3. CONSTRUCTION PLAN

The construction schedule has been prepared by examining the performance of construction equipment, including the daily workable volume of a combination of equipment and workable number of days.

3.1 Hourly Production of Equipment

Hourly production of construction equipment has been calculated based on the work volume for one excavation cycle time, exchange ratio of soil volume, coefficient of soil condition and workability at site, and one cycle time including hauling.

Hourly Production Of Bulldozer

$$V = \frac{60 \times q \times f \times E}{Cm}$$

where,

V	:	Work Volume (m^3/hr)
q	:	Work Volume for 1 Cycle Time
f	:	Exchange ratio of soil volume
E	:	Coefficient of workability and soil condition at site
Cm	:	Cycle Time = $0.027 \times I + 0.78$ (min.) I = average hauling distance

(1) Bulldozer-A, 145 ps (15-ton)

15-ton $\Rightarrow$ q = 2.2 m^3

f	=	1.0 (original surface)
E	=	0.8 (normal); for FW = 0.85
Cm	=	$0.027 \times I + 0.78$
	=	$0.027 \times (50.0) + 0.78$ = 2.13 (min.)
Cm for FW	=	$0.027 \times (20.0) + 0.78$ = 1.32 (min.)

(Note: FW = Floodway)

$$V = \frac{60 \times 2.2 \times 1.0 \times 0.8}{2.13} = 49.577 \text{ m}^3\text{/hr}$$

$$V \text{ for FW} = \frac{60 \times 2.2 \times 1.0 \times 0.85}{1.32} = 85.000 \text{ m}^3\text{/hr}$$

Oil, 145 ps = 145 ps $\times$ 0.138 = 20.01 l/ps-hr

(2) Bulldozer-B, 100ps (12-ton)

12-ton $\Rightarrow$ q = 1.5 m^3

f = 1.0 (original surface)
E = 0.8 (normal); for FW = 0.85
Cm = $0.027 \times I + 0.78$
= $0.027 \times (50.0) + 0.78$ = 2.13 (min.)
Cm for FW = $0.027 \times (20.0) + 0.78$ = 1.32 (min.)

(*Note*: FW = Floodway)

$$V = \frac{60 \times 1.5 \times 1.0 \times 0.8}{2.13} = 33.803 \text{ m}^3/\text{hr}$$

$$V \text{ for FW} = \frac{60 \times 1.5 \times 1.0 \times 0.85}{1.32} = 57.955 \text{ m}^3/\text{hr}$$

Oil, 100 ps = 100 ps $\times$ 0.138 = 13.8 *l*/ps-hr

(3) Bulldozer-C, 65 ps (6-ton)

6-ton $\Rightarrow$ q = 1.0 m^3

f = 1.0 (original surface)
E = 0.8 (normal); for FW = 0.85
Cm = $0.027 \times I + 0.78$
= $0.027 \times (15.0) + 0.78$ = 1.185 (min.)
Cm for FW = $0.027 \times (20.0) + 0.78$ = 1.32 (min.)

(*Note*: FW = Floodway)

$$V = \frac{60 \times 1.0 \times 1.0 \times 0.8}{1.185} = 40.506 \text{ m}^3/\text{hr}$$

$$V \text{ for FW} = \frac{60 \times 1.0 \times 1.0 \times 0.85}{1.32} = 38.636 \text{ m}^3/\text{hr}$$

Oil, 65 ps = 65 ps $\times$ 0.138 = 8.97 *l*/ps-hr

(4) Bulldozer with Ripper, 224 ps (21-ton)

21-ton $\Rightarrow$ q = 2.85 m^3

f = 1.0 (original surface)
E = 0.65 (normal); for FW = 0.85

Cm = $0.027 \times I + 0.78$

= $0.027 \times (50.0) + 0.78 = 2.13$ (min.)

Cm for FW = $0.027 \times (20.0) + 0.78 = 1.32$ (min.)

(*Note*: FW = Floodway)

$$V = \frac{60 \times 2.85 \times 1.0 \times 0.65}{2.13} = 52.183 \text{ m}^3/\text{hr}$$

$$V \text{ for FW} = \frac{60 \times 2.85 \times 1.0 \times 0.85}{1.32} = 110.114 \text{ m}^3/\text{hr}$$

Oil, 224 ps = 224 ps × 0.138 = 30.912 *l*/ps-hr

Hourly Production of Backhoe

$$V = \frac{3600 \times q \times f \times E}{Cm}$$

where,

V	:	Work Volume (m^3/hr)
q	:	Work Volume for 1 Cycle Time = ($q \times K$); K = coefficient for Backhoe Volume = 0.98
f	:	Exchange ratio of soil volume
E	:	Coefficient of workability and soil condition at site
Cm	:	Cycle Time = 30 sec.

(1) Backhoe-A, 120 ps (0.60 m^3)

0.60 m^3 $\Rightarrow$ $q = q \times K = 0.60 \times 0.98 = 0.59$ m^3

f	=	1.0 (original surface)
E	=	0.60 (normal); for FW = 0.75
Cm	=	30 sec.

(*Note*: FW = Floodway)

$$V = \frac{3600 \times 0.59 \times 1.0 \times 0.60}{30} = 42.480 \text{ m}^3/\text{hr}$$

$$V \text{ for FW} = \frac{3600 \times 0.59 \times 1.0 \times 0.75}{30} = 53.100 \text{ m}^3/\text{hr}$$

Oil, 120 ps = 120 ps × 0.138 = 16.56 *l*/ps-hr

(2) Backhoe-B, 88 ps (0.40 m^3)

0.40 m^3 $\Rightarrow$ $q = q \times K = 0.40 \times 0.98 = 0.39$ m^3

f = 1.0 (original surface)
E = 0.60 (normal); for FW = 0.75
Cm = 30 sec.

(*Note*: FW = Floodway)

$$V = \frac{3600 \times 0.39 \times 1.0 \times 0.60}{30} = 28.080 \text{ m}^3/\text{hr}$$

$$V \text{ for FW} = \frac{3600 \times 0.39 \times 1.0 \times 0.75}{30} = 35.100 \text{ m}^3/\text{hr}$$

Oil, 88 ps = 88 ps × 0.138 = 12.144 *l*/ps-hr

Hourly Production of Wheel-Type Loader

$$V = \frac{3600 \times q \times f \times E}{Cm}$$

where,

V	:	Work Volume (m^3/hr)
q	:	Work Volume for 1 Cycle Time = ($q \times K$); K = coefficient for Backhoe Volume = 0.98
f	:	Exchange ratio of soil volume
E	:	Coefficient of workability and soil condition at site
Cm	:	Cycle Time = 25 sec.

(1) Wheel-Type Loader, 81 ps (1.20 m^3)

1.20 m^3 $\Rightarrow$ $q = q \times K = 1.20 \times 0.98 = 1.176$ m^3

f = 1.0 (original surface)
E = 0.60 (normal); for FW = 0.80
Cm = 25 sec.
(*Note*: FW = Floodway)

$$V = \frac{3600 \times 1.176 \times 1.0 \times 0.60}{25} = 101.606 \text{ m}^3/\text{hr}$$

$$V \text{ for FW} = \frac{3600 \times 1.176 \times 1.0 \times 0.80}{25} = 135.475 \text{ m}^3/\text{hr}$$

Oil, 81 ps = 81 ps × 0.138 = 11.178 *l*/ps-hr

Hourly Production of Dump Truck

$$V = \frac{60 \times q \times f \times E}{Cm}$$

where,

V	:	Work Volume (m^3/hr)
q	:	Work Volume for 1 Cycle Time
f	:	Exchange ratio of soil volume
E	:	Coefficient of workability and soil condition at site
Cm	:	Cycle Time = $\beta \times L + \alpha$ (min.); L = Distance, one-way (km) β = Traffic condition α =Other workability

(1) Dump Truck-A, 253 ps (8-ton)

8-ton $\Rightarrow$ q = 4.5 m^3

f	= 1.0 (original surface)
E	= 0.90
β	= 5.30
α	= 13
L	= 2 km; Cm = 5.30 × 2 × 13 = 23.60
L	= 5 km; Cm = 5.30 × 5 × 13 = 39.50 ≈ 40 (min.)
L	= 10 km; Cm = 5.30 × 10 × 13 = 66.00
L	= 20 km; Cm = 5.30 × 20 × 13 = 119.00 ≈ 120 (min.)
L	= 35 km; Cm = 5.30 × 35 × 13 = 198.50 ≈ 200 (min.)

$$V_2 = \frac{60 \times 4.5 \times 1.0 \times 0.90}{23.6} = 10.2976 \text{ m}^3/\text{hr}$$

$$V_5 = \frac{60 \times 4.5 \times 1.0 \times 0.90}{40.0} = 6.075 \text{ m}^3/\text{hr}$$

$$V_{10} = \frac{60 \times 4.5 \times 1.0 \times 0.90}{66.0} = 3.682 \text{ m}^3/\text{hr}$$

$$V_{20} = \frac{60 \times 4.5 \times 1.0 \times 0.90}{120} = 2.025 \text{ m}^3/\text{hr}$$

$$V_{35} = \frac{60 \times 4.5 \times 1.0 \times 0.90}{200} = 1.215 \text{ m}^3/\text{hr}$$

Oil, 253 ps = 253 ps × 0.04 = 10.12 l/ps-hr

(2) Dump Truck-B, 182 ps (4-ton)

4-ton $\Rightarrow$ q = 2.2 m^3

f	=	1.0 (original surface)
E	=	0.90
β	=	4.8
α	=	11
L	=	2 km; Cm = 4.80 × 2 × 11 = 20.60
L	=	5 km; Cm = 4.80 × 5 × 11 = 35.00
L	=	10 km; Cm = 4.80 × 10 × 11 = 59.00
L	=	20 km; Cm = 4.80 × 20 × 11 = 107.00
L	=	35 km; Cm = 4.80 × 35 × 11 = 179.00

$$V_2 = \frac{60 \times 2.2 \times 1.0 \times 0.90}{20.6} = 5.767 \ \text{m}^3/\text{hr}$$

$$V_5 = \frac{60 \times 2.2 \times 1.0 \times 0.90}{35.0} = 3.394 \ \text{m}^3/\text{hr}$$

$$V_{10} = \frac{60 \times 2.2 \times 1.0 \times 0.90}{59.0} = 2.014 \ \text{m}^3/\text{hr}$$

$$V_{20} = \frac{60 \times 2.2 \times 1.0 \times 0.90}{107} = 1.110 \ \text{m}^3/\text{hr}$$

$$V_{35} = \frac{60 \times 2.2 \times 1.0 \times 0.90}{179} = 0.664 \ \text{m}^3/\text{hr}$$

Oil,182 ps = 182 ps × 0.04 = 7.28 l/ps-hr

Hourly Production of Dredger

(1) Dredger, 200 ps

Diesel Oil	=	78 l/hr
Capacity (V)	=	40 m^3/hr
Pipeline	=	100 m

Spoil area for dredging material (for every 20 m)

Log Pile	=	11 × 5 × 2 = 110 m
Plywood	=	30 m^2

Total pipeline length is 100 m × 6 locations = 600 m, assuming that 2/3 of the materials can be recycled.

Therefore, construction materials are only for 300 m.

$$\text{Log Pile} = \frac{300}{20} \times 110 = 1{,}650 \text{ m}$$

$$\text{Plywood} = \frac{300}{20} \times 30 = 450 \text{ m}$$

3.2 Combination of Equipment for Major Civil Works

Excavation (Common)

No. of Sets	Equipment	Capacity	Quantity	Production Volume (m^3/hr)
1	Backhoe-A	0.6 m^3	1	40
	Bulldozer-B	12-ton	1	
	Dump Truck-A	8-ton	14	
	Wheel-Type Loader	1.2 m^3	1	100

Number of Trucks Required:

Hourly Production Volume = 140 m^3
Hauling Distance = 5 km
Speed = 20 km/hr (around 30 min.)

$$140 \div 5 \div \frac{60}{30} = 14 \text{ units}$$

One (1) set of excavation requires 14 units of Dump Truck

$140 \times 8 = 1{,}120\ m^3$/set/day

Excavation (River Channel)

No. of Sets	Equipment	Capacity	Quantity	Production Volume (m^3/hr)
1	Backhoe-A	0.6 m^3	2	$30 \times 2 = 60$
	Dump Truck-A	8-ton	6	

Number of Trucks Required = 6 units

60×8 hrs. = 480 m^3/set/day

Embankment

No. of Sets	Equipment	Capacity	Quantity
1	Bulldozer-B	12-ton	1
	Backhoe-B	0.4 m^3	1
	Tire Roller	12-ton	1

100 $m^2 \times 8$ hrs. = 800 m^2/set/day

Clearing and Grubbing

No. of Sets	Equipment	Capacity	Quantity
1	Bulldozer-B	12-ton	1
	Dump Truck-A	8-ton	12
	Wheel-Type Loader	1.2 m^3	1

6 m × 20 m = 120 m^2/hr.

120 m^2 × 8 hrs. = 960 m^2/set/day

Stripping (25 cm)

No. of Sets	Equipment	Capacity	Quantity
1	Bulldozer-A	15-ton	2
	Dump Truck-A	8-ton	6
	Wheel-Type Loader	1.2 m^3	1

6 m × 12 m × 2 units = 144 m^2/hr.

144 m^2 × 8 hrs. = 1,150 m^2/set/day, or 288 m^3/set/day

3.3 Temporary Works

Temporary works include dewatering, coffering, demolition and removal of temporary bridge and wall.

Dewatering work is classified in two types depending on discharge volume, Type A (2.5 m^3/min.) and Type B (6.5 m^3/min.). Demolition and removal are also classified into two types, Type A (50 m^3 or more) and Type B (less than 50 m^3). Wall is 10 m long constructed of brick.

The temporary works for each work portion are presented in the following pages.

BILL OF QUANTITY OF TEMPORARY WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Dewatering		Collering	Demolish & Removal		Temp. Bridge	Well
						Type A set/day	Type B set/day	Lengh (m)	Type A m^3	Type B m^3	W=3.0m to 7.0m m^2	W=10 m nos.
MFC-1		PREPARATION WORKS		L.S					100	50	90	
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	290,600							
		STRIPPING		m^2	36,500							
		EXCAVATION (Common)		m^3	139,600							
		EXCAVATION (River Channel)		m^3	164,600							
		DREDGING		m^3	82,600							
		EMBANKMENT		m^3	263,800							
PE	14 + 57	PARAPET WALL		m^3	1,560	20		100				
		REVETMENT (Wet Stone Masonry)		m^3	2,560	40		50				
		SODDING		m^2	86,100							
		APPROCH STEP		Type PA	5. loc.	15		50				
PE	14 + 57	JETTY (Landing Stage)		L.S		30	40	60	150			
		DRAINAGE CHANNEL AND OUTLET WORKS				0	0	20				
		OTHER WORKS										
		MSICELLANEOUS WORKS		L.S								
			Total			105	40	280	250	50	90	
MFC-2		PREPARATION WORKS		L.S.					100	50		
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	528,000							
		STRIPPING		m^2	61,000							
		EXCAVATION (Common)		m^3	340,900							
		EXCAVATION (River Channel)		m^3	166,200							
		EMBANKMENT		m^3	338,000							
PE	55 + 0	GROUNDSILL		L.S.	0	20	10	50				
		APPROCH STEP		Type PA	23 loc	69		230				
PE	71 + 0	BANDAR SIDORAS INTAKE WEIR		L.S.	0	60	20	150	1200			
		REVETMENT (Wet Stone Masonry)		m^3	2,680	70		130				
		SODDING		m^2	175,400							
		BRIDGE WORKS										
PE	57 + 5	P1 TITI BESI BRIDGE	W= 7.0 m, L= 82.8 m	m^2	751	20		160	80		360	
PE	84 + 28	P2 PERKEBUNAN BRIDGE	W=7.0 m, L= 104.0 m	m^2	728	40		100	400			
PE	115 + 6	P3 TITI GANTUNG BRIDGE	W=7.0 m, L= 57.4 m	m^2	402	20		120	120			
		DRAINAGE WORKS										
PE	85 + 0	SL1 DRAINAGE GATE (Flap)	Dia. 600 mm			10		20				
PE	95 + 35	SL2 DRAINAGE GATE	2.0 x1.5 x 2			10		20				
		OTHER WORKS										
		MSICELLANEOUS WORKS		L.S.	1							
			Total			319	30	980	1900	50	360	

BILL OF QUANTITY OF TEMPORARY WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Dewatering		Coffering	Demolish & Removal		Temp. Bridge	Well
						Type A set/day	Type B set/day	Lengh (m)	Type A m^3	Type B m^3	W=3.0m to 7.0m m^2	W=10 m nos.
MFC-3		PREPARATION WORKS		L.S.	1				200	100		
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	332,400							
		STRIPPING		m^2	16,300							
		EXCAVATION (Common)		m^3	626,300							
		EXCAVATION (River Channel)		m^3	161,900							
		EMBANKMENT		m^3	95,200							
		REVETMENT (Wet Stone Masonry)		m^3	10,200	90		500				
		SODDING		m^2	88,500							
		PROTECTION WORKS										
PE 129 + 43	P4	PROTECTION WORK, TITI RUNTUH Br.				20	60	240				
PE 176 + 66	P8	RPOTECTION WORK, RAILWAY Br.				20	70	200				
PE 206 + 20	P10	PROTECTION WORK TOLLWAY Br.				0	0	0				
		APPROCH STEP				60		290				
		BRIDGE WORKS										
PE 137 + 45	P5	PAYUNG BRIDGE	W=7.0 m, L= 40.8 m	m^2	286	20		120	280		0	
PE 147 + 58	P6	PENDESTRAN BRIDGE	W=2.0 m, L= 40.8 m	m^2	82	15		40		40	0	
PE 169 + 59	P7	MEDAN TEMBUNG BRIDGE, /w WATER PIPE Dia.100 mn	W=9.0 m, L= 40.8 m	m^2	477	40		120	300		210	
PE 200 + 25	P9	MEDAN DENAI BRIDGE	W=16.0 m, L= 40.8 m	m^2	849	40	20	220	300		240	
		/ w WATER PIPE Dia. 150 mm, 100 mm										
		DRAINAGE WORKS										
PE 138 + 55	SL3	DRAINAGE GATE	1.5 m x 1.5 m		1	10		20				
PE 155 + 90	SL4	DRAINAGE GATE	2.0 m x 1.5 m			10		20				
PE 176 + 55	SL5	DRAIAGE GATE	1.5 m x 1.5 m			10		20				
PE 176 + 85	SL6	DRAINAGE BOX CULVERT	2.0 m x 1.5 m			10		20				
PE 166 + 80	SR1	DRAINAGE PIPE	Dia. 800 mm x 2			5		15				
PE 176 + 85	SR2	DRAINAGE PIPE	Dia. 800 mm x 2			5		15				
PE 189 + 40	SL7	DRAINAGE PIPE	Dia. 800 mm			5		15				
PE 198 + 35	SL8	DRAINAGE PIPE	Dia. 1000 mm x 2			5		15				
PE 200 + 10	SR3	DRAINAGE DITCH	W=600 mm			5		15				
PE 200 + 25	SR4	DRAINAGE PIPE	Dia. 1000 mm			5		15				
PE 200 + 25	SL9	DRAINAGE PIPE	Dia. 600 mm			5		15				
PE 200 + 40	SL10	DRAINAGE PIPE	Dia. 600 mm			5		15				
PE 206 + 0	SL11	DRAINAGE PIPE	Dia. 600 mm			5		15				
PE 206 + 55	SL12	DRAINAGE DITCH	W=1000 mm			5		15				
		OTHER WORKS										
		MSICELLANEOUS WORKS				20	30	200				
			Total			**415**	**180**	**2160**	**1080**	**140**	**450**	

BILL OF QUANTITY OF TEMPORARY WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Dewatering		Coffering	Demolish & Removal		Temp. Bridge	Well
						Type A set/day	Type B set/day	Lengh (m)	Type A m^3	Type B m^3	W=3.0m to 7.0m m^2	W=10 m nos.
MFC-4		PREPARATION WORKS		L.S.					200	100		
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	228,700							
		STRIPPING		m^2	8,750							
		EXCAVATION (Common)		m^3	342,900							
		EXCAVATION (River Channel)		m^3	99,500							
		EMBANKMENT		m^3	59,200							
		REVETMENT (Wet Stone Masonry)		m^3	5,880	100		500				
		SODDING		m^2	65,500							
		PROTECTION WORKS										
	PE 269 + 64		PROTECTION PIPE BRIDGE, Dia. 600 mm									
	PE 269 + 75	P14	PROTECTION WORK, NATIONAL ROAD Br.			20	40	300				
			APPROACH STEPS			48		240				
		BRIDGE WORKS										
	PE 222 + 0	P11	BINJAI BRIDGE /w WATER PIPE Dia. 400, 150 mm	W=16.0 m, L= 40.8 m	m^2	849	30	20	120	320		210	
	PE 246 + 57	P13	AMPLAS BRIDGE	W=16.0 m, L= 40.8 m	m^2	849	30	20	180	420		300	
			/w WATER PIPE, Dia. 300, 150, 125 mm										
	PE 224 + 65	P12	DEMOLISHION PREDESTRIAN BRIDGE Abut.										
	PE 255 + 10		PIPE BRIDGE	Dia. 600 mm x 2			15		40	100			
		DRAINAGE WORKS										
	PE 212 + 0	SL13	DRAINAGE BOX CULVERT	1.5 m x 1.5 m x 2			10		20				
	PE 222 + 0	SL14	DRAINAGE BOX CULVERT	2.1 m x 2.4 m x 2			10		20				
	PE 246 + 40	SL16	DRAINAGE BOX VULVERT	2.0 m x 2.0 m			10		20				
	PE 259 + 0	SR10	DRAINAGE BOX CULVERT	2.0 m x 2.0 m x 2			10		20				
	PE 216 + 0	SR5	DRAINAGE DITCH	W=600 mm			5		15				
	PE 218 + 40	SR6	DRAINAGE PIPE	Dia. 600 mm			5		15				
	PE 222 + 15	SL15	DRAINAGE PIPE	Dia. 1000 mm			5		15				
	PE 234 + 20	SR7	DRAINAGE PIPE	Dia. 800 mm			5		15				
	PE 246 + 30	SR8	DRAINAGE PIPE	Dia. 800 mm			5		15				
	PE 250 + 90	SL17	DRAINAGE PIPE	Dia. 600 mm			5		15				
	PE 255 + 15	SL18	DRAINAGE PIPE	Dia. 800 mm			5		15				
	PE 255 + 20	SR9	DRAINAGE PIPE	Dia. 600 mm			5		15				
	PE 258 + 25	SL19	DRAINAGE PIPE	Dia. 600 mm			5		15				
	PE 259 + 60	SL20	DRAINAGE PIPE	Dia. 600 mm			5		15				
	PE 262 + 80	SL21	DRIANAGE PIPE	Dia. 1000 mm x 2			5		15				
	PE 264 + 90	SL22	DRAINAGE PIPE	Dia. 600 mm			5		15				
	PE 269 + 50	SL23	DRAINAGE DITCH	W=600 mm			5		15				
	PE 269 + 80	SL24	DRAINAGE DITCH	W=600 mm			5		15				
	PE 271 + 40	SR11	DRAINAGE PIPE	Dia. 800 mm			5		15				
	PE 272 + 85	SR12	DRAINAGE PIPE	Dia. 1000 mm			5		15				
		OTHER WORKS											
		MSICELLANEOUS WORKS											
			Total			363	80	1700	1040	140	510		

BILL OF QUANTITY OF TEMPORARY WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Dewatering		Coffering	Demolish & Removal		Temp. Bridge	Well
						Type A set/day	Type B set/day	Lengh (m)	Type A m^3	Type B m^3	W=3.0m to 7.0m m^2	W=10 m nos.
MFC-5		PREPARATION WORKS		L.S.					100	50		4
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	152,900							
		STRIPPING		m^2	4,210							
		EXCAVATION (Floodway)		m^3	646,300	10	20					
		EMBANKMENT		m^3	15,800							
	PE 274 + 27	CONFLUENCE		L.S.								
	FW 3 + 0	FLOODWAY GROUNDSILL		L.S.		10		20				
		REVETMENT (Wet Stone Masonry)		m^3	19,100	10		30				
		SODDING		m^2	35,200							
		BRIDGE WORKS										
	FW 6 + 90	F1 JALAN BAJAK BRIDGE	W = 7.0 m, L= 31.6 m	m^2	221	20						
	FW 20 + 45	F2 PTP-IX BRIDGE	W = 9.0 m, L= 31.6 m	m^2	284	40						
	FW 20 + 50	WB2 PIPE BRIDGE	Dia. 800 mm			20						
		DRAINAGE WORKS										
	PE 274 + 55	SL25 DRAINAGE PIPE	Dia. 800 mm			5		15				
	FW 9 + 81	SF2 DRAINAGE BOX CULVERT, FALLING WORKS	2.0 m x 2.0 m			10		20				
	FW 6 + 50	SF1 DRAINAGE PIPE	Dia. 1000 mm			5						
	FW 13 + 0	SF3 DRIANAGE PIPE	Dia. 1000 mm			5						
	FW 16 + 0	SF4 DRIANAGE PIPE	Dia. 1000 mm			5						
		OTHER WORKS										
		MSICELLANEOUS WORKS				20	30	200				
			Total			160	50	285	100	50	0	4
MFC-6		PREPARATION WORKS		L.S.					200	100		7
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	63,200							
		STRIPPING		m^2	2,270							
		EXCAVATION (Floodway)		m^3	290,200							
		EMBANKMENT		m^3	4,620							
		REVETMENT (Concrete)		m^3	29,800	60		400				
		REVETMENT (Wet Stone Masonry)		m^3	3,140							
		SODDING		m^2	5,680							
		BRIDGE WORKS										
	FW 28 + 22	F3 STM UJUNG BRIDGE	W = 9.0 m, L= 31.6 m	m^2	284	20						
	FW 32 + 0	F4 RAILWAY BRIDGE	W = 3.0 m, L= 31.6 m	m^2	95	15						
	FW 33 + 65	F5 DELI TUA BRIDGE /w WATER PIPE Dia. 350 mm	W = 16.0 m, L= 31.6 m	m^2	506	40						
	FW 24 + 70	WB3 PIPE BRIDGE IRREGATION Dia. 300 mm	Dia. 300 mm			15						
	FW 32 + 0	WB4 PIPE BRIDGE Dia. 600, 300 mm	Dia. 600, 300 mm			15						
	FW 25 + 24	SF5 BATUAN RIVER, BOX CULVERT, FALLING WORKS	2.0 m x 2.0 m x 2			15		20				
	FW 30 + 0	SF6 DRAINAGE PIPE	Dia. 1000 mm			5						
		OTHER WORKS										
		MSICELLANEOUS WORKS				60	60	200				
			Total			245	60	620	200	100	0	7

BILL OF QUANTITY OF TEMPORARY WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Dewatering		Coffering	Demolish & Removal		Temp. Bridge	Well
						Type A set/day	Type B set/day	Lengh (m)	Type A m^3	Type B m^3	W=3.0m to 7.0m m^2	W=10 m nos.
MFC-7		PREPARATION WORKS		L.S.					100	200		2
		RIVER WORKS										
		CLEARING AND GRUBBING		m^2	143,700							
		STRIPPING		m^2	24,800							
		EXCAVATION (Common)		m^3	40,500							
		EXCAVATION (Floodway)		m^3	137,000							
		EXCAVATION (River Channel)		m^3	13,000							
		EMBANKMENT		m^3	267,700							
FW	39 + 51	FLOODWAY WEIR		L.S.	0	30	10	80				
UD	12 + 22	DELI RIVER WEIR		L.S.	0	30	10					
		REVETMENT (Concrete)		m^3	22,600	20		120				
		REVETMENT (Wet Stone Masonry)		m^3	5,120							
		SODDING		m^2	31,700							
		BRIDGE WORKS										
FW	37 + 70	F6 PIPE AND PREDESTRAIN BRIDGE	Dia. 300 mm x 2	m^2	94.8	15						
FW	38 + 78	F7 JALAN SMA BRIDGE	W = 4.5 m, L= 16.6 m	m^2	88.2	15						
UD	19 + 0	F8 Gg. SEKASAME BRIDGE	W = 2.0 m, L= 58.8 m	m^2	118	20	10	120	60		300(150)	
		DRAINAGE WORKS										
FW	38 + 50	SF7 DRAINAGE PIPE	Dia. 1000 mm	L.S.		5						
		MSICELLANEOUS WORKS				40	20	100				
			Total			175	50	420	160	200	300	2

ESTIMATED SCHEDULE OF MAJOR CONSTRUCTION WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Vol/Set	No. Set	Vol/Day	W-Day	Mo.Calc.	Mo.Est.
MFC-1		PREPARATION WORKS		L.S					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	290,600	960	3	2880	245	4.9	5.0
		STRIPPING		m^2	36,500	1150	2	2300	245	0.8	1.0
		EXCAVATION (Common)		m^3	139,600	1120	2	2240	245	3.1	3.5
		EXCAVATION (River Channel)		m^3	164,600	480	3	1440	245	5.6	6.0
		DREDGING		m^3	82,600	400	1	400	270	9.2	9.5
		EMBANKMENT		m^3	263,800	800	2	1600	187	10.6	11.0
		PARAPET WALL		m^3	1,560	48	1	48	245	1.6	2.0
		REVETMENT (Wet Stone Masonry)		m^3	2,560	17.5	1	17.5	245	7.2	7.5
		SODDING		m^2	86,100	400	2	800	245	5.3	5.5
		OTHERS									
	PE 14 + 57	JETTY (Landing Stage)		L.S		90	1	0.012	245	0.0	4.5
		MSICELLANEOUS WORKS		L.S							
MFC-2		PREPARATION WORKS		L.S.					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	528,000	960	3	2880	245	9.0	9.0
		STRIPPING		m^2	61,000	1150	3	3450	245	0.9	1.0
		EXCAVATION (Common)		m^3	340,900	1120	2	2240	245	7.5	7.5
		EXCAVATION (River Channel)		m^3	166,200	480	2	960	245	8.5	8.5
		EMBANKMENT		m^3	338,000	800	3	2400	187	9.0	9.0
	PE 55 + 0	GROUNDSILL		L.S.					215	5.0	5.0
	PE 71 + 0	BANDAR SIDORAS INTAKE WEIR		L.S.				0	245	10.0	10.0
		REVETMENT (Wet Stone Masonry)		m^3	2,680	17.5	1	17.5	245	7.5	7.5
		SODDING		m^2	175,400	400	4	1600	245	5.4	5.5
		BRIDGE WORKS									
	PE 57 + 5	P1 TITI BESI BRIDGE	W=7.0 m, L= 82.8 m	m^2	751	5	1	5	215	8.4	8.5
	PE 84 + 28	P2 PERKEBUNAN BRIDGE	W=7.0 m, L= 104.0 m	m^2	728	5	1	5	215	8.1	8.5
	PE 115 + 6	P3 TITI GANTUNG BRIDGE	W=7.0 m, L= 57.4 m	m^2	402	4	1	4	215	5.6	6.0
		DRAINAGE WORKS									
	PE 85 + 0	SL1 DRAINAGE GATE (Flap)	Dia. 600 mm					0	245	3.0	3.0
	PE 95 + 35	SL2 DRAINAGE GATE	2.0 x1.5 x 2					0	245	4.0	4.0
		OTHERS									
		MSICELLANEOUS WORKS		L.S.				0	245		

ESTIMATED SCHEDULE OF MAJOR CONSTRUCTION WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Vol/Set	No. Set	Vol/Day	W-Day	Mo.Calc.	Mo.Est.
MFC-3		PREPARATION WORKS		L.S.					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	332,400	960	3	2880	245	5.7	6.0
		STRIPPING		m^2	16,300	1150	1	1150	245	0.7	1.0
		EXCAVATION (Common)		m^3	626,300	1120	2	2240	245	13.7	14.0
		EXCAVATION (River Channel)		m^3	161,900	480	2	960	245	8.3	8.5
		EMBANKMENT		m^3	95,200	800	1	800	187	7.6	8.0
		REVETMENT (Wet Stone Masonry)		m^3	10,200	17.5	2	35	245	14.3	14.5
		SODDING		m^2	88,500	400	2	800	245	5.4	5.5
		PROTECTION WORKS									
PE 129 + 43	P4	PROTECTION WORK, TITI RUNTUH Br.							215	5.0	5.0
PE 176 + 66	P8	RPOTECTION WORK, RAILWAY Br.							215	6.0	6.0
		BRIDGE WORKS									
PE 137 + 49	P5	PAYUNG BRIDGE	W=7.0 m, L= 40.8 m	m^2	286	3	1	3	215	5.3	5.5
PE 147 + 58	P6	PENDESTRAN BRIDGE	W=2.0 m, L= 40.8 m	m^2	82	2	1	2	215	2.3	2.5
PE 169 + 59	P7	MEDAN TEMBUNG BRIDGE, /w WATER PIPE Dia.100 n	W=9.0 m, L= 40.8 m	m^2	477	4	1	4	215	6.7	7.0
PE 200 + 25	P9	MEDAN DENAI BRIDGE / w WATER PIPE Dia. 150 mm, 100 mm	W=16.0 m, L= 40.8 m	m^2	849	5	1	5	215	9.5	9.5
		DRAINAGE WORKS									
PE 138 + 55	SL3	DRAINAGE GATE	1.5 m x 1.5 m							4.0	4.0
PE 155 + 90	SL4	DRAINAGE GATE	2.0 m x 1.5 m							4.0	4.0
PE 176 + 55	SL5	DRAIAGE GATE	1.5 m x 1.5 m							4.0	4.0
PE 176 + 85	SL6	DRAINAGE BOX CULVERT	2.0 m x 1.5 m							4.0	4.0
PE 166 + 80	SR1	DRAINAGE PIPE	Dia. 800 mm x 2							3.0	3.0
PE 176 + 85	SR2	DRAINAGE PIPE	Dia. 800 mm x 2							3.0	3.0
PE 189 + 40	SL7	DRAINAGE PIPE	Dia. 800 mm							3.0	3.0
PE 198 + 35	SL8	DRAINAGE PIPE	Dia. 1000 mm x 2							3.0	3.0
PE 200 + 10	SR3	DRAINAGE DITCH	W = 600 mm							3.0	3.0
PE 200 + 25	SR4	DRAINAGE PIPE	Dia. 1000 mm							3.0	3.0
PE 200 + 25	SL9	DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
PE 200 + 40	SL10	DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
PE 206 + 0	SL11	DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
PE 206 + 55	SL12	DRAINAGE DITCH	W = 1000 mm							3.0	3.0
		OTHER WORKS									
		MSICELLANEOUS WORKS									

ESTIMATED SCHEDULE OF MAJOR CONSTRUCTION WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Vol/Set	No. Set	Vol/Day	W-Day	Mo.Calc.	Mo.Est.
MFC-4		PREPARATION WORKS		L.S.					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	228,700	960	3	2880	245	3.9	4.0
		STRIPPING		m^2	8,750	1150	1	1150	245	0.4	0.5
		EXCAVATION (Common)		m^3	342,900	1120	2	2240	245	7.5	7.5
		EXCAVATION (River Channel)		m^3	99,500	480	1	480	245	10.2	10.5
		EMBANKMENT		m^3	59,200	800	1	800	187	4.7	5.0
		REVETMENT (Wet Stone Masonry)		m^3	5,880	17.5	3	52.5	245	5.5	5.5
		SODDING		m^2	65,500	400	2	800	245	4.0	4.0
		PROTECTION WORKS									
	PE 269 + 75	P14 PROTECTION WORK, NATIONAL ROAD Br.							215	5.0	5.0
		BRIDGE WORKS									
	PE 222 + 0	P11 BINJAI BRIDGE /w WATER PIPE Dia. 400, 150 mm	W=16.0 m, L= 40.8 m	m^2	849	5	1	5	215	9.5	9.5
	PE 246 + 57	P13 AMPLAS BRIDGE /w WATER PIPE, Dia. 300, 150, 125 mm	W=16.0 m, L= 40.8 m	m^2	849	5	1	5	215	9.5	9.5
	PE 224 + 65	P12 DEMOLISHION PREDESTRIAN BRIDGE Abut.									
	PE 255 + 10	PIPE BRIDGE	Dia. 600 mm x 2								
		DRAINAGE WORKS									
	PE 212 + 0	SL13 DRAINAGE BOX CULVERT	1.5 m x 1.5 m x 2							4.0	4.0
	PE 222 + 0	SL14 DRAINAGE BOX CULVERT	2.1 m x 2.4 m x 2							4.0	4.0
	PE 246 + 40	SL16 DRAINAGE BOX CULVERT	2.0 m x 2.0 m							4.0	4.0
	PE 259 + 0	SR10 DRAINAGE BOX CULVERT	2.0 m x 2.0 m x 2							4.0	4.0
	PE 216 + 0	SR5 DRAINAGE DITCH	W = 600 mm							3.0	3.0
	PE 218 + 40	SR6 DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
	PE 222 + 15	SL15 DRAINAGE PIPE	Dia. 1000 mm							3.0	3.0
	PE 234 + 20	SR7 DRAINAGE PIPE	Dia. 800 mm							3.0	3.0
	PE 246 + 30	SR8 DRAINAGE PIPE	Dia. 800 mm							3.0	3.0
	PE 250 + 90	SL17 DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
	PE 255 + 15	SL18 DRAINAGE PIPE	Dia. 800 mm							3.0	3.0
	PE 255 + 20	SR9 DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
	PE 258 + 25	SL19 DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
	PE 259 + 60	SL20 DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
	PE 262 + 80	SL21 DRIANAGE PIPE	Dia. 1000 mm x 2							3.0	3.0
	PE 264 + 90	SL22 DRAINAGE PIPE	Dia. 600 mm							3.0	3.0
	PE 269 + 50	SL23 DRAINAGE DITCH	W = 600 mm							3.0	3.0
	PE 269 + 80	SL24 DRAINAGE DITCH	W = 600 mm							3.0	3.0
	PE 271 + 40	SR11 DRAINAGE PIPE	Dia. 800 mm							3.0	3.0
	PE 272 + 85	SR12 DRAINAGE PIPE	Dia. 1000 mm							3.0	3.0
		OTHER WORKS									
		MSICELLANEOUS WORKS									

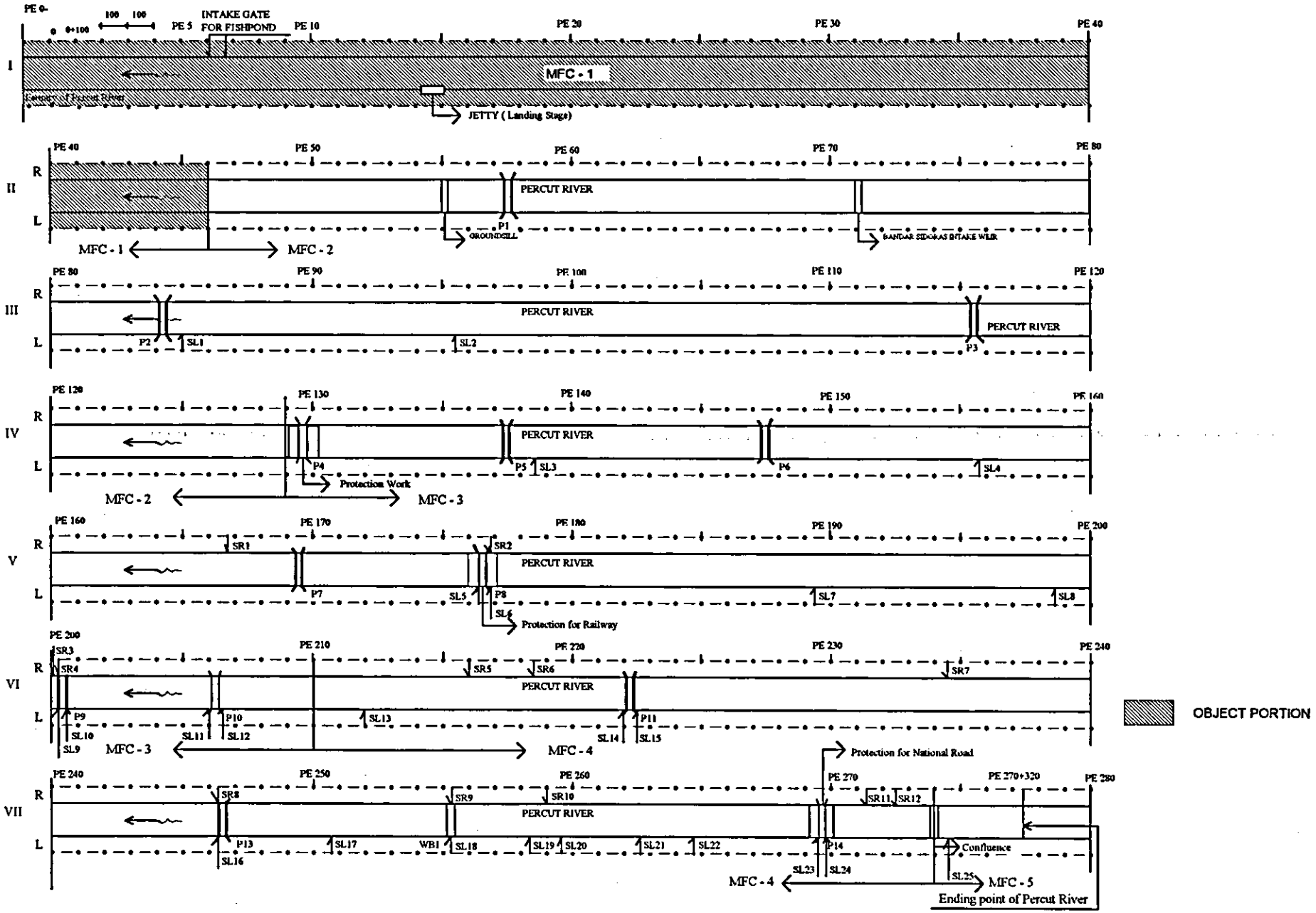
ESTIMATED SCHEDULE OF MAJOR CONSTRUCTION WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Vol/Set	No. Set	Vol/Day	W-Day	Mo.Calc.	Mo.Est.
MFC-5		PREPARATION WORKS		L.S.					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	152,900	960	3	2880	245	2.6	3.0
		STRIPPING		m^2	4,210	1150	0.5	575	245	0.4	0.5
		EXCAVATION (Floodway)		m^3	646,300	1440	3	4320	245	7.3	7.5
		EMBANKMENT		m^3	15,800	800	1	800	187	1.3	1.5
PE 274 + 27		CONFLUENCE	FW 0								
FW 3 + 0		FLOODWAY GROUNDSILL		L.S.							
		REVETMENT (Wet Stone Masonry)		m^3	19,100	17.5	6	105	245	8.9	9.0
		SODDING		m^2	35,200	400	1	400	245	4.3	4.5
		BRIDGE WORKS									
FW 6 + 90	F1	JALAN BAJAK BRIDGE	W = 7.0 m, L= 31.6 m	m^2	221	3	1	3	245	3.6	4.0
FW 20 + 45	F2	PTP-IX BRIDGE	W = 9.0 m, L= 31.6 m	m^2	284	3	1	3	245	4.6	5.0
FW 20 + 50	WB2	PIPE BRIDGE	Dia. 800 mm							3.0	3.0
		DRAINAGE WORKS									
PE 274 + 55	SL25	DRAINAGE PIPE	Dia. 800 mm							3.0	3.0
FW 9 + 81	SF2	DRAINAGE BOX CULVERT, FALLING WORKS	2.0 m x 2.0 m							4.0	4.0
FW 6 + 50	SF1	DRAINAGE PIPE	Dia. 1000 mm							3.0	3.0
FW 13 + 0	SF3	DRIANAGE PIPE	Dia. 1000 mm							3.0	3.0
FW 16 + 0	SF4	DRIANAGE PIPE	Dia. 1000 mm							3.0	3.0
		OTHER WORKS									
		MSICELLANEOUS WORKS									
MFC-6		PREPARATION WORKS		L.S.					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	63,200	960	1.5	1440	245	2.1	2.5
		STRIPPING		m^2	2,270	1150	0.5	575	245	0.2	0.5
		EXCAVATION (Floodway)		m^3	290,200	1440	1	1440	245	9.9	10.0
		EMBANKMENT		m^3	4,620	800	0.5	400	187	0.7	1.0
		REVETMENT (Concrete)		m^3	29,800	15	6	90	245	16.2	16.5
		REVETMENT (Wet Stone Masonry)		m^3	3,140	17.5	2	35	245	4.4	4.5
		SODDING		m^2	5,680	400	1	400	245	0.7	1.0
		BRIDGE WORKS									
FW 28 + 22	F3	STM UJUNG BRIDGE	W = 9.0 m, L= 31.6 m	m^2	284	3	1	3	245	4.6	5.0
FW 32 + 0	F4	RAILWAY BRIDGE	W = 3.0 m, L= 31.6 m	m^2	95	2	1	2	245	2.3	2.5
FW 33 + 65	F5	DELI TUA BRIDGE /w WATER PIPE Dia. 350 mm	W = 16.0 m, L= 31.6 m	m^2	506	4	1	4	245	6.2	6.5
FW 24 + 70	WB3	PIPE BRIDGE IRREGATION Dia. 300 mm	Dia. 300 mm							4.0	4.0
FW 32 + 0	WB4	PIPE BRIDGE Dia. 600, 300 mm	Dia. 600, 300 mm							4.0	4.0
FW 25 + 24	SF5	BATUAN RIVER, BOX CULVERT, FALLING WORKS	2.0 m x 2.0 m x 2							4.0	4.0
FW 30 + 0	SF6	DRAINAGE PIPE	Dia. 1000 mm							3.0	3.0
		OTHER WORKS									
		MSICELLANEOUS WORKS									

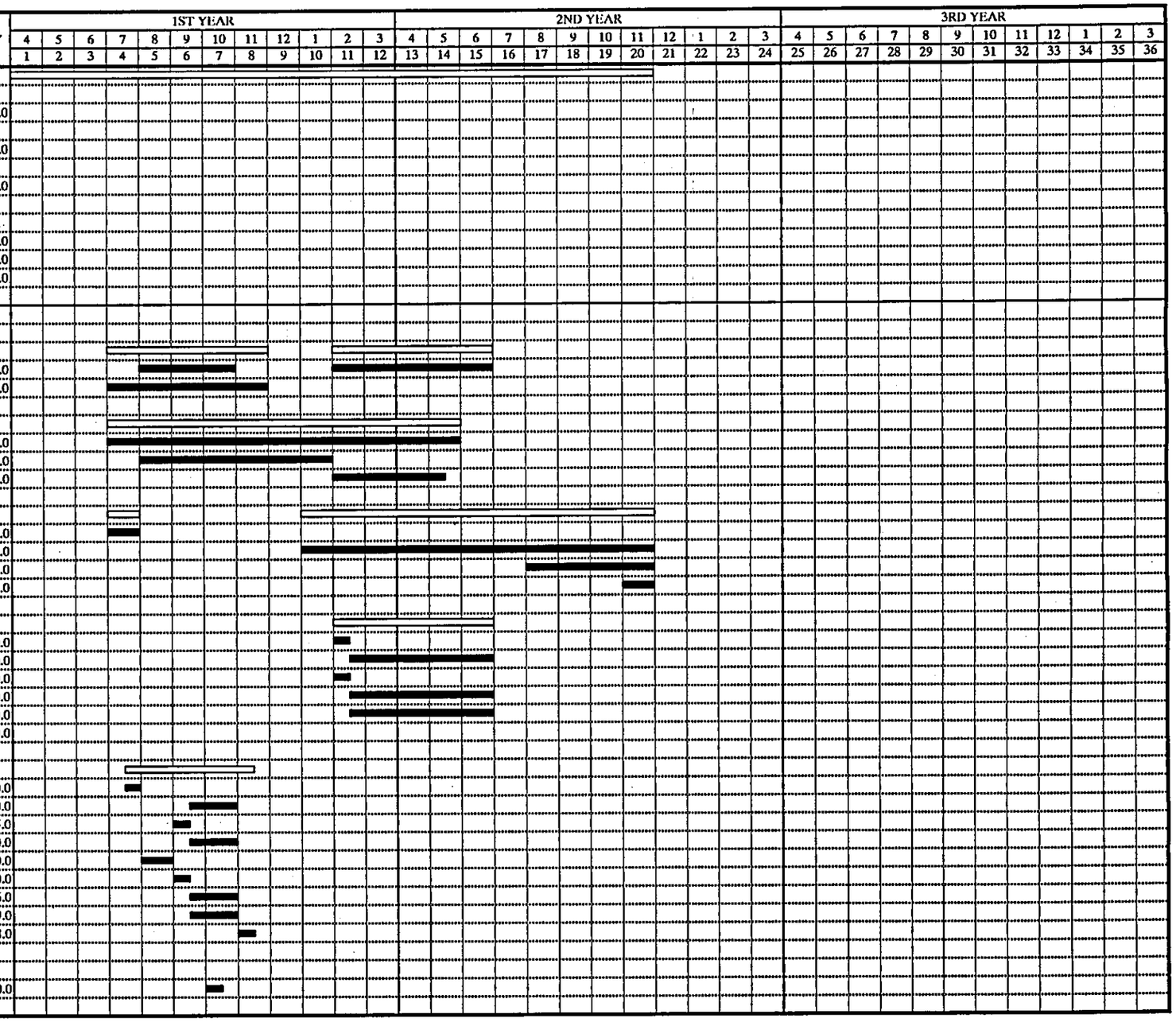
ESTIMATED SCHEDULE OF MAJOR CONSTRUCTION WORKS

Station Number		Civil Works / Structure Name	Remarks	Unit	Quantity	Vol/Set	No. Set	Vol/Day	W-Day	Mo.Calc.	Mo.Est.
MFC-7		PREPARATION WORKS		L.S.					245		
		RIVER WORKS									
		CLEARING AND GRUBBING		m^2	143,700	960	1.5	1440	245	4.9	5.0
		STRIPPING		m^2	24,800	1150	1	1150	245	1.1	1.5
		EXCAVATION (Common)		m^3	40,500	1120	1	1120	245	1.8	2.0
		EXCAVATION (Floodway)		m^3	137,000	1440	1	1440	246	4.6	5.0
		EXCAVATION (River Channel)		m^3	13,000	480	1	480	245	1.3	1.5
		EMBANKMENT		m^3	267,700	800	2	1600	187	10.7	11.0
FW	39 + 51	FLOODWAY WEIR		L.S.						12.0	12.0
UD	12 + 22	DELI RIVER WEIR		L.S.						11.0	11.0
		REVETMENT (Concrete)		m^3	22,600	15	7	105	245	10.5	10.5
		REVETMENT (Wet Stone Masonry)		m^3	5,120	17.5	3	52.5	245	4.8	5.0
		SODDING		m^2	31,700	400	2	800	245	1.9	2.0
		BRIDGE WORKS									
FW	37 + 70	F6 PIPE AND PREDESTRAIN BRIDGE	Dia. 300 mm x 2	m^2	94.8	2	1	2	245	2.3	3.0
FW	38 + 78	F7 JALAN SMA BRIDGE	W = 4.5 m, L= 16.6 m	m^2	88.2	3	1	3	245	1.4	4.0
UD	19 + 0	F8 Gg. SEKASAME BRIDGE	W = 2.0 m, L= 58.8 m	m^2	118	2	1	2	215	3.3	3.5
		DRAINAGE WORKS									
FW	38 + 50	SF7 DRAINAGE PIPE	Dia. 1000 mm	L.S.						4.0	4.0
		MSICELLANEOUS WORKS									

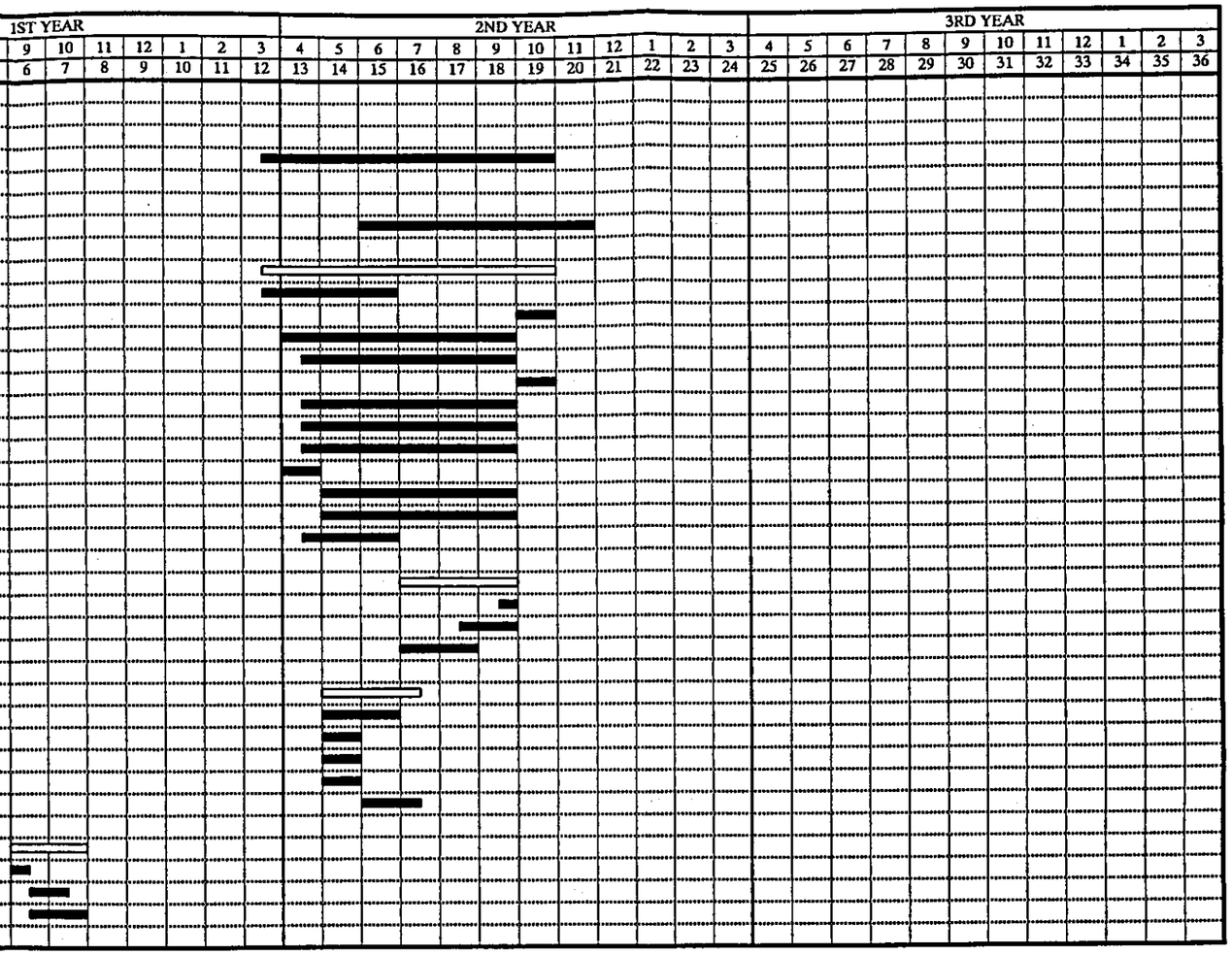
A. PERCUT RIVER



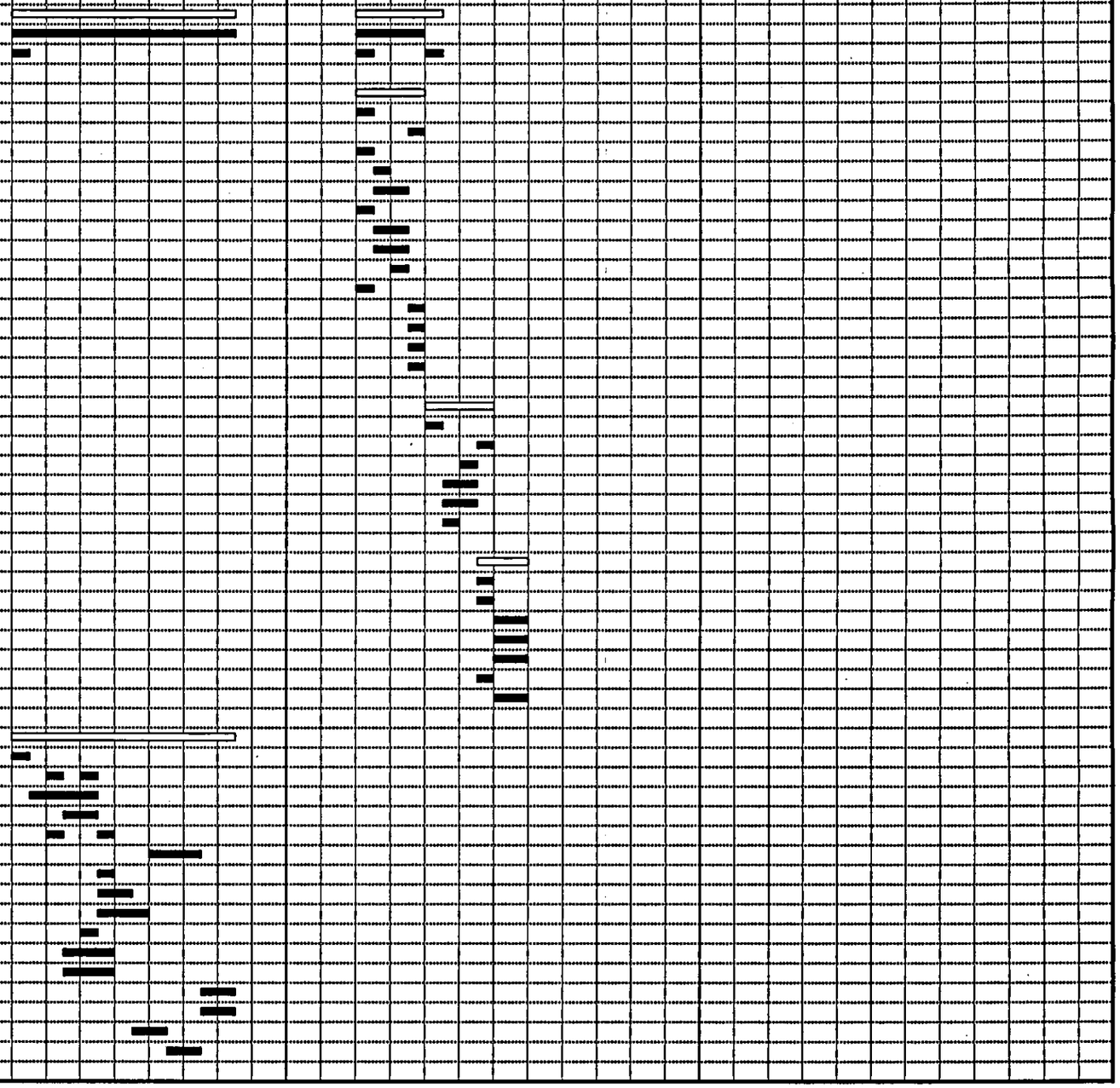
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
A	GENERAL		
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1.0
A2	ESTABLISHMENT	L.S.	1.0
A3	RELOCATION OF EXISTING FACILITIES	P.S	1.0
A4	GEOLOGICAL INVESTIGATION		
A.4.1	Hand Auger	m	100.0
A.4.2	Mechanical Boring	m	140.0
A.4.3	Exploratory Excavation	m^3	400.0
B	CHANNEL AND DIKE WORKS		
B1	PREPARATION WORKS		
B1.1	Coffering and Dewatering	L.S.	1.0
B1.2	Clearing and Grubbing	m^2	290,600.0
B2	CHANNEL EXCAVATION		
B2.1	Dredging (Rivermouth to PE14)	m^3	82,600.0
B2.2	Excavation (River Channel)	m^3	164,600.0
B2.3	Excavation (Common)	m^3	139,600.0
B3	EARTH DIKE WORKS		
B3.1	Stripping of Top Soil	m^3	36,500.0
B3.2	Embankment	m^3	263,800.0
B3.3	Gravel Pavement, 200 mm thick	m^2	4,250.0
B3.4	Maintenance Marker Post	nos.	45.0
B4	PARAPET WALL ON DIKE (PE14L-10 to PE33)		
B4.1	Excavation (Common)	m^3	2,080.0
B4.2	Wet Stone Masonry (1:3) for Revetment	m^3	1,560.0
B4.3	Crusher Run Bedding	m^3	210.0
B4.4	Elastic Joint Filler, 10 mm thick	m^2	150.0
B4.5	Water Stop, 30 cm wide	m	250.0
B4.6	Backfill with Selected Soil	m^3	1,120.0
B5	FLOOD RETAINING WALL (PE17L-6.5m to PE18+20m)		
B5.1	Excavation (Common)	m^3	290.0
B5.2	Concrete, Type C1	m^3	270.0
B5.3	Concrete, Type E	m^3	35.0
B5.4	Formwork FW1	m^2	800.0
B5.5	Supply and Driving of PC Sheet Piles, L=5.0 m	m^2	600.0
B5.6	Log Pile, Dia. 150mm, L=4.0m	m	320.0
B5.7	Elastic Joint Filler, 10 mm thick	m^2	26.0
B5.8	Water Stop, 30 cm wide	m	39.0
B5.9	Backfill with Selected Soil	m^3	48.0
B6	FILLING ON RIVER BANK		
B6.1	Soil Filling	m^3	14,000.0



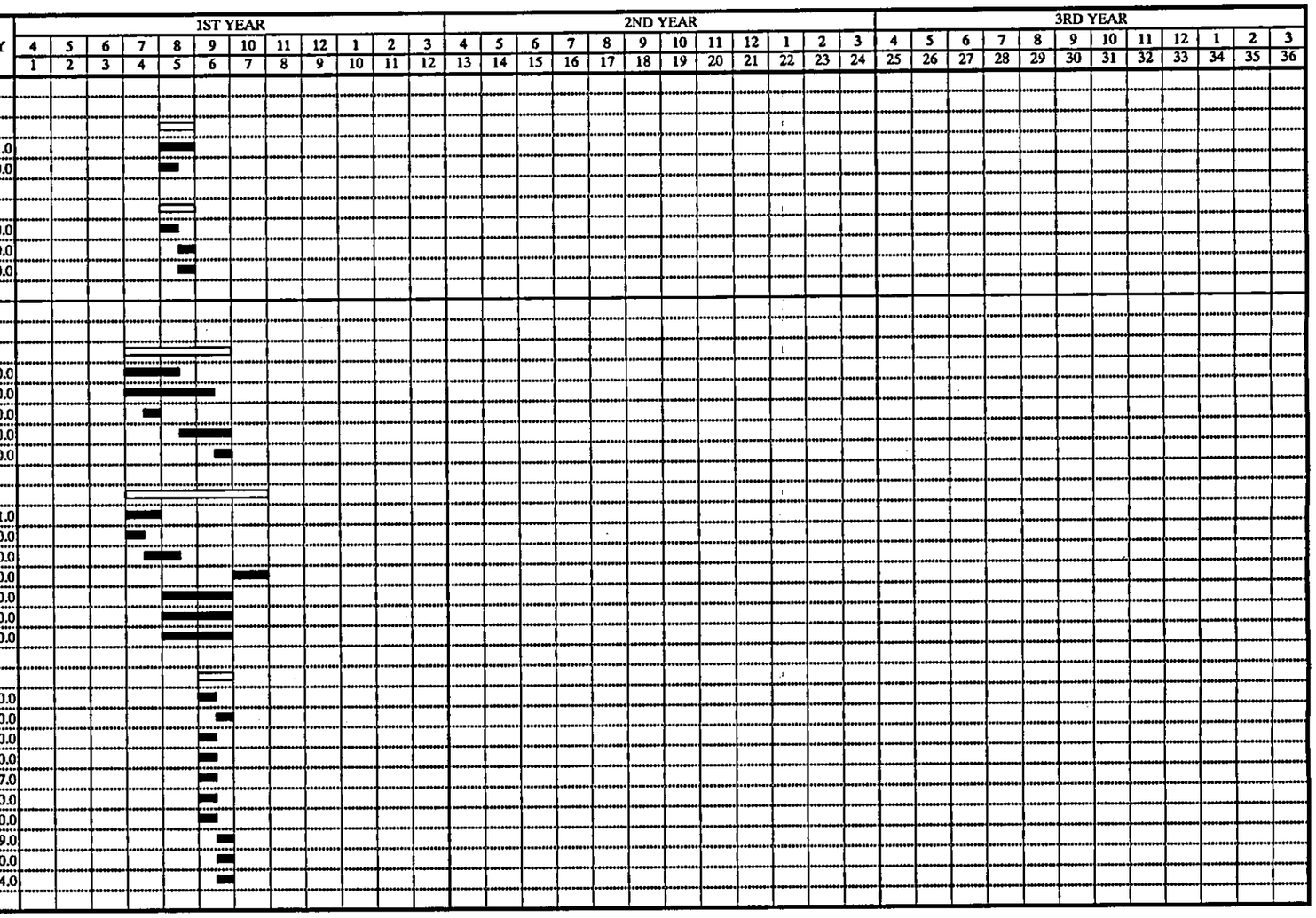
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1.0
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	86,100.0
C3	REVETMENT - WET STONE MASONRY TYPE		
C3.1	Excavation (Common)	m^3	4,640.0
C3.2	Backfill with Selected Soil	m^3	11.0
C3.3	Crusher Run Bedding	m^3	2,840.0
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	2,560.0
C3.5	Cement Mortar Plastering	m^2	8,990.0
C3.6	Concrete, Type C1	m^3	600.0
C3.7	Reinforcing Steel Bar	kg	37,800.0
C3.8	Formwork FW1	m^2	3,340.0
C3.9	Log Pile, Dia. 150 mm, L=3.0m	m	9,880.0
C3.10	Elastic Joint Filler, 10 mm thick	m^2	970.0
C3.11	Palm Fiber Filter	m^2	590.0
C3.12	Gabion Cylinder	m^3	45.0
C6	REVETMENT - GABION AND RIPRAP / RIPRAP TYPE		
C6.1	Gabion Cylinder	m^3	44.0
C6.2	Boulder Riprap, (300mm - 500mm)	m^3	5,180.0
C6.3	Boulder Riprap, (200mm - 300mm)	m^3	6,420.0
C7	GROIN (PILE TYPE)		
C7.1	RC. Piles 200mm x 200mm, including Driving	m	1,050.0
C7.2	Concrete, Type C1	m^3	2,040.0
C7.3	Reinforcing Steel Bar	kg	3,130.0
C7.4	Formwork FW1	m^2	210.0
C7.5	Boulder Riprap, (300mm - 500mm)	m^3	470.0
C13	REVETMENT RANDOM MASONRY TYPE		
C13.1	Excavation (Common)	m^3	5,030.0
C13.2	Rubble Stone Bedding	m^3	2,280.0
C13.3	Boulder Pitching, (300mm - 500mm)	m^3	4,220.0



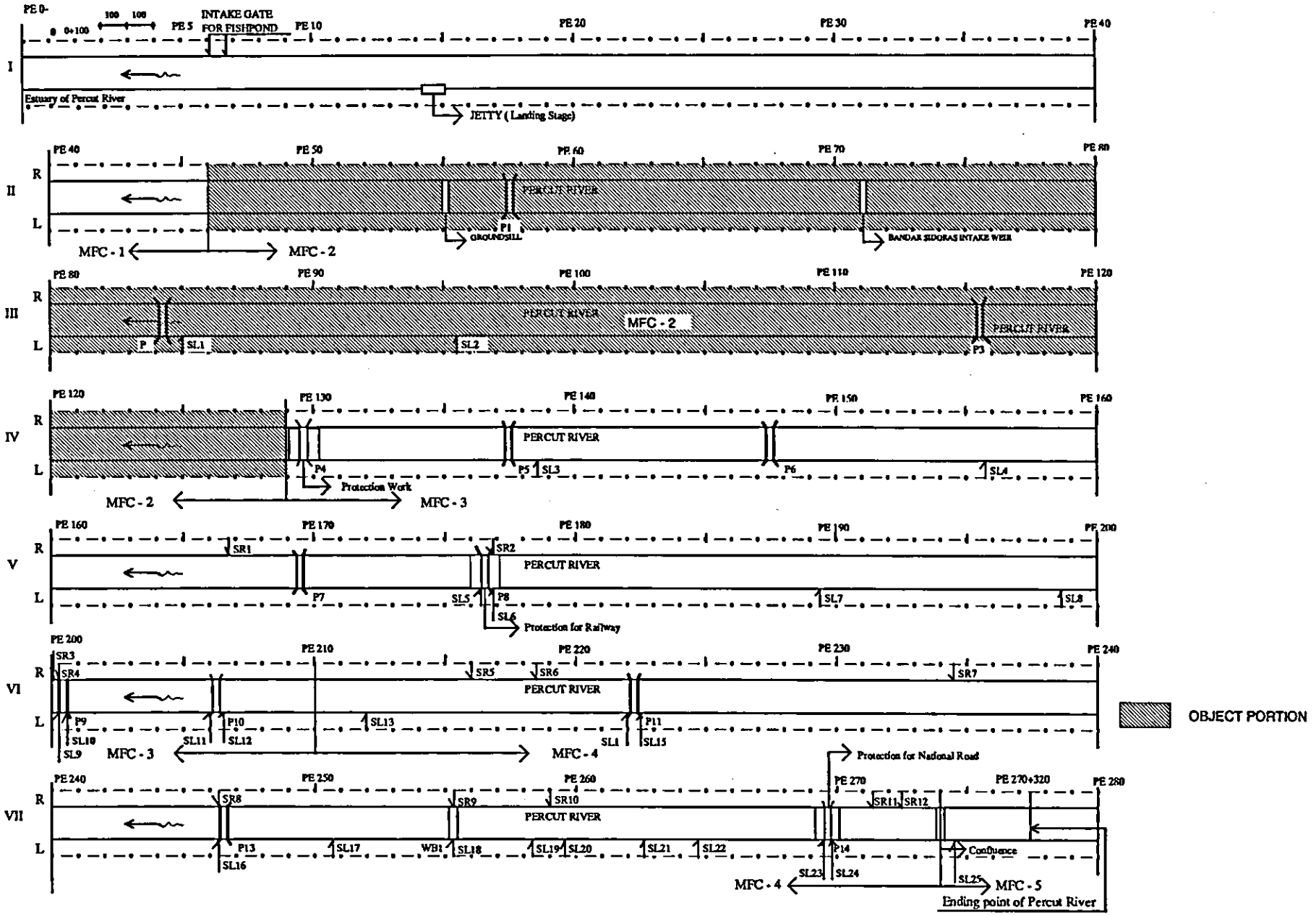
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
D	RIPARIAN STRUCTURES		
D1	PREPARATION WORKS FOR REPARIAN STRUCTURES		
D1.1	Coffering and Dewatering	L.S.	1.0
D1.2	Clearing and Grubbing	m^2	550.0
D4	APPROACH STEPS, TYPE PA (5 places)		
D4.1	Excavation (Common)	m^3	380.0
D4.2	Backfill with Selected Soil	m^3	2.0
D4.3	Log Pile, Dia. 150mm, L=3.0m & 2.0m	m	240.0
D4.4	Concrete, Type C1	m^3	6.0
D4.5	Concrete, Type D	m^3	44.0
D4.6	Concrete, Type E	m^3	4.0
D4.7	Reinforcing Steel Bar	kg	230.0
D4.8	Formwork FW1	m^2	140.0
D4.9	Wet Stone Masonry (1:4) for Revetment	m^3	35.0
D4.10	Crusher Run Bedding	m^3	56.0
D4.11	Plastering	m^2	120.0
D4.12	Gabion Mattress	m^3	75.0
D4.13	Gabion Cylinder	m^3	70.0
D4.14	Cobble Stone Filling	m^3	31.0
D5	APPROACH STEPS, TYPE PB (6 places)		
D5.1	Excavation (Common)	m^3	79.0
D5.2	Backfill with Selected Soil	m^3	9.0
D5.3	Concrete, Type C1	m^3	3.0
D5.4	Concrete, Type D	m^3	29.0
D5.5	Formwork FW1	m^2	160.0
D5.6	Crusher Run Bedding	m^3	140.0
D6	APPROACH STEPS, TYPE PC (4 places)		
D6.1	Excavation (Common)	m^3	17.0
D6.2	Log Pile, Dia. 150mm, L=3.0m	m	24.0
D6.3	Concrete, Type D	m^3	9.0
D6.4	Formwork FW1	m^2	95.0
D6.5	Wet Stone Masonry (1:3) for Revetment	m^3	17.0
D6.6	Crusher Run Bedding	m^3	6.0
D6.7	Elastic Joint Filler, 10 mm thick	m^2	4.0
D11	JETTY - LANDING STAGE AND MOORING FACILITIES(PE14+57)		
D11.1	Excavation (Common)	m^3	240.0
D11.2	Backfill with Selected Soil	m^3	170.0
D11.3	Supply and Driving of PC Sheet Piles L=4.0 m and 4.75 m	m	290.0
D11.4	Log Piles, Dia. 150mm, L=4.0m	m	370.0
D11.5	Concrete, Type C1 for Base Concrete and Top Concrete	m^3	50.0
D11.6	Concrete, Type C2 for Step	m^3	23.0
D11.7	Concrete, Type E	m^3	7.0
D11.8	Wet Stone Masonry (1:3) for Gravity Type Wall and Steps	m^3	87.0
D11.9	Concrete Block Pavement for Landing Stage	m^3	260.0
D11.10	Crusher Run Bedding	m^3	25.0
D11.11	Reinforcing Steel Bar	kg	1,750.0
D11.12	Formwork FW1	m^2	200.0
D11.13	Gabion Mattress	m^3	23.0
D11.14	Gabion Cylinder	m^3	15.0
D11.15	Mooring Post, Block Type	nos.	15.0
D11.16	Mooring Post, Pile Type	nos.	20.0



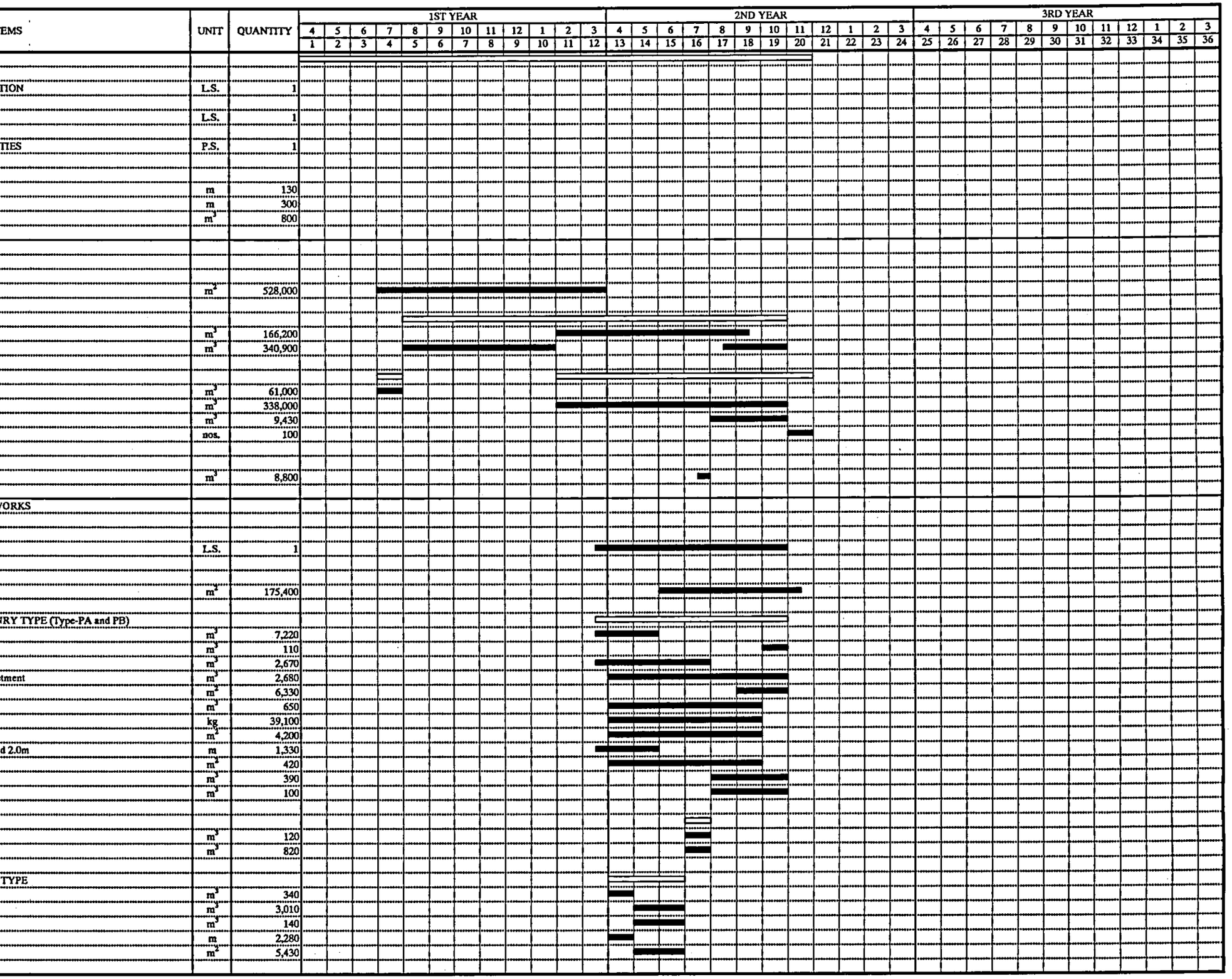
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E	DRAINAGE CHANNEL ALONG RIGHT DIKE		
E1	PREPARATION WORKS FOR DRAINAGE WORKS		
E1.1	Coffering and Dewatering	L.S.	1.0
E1.2	Clearing and Grubbing	m^2	15,900.0
E22	EARTH DRAINAGE CHANNEL (PE8+90m to PE32R+65m)		
E22.1	Stripping	m^2	190.0
E22.2	Excavation (Common)	m^3	8,460.0
E22.3	Embankment	m^3	310.0
I	OTHER WORKS		
I1	CHANNEL EXCAVATION FOR SUNGAI LALANG (PE0R-60 to PE8+50)		
I1.1	Clearing and Grubbing	m^2	30,900.0
I1.2	Excavation (River Channel)	m^3	31,900.0
I1.3	Stripping of Top Soil	m^2	3,020.0
I1.4	Embankment	m^3	13,300.0
I1.5	Solid Sodding	m^2	5,910.0
I3	RELOCATION OF KABUPATEN ROAD, (PE14L+70 to PE33+100)		
I3.1	Demolition and Removal of Existing Structure	L.S.	1.0
I3.2	Stripping	m^2	500.0
I3.3	Embankment	m^3	4,630.0
I3.4	Solid Sodding	m^2	4,060.0
I3.5	Sub-Base Course, (Class C)	m^3	1,310.0
I3.6	Base Course, (Class B)	m^3	870.0
I3.7	Asphalt Treatment Base, (A.T.B)	ton	1,420.0
I9	INTAKE FOR FISHPOND (PE 6R+00, PE 6+125)		
I9.1	Excavation (Common)	m^3	430.0
I9.2	Backfill with Selected Soil	m^3	420.0
I9.3	Log Pile, Dia. 150 mm, l=4.0m	m	760.0
I9.4	Concrete, Type C1	m^3	30.0
I9.5	Concrete, Type E	m^3	7.0
I9.6	Reinforcing Steel Bar	kg	2,400.0
I9.7	Formwork FW1	m^2	170.0
I9.8	Gablon Mattress	m^3	9.0
I9.9	Gablon Cylinder	m^3	10.0
I9.10	Steel Slide Gate (1m x 1m)	nos.	4.0



A. PERCUT RIVER



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
A	GENERAL		
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1
A2	ESTABLISHMENT	L.S.	1
A3	RELOCATION OF EXISTING FACILITIES	P.S.	1
A4	GEOLOGICAL INVESTIGATION		
A.4.1	Hand Auger	m	130
A.4.2	Mechanical Boring	m	300
A.4.3	Exploratory Excavation	m^3	800
B	CHANNEL AND DIKE WORKS		
B1	PREPARATION WORKS		
B1.1	Clearing and Grubbing	m^2	528,000
B2	CHANNEL EXCAVATION		
B2.1	Excavation (River Channel)	m^3	166,200
B2.2	Excavation (Common)	m^3	340,900
B3	EARTH DIKE WORKS		
B3.1	Stripping of Top Soil	m^3	61,000
B3.2	Embankment	m^3	338,000
B3.3	Gravel Pavement, 200 mm thick	m^3	9,430
B3.4	Maintenance Marker Post	nos.	100
B6	FILLING ON RIVER BANK		
B6.1	Soil Filling	m^3	8,800
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	175,400
C3	REVETMENT - WET STONE MASONRY TYPE (Type-PA and PB)		
C3.1	Excavation (Common)	m^3	7,220
C3.2	Backfill with Selected Soil	m^3	110
C3.3	Crusher Run Bedding	m^3	2,670
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	2,680
C3.5	Cement Mortar Plastering	m^2	6,330
C3.6	Concrete, Type C1	m^3	650
C3.7	Reinforcing Steel Bar	kg	39,100
C3.8	Formwork FW1	m^2	4,200
C3.9	Log Pile, Dia. 150 mm L=3.0m and 2.0m	m	1,330
C3.10	Elastic Joint Filler, 10 mm thick	m^2	420
C3.11	Gabion Cylinder	m^3	390
C3.12	Cobble Stone Filling	m^3	100
C4	GABION TYPE FOOT PROTECTION		
C4.1	Cobble Stone Filling	m^3	120
C4.2	Gabion Mattress	m^3	820
C5	REVETMENT - GABION CYLINDER TYPE		
C5.1	Excavation (Common)	m^3	340
C5.2	Gabion Cylinder	m^3	3,010
C5.3	Cobble Stone Filling	m^3	140
C5.4	Log Piles, Dia. 150 mm, L=2.0m	m	2,280
C5.5	Palm Fiber Filter	m^2	5,430

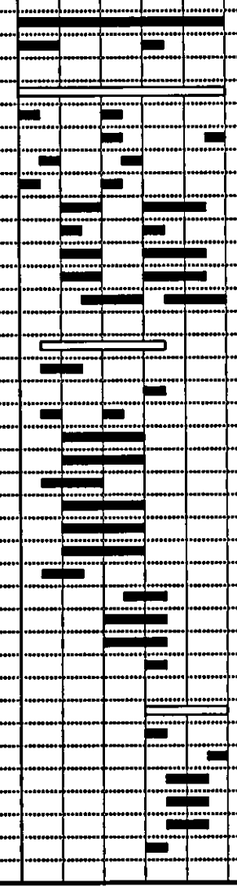


ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
D	RIPARIAN STRUCTURES		
D1	PREPARATION WORKS FOR REPARIAN STRUCTURES		
D1.1	Coffering and Dewatering	L.S.	1
D1.2	Clearing and Grubbing	m^2	550
D2	GROUND SILL (PE55+00)		
D2.1	Excavation (Common)	m^3	450
D2.2	Backfill with Selected Soil	m^3	80
D2.3	Supply and Driving of Steel Sheet Piles, Type II	m^2	130
D2.4	Supply and Driving of PC Piles, Dia. 300 mm, Type A	m	320
D2.5	Concrete, Type C1	m^3	100
D2.6	Concrete, Type E	m^3	18
D2.7	Formwork FW1	m^2	79
D2.8	Reinforcing Steel Bar	kg	92
D2.9	Gabion Mattress	m^3	180
D4	APPROACH STEPS, TYPE PA (24 place)		
D4.1	Excavation (Common)	m^3	1,810
D4.2	Backfill with Selected Soil	m^3	12
D4.3	Log Pile, Dia. 150mm, L=3.0m and 2.0m	m	1,150
D4.4	Concrete, Type C1	m^3	29
D4.5	Concrete, Type D	m^3	210
D4.6	Concrete, Type E	m^3	20
D4.7	Reinforcing Steel Bar	kg	1,090
D4.8	Formwork FW1	m^2	670
D4.9	Wet Stone Masonry (1:4) for Revetment	m^3	170
D4.10	Crusher Run Bedding	m^3	270
D4.11	Plastering	m^3	570
D4.12	Gabion Mattress	m^3	360
D4.13	Gabion Cylinder	m^3	330
D4.14	Cobble Stone Filling	m^3	150
D5	APPROACH STEPS, TYPE PB (26 place)		
D5.1	Excavation (Common)	m^3	290
D5.2	Backfill with Selected Soil	m^3	22
D5.3	Concrete, Type C1	m^3	15
D5.4	Concrete, Type D	m^3	100
D5.5	Formwork FW1	m^2	610
D5.6	Crusher Run Bedding	m^3	99

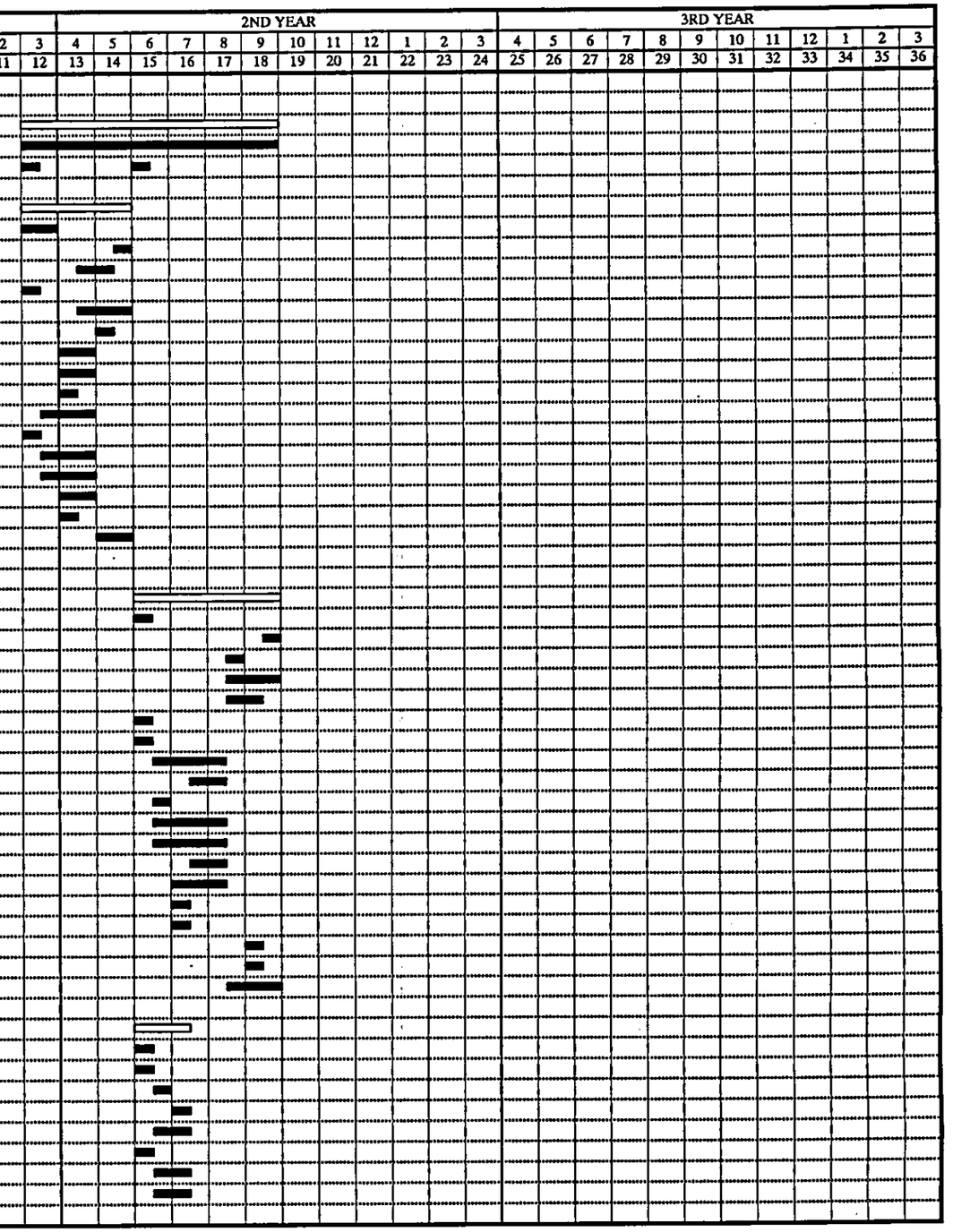
1ST YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
1	2	3	4	5	6	7	8	9	10	11	12	

2ND YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
13	14	15	16	17	18	19	20	21	22	23	24	

3RD YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
25	26	27	28	29	30	31	32	33	34	35	36	

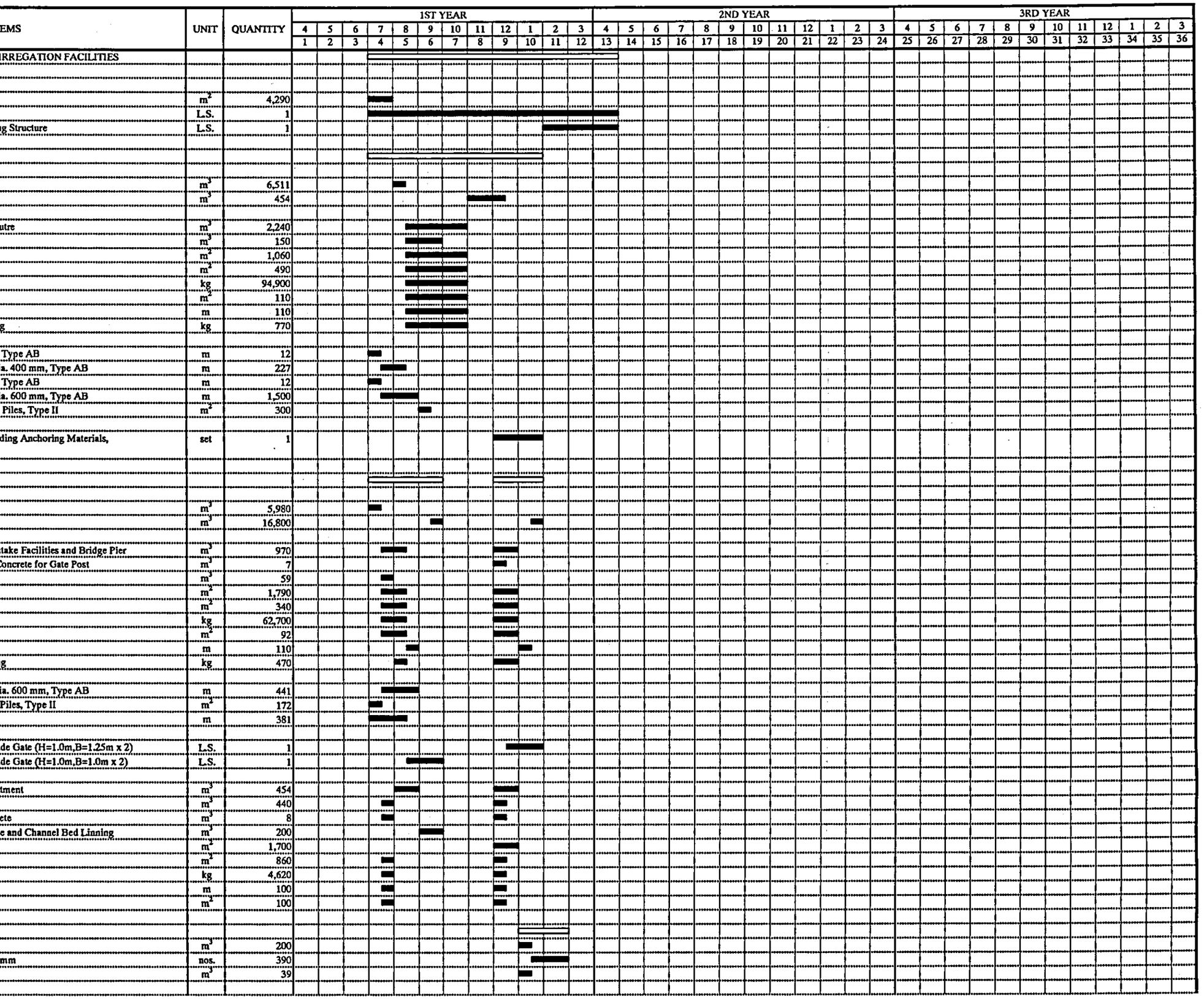


ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E	DRAINAGE CHANNEL AND OUTLET WORKS		
E1	PREPARATION WORKS FOR DRAINAGE WORKS		
E1.1	Coffering and Dewatering	L.S.	1
E1.2	Clearing and Grubbing	m^2	280
E2	DRAINAGE OUTLET SL1, PIPE CULVERT WITH FLAP GATE		
E2.1	Excavation (Common)	m^3	1,300
E2.2	Backfill with Selected Soil	m^3	220
E2.3	Crusher Run Bedding	m^3	150
E2.4	Log Pile, Dia. 150 mm, L=3.0 m	m	220
E2.5	Wet Stone Masonry (1:4) for Revetment	m^3	130
E2.6	Cement Mortar Plastering	m^2	510
E2.7	Weep Hole, Dia. 50 mm	nos.	74
E2.8	Dowel Bar, Dia. 19 mm, L=600 mm	kg	5
E2.9	Water Stop, 30 cm	m	2
E2.10	Concrete, Type C2	m^3	93
E2.11	Concrete, Type E	m^3	5
E2.12	Reinforcing Steel Bar	kg	3,600
E2.13	Formwork FW1	m^2	420
E2.14	Formwork FW2	m^2	1
E2.15	Elastic Joint Filler, 10 mm thick	m^2	30
E2.16	RC Pipe, D=600mm	m	22
E2.17	Supply and Installation of Flap Gate, Dia.600 mm	L.S.	1
E3	DRAINAGE OUTLET SL2, BOX CULVERT WITH SLUICE GATE		
E3.1	Excavation (Common)	m^3	540
E3.2	Backfill with Selected Soil	m^3	600
E3.3	Crusher Run Bedding	m^3	42
E3.4	Wet Stone Masonry (1:4) for Revetment	m^3	100
E3.5	Cement Mortar Plastering	m^2	280
E3.6	Supply and Driving of 'Steel Sheet Piles, Type II	m^2	19
E3.7	Log Pile, Dia. 150 mm, L=3.0 m	m	100
E3.8	Concrete, Type C1	m^3	130
E3.9	Concrete, Type C2	m^3	57
E3.10	Concrete, Type E	m^3	35
E3.11	Reinforcing Steel Bar	kg	11,900
E3.12	Formwork FW1	m^2	460
E3.13	Formwork FW2	m^2	75
E3.14	Dowel Bar	kg	14
E3.15	Elastic Joint Filler, 10 mm thick	m^2	2
E3.16	Water Stop, 30 cm wide	m	6
E3.17	Handrail, Galvanized Steel Pipe	kg	300
E3.18	Galvanized Steel Ladder	kg	31
E3.19	Supply and Installation of Steel Slide Gates (H=1.5m, B=2.0m)	L.S.	1
E21	DRAINAGE DITCH CONNECTING TO DRAINAGE OUTLETS		
E21.1	Excavation (Common)	m^3	600
E21.2	Crusher Run Bedding	m^3	41
E21.3	Wet Stone Masonry (1:4) for Revetment	m^3	41
E21.4	Cement Mortar Plastering	m^2	160
E21.5	Concrete, Type C2	m^3	45
E21.6	Concrete, Type E	m^3	5
E21.7	Reinforcing Steel Bar	kg	870
E21.8	Formwork FW1	m^2	80



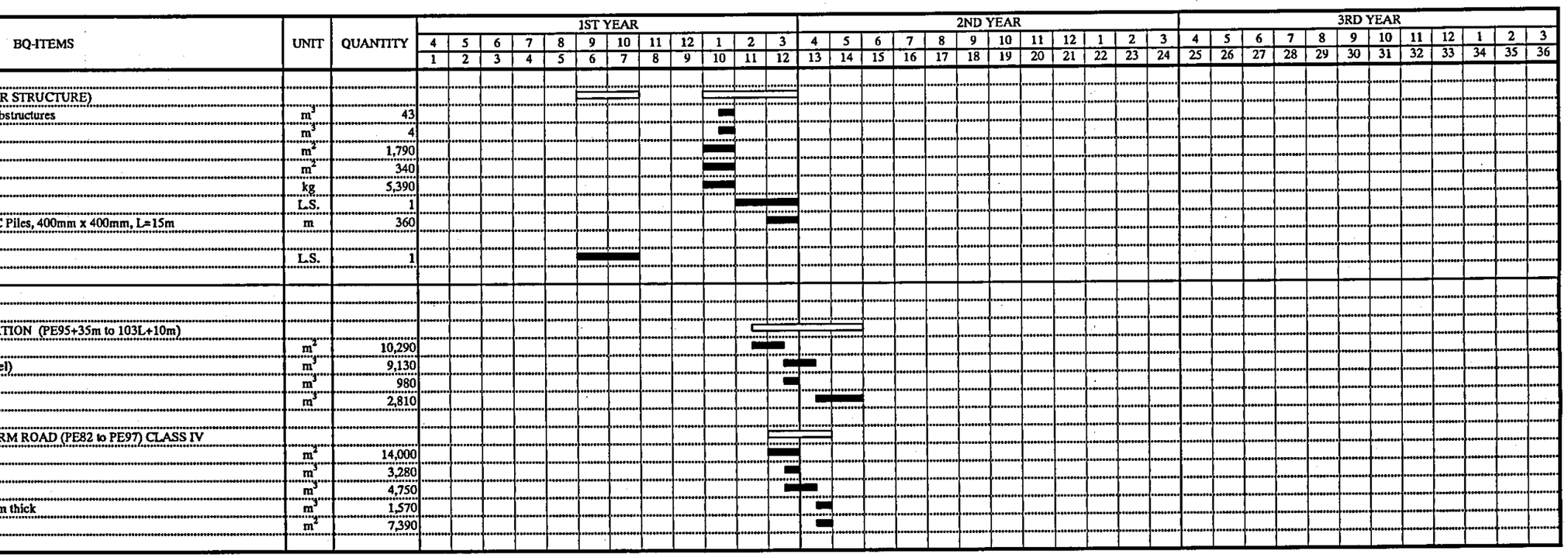
MFC - 2

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
F.	BANDAR SIDORAS INTAKE WEIR AND IRREGATION FACILITIES		
F1	PREPARATION WORKS		
F1.1	Clearing and Grubbing	m^2	4,290
F1.2	Coffering and Dewatering	L.S.	1
F1.3	Demolition and Removal of Existing Structure	L.S.	1
F2	INFLATABLE RUBBER-MADE DAM		
	EARTH WORKS		
F2.1	Excavation (Common)	m^3	6,511
F2.2	Backfill with Selected Soil	m^3	454
	CONCRETE WORKS		
F2.3	Concrete, Type C1 for Main Structutre	m^3	2,240
F2.4	Concrete, Type E	m^3	150
F2.5	Formwork FW1	m^2	1,060
F2.6	Formwork FW2	m^2	490
F2.7	Reinforcing Steel Bar	kg	94,900
F2.8	Elastic Joint Filler, 10 mm thick	m^2	110
F2.9	Water Stop, 30 cm wide	m	110
F2.10	Dowel Bars, Dia. 19mm, 1.0 m long	kg	770
	PILE WORKS		
F2.11	PC Pile for Test Pile, Dia.400 mm, Type AB	m	12
F2.12	Supply and Driving of PC Piles, Dia. 400 mm, Type AB	m	227
F2.13	PC Pile for Test Pile, Dia.600 mm, Type AB	m	12
F2.14	Supply and Driving of PC Piles, Dia. 600 mm, Type AB	m	1,500
F2.15	Supply and Driving of 'Steel Sheet Piles, Type II	m^2	300
	INFLATABLE RUBBER-MADE DAM		
F2.16	Inflatable Rubber-made Dam including Anchoring Materials, Operating and Electric Equipment	set	1
F3	IRRIGATION INTAKE FACILITIES		
	EARTH WORKS		
F3.1	Excavation (Common)	m^3	5,980
F3.2	Backfill with Selected Soil	m^3	16,800
	CONCRETE WORKS		
F3.3	Concrete, Type C1 for Irrigation Intake Facilities and Bridge Pier	m^3	970
F3.4	Concrete, Type C2 for Block-out Concrete for Gate Post	m^3	7
F3.5	Concrete, Type E	m^3	59
F3.6	Formwork FW1	m^2	1,790
F3.7	Formwork FW2	m^2	340
F3.8	Reinforcing Steel Bar	kg	62,700
F3.9	Elastic Joint Filler, 10 mm thick	m^2	92
F3.10	Water Stop, 30 cm wide	m	110
F3.11	Dowel Bars, Dia. 19mm, 1.0 m long	kg	470
	PILE WORKS		
F3.12	Supply and Driving of PC Piles, Dia. 600 mm, Type AB	m	441
F3.13	Supply and Driving of Steel Sheet Piles, Type II	m^2	172
F3.14	Log Pile	m	381
	CONTROL GATES		
F3.15	Supply and Installation of Steel Slide Gate (H=1.0m,B=1.25m x 2)	L.S.	1
F3.16	Supply and Installation of Steel Slide Gate (H=1.0m,B=1.0m x 2)	L.S.	1
	IRRIGATION CHANNEL LINNING		
F3.17	Wet Stone Masonry (1:4) for Revetment	m^3	454
F3.18	Crusher Run Bedding	m^3	440
F3.19	Concrete, Type C1 for Base Concrete	m^3	8
F3.20	Concrete, Type C2 for top Concrete and Channel Bed Linning	m^3	200
F3.21	Cement Mortar Plastering	m^2	1,700
F3.22	Formwork FW1	m^2	860
F3.23	Reinforcing Steel Bar	kg	4,620
F3.24	PVC Pipe Drain, Dia. 50 mm	m	100
F3.25	Elastic Joint Filler, 10mm thick	m^2	100
F4	CHANNEL PROTECTION WORKS		
F4.1	Excavation (Common)	m^3	200
F4.2	Concrete Block, Crib Type, t=200 mm	nos.	390
F4.3	Crusher Run Bedding	m^3	39



MFC - 2

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
F5	MAINTENANCE FACILITIES		
	INSPECTION BRIDGE (SUPER STRUCTURE)		
F5.1	Concrete, Type C2 for Substructures	m^3	43
F5.2	Concrete, Type E	m^3	4
F5.3	Formwork FW1	m^2	1,790
F5.4	Formwork FW2	m^2	340
F5.5	Reinforcing Steel Bar	kg	5,390
F5.6	Steel Girder	L.S.	1
F5.7	Supply and Driving of RC Piles, 400mm x 400mm, L=15m	m	360
	CONTROL HOUSE		
F5.8	Control House	L.S.	1
I	OTHER WORKS		
I2	DRAINAGE CHANNEL EXCAVATION (PE95+35m to 103L+10m)		
I2.1	Clearing and Grubbing	m^2	10,290
I2.2	Excavation (River Channel)	m^3	9,130
I2.3	Stripping of Top Soil	m^3	980
I2.4	Embankment	m^3	2,810
I4	RELOCATION OF EXISTING FARM ROAD (PE82 to PE97) CLASS IV		
I4.1	Clearing and Grubbing	m^2	14,000
I4.2	Stripping of Top Soil	m^3	3,280
I4.3	Embankment	m^3	4,750
I4.4	Gravel Pavement, 200 mm thick	m^3	1,570
I4.5	Sodding	m^2	7,390



Construction Schedule of Precast Concrete Bridge

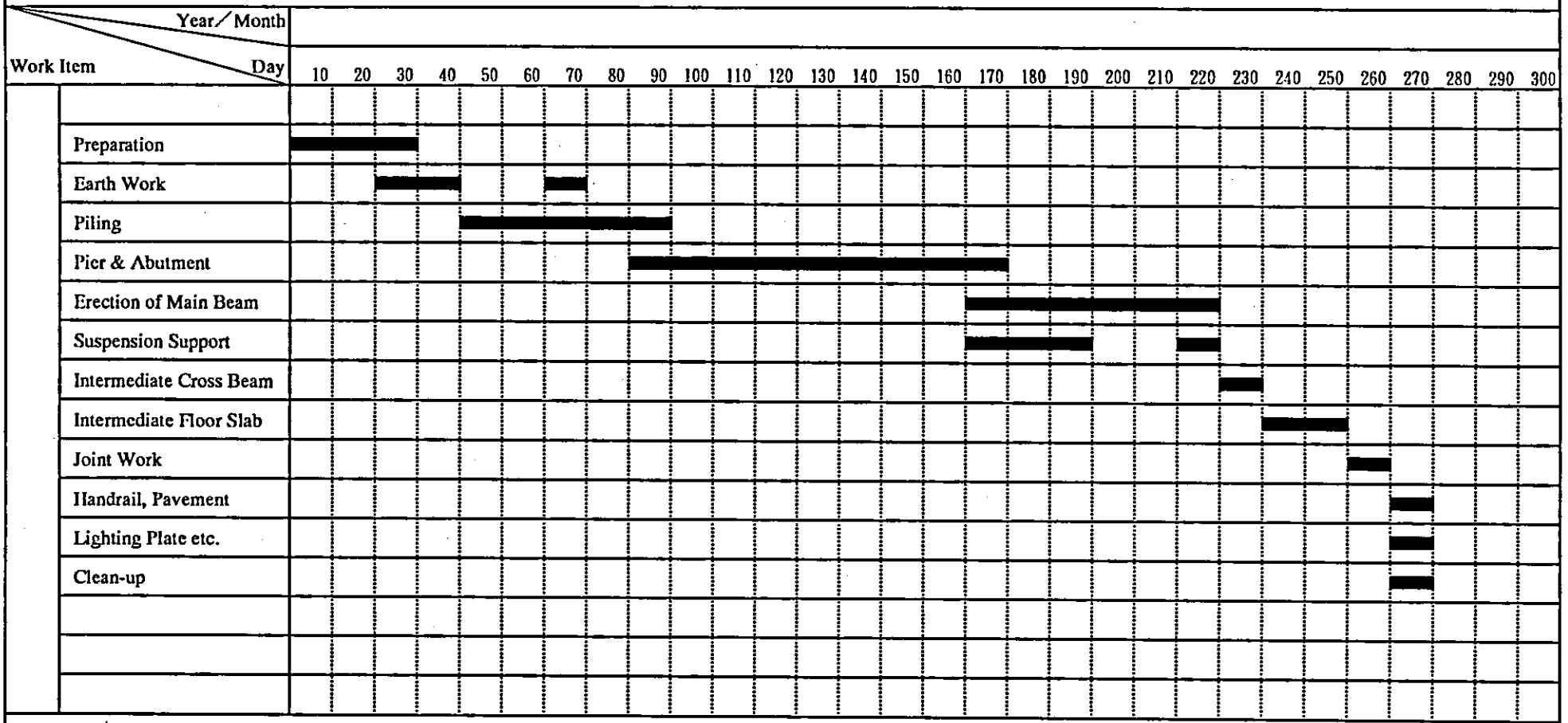
Bridge Number (P1)

Bridge Length 84.0m　　Width 7.0m

Pile Length 12.0, 18.5m　　Pile Number 4@28=112nos.

Span Pitch 25.6+31.6+25.6=82.8m (3spans)

Number of Main Beam 5+5+5



Preparation work are including demolish the existing structure, clearing / grubbing and temporary bridge.

1 Temporary Bridge 80.0x6.0=480.0m^2

2 Coffering and Dewatering 160m (2 loc.)

3 Demolish of Existing Structure 40.0x2.0x1=80m^3

Construction Schedule of Precast Concrete Bridge

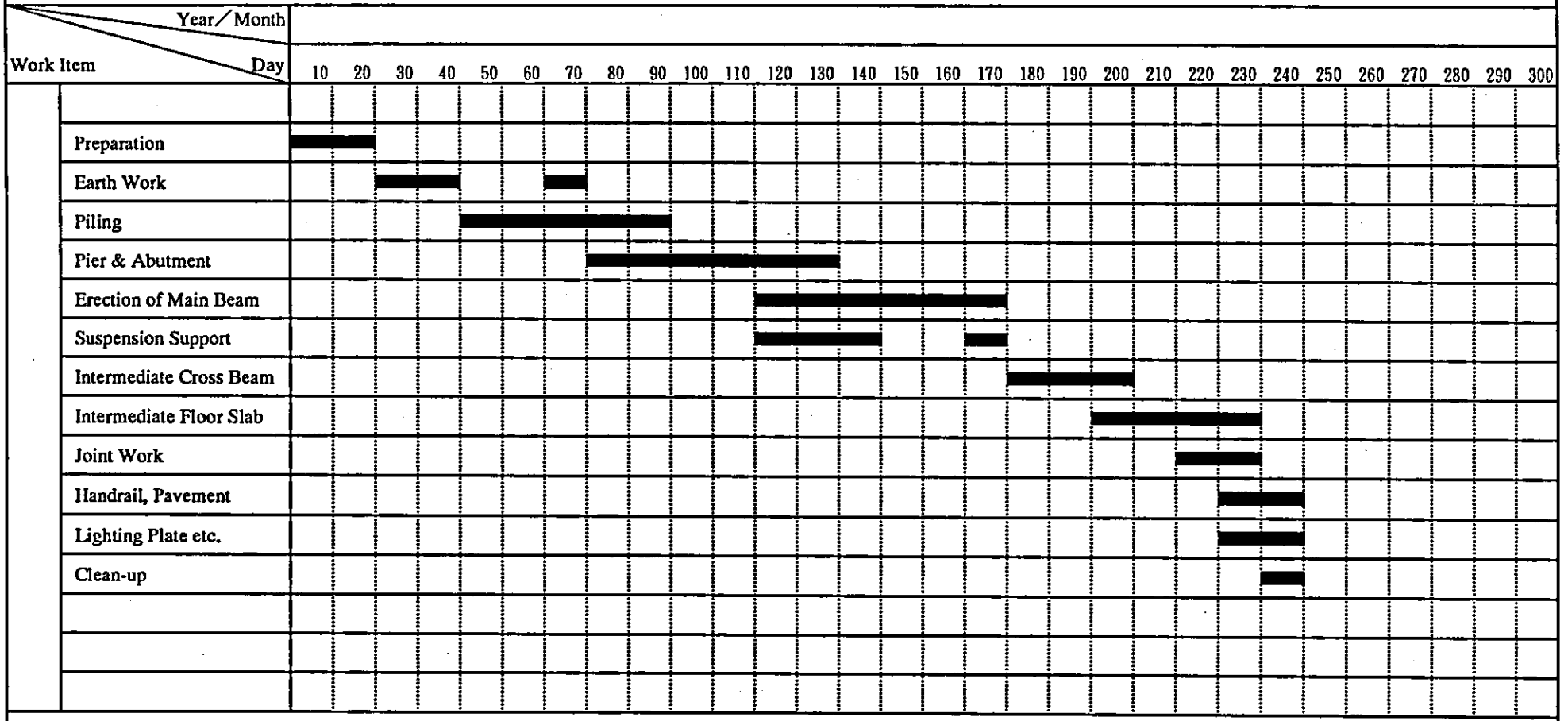
Bridge Number (P2)

Bridge Length 104.0m Width 7.0m

Pile Length 15.0, 14.0m Pile Number 112nos.

Span Pitch 31.6+40.6+31.6=103.8m (3spans)

Number of Main Beam 5+6+5=16



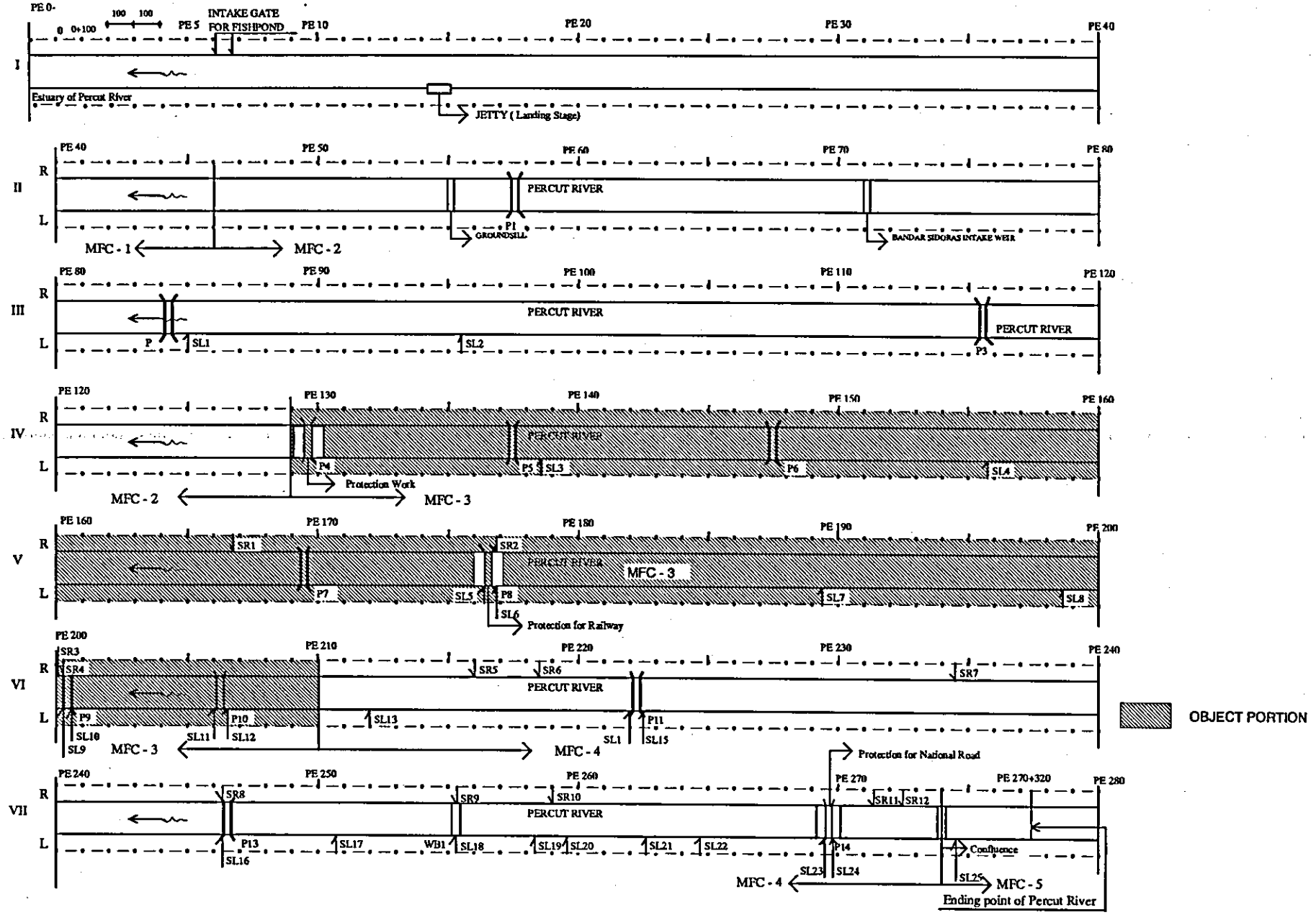
Preparation work are including demolish the existing structure, and clearing / grubbing.

1 Temporary Bridge 40.0x10x1=400.0m^3

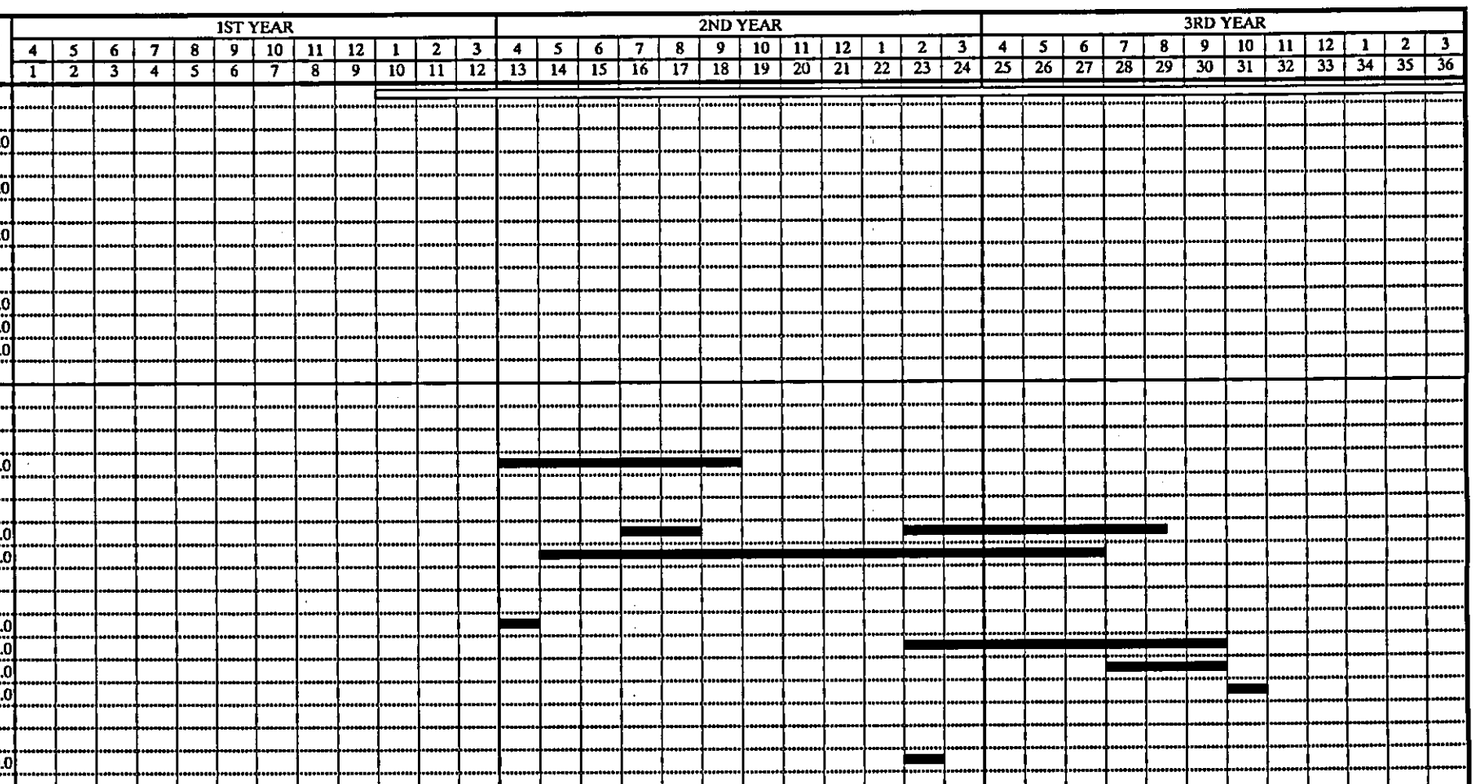
2 Clearing and Grubbing 31.6x10x2=632.0m^2

3 Coffering and Dewatering 100m (2 loc.)

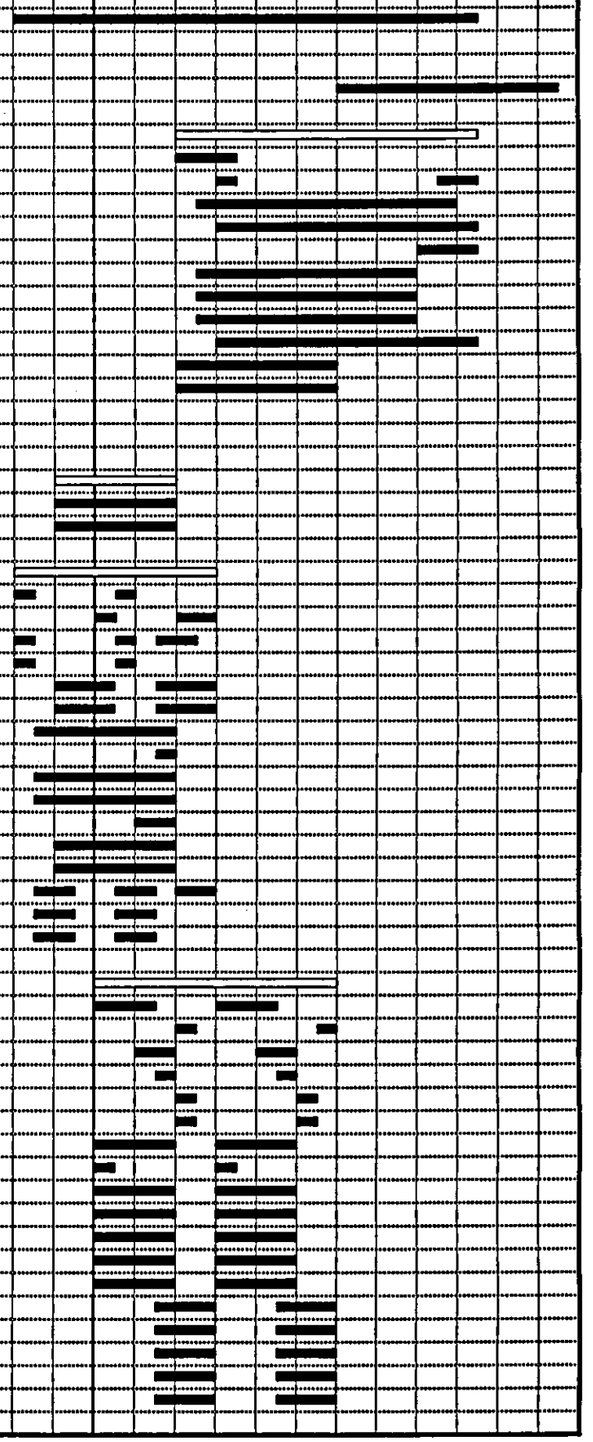
A. PERCUT RIVER



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
A	GENERAL		
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1.0
A2	ESTABLISHMENT	L.S.	1.0
A3	RELOCATION OF EXISTING FACILITIES	P.S.	1.0
A4	GEOLOGICAL INVESTIGATION		
A.4.1	Hand Auger	m	150.0
A.4.2	Mechanical Boring	m	300.0
A.4.3	Exploratory Excavation	m^3	400.0
B	CHANNEL AND DIKE WORKS		
B1	PREPARATION WORKS		
B1.1	Clearing and Grubbing	m^2	332,400.0
B2	CHANNEL EXCAVATION		
B2.1	Excavation (River Channel)	m^3	161,900.0
B2.2	Excavation (Common)	m^3	626,300.0
B3	EARTH DIKE WORKS		
B3.1	Stripping of Top Soil	m^3	16,300.0
B3.2	Embankment	m^3	95,200.0
B3.3	Gravel Pavement, 200 mm thick	m^2	8,230.0
B3.4	Maintenance Marker Post	nos.	40.0
B6	FILLING ON RIVER BANK		
B6.1	Soil Filling	m^3	27,500.0



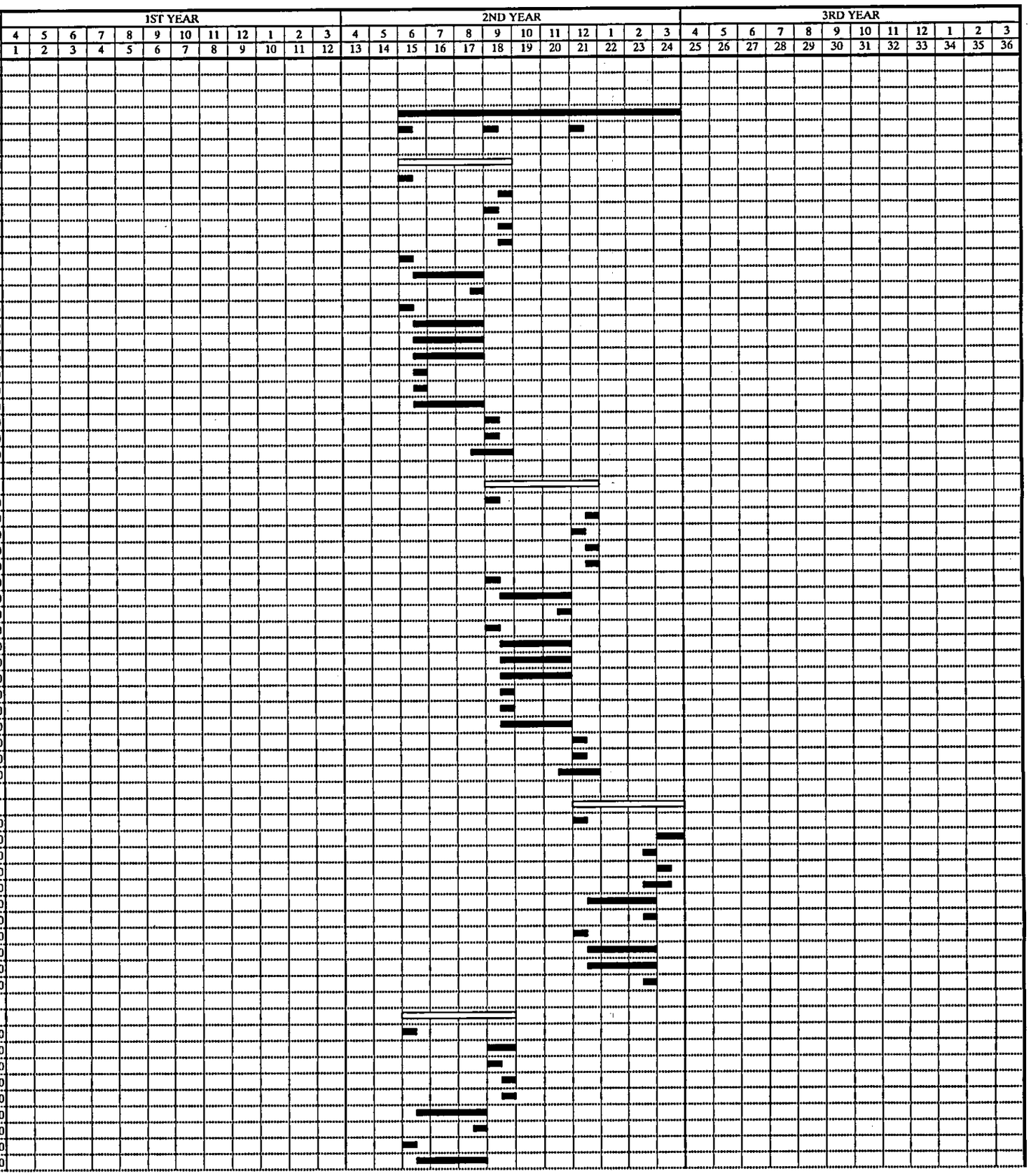
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1.0
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	88,500.0
C3	REVETMENT - WET STONE MASONRY TYPE		
C3.1	Excavation (Common)	m^3	28,500.0
C3.2	Backfill with Selected Soil	m^3	220.0
C3.3	Crusher Run Bedding	m^3	11,300.0
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	10,200.0
C3.5	Cement Mortar Plastering	m^2	39,300.0
C3.6	Concrete, Type C1	m^3	1,960.0
C3.7	Reinforcing Steel Bar	kg	138,300.0
C3.8	Formwork FW1	m^2	13,700.0
C3.9	Weep Hole, Dia 50 mm, including Filter Cloth	nos.	4,700.0
C3.10	Log Pile, Dia. 150 mm L=2.0m	m	4,440.0
C3.11	Elastic Joint Filler, 10 mm thick	m^2	4,420.0
C3.12	Gabion Cylinder	m^3	1,070.0
C3.13	Cobble Stone Filling	m^3	360.0
C4	GABION TYPE FOOT PROTECTION		
C4.1	Cobble Stone Filling	m^3	590.0
C4.2	Gabion Mattress	m^3	3,800.0
C8	PROTECTION WORKS FOR TITI RUNTUH BRIDGE (PE129+43m)		
C8.1	Excavation (Common)	m^3	2,210.0
C8.2	Backfill with Selected Soil	m^3	89.0
C8.3	Crusher Run Bedding	m^3	1,220.0
C8.4	Log Pile, Dia. 150 mm, L=3.0 m	m	920.0
C8.5	Wet Stone Masonry (1:4) for Revetment	m^3	380.0
C8.6	Cement Mortar Plastering	m^2	1,530.0
C8.7	Concrete, Type C1	m^3	570.0
C8.8	Concrete, Type D	m^3	35.0
C8.9	Reinforcing Steel Bar	kg	39,900.0
C8.10	Formwork FW1	m^2	950.0
C8.11	Formwork FW2	m^2	320.0
C8.12	Elastic Joint Filler, 10 mm thick	m^2	118.0
C8.13	Weep Hole, Dia. 50 mm, including Filter Cloth	nos.	180.0
C8.14	Gabion Mattress	m^3	320.0
C8.15	Gabion Cylinder	m^3	65.0
C8.16	Cobble Stone Filling	m^3	24.0
C9	PROTECTION WORKS FOR RAILWAY BRIDGE		
C9.1	Excavation (Common)	m^3	1,780.0
C9.2	Backfill with Selected Soil	m^3	140.0
C9.3	Backfill with Gravel	m^3	68.0
C9.4	Log Pile, Dia. 150 mm, L=3.0 m	m	240.0
C9.5	Cement Mortar Plastering	m^2	1,350.0
C9.6	Concrete, Type C1	m^3	26.0
C9.7	Concrete, Type D	m^3	2,050.0
C9.8	Concrete, Type E	m^3	18.0
C9.9	Reinforcing Steel Bar	kg	1,690.0
C9.10	Formwork FW1	m^2	1,020.0
C9.11	Formwork FW2	m^2	360.0
C9.12	Elastic Joint Filler, 10 mm thick	m^2	40.0
C9.13	Weep Hole, 50 mm	nos.	160.0
C9.14	Cobble Stone Filling	m^3	12.0
C9.15	Gabion Mattress	m^3	770.0
C9.16	Gabion Cylinder	m^3	37.0
C9.17	Crusher Run Bedding	m^3	510.0
C9.18	Wet Stone Masonry (1:4) for Revetment	m^3	340.0



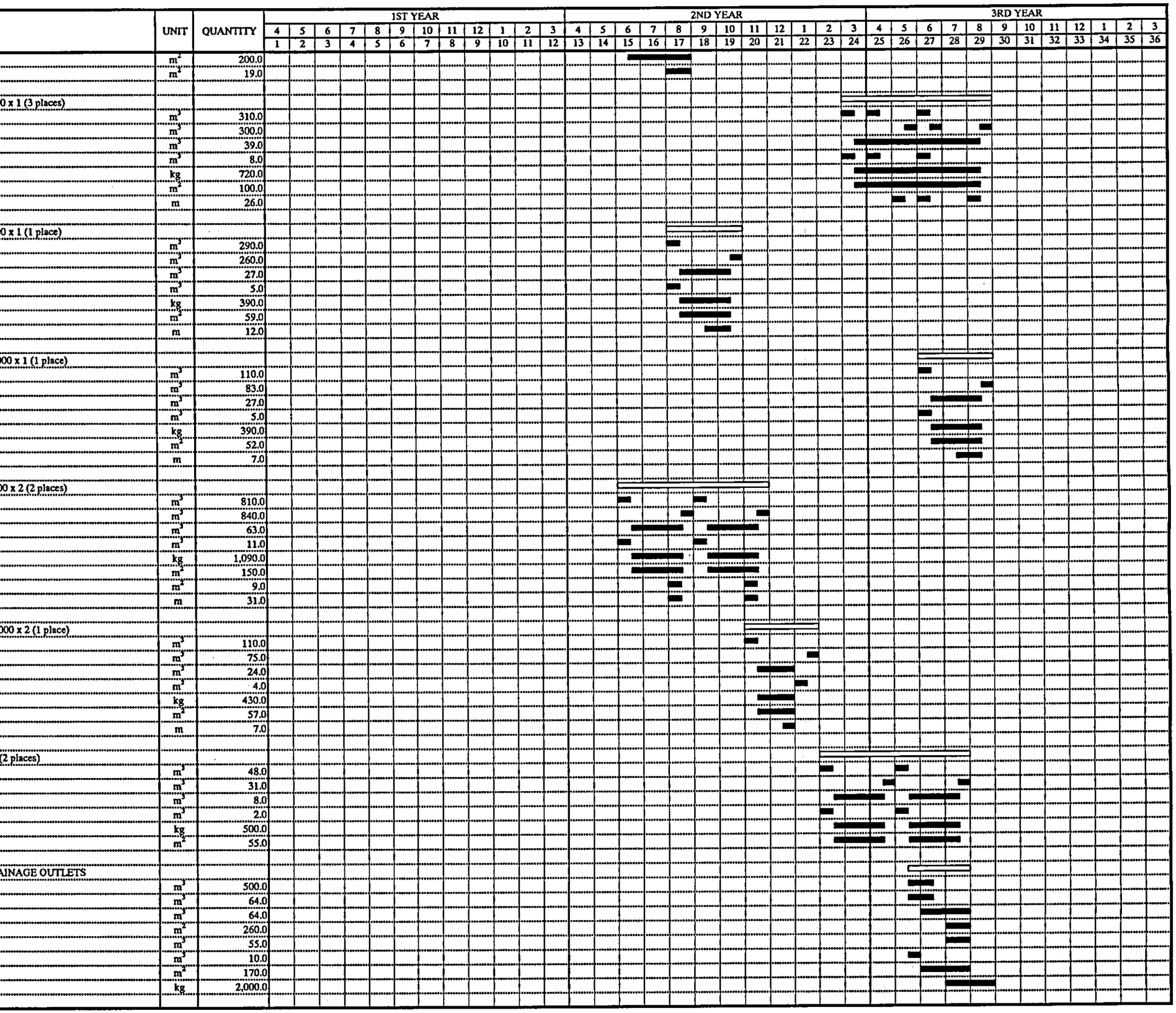
MFC - 3

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY	1ST YEAR												2ND YEAR												3RD YEAR											
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
D	RIPARIAN STRUCTURES																																						
D1	PREPARATION WORKS FOR REPARIAN STRUCTURES																																						
D1.1	Coffering and Dewatering	L.S.	1.0																																				
D1.2	Clearing and Grubbing	m^2	550.0																																				
D7	APPROACH STEPS, TYPE PD (28 place)																																						
D7.1	Excavation (Common)	m^3	2,190.0																																				
D7.2	Backfill with Selected Soil	m^3	77.0																																				
D7.3	Log Pile, Dia. 150mm, L=3.0m	m	1,230.0																																				
D7.4	Concrete, Type C1	m^3	100.0																																				
D7.5	Concrete, Type D	m^3	380.0																																				
D7.6	Reinforcing Steel Bar	kg	4,120.0																																				
D7.7	Formwork FW1	m^2	1,580.0																																				
D7.8	Crusher Run Bedding	m^3	280.0																																				
D7.9	Elastic Joint Filler, 10 mm thick	m^2	99.0																																				
D7.10	Gabion Cylinder	m^3	810.0																																				
D7.11	Cobble Stone Filling	m^3	180.0																																				
D7.12	Gabion Mattress	m^3	210.0																																				

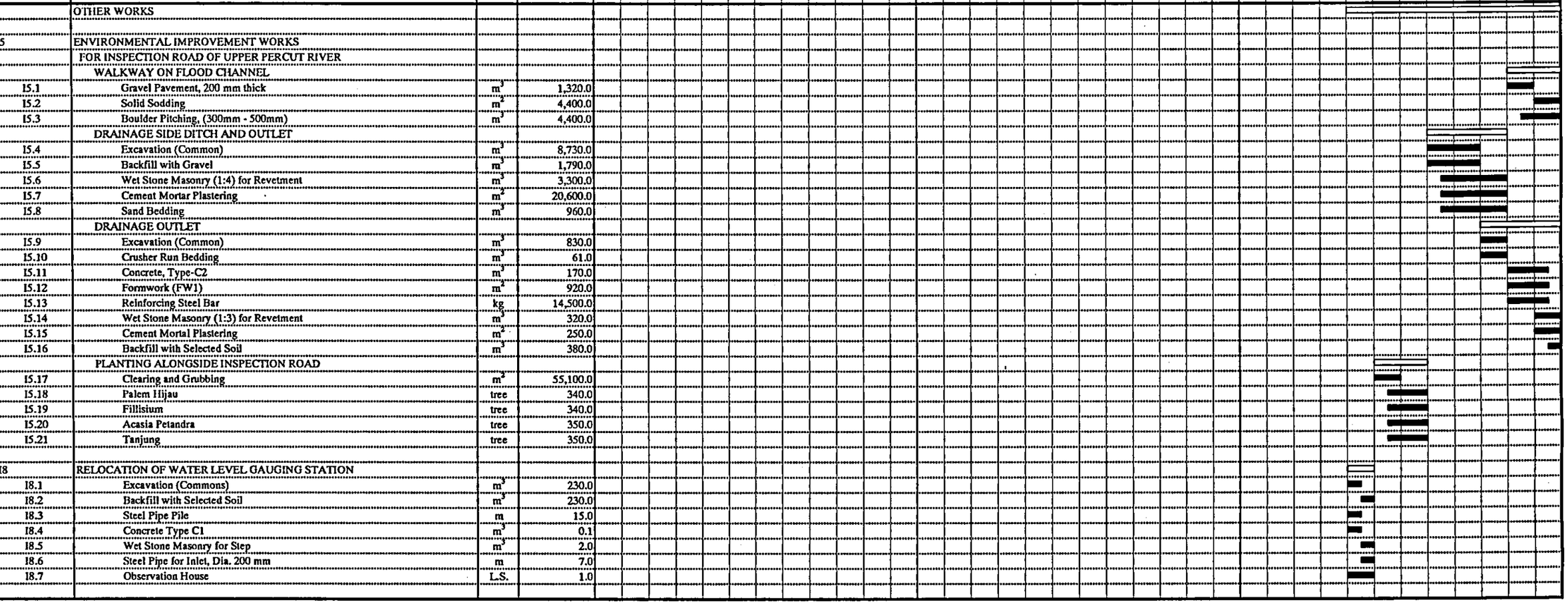
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E	DRAINAGE CHANNEL AND OUTLET WORKS		
E1	PREPARATION WORKS FOR DRAINAGE WORKS		
E1.1	Coffering and Dewatering	L.S.	1.0
E1.2	Clearing and Grubbing	m^2	6,800.0
E4	DRAINAGE OUTLET SL3, BOX CULVERT WITH SLUICE GATE		
E4.1	Excavation (Common)	m^3	190.0
E4.2	Backfill with Selected Soil	m^3	80.0
E4.3	Crusher Run Bedding	m^3	7.0
E4.4	Wet Stone Masonry (1:4) for Revetment	m^3	9.0
E4.5	Cement Mortar Plastering	m^2	34.0
E4.6	Supply and Driving of 'Steel Sheet Piles, Type II	m^2	27.0
E4.7	Concrete, Type C1	m^3	250.0
E4.8	Concrete, Type C2	m^3	10.0
E4.9	Concrete, Type E	m^3	18.0
E4.10	Reinforcing Steel Bar	kg	5,680.0
E4.11	Formwork FW1	m^2	220.0
E4.12	Formwork FW2	m^2	39.0
E4.13	Elastic Joint Filler, 10 mm thick	m^2	1.0
E4.14	Water Stop, 30 cm wide	m	3.0
E4.15	Dowel Bar	kg	85.0
E4.16	Handrail, Galvanized Steel Pipe	kg	160.0
E4.17	Galvanized Steel Ladder	kg	27.0
E4.18	Supply and Installation of Steel Slide Gates (H=1.5m, B=1.5m x 1)	L.S.	1.0
E5	DRAINAGE OUTLET SL4, BOX CULVERT WITH SLUICE GATE		
E5.1	Excavation (Common)	m^3	670.0
E5.2	Backfill with Selected Soil	m^3	210.0
E5.3	Crusher Run Bedding	m^3	7.0
E5.4	Wet Stone Masonry (1:4) for Revetment	m^3	12.0
E5.5	Cement Mortar Plastering	m^2	47.0
E5.6	Supply and Driving of 'Steel Sheet Piles, Type II	m^2	29.0
E5.7	Concrete, Type C1	m^3	110.0
E5.8	Concrete, Type C2	m^3	5.0
E5.9	Concrete, Type E	m^3	18.0
E5.10	Reinforcing Steel Bar	kg	5,170.0
E5.11	Formwork FW1	m^2	220.0
E5.12	Formwork FW2	m^2	36.0
E5.13	Elastic Joint Filler, 10 mm thick	m^2	1.0
E5.14	Water Stop, 30 cm wide	m	4.0
E5.15	Dowel Bar	m^2	19.0
E5.16	Handrail, Galvanized Steel Pipe	kg	210.0
E5.17	Galvanized Steel Ladder	kg	27.0
E5.18	Supply and Installation of Steel Slide Gate (H=1.5m, B=2.0m x 1)	L.S.	1.0
E6	DRAINAGE OUTLET SL5, BOX CULVERT		
E6.1	Excavation (Common)	m^3	250.0
E6.2	Backfill with Selected Soil	m^3	450.0
E6.3	Crusher Run Bedding	m^3	6.0
E6.4	Wet Stone Masonry (1:4) for Revetment	m^3	6.0
E6.5	Cement Mortar Plastering	m^2	23.0
E6.6	Concrete, Type C1	m^3	73.0
E6.7	Concrete, Type C2	m^3	3.0
E6.8	Concrete, Type E	m^3	79.0
E6.9	Reinforcing Steel Bar	kg	4,720.0
E6.10	Formwork FW1	m^2	200.0
E6.11	Formwork FW2	m^2	12.0
E7	DRAINAGE OUTLET SL6, BOX CULVERT		
E7.1	Excavation (Common)	m^3	130.0
E7.2	Backfill with Selected Soil	m^3	450.0
E7.3	Crusher Run Bedding	m^3	6.0
E7.4	Wet Stone Masonry (1:4) for Revetment	m^3	6.0
E7.5	Cement Mortar Plastering	m^2	23.0
E7.6	Concrete, Type C1	m^3	67.0
E7.7	Concrete, Type C2	m^3	3.0
E7.8	Concrete, Type E	m^3	12.0
E7.9	Reinforcing Steel Bar	kg	4,960.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E7.10	Formwork FW1	m^2	200.0
E7.11	Formwork FW2	m^2	19.0
E14	DRAINAGE OUTLET, PIPE CULVERT D=600 x 1 (3 places)		
E14.1	Excavation (Common)	m^3	310.0
E14.2	Backfill with Selected Soil	m^3	300.0
E14.3	Concrete, Type C1	m^3	39.0
E14.4	Concrete, Type E	m^3	8.0
E14.5	Reinforcing Steel Bar	kg	720.0
E14.6	Formwork FW1	m^2	100.0
E14.7	RC, Pipe D=600mm	m	26.0
E15	DRAINAGE OUTLET, PIPE CULVERT D=800 x 1 (1 place)		
E15.1	Excavation (Common)	m^3	290.0
E15.2	Backfill with Selected Soil	m^3	260.0
E15.3	Concrete, Type C1	m^3	27.0
E15.4	Concrete, Type E	m^3	5.0
E15.5	Reinforcing Steel Bar	kg	390.0
E15.6	Formwork FW1	m^2	59.0
E15.7	RC Pipe D=800mm	m	12.0
E16	DRAINAGE OUTLET, PIPE CULVERT D=1000 x 1 (1 place)		
E16.1	Excavation (Common)	m^3	110.0
E16.2	Backfill with Selected Soil	m^3	83.0
E16.3	Concrete, Type C1	m^3	27.0
E16.4	Concrete, Type E	m^3	5.0
E16.5	Reinforcing Steel Bar	kg	390.0
E16.6	Formwork FW1	m^2	52.0
E16.7	RC Pipe, D=1000mm	m	7.0
E17	DRAINAGE OUTLET, PIPE CULVERT D=800 x 2 (2 places)		
E17.1	Excavation (Common)	m^3	810.0
E17.2	Backfill with Selected Soil	m^3	840.0
E17.3	Concrete, Type C1	m^3	63.0
E17.4	Concrete, Type E	m^3	11.0
E17.5	Reinforcing Steel Bar	kg	1,090.0
E17.6	Formwork FW1	m^2	150.0
E17.7	Formwork FW2	m^2	9.0
E17.8	RC Pipe, D=800mm	m	31.0
E18	DRAINAGE OUTLET, PIPE CULVERT D=1000 x 2 (1 place)		
E18.1	Excavation (Common)	m^3	110.0
E18.2	Backfill with Selected Soil	m^3	75.0
E18.3	Concrete, Type C1	m^3	24.0
E18.4	Wet Stone Masonry (1:4) for Revetment	m^3	4.0
E18.5	Reinforcing Steel Bar	kg	430.0
E18.6	Formwork FW1	m^2	57.0
E18.7	RC Pipe D=1000mm	m	7.0
E20	DRAINAGE OUTLET, OPEN DITCH TYPE (2 places)		
E20.1	Excavation (Common)	m^3	48.0
E20.2	Backfill with Selected Soil	m^3	31.0
E20.3	Concrete, Type C1	m^3	8.0
E20.4	Concrete, Type E	m^3	2.0
E20.5	Reinforcing Steel Bar	kg	500.0
E20.6	Formwork FW1	m^2	55.0
E21	DRAINAGE DITCH CONNECTING TO DRAINAGE OUTLETS		
E21.1	Excavation (Common)	m^3	500.0
E21.2	Backfill with Gravel	m^3	64.0
E21.3	Wet Stone Masonry (1:4) for Revetment	m^3	64.0
E21.4	Cement Mortar Plastering	m^2	260.0
E21.5	Concrete, Type C2	m^3	55.0
E21.6	Concrete, Type E	m^3	10.0
E21.7	Formwork FW1	m^2	170.0
E21.8	Reinforcing Steel Bar	kg	2,000.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
I	OTHER WORKS		
I5	ENVIRONMENTAL IMPROVEMENT WORKS		
	FOR INSPECTION ROAD OF UPPER PERCUT RIVER		
	WALKWAY ON FLOOD CHANNEL		
I5.1	Gravel Pavement, 200 mm thick	m^2	1,320.0
I5.2	Solid Sodding	m^2	4,400.0
I5.3	Boulder Pitching, (300mm - 500mm)	m^2	4,400.0
	DRAINAGE SIDE DITCH AND OUTLET		
I5.4	Excavation (Common)	m^3	8,730.0
I5.5	Backfill with Gravel	m^3	1,790.0
I5.6	Wet Stone Masonry (1:4) for Revetment	m^3	3,300.0
I5.7	Cement Mortar Plastering	m^2	20,600.0
I5.8	Sand Bedding	m^3	960.0
	DRAINAGE OUTLET		
I5.9	Excavation (Common)	m^3	830.0
I5.10	Crusher Run Bedding	m^3	61.0
I5.11	Concrete, Type-C2	m^3	170.0
I5.12	Formwork (FW1)	m^2	920.0
I5.13	Reinforcing Steel Bar	kg	14,500.0
I5.14	Wet Stone Masonry (1:3) for Revetment	m^3	320.0
I5.15	Cement Mortal Plastering	m^2	250.0
I5.16	Backfill with Selected Soil	m^3	380.0
	PLANTING ALONGSIDE INSPECTION ROAD		
I5.17	Clearing and Grubbing	m^2	55,100.0
I5.18	Palem Hijau	tree	340.0
I5.19	Fillisium	tree	340.0
I5.20	Acasia Petandra	tree	350.0
I5.21	Tanjung	tree	350.0
I8	RELOCATION OF WATER LEVEL GAUGING STATION		
I8.1	Excavation (Commons)	m^3	230.0
I8.2	Backfill with Selected Soil	m^3	230.0
I8.3	Steel Pipe Pile	m	15.0
I8.4	Concrete Type C1	m^3	0.1
I8.5	Wet Stone Masonry for Step	m^3	2.0
I8.6	Steel Pipe for Inlet, Dia. 200 mm	m	7.0
I8.7	Observation House	L.S.	1.0



Construction Schedule of Precast Concrete Bridge

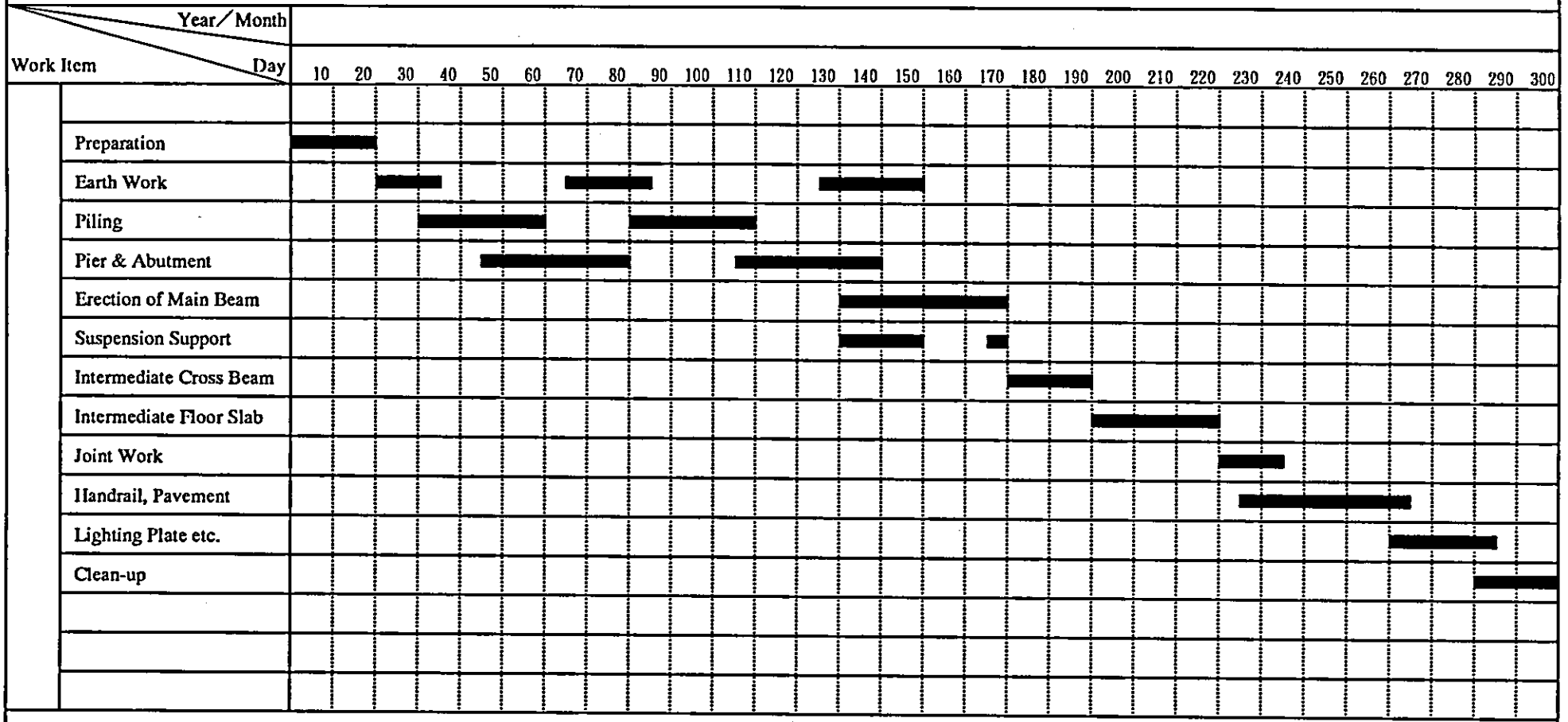
Bridge Number (P9)

Bridge Length 40.8m　　Width 16.0m

Pile Length 27.0m　　Pile Number 116nos.

Span Pitch 40.8m (1span)

Number of Main Beam 12



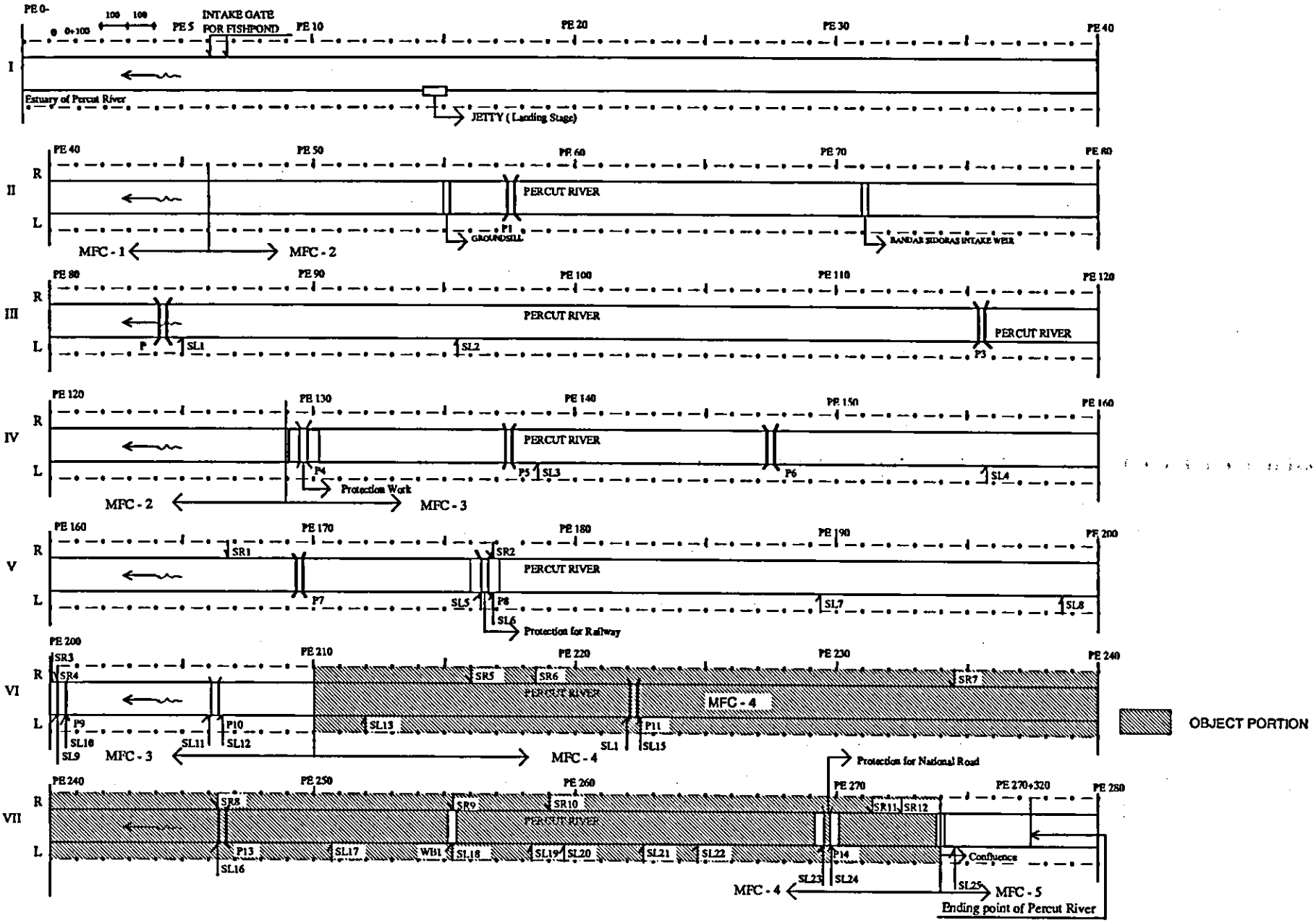
Preparation work are including demolish the existing structure, clearing / grubbing and temporary bridge.

1 Temporary Bridge 240.0m^2

2 Demolish of Existing bridge 300m^3

3 Coffering 220m (2 loc.)

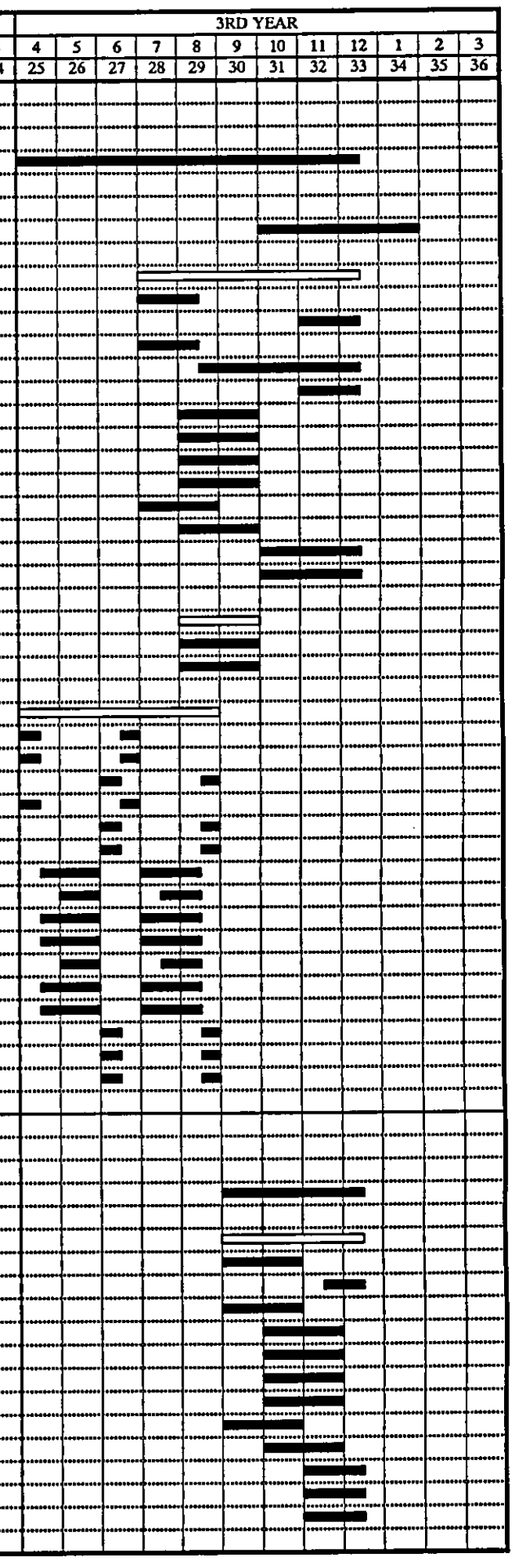
A. PERCUT RIVER



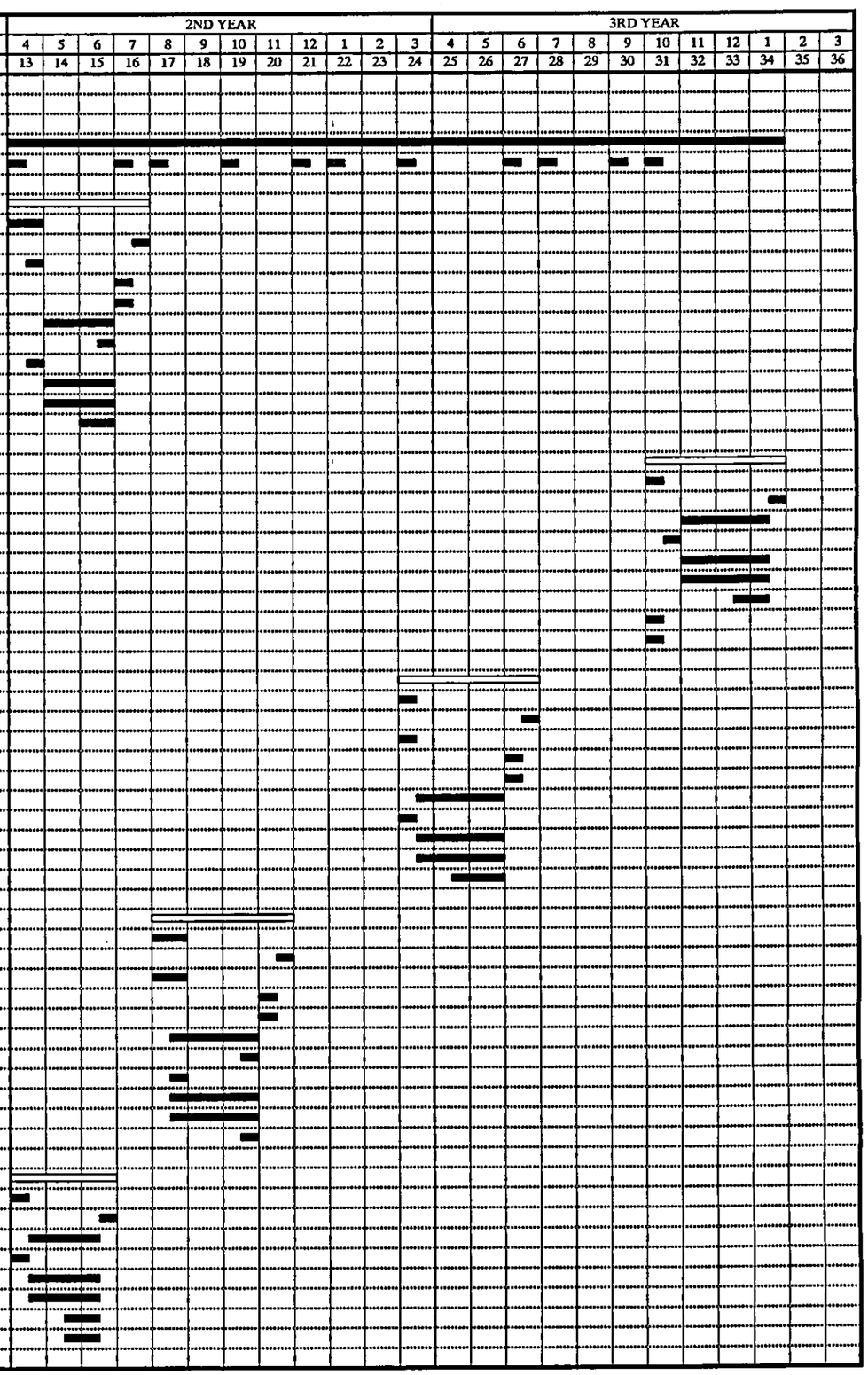
MFC - 4

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY	1ST YEAR												2ND YEAR												3RD YEAR											
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
A	GENERAL																																						
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1.0																																				
A2	ESTABLISHMENT	L.S.	1.0																																				
A3	RELOCATION OF EXISTING FACILITIES	P.S.	1.0																																				
A4	GEOLOGICAL INVESTIGATION																																						
A.4.1	Hand Auger	m	125.0																																				
A.4.2	Mechanical Boring	m	150.0																																				
A.4.3	Exploratory Excavation	m^3	400.0																																				
B	CHANNEL AND DIKE WORKS																																						
B1	PREPARATION WORKS																																						
B1.1	Clearing and Grubbing	m^2	228,700.0																																				
B2	CHANNEL EXCAVATION																																						
B2.1	Excavation (River Channel)	m^3	99,500.0																																				
B2.2	Excavation (Common)	m^3	342,900.0																																				
B3	EARTH DIKE WORKS																																						
B3.1	Stripping of Top Soil	m^3	8,750.0																																				
B3.2	Embankment	nos	59,200.0																																				
B3.3	Gravel Pavement, 200 mm thick	m^3	6,760.0																																				
B3.4	Maintenance Marker Post	nos.	35.0																																				
B6	FILLING ON RIVER BANK																																						
B6.1	Soil Filling	m^3	3,300.0																																				

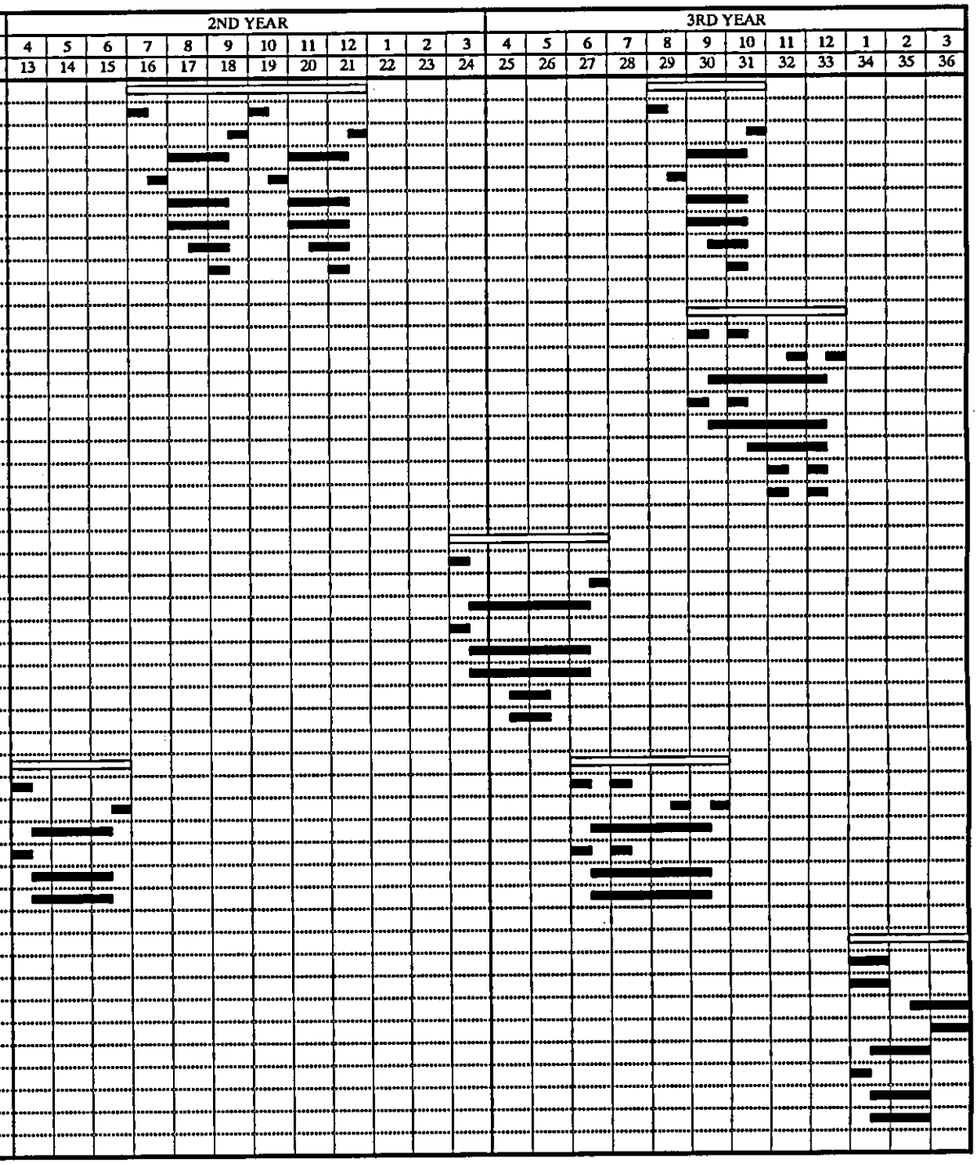
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1.0
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	65,500.0
C3	REVETMENT - WET STONE MASONRY (TYPE-PC)		
C3.1	Excavation (Common)	m^3	16,500.0
C3.2	Backfill with Selected Soil	m^3	220.0
C3.3	Crusher Run Bedding	m^3	6,610.0
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	5,880.0
C3.5	Cement Mortar Plastering	m^2	20,100.0
C3.6	Concrete, Type C1	m^3	1,160.0
C3.7	Reinforcing Steel Bar	kg	79,200.0
C3.8	Formwork FW1	m^2	7,330.0
C3.9	Weep Hole, Dia. 50mm, including Filter Cloth	nos.	3,120.0
C3.10	Log Pile, Dia. 150 mm L=2.0m	m	2,810.0
C3.11	Elastic Joint Filler, 10 mm thick	m^2	2,390.0
C3.12	Gabion Cylinder	m^3	640.0
C3.13	Cobble Stone Filling	m^3	240.0
C4	GABION TYPE FOOT PROTECTION		
C4.1	Cobble Stone Filling	m^3	360.0
C4.2	Gabion Mattress	m^3	2,300.0
C10	PROTECTION WORKS FOR NATIONAL ROAD BRIDGE		
C10.1	Excavation (Common)	m^3	560.0
C10.2	Crusher Run Bedding	m^3	500.0
C10.3	Backfill with Gravel	m^3	280.0
C10.4	Log Pile, Dia. 150 mm, L=3.0 m	m	460.0
C10.5	Wet Stone Masonry (1:4) for revetment	m^3	500.0
C10.6	Cement Mortar Plastering	m^2	2,000.0
C10.7	Concrete, Type C1	m^3	470.0
C10.8	Concrete Block 980mm x 980mm x 400mm	nos.	320.0
C10.9	Reinforcing Steel Bar	kg	31,700.0
C10.10	Formwork FW1	m^2	1,560.0
C10.11	Formwork FW2	m^2	590.0
C10.12	Elastic Joint Filler, 10 mm thick	m^2	130.0
C10.13	Weep Hole, Dia. 50mm, including Filter Cloth	nos.	415.0
C10.14	Gabion Mattress	m^3	120.0
C10.15	Gabion Cylinder	m^3	62.0
C10.17	Cobble Stone Filling	m^3	19.0
D	RIPARIAN STRUCTURES		
D1	PREPARATION WORKS FOR REPARIAN STRUCTURES		
D1.1	Coffering and Dewatering	L.S.	1.0
D7	APPROACH STEPS, TYPE PD (26 places)		
D7.1	Excavation (Common)	m^3	2,030.0
D7.2	Backfill with Selected Soil	m^3	110.0
D7.3	Log Pile, Dia. 150mm, L=3.0m	m	1,140.0
D7.4	Concrete, Type C1	m^3	96.0
D7.5	Concrete, Type D	m^3	350.0
D7.6	Reinforcing Steel Bar	kg	3,830.0
D7.7	Formwork FW1	m^2	1,470.0
D7.8	Crusher Run Bedding	m^3	260.0
D7.9	Elastic Joint Filler, 10 mm thick	m^2	92.0
D7.10	Gabion Mattress	m^3	190.0
D7.11	Gabion Cylinder	m^3	760.0
D7.12	Cobble Stone Filling	m^3	260.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E	DRAINAGE CHANNEL AND OUTLET WORKS		
E1	PREPARATION WORKS FOR DRAINAGE WORKS		
E1.1	Coffering and Dewatering	L.S.	1.0
E1.2	Clearing and Grubbing	m^2	4,650.0
E8	DRAINAGE OUTLET SL13, BOX CULVERT		
E8.1	Excavation (Common)	m^3	930.0
E8.2	Backfill with Selected Soil	m^3	85.0
E8.3	Crusher Run Bedding	m^3	13.0
E8.4	Wet Stone Masonry (1:4) for Revetment	m^3	20.0
E8.5	Cement Mortar Plastering	m^2	74.0
E8.6	Concrete, Type C1	m^3	64.0
E8.7	Concrete, Type C2	m^3	4.0
E8.8	Concrete, Type E	m^3	18.0
E8.9	Reinforcing Steel Bar	kg	3,290.0
E8.10	Formwork FW1	m^2	180.0
E8.11	Formwork FW2	m^2	6.0
E9	DRAINAGE OUTLET SL14, CONNECTING WORKS		
E9.1	Excavation (Common)	m^3	20.0
E9.2	Backfill with Selected Soil	m^3	140.0
E9.3	Concrete, Type C1	m^3	52.0
E9.4	Concrete, Type E	m^3	14.0
E9.5	Reinforcing Steel Bar	kg	2,510.0
E9.6	Formwork FW1	m^2	84.0
E9.7	Formwork FW2	m^2	21.0
E9.8	Demolition & Removal Gabion	m^3	17.0
E9.9	Demolition & Removal Stone Masaart	m^3	23.0
E10	DRAINAGE OUTLET SL16, BOX CULVERT		
E10.1	Excavation (Common)	m^3	360.0
E10.2	Backfill with Selected Soil	m^3	120.0
E10.3	Crusher Run Bedding	m^3	8.0
E10.4	Wet Stone Masonry (1:4) for Revetment	m^3	8.0
E10.5	Cement Mortar Plastering	m^2	22.0
E10.6	Concrete, Type C1	m^3	83.0
E10.7	Concrete, Type E	m^3	21.0
E10.8	Reinforcing Steel Bar	kg	4,790.0
E10.9	Formwork FW1	m^2	230.0
E10.10	Formwork FW2	m^2	44.0
E11	DRAINAGE OUTLET SR10, BOX CULVERT		
E11.1	Excavation (Common)	m^3	1,060.0
E11.2	Backfill with Selected Soil	m^3	220.0
E11.3	Crusher Run Bedding	m^3	14.0
E11.4	Wet Stone Masonry (1:4) for Revetment	m^3	17.0
E11.5	Cement Mortar Plastering	m^2	38.0
E11.6	Concrete, Type C1	m^3	180.0
E11.7	Concrete, Type C2	m^3	1.0
E11.8	Concrete, Type E	m^3	180.0
E11.9	Reinforcing Steel Bar	kg	7,980.0
E11.10	Formwork FW1	m^2	290.0
E11.11	Formwork FW2	m^2	60.0
E14	DRAINAGE OUTLET, PIPE CULVERT D=600 x 1 (6 places)		
E14.1	Excavation (Common)	m^3	690.0
E14.2	Backfill with Selected Soil	m^3	660.0
E14.3	Concrete, Type C1	m^3	79.0
E14.4	Concrete, Type E	m^3	16.0
E14.5	Reinforcing Steel Bar	kg	1,490.0
E14.6	Formwork FW1	m^2	210.0
E14.7	Formwork FW2	m^2	3.0
E14.8	RC, Pipe D=600mm	m	51.0

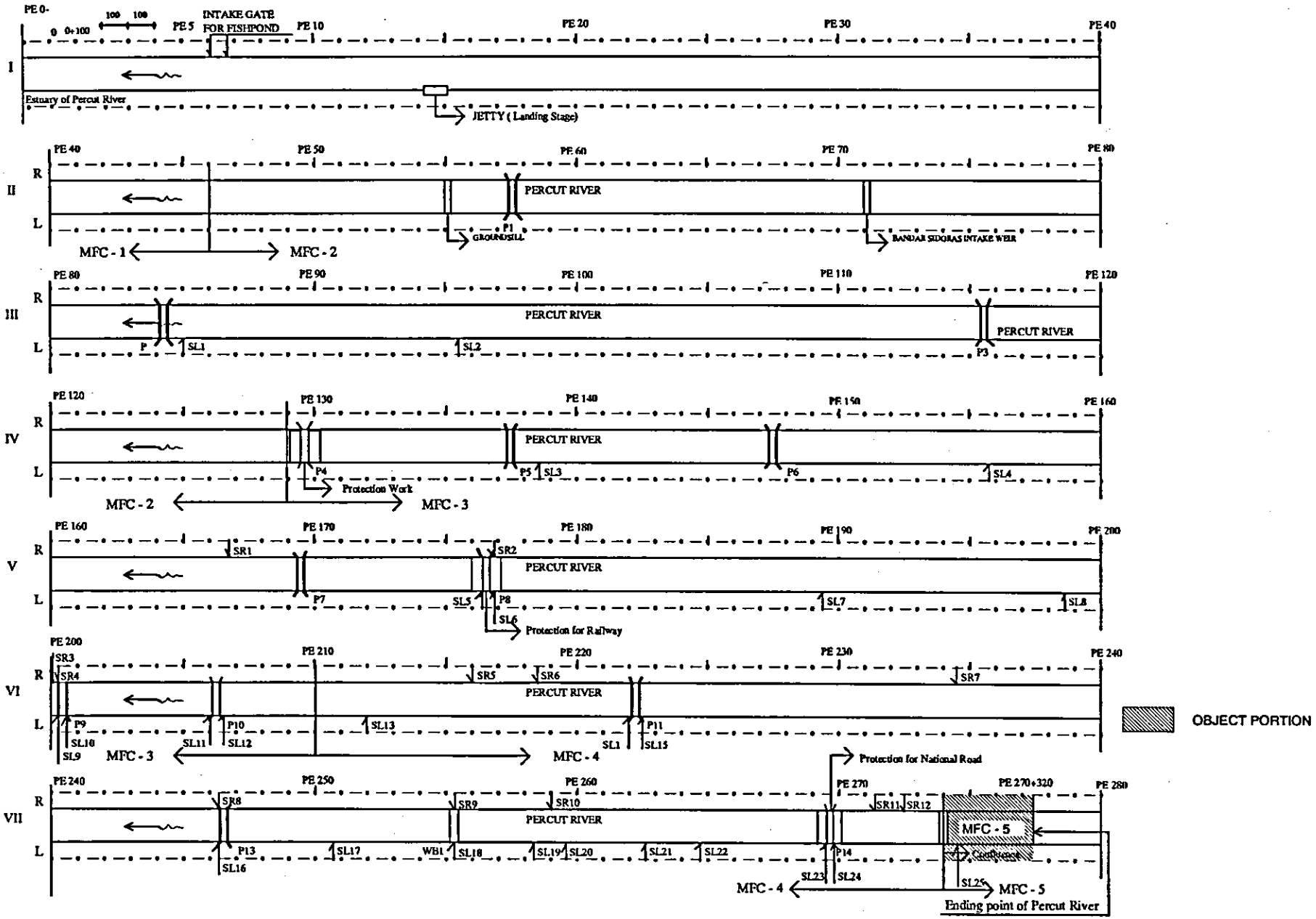


ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E15	DRAINAGE OUTLET, PIPE CULVERT D=800 x 1 (4 places)		
E15.1	Excavation (Common)	m^3	680.0
E15.2	Backfill with Selected Soil	m^3	640.0
E15.3	Concrete, Type C1	m^3	90.0
E15.4	Concrete, Type E	m^3	16.0
E15.5	Reinforcing Steel Bar	kg	1,400.0
E15.6	Formwork FW1	m^2	210.0
E15.7	Formwork FW2	m^2	2.0
E15.8	RC Pipe D=800mm	m	40.0
E16	DRAINAGE OUTLET, PIPE CULVERT D=1000 x 1 (2 places)		
E16.1	Excavation (Common)	m^3	520.0
E16.2	Backfill with Selected Soil	m^3	480.0
E16.3	Concrete, Type C1	m^3	64.0
E16.4	Concrete, Type E	m^3	9.0
E16.5	Reinforcing Steel Bar	kg	810.0
E16.6	Formwork FW1	m^2	120.0
E16.7	Formwork FW2	m^2	6.0
E16.8	RC Pipe, D=1000mm	m	19.0
E18	DRAINAGE OUTLET, PIPE CULVERT D=1000 x 2 (1 place)		
E18.1	Excavation (Common)	m^3	490.0
E18.2	Backfill with Selected Soil	m^3	450.0
E18.3	Concrete, Type C1	m^3	41.0
E18.4	Concrete, Type E	m^3	6.0
E18.5	Reinforcing Steel Bar	kg	690.0
E18.6	Formwork FW1	m^2	85.0
E18.7	Formwork FW2	m^2	9.0
E18.8	RC Pipe, D=1000mm	m	13.0
E20	DRAINAGE OUTLET, OPEN DITCH TYPE (3 places)		
E20.1	Excavation (Common)	m^3	68.0
E20.2	Backfill with Selected Soil	m^3	47.0
E20.3	Concrete, Type C1	m^3	11.0
E20.4	Concrete, Type E	m^3	3.0
E20.5	Reinforcing Steel Bar	kg	700.0
E20.6	Formwork FW1	m^2	100.0
E21	DRAINAGE DITCH CONNECTING TO DRAINAGE OUTLETS		
E21.1	Excavation (Common)	m^3	1,670.0
E21.2	Crusher Run Bedding	m^3	170.0
E21.3	Wet Stone Masonry (1:4) for Revetment	m^3	170.0
E21.4	Cement Mortar Plastering	m^2	660.0
E21.5	Concrete, Type C2	m^3	110.0
E21.6	Concrete, Type E	m^3	18.0
E21.7	Formwork FW1	m^2	300.0
E21.8	Reinforcing Steel Bar	kg	3,500.0

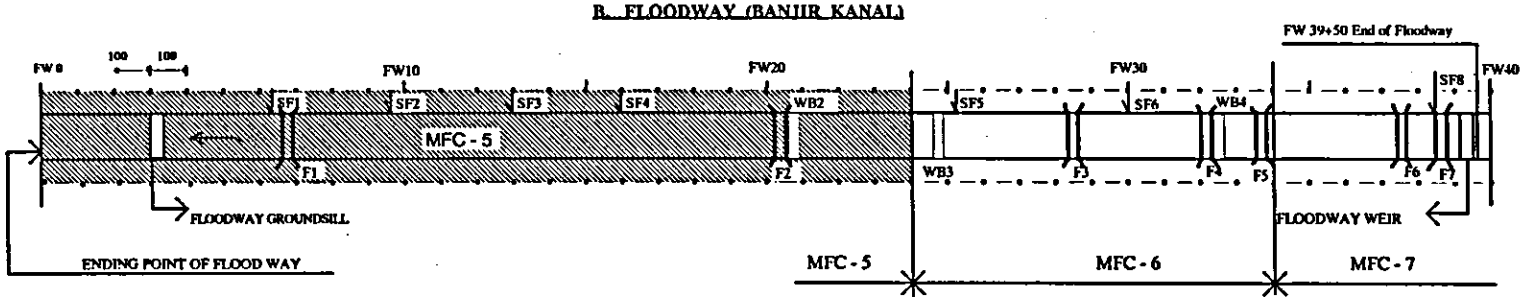


ITEM NO.	BQ-ITEMS	UNIT	QUANTITY	1ST YEAR												2ND YEAR												3RD YEAR											
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
I	OTHER WORK																																						
I5	ENVIRONMENTAL IMPROVEMENT WORKS FOR INSPECTION ROAD OF																																						
	WALKWAY ON FLOOD CHANNEL																																						
I5.1	Gravel Pavement, 200 mm thick	m^3	330.0																																				
I5.2	Solid Sodding	m^2	2,750.0																																				
I5.3	Boulder Pitching, (300mm - 500mm)	m^3	2,750.0																																				
	PLANTING ALONGSIDE INSPECTION ROAD																																						
I5.4	Clearing and Grubbing	m^2	52,700.0																																				
I5.5	Palem Hijau	tree	330.0																																				
I5.6	Fillisium	tree	330.0																																				
I5.7	Acasia Petandra	tree	330.0																																				
I5.8	Tanjung	tree	330.0																																				
	DRINAGE SIDE DITCH																																						
I5.9	Excavation (Common)	m^3	8,300.0																																				
I5.10	Backfill with Gravel	m^3	1,710.0																																				
I5.11	Wet Stone Masonry (1:4) for Revetment	m^3	3,160.0																																				
I5.12	Cement Mortar Plastering	m^2	19,800.0																																				
I5.13	Sand Bedding	m^2	860.0																																				
	DRAINAGE OUTLET																																						
I5.14	Excavation (Common)	m^3	470.0																																				
I5.15	Crusher Run Bedding	m^3	34.0																																				
I5.16	Concrete, Type-C2	m^3	95.0																																				
I5.17	Formwork FW1	m^2	510.0																																				
I5.18	Reinforcing Steel Bar	kg	8,140.0																																				
I5.19	Wet Stone Masonry (1:3) for Revetment	m^3	180.0																																				
I5.20	Cement Mortar Plastering	m^2	140.0																																				
I5.21	Backfill with Selected Soil	m^3	220.0																																				

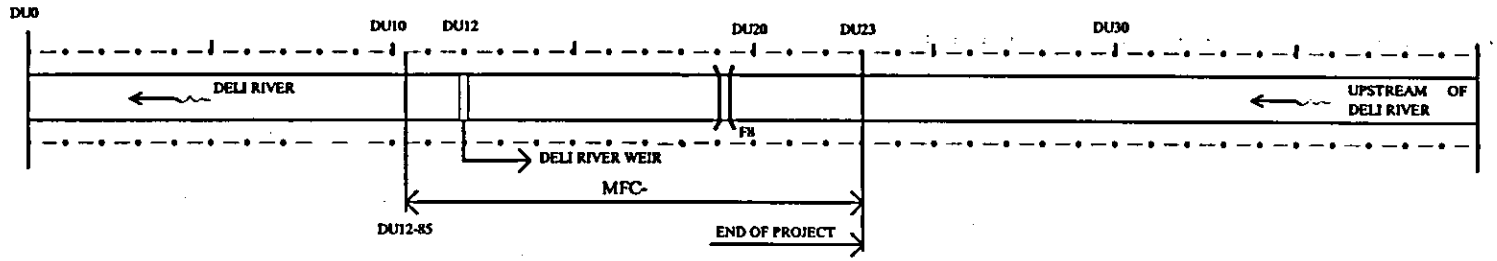
A. PERCUT RIVER



B. FLOODWAY (BANJIR KANAL)



C. UPSTREAM DELI RIVER (RESERVOIR)



OBJECT PORTION

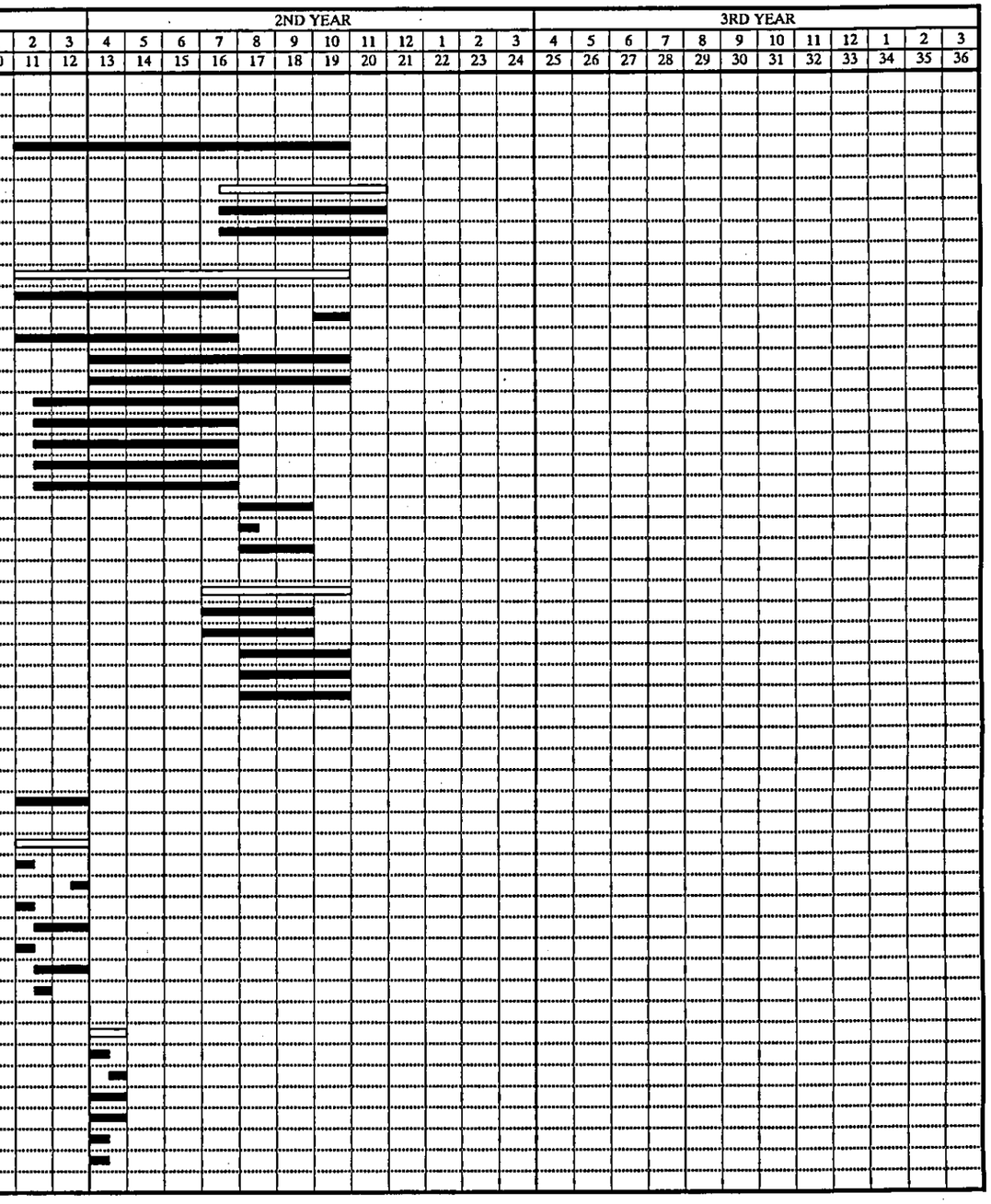
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
A	GENERAL		
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1.0
A2	ESTABLISHMENT	L.S.	1.0
A3	RELOCATION OF EXISTING FACILITIES	P.S.	1.0
A4	GEOLOGICAL INVESTIGATION		
A.4.1	Hand Auger	m	75.0
A.4.2	Mechanical Boring	m	180.0
A.4.3	Exploratory Excavation	m^3	320.0
B	CHANNEL AND DIKE WORKS		
B1	PREPARATION WORKS		
B1.1	Coffering and Dewatering	L.S.	1.0
B1.2	Clearing and Grubbing	m^2	152,900.0
B2	CHANNEL EXCAVATION		
B2.1	Excavation (Floodway Channel)	m^3	646,300.0
B3	EARTH DIKE WORKS		
B3.1	Stripping of Top Soil	m^3	4,210.0
B3.2	Embankment	m^3	15,800.0

1ST YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
1	2	3	4	5	6	7	8	9	10	11	12	

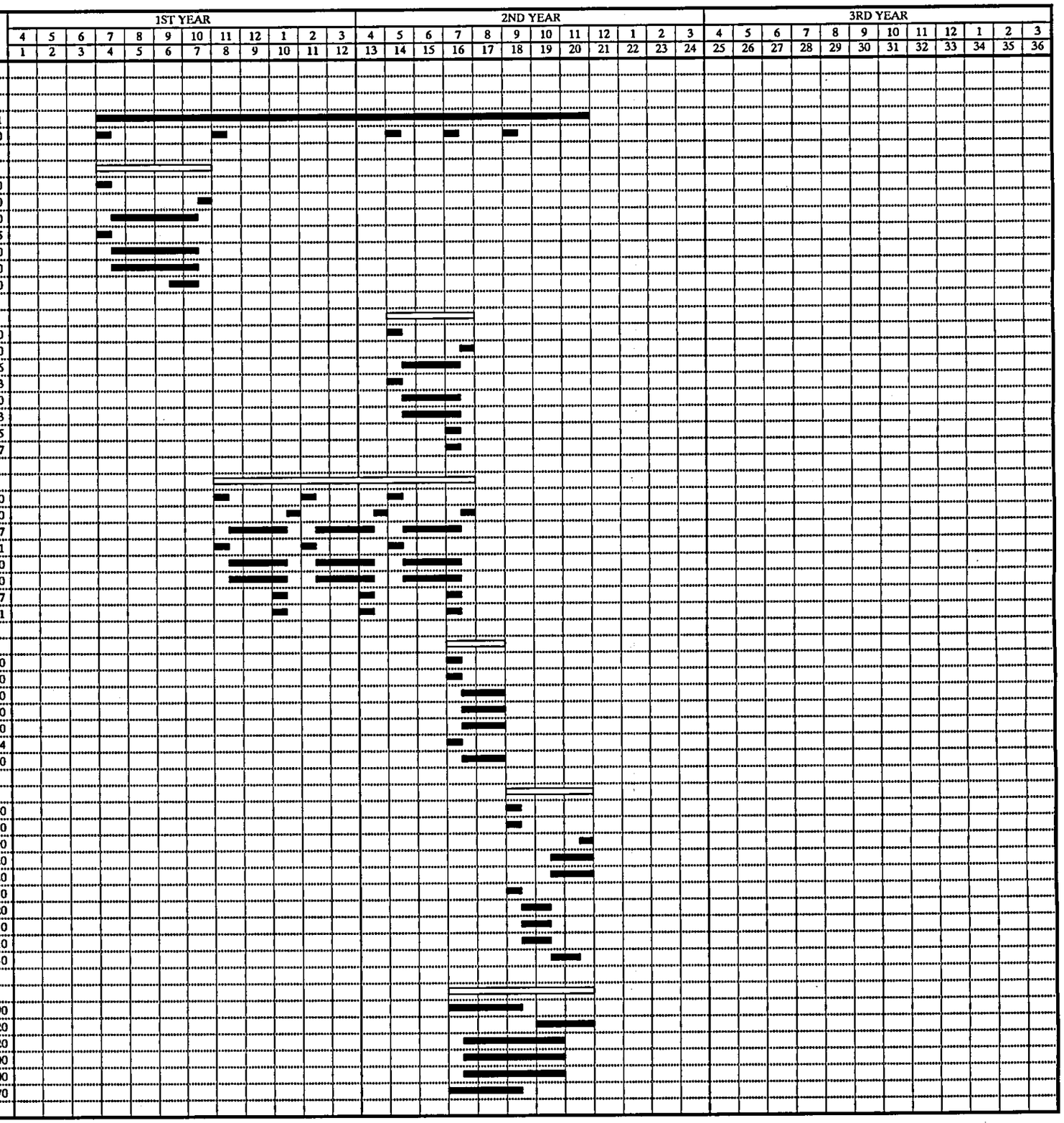
2ND YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
13	14	15	16	17	18	19	20	21	22	23	24	

3RD YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
25	26	27	28	29	30	31	32	33	34	35	36	

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	18,400
C2.2	Sprigging	m^2	16,800
C3	REVETMENT - WET STONE MASONRY TYPE		
C3.1	Excavation (Common)	m^3	48,500
C3.2	Backfill with Selected Soil	m^3	1,100
C3.3	Crusher Run Bedding	m^3	28,500
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	19,100
C3.5	Cement Mortar Plastering	m^2	76,300
C3.6	Concrete, Type C1	m^3	4,000
C3.7	Reinforcing Steel Bar	kg	247,500
C3.8	Formwork FW1	m^2	25,500
C3.9	Weep Hole, Dia. 50 mm	nos.	14,200
C3.10	Elastic Joint Filler, 10 mm thick	m^2	5,960
C3.11	Gabion Mattress	m^3	1,160
C3.12	Gabion Cylinder	m^3	100
C3.13	Cobble Stome Filling	m^3	190
C12	CHANNEL BED LINING FOR FLOODWAY		
C12.1	Excavation (Common)	m^3	4,900
C12.2	Crusher Run Bedding	m^3	3,430
C12.3	Concrete, Type C2	m^3	1,550
C12.4	Elastic Joint Filler, 10 mm thick	m^2	370
C12.5	Weep Hole, Dia. 50mm	nos.	2,460
D	RIPARIN STRUCTURES		
D1	PREPARATION WORKS FOR REPARIAN STRUCTURES		
D1.1	Coffering and Dewatering	L.S.	1
D3	GROUND SILL		
D3.1	Excavation (Common)	m^3	65
D3.2	Backfill with Selected Soil	m^3	30
D3.3	Log Piles, Dia. 150 mm, L=4.0m	m	190
D3.4	Concrete, Type D	m^3	28
D3.5	Concrete, Type E	m^3	5
D3.6	Formwork FW1	m^2	38
D3.7	Elastic Joint Filler, 10 mm thick	m^2	1
D8	MAINTENANCE STEPS, (3 places)		
D8.1	Excavation (Common)	m^3	78
D8.2	Backfill with Selected Soil	m^3	18
D8.3	Concrete, Type C2	m^3	37
D8.4	Formwork FW1	m^2	100
D8.5	Crusher Run Bedding	m^3	27
D8.6	Elastic Joint Filler, 10 mm thick	m^2	2



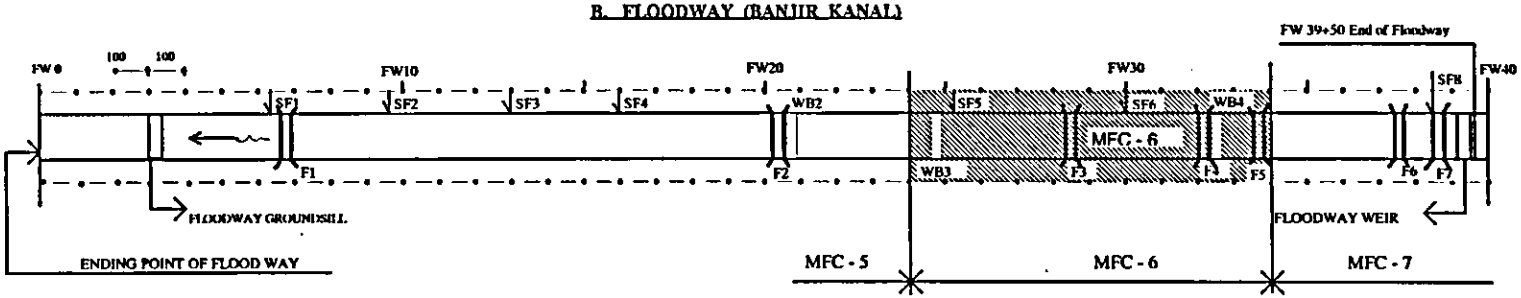
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
E	DRAINAGE CHANNEL AND OUTLET WORKS		
E1	PREPARATION WORKS FOR DRAINAGE WORKS		
E1.1	Coffering and Dewatering	L.S.	1
E1.2	Clearing and Grubbing	m^2	2,970
E12	DRAINAGE OUTLET (SF2), FALLING WORKS		
E12.1	Excavation (Common)	m^3	640
E12.2	Backfill with Selected Soil	m^3	320
E12.3	Concrete, Type C1	m^3	160
E12.4	Concrete, Type E	m^3	15
E12.5	Reinforcing Steel Bar	kg	7,870
E12.6	Formwork FW1	m^2	270
E12.7	Formwork FW2	m^2	30
E15	DRAINAGE OUTLET(SL25), PIPE CULVERT D=800 x 1 (1 place)		
E15.1	Excavation (Common)	m^3	60
E15.2	Backfill with Selected Soil	m^3	50
E15.3	Concrete, Type C1	m^3	16
E15.4	Concrete, Type E	m^3	3
E15.5	Reinforcing Steel Bar	kg	250
E15.6	Formwork FW1	m^2	33
E15.7	Formwork FW2	m^2	5
E15.8	RC Pipe, D=800mm	m	7
E19	DRAINAGE OUTLET(SF1,SF3,SF4), PIPE CULVERT D=1000 x 1, (3 places)		
E19.1	Excavation (Common)	m^3	390
E19.2	Backfill with Selected Soil	m^3	300
E19.3	Concrete, Type C1	m^3	77
E19.4	Concrete, Type E	m^3	11
E19.5	Reinforcing Steel Bar	kg	230
E19.6	Formwork FW1	m^2	170
E19.7	Formwork FW2	m^2	7
E19.8	RC Pipe, D=1000mm	m	21
E21	DRAINAGE DITCH CONNECTING TO DRAINAGE OUTLETS		
E21.1	Excavation (Common)	m^3	160
E21.2	Backfill with Gravel	m^3	20
E21.3	Wet Stone Masonry (1:4) for Revetment	m^3	20
E21.4	Cement Mortar Plastering	m^2	80
E21.5	Concrete, Type C2	m^3	20
E21.6	Concrete, Type E	m^3	4
E21.7	Formwork FW1	m^2	50
E23	DRAINAGE SIDE DITCH (WET MASONRY TYPE)		
E23.1	Excavation (Common)	m^3	1,560
E23.2	Sand Bedding	m^3	150
E23.3	Backfill with Selected Soil	m^3	690
E23.4	Wet Stone Masonry (1:4) for Revetment	m^3	520
E23.5	Cement Mortar Plastering	m^2	2,720
E23.6	Crusher Run Bedding	m^3	10
E23.7	Concrete, Type C2	m^3	20
E23.8	Reinforcing Steel Bar	kg	1,810
E23.9	Formwork FW1	m^2	110
E23.10	Wet Stone Masonry (1:3) for Revetment	m^3	40
E24	DRAINAGE SIDE DITCH (CONCRETE U-TYPE)		
E24.1	Excavation (Common)	m^3	5,990
E24.2	Backfill with Selected Soil	m^3	3,320
E24.3	Concrete, Type C2	m^3	1,520
E24.4	Reinforcing Steel Bar	kg	48,900
E24.5	Formwork FW1	m^2	10,100
E24.6	Crusher Run Bedding	m^3	370



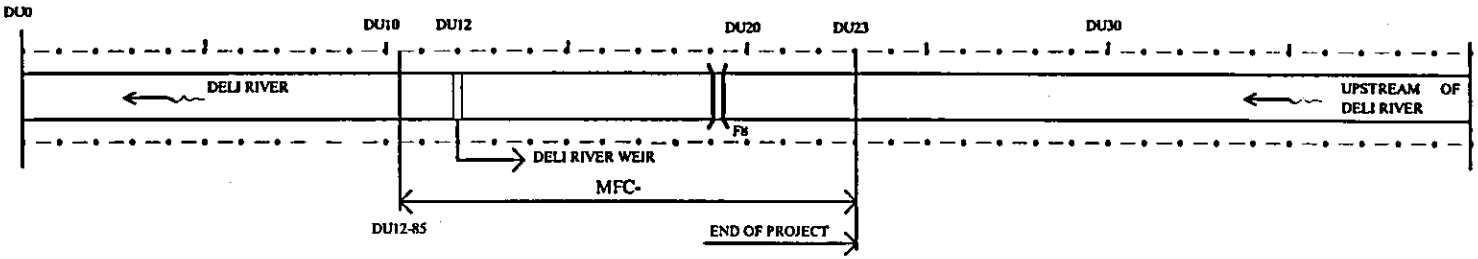
MFC - 5

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY	1ST YEAR												2ND YEAR												3RD YEAR											
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
I	OTHER WORKS																																						
I6	ENVIRONMENTAL IMPROVEMENT WORKS FOR INSPECTION ROAD OF																																						
	INSPECTION ROAD																																						
I6.1	Excavation (Common)	m^3	4,040																																				
I6.2	Gravel Pavement, 200 mm thick	m^3	2,660																																				
I6.3	Maintenance marker Post	nos.	46																																				
	KABUPATEN ROAD (CLASS III)																																						
I6.4	Excavation (Common)	m^3	590																																				
I6.5	Sub-Base Course, (Class C)	m^3	280																																				
I6.6	Base Course, (Class B)	m^3	190																																				
I6.7	Asphalt Treatment Base (A.T.B)	ton	240																																				
	PLANTING ALONGSIDE INSPECTION ROAD																																						
I6.8	Excavation (Common)	m^3	1,150																																				
I6.9	Sand Bedding	m^3	230																																				
I6.10	Concrete, Type D	m^3	400																																				
I6.11	Formwork FW1	m^2	3,910																																				
I6.12	Boulder Pitching, (200mm - 300mm)	m^2	4,600																																				
I6.13	Palem Hijau	tree	120																																				
I6.14	Fillisium	tree	120																																				
I6.15	Acasia Petandra	tree	120																																				
I6.16	Tanjung	tree	120																																				
I6.17	Cemara Kipas	tree	230																																				
I6.18	Cemara Lilin	tree	230																																				
I6.19	Soka	tree	230																																				
I6.20	Bougainvillea	tree	230																																				
	FENCE																																						
I6.21	Excavation (Common)	m^3	560																																				
I6.22	Backfill with Selected Soil	m^3	420																																				
I6.23	Crusher Run Bedding	m^3	58																																				
I6.24	Concrete, Type D	m^3	85																																				
I6.25	Formwork FW1	m^2	1,110																																				
I6.26	Galvanized Steel Fence, H=1.20 m	m	4,600																																				

B. FLOODWAY (BANJIR KANAL)



C. UPSTREAM DELI RIVER (RESERVOIR)



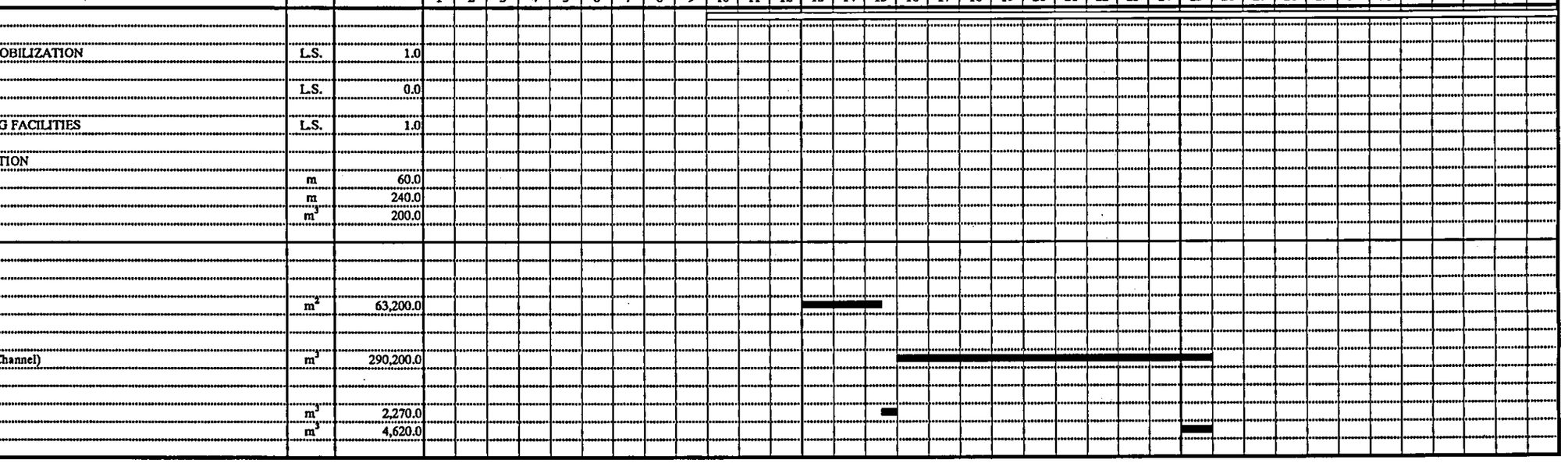
OBJECT PORTION

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
A	GENERAL		
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1.0
A2	ESTABLISHMENT	L.S.	0.0
A3	RELOCATION OF EXISTING FACILITIES	L.S.	1.0
A4	GEOLOGICAL INVESTIGATION		
A.4.1	Hand Auger	m	60.0
A.4.2	Mechanical Boring	m	240.0
A.4.3	Exploratory Excavation	m^3	200.0
B	CHANNEL AND DIKE WORKS		
B1	PREPARATION WORKS		
B1.1	Clearing and Grubbing	m^2	63,200.0
B2	CHANNEL EXCAVATION		
B2.1	Excavation (Floodway Channel)	m^3	290,200.0
B3	EARTH DIKE WORKS		
B3.1	Stripping of Top Soil	m^3	2,270.0
B3.2	Embankment	m^3	4,620.0

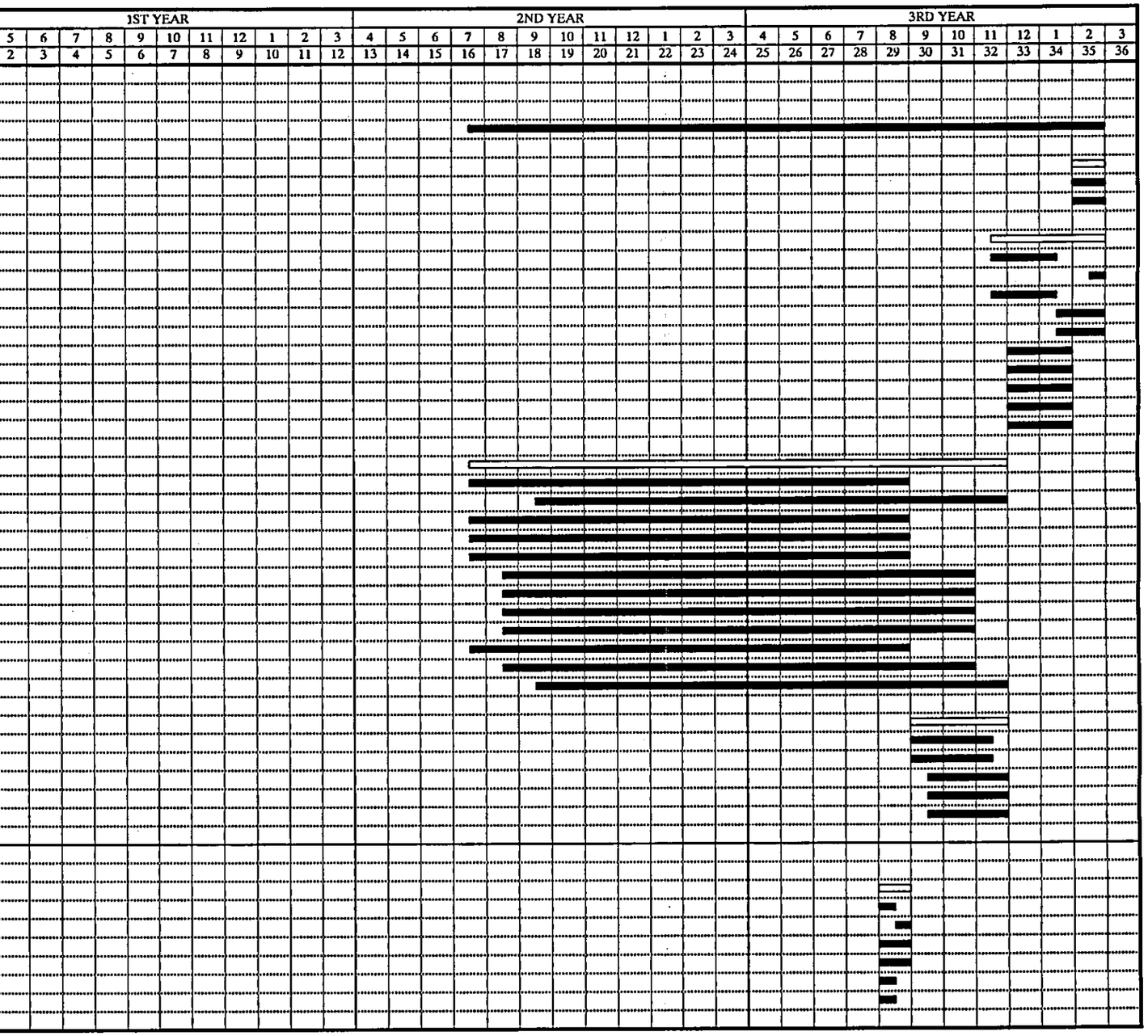
1ST YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
1	2	3	4	5	6	7	8	9	10	11	12	

2ND YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
13	14	15	16	17	18	19	20	21	22	23	24	

3RD YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
25	26	27	28	29	30	31	32	33	34	35	36	



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1.0
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	3,360.0
C2.2	Sprigging	m^2	2,320.0
C3	REVETMENT - WET STONE MASONRY TYPE		
C3.1	Excavation (Common)	m^3	7,900.0
C3.2	Backfill with Selected Soil	m^3	220.0
C3.3	Crusher Run Bedding	m^3	4,920.0
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	3,140.0
C3.5	Cement Mortar Plastering	m^2	12,700.0
C3.6	Concrete, Type C1	m^3	710.0
C3.7	Reinforcing Steel Bar	kg	45,400.0
C3.8	Formwork FW1	m^2	4,350.0
C3.9	Weep Hole, Dia. 50 mm	nos	2,490.0
C3.10	Elastic Joint Filler, 10 mm thick	m^2	1,050.0
C11	LEANING WALL FOR FLOODWAY(FW28+50m to FW34)		
C11.1	Excavation (Common)	m^3	39,500.0
C11.2	Backfill with Selected Soil	m^3	4,670.0
C11.3	Backfill with Gravel	m^3	10,300.0
C11.4	Rubble Stone Bedding	m^3	1,510.0
C11.5	Concrete, Type E	m^3	1,080.0
C11.6	Concrete, Type D	m^3	29,800.0
C11.7	Reinforcing Steel Bar	kg	24,600.0
C11.8	Formwork FW1	m^2	16,700.0
C11.9	Formwork FW2	m^2	24,400.0
C11.10	Elastic Joint Filler, 10 mm thick	m^2	1,420.0
C11.11	Weep Hole, Dia. 50 mm, including Filter Cloth	nos.	4,380.0
C11.12	Gravel Pavement, 200 mm thick	m^3	390.0
C12	CHANNEL BED LINING FOR FLOODWAY		
C12.1	Excavation (Common)	m^3	3,530.0
C12.2	Crusher Run Bedding	m^3	2,390.0
C12.3	Concrete, Type C2	m^3	1,130.0
C12.4	Elastic Joint Filler, 10 mm thick	m^2	200.0
C12.5	Weep Hole, Dia. 50 mm	nos.	1,310.0
D	RIPARIAN STRUCTURES		
D8	MAINTENANCE STEPS, TYPE A (1 place)		
D8.1	Excavation (Common)	m^3	34.0
D8.2	Backfill with Selected Soil	m^3	8.0
D8.3	Concrete, Type C2	m^3	16.0
D8.4	Formwork FW1	m^2	45.0
D8.5	Crusher Run Bedding	m^3	12.0
D8.6	Elastic Joint Filler, 10 mm thick	m^2	1.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY	1ST YEAR												2ND YEAR												3RD YEAR											
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
E	DRAINAGE CHANNEL AND OUTLET WORKS																																						
E1	PREPARATION WORKS FOR DRAINAGE WORKS																																						
E1.1	Coffering and Dewatering	L.S.	1.0																																				
E1.2	Clearing and Grubbing	m^2	1,170.0																																				
E13	DRAINAGE OUTLET(SF5), BOX CULVERT(BATUAN RIVER)																																						
E13.1	Excavation (Common)	m^3	2,070.0																																				
E13.2	Backfill with Selected Soil	m^3	550.0																																				
E13.3	Concrete, Type C1	m^3	210.0																																				
E13.4	Concrete, Type C2	m^3	140.0																																				
E13.5	Concrete, Type E	m^3	120.0																																				
E13.6	Reinforcing Steel Bar	kg	8,720.0																																				
E13.7	Formwork FW1	m^2	430.0																																				
E13.8	Formwork FW2	m^2	70.0																																				
E19	DRAINAGE OUTLET(SF6), PIPE CULVERT D=1000 x 1, (1 places)																																						
E19.1	Excavation (Common)	m^3	130.0																																				
E19.2	Backfill with Selected Soil	m^3	100.0																																				
E19.3	Concrete, Type C1	m^3	26.0																																				
E19.4	Concrete, Type E	m^3	4.0																																				
E19.5	Reinforcing Steel Bar	kg	370.0																																				
E19.6	Formwork FW1	m^2	58.0																																				
E19.7	Formwork FW2	m^2	1.0																																				
E19.8	RC Pipe, D=1000mm	m	7.0																																				
E21	DRAINAGE DITCH CONNECTING TO DRAINAGE OUTLETS																																						
E21.1	Excavation (Common)	m^3	1,000.0																																				
E21.2	Crusher Run Bedding	m^3	95.0																																				
E21.3	Wet Stone Masonry (1:4) for Revetment	m^3	95.0																																				
E21.4	Cement Mortar Plastering	m^2	370.0																																				
E21.5	Concrete, Type C2	m^3	92.0																																				
E21.6	Concrete, Type E	m^3	13.0																																				
E21.7	Formwork FW1	m^2	210.0																																				
E21.8	Reinforcing Steel Bar	kg	2,300.0																																				
E23	DRAINAGE SIDE DITCH (WET MASONRY TYPE)																																						
E23.1	Excavation (Common)	m^3	760.0																																				
E23.2	Backfill with Gravel	m^3	330.0																																				
E23.3	Wet Stone Masonry (1:4) for Revetment	m^3	250.0																																				
E23.4	Cement Mortar Plastering	m^2	1,320.0																																				
E23.5	Sand Bedding	m^3	73.0																																				
E23.6	Crusher Run Bedding	m^3	4.0																																				
E23.7	Concrete, Type C2	m^3	11.0																																				
E23.8	Reinforcing Steel Bar	kg	900.0																																				
E23.9	Formwork FW1	m^2	57.0																																				
E23.10	Wet Stone Masonry (1:3) for Revetment	m^3	20.0																																				
E24	DRAINAGE SIDE DITCH (CONCRETE U-TYPE)																																						
E24.1	Excavation (Common)	m^3	2,900.0																																				
E24.2	Backfill with Selected Soil	m^3	1,610.0																																				
E24.3	Concrete, Type C2	m^3	730.0																																				
E24.4	Reinforcing Steel Bar	kg	23,700.0																																				
E24.5	Formwork FW1	m^2	4,910.0																																				
E24.6	Crusher Run Bedding	m^3	180.0																																				

ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
I	OTHER WORKS		
I6	ENVIRONMENTAL IMPROVEMENT WORKS FOR INSPECTION ROAD OF		
	INSPECTION ROAD		
I6.1	Excavation (Common)	m^3	1,070.0
I6.2	Gravel Pavement, 200 mm thick	m^3	1,280.0
I6.3	Maintenance Marker Post	nos.	24.0
	KABUPATEN ROAD (CLASS III)		
I6.4	Excavation (Common)	m^3	1,820.0
I6.5	Sub-Base Course (Class C)	m^3	870.0
I6.6	Base Course, (Class B)	m^3	580.0
I6.7	Asphalt Treatment Base (A.T.B)	ton	750.0
	PLANTING ALONGSIDE INSPECTION ROAD		
I6.8	Excavation (Common)	m^3	560.0
I6.9	Concrete, Type D	m^3	190.0
I6.10	Sand Bedding	m^3	110.0
I6.11	Formwork FW1	m^2	1,900.0
I6.12	Boulder Pitching, (200mm - 300mm)	m^2	1,020.0
I6.13	Palem Hijau	tree	56.0
I6.14	Fillisium	tree	56.0
I6.15	Acasia Petandra	tree	56.0
I6.16	Tanjung	tree	56.0
I6.17	Cemara Kipas	tree	110.0
I6.18	Cemara Lilin	tree	110.0
I6.19	Soka	tree	110.0
I6.20	Bougainvillea	tree	110.0
	FENCE		
I6.21	Excavation (Common)	m^3	270.0
I6.22	Backfill with Selected Soil	m^3	200.0
I6.23	Crusher Run Bedding	m^3	28.0
I6.24	Concrete, Type D	m^3	41.0
I6.25	Formwork FW1	m^2	540.0
I6.26	Galvanized Steel Fence, H=1.20 m	m	2,230.0
I10	APPROACH ROAD FOR MAINTENANCE		
I10.1	Excavation (Common)	m^3	2,530.0
I10.2	Base Course, (Class A)	m^3	53.0
I10.3	Sub-Base Course, (Class C)	m^3	79.0
I10.4	Asphalt Treatment Base (A.T.B)	ton	76.0
I10.5	Entrance Gate	nos.	1.0

1ST YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
1	2	3	4	5	6	7	8	9	10	11	12	

2ND YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
13	14	15	16	17	18	19	20	21	22	23	24	

3RD YEAR												
4	5	6	7	8	9	10	11	12	1	2	3	
25	26	27	28	29	30	31	32	33	34	35	36	

Construction Schedule of Precast Concrete Bridge

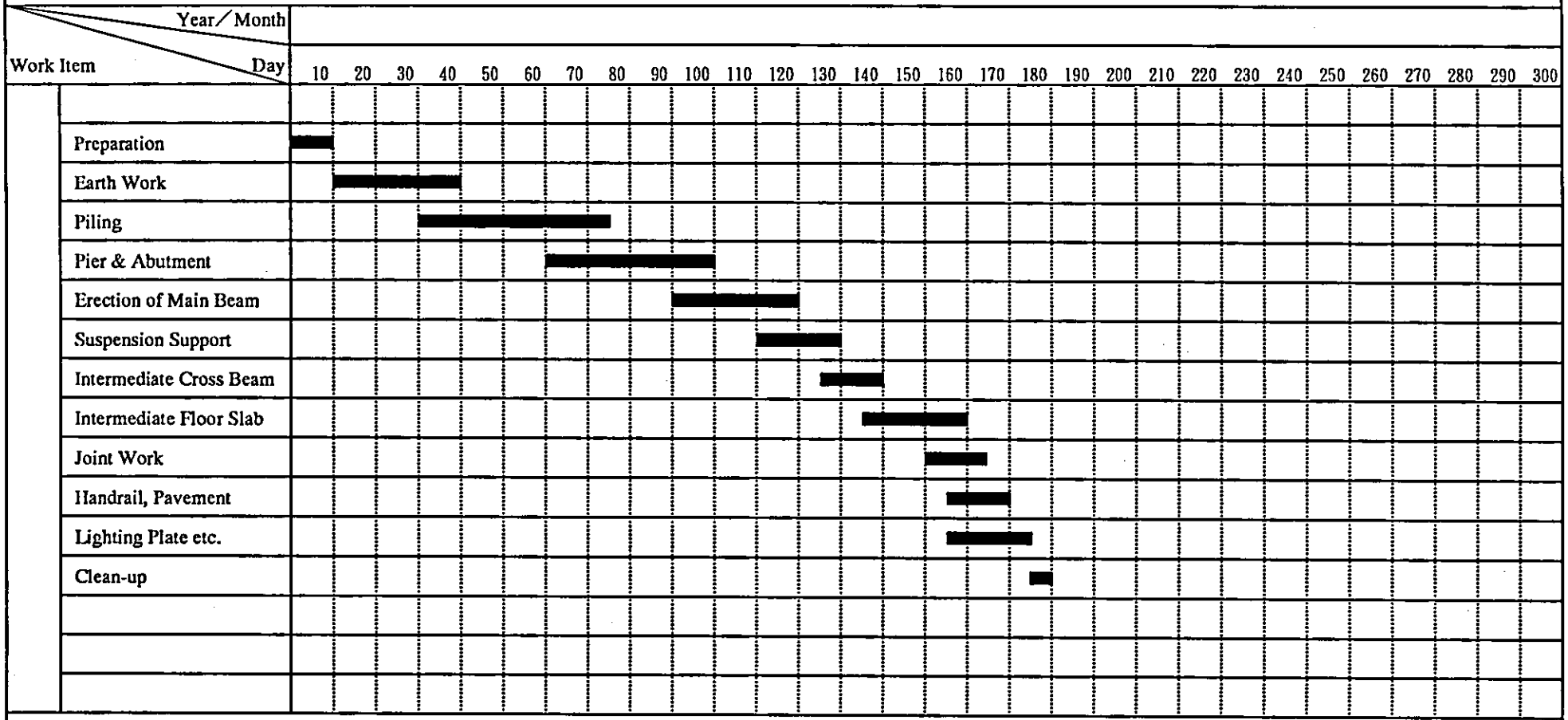
Bridge Number (F3)

Bridge Length 31.6m　　Width 9.0m

Pile Length 9.0m　　Pile Number Dia.

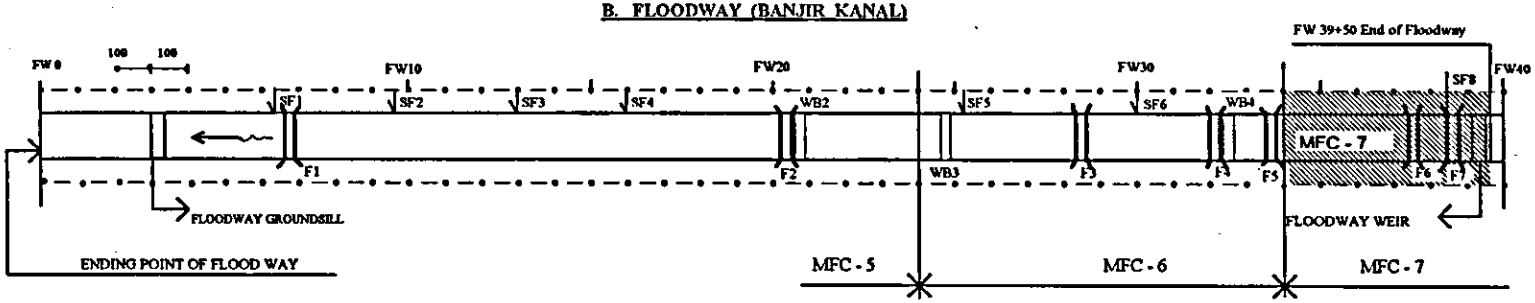
Span Pitch 1span

Number of Main Beam 6

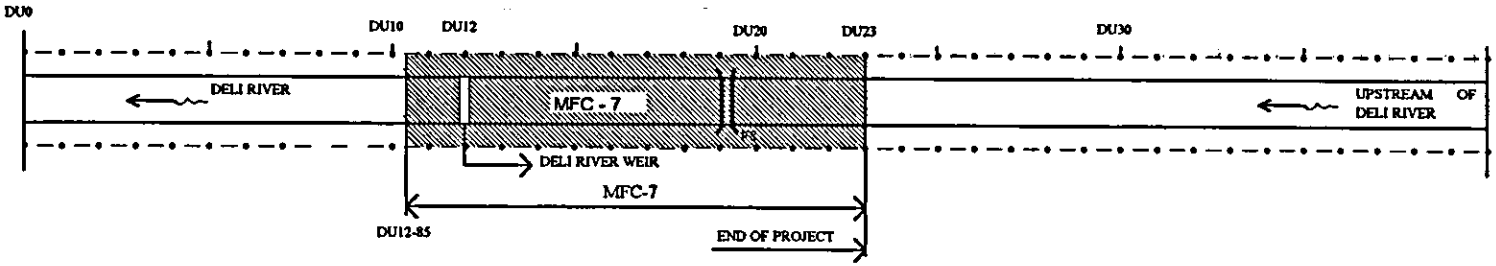


Preparation work are including demolish the existing structure, clearing / grubbing and temporary bridge.

B. FLOODWAY (BANJIR KANAL)

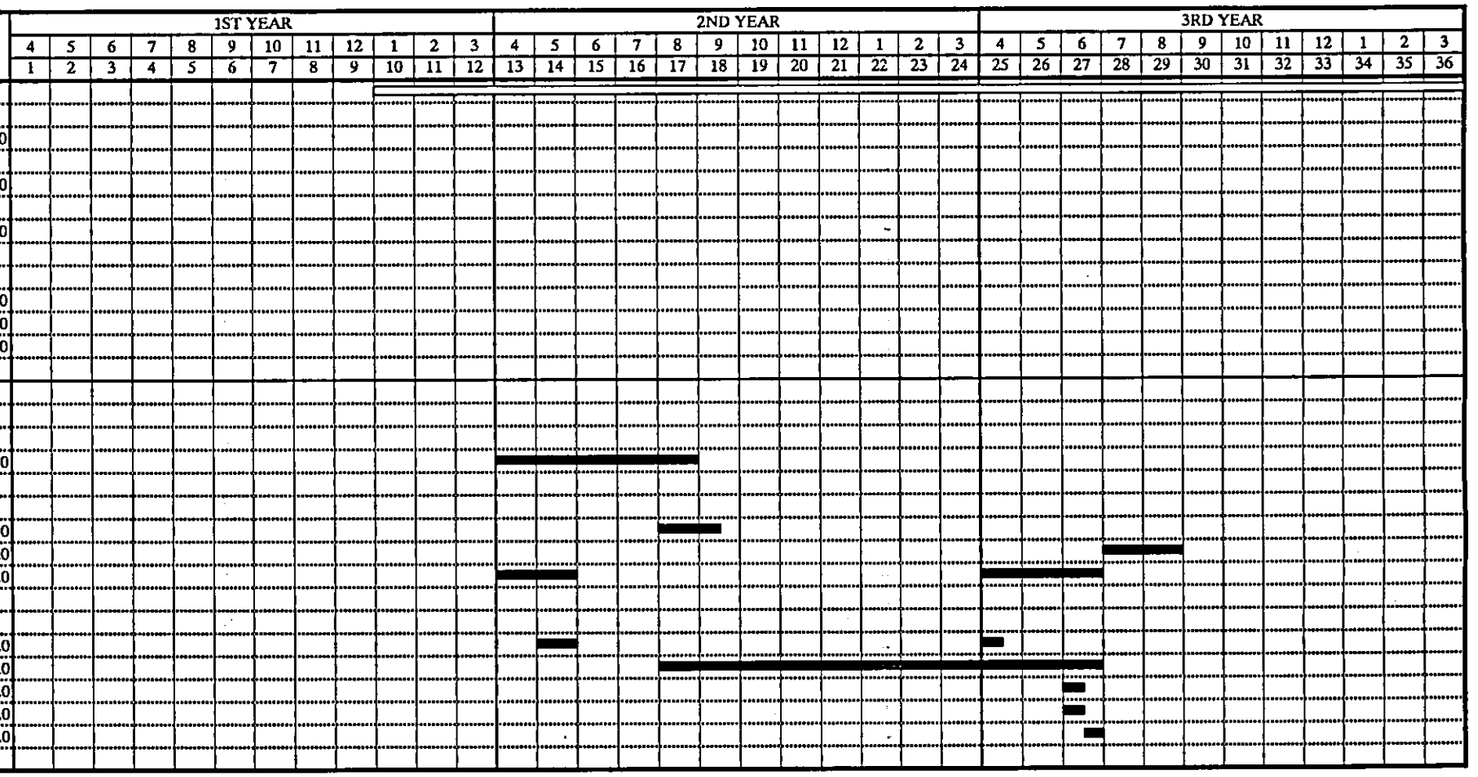


C. UPSTREAM DELI RIVER (RESERVOIR)

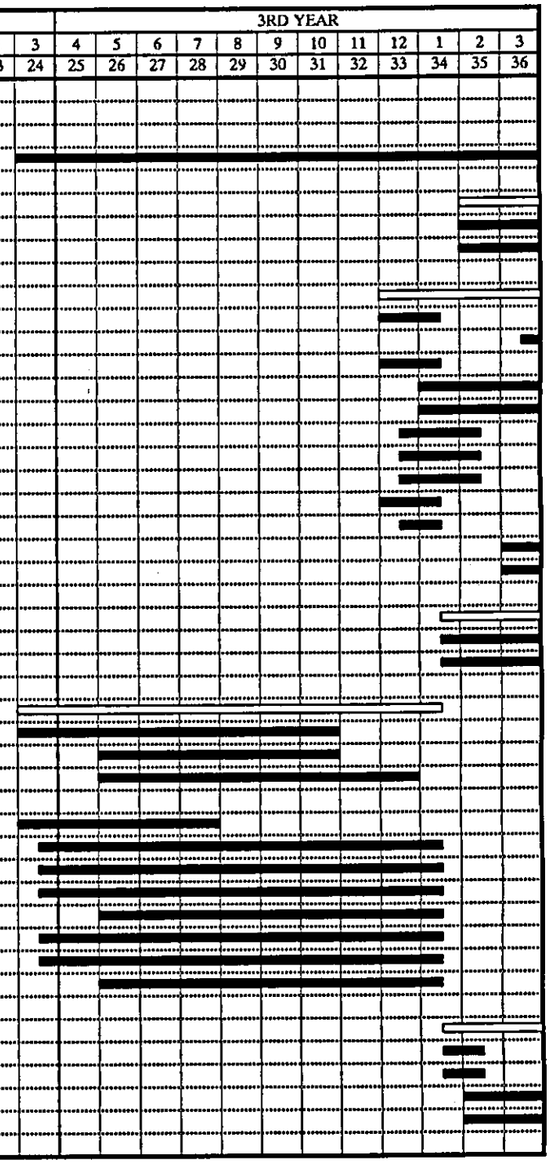


OBJECT PORTION

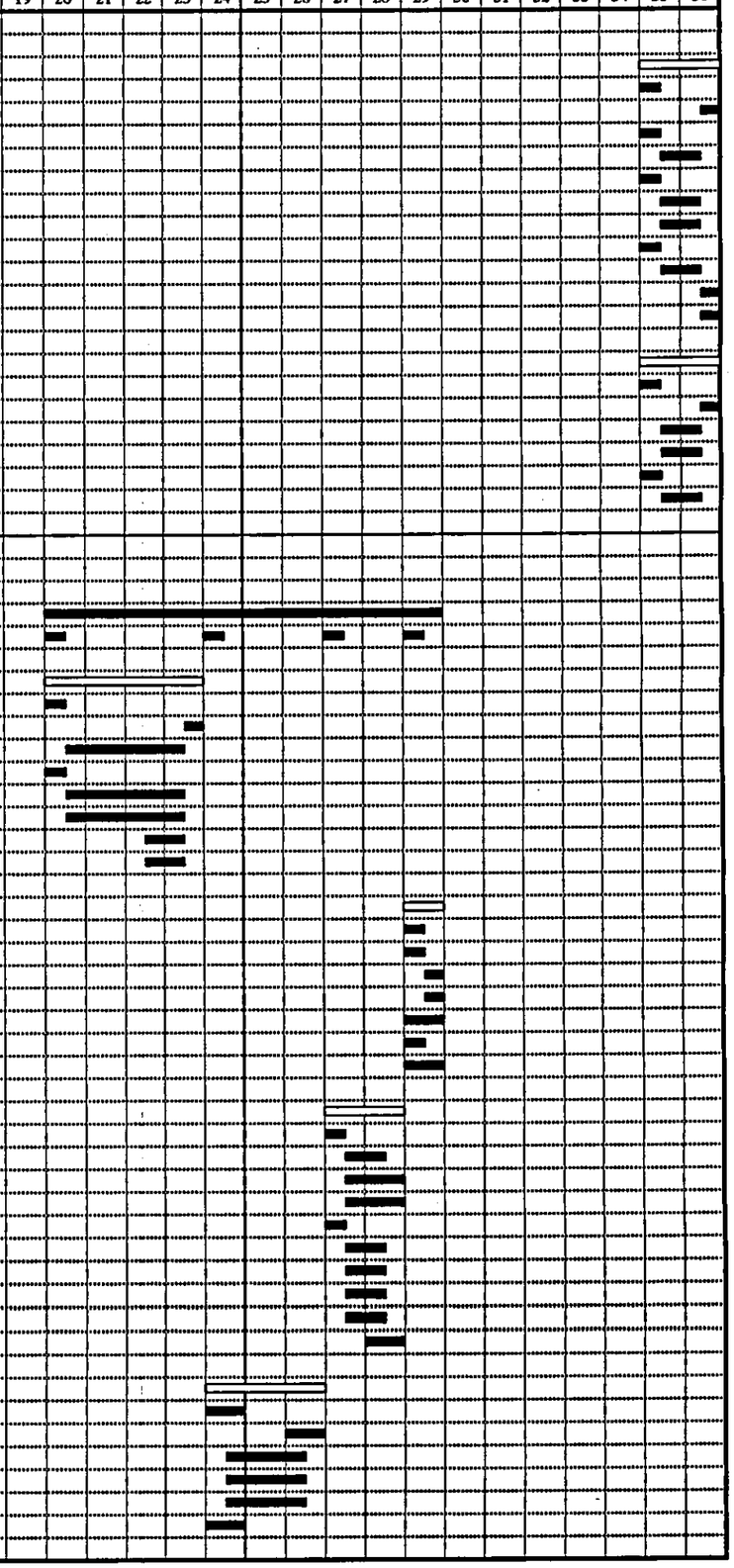
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
A	GENERAL		
A1	MOBILIZATION AND DEMOBILIZATION	L.S.	1.0
A2	ESTABLISHMENT	L.S.	1.0
A3	RELOCATION OF EXISTING FACILITIES	L.S.	1.0
A4	GEOLOGICAL INVESTIGATION		
A.4.1	Hand Auger	m	100.0
A.4.2	Mechanical Boring	m	250.0
A.4.3	Exploratory Excavation	m^3	800.0
B	CHANNEL AND DIKE WORKS		
B1	PREPARATION WORKS		
B1.1	Clearing and Grubbing	m^2	143,700.0
B2	CHANNEL EXCAVATION		
B2.1	Excavation (River Channel)	m^3	13,000.0
B2.2	Excavation (Common)	m^3	40,500.0
B2.3	Excavation (Floodway Channel)	m^3	137,000.0
B3	EARTH DIKE WORKS		
B3.1	Stripping of Top Soil	m^3	24,800.0
B3.2	Embankment	m^3	267,700.0
B3.3	Base Course, (Class A)	m^3	61.0
B3.4	Sub-Base Course, (Class C)	m^3	91.0
B3.5	Asphalt Treatment Base (A.T.B)	ton	87.0



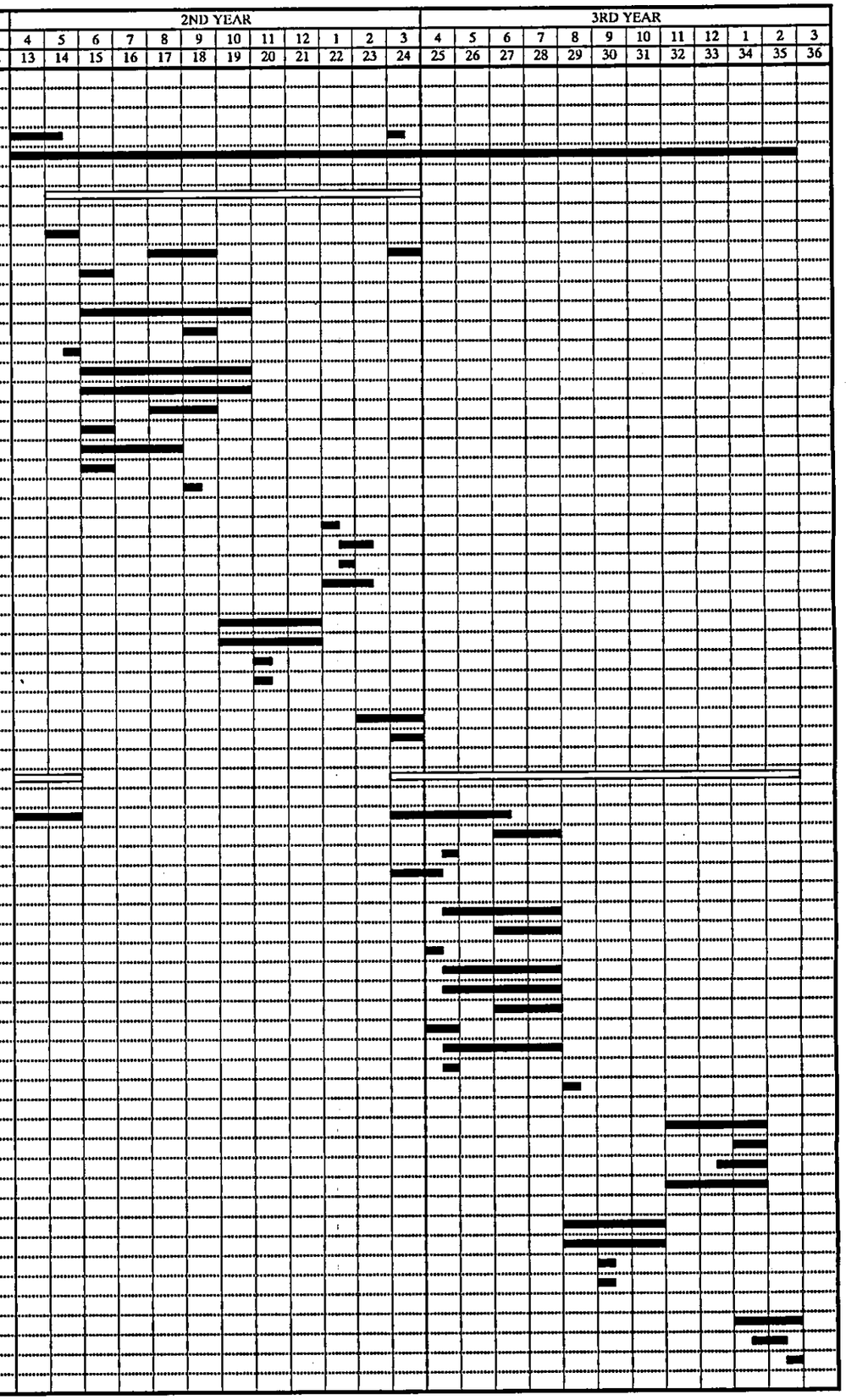
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
C	SLOPE AND RIVERBED PROTECTION WORKS		
C1	PREPARATION WORKS		
C1.1	Coffering and Dewatering	L.S.	1.0
C2	SODDING AND DIKE		
C2.1	Solid Sodding	m^2	12,500.0
C2.2	Check Sodding for Retarding Channel and Diversion Weirs	m^2	19,200.0
C3	REVETMENT - WET STONE MASONRY TYPE		
C3.1	Excavation (Common)	m^3	14,700.0
C3.2	Backfill with Selected Soil	m^3	550.0
C3.3	Crusher Run Bedding	m^3	5,900.0
C3.4	Wet Stone Masonry (1:4) for Revetment	m^3	5,120.0
C3.5	Cement Mortar Plastering	m^2	17,500.0
C3.6	Concrete, Type C1	m^3	960.0
C3.7	Reinforcing Steel Bar	kg	56,800.0
C3.8	Formwork FW1	m^2	5,040.0
C3.9	Log Pile, Dia. 150 mm L=2.0m	m	1,710.0
C3.10	Elastic Joint Filler, 10 mm thick	m^2	770.0
C3.11	Gabion Cylinder	m^3	90.0
C3.12	Cobble Stone Filling	m^3	20.0
C4	GABION TYPE FOOT PROTECTION		
C4.1	Cobble Stone Filling	m^3	1,280.0
C4.2	Gabion Mattress	m^3	2,640.0
C11	LEANING WALL FOR FLOODWAY(FW34 to FW38+76)		
C11.1	Excavation (Common)	m^3	27,900.0
C11.2	Backfill with Selected Soil	m^3	3,860.0
C11.3	Backfill with Gravel	m^3	7,130.0
C11.4	Rubble Stone Bedding	m^3	1,090.0
C11.5	Concrete, Type E	m^3	780.0
C11.6	Concrete, Type D	m^3	22,600.0
C11.7	Reinforcing Steel Bar	kg	19,200.0
C11.8	Formwork FW1	m^2	14,200.0
C11.9	Formwork FW2	m^2	15,500.0
C11.10	Elastic Joint Filler, 10 mm thick	m^2	880.0
C11.11	Weep Hole, Dia. 50 mm, including Filter Cloth	nos.	3,000.0
C11.12	Gravel Pavement, 200 mm thick	m^3	320.0
C12	CHANNEL BED LINING FOR FLOODWAY		
C12.1	Excavation (Common)	m^3	2,020.0
C12.2	Crusher Run Bedding	m^3	1,280.0
C12.3	Concrete, Type C2	m^3	2,660.0
C12.4	Elastic Joint Filler, 10 mm thick	m^2	110.0



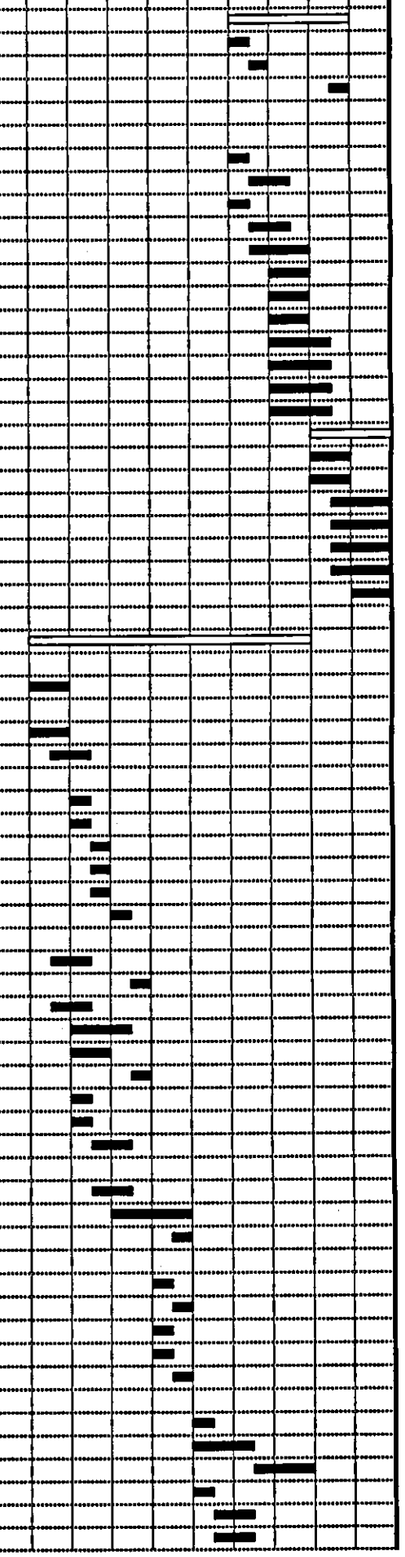
ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
D	RIPARIN STRUCTURES		
D9	APPROACH STEPS, TYPE DA (6 places)		
D9.1	Excavation (Common)	m^3	260.0
D9.2	Backfill with Selected Soil	m^3	11.0
D9.3	Log Pile, Dia. 150mm, L=2.0m	m	36.0
D9.4	Concrete, Type C2	m^3	45.0
D9.5	Concrete, Type D	m^3	59.0
D9.6	Reinforcing Steel Bar	kg	2,440.0
D9.7	Formwork FW1	m^2	330.0
D9.8	Crusher Run Bedding	m^3	53.0
D9.9	Elastic Joint Filler, 10 mm thick	m^2	29.0
D9.10	Gabion Mattress	m^3	50.0
D9.11	Cobble Stone Filling	m^3	9.0
D10	APPROACH STEPS, TYPE DB (10 places)		
D10.1	Excavation (Common)	m^3	68.0
D10.2	Backfill with Selected Soil	m^3	30.0
D10.3	Concrete, Type C2	m^3	26.0
D10.4	Formwork FW1	m^2	100.0
D10.5	Crusher Run Bedding	m^3	26.0
D10.6	Elastic Joint Filler, 10mm thick	m^2	25.0
E	DRAINAGE CHANNEL AND OUTLET WORKS FOR FLOODWAY		
E1	PREPARATION WORKS FOR DRAINAGE WORKS		
E1.1	Coffering and Dewatering	L.S.	1.0
E1.2	Clearing and Grubbing	m^2	560.0
E19	DRAINAGE OUTLET(SF7), PIPE CULVERT D=1000 x 1, (1 place)		
E19.1	Excavation (Common)	m^3	130.0
E19.2	Backfill with Selected Soil	m^3	100.0
E19.3	Concrete, Type C1	m^3	26.0
E19.4	Concrete, Type E	m^3	4.0
E19.5	Reinforcing Steel Bar	kg	370.0
E19.6	Formwork FW1	m^2	58.0
E19.7	Formwork FW2	m^2	1.0
E19.8	RC Pipe, D=1000mm	m	7.0
E21	DRAINAGE DITCH CONNECTING TO DRAINAGE OUTLETS		
E21.1	Excavation (Common)	m^3	20.0
E21.2	Crusher Run Bedding	m^3	3.0
E21.3	Wet Stone Masonry (1:4) for Revetment	m^3	3.0
E21.4	Cement Mortar Plastering	m^2	12.0
E21.5	Concrete, Type C2	m^3	3.0
E21.6	Concrete, Type E	m^3	1.0
E21.7	Formwork FW1	m^2	10.0
E23	DRAINAGE SIDE DITCH (WET MASONRY TYPE)		
E23.1	Excavation (Common)	m^3	360.0
E23.2	Backfill with Gravel	m^3	160.0
E23.3	Wet Stone Masonry (1:4) for Revetment	m^3	120.0
E23.4	Cement Mortar Plastering	m^2	620.0
E23.5	Sand Bedding	m^3	35.0
E23.6	Crusher Run Bedding	m^3	2.0
E23.7	Concrete, Type C2	m^3	5.0
E23.8	Reinforsing Steel Bar	kg	450.0
E23.9	Formwork FW1	m^2	29.0
E23.10	Wet Stone Masonry (1:3) for Revetment	m^3	10.0
E24	DRAINAGE SIDE DITCH (CONCRETE U-TYPE)		
E24.1	Excavation (Common)	m^3	1,370.0
E24.2	Backfill with Selected Soil	m^3	760.0
E24.3	Concrete Type C2	m^3	350.0
E24.4	Reinforcing Steel Bar	kg	19,900.0
E24.5	Formwork FW1	m^2	2,320.0
E24.6	Crusher Run Bedding	m^3	85.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
G	DIVERSION WEIRS		
G1	PREPARATION WORKS FOR DIVERSION WEIRS		
G1.1	Clearing and Grubbing	m^2	4,150.0
G1.2	Coffering and Dewatering	L.S.	1.0
G2	DELI RIVER WEIR		
	EARTH WORKS		
G2.1	Excavation (Common)	m^3	15,000.0
G2.2	Backfill with Selected Soil	m^3	3,800.0
G2.3	Backfill with Impervious Soil	m^3	250.0
	CONCRETE WORKS		
G2.4	Concrete, Type C1	m^3	5,810.0
G2.5	Concrete, Type D for Leaning Wall	m^3	810.0
G2.6	Concrete, Type E	m^3	60.0
G2.7	Reinforcing Steel Bar	kg	64,200.0
G2.8	Formwork FW1	m^2	2,100.0
G2.9	Formwork FW2	m^2	3,400.0
G2.10	Water Stop, 30 cm wide	m	150.0
G2.11	Dowel Bars, Dia.19mm, 1.0 m long	kg	750.0
G2.12	Elastic Joint Filler, 10 mm thick	m^2	140.0
G2.13	Surface Caulking	m	85.0
	DRAIN WORKS		
G2.14	Concrete Drainage Ditch (U- 300mm x 300mm) with Gravel Foundation	m	69.0
G2.15	Backfill with Gravel	m^3	650.0
G2.16	Valve, L=7m	nos.	2.0
G2.17	Weep Hole, Dia. 50 mm, including Filter Cloth, L=1.5m	nos.	180.0
	RIVER BED PROTECTION WORKS		
G2.18	Concrete Block, 980mm x 980mm x 400mm	nos.	470.0
G2.19	Concrete Block, Crib Type, t=400 mm	nos.	150.0
G2.20	Cobble Stone Filling for Crib type Concrete Block	m^3	100.0
G2.21	Crusher Run Bedding	m^3	90.0
	MISCELLANEOUS WORKS		
G2.22	Handrail, Galvanized Steel Pipe	kg	700.0
G2.23	Gabion Mattress	m^3	87.0
G3	FLOODWAY WEIR		
	EARTH WORKS		
G3.1	Excavation (Common)	m^3	27,000.0
G3.2	Backfill with Selected Soil	m^3	4,500.0
G3.3	Backfill with Impervious Soil	m^3	90.0
G3.4	Foundation Improvement with Cement	m^3	1,700.0
	CONCRETE WORKS		
G3.5	Concrete, Type C1	m^3	3,360.0
G3.6	Concrete, Type D for Leaning Wall	m^3	880.0
G3.7	Concrete, Type E	m^3	54.0
G3.8	Reinforcing Steel Bar	kg	40,800.0
G3.9	Formwork FW1	m^2	1,020.0
G3.10	Formwork FW2	m^2	3,270.0
G3.11	Water Stop, 30 cm wide	m	140.0
G3.12	Dowel Bars, Dia.19mm, 1.0 m long	kg	780.0
G3.13	Elastic Joint Filler, 10 mm thick	m^2	160.0
G3.14	Surface Caulking	m	88.0
	DRAIN WORKS		
G3.15	Concrete Drainage Ditch (U- 300mm x 300mm) with Gravel Foundation	m	140.0
G3.16	Backfill with Gravel	m^3	450.0
G3.17	Valve	nos.	2.0
G3.18	Weep Hole, Dia. 50 mm, including Filter Cloth, L=1.5m	nos.	130.0
	RIVER BED PROTECTION WORKS		
G3.19	Concrete Block, 980mm x 980mm x 400mm	nos.	600.0
G3.20	Concrete Block, Crib Type, t=400 mm	nos.	110.0
G3.21	Cobble Stone Filling for Crib type Concrete Block	m^3	70.0
G3.22	Crusher Run Bedding	m^3	100.0
	MISCELLANEOUS WORKS		
G3.23	Handrail, Galvanized Steel Pipe	kg	2,300.0
G3.24	Galvanized Steel Ladder	kg	130.0
G3.25	Water Level Staff Gauge, Type A	L.S.	1.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY
I	OTHER WORKS		
I6	ENVIRONMENTAL IMPROVEMENT WORKS FOR INSPECTION ROAD OF		
	INSPECTION ROAD		
I6.1	Excavation (Common)	m^3	1,070.0
I6.2	Gravel Pavement, 200 mm thick	m^3	1,340.0
I6.3	Maintenance Market Post	nos.	11.0
	PLANTING ALONGSIDE INSPECTION ROAD		
I6.4	Excavation (Common)	m^3	260.0
I6.5	Concrete, Type D	m^3	91.0
I6.6	Sand Bedding	m^3	53.0
I6.7	Formwork FW1	m^2	900.0
I6.8	Palem Hijau	tree	26.0
I6.9	Fillisium	tree	26.0
I6.10	Acasia Petandra	tree	26.0
I6.11	Tanjung	tree	26.0
I6.12	Cemara Kipas	tree	53.0
I6.13	Cemara Lilin	tree	53.0
I6.14	Soka	tree	53.0
I6.15	Bougainvillea	tree	53.0
	FENCE		
I6.16	Excavation (Common)	m^3	130.0
I6.17	Backfill with Selected Soil	m^3	100.0
I6.18	Crusher Run Bedding	m^3	13.0
I6.19	Concrete, Type D	m^3	20.0
I6.20	Formwork FW1	m^2	250.0
I6.21	Galvanized Steel Fence, H=1.20 m	m	1,060.0
I6.22	Steel Gate (2 places)	L.S.	1.0
I7	ENVIRONMENTAL IMPROVEMENT WORKS FOR RETARDING CHANNEL		
	PREPARATION WORK		
I7.1	Clearing and Grubbing	m^2	550.0
	WALKWAY		
I7.2	Excavation (Common)	m^3	1,640.0
I7.3	Gravel Pavement, 200 mm thick for Walkway	m^3	1,540.0
	APPROACH ROAD TO RETARDING CHANNEL (CLASS III)		
I7.4	Stripping of Top Soil	m^3	66.0
I7.5	Excavation (Common)	m^3	260.0
I7.6	Embankment	m^3	130.0
I7.7	Sub-Base Course, (Class C)	m^3	40.0
I7.8	Base Course, (Class B)	m^3	26.0
I7.9	Asphalt Treatment Base (A.T.B)	ton	13.0
	DRAINAGE SIDE DITCH (WET MASONRY TYPE) AND OUTLET		
I7.10	Excavation (Common)	m^3	880.0
I7.11	Backfill with Selected Soil	m^3	290.0
I7.12	Crusher Run Bedding	m^3	9.0
I7.13	Wet Stone Masonry (1:4) for Revetment	m^3	420.0
I7.14	Wet Stone Masonry (1:3) for Revetment	m^2	25.0
I7.15	Cement Mortar Plastering	m^2	1,640.0
I7.16	Concrete, Type C2	m^3	2.0
I7.17	Reinforcing Steel Bar	kg	330.0
I7.18	Formwork FW1	m^2	30.0
	BOULDER PITCHING FOR SLOPE BETWEEN ZONE A AND B		
I7.19	Excavation (Common)	m^3	350.0
I7.20	Boulder Pitching, (300mm - 500mm)	m^2	1,730.0
I7.21	Backfill with Selected Soil	m^3	170.0
	FENCE		
I7.22	Excavation (Common)	m^3	86.0
I7.23	Backfill with Selected Soil	m^3	44.0
I7.24	Crusher Run Bedding	m^3	17.0
I7.25	Concrete, Type D	m^3	25.0
I7.26	Galvanized Steel Fence, H=1.20 m	m	1,370.0
	PLANTING ALONGSIDE WALKWAY ON ZONE-D		
I7.27	Excavation (Common)	m^3	310.0
I7.28	Backfill with Selected Soil	m^3	140.0
I7.29	Solid Sodding	m^2	2,500.0
I7.30	Sand Bedding	m^3	63.0
I7.31	Concrete, Type D	m^3	110.0
I7.32	Formwork, FW1	m^2	1,040.0



ITEM NO.	BQ-ITEMS	UNIT	QUANTITY	1ST YEAR												2ND YEAR												3RD YEAR											
				4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
17.33	Palem Hijau	tree	32.0																																				
17.34	Fillisium	tree	32.0																																				
17.35	Acasia Petandra	tree	32.0																																				
17.36	Tanjung	tree	32.0																																				
	MISCELLANEOUS																																						
17.37	Information Board	nos.	3.0																																				
17.38	Water Level Staff Gauge	nos.	2.0																																				
17.39	Roofed Bench	nos.	4.0																																				
17.40	Entrance Gate	nos.	2.0																																				

ANNEX

Riverbed Protection of Groundsill

(1) General

In general, riverbed protection works are provided not only on the riverbed downstream of a groundsill but also the upstream. The upstream riverbed protection works have the functions of preventing local scouring which is anticipated in the immediate upstream of groundsill and of preventing collapse of the main body of groundsill and the side walls at both sides of it.

Presenting the results of a hydraulic model test on groundsill, this paper explains why riverbed protection works are necessary in the riverbed upstream of groundsill.

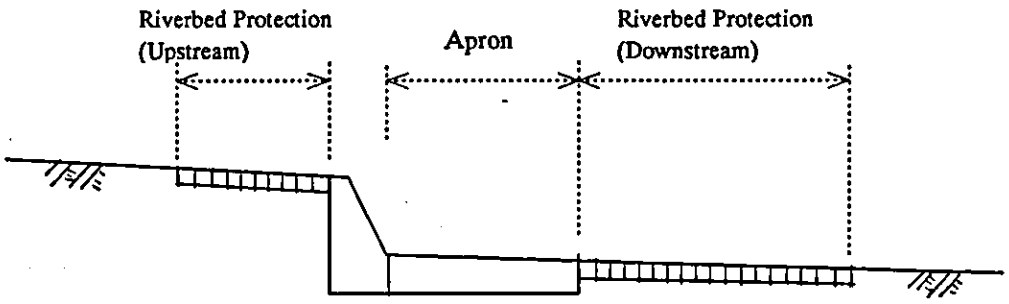
(2) Model Test

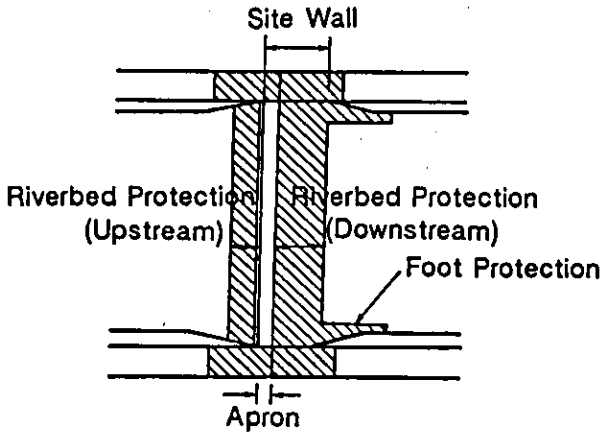
This paper is prepared based on the model test results of "The Survey and Study on Groundsill" conducted by the Institute of Construction, Ministry of Construction, Japan.

Model

The following conditions were applied to the groundsill model:

Case of Model Test	Rapid Flow Channel	Slow Flow Channel
Scale of Model		
Riverbed Condition	Movable Bed	Movable Bed
Head of Groundsill	4.0 cm (2 m)	4.0 cm (2 m)
Length of Apron	20 cm (10 m)	20 cm (10 m)
Riverbed Protection - Upstream - Downstream	 17 cm 34 cm	 20 cm (10 m) 30 cm (15 m)
Channel Bed Slope	1/200	1/2,000





PLAN OF GROUNDSILL

Model Test Cases

Model testing was performed on the following two cases:

	(1)	(2)
Case	Rapid Flow Channel	Slow Flow Channel
Discharge per Unit Width	10.0 m^3/s	6.0 m^3/s

(3) Test Results

The major outputs of the model test are summarized below.

Rapid Flow Channel

(a) Flow Regime

A supercritical flow arises in the area from the top of the groundsill to the middle of the riverbed protection. Besides, a flow towards the center of the channel occurs and eddy flow is observed along the channel bank. After flowing over the groundsill, the flow is rectified as the straight smooth flow in the downstream. The flow regime is shown in Fig. 1.

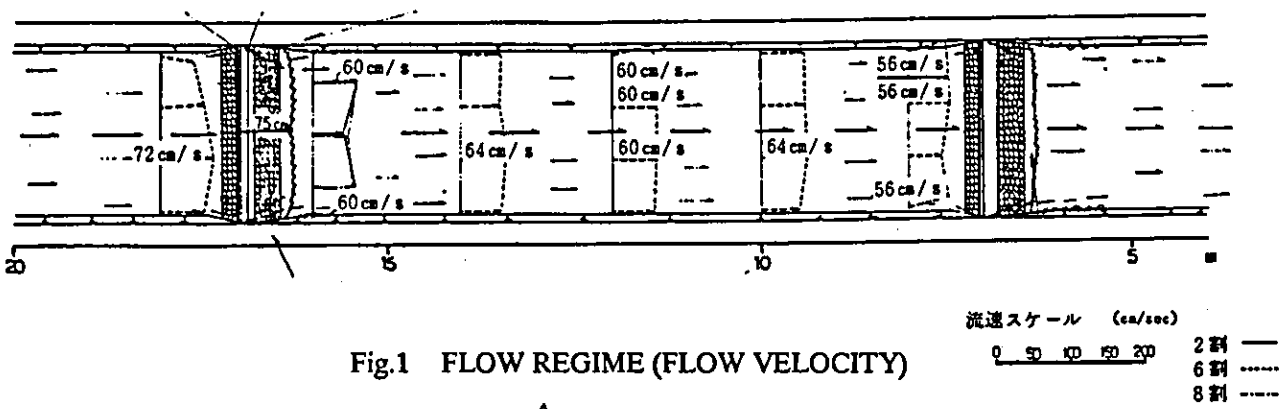


Fig.1 FLOW REGIME (FLOW VELOCITY)

(b) Riverbed Variation

As Figs. 2 and 3 show, both upstream and downstream riverbeds become lower and rather flat. Local scouring arises in the immediate downstream of apron and along the side walls.

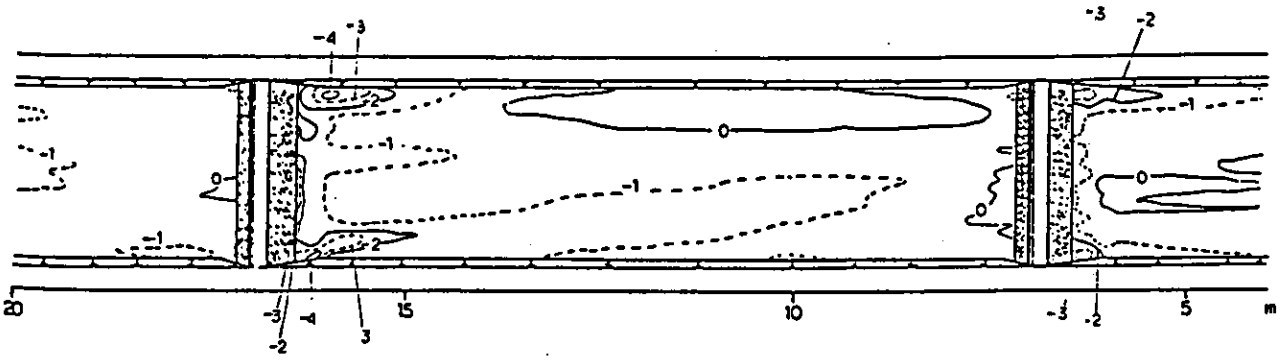


Fig. 2 RIVERBED CONTOUR LINE

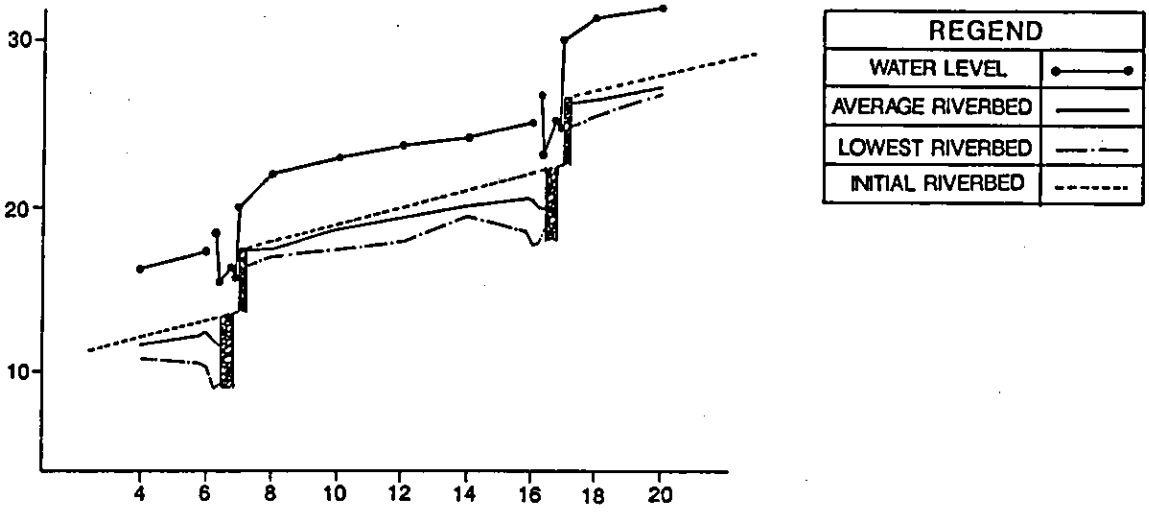


Fig. 3 RIVERBED PROFILE

Slow Flow Channel

(a) Flow Regime

The flow regime such as flow direction, velocity and water depth is almost the same between the upstream and the downstream of ground sill as shown in Fig. 4, and hydraulic jump occurs at the apron. In the downstream, water flow is observed on the flood channel.

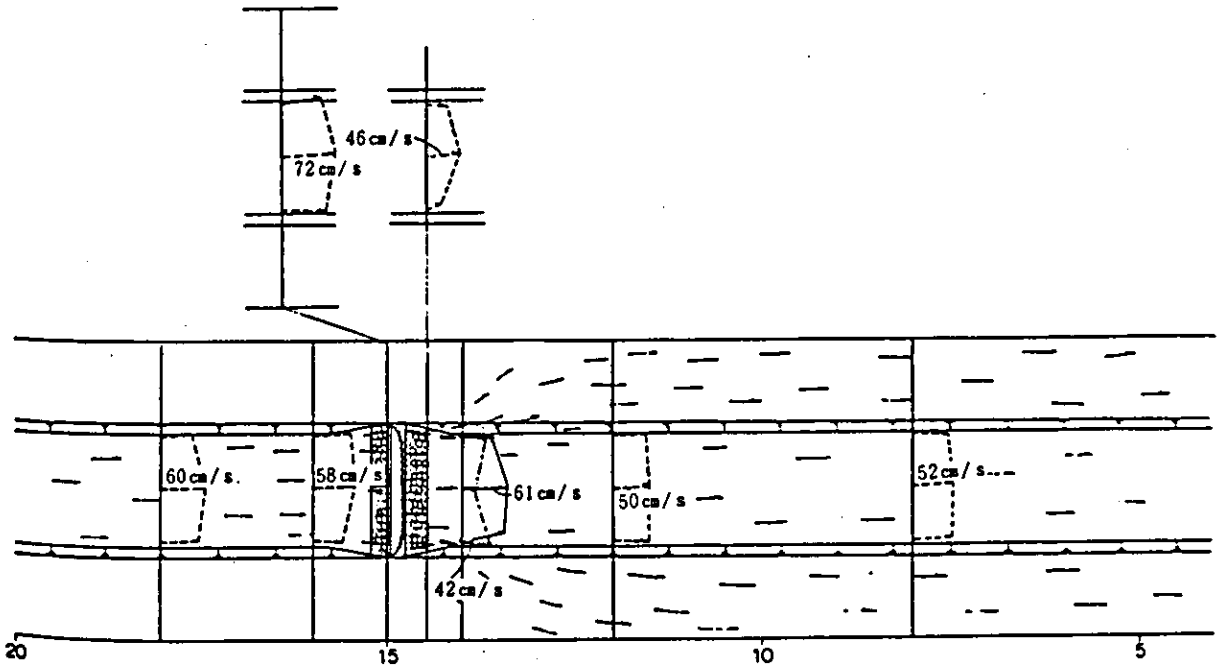


Fig. 4 FLOW REGIME (FLOW VELOCITY)

(b) Riverbed Variation

Figs. 5 and 6 show the contour lines of the riverbed and the riverbed profile, respectively. In the upstream of groundsill the riverbed becomes lower at almost the same rate, and degradation is about 1.7 cm (0.85 m) on average. On the other hand, the average riverbed downstream of the apron becomes higher due to sediment deposition. Further, local scouring is observed near the side walls in the immediate downstream of the groundsill.

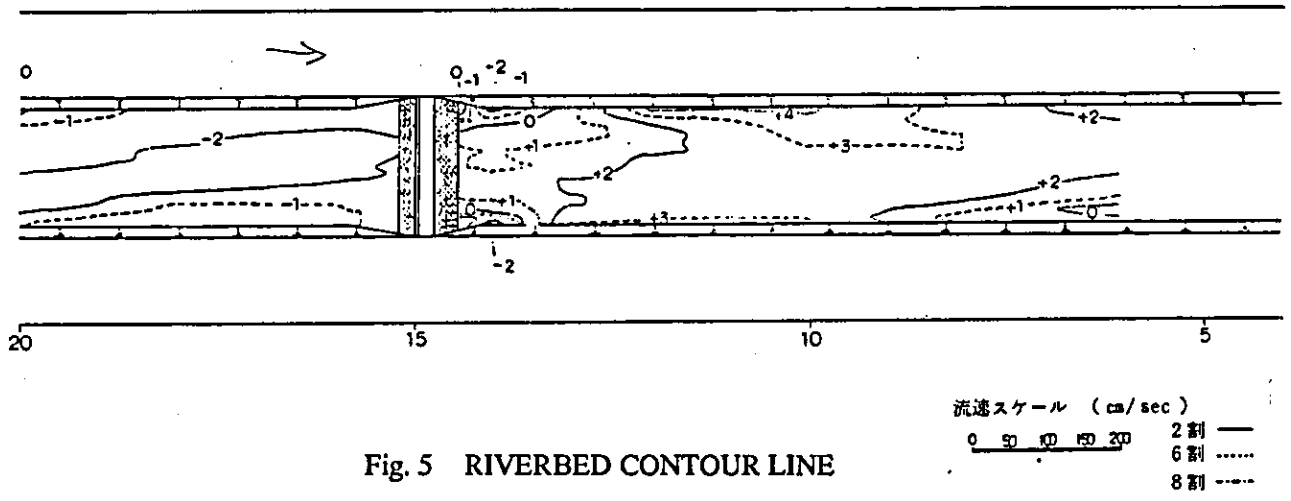


Fig. 5 RIVERBED CONTOUR LINE

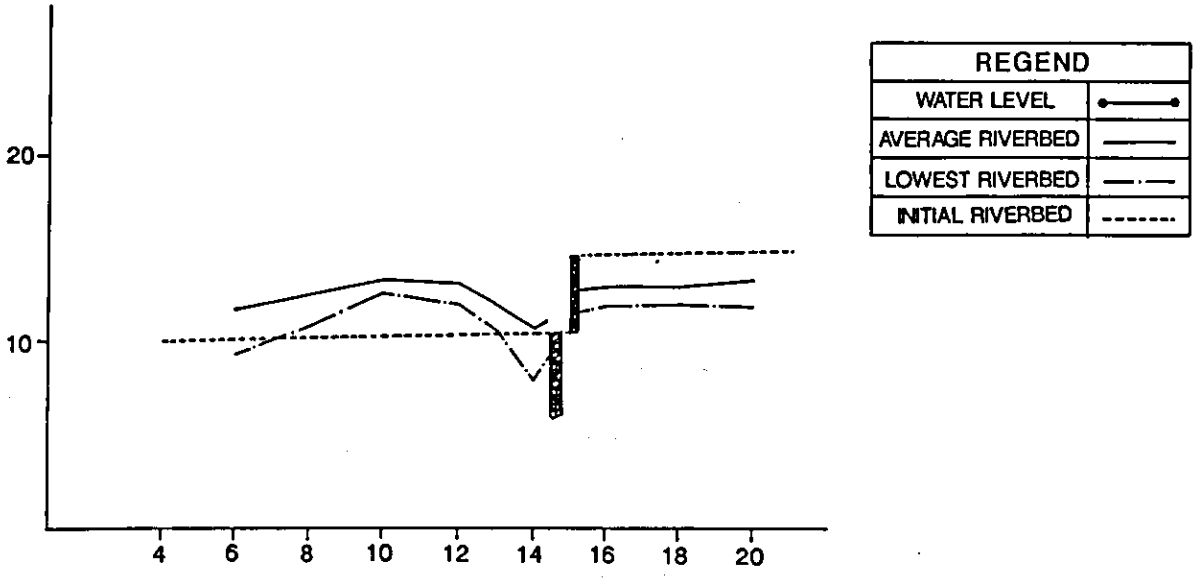


Fig. 6 RIVERBED PROFILE

(4) Consideration

Riverbed degradation in the upstream of groundsill was confirmed through the hydraulic model test. Furthermore, degradation is more predominant in the upstream than the downstream in the case of the slow flow channel, and the riverbed degradation may cause serious local scouring around the groundsill and collapse of the structures. To maintain the structural stability of both groundsill and side walls, upstream riverbed protection works is essential.

Stability of Rubber Dam

(1) Damage on Rubber Dam

Among the rubber dams installed on the Kali Brantas River, the Jatimlcrek Intake Weir (1.85m x 150m, 6 spans) was reported to have sustained damage to its rubber body. This rubber dam was completely deflated and lain flat on the ground in more than 9 months a year, and the rubber body was damaged during that period. The damage and causes are described as follows:

(a) When deflated, the rubber dam lies flat on the ground forming a swell of rubber bag at the tip (refer to Fig. 1). Since the riverbed at the rubber dam site is formed of gravel material with cobblestones, such materials roled continuously on the rubber bag surface bumping the swell, resulting in damage due to abrasion.

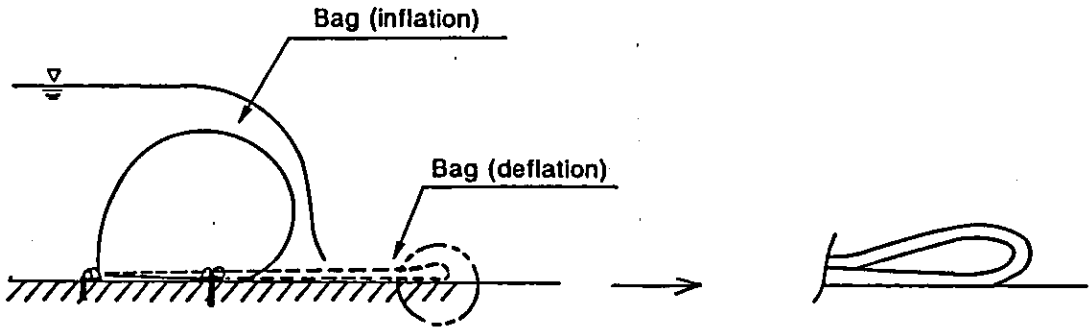


Fig. 1 Cross Section of Rubber Dam Body

(b) A lift arose at the tip of the rubber bag due to the difference of flow velocity on the surface of the upper and lower faces. This lift induced shaking and the shake continued for a long time causing abrasion of the rubber body.

(c) Besides the causes mentioned above, the insufficient corrosion allowance was pointed out as one of the causes of damage.

In general the stability of rubber dam and durability of material is studied focusing on the inflated condition. This is because a rubber dam is subject to more critical external forces in inflated condition than in deflated one and because a rubber dam is normally operated to be inflated for water use. In this context, the damage to the rubber dam mentioned above was an unforeseen and significant case.

(2) Considerations on Rubber Dam Body of Bandar Sidoras Intake Weir

Shape and Dimensions of Rubber Dam Body

The cross sectional form of the rubber body is shown below.

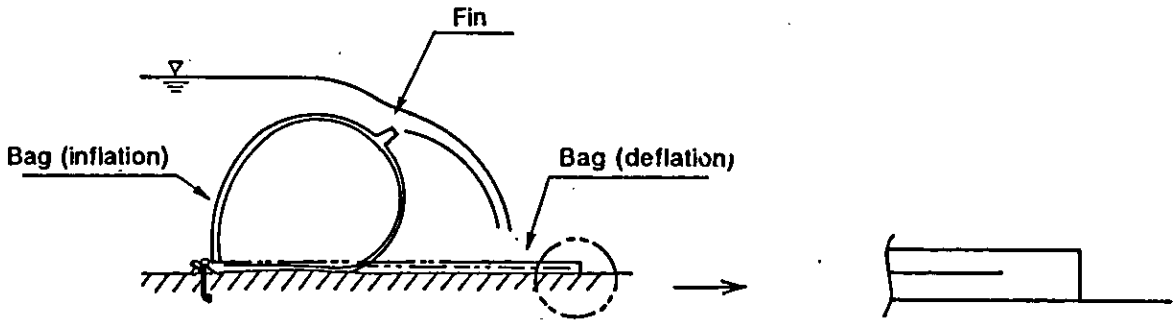


Fig. 2 Rubber Dam Cross Sections of Bandar Sidoras Weir

The dimensions of rubber dam are as follows:

Full height of dam (H)	3.14 m
Length of dam at riverbed position	13.0 m
Design depth of overflow water (h)	0.81 m
Design water depth upstream	3.95 m
Means of rubber bag inflation	by air
Air pressure inside the rubber bag	about 4.0 mAg
Thickness of rubber bag	15.8 mm
Rubber bag surface	With a water fin (deflector)
Frequency of deflation	10 times a year

(3) Considerations for Stability

Abrasion

When deflated, the rubber bag lies flat on the ground without forming a swell at the tip. Therefore, riverbed materials or rolling stuff can shift smoothly without bumping the rubber bag surface in the horizontal direction. At the rubber dam site, however, rolling stones or other harmful materials are not foreseen on the riverbed (mainly silty fine sand). Furthermore, this rubber dam will stay inflated in normal time (deflated 10 times a year before flooding) under the operation rule. For all these reasons, the abrasion of rubber bag does not become a serious problem.

Shake/Vibration of Rubber Body

As shown in Fig. 2, the rubber body has a long fin shooting water at a distance. This fin reduces the vibration caused by water flow, when the rubber body stays inflated. After the rubber bag is deflated, it is lain completely flat on the concrete riverbed, preventing uplift in the rubber bag at the tip. As the result, the vibration of rubber body will not take place. Even if vibration occurs, it will be a slight and has little influence on the rubber body.

Thickness of Rubber Bag

According to the survey on existing rubber dams concerning the relationship between height of rubber body and thickness of rubber bag, rubber dams with a height of about 3.2 m, in general, have the thickness of 12 mm to 15 mm. For the Bandar Sidoras Intake Weir, the thickness of 15.8 mm is applied to the rubber bag to ensure durability and stability under any condition.

2004.12.6
登録済
(阿部)