4		350.8
12	135-140	57.2	20.0	15.0	15.0			233.6	154.2	13.7		451.5
11	130-135	67.2	20.0	15.0	15.0			302.8	192.9	2.7		548.4
10	125-130	77.2	20.0	15.0	15.0			363.7	231.8			645.5
9	120-125	87.2	20.0	15.0	15.0			422.0	270.7			742.7
8	115-120	97.2	20.0	15.0	15.0	110.0	75.0	370.2	234.6			839.8
7	110-115	107.2	20.0	15.0	15.0	130.0	95.0	408.5	253.5			1,044.2
6	105-110	117.2	20.0	15.0	15.0	150.0	115.0	446.8	272.4			1,151.4
5	100-105	127.2	20.0	15.0	15.0	86.6	135.0	420.4	291.3			1,110.5
4	95-100	137.2	20.0	15.0	15.0	46.1	155.0	275.1	310.2			973.6
3	90-95	147.2	24.3	15.0	15.0	14.7	175.0	265.6	329.1			985.9
2	85-90	30.6	1.5	3.0	3.0		156.2	79.4	348.0			624.7
1	80-85						30.3		161.8			192.1
Total		1,172.4	271.1	199.7	199.7	537.4	936.5	3,924.9	3,276.1	66.9	7.2	10,591.9

EMBANKMENT VOLUME CALCULATION (5/10)

Sta. 140

No.	Elevation (E.L. m)	(m ³)										
		1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	Total
16	155-157	8.2	4.5	3.4	3.4	4.9			6.9	7.5	7.2	46.0
15	150-155	27.5	18.0	13.5	13.5	50.4			33.8	14.4		171.1
14	145-150	37.2	20.0	15.0	15.0	111.1			72.7	14.4		285.4
13	140-145	47.2	20.0	15.0	15.0	173.6			114.5	14.4		399.7
12	135-140	57.2	20.0	15.0	15.0	236.0			156.0	14.1		513.3
11	130-135	67.2	20.0	15.0	15.0	306.1			195.2	2.7		621.2
10	125-130	77.2	20.0	15.0	15.0	366.6			233.9			727.7
9	120-125	87.2	20.0	15.0	15.0	424.5			272.6			834.3
8	115-120	97.2	20.0	15.0	15.0	372.3			236.3			940.8
7	110-115	107.2	20.0	15.0	15.0	410.2			255.1			1,047.5
6	105-110	117.2	20.0	15.0	15.0	448.0			273.8			1,154.0
5	100-105	127.2	20.0	15.0	15.0	485.8			292.5			1,260.5
4	95-100	137.2	20.0	15.0	15.0	523.7			311.2			1,367.1
3	90-95	147.2	20.0	15.0	15.0	548.4			329.9			1,460.5
2	85-90	157.2	20.0	15.0	15.0	125.5			348.6			1,022.8
1	80-85	167.2	23.6	15.0	18.6	46.1			247.9			524.8
Total		1,466.5	306.1	226.9	230.5	1,112.9	991.1	4,587.1	3,380.9	67.5	7.2	12,376.7

Sta. 150

No.	Elevation (E.L. m)	(m ³)										
		1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	Total
16	155-157	8.2	4.5	3.4	3.4	4.9			6.9	7.5	7.2	46.0
15	150-155	27.5	18.0	13.5	13.5	50.4			33.8	14.4		171.1
14	145-150	37.2	20.0	15.0	15.0	111.1			72.7	14.4		285.4
13	140-145	47.2	20.0	15.0	15.0	173.6			114.5	14.4		399.7
12	135-140	57.2	20.0	15.0	15.0	236.0			156.0	14.1		513.3
11	130-135	67.2	20.0	15.0	15.0	306.1			195.2	2.6		620.5
10	125-130	77.2	20.0	15.0	15.0	366.6			233.9			726.5
9	120-125	87.2	20.0	15.0	15.0	424.5			272.6			832.3
8	115-120	97.2	20.0	15.0	15.0	369.7			236.3			938.2
7	110-115	107.2	20.0	15.0	15.0	406.9			254.9			1,044.0
6	105-110	117.2	20.0	15.0	15.0	444.1			273.6			1,149.9
5	100-105	127.2	20.0	15.0	15.0	488.2			292.3			1,262.7
4	95-100	137.2	20.0	15.0	15.0	466.1			311.0			1,309.3
3	90-95	147.2	20.0	15.0	15.0	372.9			329.7			1,284.8
2	85-90	157.2	20.0	15.0	15.0	74.0			348.4			996.9
1	80-85	167.2	23.6	15.0	18.6	6.4			162.3			414.6
Total		1,466.5	306.1	226.9	230.5	1,138.7	966.5	4,291.3	3,294.1	67.4	7.2	11,995.2

EMBANKMENT VOLUME CALCULATION (6/10)

No.	Elevation (EL. m)	(m ²)										
		1	2	3	4	5	6	7	8	9	10	Total
16	155-157	8.1	4.4	3.3	3.3			4.8	6.7	7.4	7.2	45.2
15	150-155	27.5	18.0	13.5	13.5			50.0	33.5	14.4		170.4
14	145-150	37.2	20.0	15.0	15.0			110.6	72.4	14.4		284.6
13	140-145	47.2	20.0	15.0	15.0			173.1	114.2	14.4		398.9
12	135-140	57.2	20.0	15.0	15.0			234.9	155.0	13.8		510.9
11	130-135	67.2	20.0	15.0	15.0			302.9	193.3	2.7		616.1
10	125-130	77.2	20.0	15.0	15.0			362.2	231.3			720.7
9	120-125	87.2	20.0	15.0	15.0			418.8	269.3			825.3
8	115-120	97.2	20.0	15.0	15.0	110.0	75.0	365.5	232.3			930.0
7	110-115	107.2	20.0	15.0	15.0	130.0	95.0	408.0	250.3			1,040.5
6	105-110	117.2	20.0	15.0	15.0	150.0	115.0	406.5	268.3			1,107.0
5	100-105	127.2	20.0	15.0	15.0	170.0	135.0	323.7	263.0			1,068.9
4	95-100	137.2	20.0	15.0	15.0	190.0	155.0	209.1	199.5			940.8
3	90-95	147.2	20.0	15.0	15.0	205.1	175.0	63.5	96.4			737.2
2	85-90	157.2	24.3	15.0	17.1	38.0	98.2		0.3			330.1
1	80-85	32.6	4.5	3.0	3.5							43.6
Total		1,331.8	291.2	214.8	217.4	993.1	848.2	3,433.6	2,385.8	67.1	7.2	9,790.2

No.	Elevation (EL. m)	(m ²)										
		1	2	3	4	5	6	7	8	9	10	Total
16	155-157	7.7	4.2	3.2	3.2			4.4	6.4	7.1	7.2	43.4
15	150-155	27.5	18.0	13.5	13.5			49.0	32.9	14.4		168.8
14	145-150	37.2	20.0	15.0	15.0			109.5	71.7	14.4		282.8
13	140-145	47.2	20.0	15.0	15.0			171.9	113.1	14.1		396.3
12	135-140	57.2	20.0	15.0	15.0			230.3	151.5	13.3		502.3
11	130-135	67.2	20.0	15.0	15.0			297.2	189.1	2.7		606.2
10	125-130	77.2	20.0	15.0	15.0			356.2	226.7			710.1
9	120-125	87.2	20.0	15.0	15.0			415.6	264.3			817.1
8	115-120	97.2	20.0	15.0	15.0	109.6	75.0	215.0	208.9			755.7
7	110-115	107.2	20.0	15.0	15.0	100.4	95.0		74.4			427.0
6	105-110	117.2	20.0	15.0	15.0	73.3	104.3		6.1			350.9
5	100-105	127.2	20.0	15.0	15.0	46.1	65.1					288.4
4	95-100	137.2	24.3	15.0	19.3	14.7	16.0					226.5
3	90-95	28.6	4.5	3.0	3.5							39.6
2	85-90											0.0
1	80-85											0.0
Total		1,023.0	251.0	184.7	189.5	344.1	355.4	1,849.1	1,345.1	66.0	7.2	5,615.1

EMBANKMENT VOLUME CALCULATION (7/10)

Sta. 180

No.	Elevation (E.L., m)	1		2		3		4		5		6		7		8		9		10		Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material											
16	155-157	7.3	4.0	3.0	3.0	4.0	6.1	4.0	6.1	6.9	7.2	41.5										
15	150-155	27.5	17.9	13.4	13.4	47.9	32.2	47.9	32.2	14.4	14.4	166.7										
14	145-150	37.2	20.0	15.0	15.0	108.5	70.9	108.5	70.9	14.4	14.4	281.0										
13	140-145	47.2	20.0	15.0	15.0	168.5	110.2	168.5	110.2	13.3	13.3	389.2										
12	135-140	57.2	20.0	15.0	15.0	224.8	147.6	224.8	147.6	13.2	13.2	492.8										
11	130-135	67.2	20.0	15.0	15.0	291.6	185.0	291.6	185.0	2.7	2.7	596.5										
10	125-130	77.2	20.0	15.0	15.0	315.0	218.7	315.0	218.7			660.9										
9	120-125	87.2	20.0	15.0	15.0	110.5	155.5	110.5	155.5			403.2										
8	115-120	97.2	20.0	15.0	15.0	73.3	68.2	73.3	68.2			306.2										
7	110-115	107.2	20.0	15.0	15.0	46.1	46.1	46.1	46.1			249.4										
6	105-110	117.2	24.3	19.3	19.3	14.7	14.7	14.7	14.7			205.2										
5	100-105	21.6	4.5	3.0	3.5							35.6										
4	95-100											0.0										
3	90-95											0.0										
2	85-90											0.0										
1	80-85											0.0										
Total		754.2	210.7	154.4	159.2	134.1	129.0	1,270.8	943.7	64.9	7.2	3,828.2										

Sta. 190

No.	Elevation (E.L., m)	1		2		3		4		5		6		7		8		9		10		Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material											
16	155-157	7.0	3.8	2.9	2.9	3.7	5.8	3.7	5.8	6.7	7.2	40.0										
15	150-155	27.4	17.9	13.4	13.4	46.9	31.5	46.9	31.5	14.4	14.4	164.9										
14	145-150	37.2	20.0	15.0	15.0	106.3	68.9	106.3	68.9	13.6	13.6	276.0										
13	140-145	47.2	20.0	15.0	15.0	163.0	106.7	163.0	106.7	13.2	13.2	380.1										
12	135-140	57.2	20.0	15.0	15.0	219.1	144.3	219.1	144.3	16.8	16.8	487.4										
11	130-135	67.2	20.0	15.0	15.0	177.0	175.1	177.0	175.1	2.9	2.9	472.2										
10	125-130	77.2	20.0	15.0	15.0	73.3	94.9	73.3	94.9			295.4										
9	120-125	87.2	20.0	15.0	15.0	46.9	46.9	46.9	46.9			231.0										
8	115-120	97.2	20.4	15.4	15.4	23.6	23.6	23.6	23.6			195.2										
7	110-115	99.5	14.9	8.5	12.1							95.0										
6	105-110											0.0										
5	100-105											0.0										
4	95-100											0.0										
3	90-95											0.0										
2	85-90											0.0										
1	80-85											0.0										
Total		564.3	177.0	129.8	133.8	23.6	23.6	836.2	674.1	67.6	7.2	2,637.2										

EMBANKMENT VOLUME CALCULATION (8/10)

Sta. 200																						
No.	Elevation (El., m)	1		2		3		4		5		6		7		8		9		10		Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material							
16	155-157	6.6	3.6	2.7	2.7	3.4	5.5	3.4	5.5	3.4	5.5	3.4	5.5	6.5	7.2	38.2						
15	150-155	27.4	17.8	13.4	13.4	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.0	14.0	162.0						
14	145-150	37.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	13.4	13.4	268.6						
13	140-145	47.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	13.4	13.4	373.9						
12	135-140	57.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	9.6	9.6	392.2						
11	130-135	67.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	7.0	7.0	249.2						
10	125-130	77.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	29.9	29.9	187.0						
9	120-125	51.1	16.9	9.0	13.9											90.9						
8	115-120															0.0						
7	110-115															0.0						
6	105-110															0.0						
5	100-105															0.0						
4	95-100															0.0						
3	90-95															0.0						
2	85-90															0.0						
1	80-85															0.0						
Total		371.1	138.3	100.1	105.0	0.0	0.0	532.3	451.1	56.9	7.2	1,762.0										

Sta. 210																						
No.	Elevation (El., m)	1		2		3		4		5		6		7		8		9		10		Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material							
16	155-157	6.3	3.4	2.6	2.6	3.1	5.2	3.1	5.2	3.1	5.2	3.1	5.2	6.2	7.2	36.6						
15	150-155	27.4	17.8	13.4	13.4	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	13.6	13.6	156.4						
14	145-150	37.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	13.6	13.6	263.1						
13	140-145	47.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	14.1	14.1	326.6						
12	135-140	57.2	20.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	35.5	35.5	172.6						
11	130-135	39.1	16.9	9.0	13.9											78.9						
10	125-130															0.0						
9	120-125															0.0						
8	115-120															0.0						
7	110-115															0.0						
6	105-110															0.0						
5	100-105															0.0						
4	95-100															0.0						
3	90-95															0.0						
2	85-90															0.0						
1	80-85															0.0						
Total		214.4	98.1	70.0	74.9	0.0	0.0	285.7	236.4	47.5	7.2	1,034.2										

EMBANKMENT VOLUME CALCULATION (9/10)

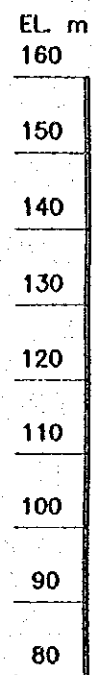
Sta. 220	No.	Elevation (EL. m)	(m ³)										
			1	2	3	4	5	6	7	8	9	10	Total
			Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Course	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
	16	155-157	5.9	3.2	2.4	2.4	2.4	2.6	4.7	5.7	7.2	34.1	
	15	150-155	27.3	17.8	13.3	13.3	40.8	26.9	13.7	13.7	13.7	153.1	
	14	145-150	37.2	20.0	15.0	15.0	75.1	61.3	19.8	19.8	19.8	243.4	
	13	140-145	47.2	22.5	15.0	17.5	18.3	30.7	2.3	2.3	2.3	153.5	
	12	135-140	19.7	8.8	5.5	7.0						41.0	
	11	130-135										0.0	
	10	125-130										0.0	
	9	120-125										0.0	
	8	115-120										0.0	
	7	110-115										0.0	
	6	105-110										0.0	
	5	100-105										0.0	
	4	95-100										0.0	
	3	90-95										0.0	
	2	85-90										0.0	
	1	80-85										0.0	
	Total		137.3	72.3	51.2	55.2	0.0	136.8	123.6	41.5	7.2	625.1	

Sta. 230	No.	Elevation (EL. m)	(m ³)										
			1	2	3	4	5	6	7	8	9	10	Total
			Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Course	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
	16	155-157	5.6	3.0	2.3	2.3	2.3	2.3	4.5	5.5	7.2	32.7	
	15	150-155	27.3	17.7	13.3	13.3	31.6	26.3	13.9	13.9	13.9	143.4	
	14	145-150	37.2	23.8	15.0	18.8	10.2	18.9				123.9	
	13	140-145	5.6	2.8	2.0	2.2						12.6	
	12	135-140										0.0	
	11	130-135										0.0	
	10	125-130										0.0	
	9	120-125										0.0	
	8	115-120										0.0	
	7	110-115										0.0	
	6	105-110										0.0	
	5	100-105										0.0	
	4	95-100										0.0	
	3	90-95										0.0	
	2	85-90										0.0	
	1	80-85										0.0	
	Total		75.7	47.3	32.6	36.6	0.0	44.1	49.7	19.4	7.2	312.6	

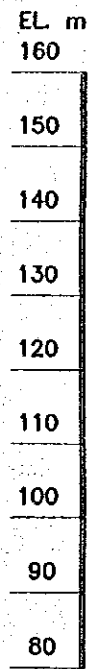
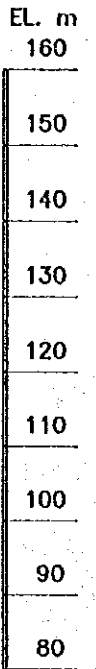
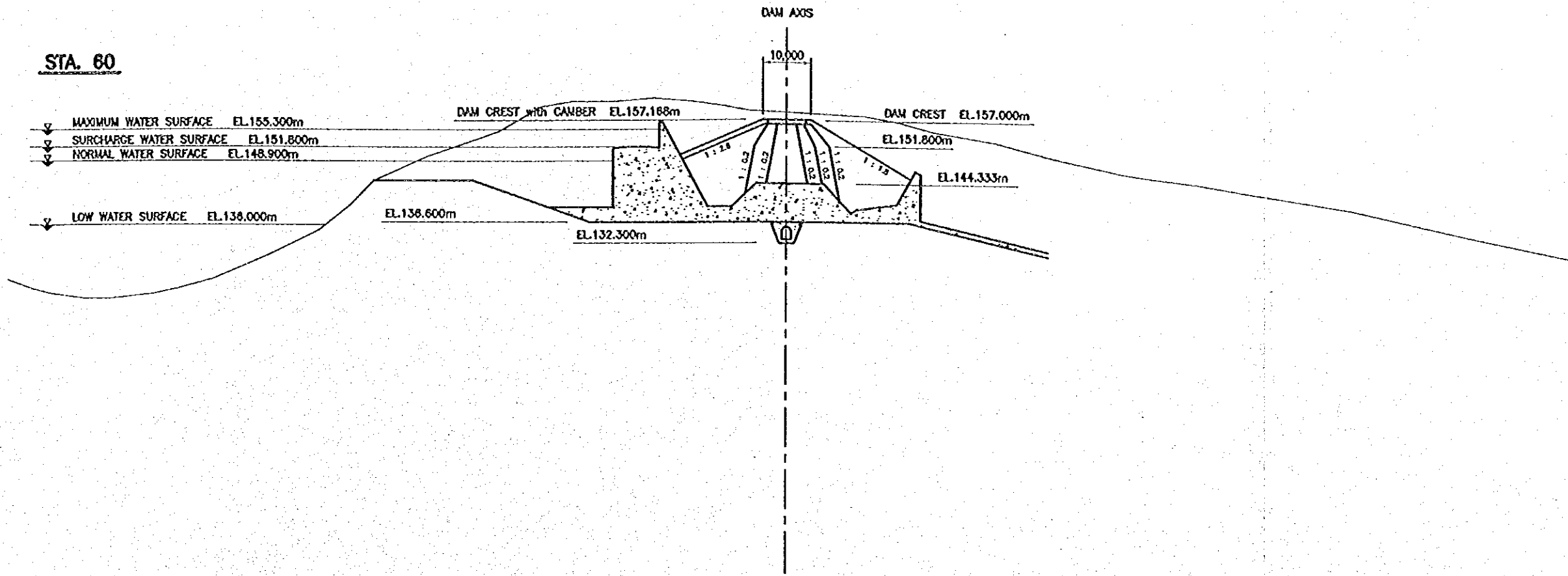
EMBANKMENT VOLUME CALCULATION (10/10)

Sta.2+0

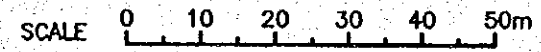
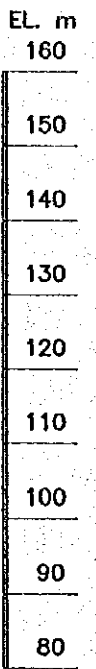
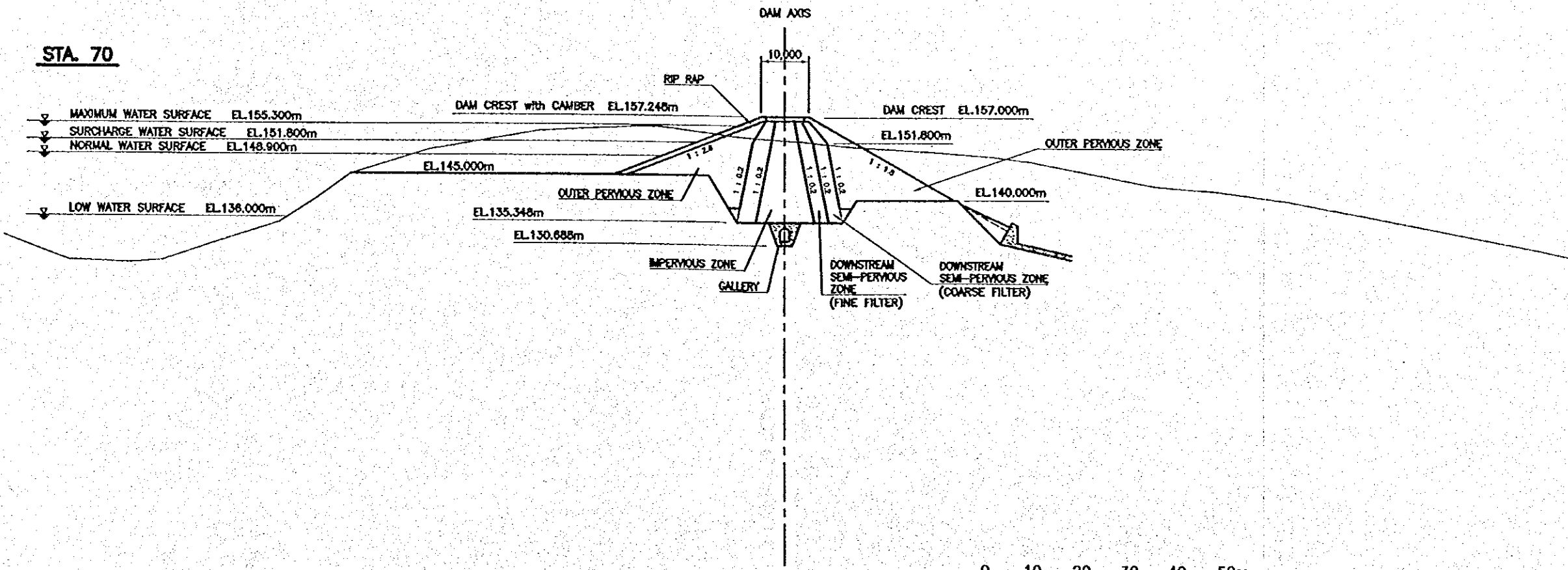
No.	Elevation (E.L. m)	(m ²)										
		1	2	3	4	5	6	7	8	9	10	Total
		Impervious	Upstream Semi-pervious	Downstream Semi-pervious Fine	Downstream Semi-pervious Coarse	Upstream Inner Pervious	Downstream Inner Pervious	Upstream Outer Pervious	Downstream Outer Pervious	Riprap	Road Material	
16	155-157	5.2	2.8	2.1	2.1			2.0	6.5	12.2	7.2	40.1
15	150-155	24.0	20.3	11.7	16.7			5.4	7.3	1.1		86.5
14	145-150											0.0
13	140-145											0.0
12	135-140											0.0
11	130-135											0.0
10	125-130											0.0
9	120-125											0.0
8	115-120											0.0
7	110-115											0.0
6	105-110											0.0
5	100-105											0.0
4	95-100											0.0
3	90-95											0.0
2	85-90											0.0
1	80-85											0.0
Total		29.2	23.1	13.8	18.8	0.0	0.0	7.4	13.8	13.3	7.2	126.5

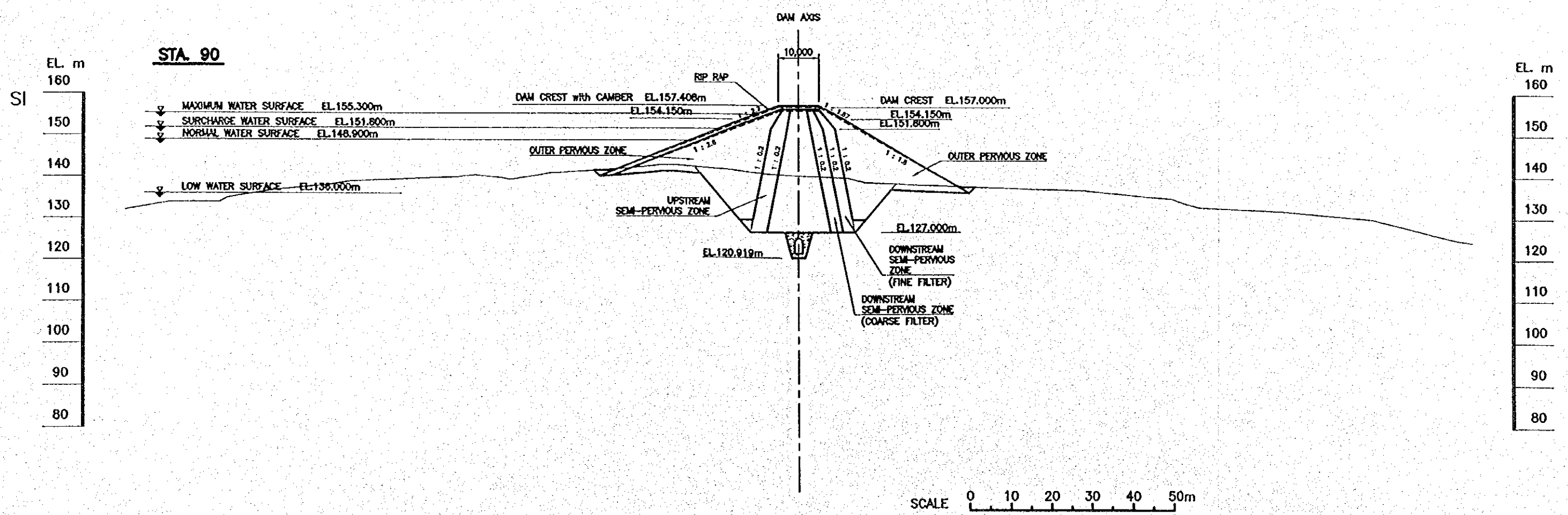
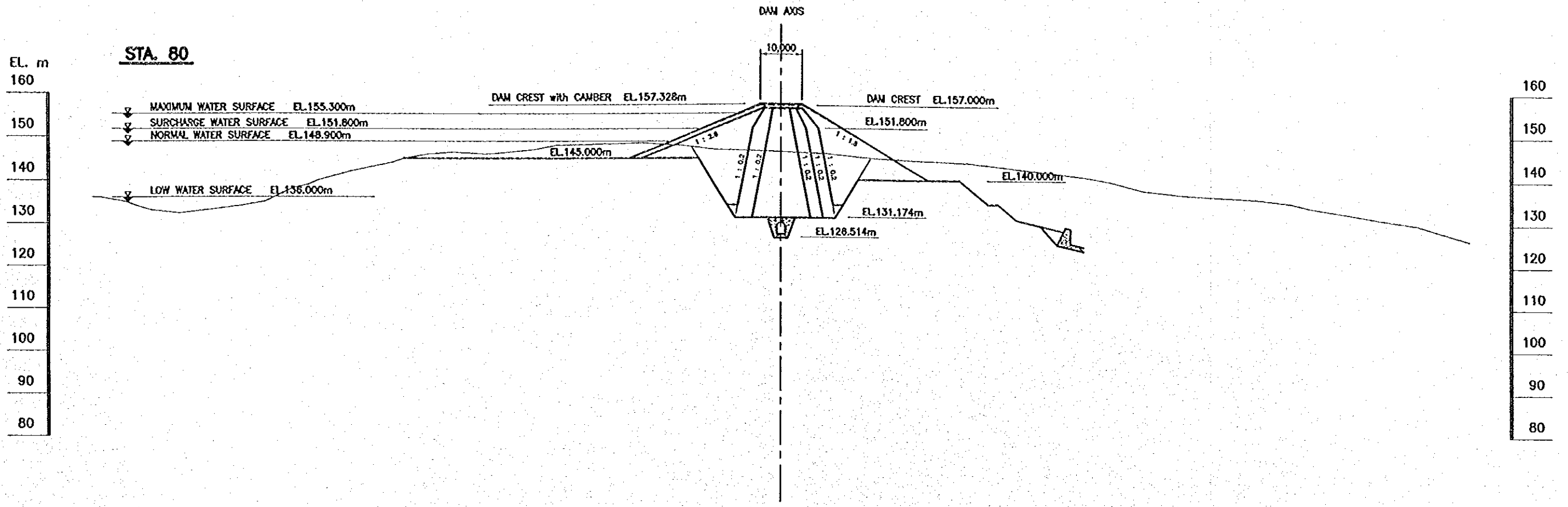


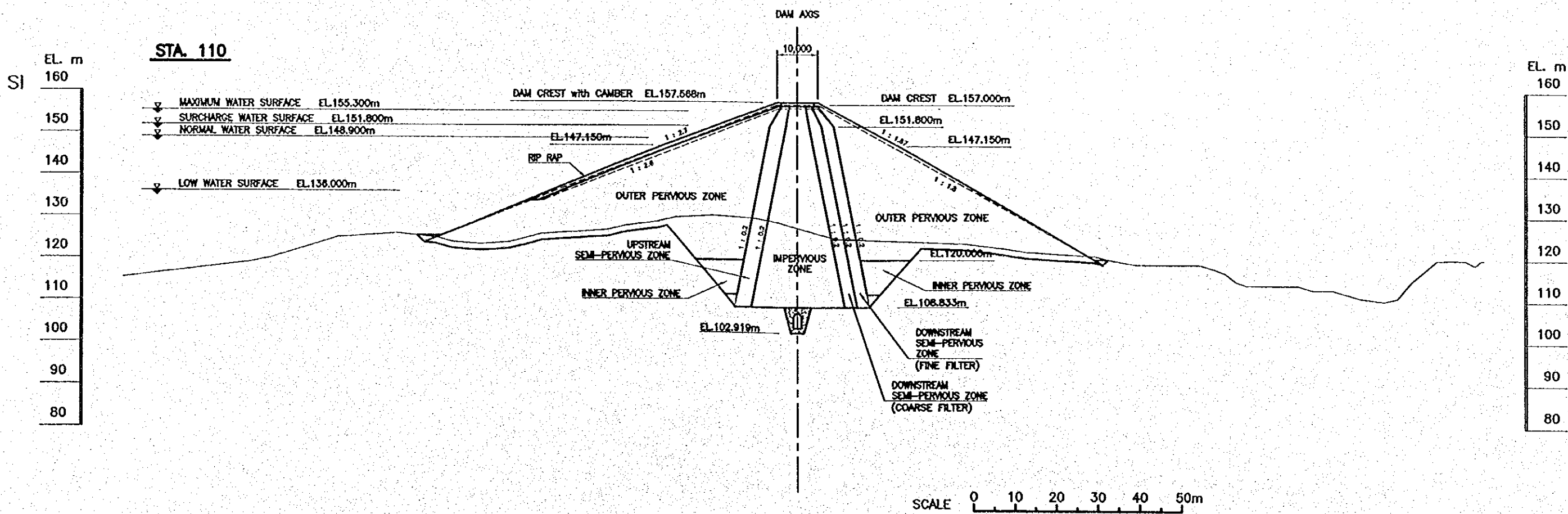
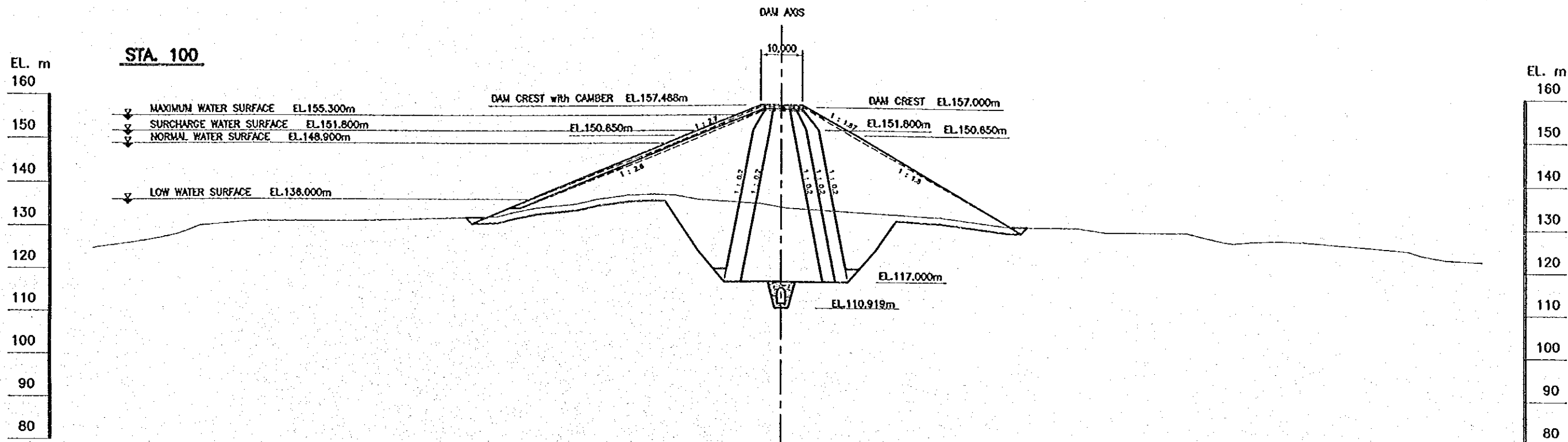
STA. 60

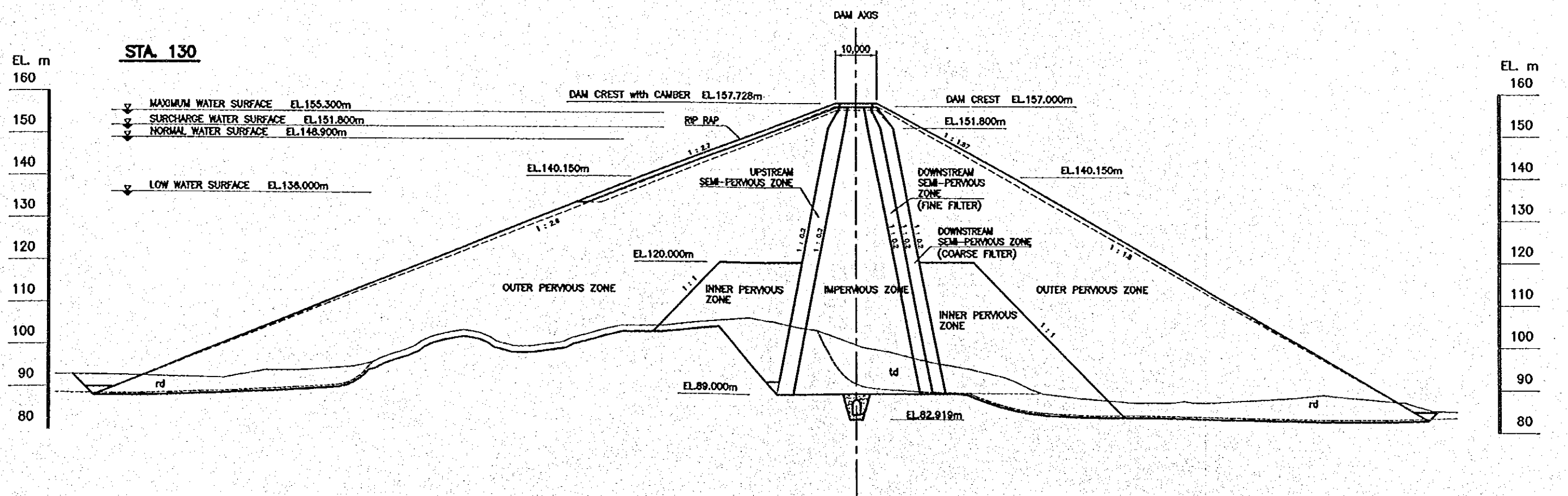
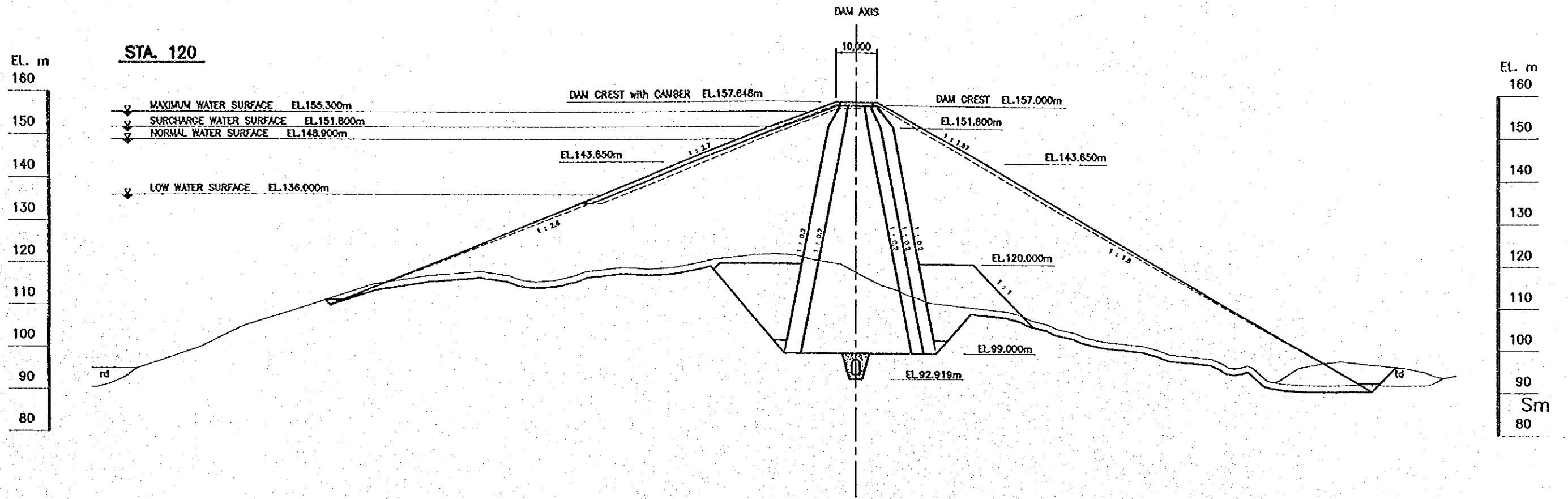


STA. 70

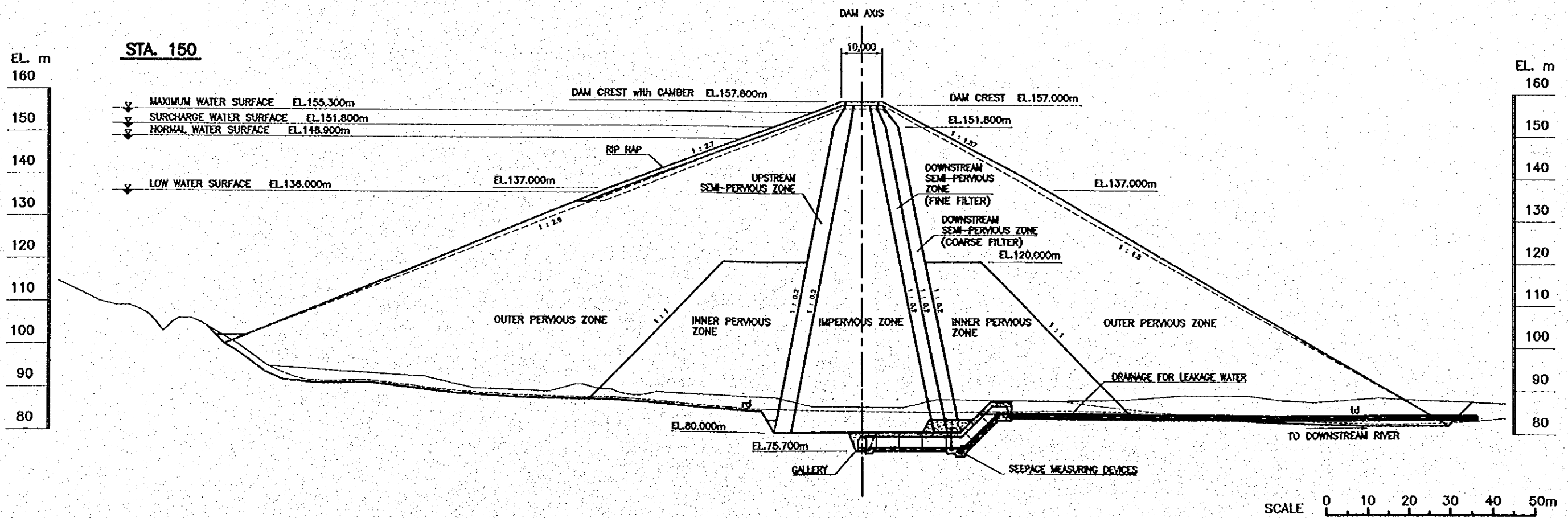
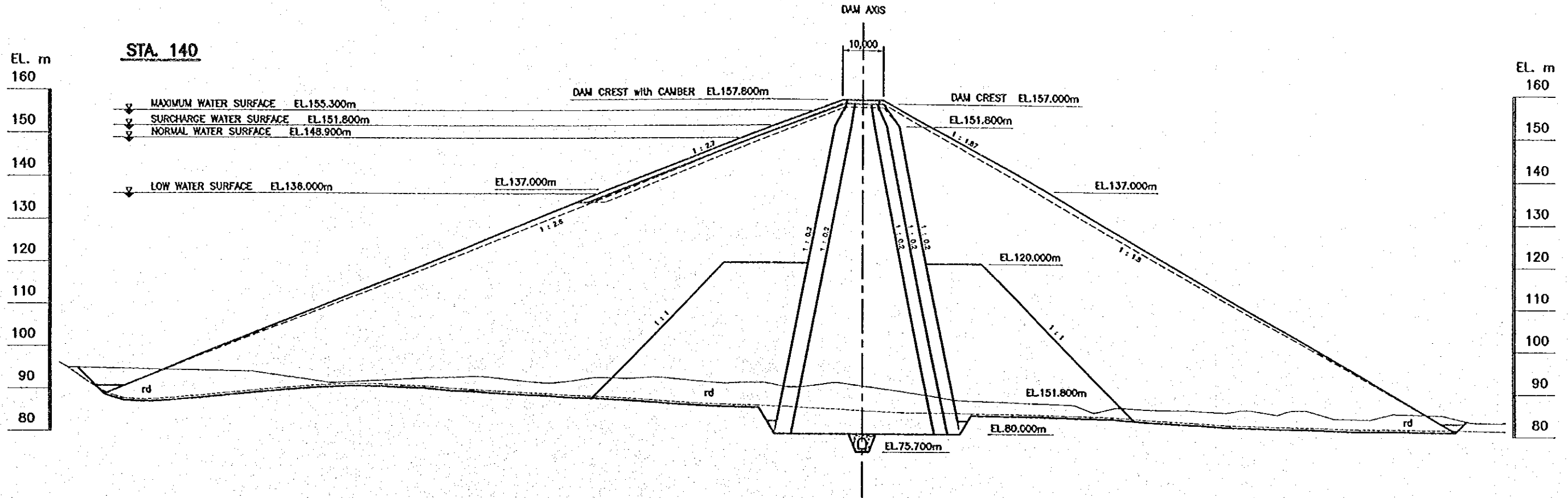


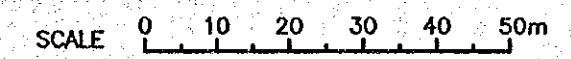
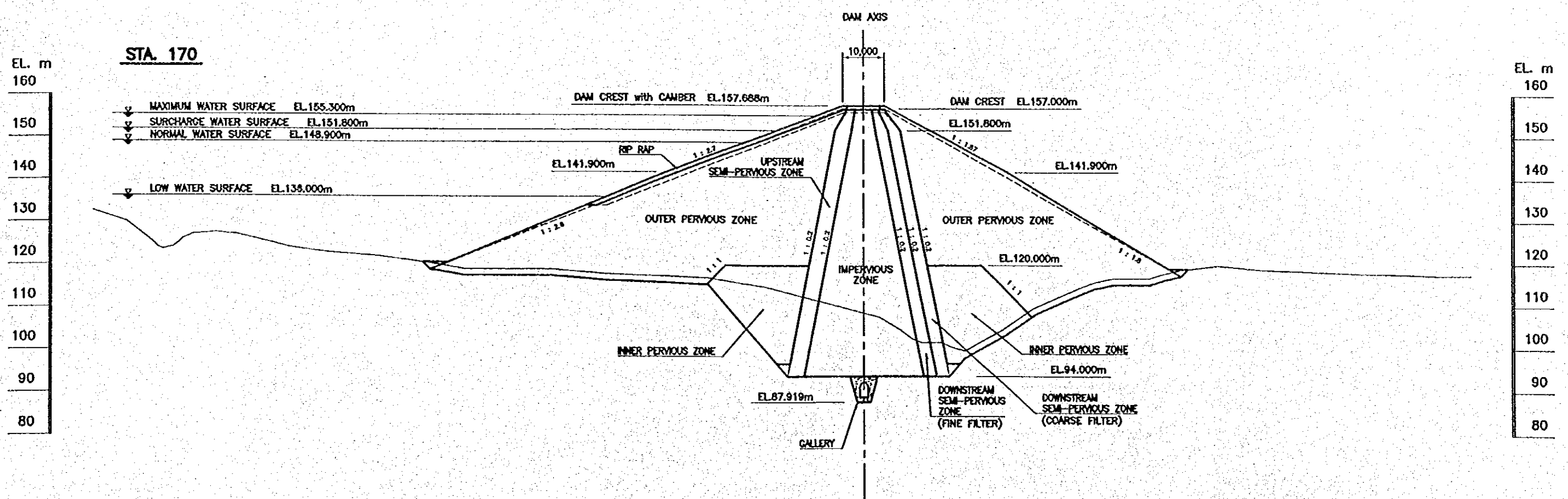
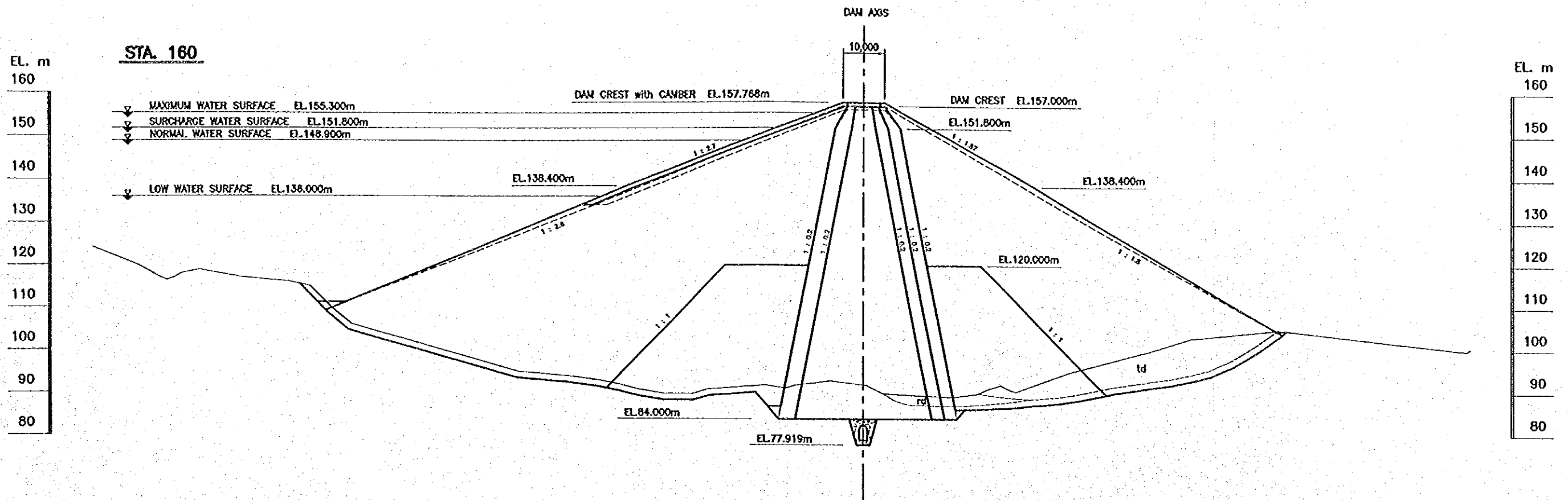


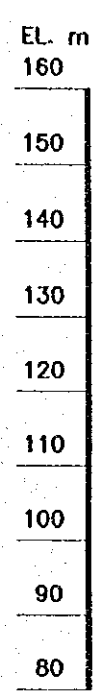




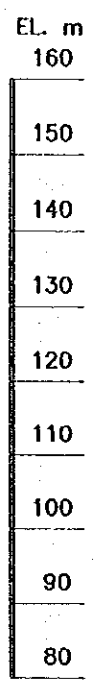
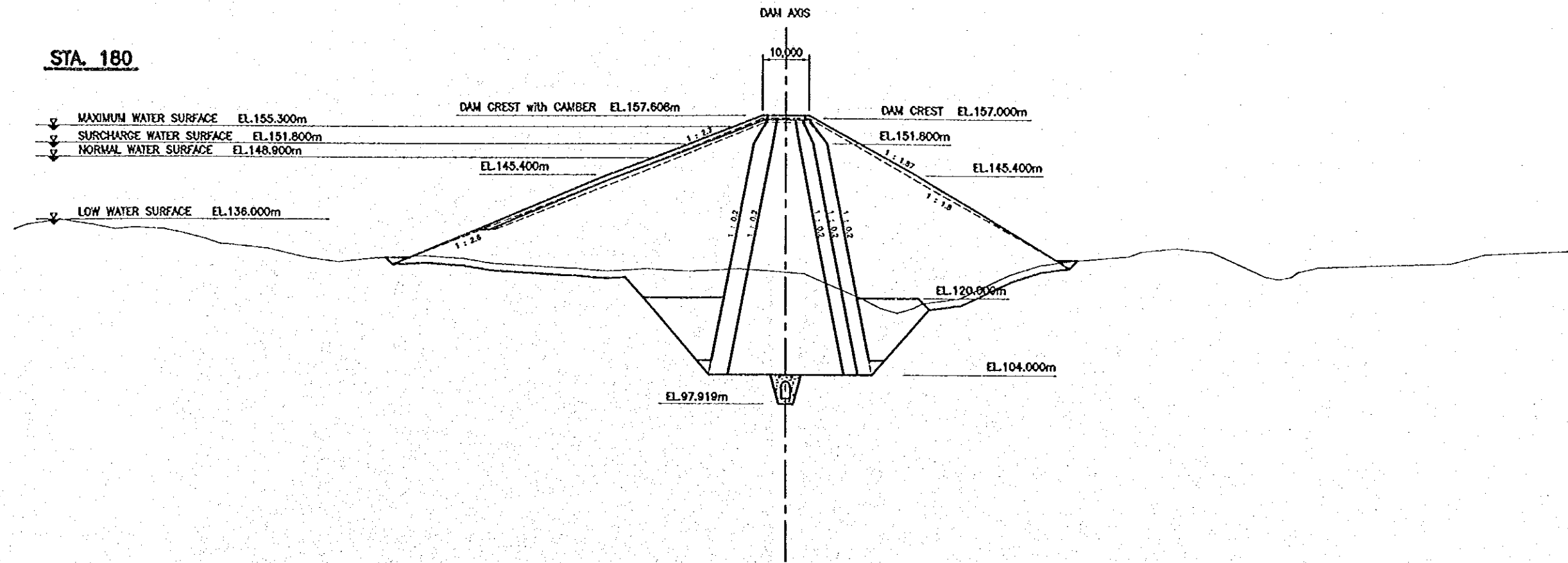
SCALE 0 10 20 30 40 50m



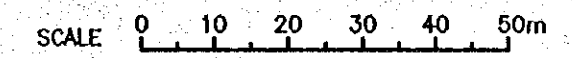
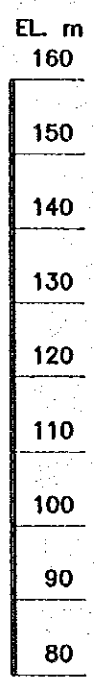
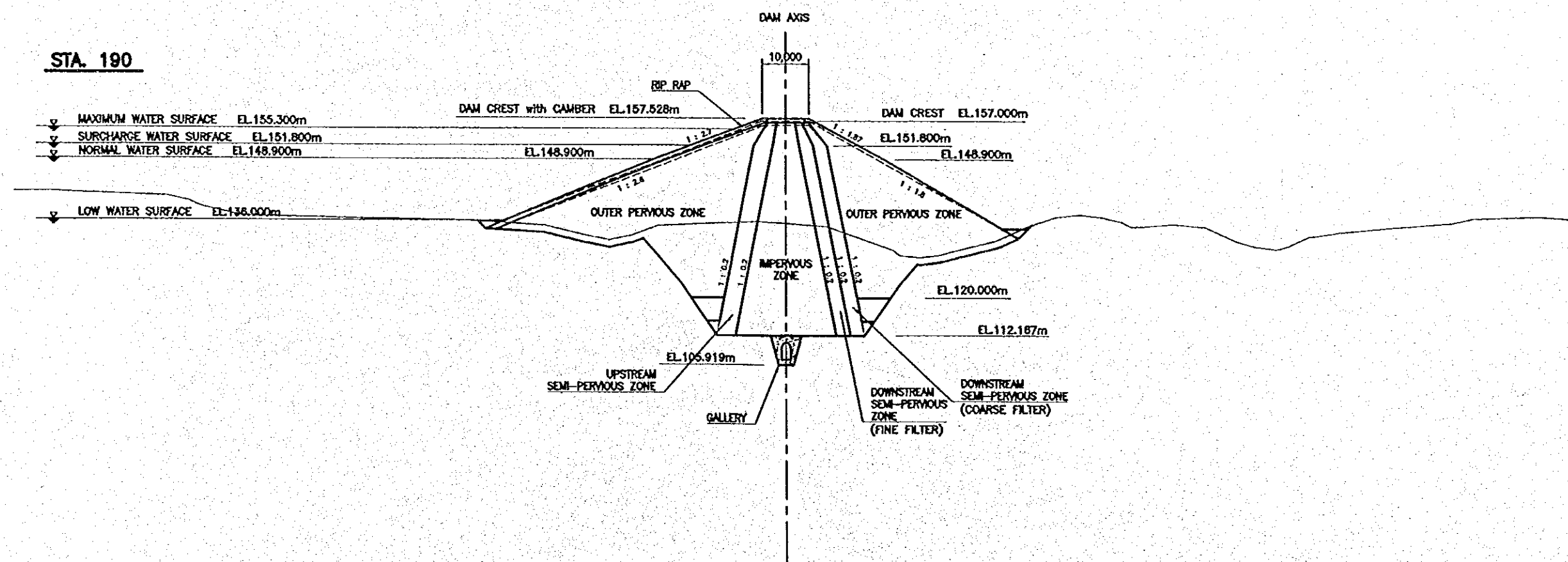


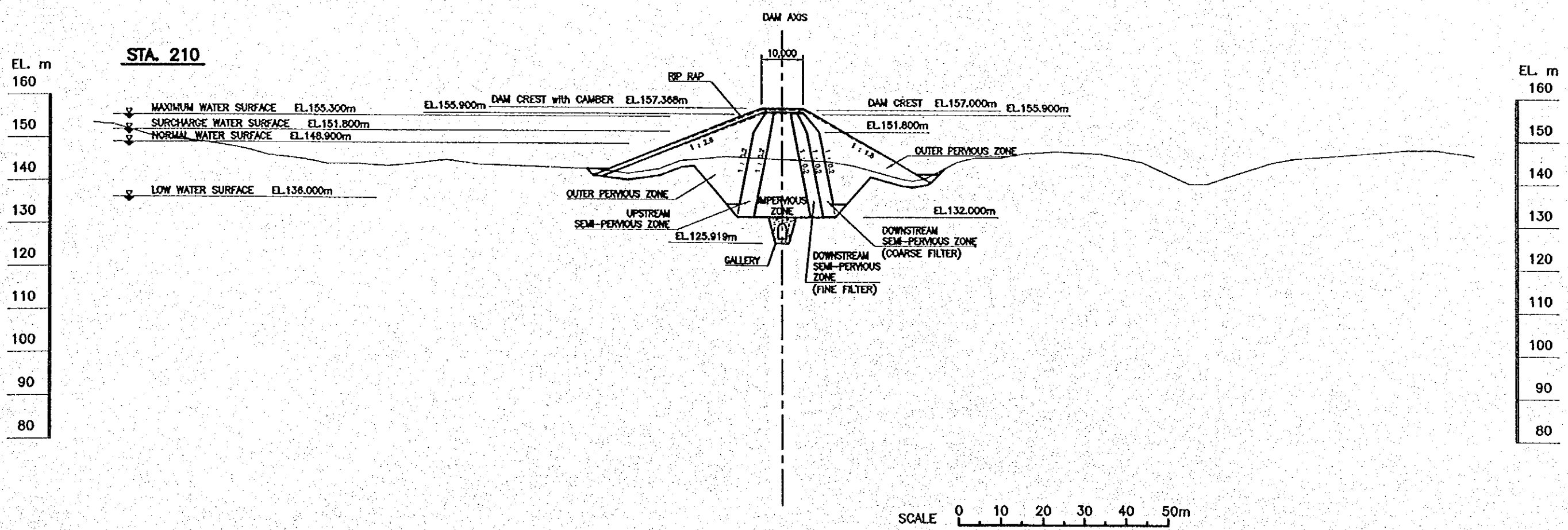
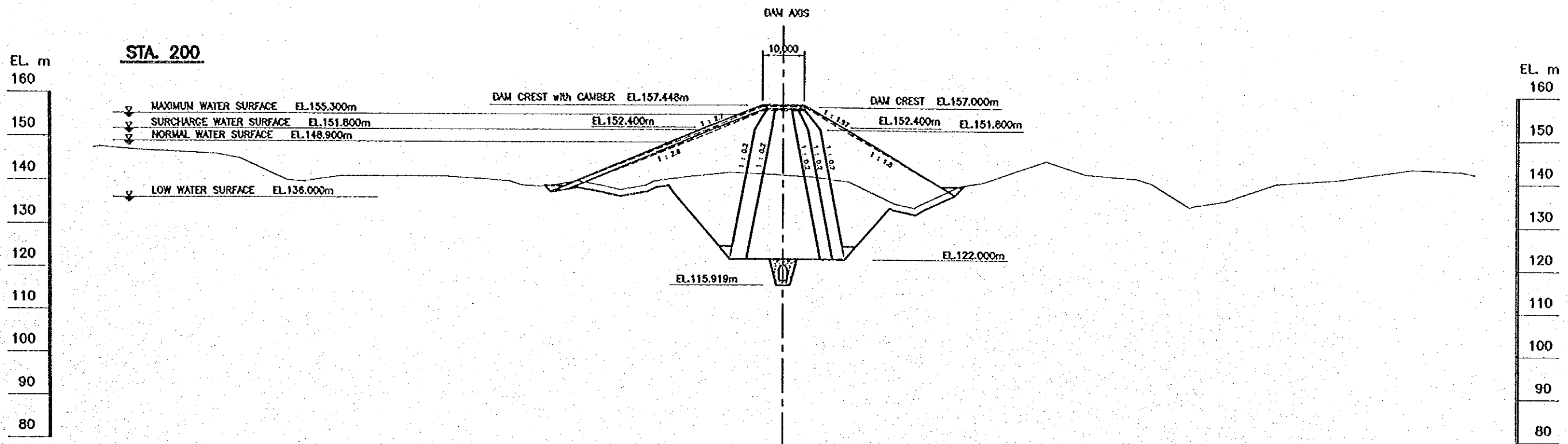


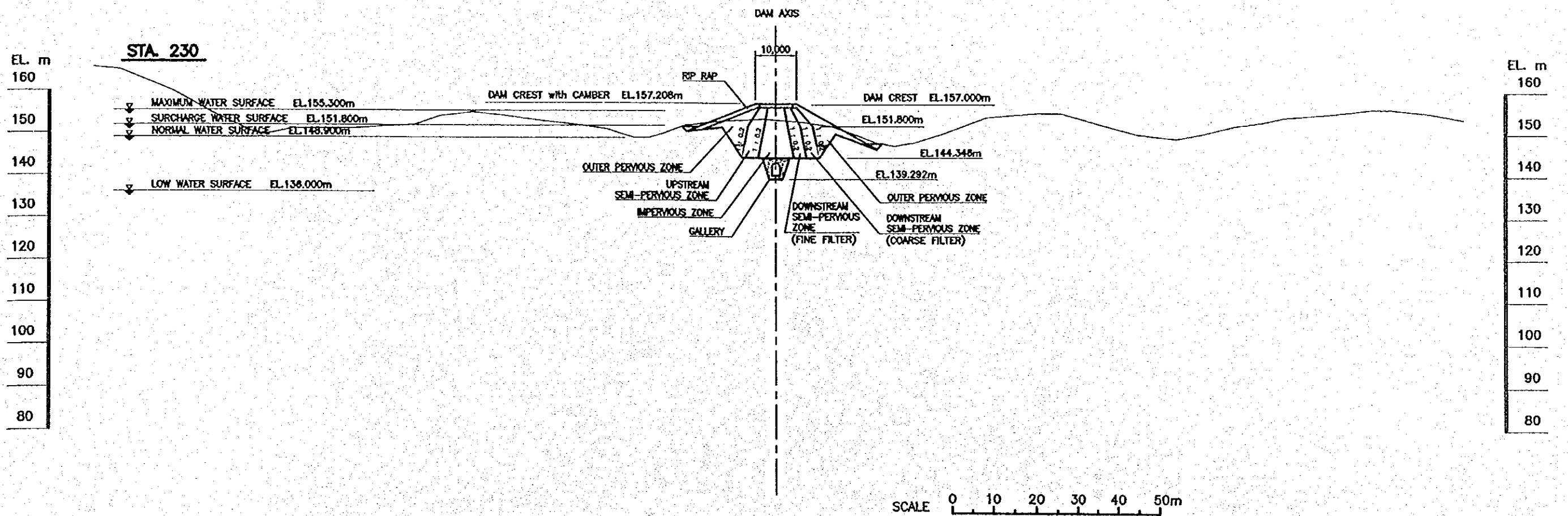
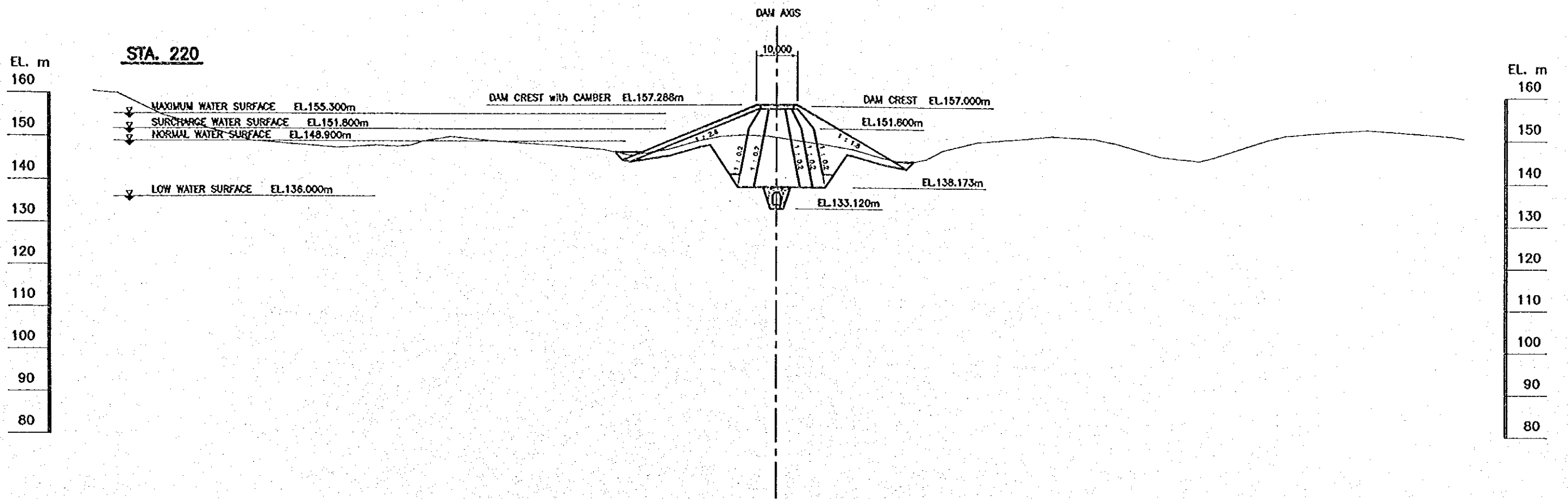
STA. 180



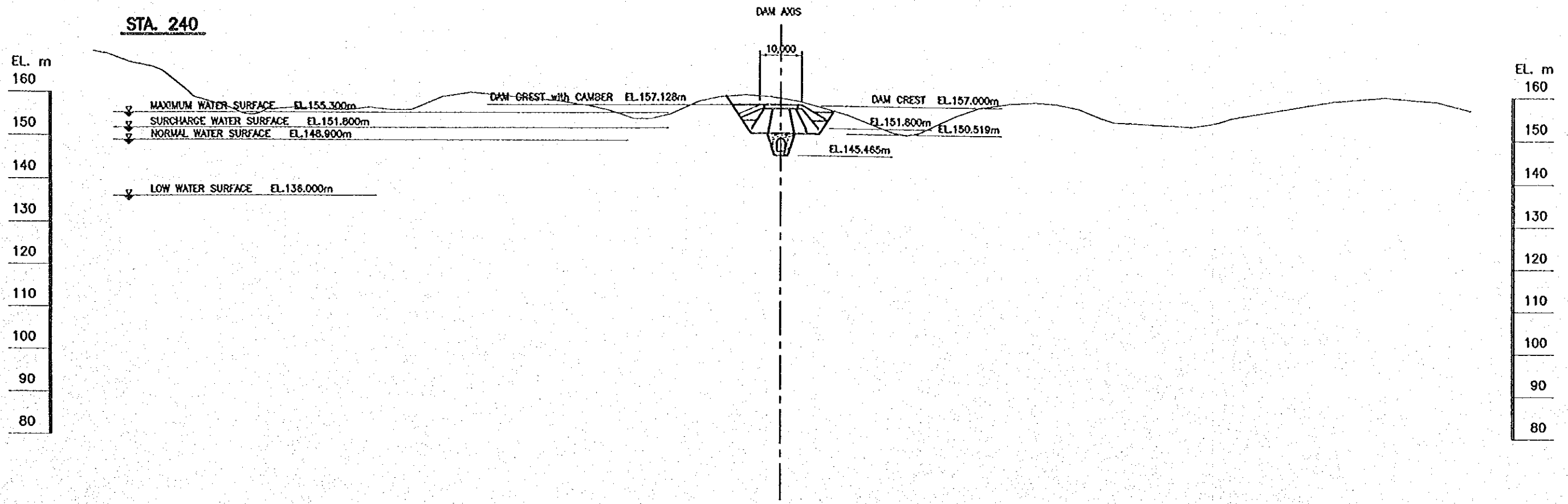
STA. 190







STA. 240



STA. 250

