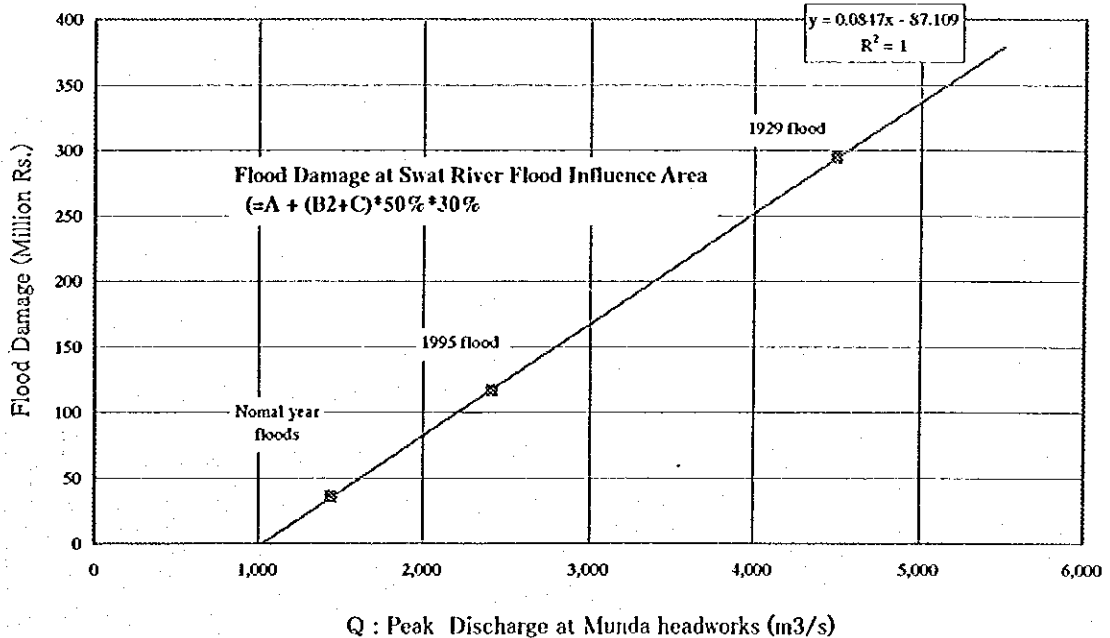


### DISCHARGE AND FLOOD DAMAGE RELATION OF SWAT RIVER FLOOD PLAIN

	River	Stretch	Flood Damage (Million Rs.)		
			Historical (Maximum) class Flood 1929/8/28	Medium class Flood (ex.1995/7/25)	Low class (Normal year) Floods (ex.1989/7/31)
A	Swat	From MUNDA H/W to Swat-Kabul confluence	483.68	217.80	82.23
B1	Kabul	Kabul River from Warsak Dam to Influence line of Swat river backwater	789.66	456.57	86.04
B2	Kabul	Kabul River from Influence line of Swat river backwater to confluence	376.92	298.82	65.91
C	Kabul	Kabul River from Swat&Kabul confluence to Nowshera	294.31	116.54	35.53
Total Flood Damage (A+B1+B2+C)			1,944.56	1,089.72	269.70
Flood Damage at Swat River Flood Influence Area ( $=A+(B2+C)*0.5*0.3$ )			584.36	280.10	97.44

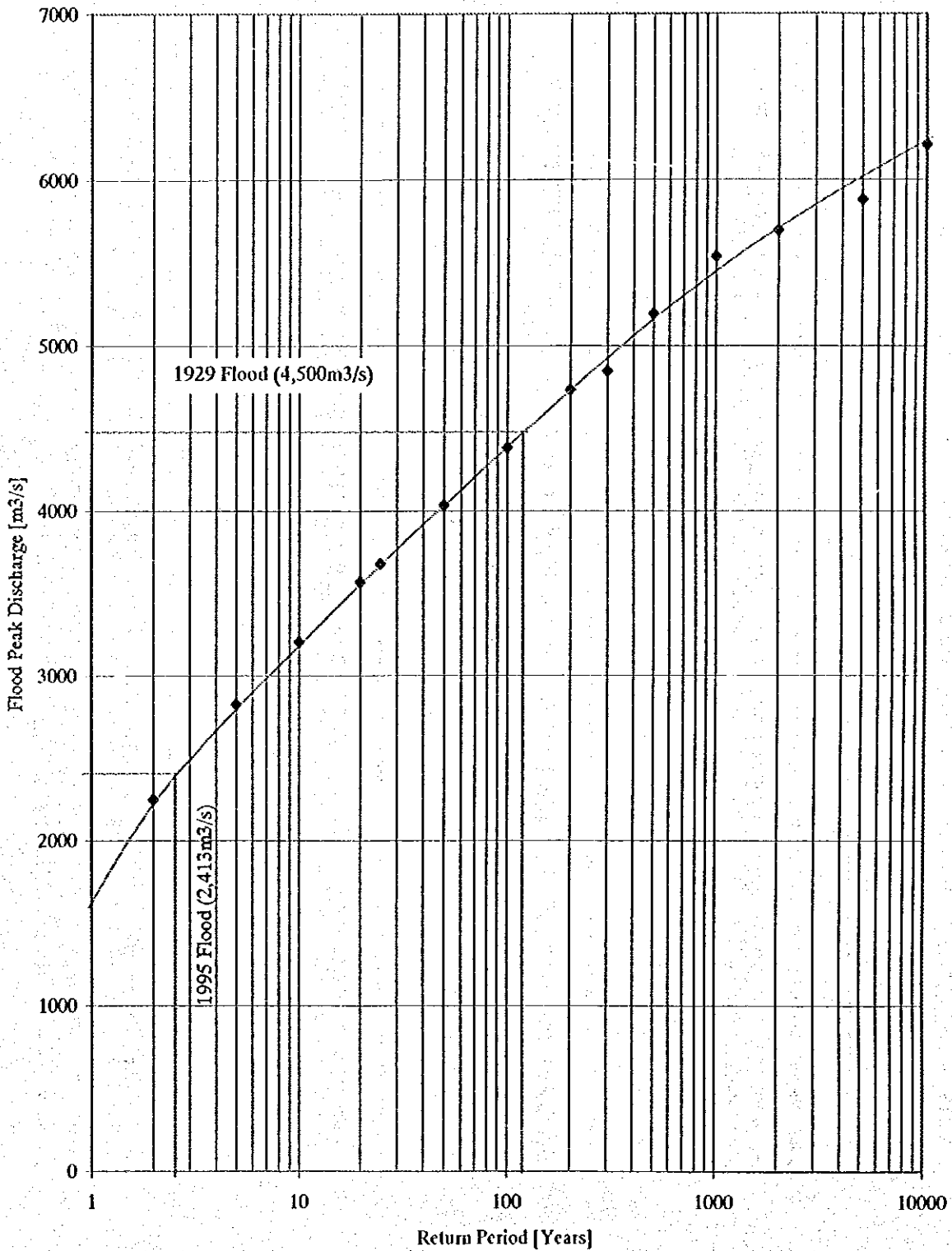
	Station	Peak discharge (m <sup>3</sup> /s)		
A	at Munda H/W (Swat River)	**	4,500	**
			2,413	**
				1,441

\*1) Source : Irrigation Dept. NWFP., Q from observed water level at Munda Headworks.



**Figure 6.6.2**  
**Discharge - Flood Damage Curve**

### FLOOD FREQUENCY AT MUNDA DAM SITE



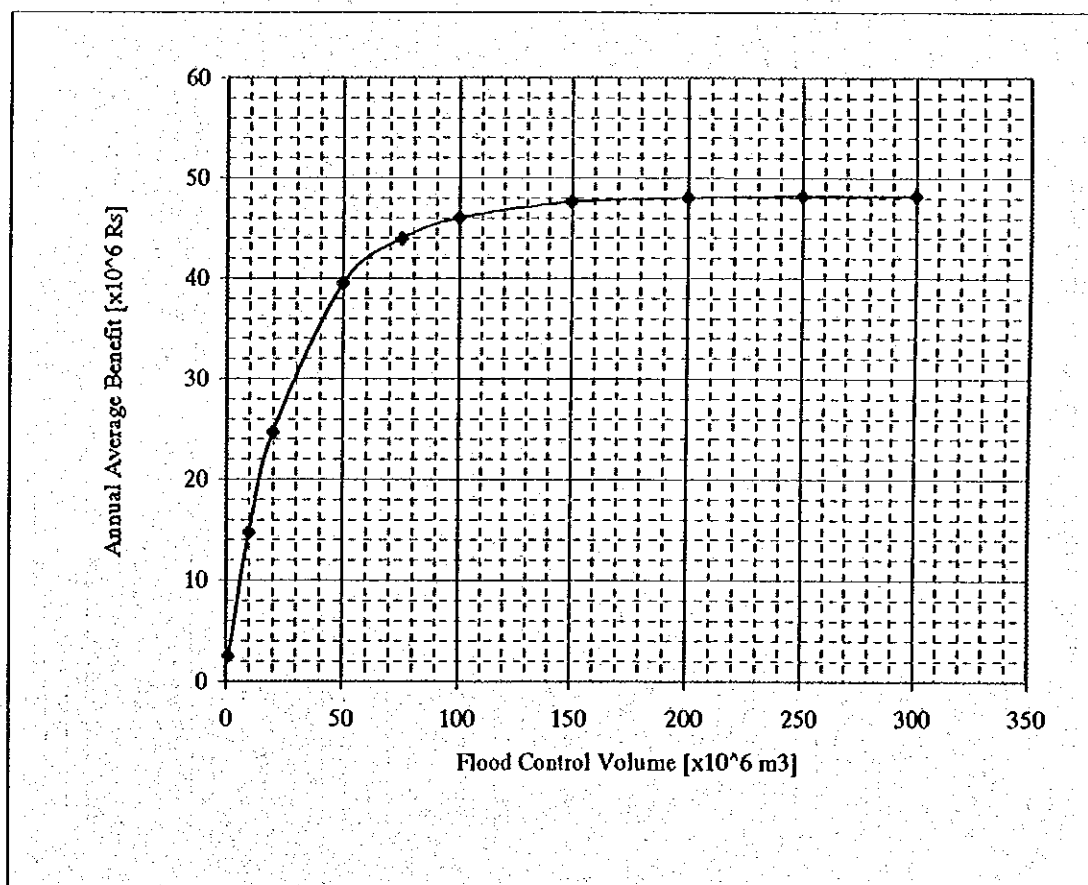
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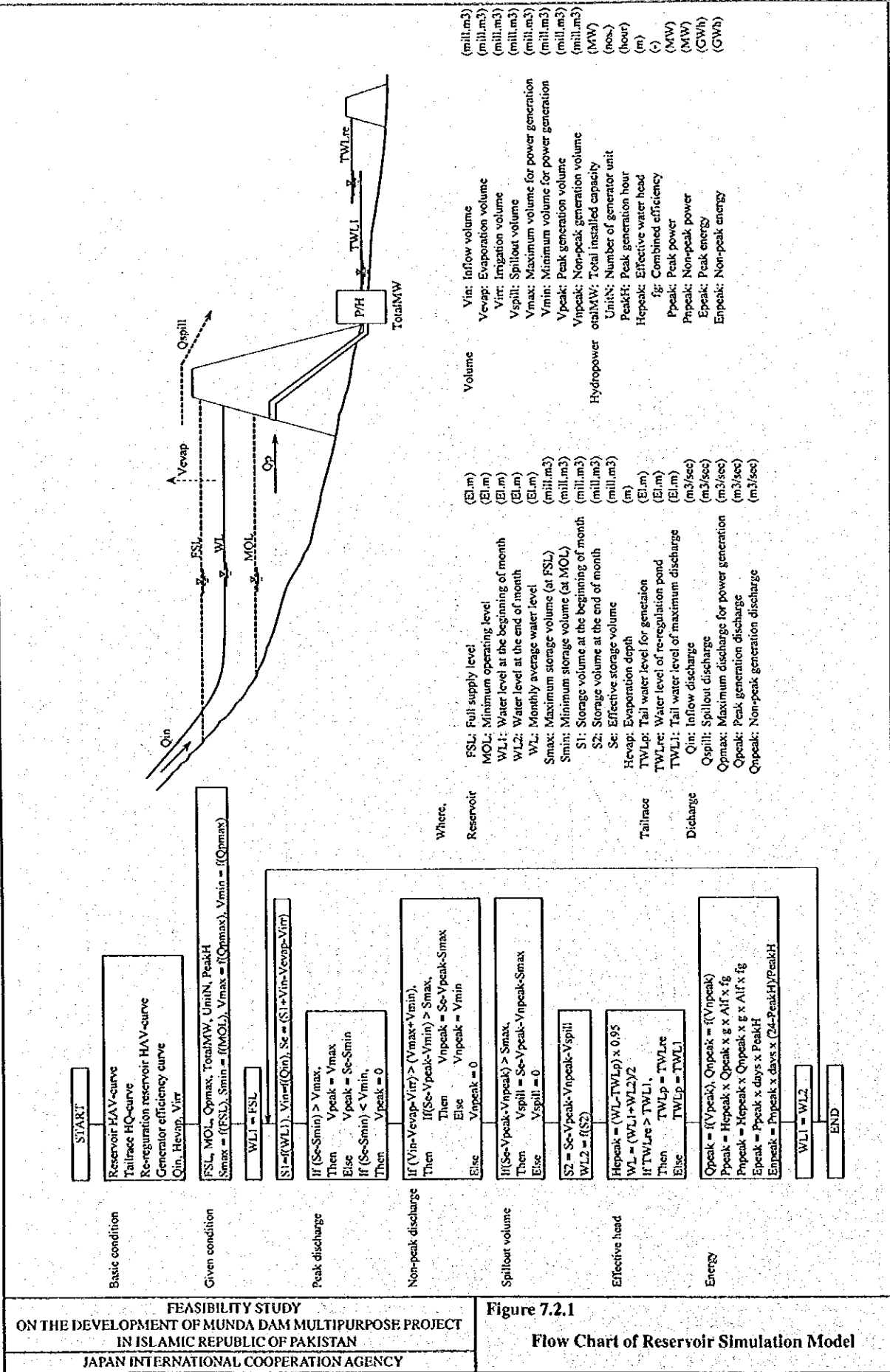
Figure 6.7.2

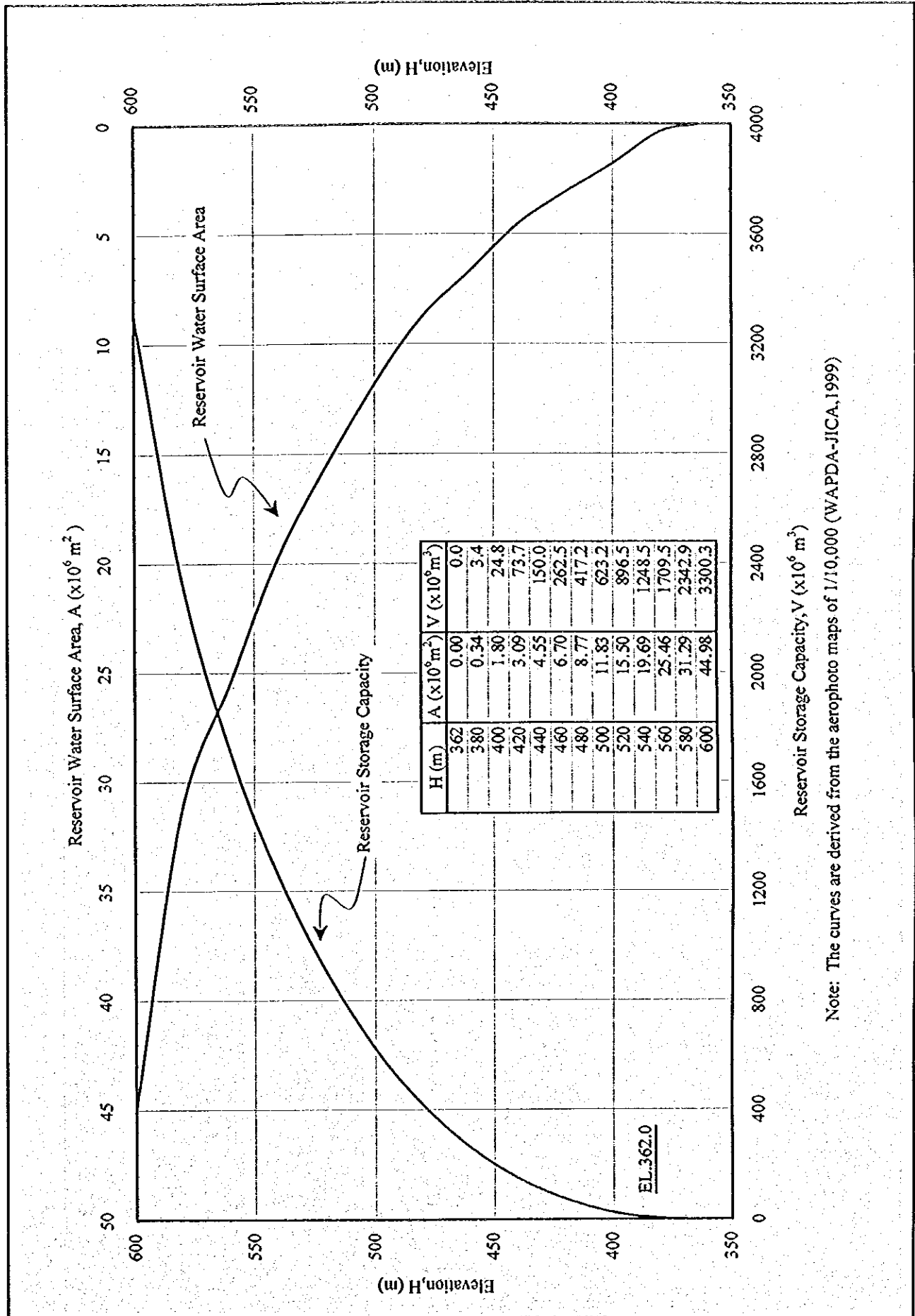
Flood Frequency at Munda Dam Site

Case No.	Flood Control Volume [x10 <sup>6</sup> m <sup>3</sup> ]	Total Annual Average Damage [x10 <sup>6</sup> Rs.]	Flood Control Benefit [x10 <sup>6</sup> Rs.]	Flood Control Benefit [x10 <sup>6</sup> US.\$]
1	0	48.223		
2	1	45.743	2.481	0.050
3	10	33.518	14.705	0.294
4	20	23.557	24.666	0.493
5	50	8.743	39.480	0.790
6	75	4.338	43.885	0.878
7	100	2.246	45.977	0.920
8	150	0.634	47.589	0.952
9	200	0.214	48.009	0.960
10	250	0.084	48.139	0.963
11	300	0.046	48.177	0.964

US \$1.0 (1999 price) = Rs.50.00

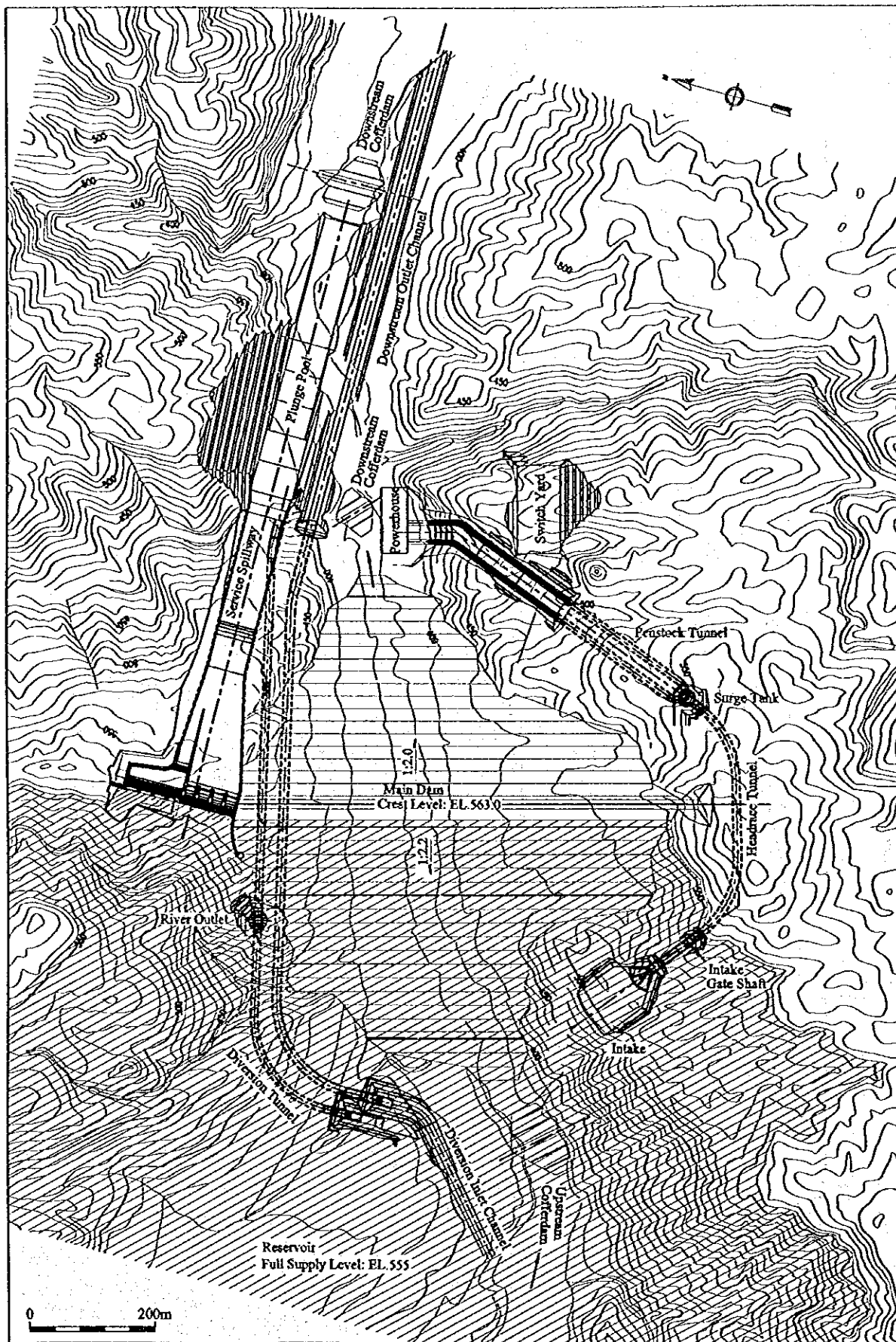






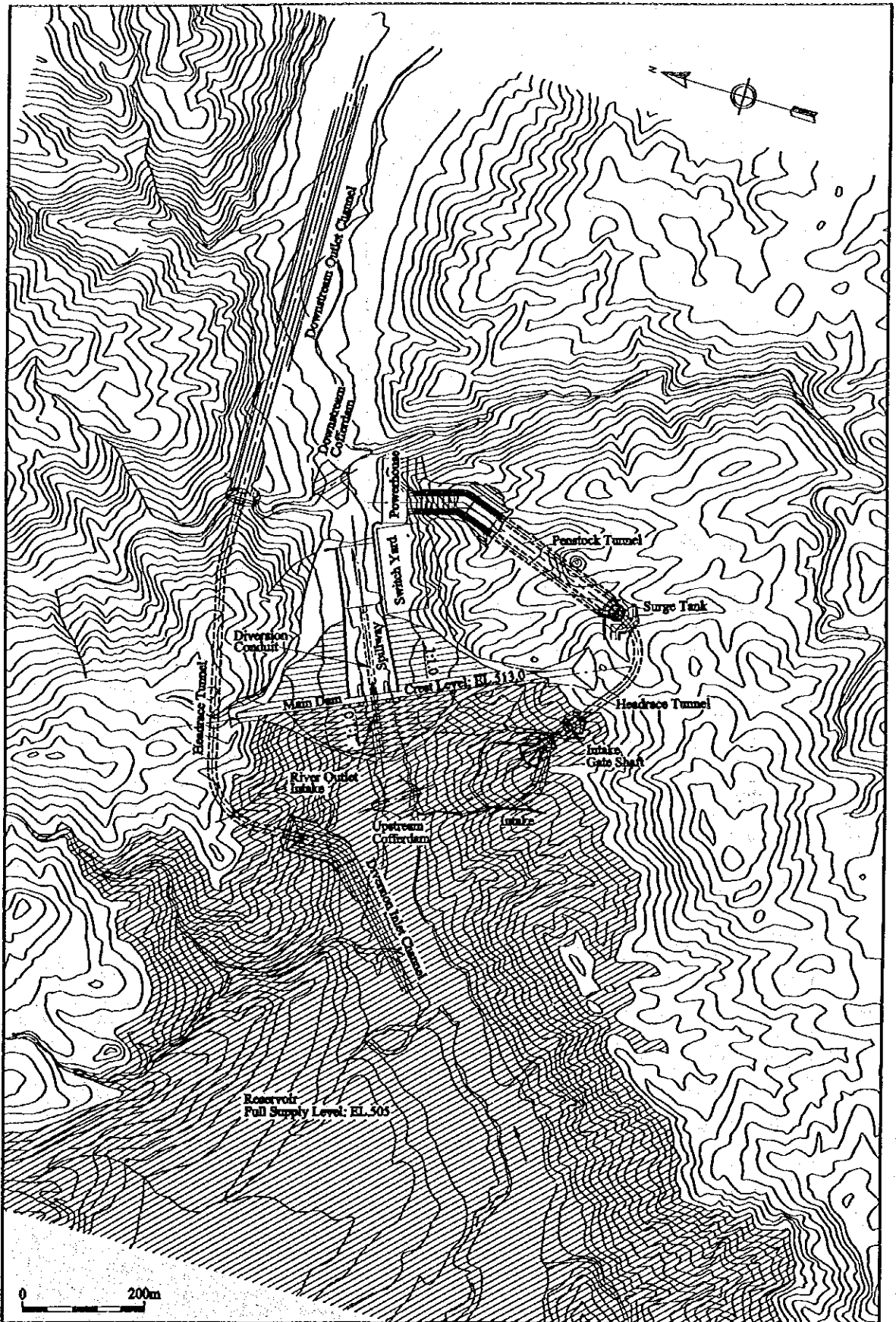
Note: The curves are derived from the aerophoto maps of I/10,000 (WAPDA-JICA, 1999)

Figure 7.2.2  
Storage Area Curve of Munda Reservoir



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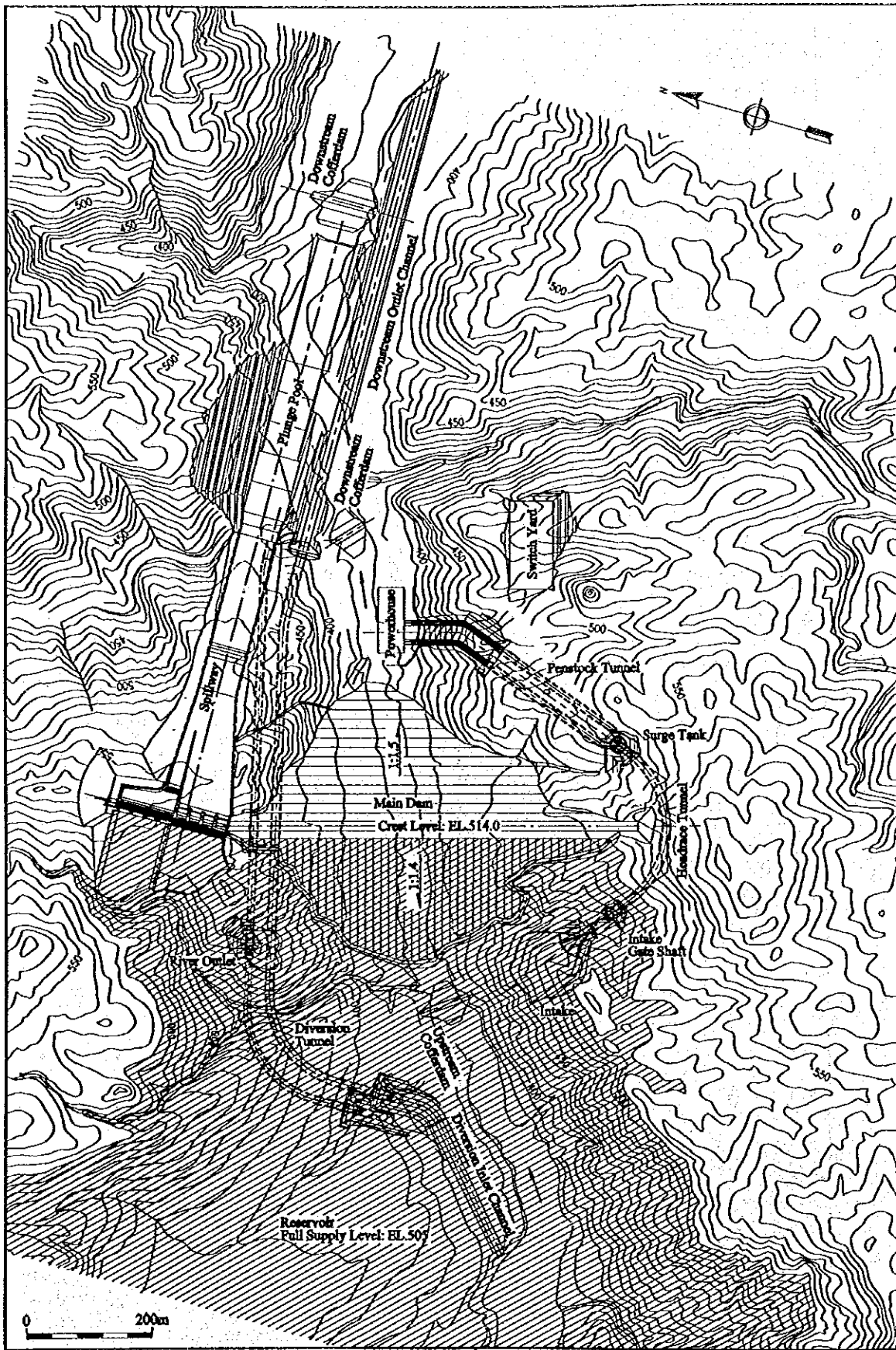
**Figure 7.2.3**  
**Alternative ECRD at Munda Site**



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Figure 7.2A

Alternative RCC at Munda Site

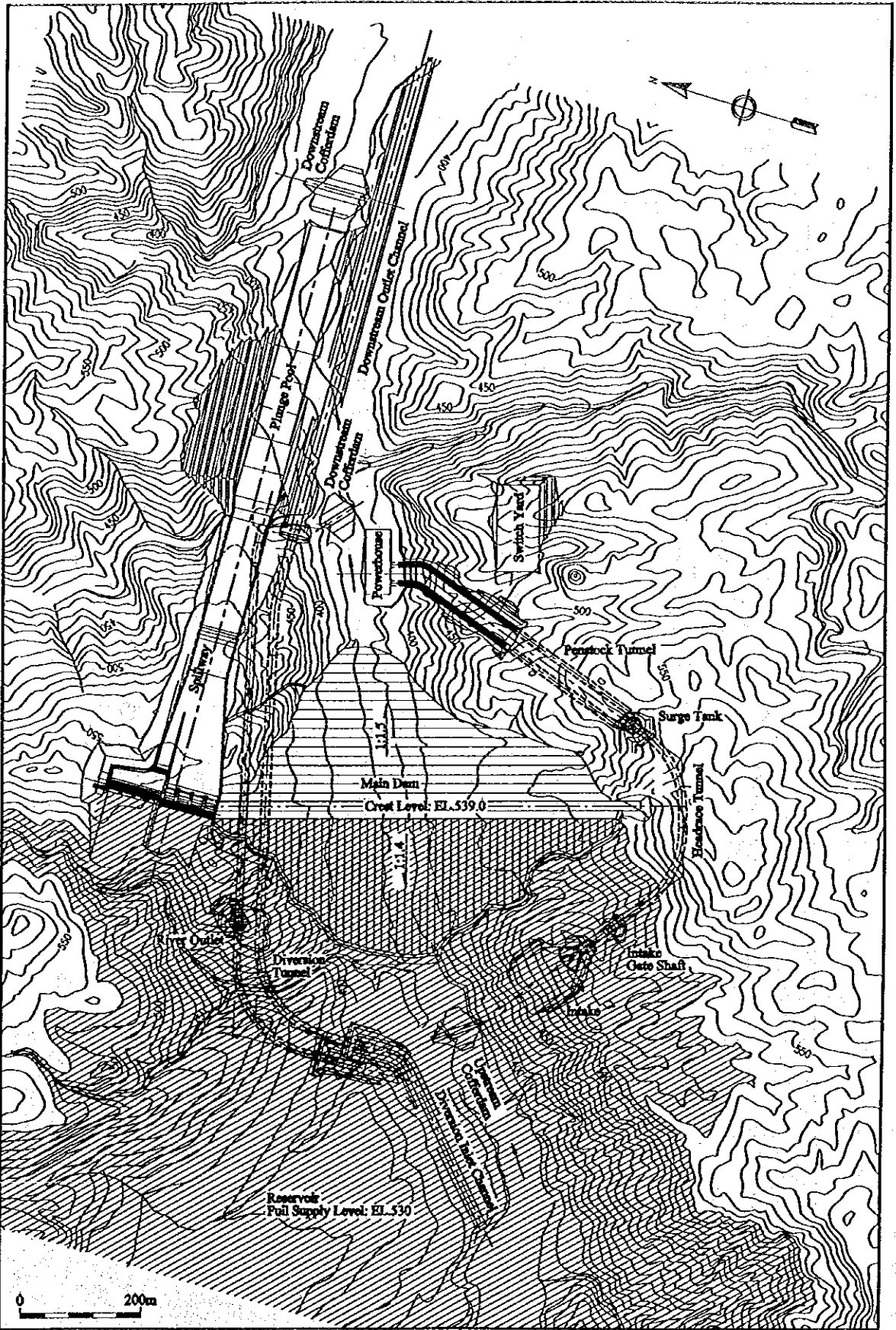


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Figure 7.2.5(1)

Layout of 164m High Dam at Munda Site

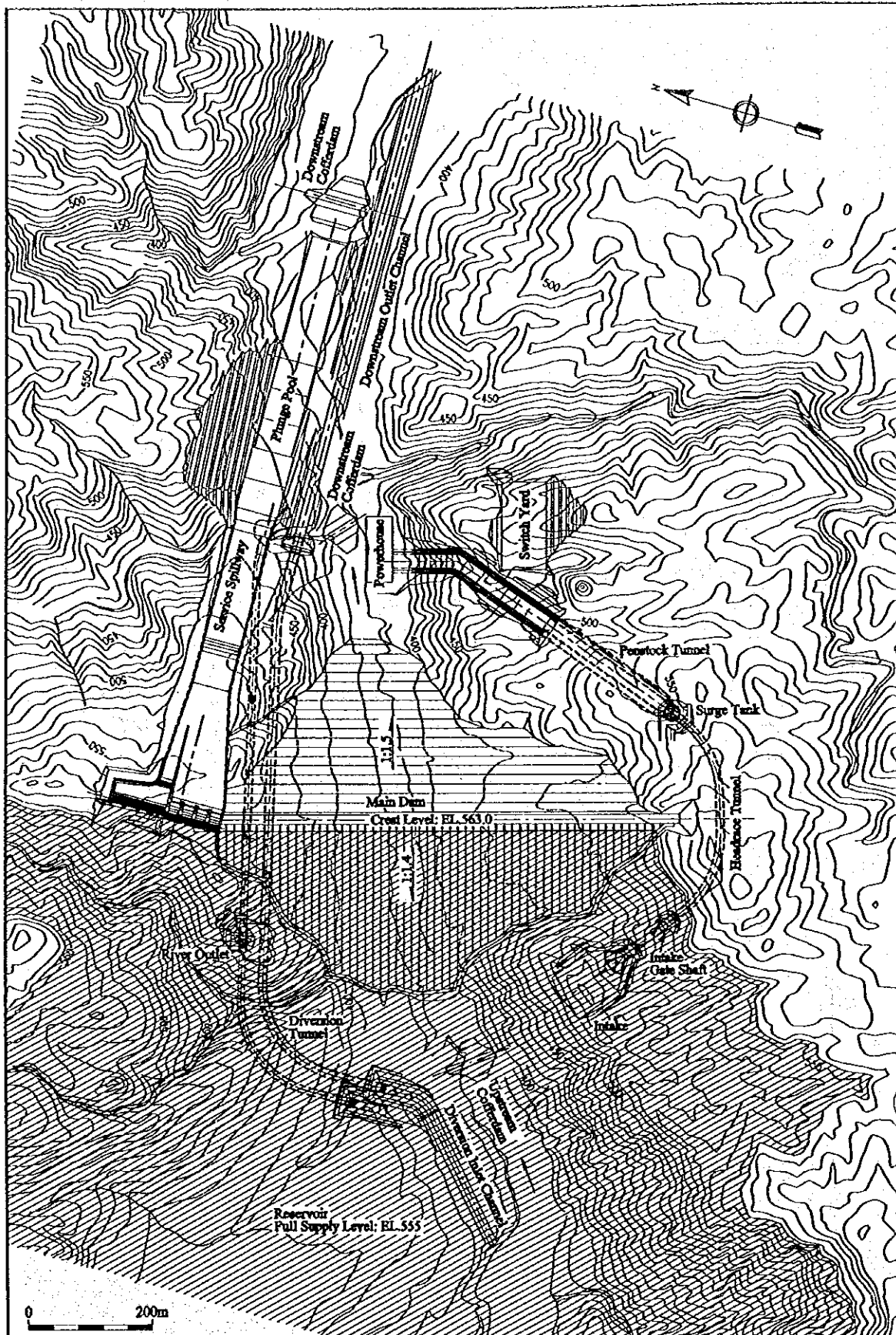




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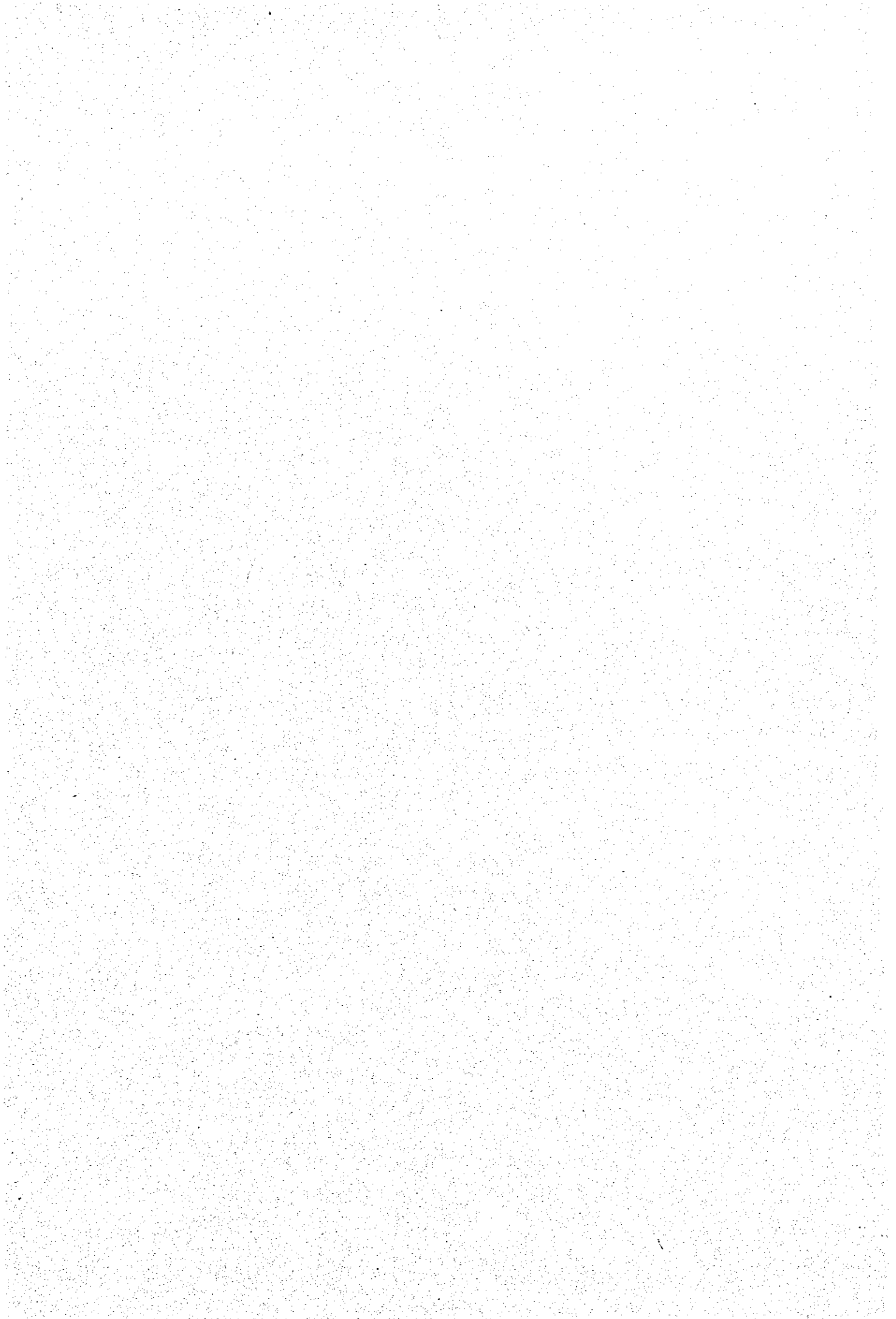
Figure 7.2.5(2)

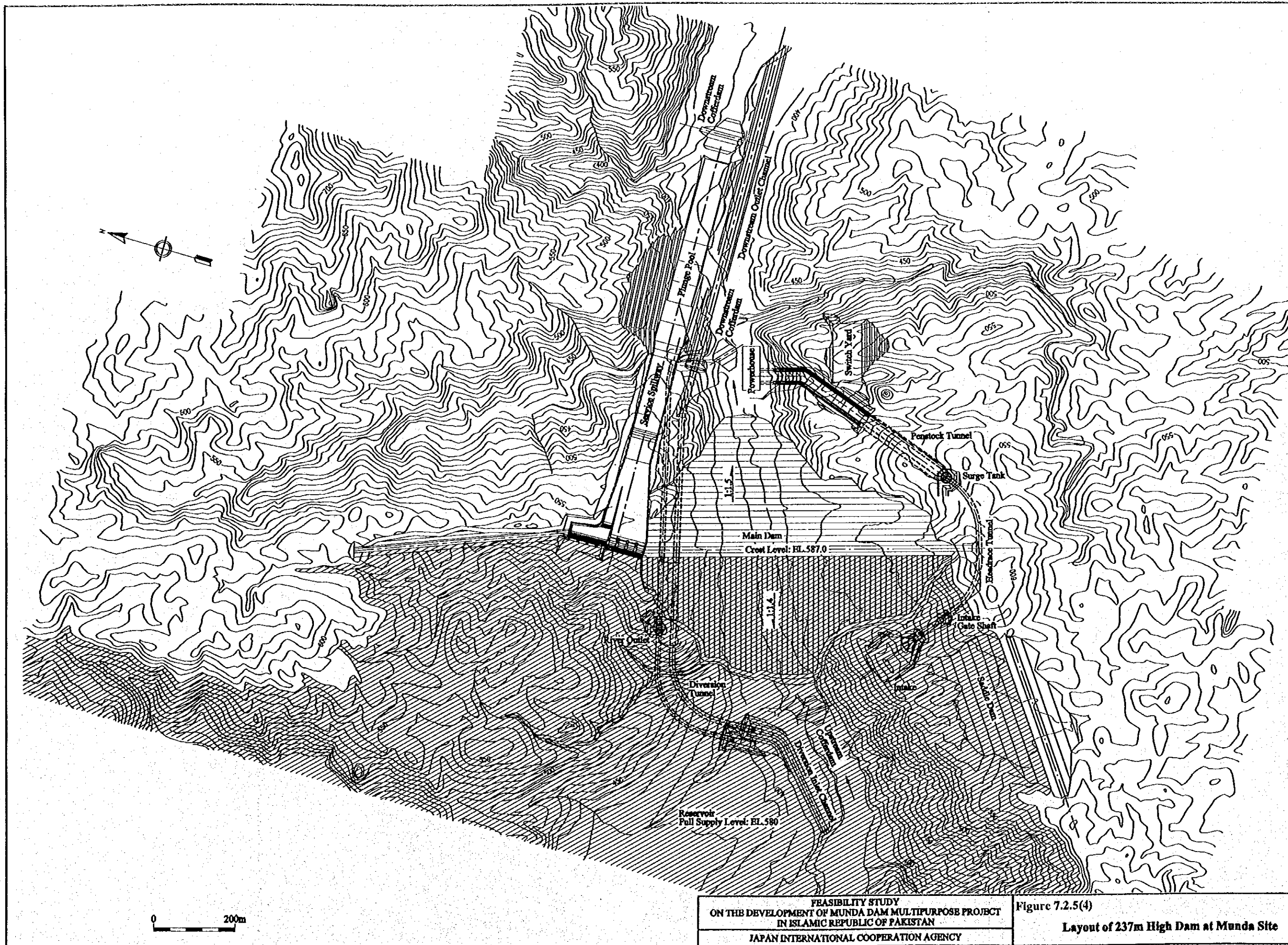
Layout of 189m High Dam at Munda Site



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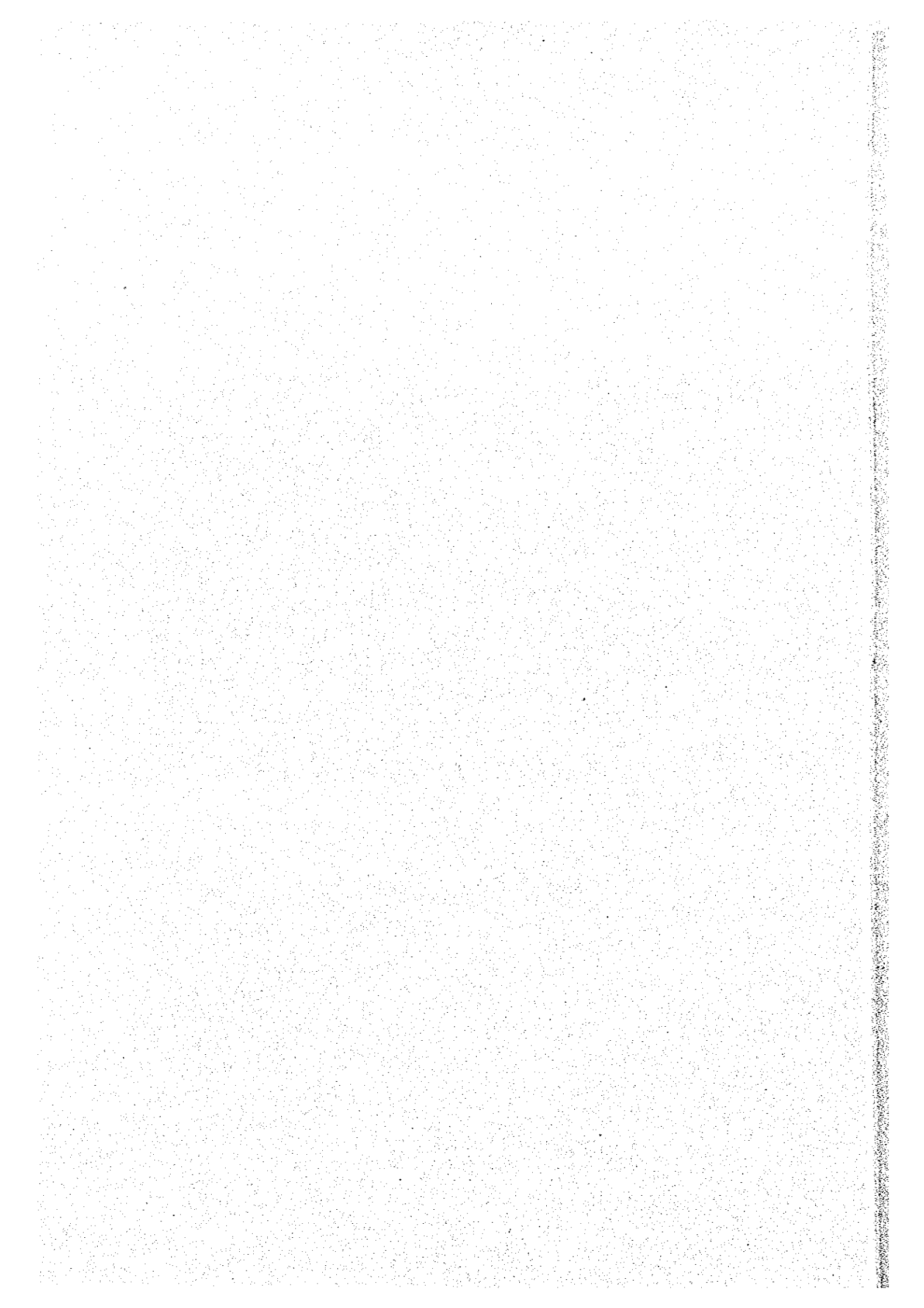
Figure 7.2.5(3)  
 Layout of 213m High Dam at Munda Site

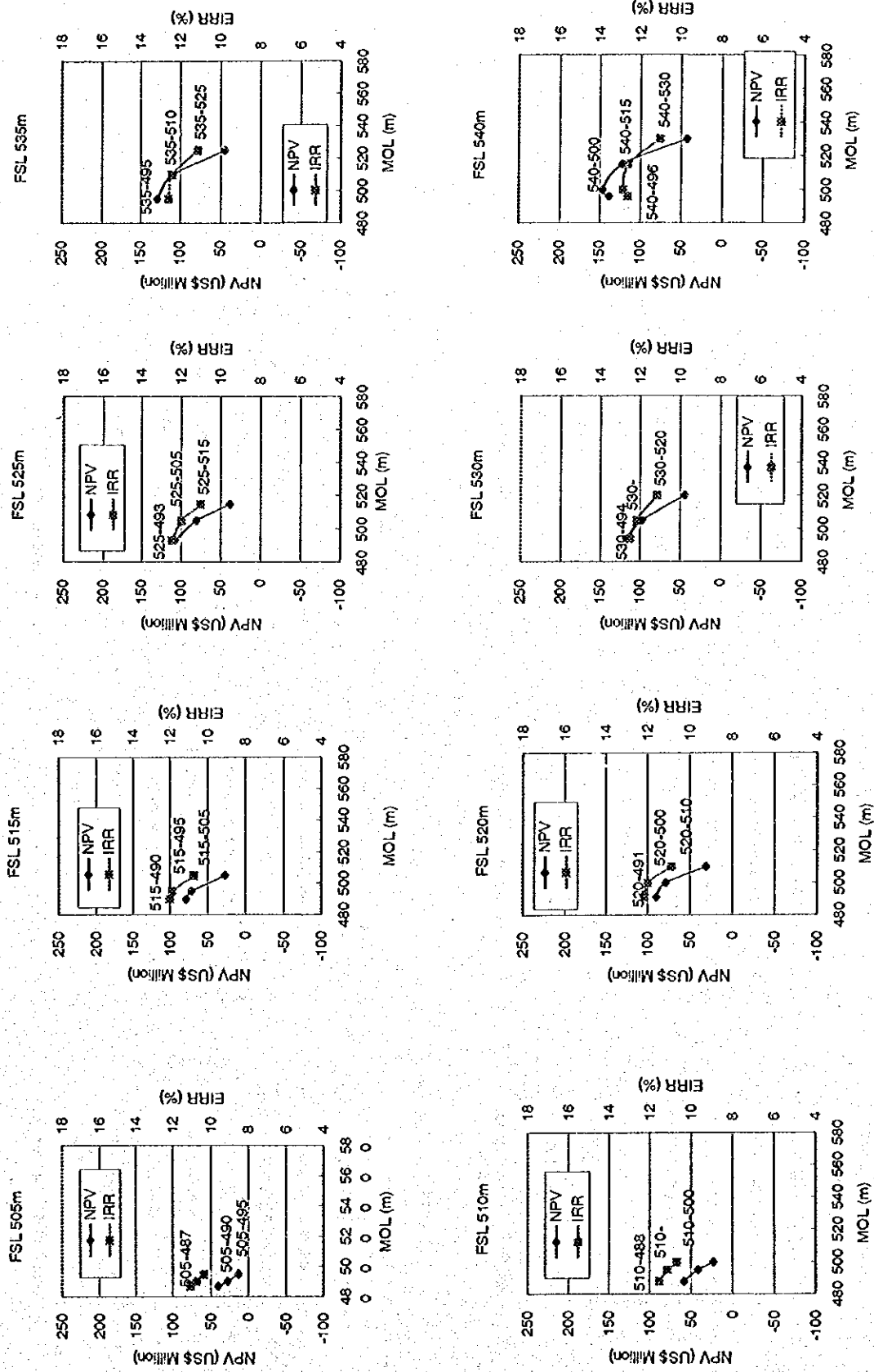




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Figure 7.2.5(4)  
 Layout of 237m High Dam at Munda Site





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Figure 7.2.6  
NPV and EIRR for Alternative FSL and MOL (1/2)

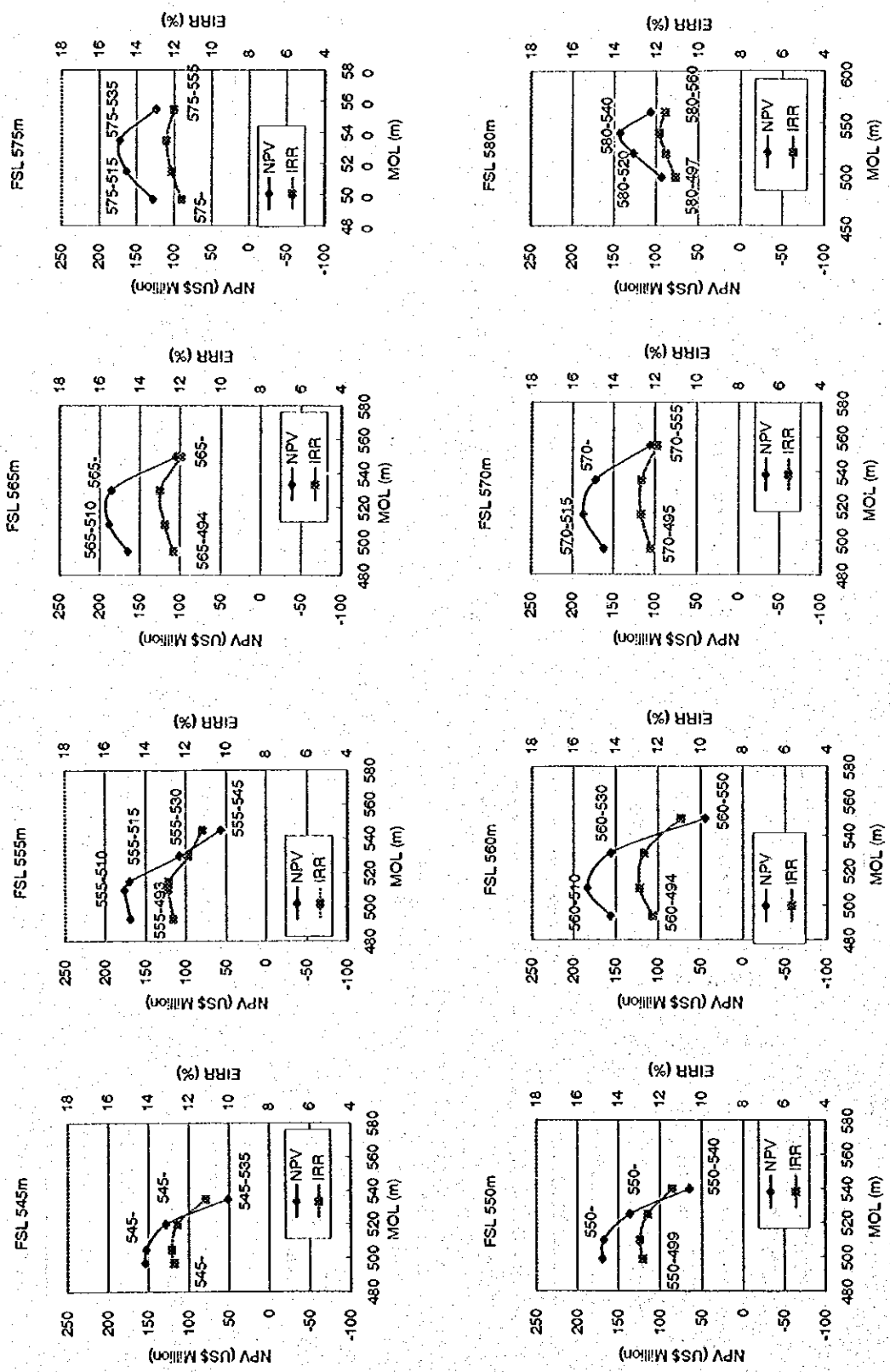
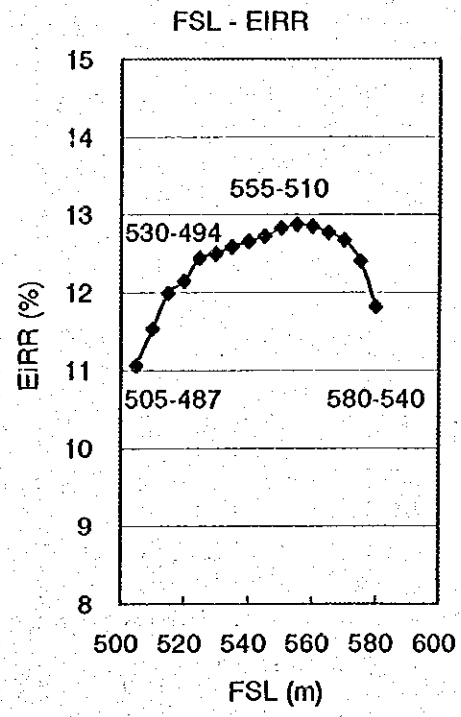
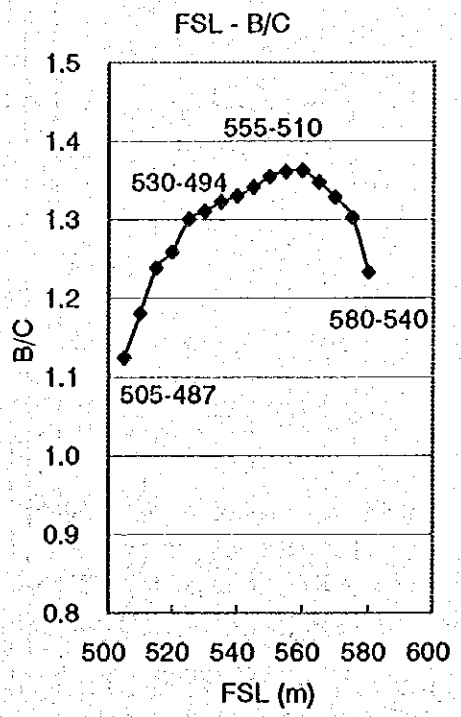
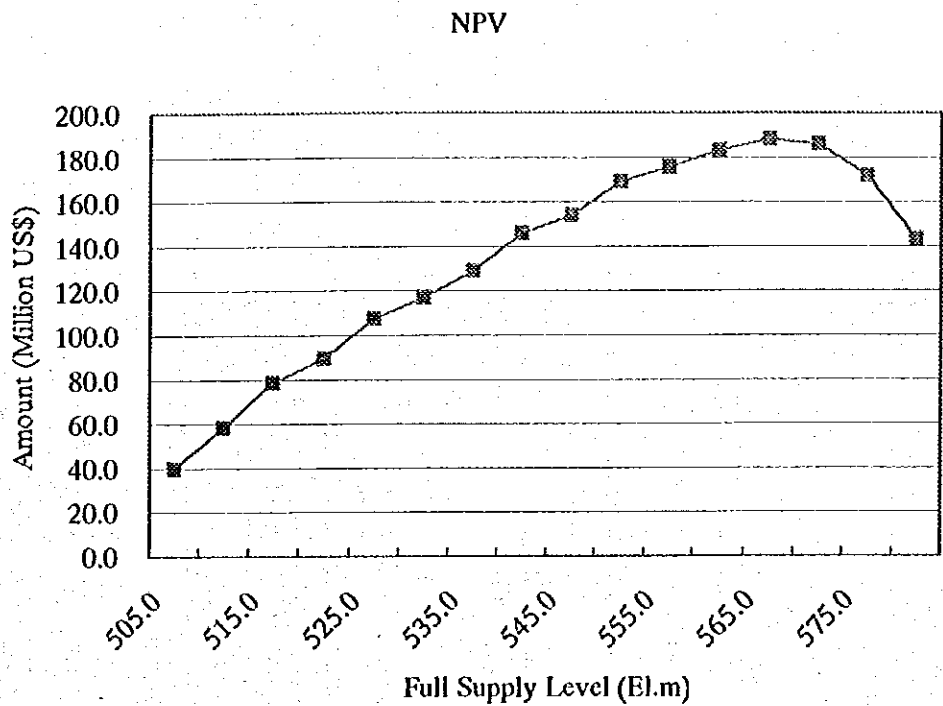
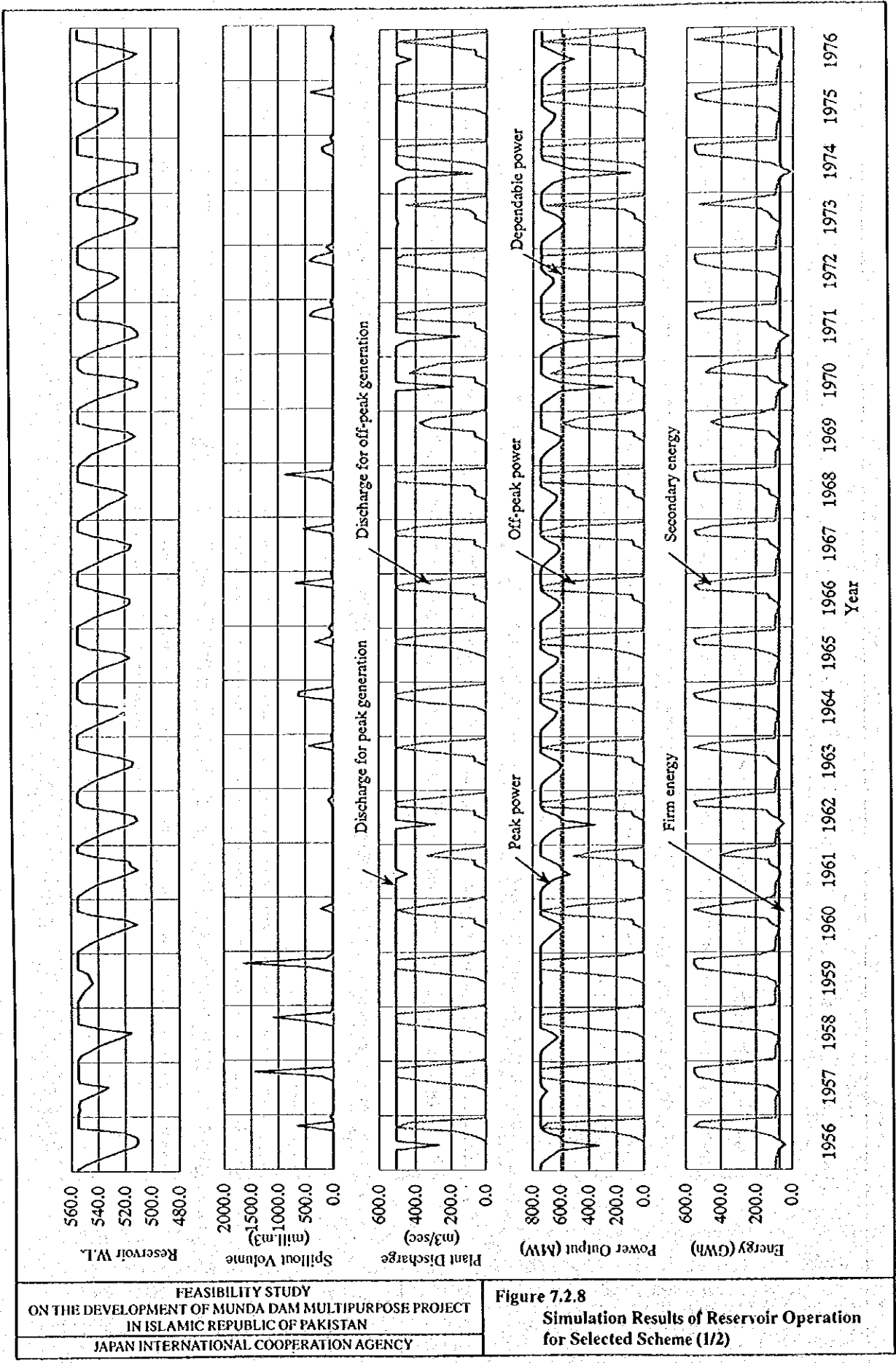


Figure 7.2.6  
NPV and EIRR for Alternative FSL and MOL (2/2)



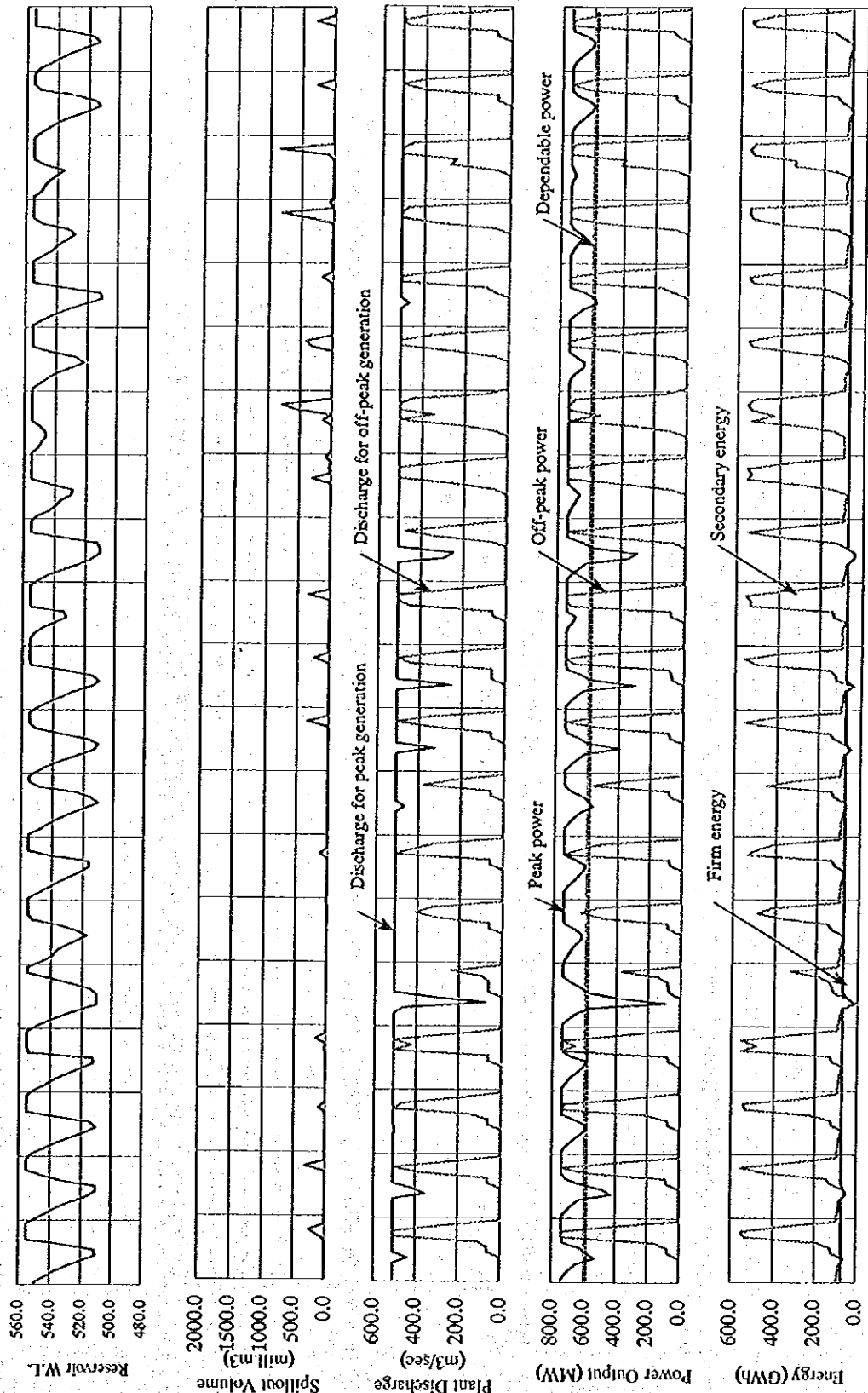
**Figure 7.2.7**  
**Economic Indices for Alternative FSL**





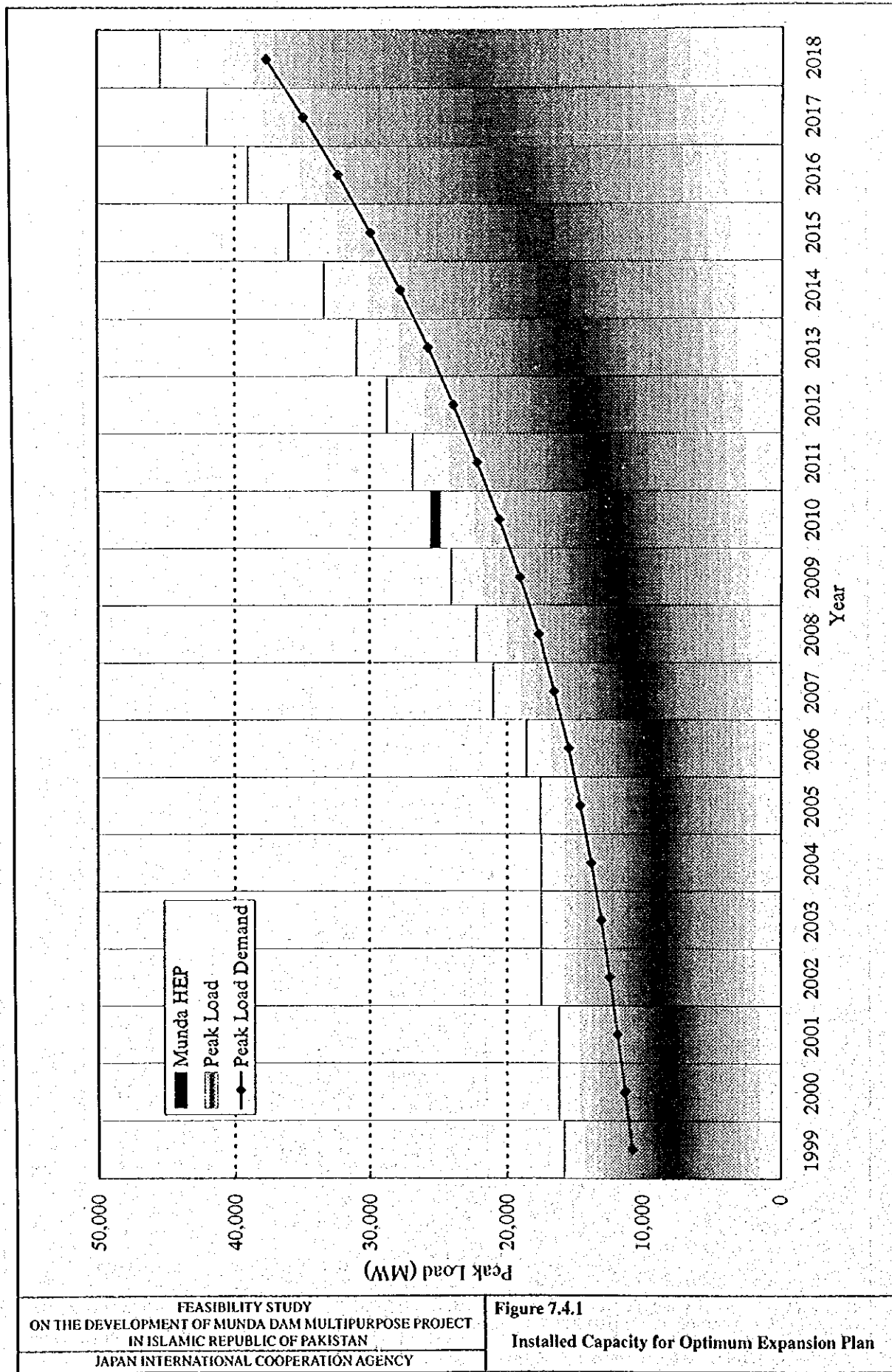
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Figure 7.2.8  
 Simulation Results of Reservoir Operation  
 for Selected Scheme (1/2)



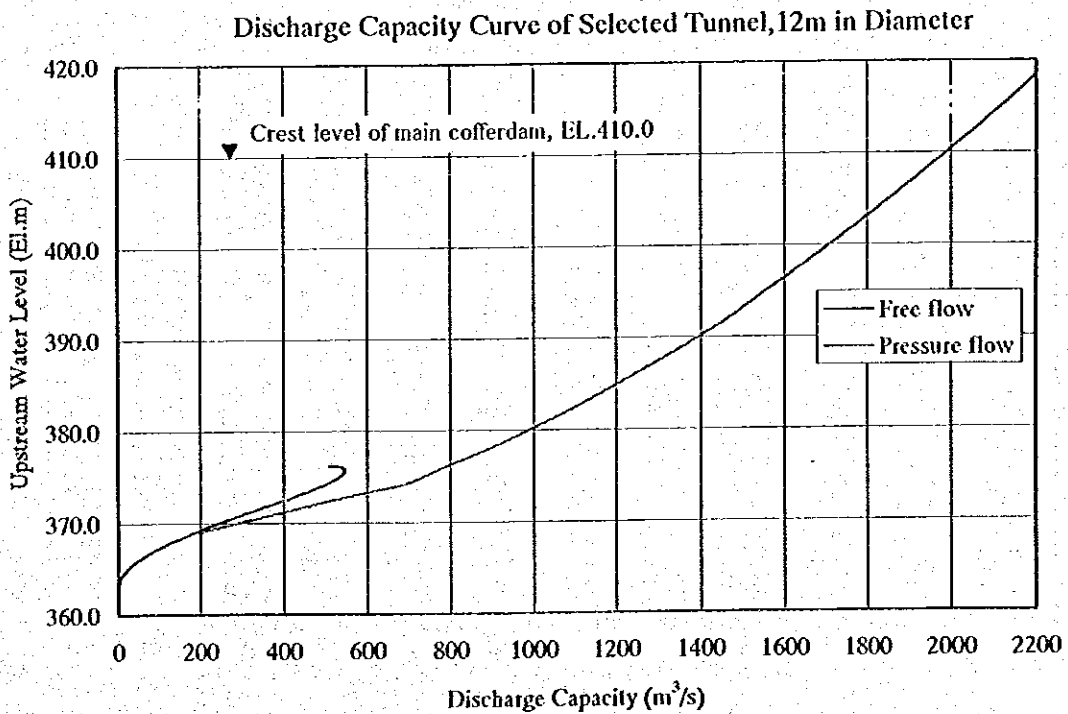
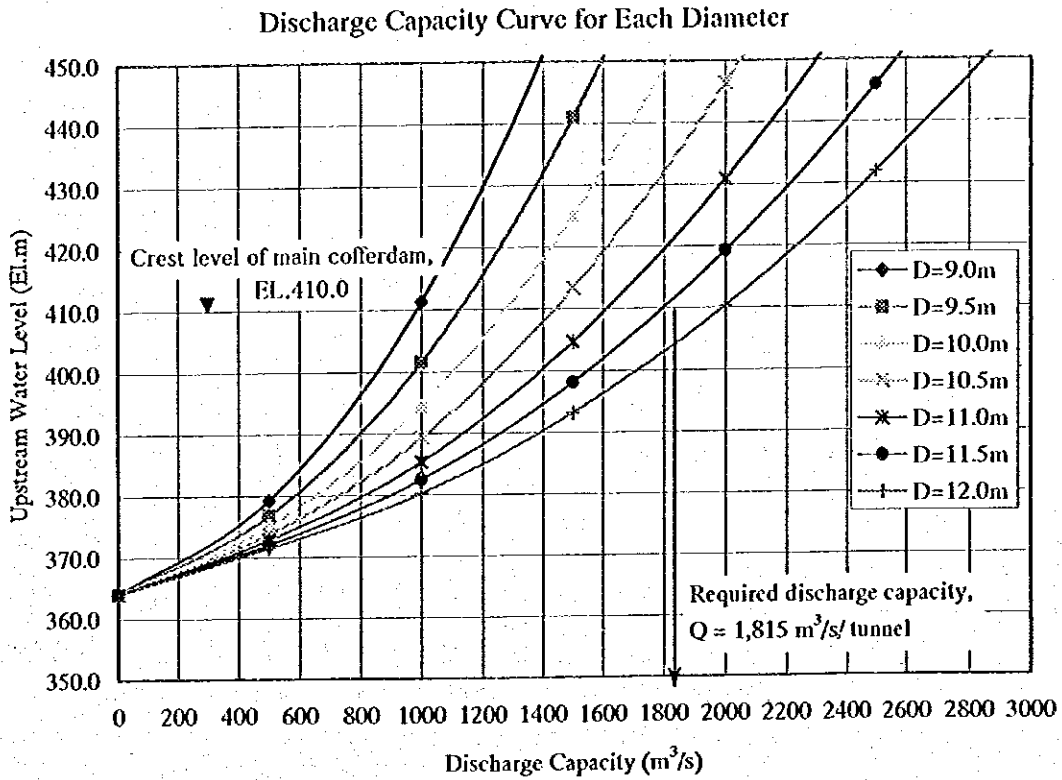
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Figure 7.2.8  
 Simulation Results of Reservoir Operation  
 for Selected Scheme (2/2)

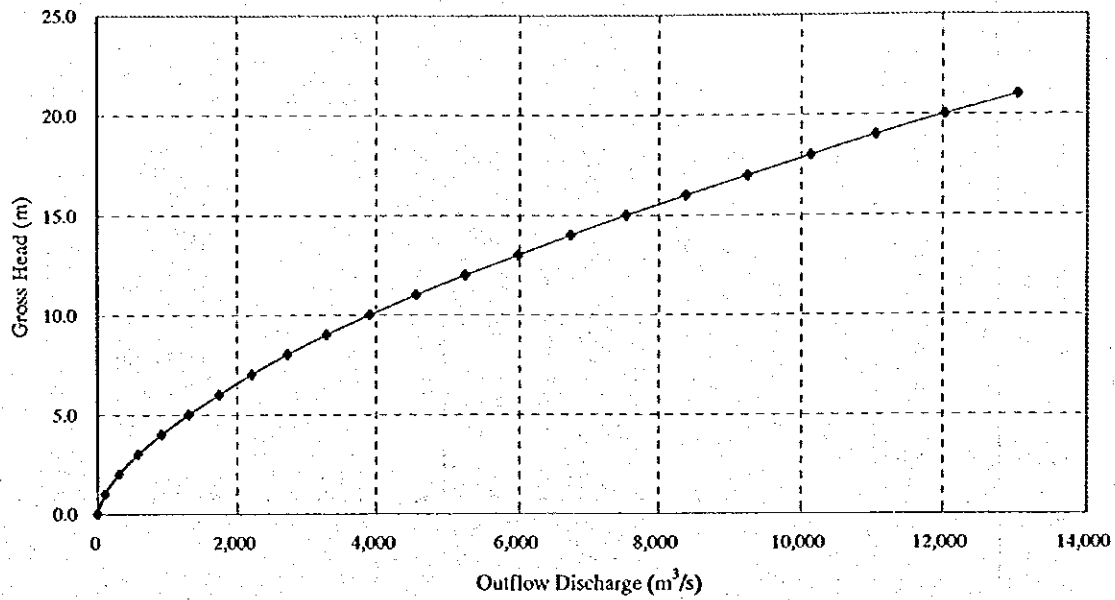


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Figure 7.4.1  
 Installed Capacity for Optimum Expansion Plan



**Gated Spillway  
(Gates fully opened)**



**Non-gated Overflow Spillway**

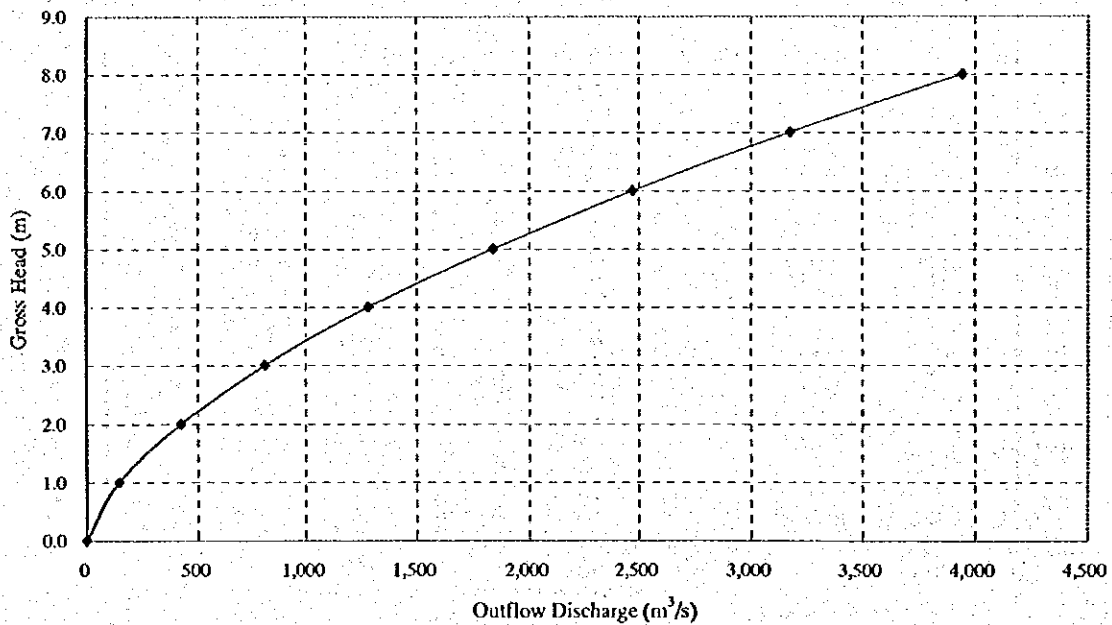
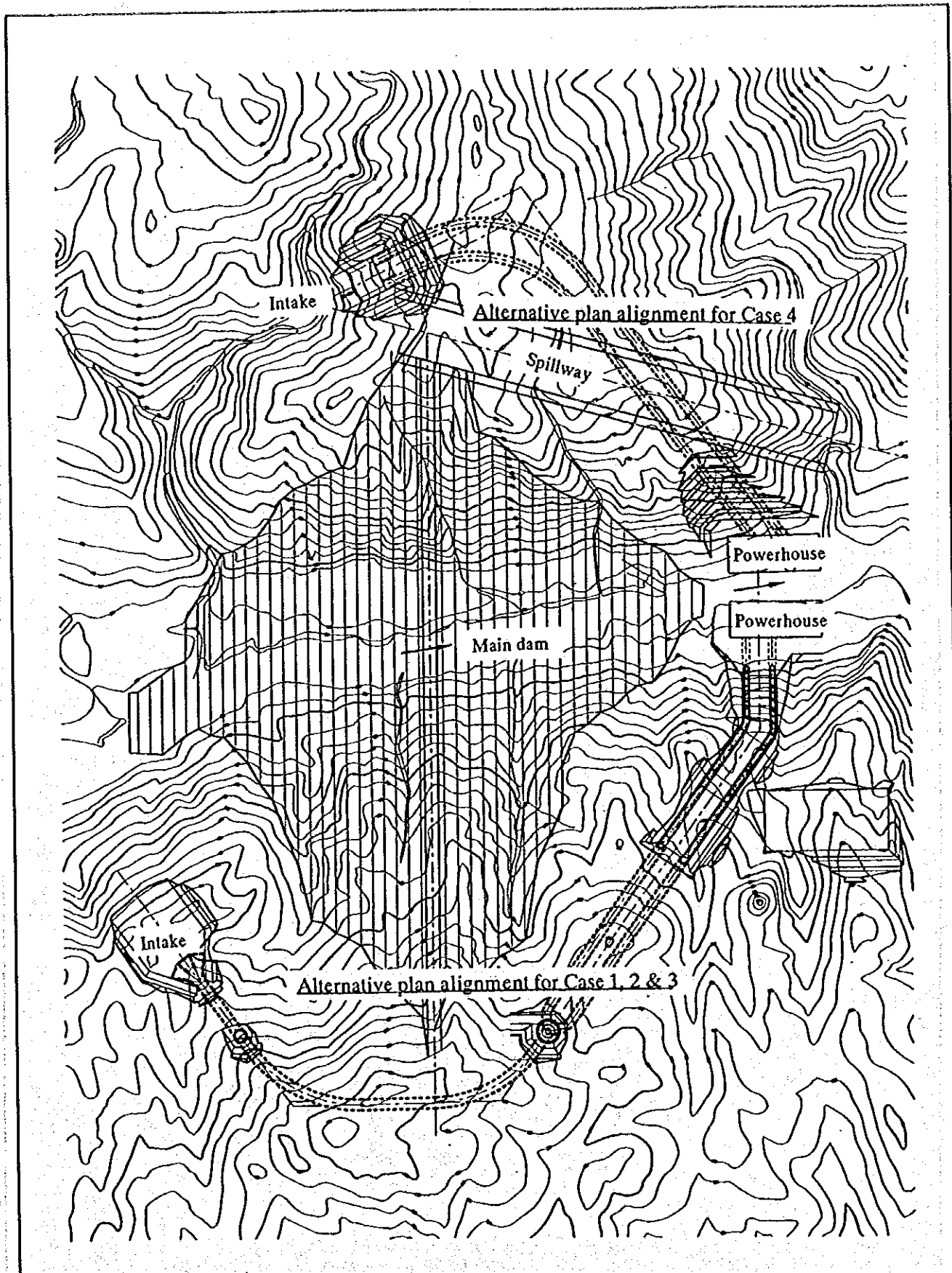


Figure 8.2.2

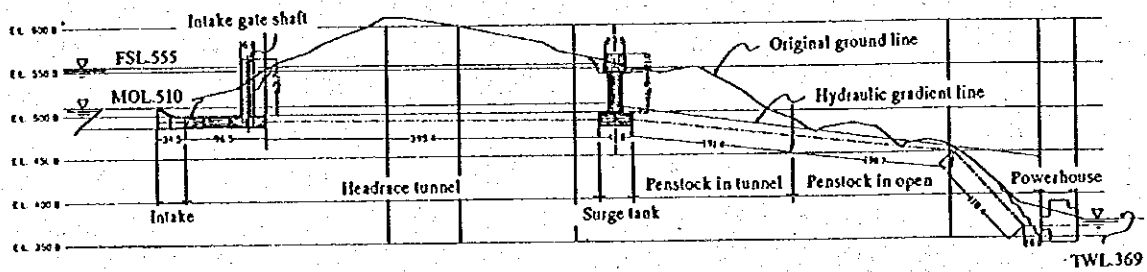
Discharge Capacity Curve of Spillway



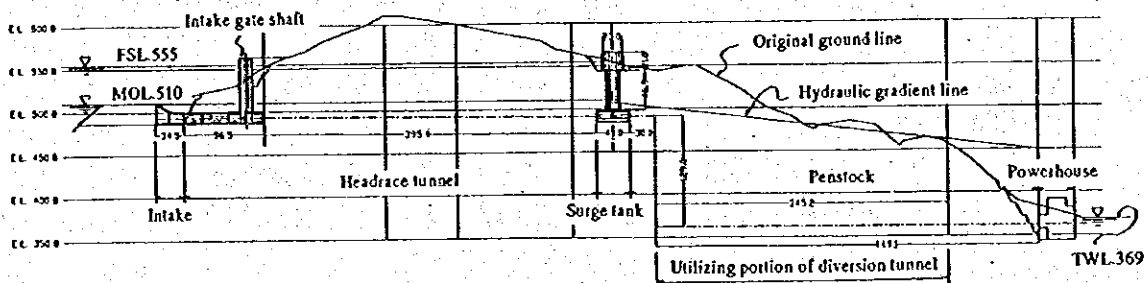
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Figure 8.2.3  
 Waterway Route and Type Alternatives (1/2)

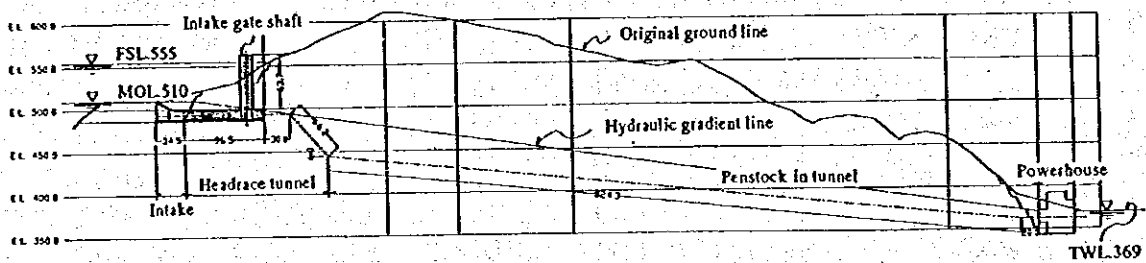
Case 1: Waterway with surge tank on right bank



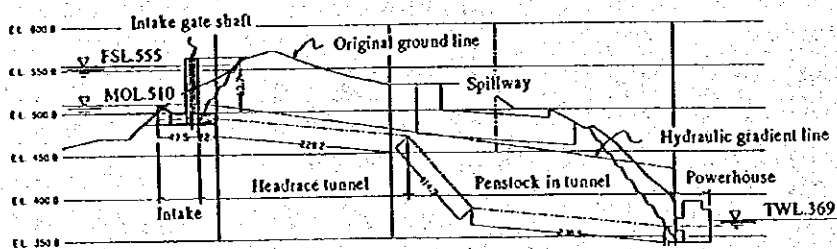
Case 2: Waterway with surge tank on right bank with utilizing diversion tunnel

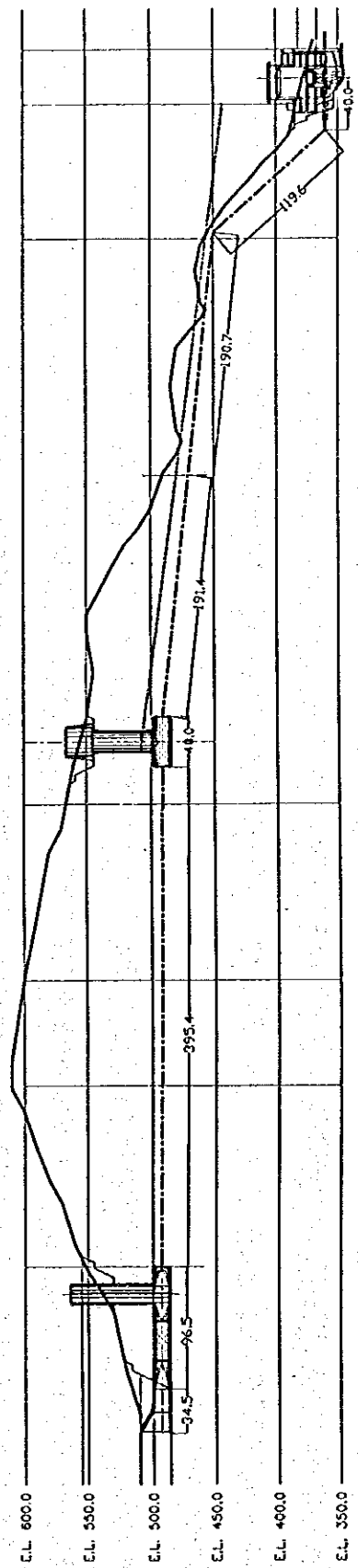
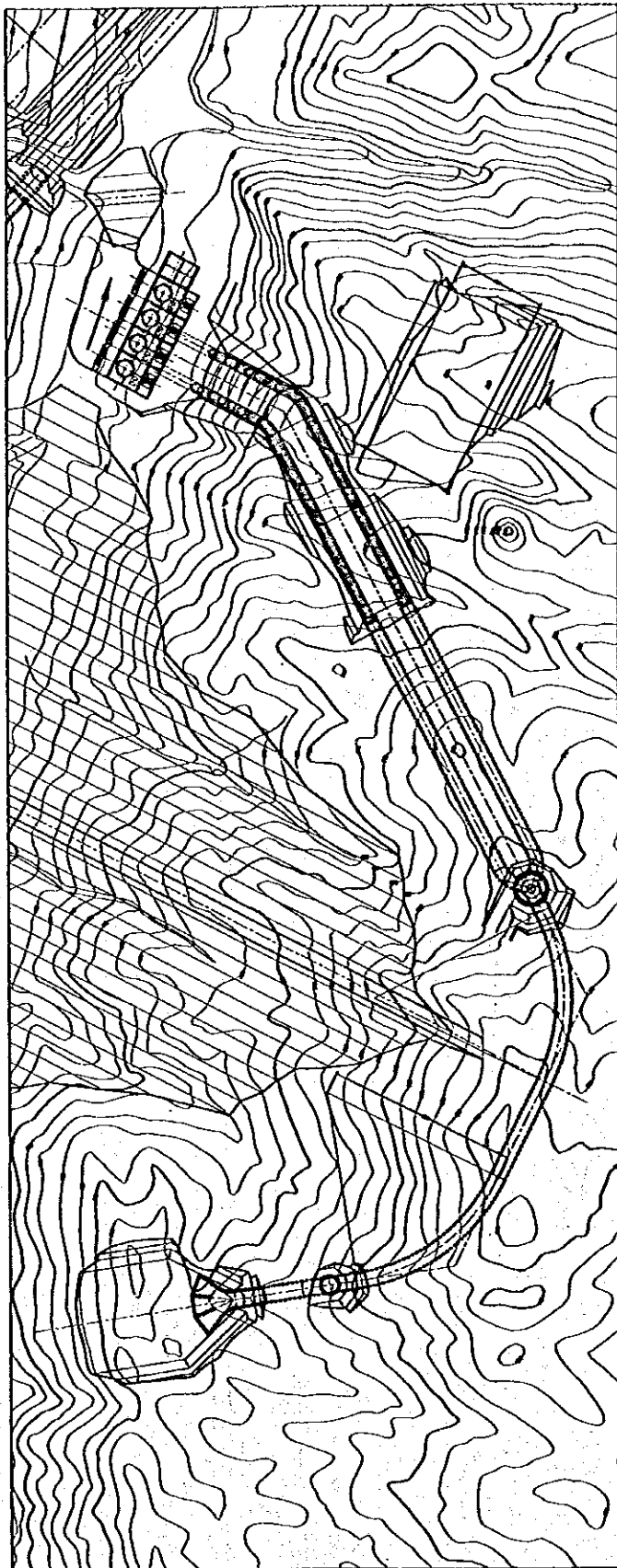


Case 3: Waterway without surge tank on right bank



Case 4: Waterway without surge tank on left bank



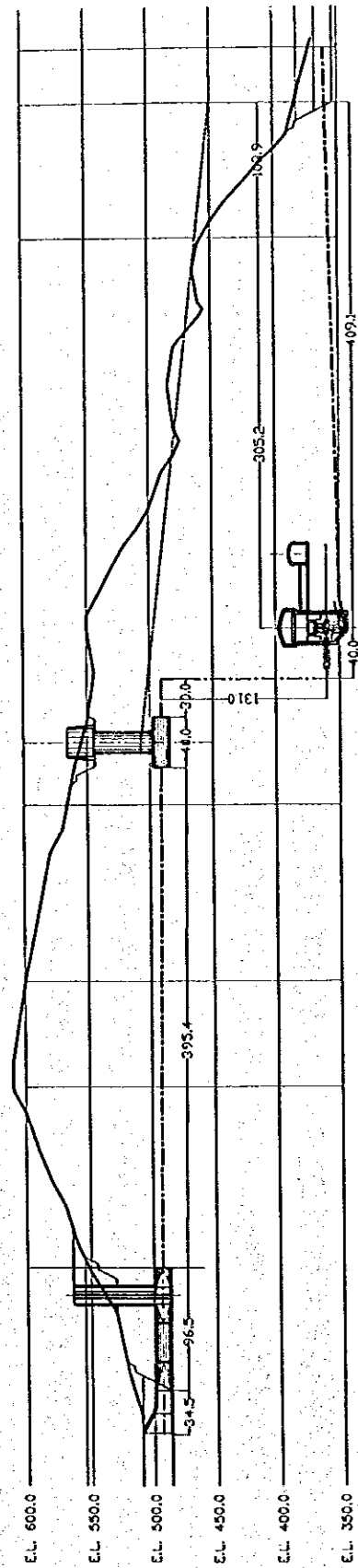
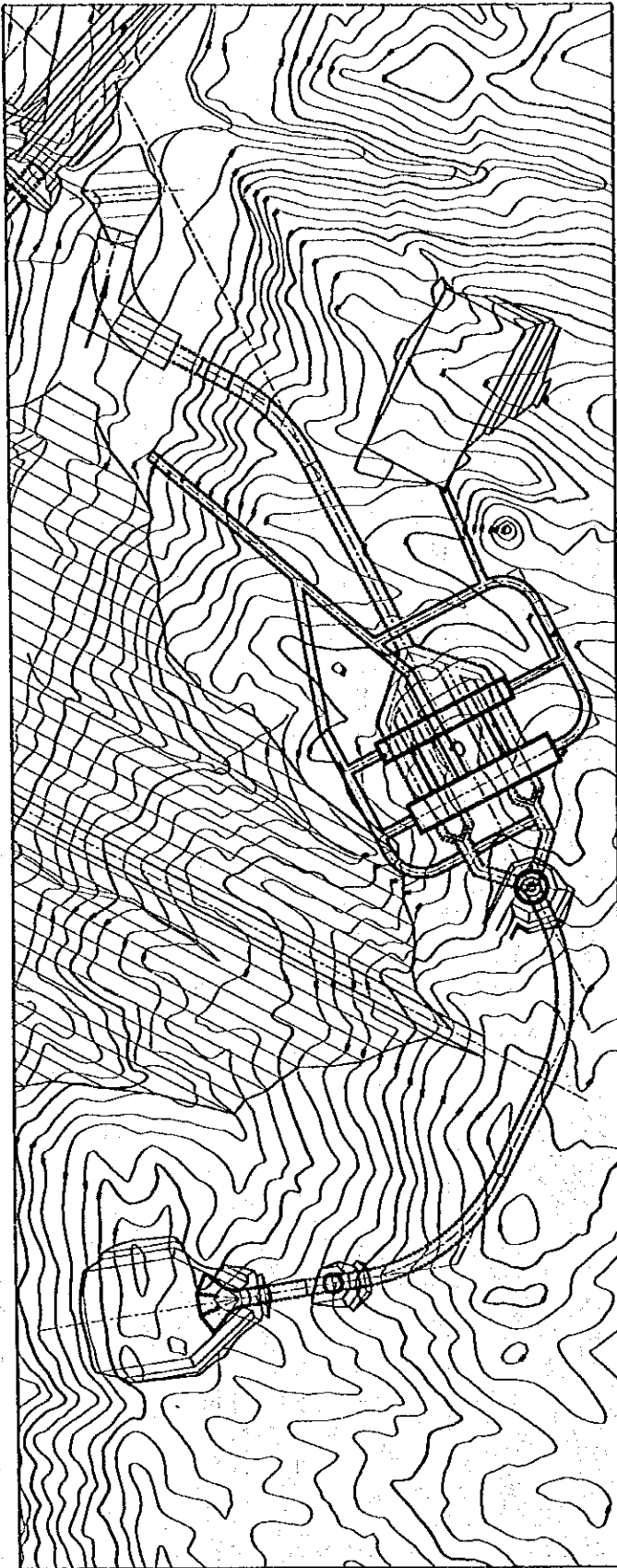


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Figure 8.2.4

Right Bank Waterway Alternative (1/2)

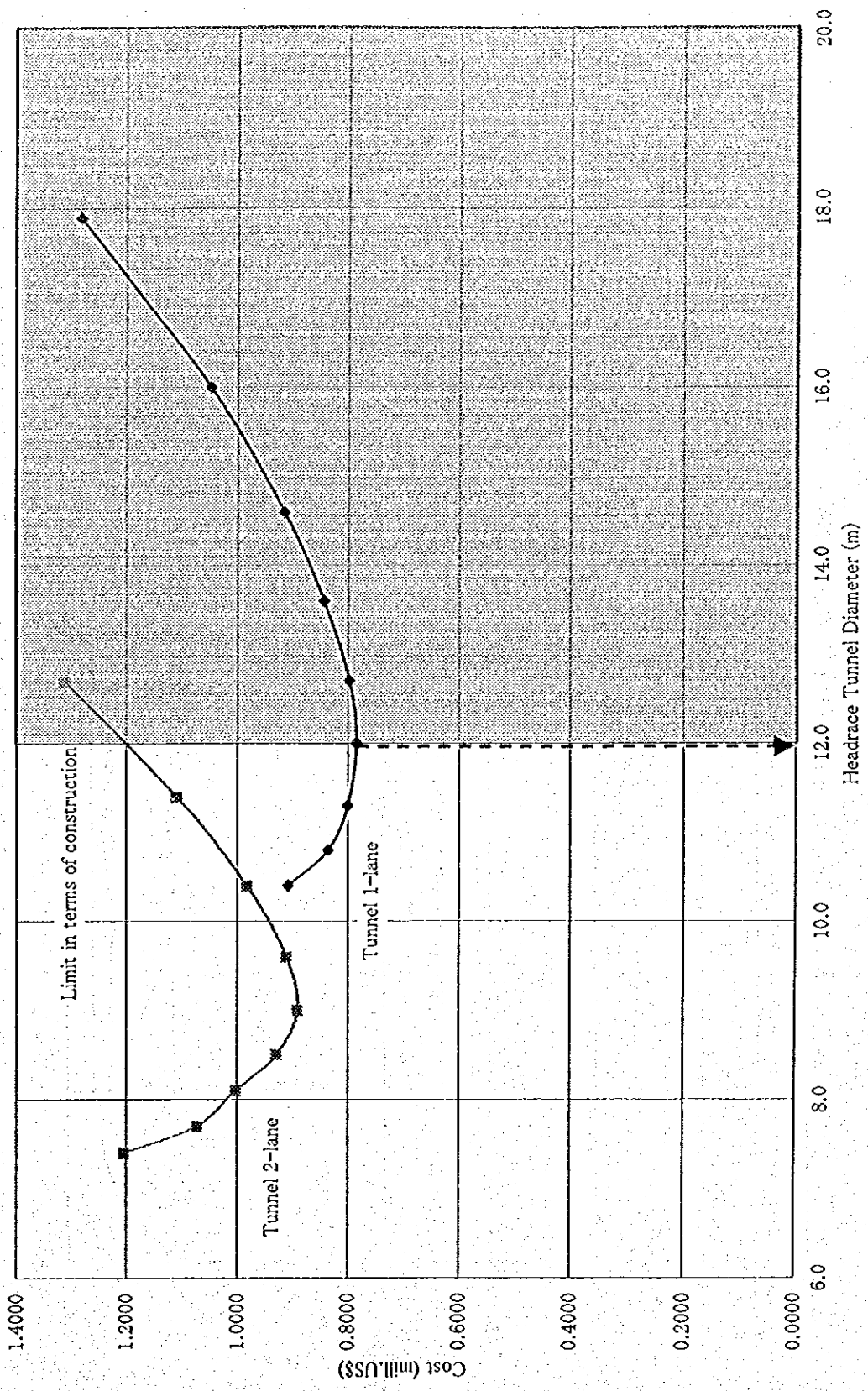




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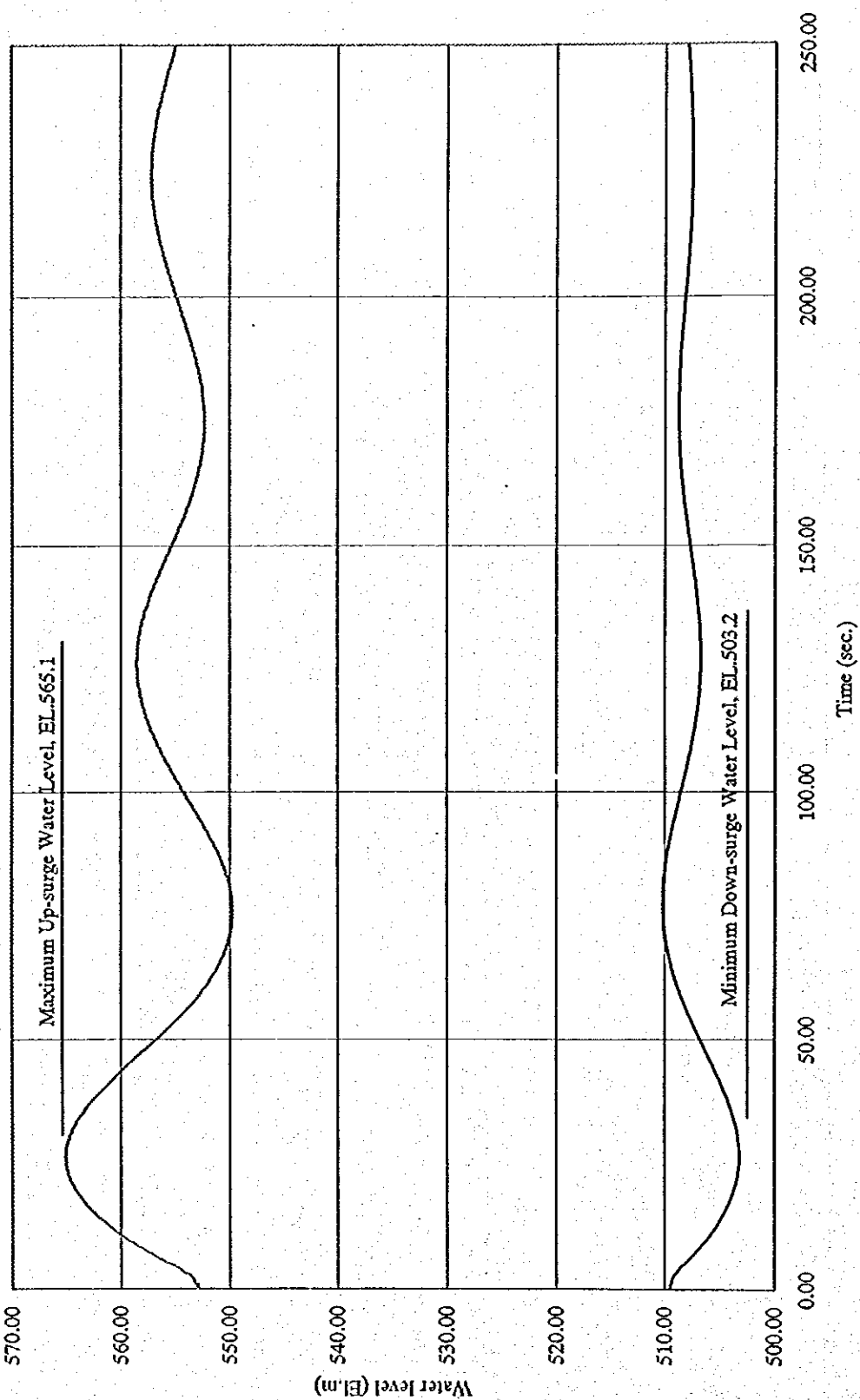
Figure 8.2.4

Right Bank Waterway Alternative (2/2)



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Figure 8.2.5  
 Optimization of Headrace Tunnel Diameter



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Figure 8.2.6  
 Surging Calculation