

## 2.4 Spillway

### 2.4.1 Excavation, Backfill and Stripping Top Soil

#### Excavation Volume of Spillway

Unit : [m<sup>3</sup>]

Elevation	Excavation Volume [m <sup>3</sup> ]						Total
	D	CL	CM-L	CM-H	td	rd	
higher than EL. 157.0 m	4,047.0	61,471.5	7.0	0.0	0.0	0.0	65,525.5
EL. 136.6 m - EL. 157.0 m	26,173.0	102,664.0	32,945.0	0.0	0.0	0.0	161,782.0
EL. 125.0 m - EL. 136.6 m	27,817.0	19,148.0	0.0	0.0	0.0	0.0	46,965.0
EL. 110.0 m - EL. 125.0 m	19,075.3	21,942.3	0.0	20,528.4	344.0	0.0	61,890.0
EL. 95.0 m - EL. 110.0 m	0.0	6,286.3	11,737.4	22,844.5	104.0	0.0	40,972.2
EL. 80.0 m - EL. 95.0 m	0.0	4,510.1	23,751.5	994.0	1,248.5	3,632.4	34,136.5
Lower than EL. 80.0 m	0.0	0.0	0.2	1,029.0	0.0	0.0	1,029.2
<b>Total</b>	<b>77,112.3</b>	<b>216,022.2</b>	<b>68,441.1</b>	<b>45,395.9</b>	<b>1,696.5</b>	<b>3,632.4</b>	<b>412,300.4</b>
<b>Total x 1.1</b>	<b>84,800.0</b>	<b>237,600.0</b>	<b>75,300.0</b>	<b>49,900.0</b>	<b>1,900.0</b>	<b>4,000.0</b>	<b>453,500.0</b>

#### Backfill Volume of Spillway

Unit : [m<sup>3</sup>]

	Left Side	Right Side	Total
Backfill Volume	17,154.0	2,108.0	19,262.0
Backfill Volume x 1.1	18,900.0	2,300.0	21,200.0

Unit : [m<sup>2</sup>]

	Total
Stripping Top Soil	33,962.1
Stripping Top Soil x 1.1	37,400.0

**Excavation Volume Classified by Elevation**

(1) Higher than EL. 157.0 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20												
-10												
0												
10		0										
20		87					0	433	0	0		
30		333					0	2,098	0	0		
40		612					0	4,727	0	0		
50		845					0	7,286	0	0		
60		991	0				0	9,180	0	0		
70		1,030	1				0	10,104	4	0		
80-1		964	0				0	9,966	4	0		
80-1 (Left)	0	766					---	---	---	---	---	---
80-2 (Left)	42	623					209	6,947	0	0		
90	83	532					625	5,774	0	0		
100	106	230					947	3,808	0	0		
110	147	0					1,266	1,150	0	0		
120	27						868	0	0	0		
130	0						134	0	0	0		
140							0	0	0	0		
150												
160												
170												
180												
190												
200												
210												
220												
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
<b>Total</b>							<b>4,047</b>	<b>61,472</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>0</b>

(2) EL. 136.6 m - EL. 157.0 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20		0										
-10		86					0	428	0	0		
0		228					0	1,567	0	0		
10		597	0				0	4,122	0	0		
20		1,221	42				0	9,089	210	0		
30		1,162	192				0	11,917	1,170	0		
40		997	364				0	10,798	2,782	0		
50		771	548				0	8,839	4,564	0		
60		525	591				0	6,477	5,698	0		
70		498	607				0	5,115	5,993	0		
80-1		630	482				0	5,640	5,446	0		
80-1 (Left)		143	386				---	---	---	---	---	---
80-2 (Left)		212	318				0	1,775	3,522	0		
90		873	187				0	5,421	2,525	0		
100	0	835	10				0	8,536	986	0		
110	48	772	0				239	8,032	51	0		
120	257	572					1,523	6,720	0	0		
130	407	357					3,320	4,649	0	0		
140	496	156					4,517	2,566	0	0		
150	489	17					4,926	866	0	0		
160	369	2					4,288	99	0	0		
170	261	0					3,148	12	0	0		
180	184						2,227	0	0	0		
190	92						1,383	0	0	0		
200	14						532	0	0	0		
210	0						72	0	0	0		
220							0	0	0	0		
230												
240												
250												
260												
270												
280												
290												
300												
310												
320												
330												
Total							26,173	102,664	32,945	0	0	0

(3) EL. 125.0 m - EL. 136.6 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20												
-10												
0												
10												
20												
30												
40												
50												
60												
70												
80-1												
80-2												
90												
100		0					0	0	0	0	0	0
110		48					0	241	0	0	0	0
120		122					0	851	0	0	0	0
130		216					0	1,691	0	0	0	0
140	0	330					0	2,732	0	0	0	0
150	37	418					187	3,744	0	0	0	0
160	161	350					994	3,840	0	0	0	0
170	287	250					2,243	2,996	0	0	0	0
180	391	154					3,389	2,019	0	0	0	0
190	497	22					4,437	881	0	0	0	0
200	479	5					4,881	133	0	0	0	0
210	380	0					4,296	23	0	0	0	0
220	272						3,261	0	0	0	0	0
230	147						2,096	0	0	0	0	0
240	33						900	0	0	0	0	0
250	0						165	0	0	0	0	0
260							0	0	0	0	0	0
270							0	0	0	0	0	0
280							0	0	0	0	0	0
290	0						0	0	0	0	0	0
300	4						18	0	0	0	0	0
310	27						151	0	0	0	0	0
320	35						308	0	0	0	0	0
330	23						291	0	0	0	0	0
340	9						159	0	0	0	0	0
350	0						43	0	0	0	0	0
360	0						0	0	0	0	0	0
Total							27,817	19,148	0	0	0	0

## (4) EL. 110.0 m - EL. 125.0 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20												
-10												
0												
10												
20												
30												
40												
50												
60												
70												
80-1												
80-2												
90												
100												
110												
120												
130												
140												
150		0					0	0	0	0	0	0
160		70					0	351	0	0	0	0
170		156					0	1,128	0	0	0	0
180	0	269		0			0	2,124	0	0	0	0
190	3	373		83			16	3,213	0	415	0	0
200	39	366		236			212	3,698	0	1,594	0	0
210	193	210		249			1,161	2,883	0	2,424	0	0
220	274	116		220			2,333	1,632	0	2,342	0	0
230	300	54		215			2,867	849	0	2,173	0	0
240	320	37		224			3,097	452	0	2,197	0	0
250	273	30		228			2,965	330	0	2,261	0	0
260	196	35		198			2,345	323	0	2,127	0	0
270	87	31		154	0		1,412	333	0	1,759	0	0
280	36	31		94	24		613	311	0	1,241	120	0
290	18	24		61	10		268	274	0	773	172	0
300	40	69		21	0		290	466	0	406	52	0
310	40	81		47			400	753	0	339	0	0
320	39	94		15			392	874	0	310	0	0
330	27	70		10			330	820	0	123	0	0
340	17	53		0			221	615	0	49	0	0
350	7	24					120	382	0	0	0	0
360	0	2					37	127	0	0	0	0
370		0					0	8	0	0	0	0
Total							19,075	21,942	0	20,528	344	0

(5) EL. 95.0 m - EL. 110.0 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20												
-10												
0												
10												
20												
30												
40												
50												
60												
70												
80-1												
80-2												
90												
100												
110												
120												
130												
140												
150												
160												
170												
180												
190				0			0	0	0	0	0	0
200		0		27			0	0	0	135	0	0
210		7	0	197	0		0	36	0	1,122	0	0
220		0	93	262	1		0	36	464	2,299	6	0
230		37	192	260	9		0	185	1,426	2,612	52	0
240		51	190	287	0		0	442	1,912	2,736	46	0
250		45	177	301			0	483	1,833	2,943	0	0
260		45	156	273			0	453	1,661	2,870	0	0
270		49	124	222			0	471	1,399	2,471	0	0
280		55	106	177			0	518	1,151	1,994	0	0
290		58	78	124			0	564	920	1,504	0	0
300		54	18	52			0	563	483	879	0	0
310		58	29	74			0	562	236	632	0	0
320		65	5	23			0	613	168	488	0	0
330		69	3	5			0	667	40	140	0	0
340		35	3	0			0	520	32	23	0	0
350		0	0				0	176	16	0	0	0
360												
Total							0	6,286	11,737	22,845	104	0

## (6) EL. 80.0 m - EL. 95.0 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20												
-10												
0												
10												
20												
30												
40												
50												
60												
70												
80-1												
80-2												
90												
100												
110												
120												
130												
140												
150												
160												
170												
180												
190												
200												
210												
220			0				0	0	0	0	0	0
230		0	27		0		0	0	136	0	0	0
240		20	228		4	0	0	102	1,274	0	20	0
250		41	388	0	8	14	0	308	3,077	0	60	70
260		38	456	8	10	26	0	393	4,219	39	89	202
270		31	404	10	0	42	0	344	4,302	90	49	341
280		42	328	22		52	0	367	3,660	164	0	469
290		38	296	11	0	30	0	401	3,119	166	0	411
300		35	90	20	27	59	0	365	1,932	153	137	447
310		59	108	24	7	43	0	469	990	220	171	510
320		63	31	4	15	28	0	610	691	142	108	353
330		52	20	0	27	27	0	573	252	22	208	277
340		32	0		27	42	0	420	101	0	271	346
350		0	0		0	0	0	161	1	0	137	209
360												
Total							0	4,510	23,752	994	1,249	3,632

(7) Lower than EL. 80.0 m

Sta.	Area (m <sup>2</sup> )						Volume (m <sup>3</sup> )					
	D	CL	CM-L	CM-H	td	rd	D	CL	CM-L	CM-H	td	rd
-20												
-10												
0												
10												
20												
30												
40												
50												
60												
70												
80-1												
80-2												
90												
100												
110												
120												
130												
140												
150												
160												
170												
180												
190												
200												
210												
220												
230												
240												
250												
260												
270												
280												
290			0	0			0	0	0	0	0	0
300			0	36			0	0	0	178	0	0
310			0	67			0	0	0	515	0	0
320				0			0	0	0	337	0	0
330							0	0	0	0	0	0
Total							0	0	0	1,029	0	0



**Backfill Volume of Spillway**

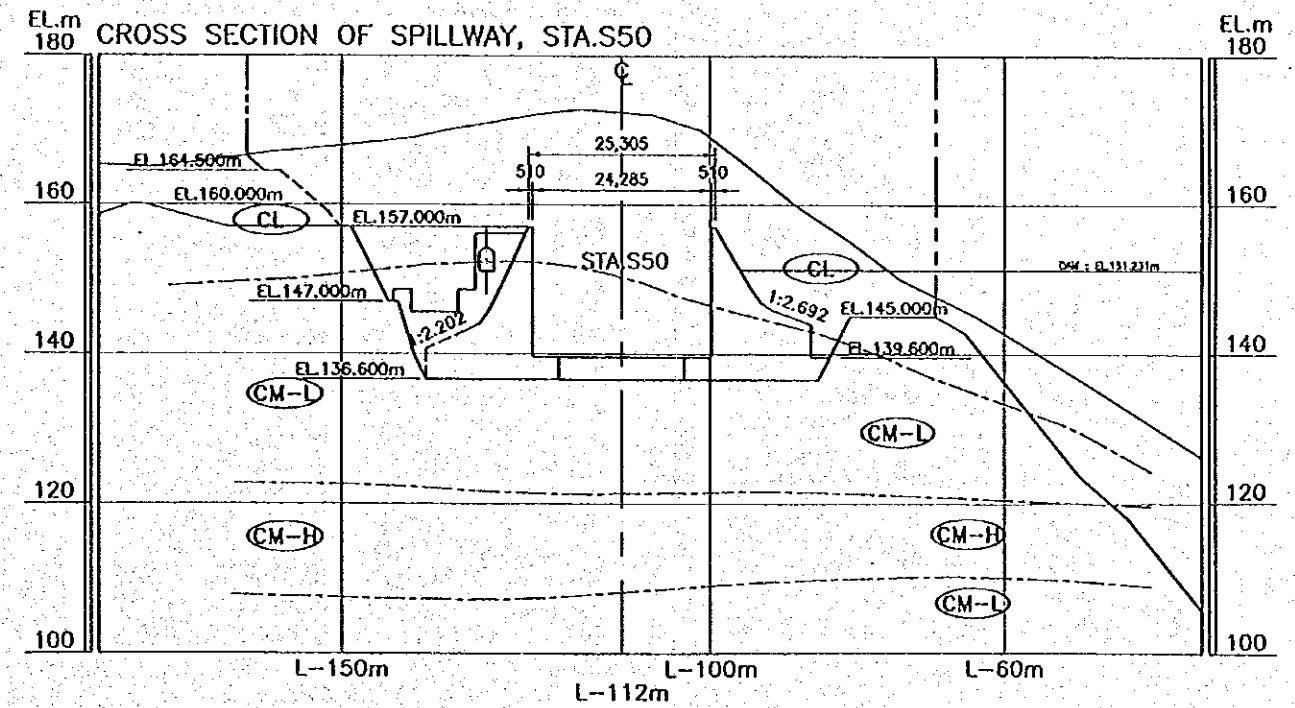
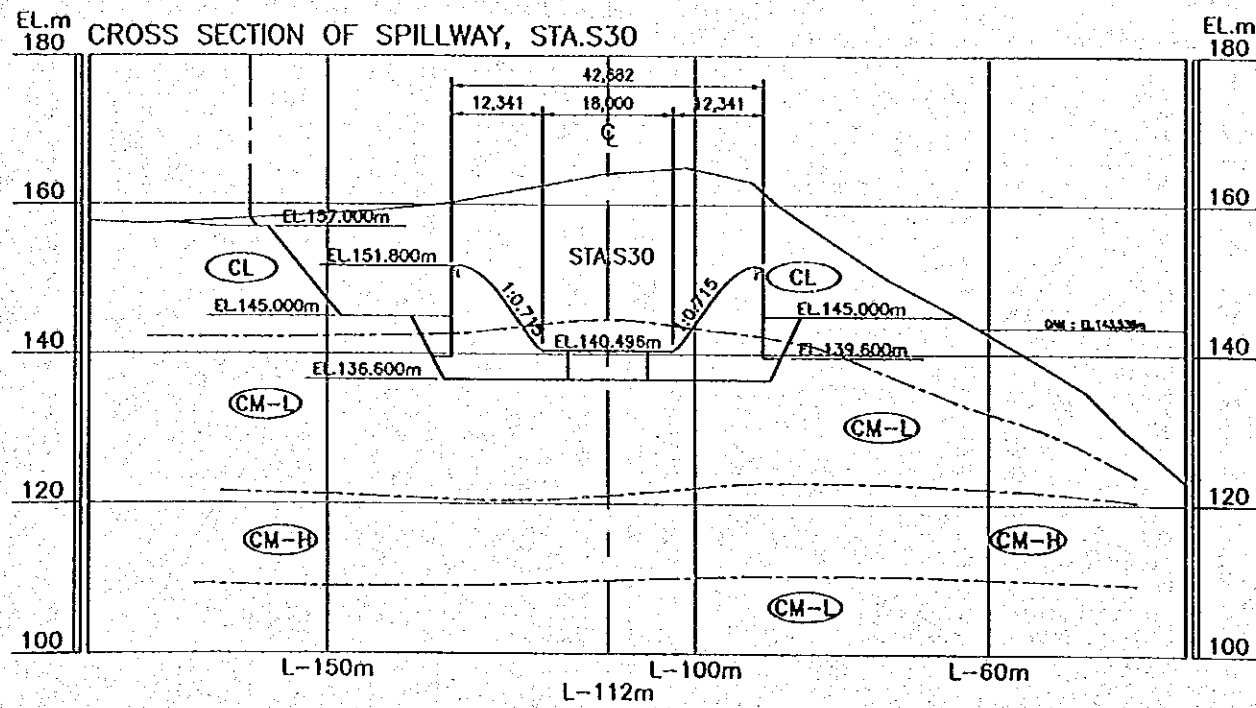
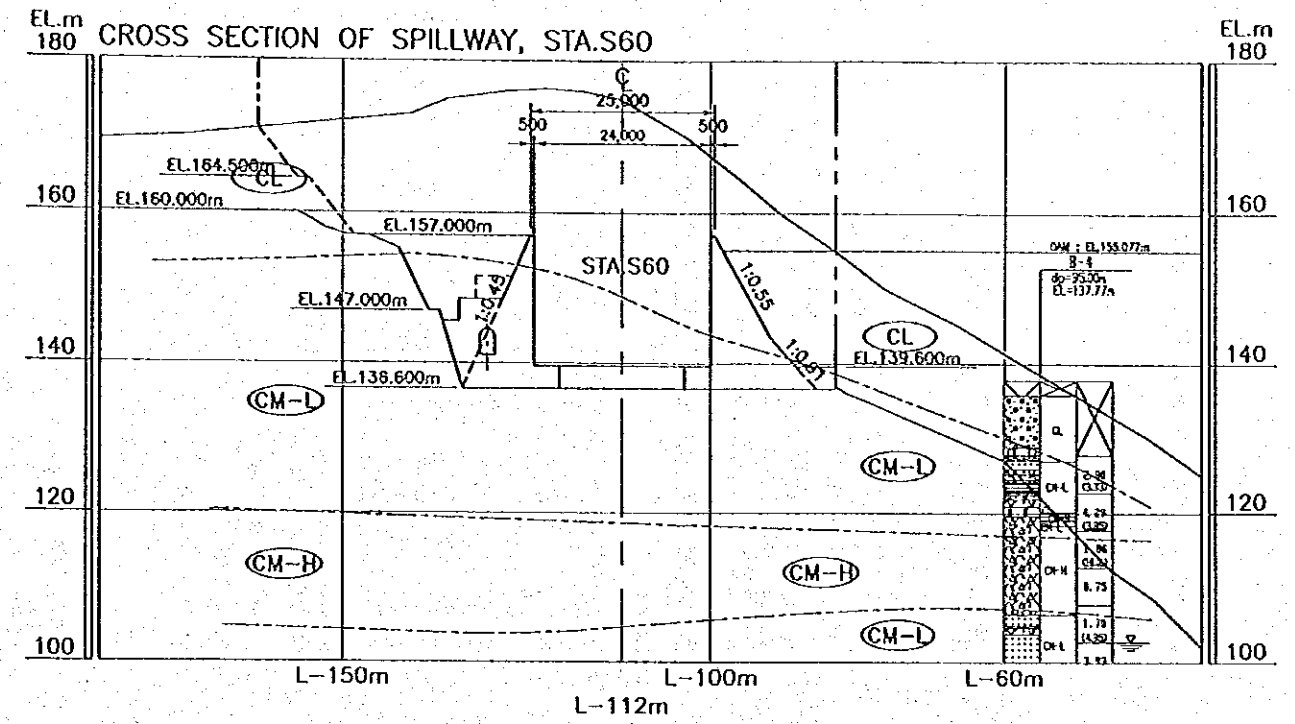
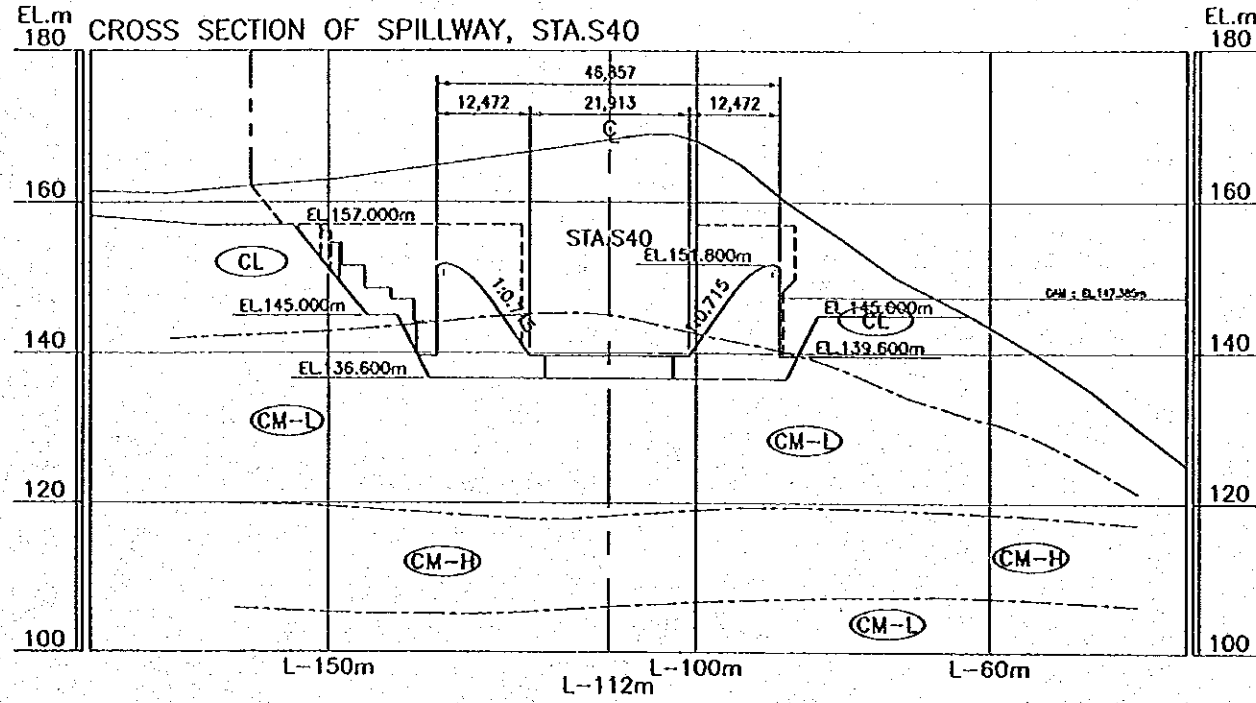
Sta.S	Left Side of Spillway			Right Side of Spillway		
	Area [m <sup>2</sup> ]	Ave. Area [m <sup>2</sup> ]	Volume [m <sup>3</sup> ]	Area [m <sup>2</sup> ]	Ave. Area [m <sup>2</sup> ]	Volume [m <sup>3</sup> ]
-20						
-10						
0						
10	0.0			0.0		
20	32.4	16.2	162.0	32.4	16.2	162.0
30	21.2	26.8	268.0	21.2	26.8	268.0
40	15.0	18.1	181.0	21.2	21.2	212.0
50	151.3	83.2	831.5	22.6	21.9	219.0
60	137.9	144.6	1,446.0	0.0	11.3	113.0
70	177.7	157.8	1,578.0			
80-1	177.7	177.7	1,777.0			
80-2	177.7	177.7	1,777.0			
90	111.4	144.6	1,445.5	0.0		
100	52.0	81.7	817.0	1.2	0.6	6.0
110	26.3	39.2	391.5	8.0	4.6	46.0
120	11.0	18.7	186.5	8.8	8.4	84.0
130	3.5	7.3	72.5	1.4	5.1	51.0
140	3.5	3.5	35.0	3.5	2.5	24.5
150	3.5	3.5	35.0	3.5	3.5	35.0
160	3.5	3.5	35.0	3.5	3.5	35.0
170	3.5	3.5	35.0	3.5	3.5	35.0
180	4.1	3.8	38.0	4.1	3.8	38.0
190	2.1	3.1	31.0	2.1	3.1	31.0
200	1.4	1.8	17.5	1.4	1.8	17.5
210	1.4	1.4	14.0	1.4	1.4	14.0
220	1.4	1.4	14.0	1.4	1.4	14.0
230	1.8	1.6	16.0	1.8	1.6	16.0
240	18.4	10.1	101.0	0.0	0.9	9.0
250	65.6	42.0	420.0	19.0	9.5	95.0
260	93.9	79.8	797.5	5.0	12.0	120.0
270	93.9	93.9	939.0	3.2	4.1	41.0
280	93.9	93.9	939.0	3.8	3.5	35.0
290	93.9	93.9	939.0	0.0	1.9	19.0
300	88.6	91.3	912.5			
310	45.5	67.1	670.5	0.0		
320	0.4	23.0	229.5	36.8	18.4	184.0
330	0.0	0.2	2.0	0.0	18.4	184.0
<b>Total</b>			<b>17,154.0</b>			<b>2,108.0</b>
				<b>Grand Total :</b>		<b>19,262.0</b>

**Stripping Top Soil Area of Spillway**

Sta.S	Length [m]	Ave. Length [m]	Area [m <sup>2</sup> ]
-20	0.00	-	-
-10	36.05	18.03	180.25
0	56.98	46.51	465.13
10	95.23	76.10	761.04
20	100.11	97.67	976.74
30	102.91	101.51	1,015.10
40	105.51	104.21	1,042.07
50	101.34	103.42	1,034.23
60	85.19	93.27	932.66
70	88.19	86.69	866.92
80-1	85.12	86.66	866.57
80-2	85.57	85.34	853.45
90	76.29	80.93	809.28
100	64.48	70.39	703.85
110	62.38	63.43	634.32
120	63.73	63.05	630.55
130	68.78	66.25	662.54
140	71.82	70.30	703.01
150	72.94	72.38	723.79
160	70.26	71.60	716.00
170	73.34	71.80	717.99
180	74.81	74.07	740.74
190	76.69	75.75	757.52
200	78.98	77.84	778.35
210	81.23	80.11	801.06
220	80.76	81.00	809.99
230	82.44	81.60	816.01
240	92.56	87.50	875.00
250	97.51	95.04	950.38
260	95.24	96.38	963.77
270	89.85	92.54	925.44
280	85.78	87.81	878.14
290	82.54	84.16	841.60
300	95.08	88.81	888.08
310	103.26	99.17	991.71
320	118.79	111.03	1,110.26
330	122.05	120.42	1,204.17
340	97.92	109.98	1,099.85
350	25.48	61.70	617.04
360	4.35	14.92	149.18
370	0.00	2.18	21.76
<b>Total</b>			<b>31,515.47</b>

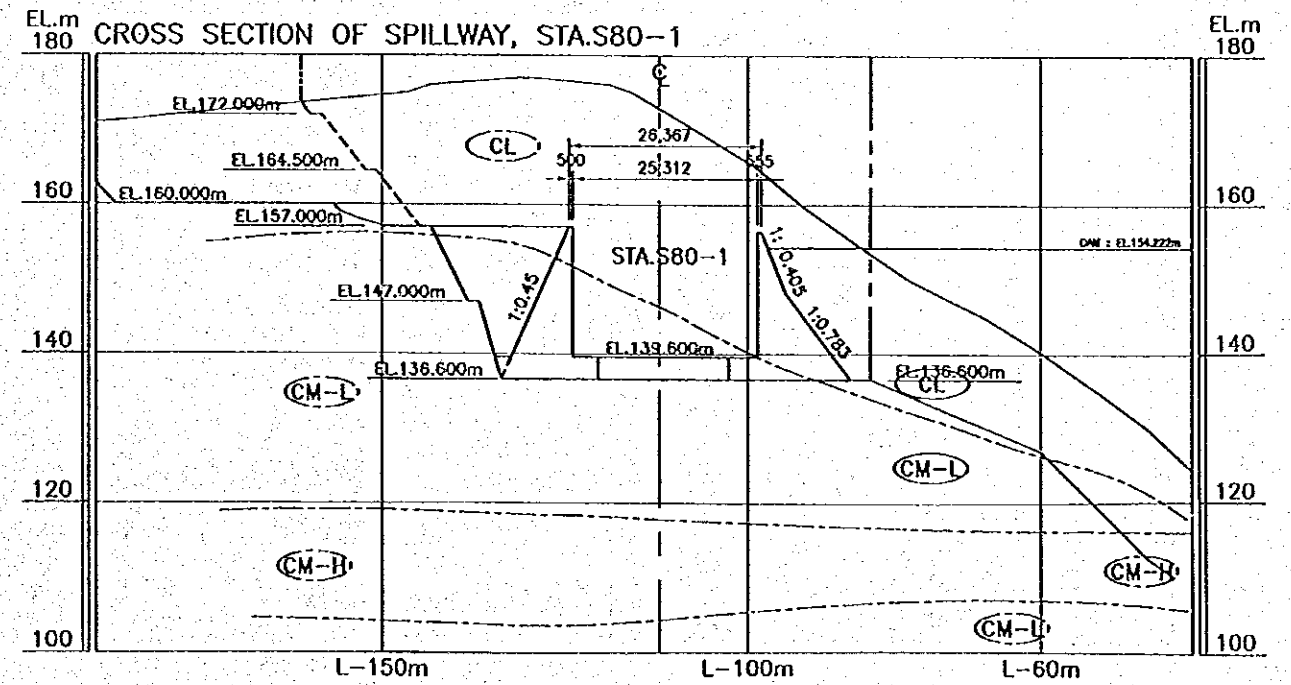
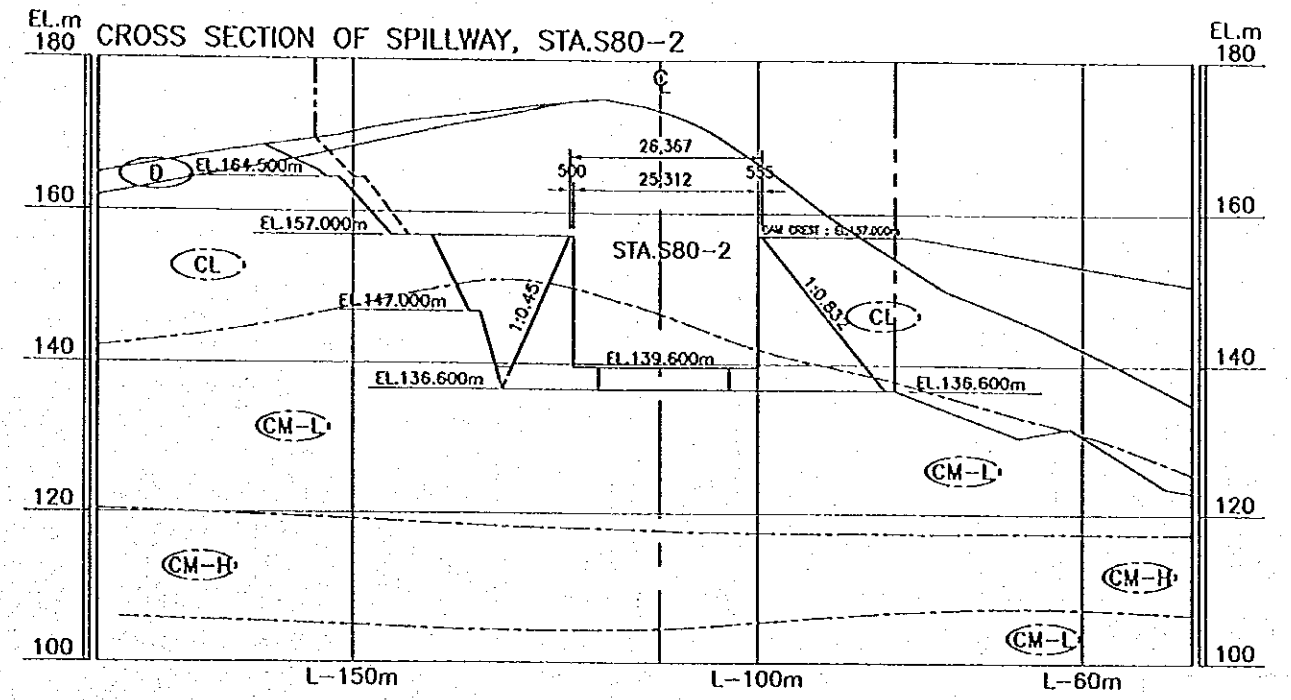
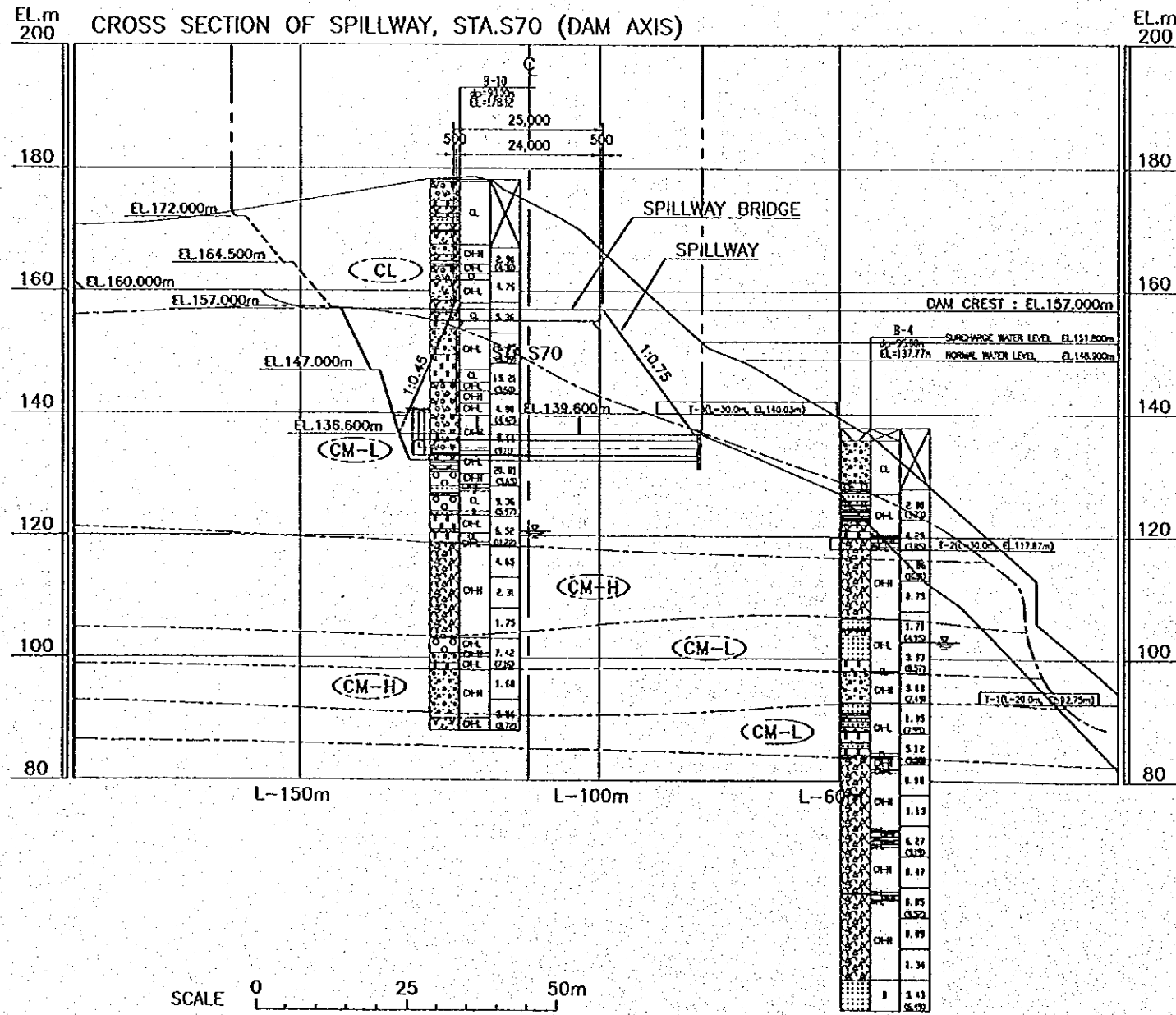


CROSS SECTIONS OF SPILLWAY (2/10)

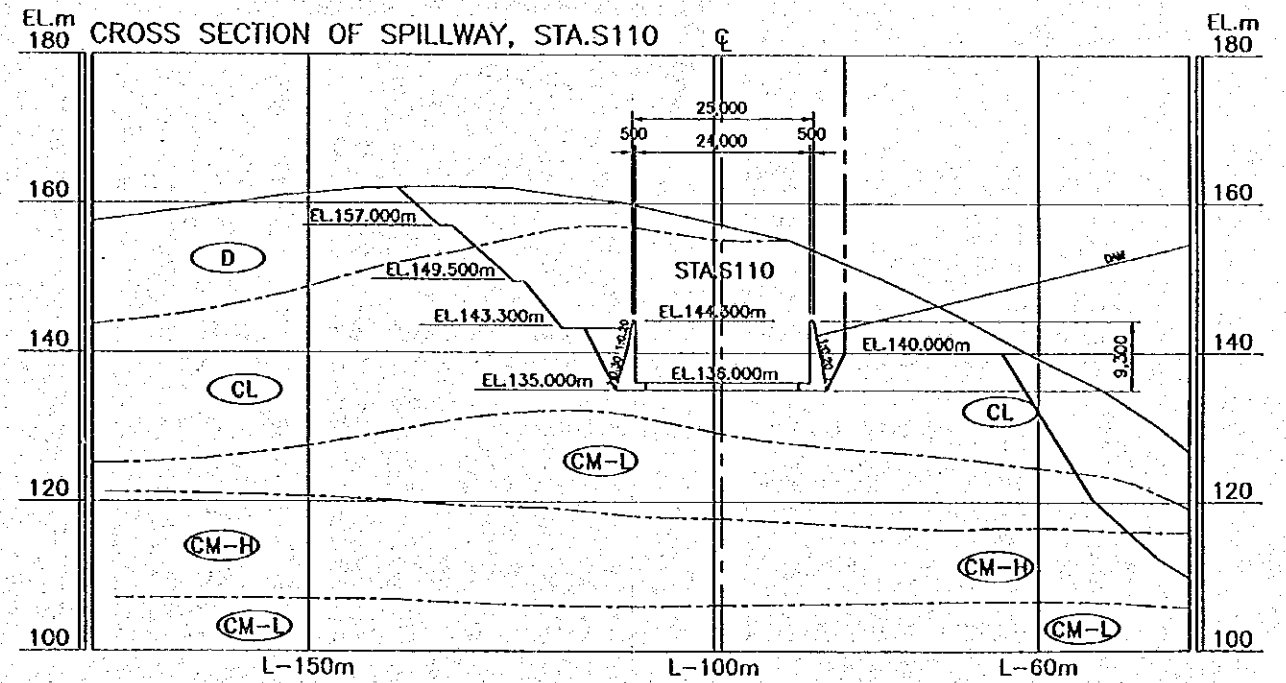
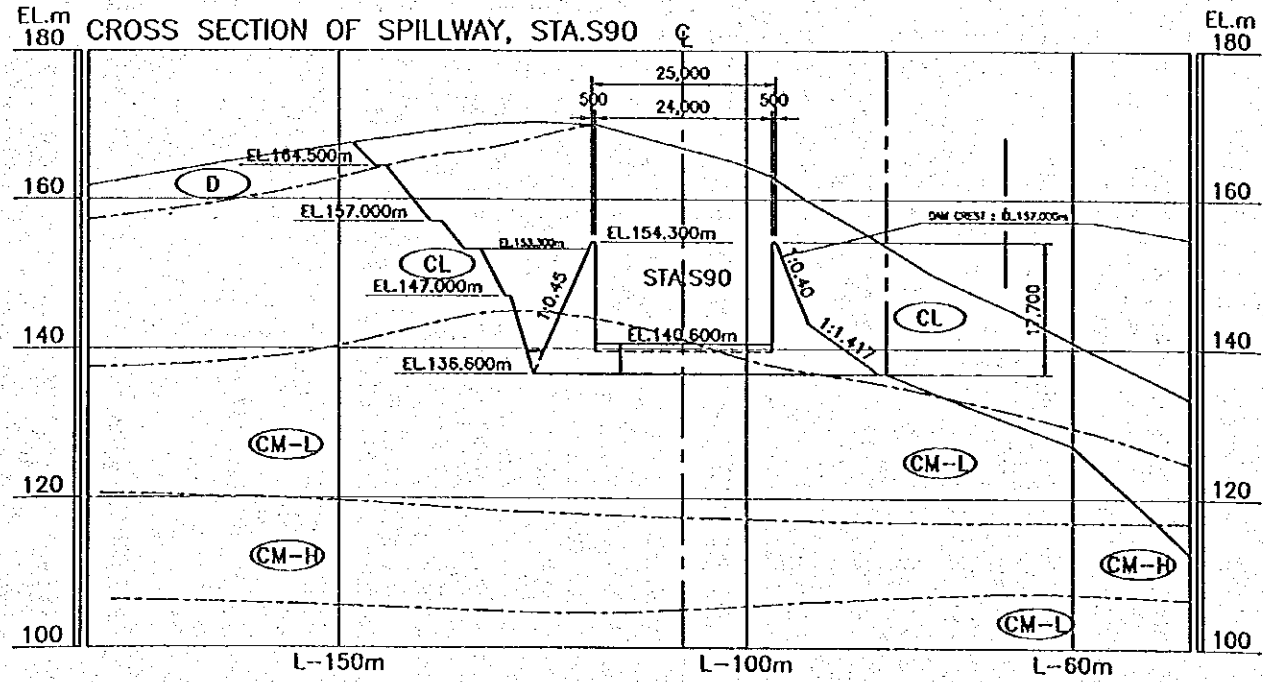
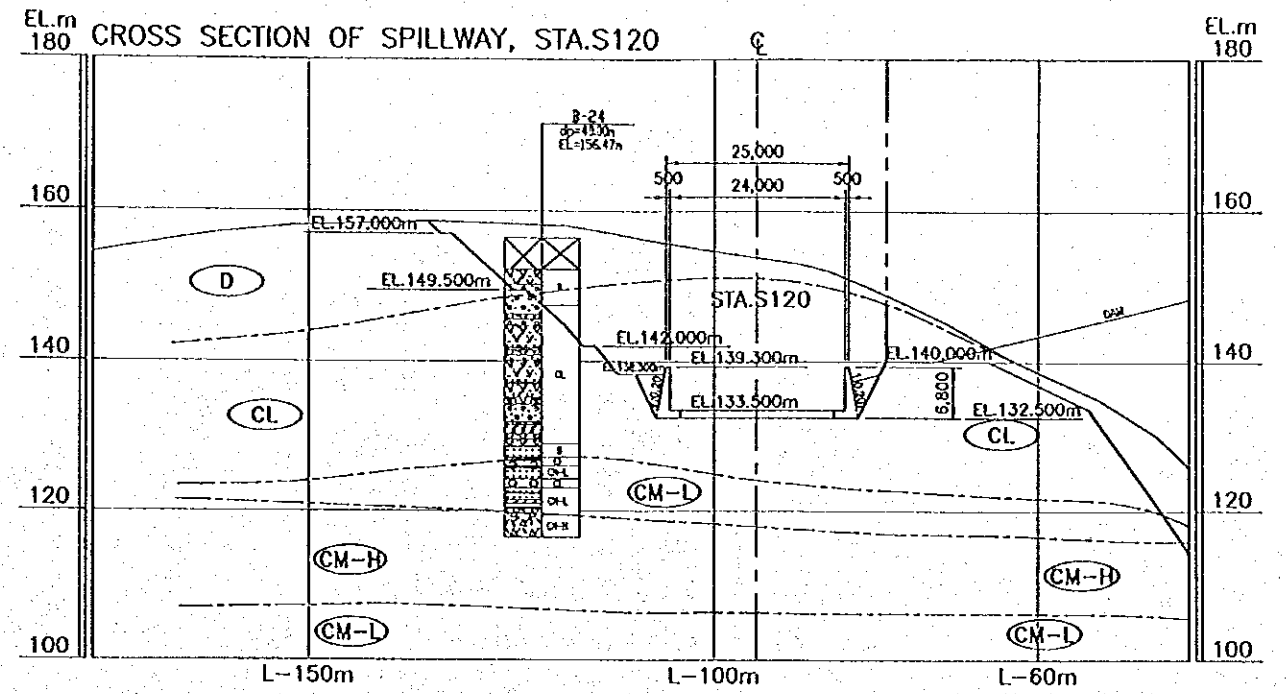
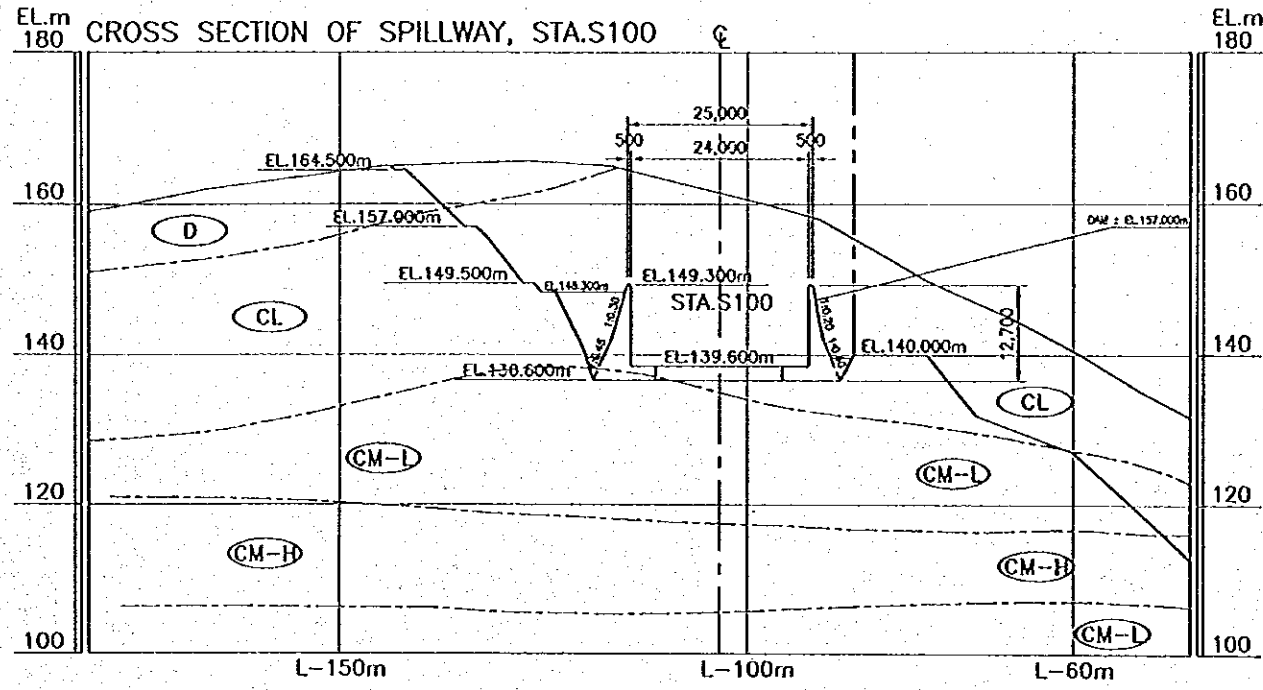


SCALE 0 25 50m

CROSS SECTIONS OF SPILLWAY (3/10)

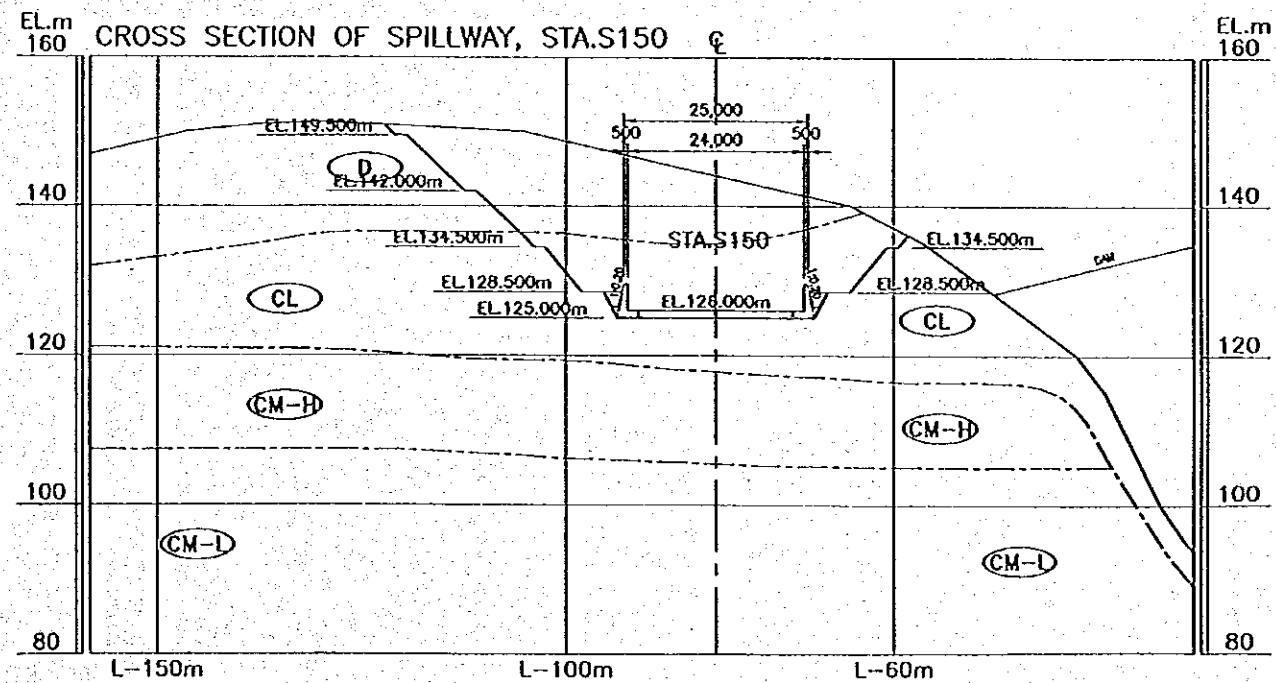
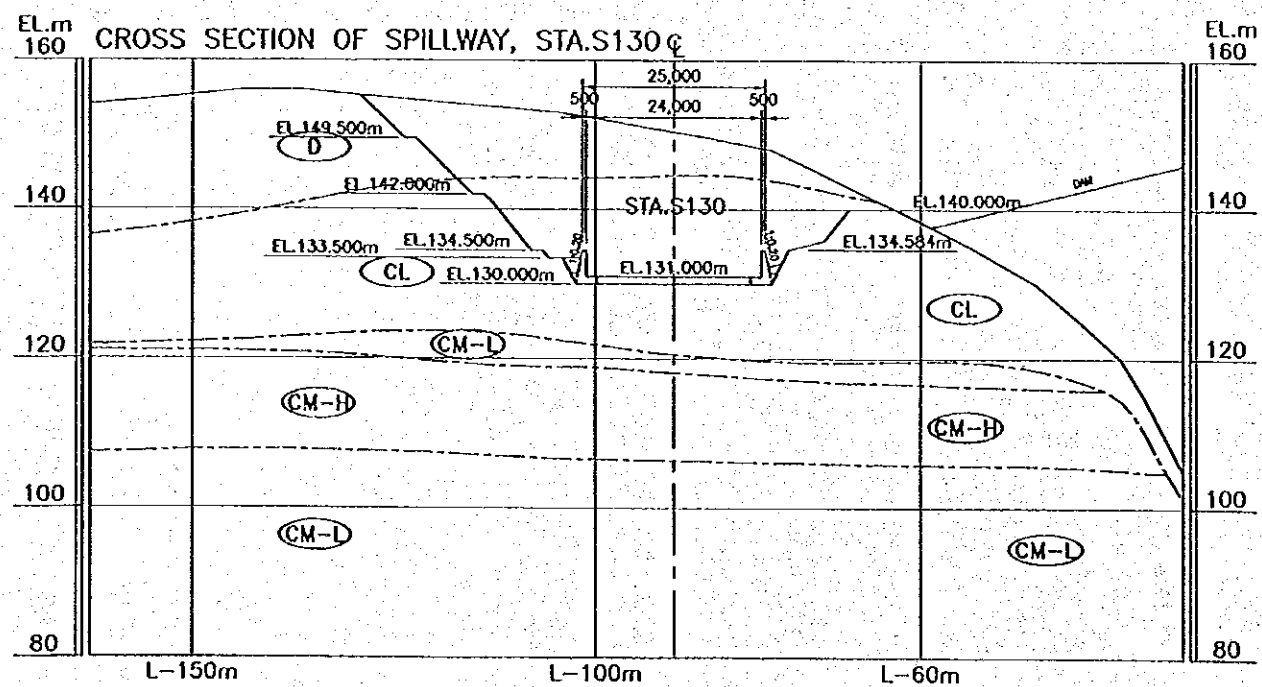
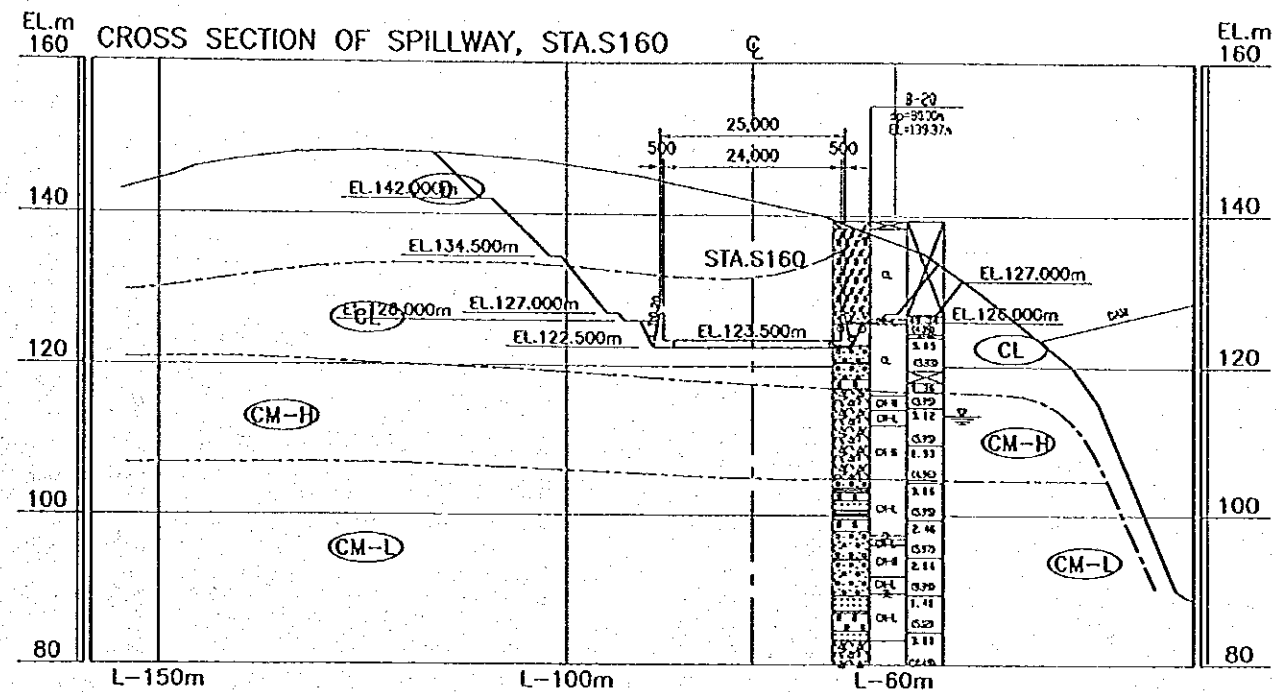
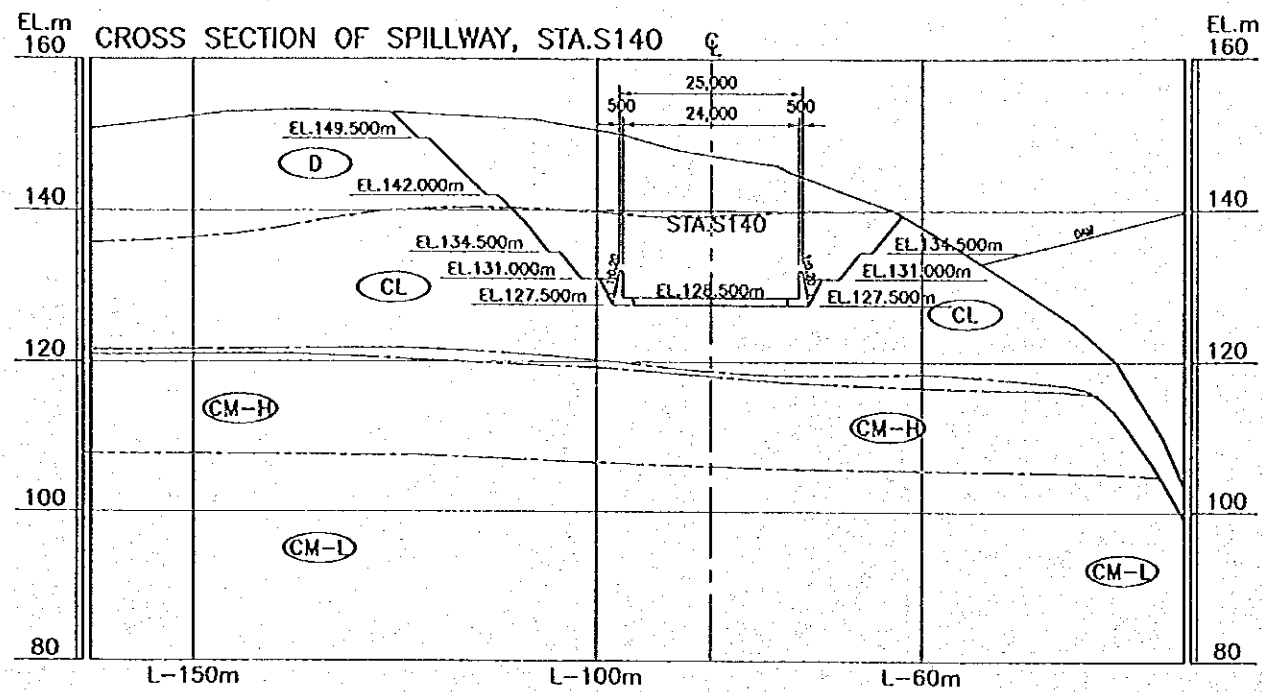


### CROSS SECTIONS OF SPILLWAY (4/10)



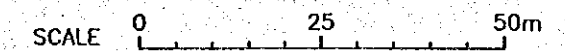
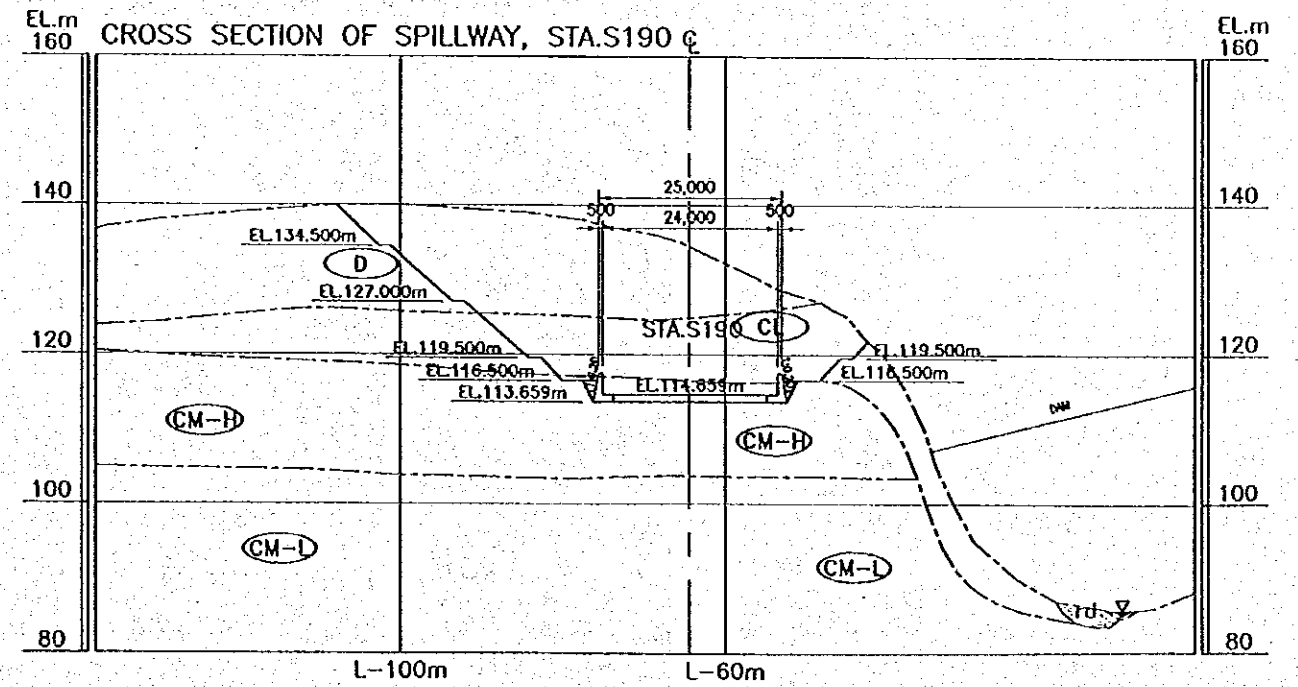
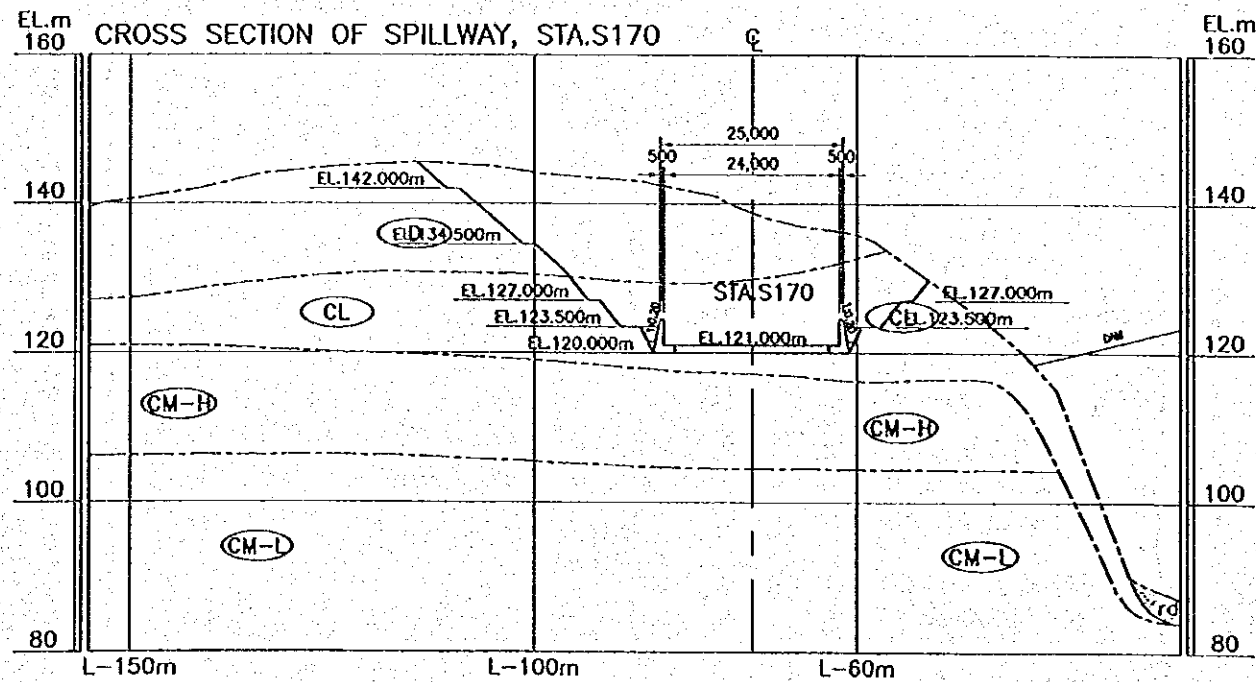
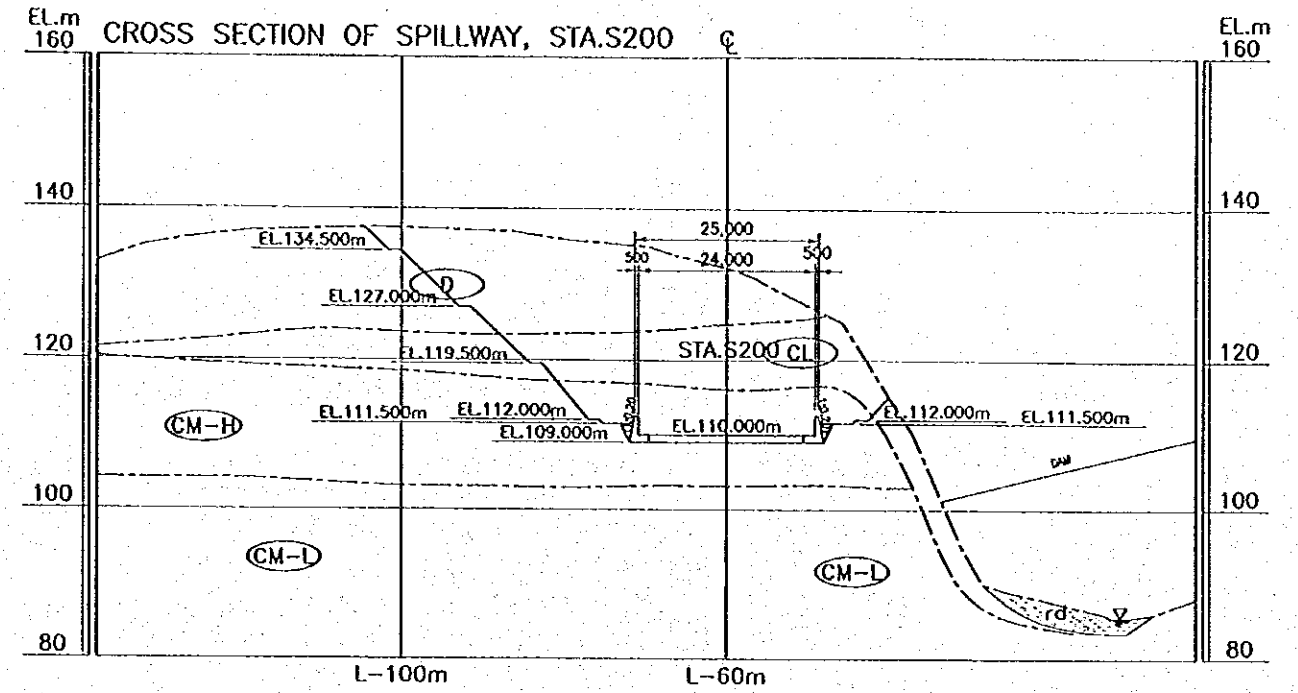
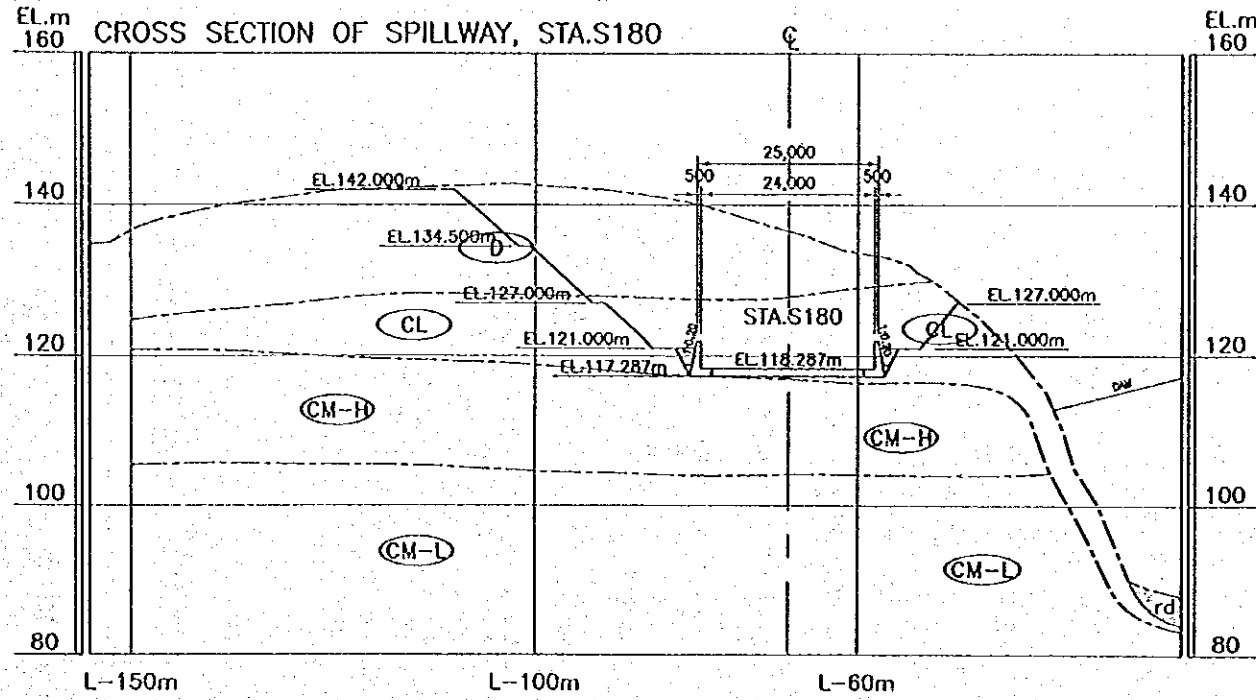
SCALE 0 25 50m

CROSS SECTIONS OF SPILLWAY (5/10)



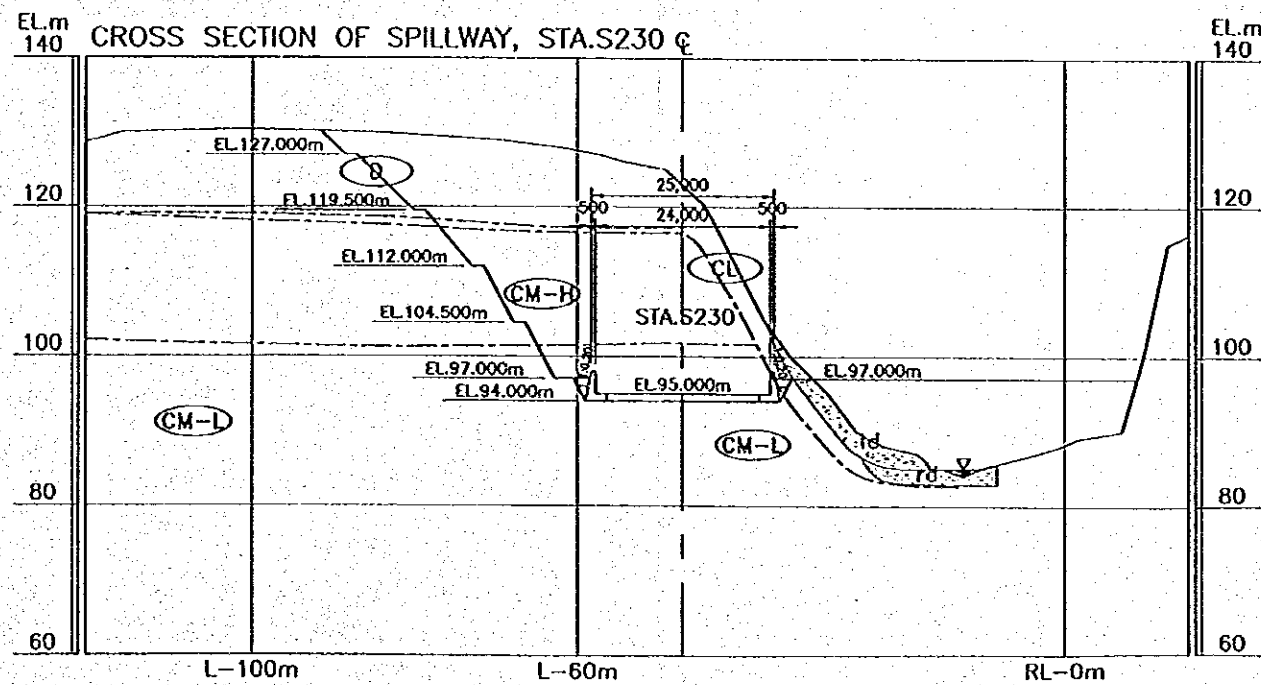
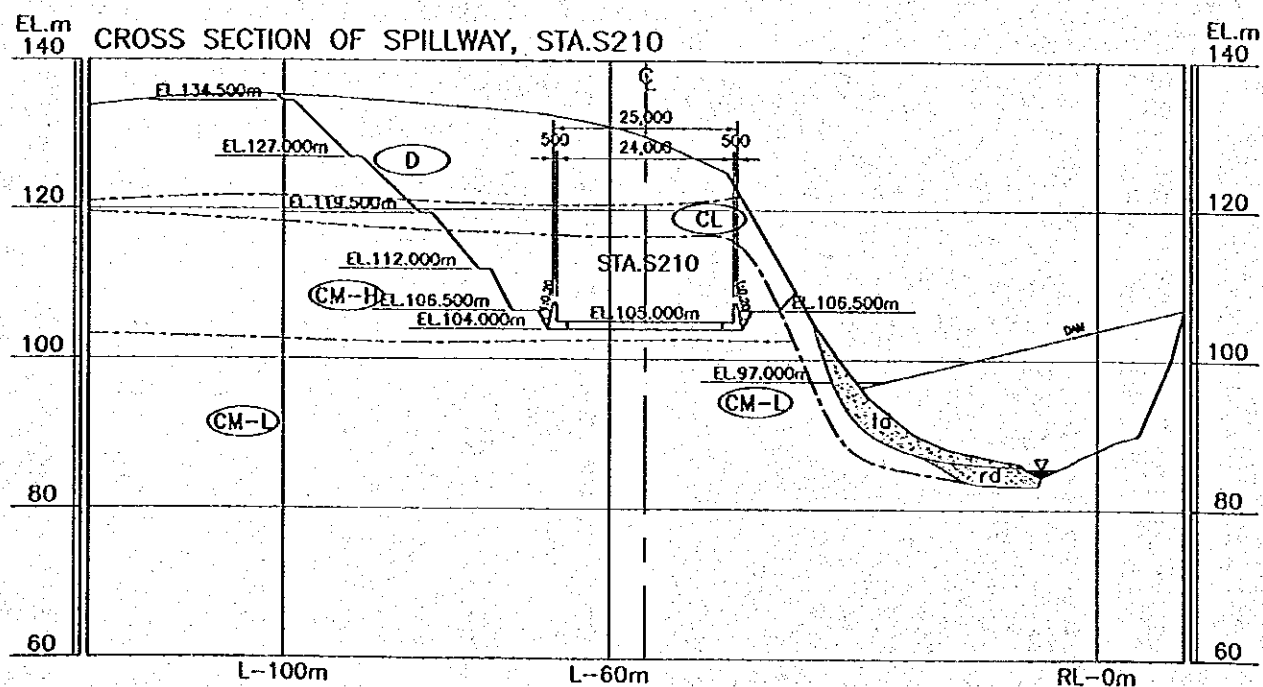
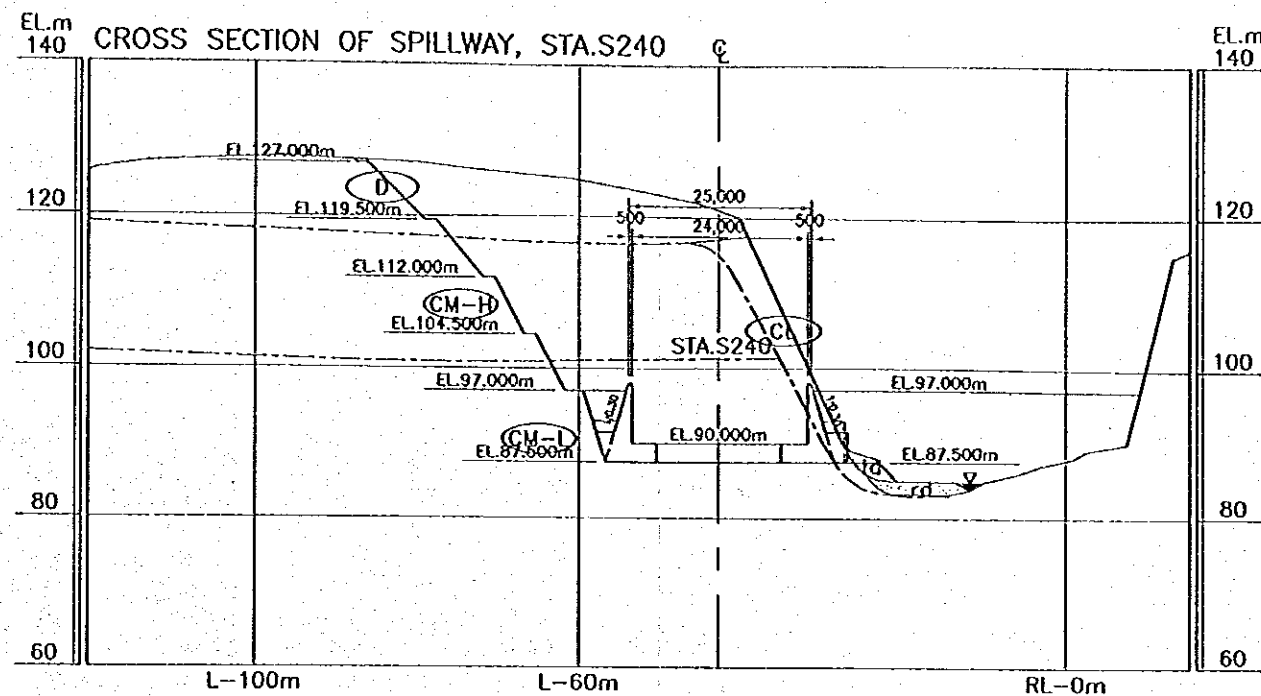
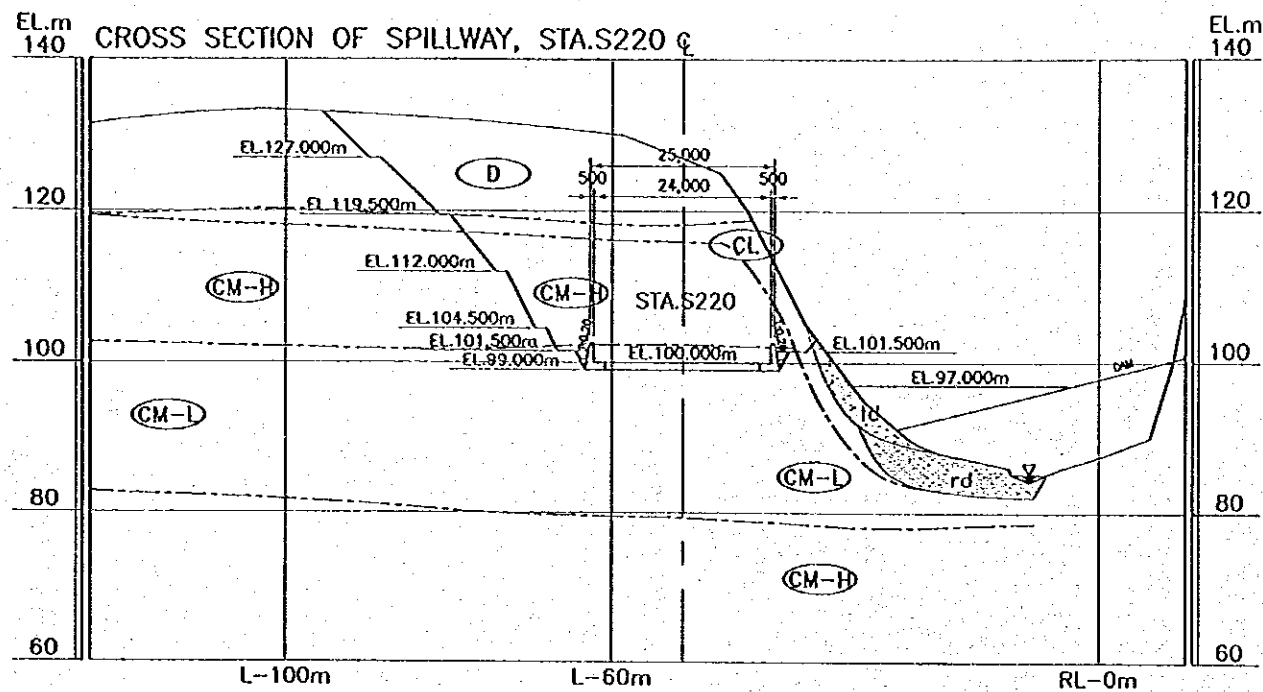


CROSS SECTIONS OF SPILLWAY (6/10)



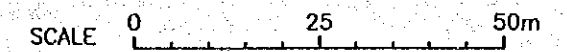
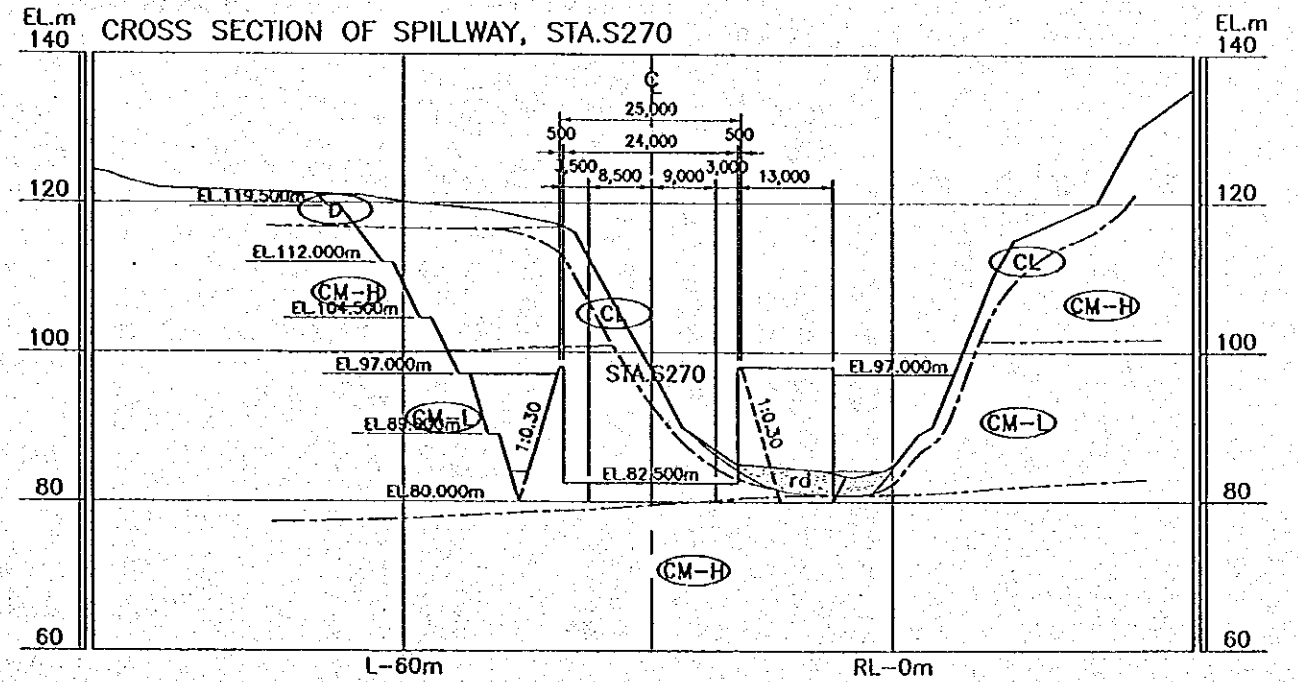
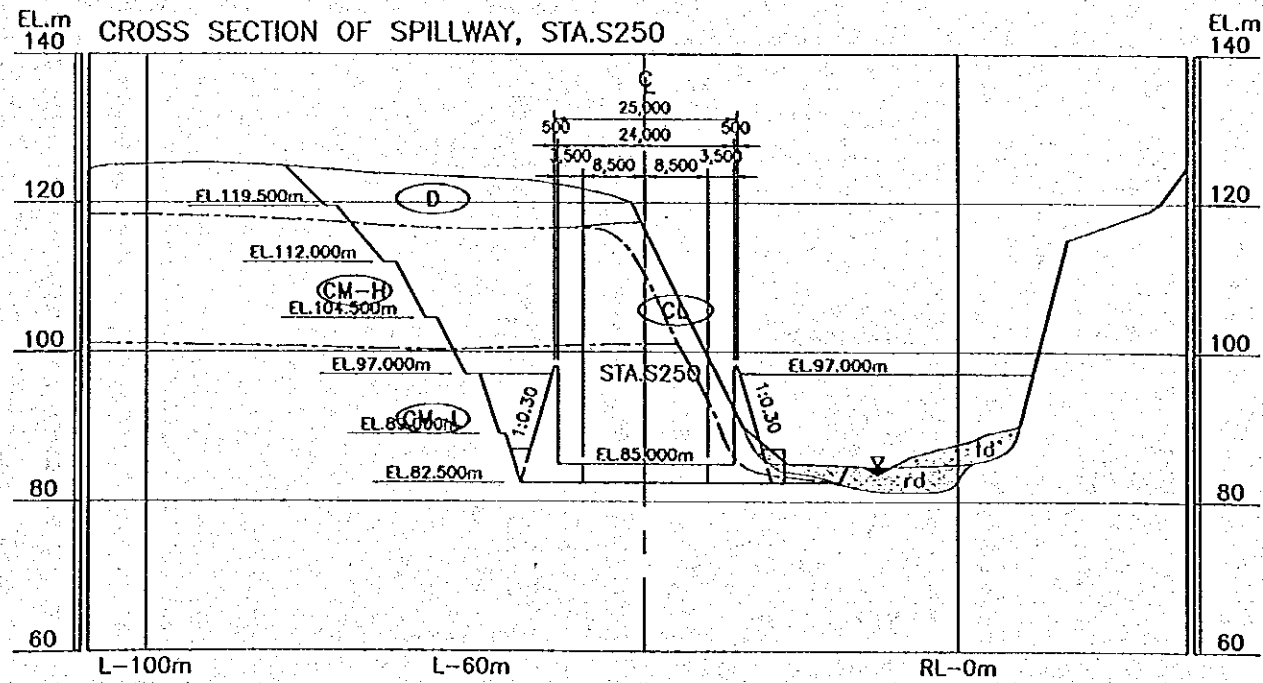
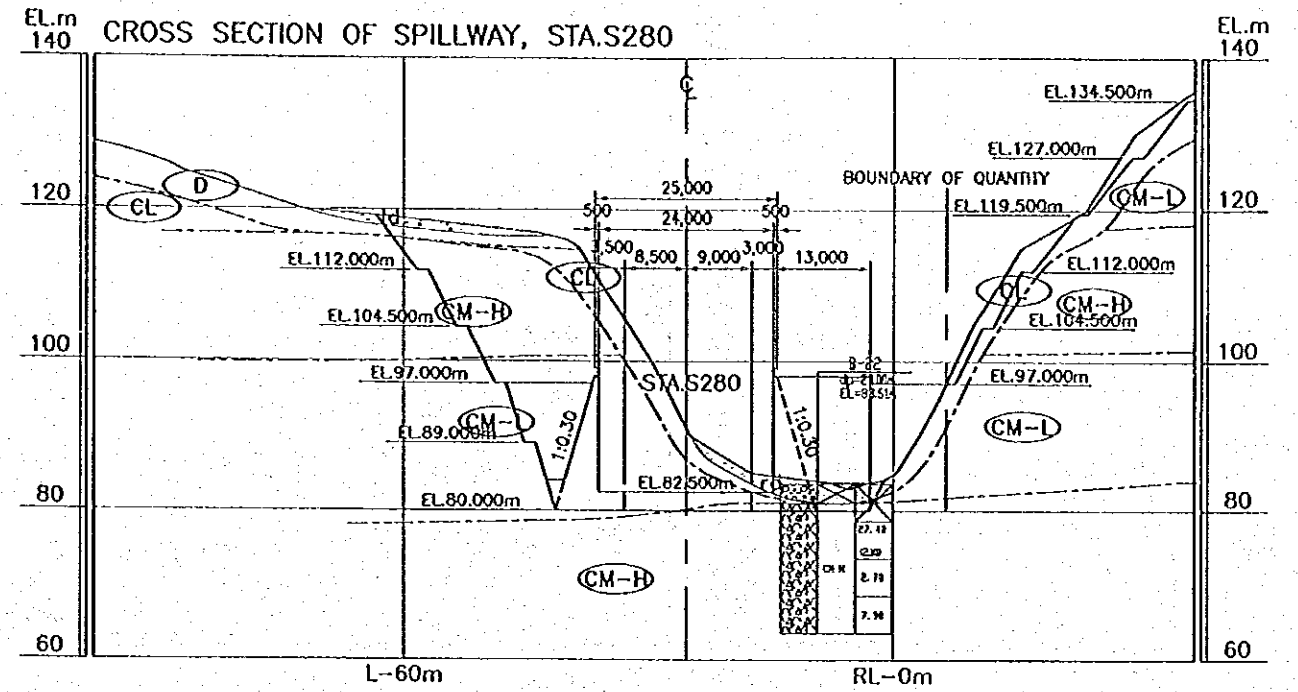
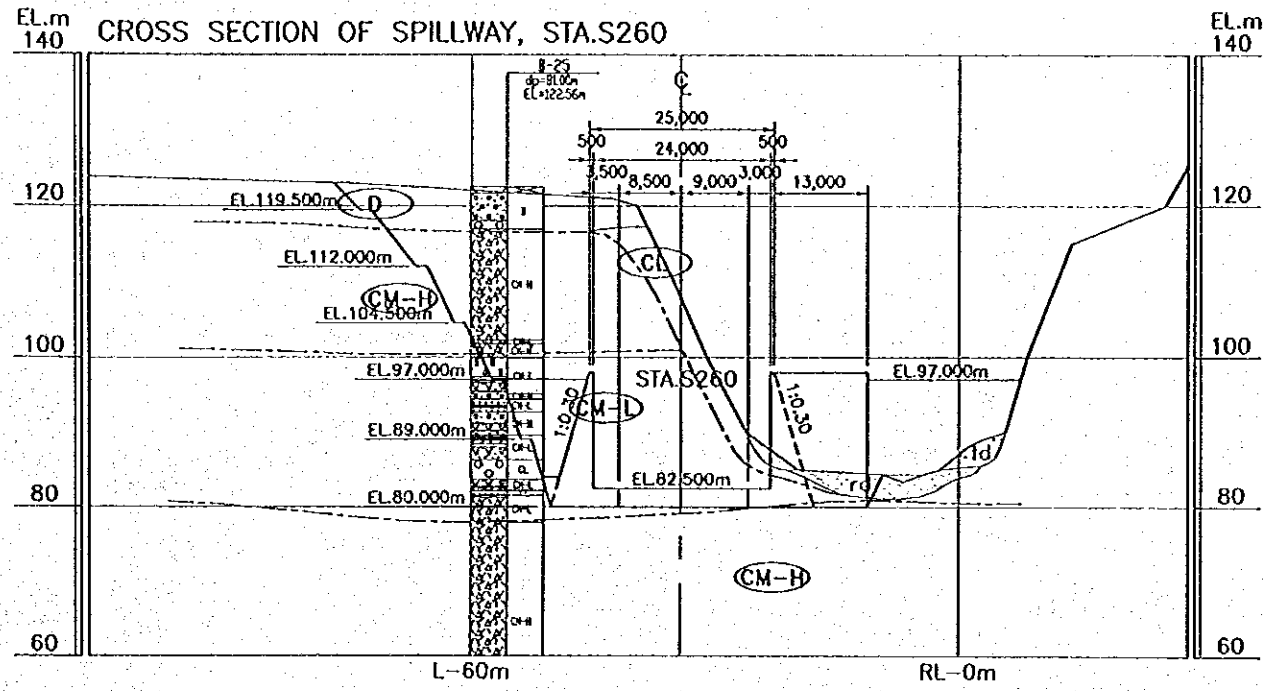


CROSS SECTIONS OF SPILLWAY (7/10)

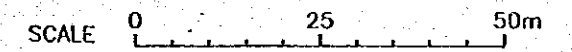
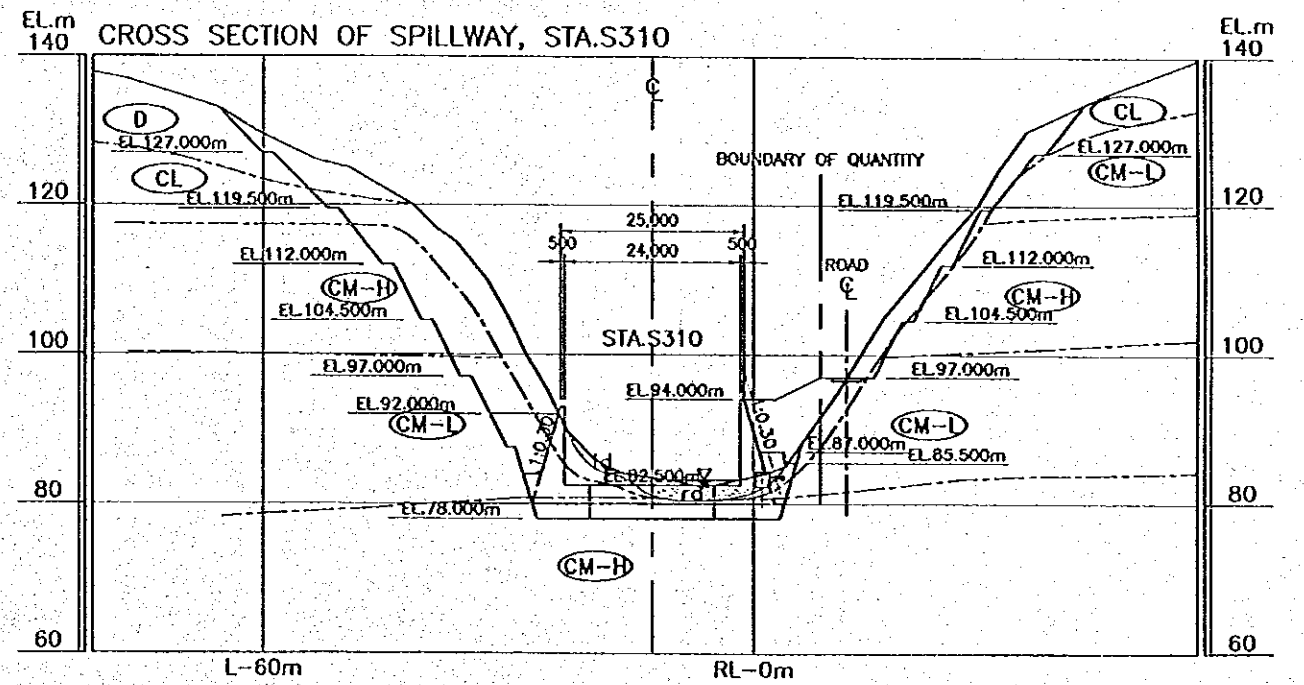
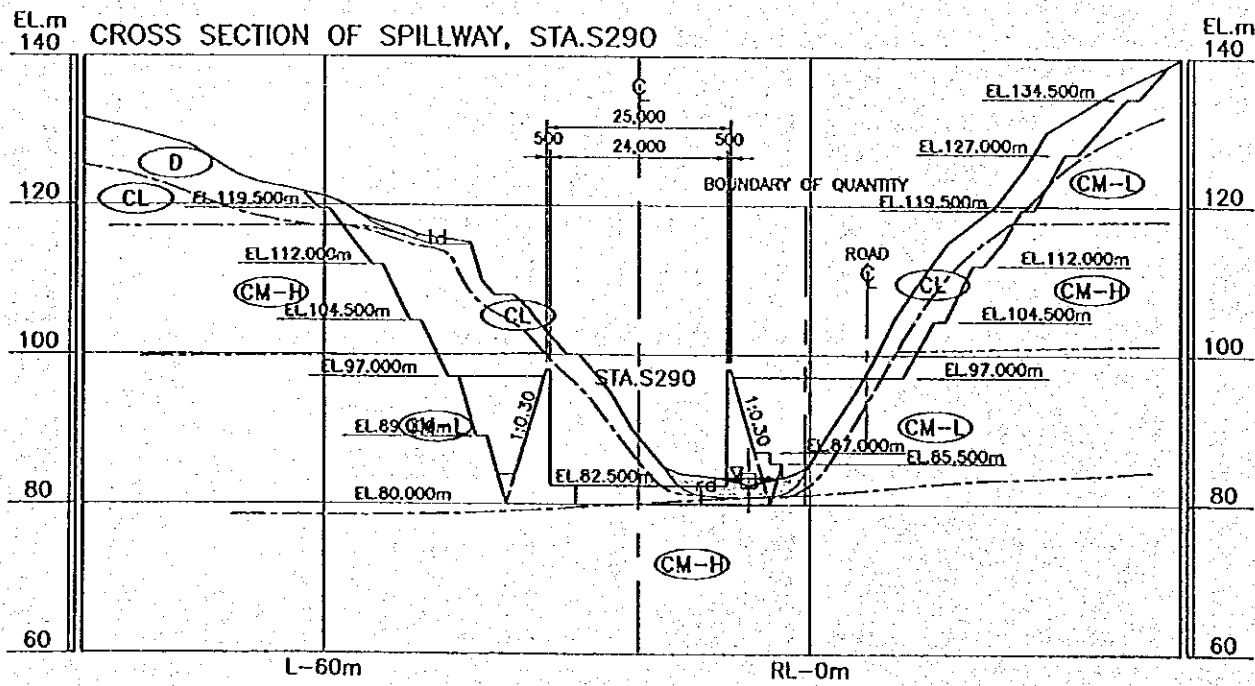
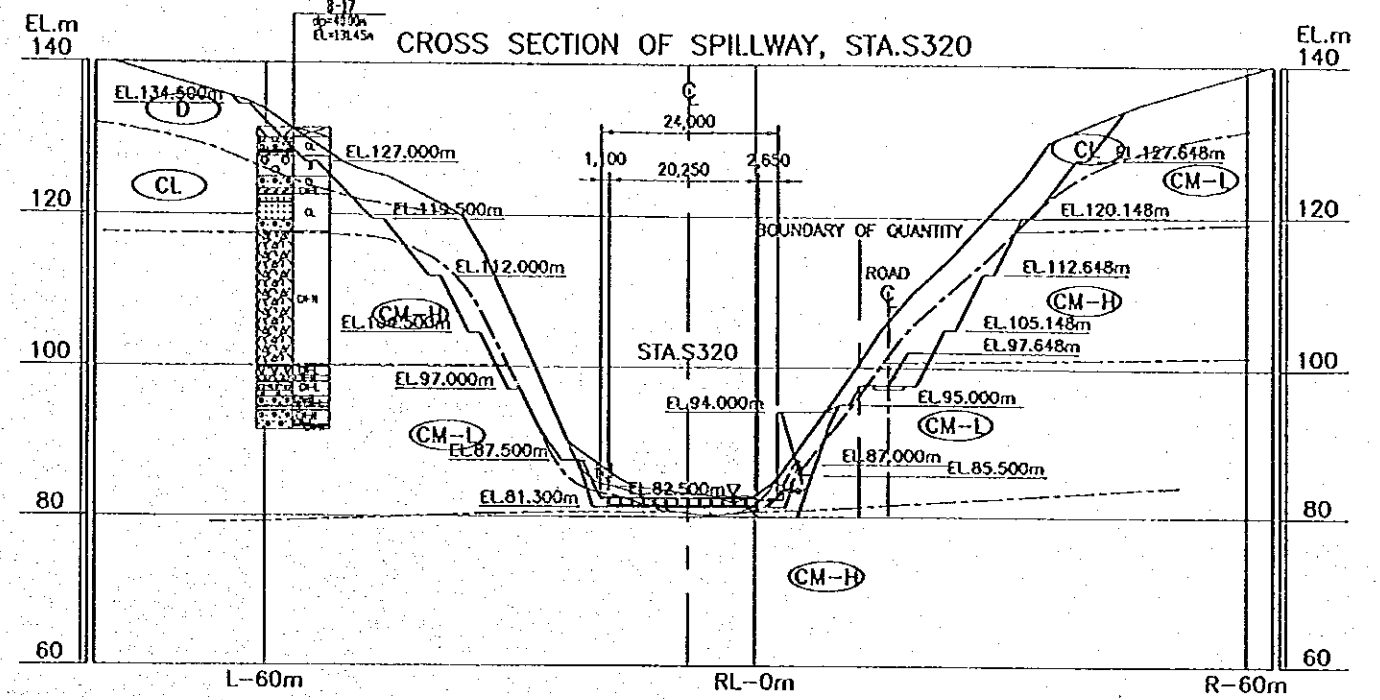
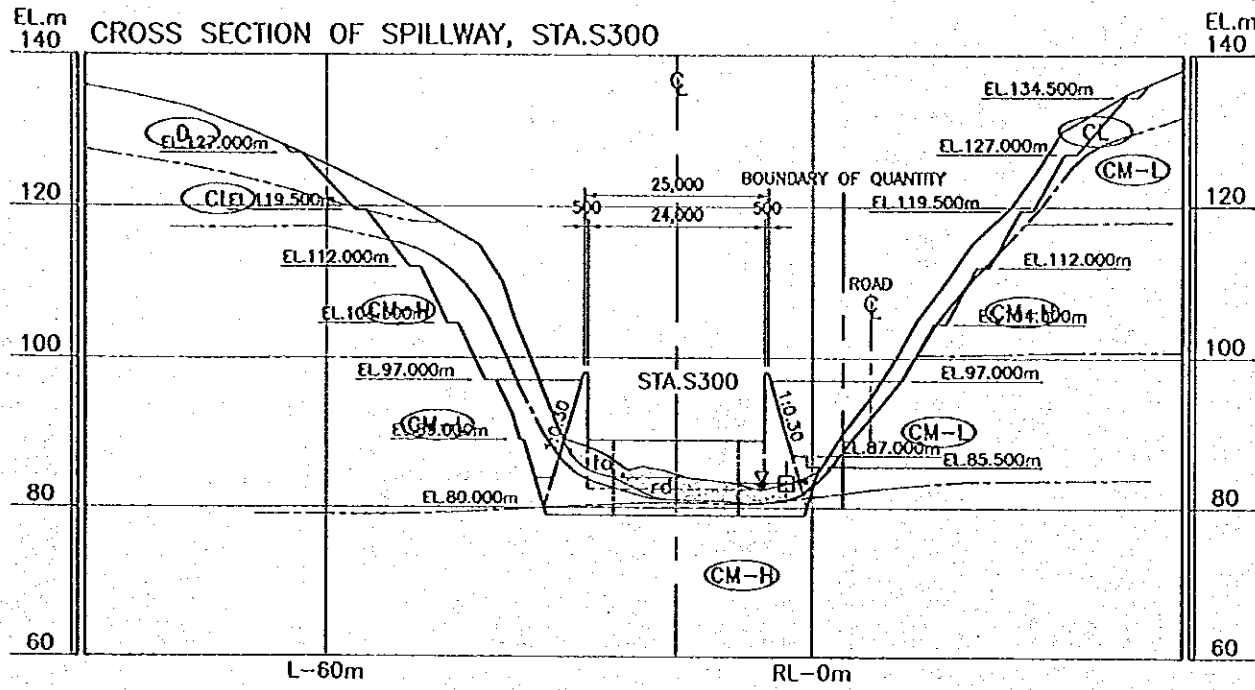


SCALE 0 25 50m

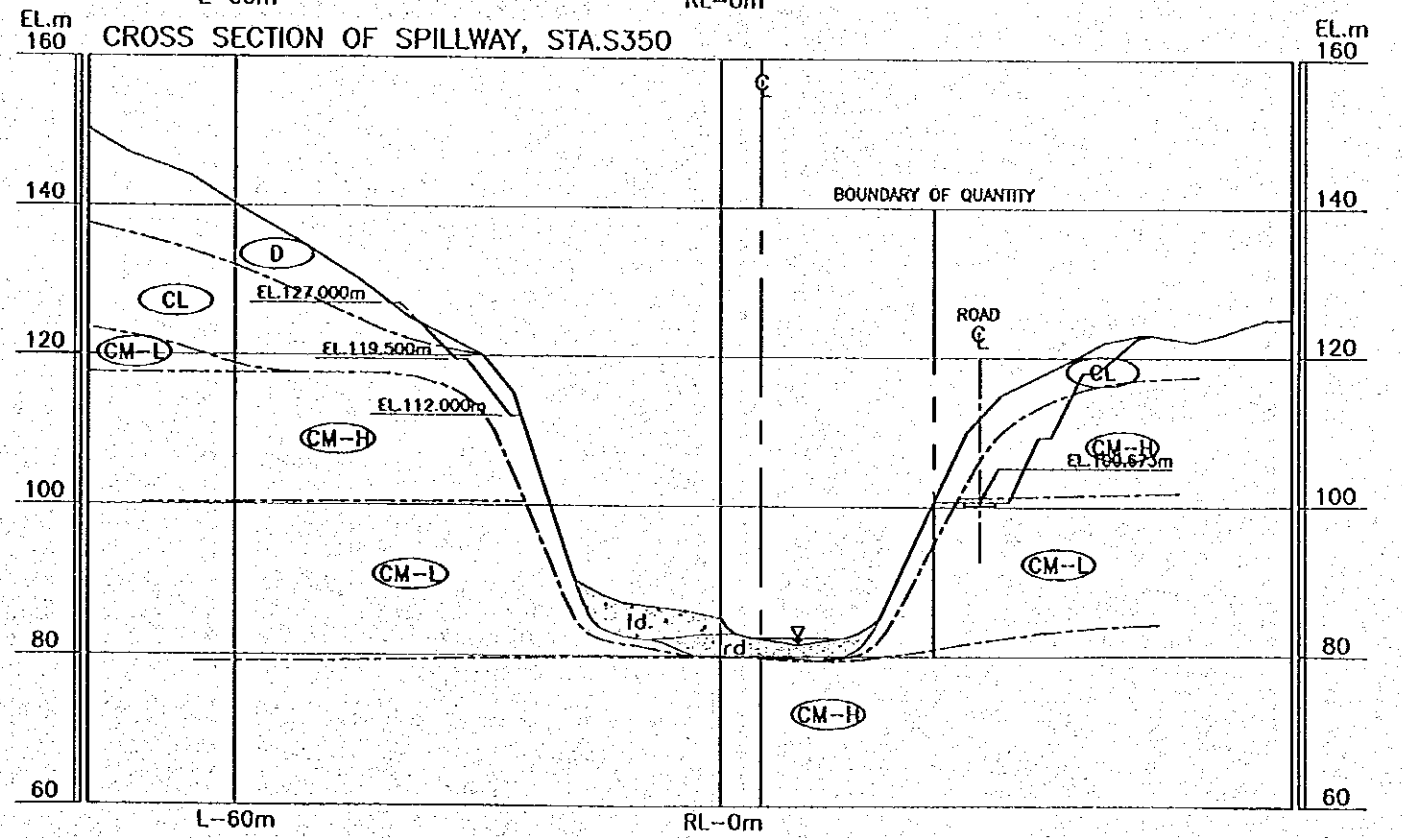
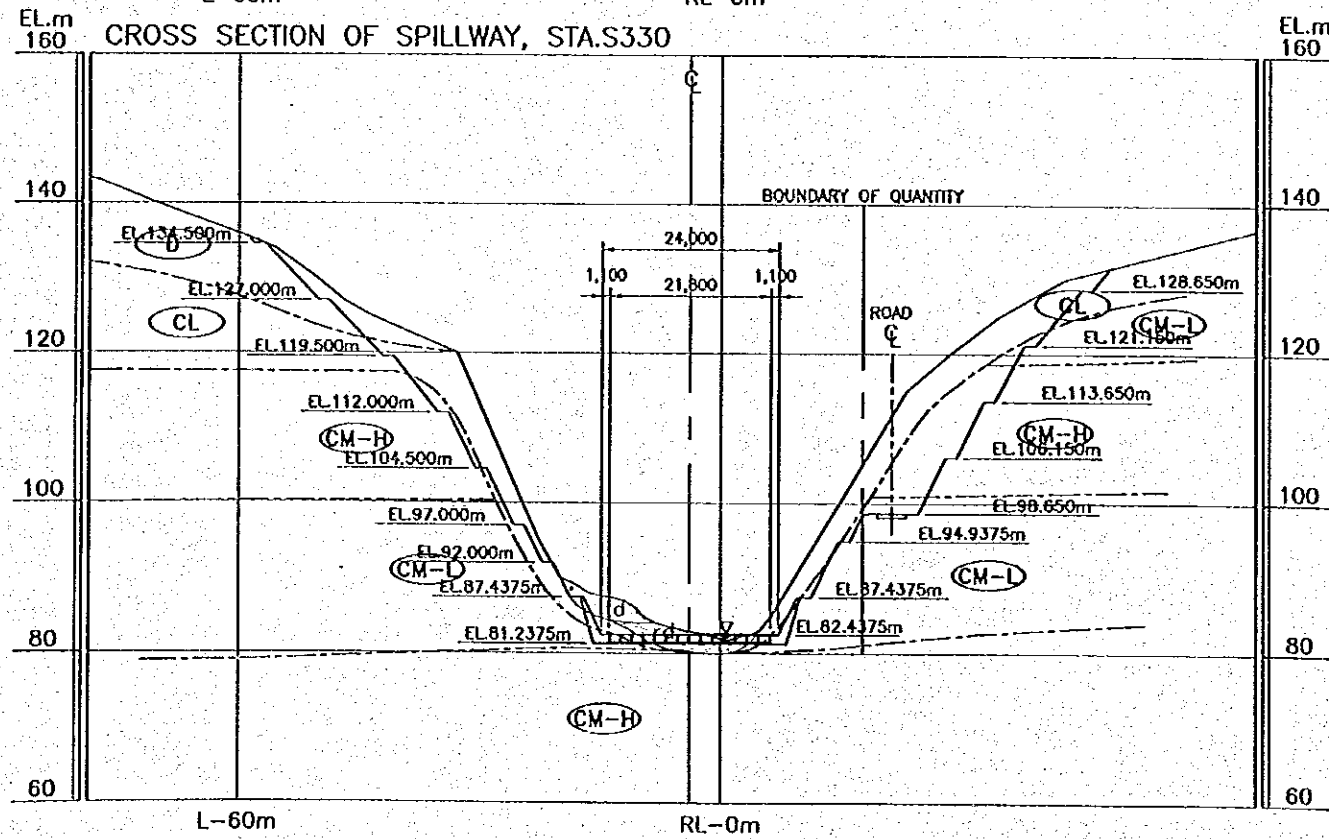
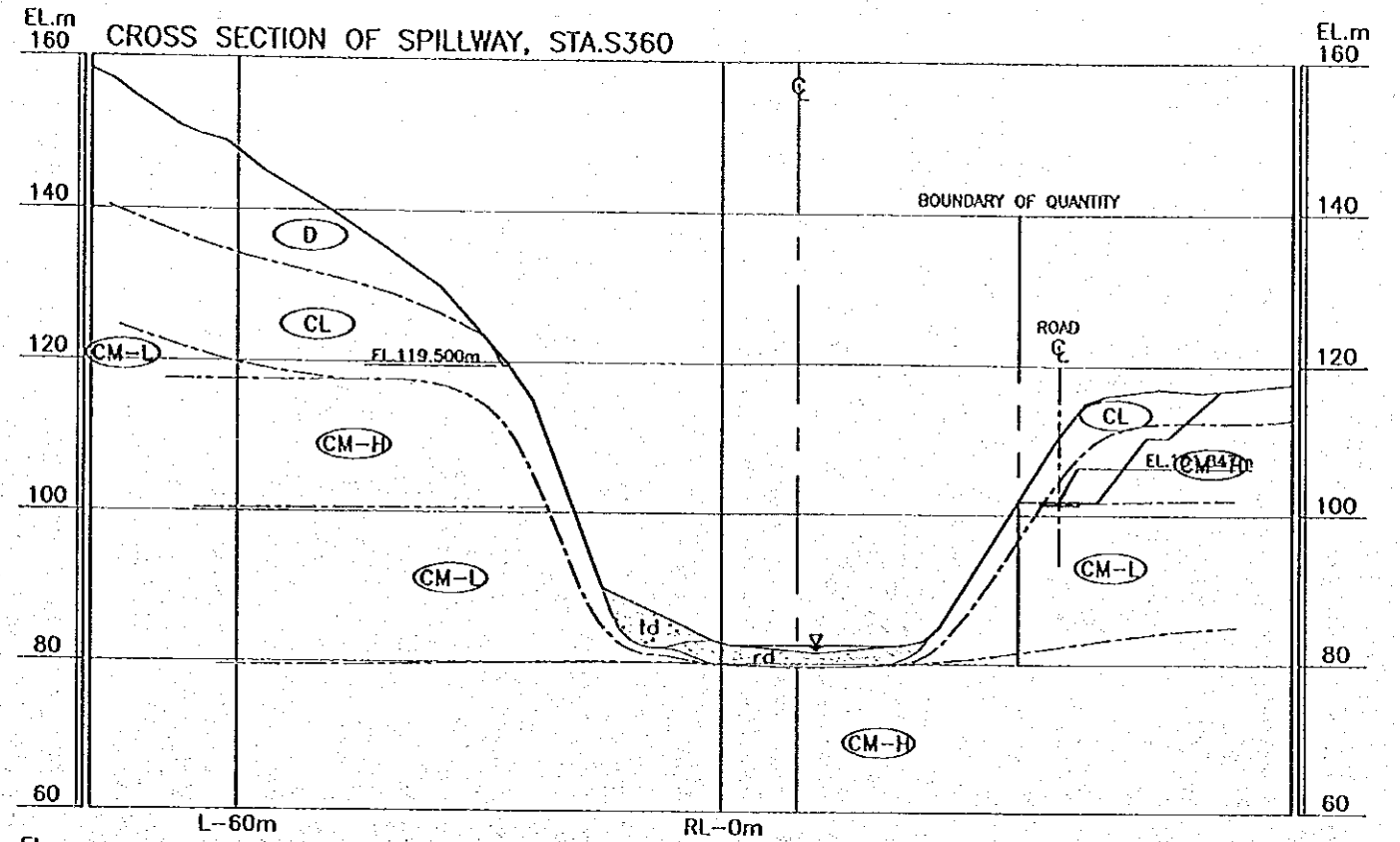
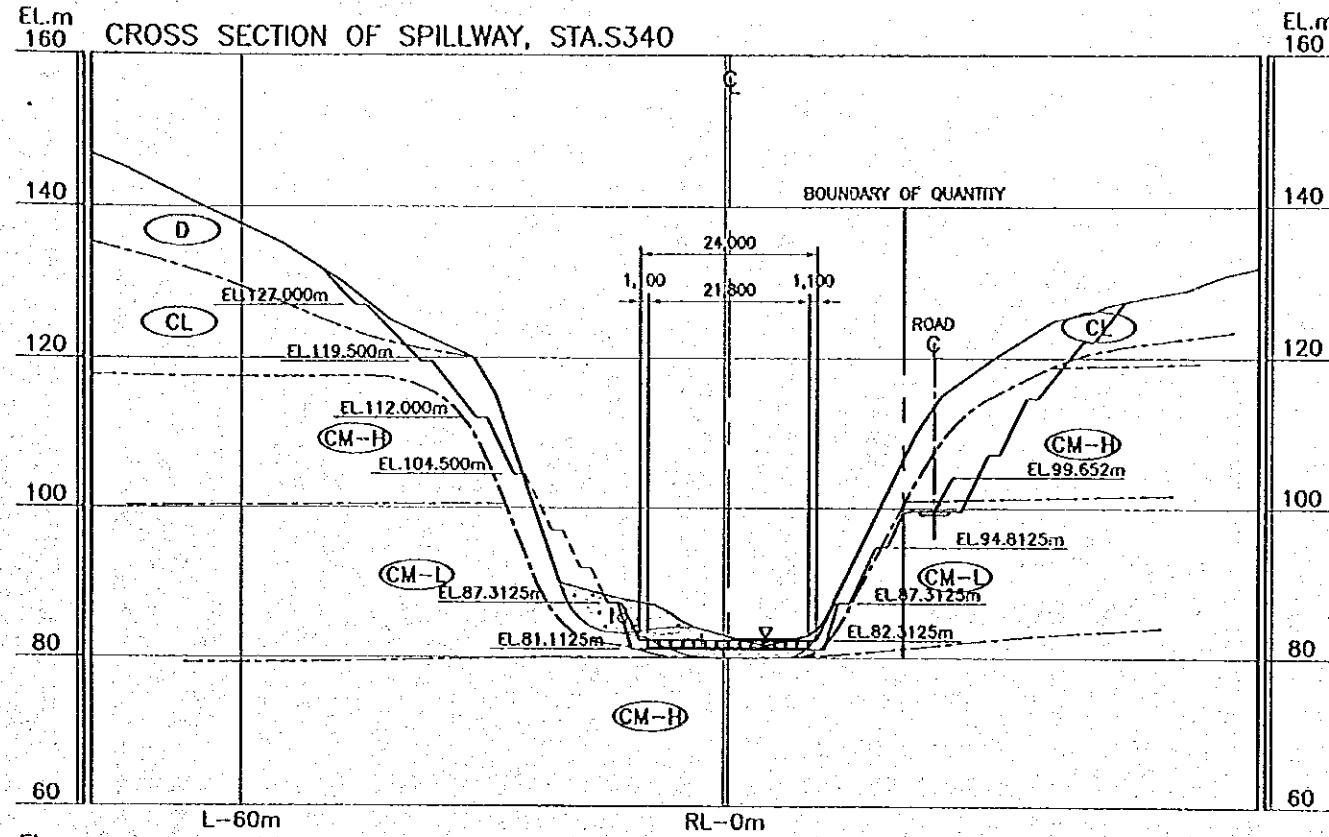
### CROSS SECTIONS OF SPILLWAY (8/10)



### CROSS SECTIONS OF SPILLWAY (9/10)



### CROSS SECTIONS OF SPILLWAY (10/10)



SCALE 0 25 50m

## 2.4.2 Concrete (Type D)

### Concrete Volume of Spillway by Each Block

Unit : (m<sup>3</sup>)

Block	Left Wall		Center Slab				Right Wall	
	Name	Volume (m <sup>3</sup> )	Name	Volume (m <sup>3</sup> )	Name	Volume (m <sup>3</sup> )	Name	Volume (m <sup>3</sup> )
1	L-1	2,387.64	C-1	1,191.11	---	---	R-1	2,387.64
2	L-2	1,382.29	C-2	621.08	---	---	R-2	1,382.29
---	L-W	685.21	---	---	---	---	---	---
3	L-3	3,710.33	C-3	765.00	---	---	R-3	2,937.61
4-1	L-4-1	2,036.12	C-4-1	765.00	---	---	R-4	4,458.87
4-2	L-4-2	2,270.63	C-4-2	642.60	---	---	---	---
5	L-5	1,107.15	C-5	714.00	---	---	R-5	474.66
6	L-6	250.82	C-6L	140.70	C-6R	140.70	R-6	210.28
7	L-7	137.48	C-7L	157.50	C-7R	157.50	R-7	137.48
8	L-8	98.50	C-8L	157.50	C-8R	157.50	R-8	98.50
9	L-9	98.50	C-9L	157.50	C-9R	157.50	R-9	98.50
10	L-10	98.51	C-10L	157.50	C-10R	157.50	R-10	98.51
11	L-11	96.95	C-11L	157.50	C-11R	157.50	R-11	96.95
12	L-12	80.95	C-12L	157.50	C-12R	157.50	R-12	80.95
13	L-13	79.21	C-13L	157.50	C-13R	157.50	R-13	79.21
14	L-14	186.13	C-14L	212.63	C-14R	212.63	R-14	196.84
15	L-15	730.74	C-15	637.50	---	---	R-15	786.00
16	L-16	1,061.06	C-16	656.25	---	---	R-16	Hydro PS
17	L-17	1,067.25	C-17	656.25	---	---	R-17	Hydro PS
18	L-18	1,067.25	C-18	637.50	---	---	R-18	1,113.56
19	L-19	1,517.30	C-19	2,155.31	---	---	R-19	1,492.47
20	---	---	---	---	---	---	R-20	616.89
Total		20,150.03		10,897.41		1,455.83		16,747.22
							G-Total	49,250.49
							G-Total x 1.05	51,700.00

(1) Concrete Volume of Overflow Weir (Overflow Weir ~ J3 and JR3)

G-Total 16,764.98 (m<sup>3</sup>)

Left Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
L-1	JCL	108.28	2.00	216.56	
	Pier+J1	190.01	1.50	285.02	
	J1	142.75	10.21	1,457.80	
	J1	142.75	3.00	428.26	2,387.64
L-2	J1	142.75	9.68	1,382.29	1,382.29
L-3	J2	142.75	2.00	285.51	
	LW.	120.25			
	1-1	177.90	2.00	298.15	
	2-2	162.90	3.15	536.08	
	3-3	135.17	3.56	530.56	
	Edge	0.00	7.82	623.71	
	4-4	159.62	3.56	594.62	
	5-5	174.44	4.94	841.70	
J3		166.54			3,710.33
				Total	7,480.27

Center

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
C-1	JCL	108.28			
	JCR	108.28	11.00	1,191.11	1,191.11
C-2	A	207.03	3.00	621.08	621.08
C-3	B	255.00	3.00	765.00	765.00
				Total	2,577.18

Right Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
R-1	JCR	108.28	2.00	216.56	
	Pier+J1	190.01	1.50	285.02	
	J1	142.75	10.21	1,457.80	
	J1	142.75	3.00	428.26	2,387.64
R-2	J1	142.75	9.68	1,382.29	1,382.29
R-3	J2	142.75	2.00	285.51	
	JR3	152.75	3.82	582.75	
	JR3	152.75	9.52	1,454.67	
	JR3	152.75	4.02	614.68	2,937.61
				Total	6,707.54

(2) Concrete Volume of Control Portion (J3 and JR3 ~ JR4 and Block L-W)

Left Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
L-4-1	J3	153.77	15.00	2,036.12	
	J4-1(left)	117.71			2,036.12
	J4-1(left)	117.71			
L-4-2	J4-1(left)	117.71	8.68	1,021.71	
	J4-1(left)	117.71	11.28	1,248.91	
	J4-2(left)	103.73			2,270.63
L-5 upper	J4-2(left)	103.73	6.00	552.67	
	JR4(left)	80.49			552.67
L-W	Edge	0.00			
	A1-A1	23.92	3.30	39.46	
	A2-A2	19.60			
	B1-B1	35.74	1.50	41.50	
	B2-B2	26.40			
	C1-C1	44.96			
	C2-C2	27.48			
	D-D	59.93	3.30	144.24	
	E1-E1	67.48	2.70	172.01	
	E2-E2	53.00			
	F-F	103.32	3.00	234.48	
				Total	685.21
					5,544.62

G-Total 11,742.60 (m<sup>3</sup>)

Center

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
C-4-1	C-4-1	255.00	3.00	765.00	765.00
C-4-2	C-4-2	214.20	3.00	642.60	642.60
C-5 upper	G-G	19.50	17.00	331.50	331.50
				Total	1,739.10

Right Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
R-4	JR3	152.75			
	J4-1(right)	176.76	18.00	2,965.61	
	JR4(right)	70.76	12.07	1,493.26	
				Total	4,458.87
					4,458.87

(3) Concrete Volume of Chute (JR4 ~ J15+3.000)

(a) Left Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
L-5 lower	JR4	80.49			
			10.00	554.49	
L-6	J5(1/2)	30.41			554.49
	J5(2/2)	25.67			
L-7			13.40	250.82	
	J6	11.76			250.82
L-8	J6	11.76			
			15.00	137.48	
L-9	J7	6.57			137.48
	J7	6.57			
L-10			15.00	98.50	
	J8	6.57			98.50
L-11	J8	6.57			
			15.00	98.50	
L-12	J9	6.57			98.50
	J9	6.57			
L-13			15.00	98.51	
	J10	6.57			98.51
L-14	J10	6.57			
			5.00	34.08	
L-15	J10+5.0m	7.06			
			10.00	62.87	
L-16	J11	5.51			96.95
	J11	5.51			
L-17			15.00	80.95	
	J12	5.28			80.95
L-18	J12	5.28			
			15.00	79.21	
L-19	J13	5.28			79.21
	J13	5.28			
L-20			10.00	81.12	
	J13+10.0m	10.94			
L-21			3.00	51.76	
	J13+13.0m	23.56			
L-22			2.00	53.25	
	J14(1/2)	29.68			186.13
L-23	J14(2/2)	30.31			
			15.00	730.74	
L-24	J15(1/2)	67.12			730.74
	J15(2/2)	62.75			
L-25 upper			3.00	207.26	
	J15+3.0m	75.43			207.26
				Total	2,619.55

G-Total 9,040.33 (m<sup>3</sup>)

(b) Center

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
C-5 lower	JR4	59.50			
			10.00	382.50	
C-6	J5(1/2)	17.00			382.50
	J5(2/2)-J6				
C-7			13.40	140.70	140.70
	C-6L	10.50			140.70
C-8	C-6R	10.50			140.70
	J6-J7				
C-9	C-7L	10.50	15.00	157.50	157.50
	C-7R	10.50	15.00	157.50	157.50
C-10	J7-J8				
	C-8L	10.50	15.00	157.50	157.50
C-11	C-8R	10.50	15.00	157.50	157.50
	J8-J9				
C-12	C-9L	10.50	15.00	157.50	157.50
	C-9R	10.50	15.00	157.50	157.50
C-13	J9-J10				
	C-10L	10.50	15.00	157.50	157.50
C-14	C-10R	10.50	15.00	157.50	157.50
	J10-J11				
C-15	C-11L	10.50	15.00	157.50	157.50
	C-11R	10.50	15.00	157.50	157.50
C-16	J11-J12				
	C-12L	10.50	15.00	157.50	157.50
C-17	C-12R	10.50	15.00	157.50	157.50
	J12-J13				
C-18	C-13L	10.50	15.00	157.50	157.50
	C-13R	10.50	15.00	157.50	157.50
C-19	C-14L	J13	10.50		
			10.00	105.00	
C-20	J13+10.0m	10.50			
			3.00	55.13	
C-21	J13+13.0m	26.25			
			2.00	52.50	
C-22	J14(1/2)	26.25			212.63
	C-14R	J13	10.50		
C-23			10.00	105.00	
	J13+10.0m	10.50			
C-24			3.00	55.13	
	J13+13.0m	26.25			
C-25			2.00	52.50	
	J14(1/2)	26.25			212.63
C-26	J14(2/2)	42.50			
			15.00	637.50	
C-27	J15(1/2)	42.50			637.50
	J15(2/2)	43.75			
C-28 upper			3.00	131.25	
	J15+3.0m	43.75			131.25
				Total	4,062.90



(4) Concrete Volume of Stilling Basin (J15+3.000 ~ END)

G-Total 11,702.58 (m<sup>3</sup>)

(a) Left Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )	
L-16 lower	J15+3.000~J16	71.15	12.00	853.80	853.80	
L-17	J16~J17(1/2)	71.15	15.00	1,067.25	1,067.25	
L-18	J17(2/2)~J18	71.15	15.00	1,067.25	1,067.25	
L-19	G-G	126.78	3.50	443.74	1,517.30	
	J18	62.40	2.00	124.80		
	A-A	62.40	2.00	136.00		
	B-B	73.60	1.50	110.40		
	B-B	73.60	9.00	511.36		
	C-C	40.01	3.00	151.43		
	D-D	60.91	0.50	30.46		
	D-D	60.91	2.30	9.11		
	I-I	7.93				
	Edge	0.00				
	Total					4,505.60

(b) Center

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
C-16 lower	J15+3.000~J16	43.75	12.00	525.00	525.00
C-17	J16~J17(1/2)	43.75	15.00	656.25	656.25
C-18	J17(2/2)~J18	42.50	15.00	637.50	637.50
C-19	G-G	126.78	17.00	2,155.31	2,155.31
Total				3,974.06	

(c) Right Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
R-16 lower	Concrete volume should be estimated in Hydropower Station				
R-17	Concrete volume should be estimated in Hydropower Station				
R-18	J17(2/2)~J18	74.24	15.00	1,113.56	1,113.56
	H-H	112.88	3.50	395.07	
R-19	J18	65.49	2.00	130.98	1,492.47
	A-A	65.49	2.00	142.18	
	B-B	76.69	1.50	115.03	
	B-B	76.69	6.00	421.73	
	C-C	63.89	4.50	287.49	
	J19(1/2)	63.89			
	J19(2/2)	79.64	1.00	79.64	
	J19(2/2)	79.64	0.50	38.49	
	D-D	74.31	5.45	316.06	
	E-E	41.68	2.55	142.88	
	F-F	70.39	0.50	35.19	
	F-F	70.39			
	J-J	7.14			
Edge	0.00				
Total				3,222.93	

## (c) Right Side

Name	Section	Area (m <sup>2</sup> )	Distance (m)	Volume (m <sup>3</sup> )	Block (m <sup>3</sup> )
R-5	JR4	70.76			474.66
			10.00	474.66	
R-6	J5(1/2)	24.17			210.28
	J5(2/2)	19.62	13.40	210.28	
R-7	J6	11.76			137.48
			15.00	137.48	
R-8	J7	6.57			98.50
			15.00	98.50	
R-9	J8	6.57			98.50
			15.00	98.50	
R-10	J9	6.57			98.51
			15.00	98.51	
R-11	J10	6.57			96.95
			5.00	34.08	
	J10+5.0m	7.06	10.00	62.87	
R-12	J11	5.51			80.95
			15.00	80.95	
R-13	J12	5.28			79.21
			15.00	79.21	
R-14	J13	5.28			196.84
			10.00	79.13	
	J13+10.0m	10.54	3.00	57.54	
	J13+13.0m	27.81	2.00	60.18	
R-15	J14(1/2)	32.36			786.00
	J14(2/2)	35.00	15.00	786.00	
R-16 upper	J15(1/2)	69.80			0.00
				Total	2,357.88

Area (m <sup>2</sup> )	L	CL	CR	R	Total
JR4	80.49	59.50		70.76	210.75
J5(1/2)	30.41	17.00		24.17	71.58
J5(2/2)	25.67	10.50	10.50	19.62	66.29
J6	11.76	10.50	10.50	11.76	44.53
J7,J8,J9	6.57	10.50	10.50	6.57	34.13
J10	6.57	10.50	10.50	6.57	34.14
J10+5.0m	7.06	10.50	10.50	7.06	35.12
J11	5.51	10.50	10.50	5.51	32.02
J12,J13	5.28	10.50	10.50	5.28	31.56
J13+10.0m	10.94	10.50	10.50	10.54	42.49
J13+13.0m	23.56	26.25	26.25	27.81	103.88
J14(1/2)	29.68	26.25	26.25	32.36	114.55
J14(2/2)	30.31	42.50		35.00	107.81
J15(1/2)	67.12	42.50		69.80	179.42
J15(2/2)	62.75	43.75		---	106.50
J15+3.0m	75.43	43.75		---	119.18

### 2.4.3 Form Work of Spillway

Unit : (m<sup>2</sup>)

Portion	Location	Outside	Inside	Total
Overflow Weir	Overflow Weir~J3, JR3	2,246.98	1,938.61	4,185.60
Control Portion	J3, JR3 ~ JR4, Block L-W	1,663.69	1,522.42	3,186.11
Chute	JR4 ~ J15+3.000	1,603.18	2,077.24	3,680.42
Stilling Basin	J15+3.000 ~ End	1,539.68	2,712.00	4,251.68
Grand Total		7,053.53	8,250.27	15,303.80

#### (1) Form Work of Overflow Weir (Overflow Weir~J3 and JR3)

(a) Outside : 2,246.98 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
JCL	10.91	7.50	81.84	1,186.57	JCR	10.91	7.50	81.84	1,060.41
Pier-in	-	-	81.73		Pier-in	-	-	81.73	
Pier-out	-	-	47.26		Pier-out	-	-	47.26	
Pier	8.32	1.50	12.48		Pier	8.32	1.50	12.48	
J1	12.90	30.00	386.85		J1	12.90	30.00	386.85	
J3	19.08	30.21	576.42		JR3	19.86	14.98	297.50	
					JR3	-	-	152.75	

(b) Inside : 1,938.61 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
JCL	16.10	7.50	120.78	999.91	JCR	16.10	7.50	120.78	938.71
Pier	12.58	1.50	18.87		Pier	12.58	1.50	18.87	
J1	17.01	30.00	510.21		J1	17.01	30.00	510.21	
J1	3.00	14.68	44.05		J1	3.00	14.68	44.05	
Wall	-	-	261.00		Wall	-	-	208.80	
Toe	-	-	45.00		Toe	-	-	36.00	

#### (2) Form Work of Control Portion (J3 and JR3 ~ JR4, and Block L-W)

(a) Outside : 1,663.69 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
J4-1(left)	19.08	34.96	667.07	897.00	J4-1(right)	25.50	30.07	766.68	766.68
J4-2	17.44	6.00	104.62						
L-W	-	-	125.32						

(b) Inside : 1,522.42 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
Wall	-	-	560.89	796.03	Wall	-	-	613.09	726.39
Toe	-	-	104.30		Toe	-	-	113.30	
L-W	-	-	130.84						

**(3) Form Work of Chute (JR4 ~ J15+3.000)**

(a) Outside : 1,603.18 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
JR4(left)	14.15				JR4(right)	17.13			
		10.00	111.97				10.00	125.91	
J5(1/2)	8.25				J5(1/2)	8.06			
J5(2/2)	9.81				J5(2/2)	9.59			
		13.40	107.09				13.40	105.57	
J6	6.17				J6	6.17			
		15.00	69.22				15.00	69.22	
J7	3.06				J7	3.06			
		50.00	162.13				50.00	162.13	
J10+5.0	3.43				J10+5.0	3.43			
		47.00	128.45				47.00	128.45	
J13+7.0	2.04				J13+7.0	2.04			
		26.00	216.53				26.00	216.53	
J15+3.0	14.62			795.38	J15+3.0	14.62			807.79

(b) Inside : 2,077.24 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
Wall	-	-	827.62		Wall	-	-	827.62	
Toe	-	-	211.00	1,038.62	Toe	-	-	211.00	1,038.62

**(4) Form Work of Stilling Basin (J15+3.000 ~ End)**

(a) Outside : 1,539.68 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
J15+3.0	14.62				J15+3.0	14.62			
		47.50	694.26				20.50	299.63	
J18+5.5	14.62				J18+5.5	14.62			
		9.00	103.36				9.00	105.41	
C-C	8.35				C-C	8.81			
							8.45	74.43	
D-D(u/s)			60.92		E-E	8.81			
D-D(d/s)			60.92	919.45	F-F(u/s)			70.39	
					F-F(d/s)			70.39	620.23

(b) Inside : 2,712.00 (m<sup>2</sup>)

Left					Right				
Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )	Section	Length (m)	Distance (m)	Area (m <sup>2</sup> )	Total (m <sup>2</sup> )
Wall	-	-	830.88		Wall	-	-	936.88	
Toe	-	-	232.75		Toe	-	-	247.13	
Sub-Dam	19.35	24.00	464.38	1,528.00					1,184.00

**Frame Work of Joints**

**Grand Total : 3,184.32 (m<sup>2</sup>)**

Left		Right		Center	
Section	Area (m <sup>2</sup> )	Section	Area (m <sup>2</sup> )	Section	Area (m <sup>2</sup> )
JCL	108.28	JCR	108.28	-	-
J1	142.75	J1	142.75	-	-
J2	142.75	J2	142.75	J2	72.00
J3	166.54	JR3	152.75	J3	72.00
Jw	120.25	-	-	J4-1	72.00
J4-1	117.71	JR4	70.76	J4-2	72.00
J4-2	103.73	-	-	-	-
J5	30.41	J5	24.17	J5	21.00
J6	11.76	J6	11.76	J6	21.00
J7	6.57	J7	6.57	J7	21.00
J8	6.57	J8	6.57	J8	21.00
J9	6.57	J9	6.57	J9	21.00
J10	6.57	J10	6.57	J10	21.00
J11	5.51	J11	5.51	J11	21.00
J12	5.28	J12	5.28	J12	21.00
J13	5.28	J13	5.28	J13	21.00
J14	30.31	J14	35.00	J14	52.50
J15	67.12	J15	69.80	J15	43.75
J16	71.15	J16	-	J16	43.75
J17	71.15	J17	78.24	J17	43.75
J18	71.15	J18	78.24	J18	42.50
-	-	J19	83.64	Center	143.16
<b>Total</b>	<b>1,297.42</b>	<b>Total</b>	<b>1,040.49</b>	<b>Total</b>	<b>846.41</b>