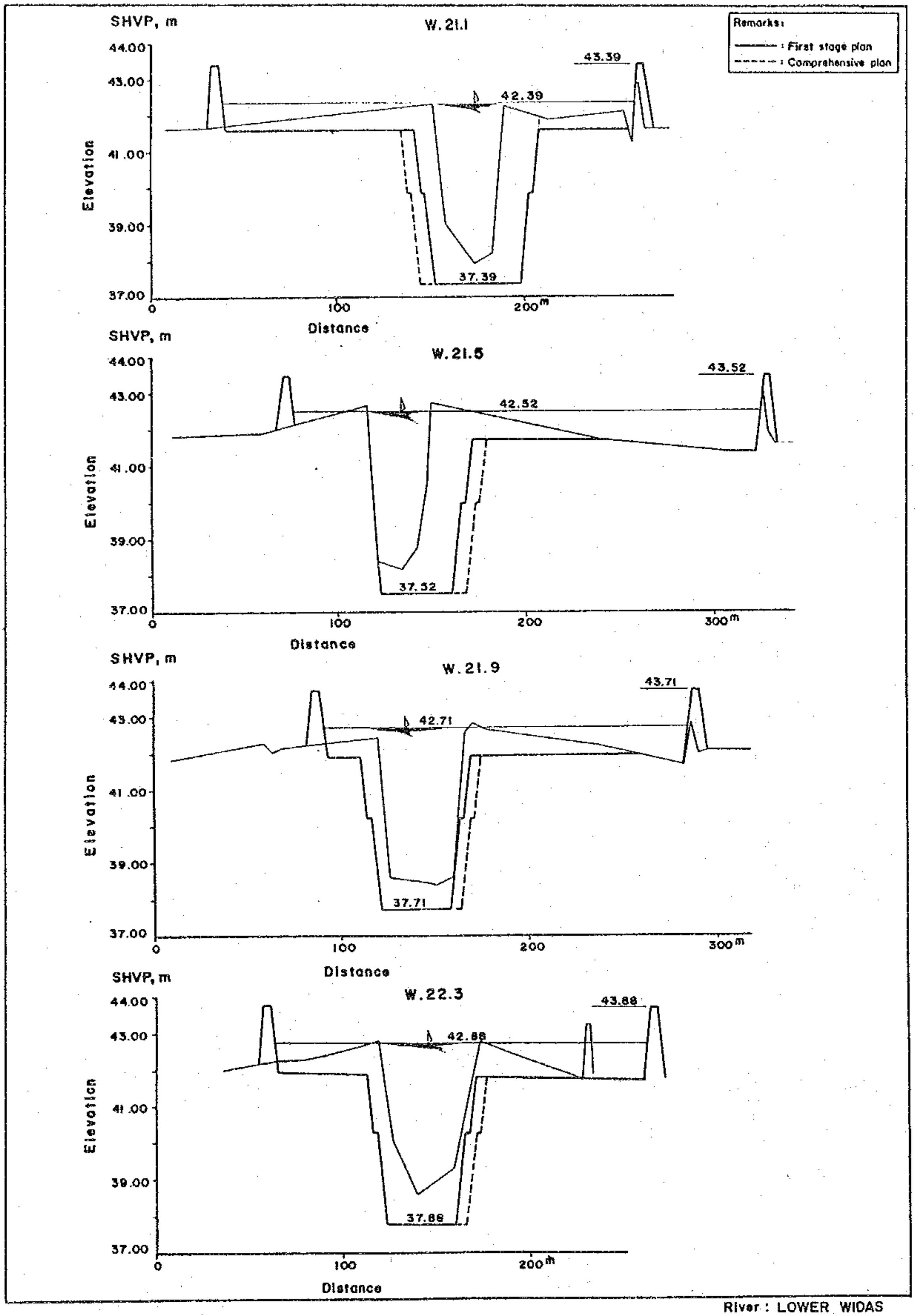
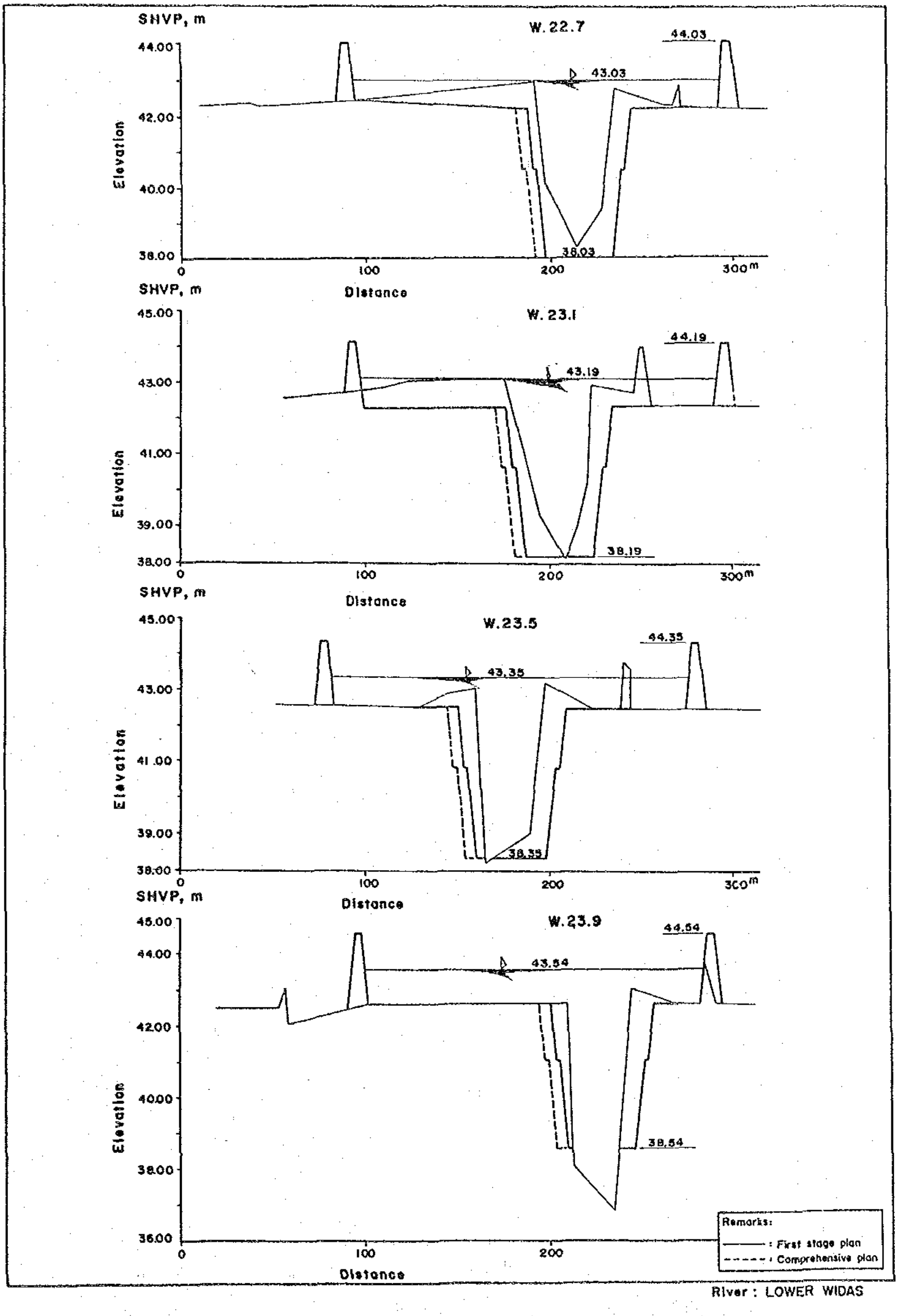


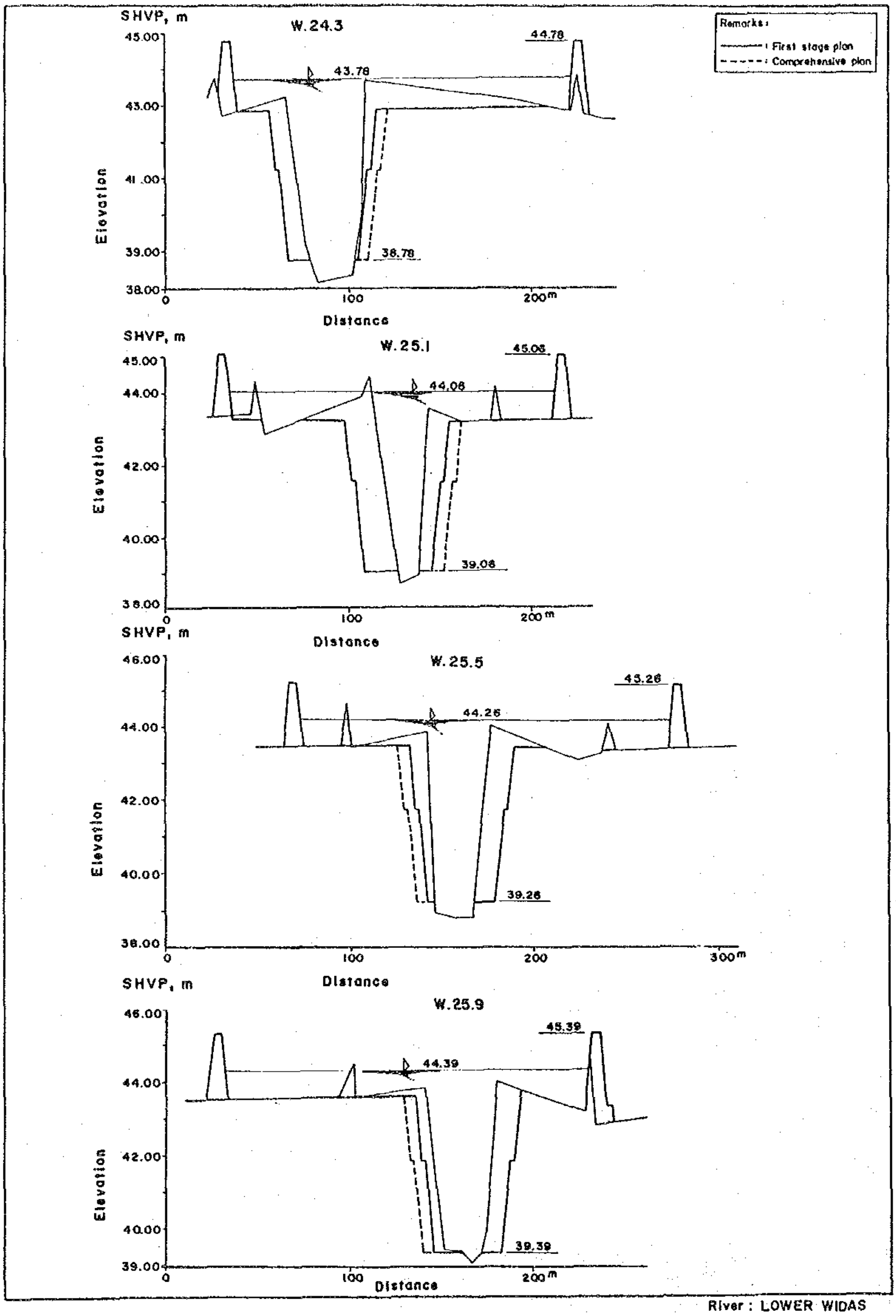
River : LOWER WIDAS

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (10/26)



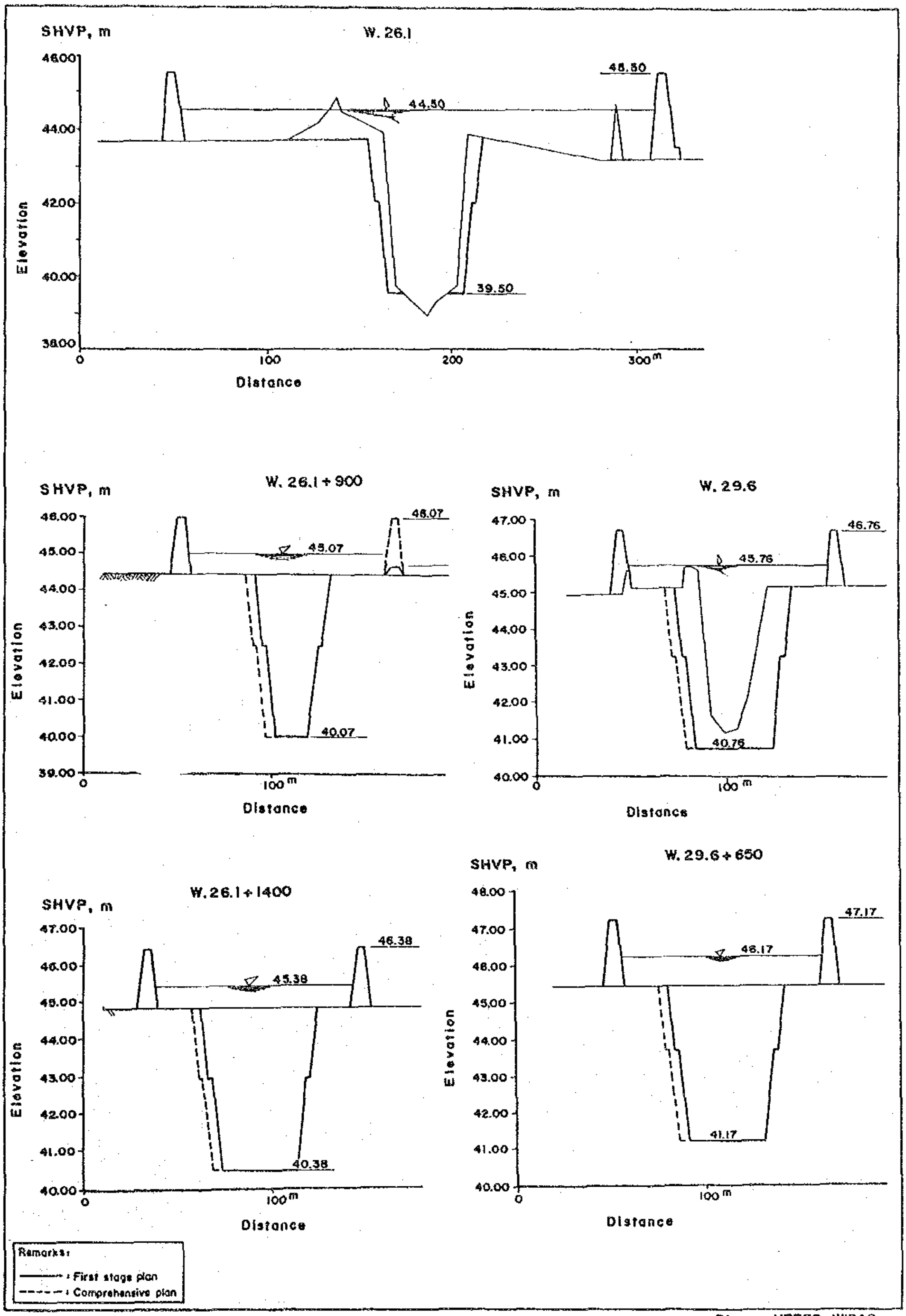
River : LOWER WIDAS

Fig. 4.4.5. PROPOSED RIVER CROSS-SECTION (II/26)



River : LOWER WIDAS

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (12/26)



River : UPPER WIDAS

Fig. 4.4.5. PROPOSED RIVER CROSS-SECTION (13/26)

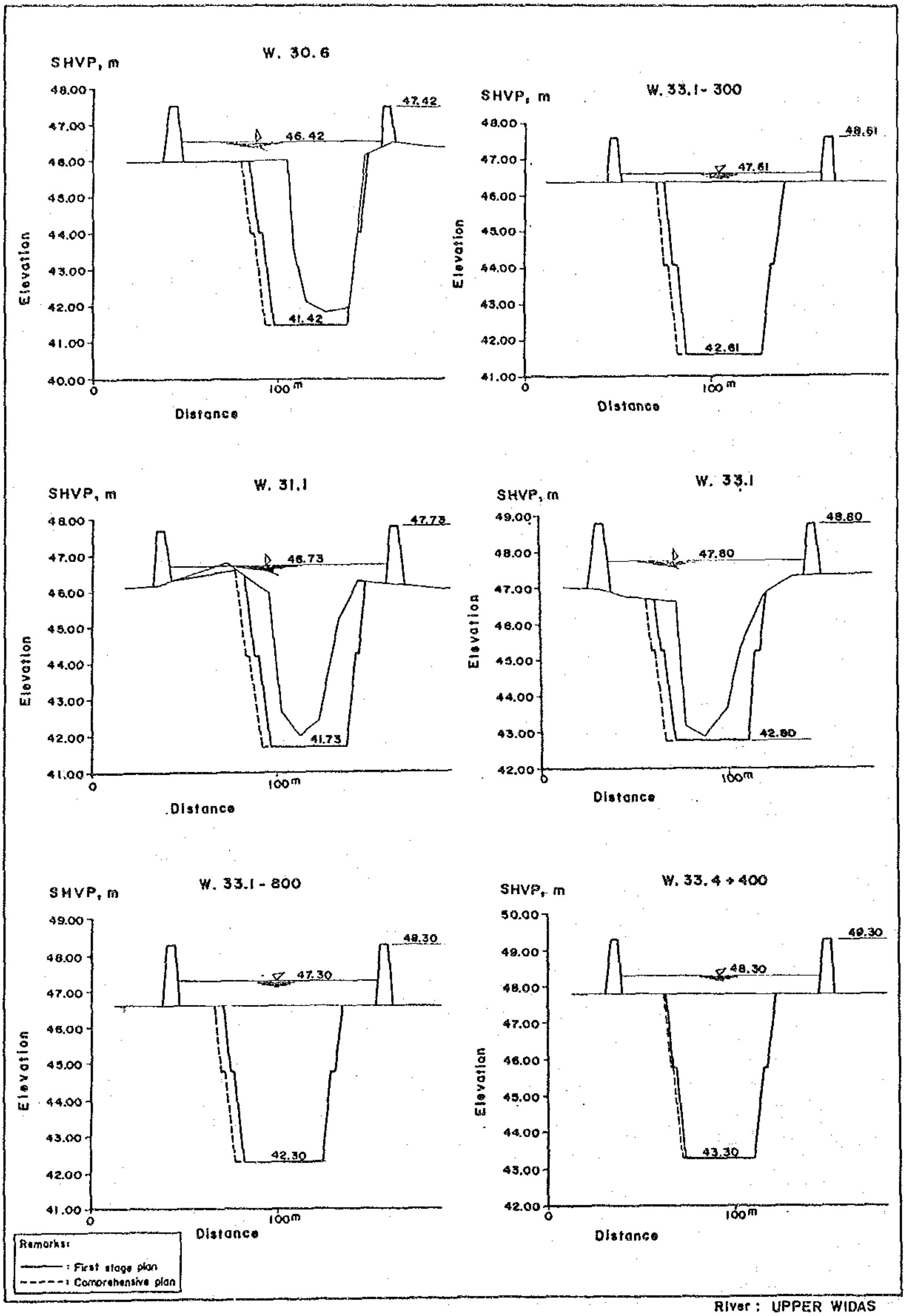
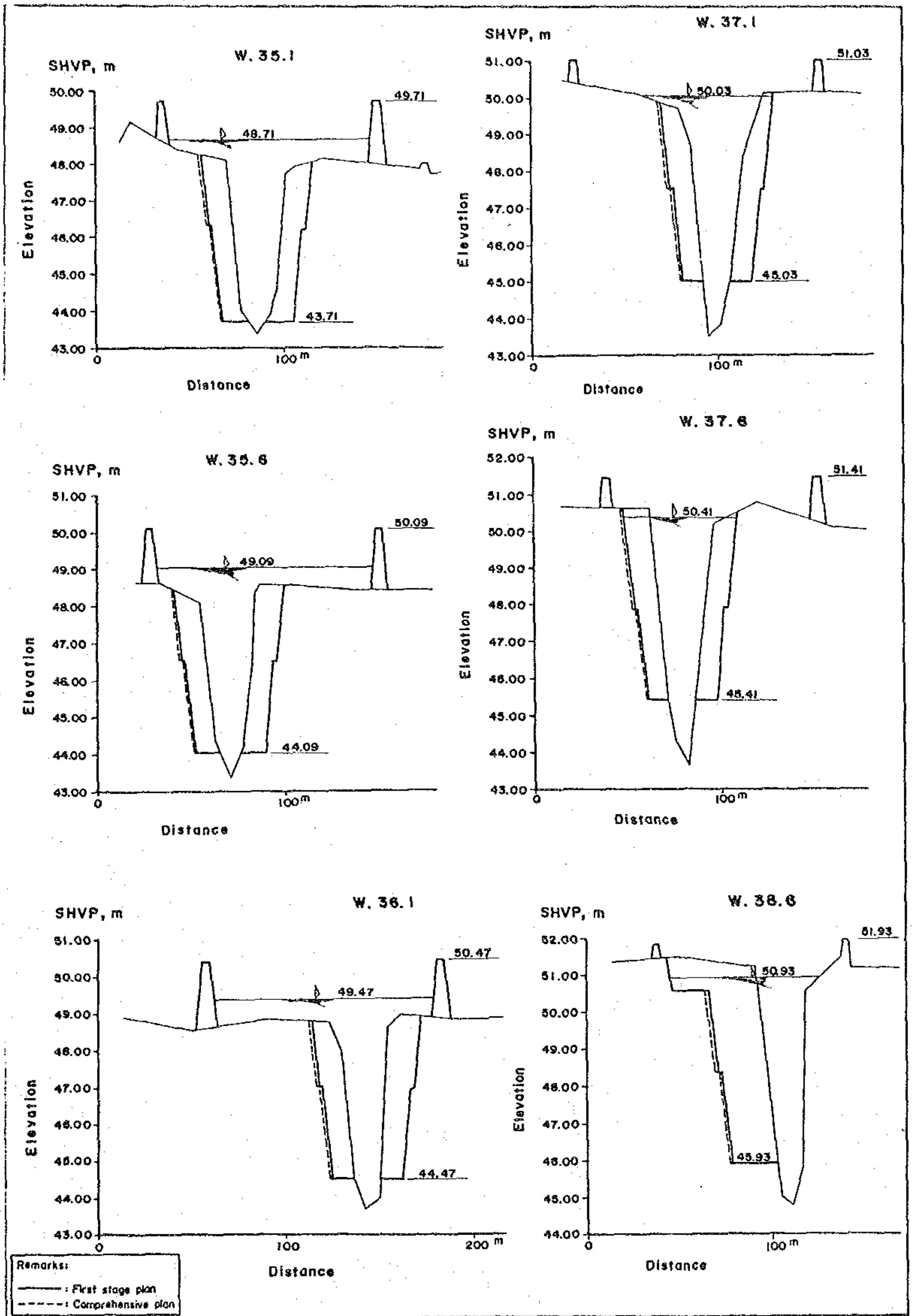


Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (14/26)



River : UPPER WIDAS

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (15/26)

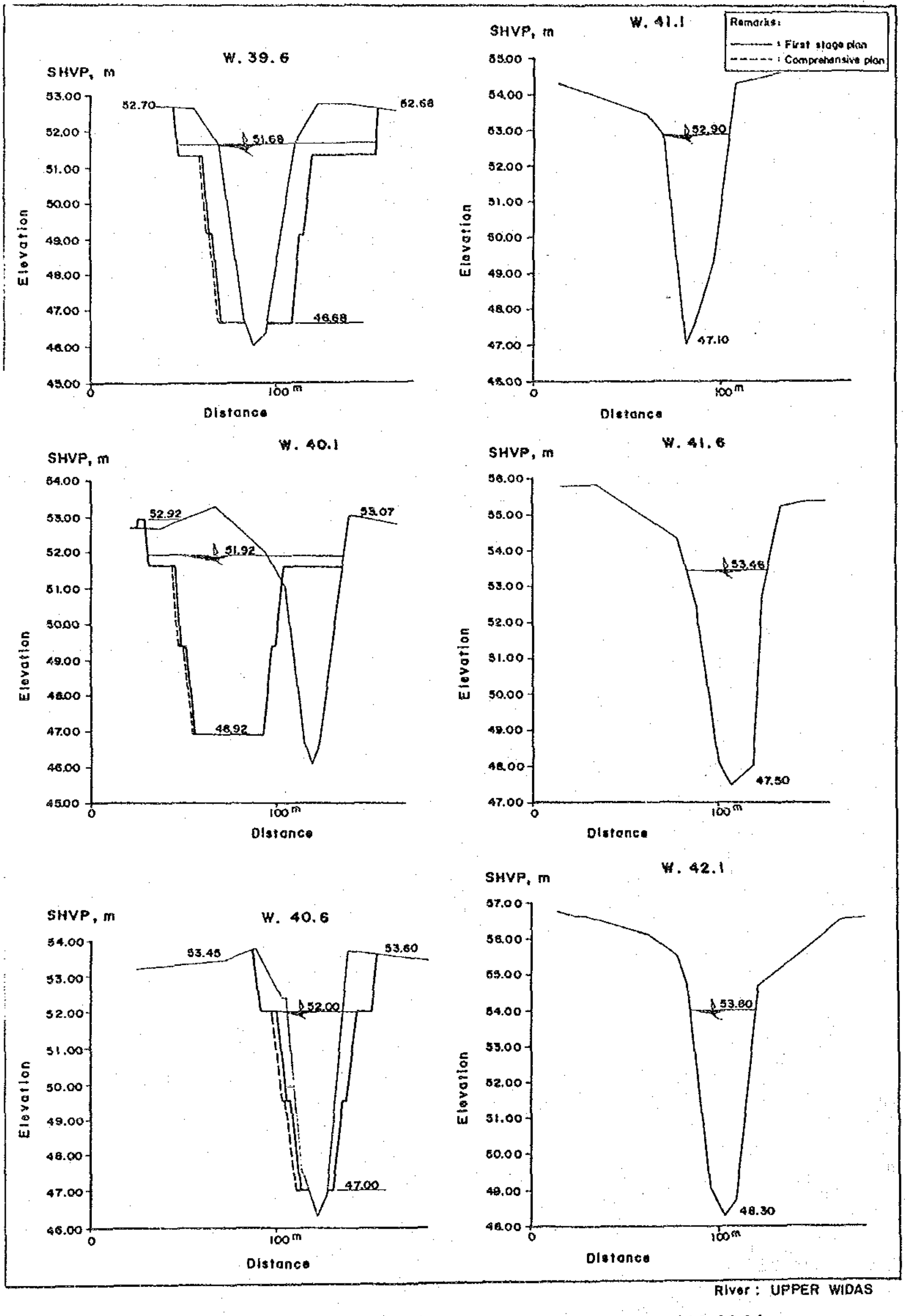
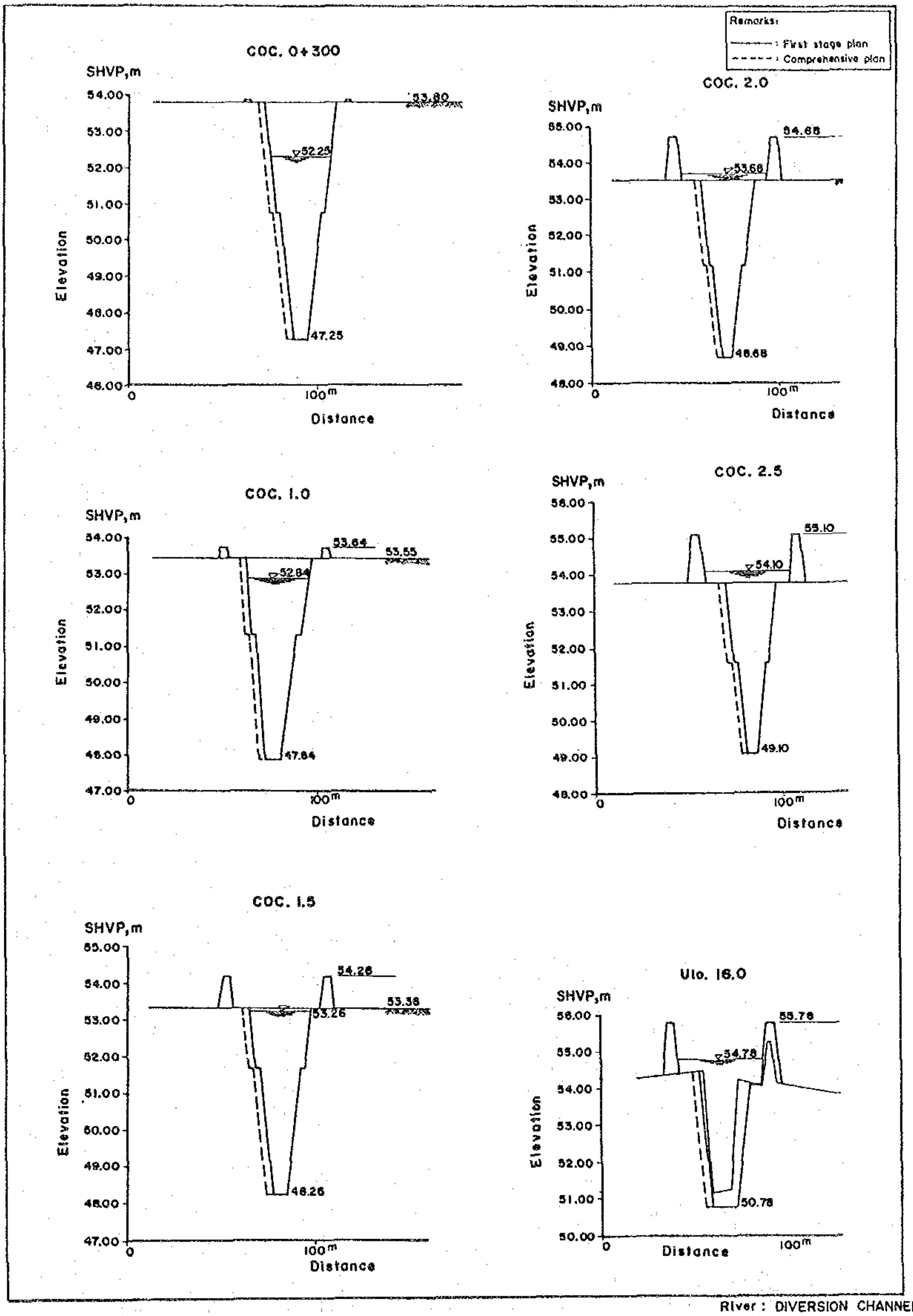
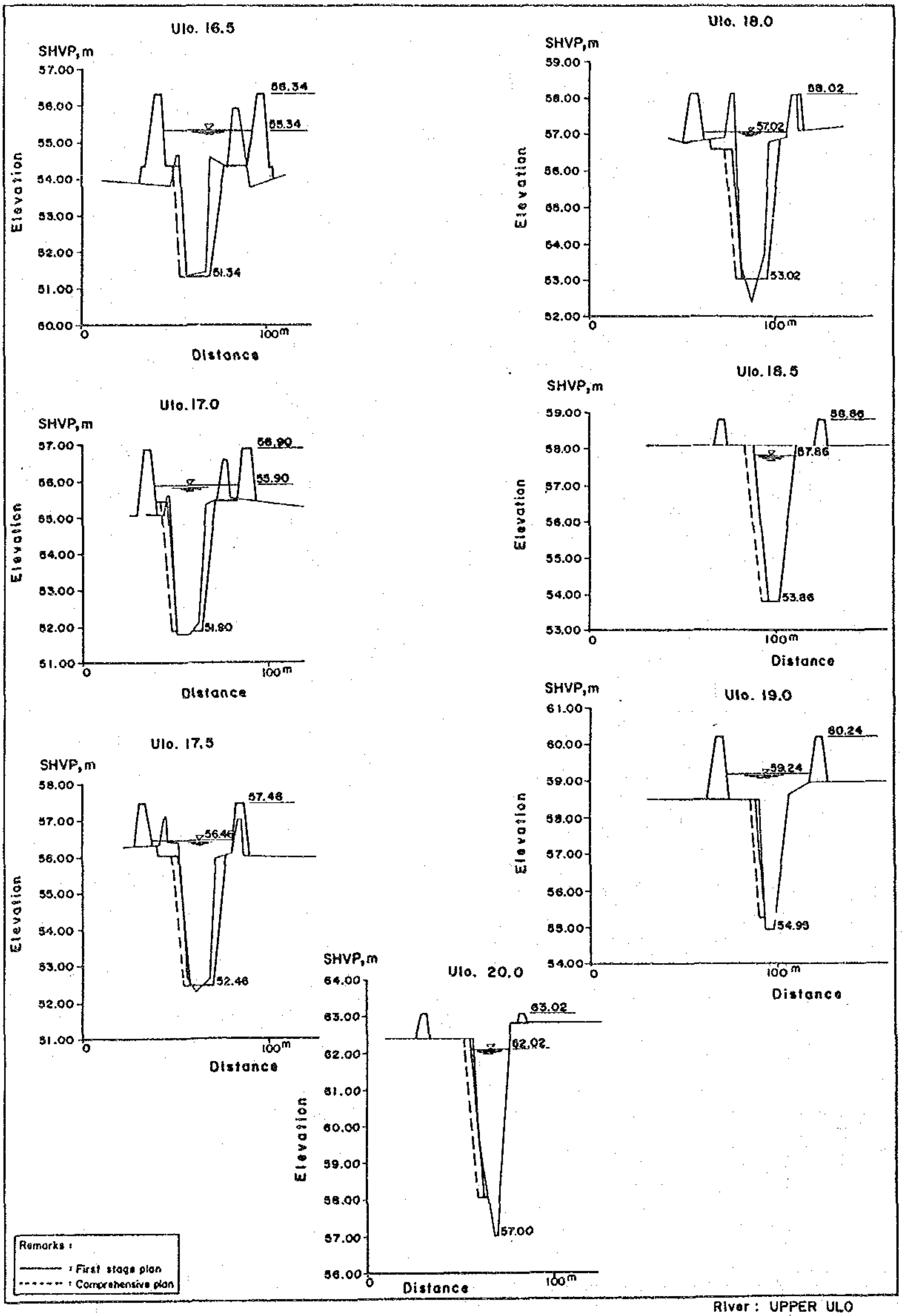


Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (16/26)



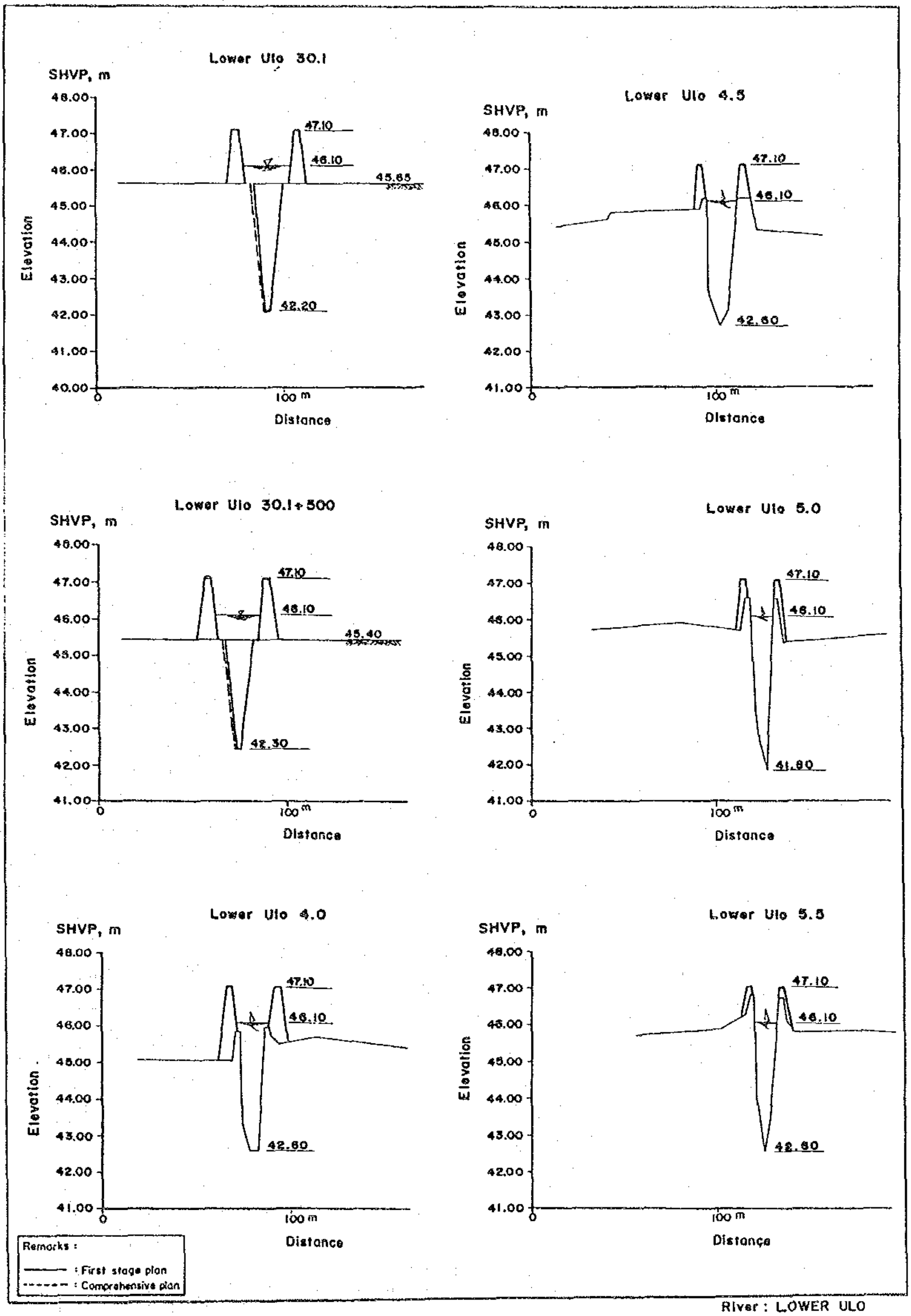
River : DIVERSION CHANNEL AND UPPER ULO

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (17/26)



River : UPPER ULO

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (18/26)



River : LOWER ULO

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (19/26)

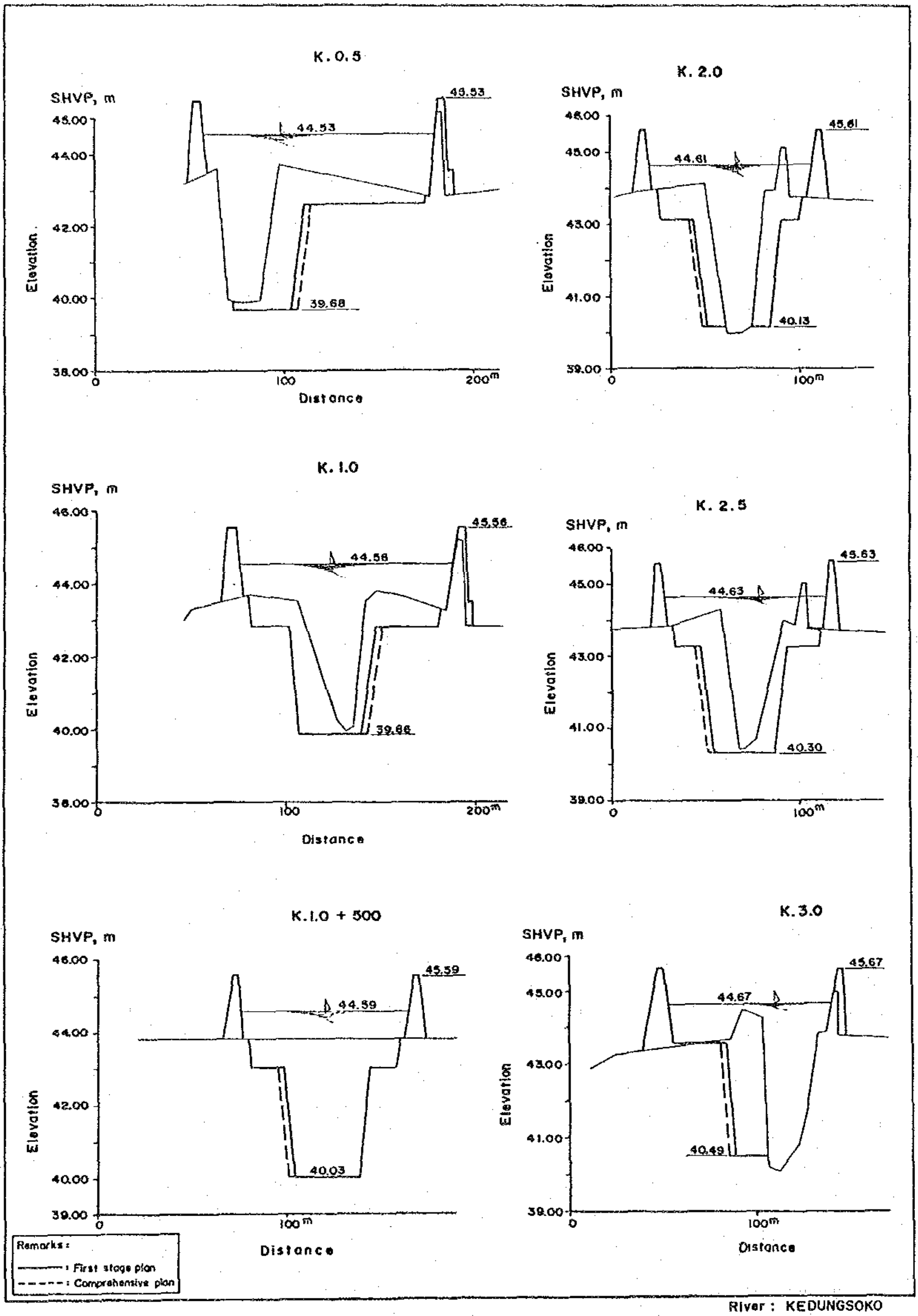
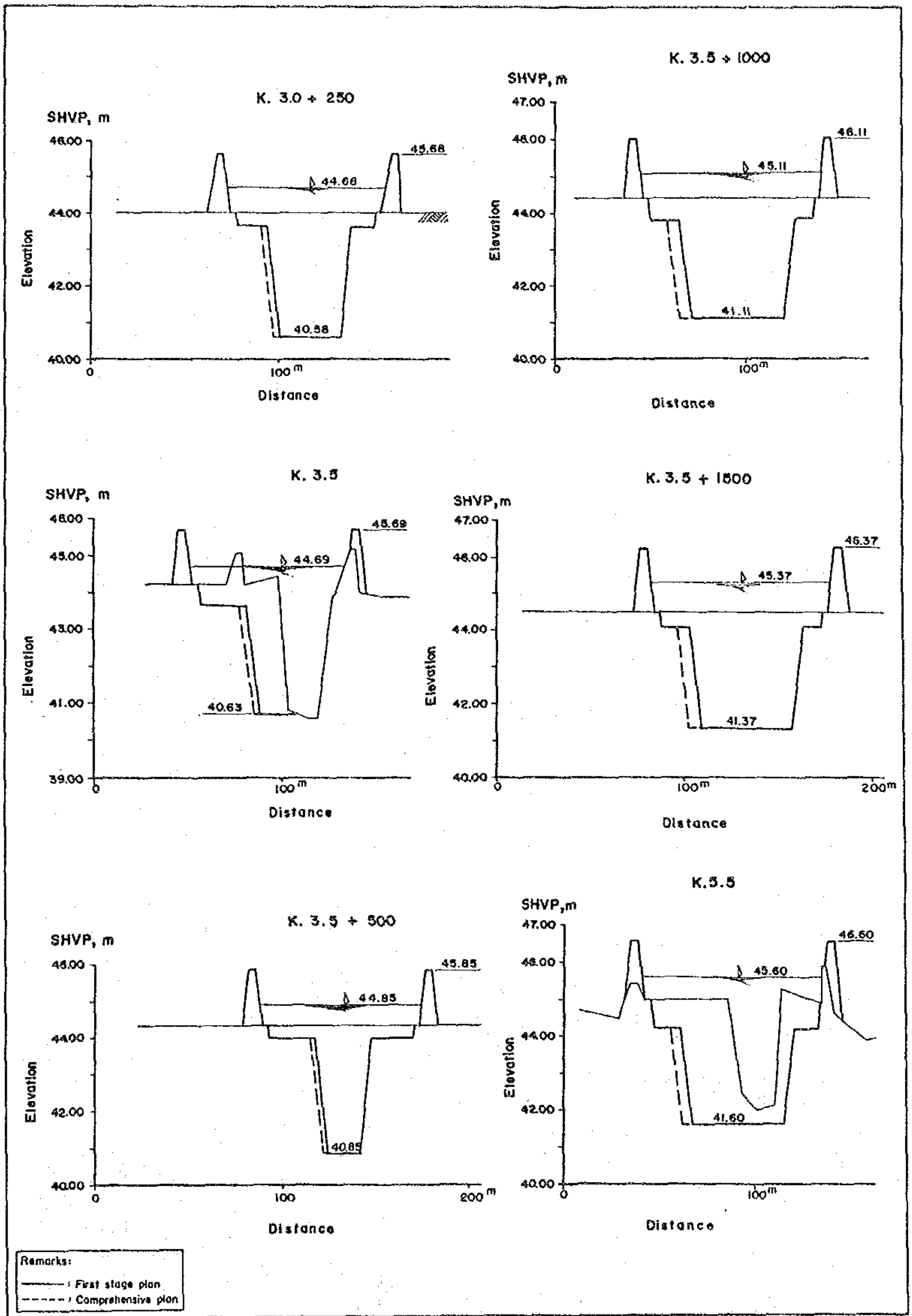


Fig. 4.4.5. PROPOSED RIVER CROSS-SECTION (20/26)



River : KEDUNGSOKO

Fig. 4.4.5. PROPOSED RIVER CROSS-SECTION (21/26)

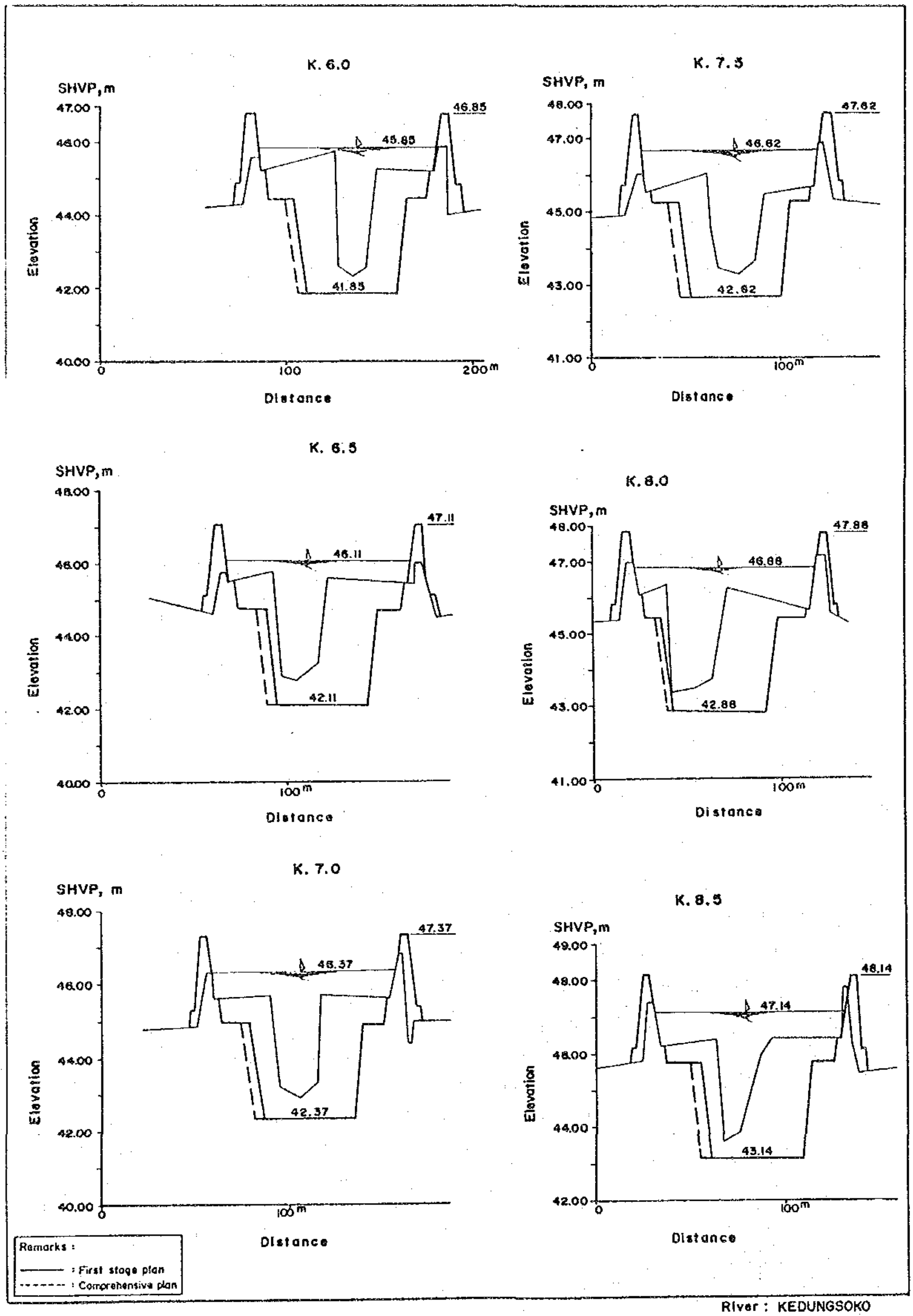
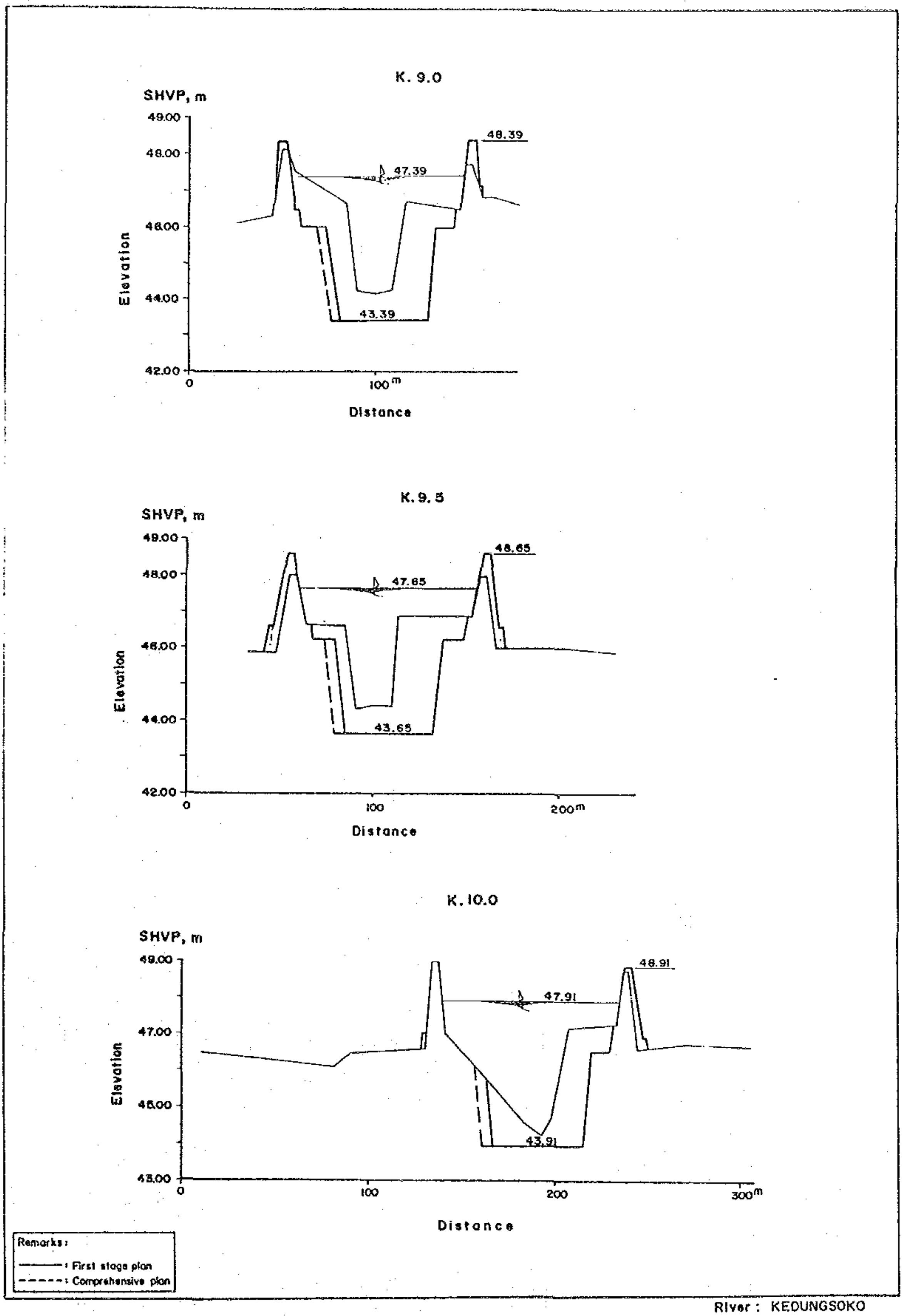
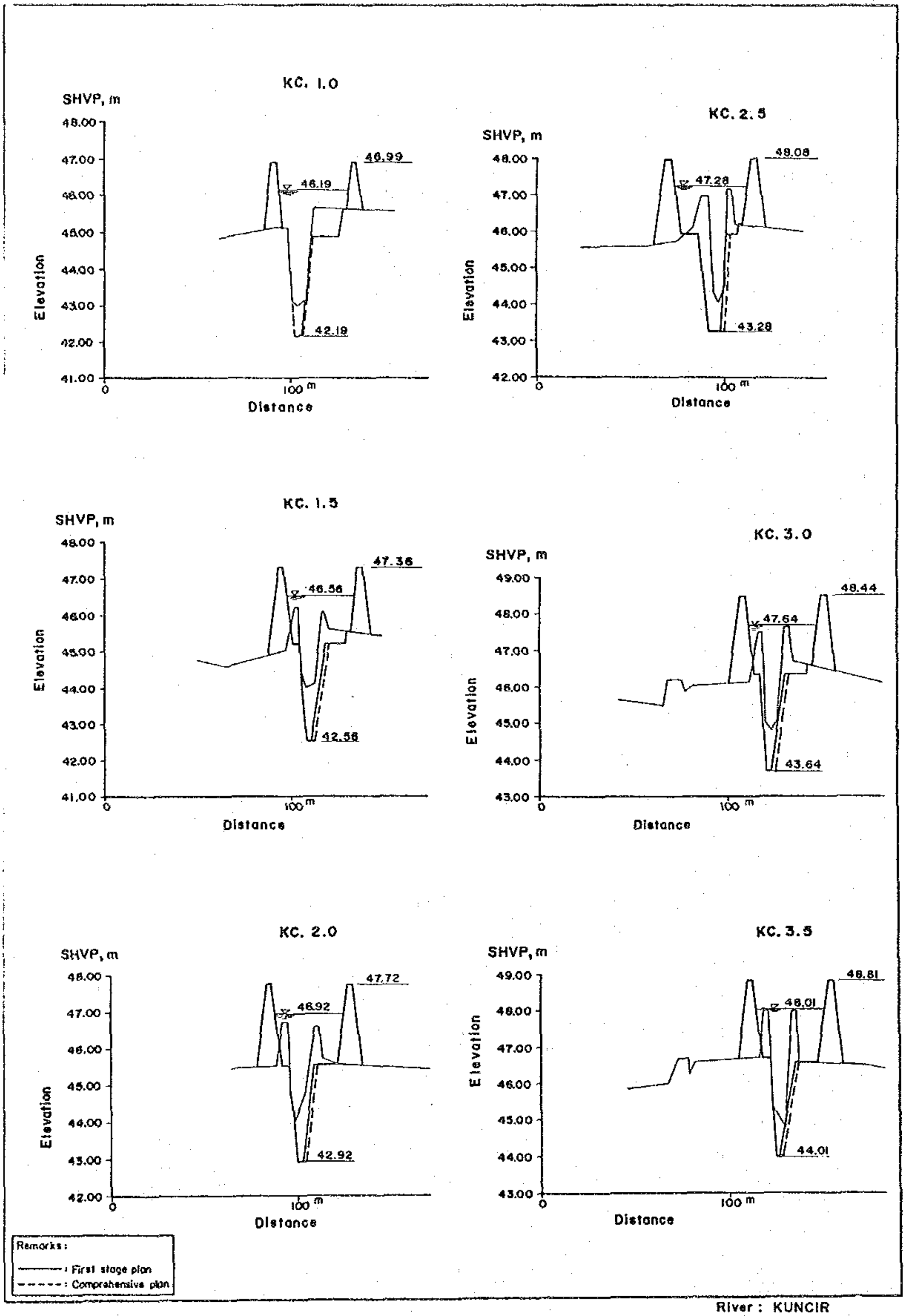


Fig. 4.4.5. PROPOSED RIVER CROSS-SECTION (22/26)



River : KEDUNGSOKO

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (23/26)



River : KUNCIR

Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (24/26)

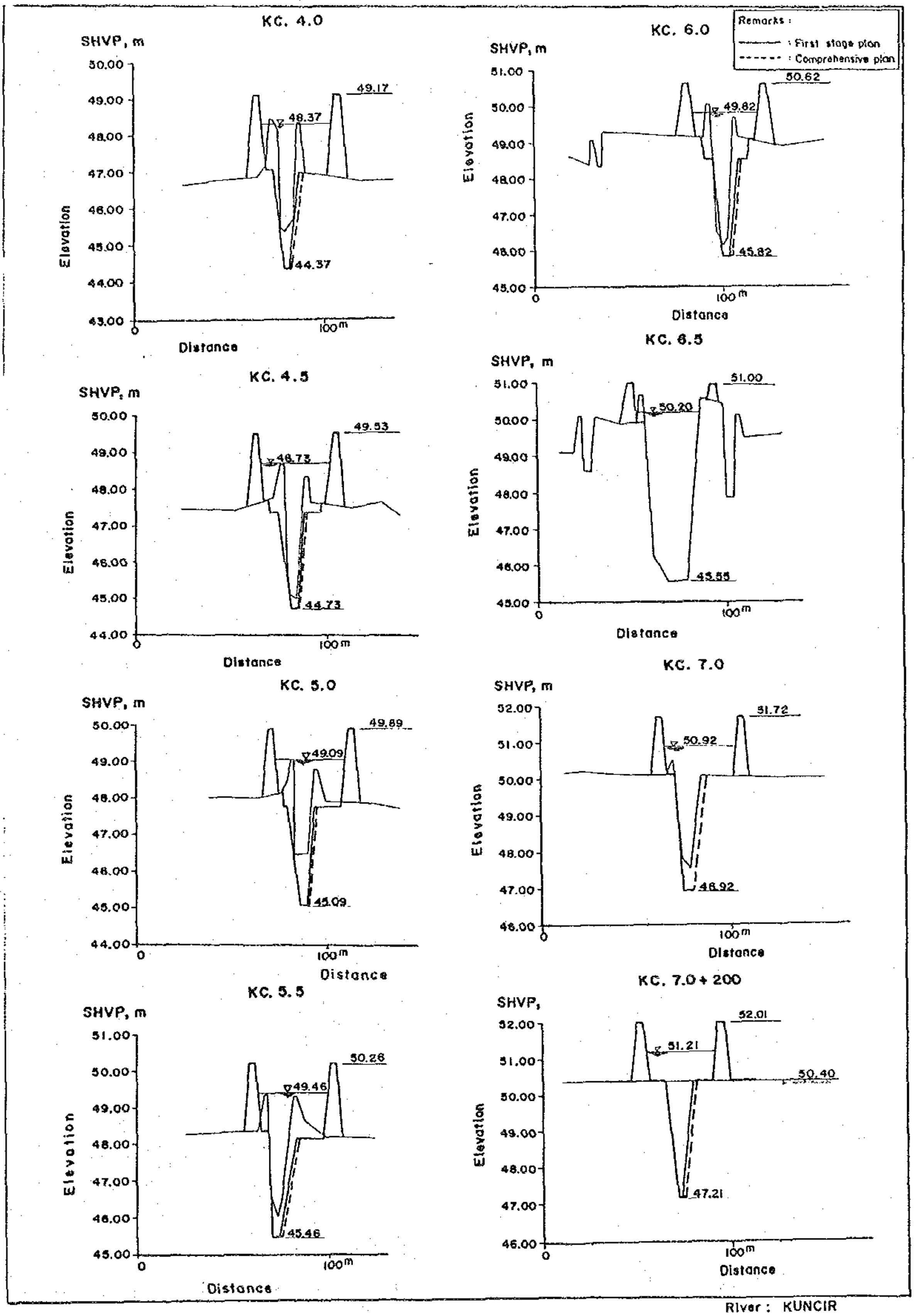


Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (25/26)

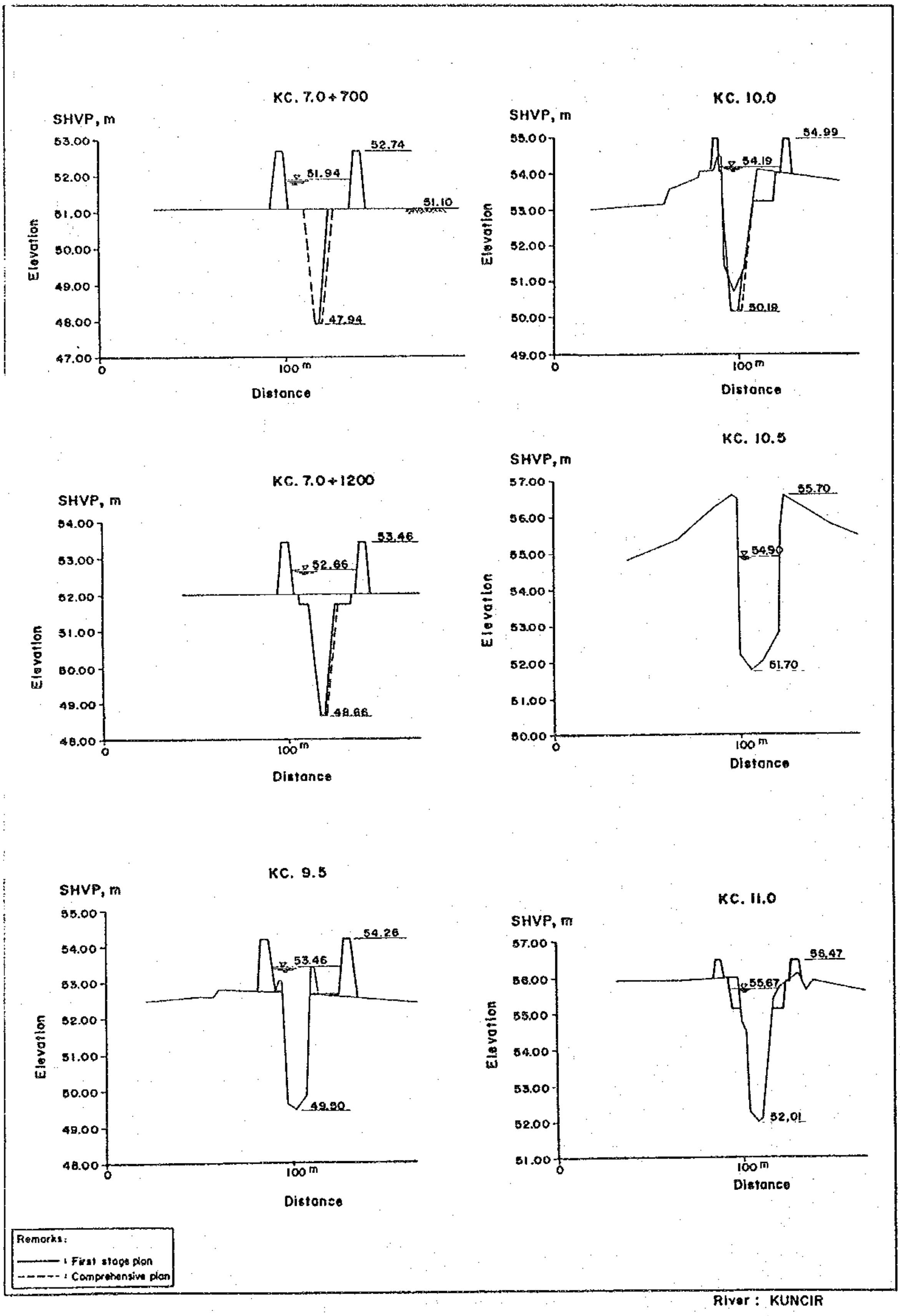


Fig.4.4.5. PROPOSED RIVER CROSS-SECTION (26/26)

4.5 Proposed Related River Structure

4.5.1 General

The proposed comprehensive flood control plan involves such related river structures of diversion weir, drop structure, drainage culvert or sluice and so on.

In the Widas flood control and drainage project, the comprehensive flood control plan is formulated for 25-yr probable flood and the stage-wise development is considered according to the implementation program of the above project. The first stage plan is taken up as priority project for immediate implementation and is designed for 10-yr probable flood. However, such related river structures are to be constructed by construction works of the first stage plan in principle to avoid reconstruction or reimprovement by construction works of comprehensive plan which will be subsequently proceeded.

Therefore, the feasibility design of the related river structures is made for the comprehensive plan and those results are described below.

4.5.2 Related river structure except bridge

1. Objective river structures to be planned

The objective structures except bridge are selected based on the results of inventory survey and proposed river improvement works by comprehensive plan. The proposed structures to be improved/reconstructed are classified into 2 categories of major and minor as shown below.

<u>Major structure</u>

Kuncir diversion weir
Drainage sluice and side overflow dike in controllable retarding basin
Irrigation head works

<u>Minor structure</u>

Drainage culvert/intake sluice
Drop structure
Syphon
Bank protection works

The objective structures to be planned are listed below.

Structure	Lower Widas	Upper Widas	Lower Ulo	Diversion channel & Upper Ulo	K.soko	Kuncir	Total	Remark
Major								
Kuncir diversion weir	-	-	-	1	-	-	1	Replace
Related structure in retarding basin								
Sluice	2	-	-	-	3	-	3	New
Side over-flow dike	400m x2	550m	-	-	360m x2	-	2,070m	"
Irrigation head works								
Tiripan dam	-	-	-	1	-	-	1	Replace
Malangsari dam	-	-	-	-	1	-	1	Improve
Kapas dam	-	-	-	-	-	1	1	"
Kramat dam	-	-	-	-	-	1	1	"
Drainage culvert								
Type I	4	1	1	4	-	5	15	"
II	3	1	1	-	3	1	9	"
III	-	-	-	-	-	1	1	"
Intake sluice								
Type I	-	-	1	-	-	1	2	"
II	-	-	-	1	-	-	1	"
Drop structure	-	-	1	1	-	-	2	"
Syphon	-	-	1	2	-	1	4	"

2. Classification of feasibility design

Feasibility design on the river structures are divided into 2 categories of major and minor.

For the major structures of diversion weir, drainage sluices and side overflow dikes in the retarding basin, and irrigation head works, the feasibility designs are made for each one.

On the other hand, the standard designs are prepared for the other minor structures of drainage culvert, drop structures, revetment works and syphon.

3. Basic idea adopted to design

The related river structures are designed for the proposed comprehensive plan. The following are the basic idea adopted to the respective structure designs.

Kuncir diversion weir

Flood diversion into the existing Kuncir is to be completely stopped in time of flood in this flood control plan. The main purpose of the existing Kuncir is limited to supply lowflow and to drain flood water from its lower residual basin. The upper Ulo/Kuncir Kiri is improved as main floodway. The existing Kuncir diversion weir is reconstructed considering flow direction and structural aspect of the existing weir against the coming 50 years life to be expected. The open type with non-gated structure like bridge is provided on the main Upper Ulo river and the intake sluice is provided on the existing Kuncir river.

Flood control facilities in the controllable retarding basin

The control facilities in the retarding basin consists mainly of low-height side overflow dike and drainage sluice.

A fixed overflow dike with non-gated sluice is adopted to side overflow dike.

The type of drainage sluice is determined throughout hydraulic calculation results and considering site condition, as shown below.

Retarding basin	Type of sluice
Widas	Open (2 places)
Ulo	Open (1 place)
Kedungsoko	Culvert (2 places)

Irrigation haed works

The objective structures are Tiripan, Malangsari, Kapas and Kramat dams. Such structures are replaced/improved so as to keep the existing intake water level.

The Tiripan dam on the Upper Ulo is replaced by new one in view of carrying capacity and its gate operation is motorized.

The Malangsari dam on the Kedungsoko is improved with extension of 1 span to right side for reason of increased design discharge and its gate operation is motorized.

The other 2 dams are improved with minor modification. For reference, the following are intake capacity of each dam.

Irrigation head works	Intake capacity (m^3/s)
Tiripan left	0.05
right	0.02 x 2
Malangsari left	0.8
Kapas left	0.2
right	0.25
Kramat right	0.3

Drainage culvert/intake sluice

Drainage culvert with flap gate is provided at outlet of small drainage channel. Intake sluice is provided at diversion points of lower Ulo and middle Kuncir which are remained as they are to supply lowflow/flushing flow.

Considering existing and future conditions, the following three are adopted to standard one.

Type	Dimension (m)
	(width)(height)(span)
I	1.5 x 1.5 x 1
II	2.5 x 2.0 x 2
III	2.5 x 2.0 x 3

Drop structure

Drop structure is proposed at the upper end of diversion channel and at the lower end of lower Ulo in view of river bed profile between up and dowstream reaches. The drop-height is 1 m for both ones.

Syphon

Some proposed new channels cross main irrigation canal. Syphon is provided at those crossing.

The capacity of syphon is determined considering existing canal capacity as shown below and maintenance work after construction.

Site		Capacity (m^3/s)
New diversion channel		
	lower	0.6
	upper	0.3
Lower Ulo		0.5 (assumed)
Kuncir		0.6 (assumed)

Bank protection works

Wetmasonry type and gabion type are employed in locations as bank protection works.

Foundation of the above structures

Foundation condition of the above structures are determined based on the geological profile in the basin prepared by geological investigation. Such data are described in ANNEX-3.

4. Results of feasibility design

The proposed related river structures are shown on Fig. 4.5.1. The feasibility designs for major structures are presented on Figs. 4.5.2, 4.5.3 and 4.5.4. The standard designs for minor structures are presented on Figs. 4.5.5 to 4.5.9.

5. Work quantity

The work quantity of the proposed structures are listed in Table 4.5.1.

4.5.3 Bridges

1. Objective bridges to be planned

The objective bridges to be taken up are determined based on the results of inventory survey and proposed river improvement works by comprehensive plan. The bridges to be improved/replaced are as follows.

R i v e r	Nos. of bridge	Remarks
Widas	14	- Including 3 foot paths
Kedungsoko	4	and 1 bridge in the
Flood diversion channel	6	lower Ulo.
U l o	4	
Kuncir	7	- Including 1 foot path

2. Classification of feasibility design

The bridges to be designed are classified into 2 categories of major and minor. The major bridges are designed for respective ones. Those are as follows.

Bridge	Grade	Remarks
Road bridge		
Lengkong bridge	Provincial	
Bridge across diversion Channel	National	
Kedungsoko bridge	National	
Railway bridge		
Bridge across diversion channel	-	
Kedungsoko bridge	-	Pier protection

The others are defined herein as minor one. The standard designs are prepared for the minor ones.

3. Basic condition adopted to design

(1) Width and design load of road bridge

Bridge width is determined based on the Binamarga standard and existing bridge width/road width.

The adopted bridge width and design load for each class are as follows.

Class	Effective width (cm)			Design load (t)
	Effective	Side walk	Total	
National	7.0	1.0 (for each side)	9.0	TL-45
Provincial	7.0	-	7.0	TL-14
Rural	3 to 5	-	3 to 5	TL-10
Footpath	1.5	-	1.5	0.35 t/m^2

(2) Length and type of road bridge

The bridge length is set at river width of dike to dike.

The reinforced concrete bridge is adopted considering economic aspect, materials to be acquisited, construction work and maintenance after construction. The reinforced concrete bridge is divided into the following 2 types depending on span length.

Span length L (m)	Type	
	Superstructure	Sub structure
Less than 10	RC - slab	inverted T type
25 > L > 10	RC - T beam	inverted T type

The bridge classification to be adopted to design is given on Fig. 4.5.10.

(3) Type of railway bridge

The objective railway bridge is of trunk one which connects East Jawa and Central Jawa. Therefore, it is impossible stop daily operation of train for construction works. The steel bridge is adopted as the type of superstructure considering construction period and other existing bridges.

(4) Foot path

Foot path is considered to limited transportation for inhabitants. Wooden bridge/submergible reinforced concrete slab bridge is adopted depending on site condition.

(5) Foundation type

According to geological investigation results (see ANNEX-3), the objective area is divided into 3 types in geological features.

The upper reach near hilly area of the objective rivers belongs to type 1 that bearing capacity is sufficiently strong. On the other hand, the middle and lower reaches of the objective rivers belong to other categories that bearing capacity is not expected sufficiently.

In this plan, foundation condition at each site is assumed based on typical soil and geological profile obtained from the above investigation results. For type 1 area, direct foundation is adopted and for other areas, pile foundation is adopted.

4. Results of feasibility design

The proposed bridges are outlined on Fig. 4.5.11. The major bridges are planned as shown below.

B r i d g e	Classification of improvement
Road bridge	
Lengkong	Replacement
Kedungsoko	Replacement
Flood diversion channel	New construction
Railway bridge	
Flood diversion channel	New construction
Kedungsoko	Pier protection

The feasibility designs of the above are presented on Figs 4.5.12 to 4.5.16.

The standard designs for minor ones are given on Figs. 4.5.17 and 4.5.18.

The major dimensions of the proposed bridges are summarized in Table 4.5.2 (see General No in the Table and Figures)

5. Work quantity

The work quantity of the proposed bridges are summarized in Table 4.5.3.

Table 4.5.1 WORK QUANTITY OF PROPOSED RIVER STRUCTURES (1/6)

Drainage sluice in retarding basin

Widas (right side)

Works	Unit	Body	Water way (River side)	Water way (Land Side)	Others	Total
Structural work						
Concrete volume	m^3	610	330	120		1,060
Form	m^2	720	260	96		1,076
Reinforcement bar	t	42.7	23.1	8.4		74.2
Concrete sheet pile	m^2	140	78	54		274
Pile (0.4 x 0.4 RC)	m	1160				1,160
Pile (0.35x0.35 RC)	m		900	620		1,610
Revetment (Wetmasonry)	m^2				1,550	1,550
Bed proetction (Riprap)	m^3				120	120
" (Wetmasonry)	m^3				190	190
Gate	t	22.1				22.1
Inspection house	m^2	52				52
Inspection straircase	nos	1				1
Earth work						
Excavation	m^3				6,300	6,300
Fill up	m^3				1,240	1,240
Embankment	m^3					
Temporary work						
Staging	Em^3	540				540

Widas (left side)

Works	Body	Water way (River side)	Water way (Land Sice)	Other	Total
Structural work					
Concrete volume	515	140	100		755
Form	610	110	80		800
Reinforcement bar	36.1	9.8	7.0		52.9
Concrete sheet pile	130	60	45		235
Pile (0.4 x 0.4 RC)	940	-	-		940
Pile (0.35x0.35 RC)		610	610		1,220
Revetment (Wetmasonry)				790	790
Bed proetction (Riprap)				120	120
" (Wetmasonry)				75	75
Gate	16.6				16.6
Inspection house	42				42
Inspection straircase	1				1
Earth work					
Excavation				3,480	3,480
Fill up				1,580	1,580
Embankment				2,000	2,000
Temporary work					
Staging	400				400

Kedungsoko (right side)

Works	Unit	Body	Water way (River side)	Water Way (Land Side)	Others	Total
Structural works						
Concrete volume	m^3	240	100	55		395
Form	m^2	520	250	140		910
Reinforcement bar	t	16.8	7.0	3.8		27.6
Concrete sheet pile	m^2	65	54	33		152
Pile (0.4 x 0.4 RC)	m	480				480
Pile (0.35x0.35 RC)	m		300	195		495
Revetment (Wet masonry)	m^2				900	900
Bed protection (Riprap)	m^3				145	145
" (Wet masonry)	m^3				320	320
Gate	t	7.5				7.5
Earth work						
Excavation	m^3				2,800	2,800
Fill up	m^3				2,050	2,050
Embankment	m^3				2,000	2,000
Temporary work						
Staging	Em^3	160				160

Kedungsoko (left side)

Works	Body	Water way (River side)	Water way (Land side)	Others	Total
Structural works					
Concrete volume	130	95	35		260
Form	220	240	88		608
Reinforcement bar	9.1	6.7	2.5		18.3
Concrete sheet pile	60	35	30		125
Pile (0.4 x 0.4 RC)	330	300	120		750
Pile (0.35x0.35 RC)					
Revetment (Wet masonry)				940	940
Bed protection (Riprap)				145	145
" (Wet masonry)				275	275
Gate	4.8				4.8
Earth work					
Excavation				3,150	3,150
Fill up				2,340	2,340
Embankment				2,000	2,000
Temporary work					
Staging	110				100

Table 4.5.1 WORK QUANTITY OF PROPOSED RIVER STRUCTURES (2/6)

Drainage sluice in retarding basin

Ulo

Works	Unit	Body	Water way (River side)	Water way (Land Side)	Others	Total
Structural work						
Concrete volume	m^3	550	140	105		795
Form	m^2	650	110	85		845
Reinforcement bar	t	38.5	9.8	7.4		55.7
Concrete sheet pile	m^2	140	63	48		251
Pile (0.4 x 0.4 RC)	m	960	-	-		960
Pile (0.35x0.35 RC)	m		480	450		930
Revetment (Wetmasonry)	m^2				1,280	1,280
Bed protection (riprap)	m^3				370	370
" (Wetmasonry)	m^3				96	96
Gate	t	16.8				16.8
Inspection house	m^2	52				52
Inspection staircase	nos	1				1
Earth work						
Excavation	m^3				3,850	3,850
Fill up	m^3				1,360	1,360
Embankment	m^3				1,200	1,200
Temporary work						
Staging	Em^3	490				490

Side overflow dike (per 10 m)

Works	Unit	Total
Structural work		
Concrete volume	m^3	63
Form	m^2	25
Reinforcement bar	t	3.0
Concrete sheet pile	m^2	60
Bed protection (wetmasonry)	m^3	42
Bed protection (riprap)	m^3	50
Pile (wooden ø 0.2 m)	m	100
Earth work		
Excavation	m^3	170
Fill up	m^3	30
Sodding	m^2	50

Syphon

Works	Unit	Lower Ulo Manhole	Lower Ulo Center	Lower Ulo Manhole	Lower Ulo Total	Kuncir Manhole	Kuncir Center	Kuncir Manhole	Kuncir Total
Structural work									
Concrete volume	m^3	65	202	65	332	66	235	66	367
Form	m^2	220	522	220	962	225	635	225	1085
Reinforcement bar	t	6.8	20.6	6.8	34.2	6.9	24.9	6.9	38.7
Concrete sheet pile	m^2	12	24	12	48	12	24	12	48
Pile (0.35 x 0.35 RC)	m	60	500	60	620	60	600	60	720
Revetment (Wetmasonry)	m^2		1,400		1,400		1,900		1,900
Bed protection (Riprap)	m^3		18		18		24		24
Gate		2.0		2.0	4.0	2.0		2.0	4.0
Earth work									
Excavation	m^3		14,350		14,350		17,240		17,240
Fill up	m^3		13,930		13,930		16,770		16,770
Temporary work									
Staging	Em^3		113		113		143		143

Table 4.5.1 WORK QUANTITY OF PROPOSED RIVER STRUCTURES (3/6)

Syphon

New diversion channel

Works	Unit	Manhole	Center	Manhole	Total
Structural work					
Concrete volume	m^3	73	277	73	423
Form	m^2	240	726	240	1206
Reinforcement bar	t	7.8	28.6	7.8	44.2
Concrete sheet pile	m^2	12	24	12	48
Pile (0.35x0.35 RC)	m	60	700	60	820
Revetment (Wetmasonry)	m^2		2,390		2,390
Bed protection (Riprap)	m^3		72		72
Gate	t	2.0		2.0	4.0
Earth work					
Excavation	m^3		21,400		21,400
Fill up	m^3		20,860		20,860
Temporary work					
Staging	E m^3		156		156

Irrigation head works

Works	Unit	Kapas dam Body	Kapas dam Sluice	Kapas dam Others	Kapas dam Total	Tiripan dam Body	Tiripan dam Others	Tiripan dam Total
Structural works								
Concrete volume	m^3	960	160	750	1,870	1,200	1,740	2,940
Form	m^2	1,530	480	1,230	3,240	1,680	2,257	3,937
Reinforcement bar	t	86.4	11.2	48.5	146.1	84.2	114.4	198.6
Concrete sheet pile	m^2	224	114	120	458	320	150	470
Pile (0.4x0.4RC)	m	950			950	1,060		1,060
Pile (0.35x0.35RC)	m		440	1,650	2,090		2,780	2,780
Revetment (wet-masonry)	m^2			950	950		1,620	1,620
Bed protection (Riprap)	m^3			90	90		520	520
Bed protection (Wetmasonry)				490	490		1,400	1,400
Gate	t	28.8	1.4		30.2	36.7	1.4	38.1
Inspection house	m^2	95			95	130		130
Inspection staircase	nos	1			1	1		1
Earth work								
Excavation	m^3			6,000	6,000		12,600	12,600
Fill up	m^3			4,800	4,800		10,080	10,080
Embankment	m^3						1,500	1,500
Surplus				1,200	1,200			
Temporary work								
Staging	Em^3	270	36		306	356	60	416
Bridge (wooden)	m^2			60	60			
Coffering work								
Sheet pile	m^2			980	980		1,600	1,600
Removal work								
Concrete volume	m^3						340	340

Table 4.5.1 WORK QUANTITY OF PROPOSED RIVER STRUCTURES (4/6)

Irrigation head works

Kramat dam / Malangsari dam

Work	Unit	Kramat dam: Body	Sluice	Others	Total	Malangsari dam: Body & Bed Protection	Wall	Earth Work & Temporary	Total
Structural work									
Concrete volume	m^3	630	180	220	1,030	1,884	820		2,704
Form	m^2	1,050	430	410	1,890	3,230	780		4,010
Reinforcement bar	t	63.1	8.4	19.5	91.0	188.4	57.4		245.8
Concrete sheet pile	m^2	226	60	120	406	400	120		520
Pile (0.4 x 0.4 RC)	m	600		120	720	1,000	950		1,950
Pile (0.35 x 0.35 RC)	m		380	500	880	1,500			1,500
Revetment (Wetmasonry)	m^2			1,380	1,380		1,170		1,170
Bed Protection (Riprap)	m^3			410	410	590			590
" (Wetmasonry)	m^3			780	780	2,500			2,500
Gate	t	11.5	0.7		12.2	87.5			87.5
Inspection house	m^2	50			50	220			220
Inspection staircase	nos	1			1	2			2
Earth work									
Excavation	m^3			5,080	5,080			3,200	3,200
Fill up	m^3			4,060	4,060			1,800	1,800
Embankment	m^3							1,200	1,200
Temporary work									
Staging	Em^3	640	17		657	800			800
Bridge (wooden)	m^2			90	90			510	510
Coffering work									
Sheet pile	m^2			800	800			5,400	5,400

Kuncir diversion weir

Works	Unit	Bridge (1)	Intake Sluice	Bridge (2)	Wall	Others	Total
Structural work							
Concrete volume	m^3	539	680	245	308		1,772
Form	m^2	858	730	427	420		2,435
Reinforcement bar	t	47.7	47.6	24.1	21.6		141.0
Revetment (wetmasonry)	m^2					4,400	4,400
Bed protection (Riprap)	m^3	216	45	60		540	861
Bed protection (wet masonry)	m^3	1,060	90	120		330	1,600
Gate	t	1.8	20.3				22.1
Inspection house	m^2		50				50
Inspection staircase	nos		1				1
Earth work							
Excavation	m^3					30,000	30,000
Fill up	m^3					1,400	1,400
Embankment	m^3					39,500	39,500
Temporary work							
Staging	Em^3	855	186	190			1,231
Bridge (wooden)	m^2					200	200
Coffering work							
Plank	m^2	1,200					1,200
Steel weight	t	120					120
Removal work							
Concrete volume	m^3					2,730	2,730

Table 4.5.1 WORK QUANTITY OF PROPOSED RIVER STRUCTURES (5/6)

Drainage culvert

Type I / Type II

Works	Unit	Body (Type I)	Water way (River side) (Type I)	Water way (Land side) (Type I)	Others (Type I)	Total (Type I)	Body (Type II)	Water way (River side) (Type II)	Water way (Land side) (Type II)	Others (Type II)	Total (Type II)
Structural work											
Concrete volume	m^3	55	16	25		96	150	30	55		235
Form	m^2	160	50	50		260	320	60	140		520
Reinforcement bar	t	4.0	1.0	1.8		6.8	10.5	1.8	3.8		16.1
Concrete sheet pile	m^2	30	45	20		95	60	60	36		156
Pile (0.4x0.4 RC)	m						360				360
Pile (0.35x 0.35RC)	m	240	60	120		420		90	180		270
Revetment (wet-masonry)	m^2				160	160				160	160
Bed protection (Riprap)	m^3										
Bed protection (wetmasonry)	m^3				20	20				40	40
Gate	t	0.5				0.5	2.0				2.0
Earth work											
Excavation	m^3				730	730				1,600	1,600
Fill up	m^3				640	640				1,250	1,250
Embankment	m^3				770	770				810	810
Temporary work											
Staging	Em^3				30	30				140	140

Type III

Works	Unit	Body	Waterway (Riverside)	Waterway (Landside)	Others	Total
Structural work						
Concrete volume	m^3	230	40	55		325
Form	m^2	560	60	110		730
Reinforcement bar	t	16.0	2.5	4.0		22.5
Concrete sheet pile	m^2	85	75	45		205
Pile (0.4 x 0.4 RC)	m	540				540
Pile (0.35 x 0.35 RC)	m		270	300		570
Revetment (Wet-masonry)	m^3				180	180
Bed protection (Riprap)	m^3					
Bed protection (Wetmasonry)					64	64
Gate	t	3.0				3.0
Earth work						
Excavation	m^3				330	330
Embankmnet	m^3				1,640	1,640
Temporary work						
Staging	Em^3				250	250

Table 4.5.1 WORK QUANTITY OF PROPOSED RIVER STRUCTURES (6/6)

Drainage sluice

Works	Unit	Type I Body	Type I Water way (River side)	Type I Water way (Land side)	Type I Others	Type I Total	Type II Body	Type II Water way (River side)	Type II Water way (Land side)	Type II Others	Type II Total
Structural work											
Concrete volume	m^3	55	16	25		96	150	30	55		235
Form	m^2	160	50	50		260	320	60	140		520
Reinforcement bar	t	4.0	1.0	1.8		6.8	10.5	1.8	3.8		16.1
Concrete sheet pile	m^2	30	45	20		95	50	60	36		156
Pile (0.4x0.4 RC)	m						360				360
Pile (0.35x 0.35RC)	m	240	60	120		420		90	180		270
Revetment (wet-masonry)	m^2				160	160				160	160
Bed protection (Riprap)	m^3										
Bed protection (wetmasonry)	m^3				20	20				40	40
Gate	t	1.4				1.4	6.0				6.0
Earth work											
Excavation	m^3				730	730				1,600	1,600
Fill up	m^3				640	640				1,250	1,250
Embankment	m^3				770	770				810	810
Temporary work											
Staging	Em^3				30	30				140	140

Drop structure

Works	Unit	New Diversion Channel	Lower Ulo
Structural work			
Concrete volume	m^3	145	60
Form	m^2	250	185
Reinforcement bar	t	7.3	3.0
Concrete sheet pile	m^2	150	75
Pile (0.35x0.35 RC)	m	120	60
Revetment (Wetmasonry)	m^2	1,000	300
Bed protection (Riprap)	m^3	120	18
" (Wetmasonry)	m^3	200	65
Earth work			
Excavation	m^3	6,750	4,160
Fill up	m^3	6,100	3,750
Surplus	m^3	650	410

Table 4.5.2 MAJOR DIMENSIONS OF PROPOSED BRIDGES (1/6)

Widas river

			New	New	2	New	New	3	New	4	New	New
NO. OF INVENTORY SURVEY			New	New	2	New	New	3	New	4	New	New
CLASSIFICATION OF IMPROVEMENT METHOD			New Construction	New Construction	Replacement Lengkong	New Construction	New Construction	Replacement Karangsemu	New Construction	Replacement Depok	New Construction	New Construction
LOCATION			K m 1.1 + 100	K m 6.3 + 200	K m 11.5 + 150	K m 15.1 + 80	K m 19.1 + 300	K m 24.7 + 150	K m 29.1 - 300	K m 32.1 + 300	K m 33.1 + 350	K m 34.6 + 250
ROAD CONDITION	CLASS		Rural Road	Footh Path	Propincial Road	Footh Path	Foot Path	Rural Road	Rural Road	Rural Road	Rural Road	Rural Road
	EFFECTIVE WIDTH W (m)		3.0	1.5	9.0 (with side walk)	1.5	1.5	3.0	3.0	5.0	3.0	3.0
PROPOSED RIVER CONDITION	DESIGN DISCHARGE (m3/sec)		240	240	570	240	240	530	640	590	590	590
	No. of GENERAL VIEW		VI	XI	V	XI	XI	VI	VI	VI	VI	VI
	DATA FOR WIDTH	RIVER WIDTH B1 (m)	110	170	260	310	260	180	110	110	110	110
		B2 (m)	27.3	B_{21} = 50.3 B_{22} = 70.3	85.0	B_{21} = 150.4 B_{22} = 80.4	B_{21} = 130.4 B_{22} = 50.4	55.4	19.1	22.65	22.65	22.65
		B3 (m)	37.0	41.0	72.0	72.0	72.0	62.0	65.0	59.5	59.5	59.5
		BOTTOM WIDTH B4 (m)	21.4	25.0	56.0	55.0	55.0	45.0	48.0	41.0	41.0	41.0
		LEVEE WIDTH B5 (m)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	DATA FOR HEIGHT	LOW WATER DEPTH H1 (m)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
		H2 (m)	3.9	3.9	4.0	4.2	4.2	4.2	4.3	4.7	4.7	4.7
		H3 (m)	1.1	1.1	1.0	0.8	0.8	0.8	0.7	0.3	0.3	0.3
		H4 (m)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		FREE BOARD H5 (m)	1.0	-2.1	1.0	-1.8	-1.8	1.0	1.0	1.0	1.0	1.0
SUPER STRUCTURE	SKEW ANGLE θ (°)		90°	90°	80°	90°	90°	90°	90°	90°	50°	70°
	TOTAL WIDTH Bt (m)		3.8	1.5	9.92	1.5	1.5	3.8	3.8	5.8	3.8	3.8
	BRIDGE LENGTH Lb (m)		103.0	43.5	258	76.7	76.7	178.0	108.0	108.0	141.0	115.0
	TYPE OF BRIDGE		T-beam	RC-Slab	T-beam	RC-Slab	RC-Slab	T-beam	T-beam	T-beam	T-beam	T-beam
	NOS. OF SPAN		5	5	12	9	9	8	5	5	7	5
	SPAN LENGTH L (m)		20.7	8.3	20.6	8.3	8.3	21.35	20.7	20.7	19.24	22.1
	NOS. OF BEAM		2	-	6	-	-	2	2	3	2	2
	BEAM HEIGHT h (m)		1.60	0.35	1.60	0.35	0.35	1.65	1.60	1.60	1.40	1.70
SUBSTRUCTURE	ABUTMENT	TOTAL HEIGHT H1 (m)	5.0	-	5.0	-	-	5.0	5.0	5.0	5.0	5.0
		Width (m) Bt	3.8	-	(10.07) 9.92	-	-	3.8	3.8	5.8	(4.96) 3.8	(4.04) 3.8
		Width (m) Bf	3.8	-	(10.07) 9.92	-	-	4.0	4.0	5.8	(4.96) 3.8	(4.26) 4.0
		Nos of Pile	12	2	32	2	2	14	14	20	12	14
		Pile arrangement N @ P	2 @ 1.4	1 @ 1.0	7 @ 1.25	1 @ 1.0	1 @ 1.0	3 @ 1.0	3 @ 1.0	4 @ 1.2	2 @ 1.4	3 @ 1.0
		Pile length lp (m)	18.0	10.0	18.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0
	PIER	Total Height H1 (m)	9.5	-	9.5 [5.5]	-	-	9.5	9.5	9.5	9.5	9.5
		Width (m) Bt	3.8	-	9.92 (10.07)	-	-	3.8	3.8	5.8	(4.96) 3.8	(4.04) 3.8
		Width (m) Bf	4.3	-	10.50 (10.66)	-	-	4.3	4.3	6.3	(5.61) 4.3	(4.58) 4.3
		Nos of Pile	14	2	45 [32]	2	2	14	14	22	14	14
		Pile arrangement N @ P	3 @ 1.1	1 @ 1.0	8 @ 1.185 (7 @ 1.354)	1 @ 1.0	1 @ 1.0	3 @ 1.1	3 @ 1.1	5 @ 1.06	3 @ 1.1	3 @ 1.1
		Pile length lp (m)	18.0	10.0	18.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0

Note : ( ) is shown in case of skew angled bridge
[ ] is shown in case of pier located at highwater channel.

Table 4.5.2 MAJOR DIMENSIONS OF PROPOSED BRIDGES (2/6)

Widas river

NO. OF INVENTORY SURVEY				6	7	8
CLASSIFICATION OF IMPROVEMENT METHOD				Replacement	Replacement	New Construction
LOCATION				37.1 + 120	38.6 + 250	k m 40.1 + 50
ROAD CONDITION	CLASS			Rural Road	Rural Road	Rural Road
	EFFECTIVE WIDTH W (m)			3.0	5.0	3.0
PROPOSED RIVER CONDITION	DESIGN DISCHARGE (m^3/sec)			590	590	440
	No. of GENERAL VIEW			VI	VI	VI
	DATA FOR WIDTH	RIVER WIDTH B1 (m)		110	110	90
		B2 (m)		22.65	22.65	22.4
		B3 (m)		59.5	59.5	42.0
		BOTTOM WIDTH B4 (m)		41.0	41.0	22.0
		LEVEE WIDTH B5 (m)		4.0	4.0	3.0
	DATA FOR HEIGHT	LOW WATER DEPTH H1 (m)		5.0	5.0	5.0
		H2 (m)		4.7	4.7	5.0
		H3 (m)		0.3	0.3	0
		H4 (m)		1.0	1.0	0.8
		FREE BOARD H5 (m)		1.0	1.0	0.8
SUPER STRUCTURE	SKEW ANGLE θ (°)			80°	90°	90°
	TOTAL WIDTH Bt (m)			3.8	5.8	3.8
	BRIDGE LENGTH Lb (m)			109.5	108.0	88.0
	TYPE OF BRIDGE			T-beam	T-beam	T-beam
	NOS. OF SPAN			5	5	4
	SPAN LENGTH L (m)			21.0	20.7	21.1
	NOS. OF BEAM			2	3	2
	BEAM HEIGHT h (m)			1.60	1.60	1.60
SUBSTRUCTURE	ABUTMENT	TOTAL HEIGHT H1 (m)		5.0	5.0	5.0
		Width (m)	Bt	(3.86) 3.8	5.8	3.8
			Bf	(4.06) 4.0	5.8	3.8
		Nos of Pile		14	20	12
		Pile arrangement N @ P		3 @ 1.0	4 @ 1.2	2 @ 1.4
		Pile length lp (m)		10.0	10.0	10.0
	PIER	Total Height H1 (m)		9.5	9.5	9.5
		Width (m)	Bt	3.8	5.8	3.8
			Bf	4.3	6.3	4.3
		Nos of Pile		14	22	14
		Pile arrangement N @ P		3 @ 1.1	5 @ 1.06	3 @ 1.1
		Pile length lp (m)		10.0	10.0	10.0

Note : ( ) is shown in case of skew angled bridge
[ ] is shown in case of pier located at highwater channel.

Table 4.5.2 MAJOR DIMENSIONS OF PROPOSED BRIDGES (3/6)

Kedungsoko river

NO. OF INVENTORY SURVEY			1	2	New	3
CLASSIFICATION OF IMPROVEMENT METHOD			Replacement	Remain	New Construction	Replacement
LOCATION			k m 3.5 + 200	k m 3.5 + 220	k near 5.0	k m 7.0 + 250
ROAD CONDITION	CLASS		National Road	Railway	Rural	Rural
	EFFECTIVE WIDTH W (m)		9 m with (side walk)	1.067	3.0	3.0
PROPOSED RIVER CONDITION	DESIGN DISCHARGE (m3/sec)		200	200	200	470
	No. of GENERAL VIEW		II	I	VI	VI
	DATA FOR WIDTH	RIVER WIDTH B1 (m)	80	83	110	100
		B2 (m)	-	-	34.7	11.85
		B3 (m)	35.0	39.0	33.0	67.50
		BOTTOM WIDTH B4 (m)	20.0	34.0	21.0	45.0
		LEVEE WIDTH B5 (m)	4.0	4.0	4.0	4.0
	DATA FOR HEIGHT	LOW WATER DEPTH H1 (m)	4.0	4.0	4.0	4.0
		H2 (m)	-	-	3.1	2.8
		H3 (m)	-	-	0.9	1.2
		H4 (m)	-	-	1	1
		FREE BOARD H5 (m)	0.60	0.60	1.00	1.00
SUPER STRUCTURE	SKEW ANGLE θ (°)		90°	90°	90°	65°
	TOTAL WIDTH Bt (m)		9.92	-	3.8	3.8
	BRIDGE LENGTH Lb (m)		80.0	82.0	108.0	108.0
	TYPE OF BRIDGE		T-beam	Steel through	T-beam	T-beam
	NOS. OF SPAN		4	8	5	5
	SPAN LENGTH L (m)		14.3 ~ 21.50	7.75 ~ 12.23	20.7	20.7
	NOS. OF BEAM		6	2	2	2
	BEAM HEIGHT h (m)		1.65	1.0 ~ 1.4	1.60	1.60
SUBSTRUCTURE	ABUTMENT	TOTAL HEIGHT H1 (m)	5.0 9.0	-	5.0	5.0
		Width (m) Bt	9.92	-	3.8	3.8
		Width (m) Bf	9.92	-	4.0	4.0
		Nos of Pile	32 56	-	14	14
		Pile arrangement N @ P	7 @ 1.25	-	3 @ 1.0	3 @ 1.0
		Pile length lp (m)	15.0	-	15.0	15.0
	PIER	Total Height H1 (m)	[5.5] 8.5	-	8.5	8.5
		Width (m) Bt	9.92	-	3.8	3.8
		Width (m) Bf	10.5	-	4.3	4.3
		Nos of Pile	[32] 45	-	14	14
		Pile arrangement N @ P	8 @ 1.185 [7 @ 1.354]	-	3 @ 1.1	3 @ 1.1
		Pile length lp (m)	15.0	-	15.0	15.0

Note : ( ) is shown in case of skew angled bridge

: [ ] shown in case of pier located at highwater channel.

Table 4.5.2 MAJOR DIMENSIONS OF PROPOSED BRIDGES (4/6)

Diversion channel

NO. OF INVENTORY SURVEY				-	-	-	-	-	-				
CLASSIFICATION OF IMPROVEMENT METHOD				New Construction	New Construction	New Construction	New Construction	New Construction	New Construction				
LOCATION													
ROAD CONDITION	CLASS			Railway	National Road	Rural Road	Rural Road	Rural Road	Rural Road				
ROAD CONDITION	EFFECTIVE WIDTH W (m)			1.067	9.0 (with side walk)	5.0	5.0	3.0	5.0				
PROPOSED RIVER CONDITION	DESIGN DISCHARGE (m3/sec)			230	230	230	230	230	230				
PROPOSED RIVER CONDITION	No. of GENERAL VIEW			III	IV	VII	VIII	VIII	VIII				
PROPOSED RIVER CONDITION	DATA FOR WIDTH	RIVER WIDTH B1 (m)		50.0	50.0	50.0	40.0	40.0	50.0				
PROPOSED RIVER CONDITION	DATA FOR WIDTH	B2 (m)		5.5	5.5	5.5	2.0	2.0	7.0				
PROPOSED RIVER CONDITION	DATA FOR WIDTH	B3 (m)		33.0	33.0	33.0	26.0	26.0	26.0				
PROPOSED RIVER CONDITION	DATA FOR WIDTH	BOTTOM WIDTH B4 (m)		11.6	11.60	11.6	12.0	12.0	12.0				
PROPOSED RIVER CONDITION	DATA FOR WIDTH	LEVEE WIDTH B5 (m)		4.0	4.0	4.0	3.0	3.0	3.0				
PROPOSED RIVER CONDITION	DATA FOR HEIGHT	LOW WATER DEPTH H1 (m)		5.0	5.0	5.0	5.0	5.0	5.0				
PROPOSED RIVER CONDITION	DATA FOR HEIGHT	H2 (m)		2.5	2.5	2.5	3.5	3.5	3.5				
PROPOSED RIVER CONDITION	DATA FOR HEIGHT	H3 (m)		0.5	0.5	0.5	1.5	1.5	1.5				
PROPOSED RIVER CONDITION	DATA FOR HEIGHT	H4 (m)		1.0	1.0	1.0	1.0	1.0	1.0				
PROPOSED RIVER CONDITION	DATA FOR HEIGHT	FREE BOARD H5 (m)		1.50	1.05	1.05	1.05	1.05	1.05				
SUPER STRUCTURE	SKEW ANGLE θ (°)			81°	81°	90°	60°	90°	55°				
SUPER STRUCTURE	TOTAL WIDTH Bt (m)			-	9.92	5.8	5.8	3.8	5.8				
SUPER STRUCTURE	BRIDGE LENGTH Lb (m)			52.5	52.5	47.0	48.5	42.0	63.5				
SUPER STRUCTURE	TYPE OF BRIDGE			Steel through	T-beam	T-beam	T-beam	T-beam	T-beam				
SUPER STRUCTURE	NOS. OF SPAN			2	2	2	2	2	3				
SUPER STRUCTURE	SPAN LENGTH L (m)			25.35	25.35	22.6	23.35	20.0	20.18				
SUPER STRUCTURE	NOS. OF BEAM			2	6	3	3	2	3				
SUPER STRUCTURE	BEAM HEIGHT h (m)			2.0	1.70	1.70	1.70	1.40	1.40				
SUBSTRUCTURE	ABUTMENT	TOTAL HEIGHT H1 (m)		4.0	5.0	5.0	5.0	5.0	5.0				
SUBSTRUCTURE	ABUTMENT	Width (m)	Bt	6.0 (6.075)	9.92 (10.05)	5.8	5.8 (6.70)	3.8	5.8 (7.08)				
SUBSTRUCTURE	ABUTMENT	Width (m)	Bf	8.0 (8.10)	9.92 (10.05)	5.8	5.8 (6.70)	3.8	5.8 (7.08)				
SUBSTRUCTURE	ABUTMENT	Nos of Pile		16	36	20	20	12	20				
SUBSTRUCTURE	ABUTMENT	Pile arrangement N @ P		-	8 @ 1.10	4 @ 1.2	4 @ 1.2	2 @ 1.4	4 @ 1.2				
SUBSTRUCTURE	ABUTMENT	Pile length lp (m)		15.0	15.0	15.0	15.0	15.0	15.0				
SUBSTRUCTURE	PIER	Total Height H1 (m)		9.5	9.5	9.5	9.5	9.5	9.5				
SUBSTRUCTURE	PIER	Width (m)	Bt	-	9.92 (10.05)	5.8	5.8 (6.70)	3.8	5.8 (7.08)				
SUBSTRUCTURE	PIER	Width (m)	Bf	-	10.5 (10.63)	6.3	6.3 (7.27)	4.3	6.3 (7.69)				
SUBSTRUCTURE	PIER	Nos of Pile		28	45	22	22	14	22				
SUBSTRUCTURE	PIER	Pile arrangement N @ P		3 @ 1.0	8 @ 1.185	5 @ 1.05	5 @ 1.06	3 @ 1.1	5 @ 1.06				
SUBSTRUCTURE	PIER	Pile length lp (m)		15.0	15.0	15.0	15.0	15.0	15.0				

Note : ( )is shown in case of skew angled bridge

Table 4.5.2 MAJOR DIMENSIONS OF PROPOSED BRIDGES (5/6)

Upper and lower

			1	2	3	4	5	6	7	8	9	10
NO. OF INVENTORY SURVEY			10	11	12	13	New					
CLASSIFICATION OF IMPROVEMENT METHOD			Replace	Replace	Replace	Replace	New Construction					
LOCATION			k m 16.0 + 300	k m 18 + 300	k m 18.5 + 50	k m 19.5 + 250	k near 3.0 (lower)					
ROAD CONDITION	CLASS		Province	Province	Rural	Rural	Rural					
	EFFECTIVE WIDTH W (m)		7.0	9.0	3.0	3.0	5.0					
PROPOSED RIVER CONDITION	DESIGN DISCHARGE (m3/sec)		220	220	190	190	35					
	No. of GENERAL VIEW		IX	IX	IX	IX	VII					
	DATA FOR WIDTH	RIVER WIDTH B1 (m)	50.0	50.0	50.0	55.0	25.0					
		B2 (m)	6.95	7.8	7.8	10.3	1.0					
		B3 (m)	30.5	20.0	20.0	28.0	15.0					
		BOTTOM WIDTH B4 (m)	16.0	12.0	12.0	12.0	3.0					
		LEVEE WIDTH B5 (m)	4.0	4.0	4.0	4.0	4.0					
	DATA FOR HEIGHT	LOW WATER DEPTH H1 (m)	4.0	4.6	4.6	4.6	4					
		H2 (m)	3.6	4.0	4.0	4.0	3.0					
		H3 (m)	0.4	0.6	0.6	0.6	1.0					
		H4 (m)	1.0	1.0	1.0	1.0	1.0					
		FREE BOARD H5 (m)	1.05	1.05	1.05	1.05	1.05					
SUPER STRUCTURE	SKEW ANGLE θ (°)		90°	55°	90°	90°	60°					
	TOTAL WIDTH Bt (m)		7.8	9.92	3.8	3.8	5.8					
	BRIDGE LENGTH Lb (m)		52.0	63.5	52.0	53.0	31.0					
	TYPE OF BRIDGE		T-beam	T-beam	T-beam	T-beam	T-beam					
	NOS. OF SPAN		3	3	3	3	2					
	SPAN LENGTH L (m)		16.43	20.27	16.43	16.77	14.6					
	NOS. OF BEAM		4	6	2	2	3					
	BEAM HEIGHT h (m)		1.15	1.60	1.15	1.15	1.05					
SUBSTRUCTURE	ABUTMENT	TOTAL HEIGHT H1 (m)	5.0	5.0	5.0	5.0	5.0					
		Width (m) Bt	7.8	9.92 (12.11)	3.8	3.8	5.8 (6.70)					
		Width (m) Bf	7.8	9.92 (12.11)	3.8	3.8	5.8 (6.70)					
		Nos of Pile	24	36	11	11	24					
		Pile arrangement N @ P	5 @ 1.36	8 @ 1.10	2 @ 1.40	2 @ 1.40	5 @ 1.36					
		Pile length lp (m)	10	10	10	10	15					
	PIER	Total Height H1 (m)	9.0	9.5	9.5	9.5	9.0					
		Width (m) Bt	7.8	9.92 (12.11)	3.8	3.8	5.8 (6.70)					
		Width (m) Bf	8.3	10.5 (12.82)	4.3	4.3	6.3 (7.27)					
		Nos of Pile	24	45	12	12	18					
		Pile arrangement N @ P	5 @ 1.46	8 @ 1.105	2 @ 1.65	2 @ 1.65	4 @ 1.325					
		Pile length lp (m)	10	10	10	10	15					

Note : ( ) is shown in case of skew angled bridge

Table 4.5.3 MAJOR DIMENSIONS OF PROPOSED BRIDGES (6/6)

Kuncir river

NO. OF INVENTORY SURVEY			3	7	8	9		13	15			
CLASSIFICATION OF IMPROVEMENT METHOD			Replace	Replace	Replace	Replace	New Construction	Replace	Replacement			
LOCATION			k m 1.0 - 50	k m 2.5 + 120	k m 4.0 + 250	k m 5.5 + 0	k m 7.0 + 600	k m 9.5 + 150	k m 10.5 + 0			
ROAD CONDITION	CLASS		Rural Road	Footpath	Rural Road	Rural Road	Provincial Road	Provincial Road	Provincial Road			
	EFFECTIVE WIDTH W (m)		3.0	1.5	5.0	5.0	7.0	7.0	7.0			
PROPOSED RIVER CONDITION	DESIGN DISCHARGE (m3/sec)		95	95	95	95	95	95	95			
	No. of GENERAL VIEW		VII	X	VII	VII	VII	VII	VII			
	DATA FOR WIDTH	RIVER WIDTH B1 (m)	50.0	40.0	40.0	40.0	40.0	40.0	40.0			
		B2 (m)	12.8	7.8	7.8	7.8	8.6	8.6	8.6			
		B3 (m)	16.0	16.0	16.0	16.0	16.0	16.0	16.0			
		BOTTOM WIDTH B4 (m)	5.0	5.0	5.0	5.0	4.0	4.0	4.0			
		LEVEE WIDTH B5 (m)	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
	DATA FOR HEIGHT	LOW WATER DEPTH H1 (m)	4.0	4.0	4.0	4.0	4.0	4.0	4.0			
		H2 (m)	2.7	2.7	2.7	2.7	3.1	3.1	3.1			
		H3 (m)	1.3	1.3	1.3	1.3	0.9	0.9	0.9			
		H4 (m)	0.80	0.80	0.80	0.80	0.80	0.80	0.80			
		FREE BOARD H5 (m)	0.85	0.80	0.85	0.85	0.85	0.85	0.85			
SUPER STRUCTURE	SKEW ANGLE θ (°)		90°	90°	90°	90°	70°	90°	90°			
	TOTAL WIDTH Bt (m)		3.8	1.5	5.8	5.8	7.8	7.8	7.8			
	BRIDGE LENGTH Lb (m)		52.0	40.0	42.0	42.0	44.5	42.0	42.0			
	TYPE OF BRIDGE		T-beam	Wooden	T-beam	T-beam	T-beam	T-beam	T-beam			
	NOS. OF SPAN		2	10	2	2	2	2	2			
	SPAN LENGTH L (m)		25.1	4.0	20.1	20.1	21.35	20.1	20.1			
	NOS. OF BEAM		2	-	3	3	4	4	4			
	BEAM HEIGHT h (m)		1.70	-	1.4	1.4	1.65	1.4	1.4			
SUBSTRUCTURE	ABUTMENT	TOTAL HEIGHT H1 (m)	5.0	-	5.0	5.0	5.0	5.0	5.0			
		Width (m) Bt	3.8	-	5.8	5.8	7.8 (8.3)	7.8	7.8			
		Width (m) Bf	3.8	-	5.8	5.8	7.8 (8.3)	7.8	7.8			
		Nos of Pile	12.0	-	20	20	28	28	28			
		Pile arrangement N @ P	2 @ 1.4	-	4 @ 1.2	4 @ 1.2	6 @ 1.13	6 @ 1.13	6 @ 1.13			
		Pile length lp (m)	10	-	10	10	10	10	10			
	PIER	Total Height H1 (m)	8.5	-	8.5	8.5	8.5	8.5	8.5			
		Width (m) Bt	3.8	-	5.8	5.8	7.8 (8.3)	7.8	7.8			
		Width (m) Bf	4.3	-	6.3	6.3	8.3 (8.83)	8.3	8.3			
		Nos of Pile	14.0	-	20	20	28	28	28			
		Pile arrangement N @ P	3 @ 1.1	-	4 @ 1.06	4 @ 1.06	6 @ 1.217	6 @ 1.217	6 @ 1.217			
		Pile length lp (m)	10	-	10	10	10	10	10			

Note : ( ) is shown in case of skew angled bridge

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES (1/7)

Whole

		Unit	Widas River	Ulo Diversion Channel	Ulo River	Kedungsoko River	Kuncir River			Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m^2	3083	126	315	648	156			4328
	- do - t = 0.075 m	m^2	540	801	155	-	420			1916
	- do - t = 0.085 m	m^2	1806	368	809	560	900			4443
	Concrete volume	m^3	4802	1244	912	1072	1058			9088
	Form area	m^2	20228	4757	4174	4115	4424			37698
	Reinforcement bar	t	888.1	240.2	169.4	195.8	192.2			1685.7
	Steel weight (Plate)	t	-	72.0	-	-	-			72.0
	Staging	m^3	21247	2149	2341	3514	4454			33705
	Timber	m^3	-	-	-	-	8.4			8.4
	Additional Work	set	1	1	1	1	1			1
Sub - Structure	Structural Work									
	Concrete volume	m^3	6333	1696	1780	1615	1399			12823
	Form area	m^2	8012	2231	2299	2005	1614			16161
	Reinforcement bar	t	313.8	93.1	93.3	83.6	74.8			658.6
	Pile (□0.4x0.4 RC)	m	20828	6465	4490	5670	4100			41553
	Pile (□0.35x0.35 RC)	m	520	-	-	-	-			520
	Earth Work									
	Excavation (Machine)	m^3	2354	1245	1461	872	1186			7118
	- do - (Man Power)	m^3	13398	3265	3741	3112	1226			24742
	Fill up soil	m^3	11580	3322	3840	2781	1226			22749
	Surplus soil	m^3	4172	1188	1360	1202	804			8726
Other	Coffering Work									
	Plank	m^2	-	396	-	-	-			396
	Sheet pile	m^2	21523	4145	5202	4931	2369			38170
	Steel weight (Strut, Walling)	t	1313	345	373	320	128			2479
	Temporary bridge Work									
	Wooden bridge	m^2	595	-	49	-	80			724
	Steel bridge	m^2	-	-	317	305	237			859
	Removal Work									
	Steel weight	t	53	-	4	65	32			154
	Reinforced concrete (Super - Structure)	m^3	402	-	183	86	128			799
	-do- (Sub - Structure)	m^3	119	-	32	33	360			544
	Wet masonry	m^3	2346	-	1488	473	374			4681
	Banking Work									
	Approach road	m^3	27586	16209	13547	11234	23643			92219
	Protection Work									
	Revetment	m^2	8622	5801	4188	2656	4678			25945
	Riprap	m^3	-	-	-	391	-			391
	Temporary Work									
	Staging (Wooden)	m^2	500	-	-	300	-			800
	Staging (Steel)	m^2	-	315	-	-	-			315
	Banking of access road	m^3	4275	4622	-	2419	-			11316

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES (2/7)

Widas river

		Unit	km 1.1 + 100	km 6.3 + 200	km 11.5+130	km 15.1 + 80	km 19.1+300	km 26.7+150	km 29.1-300	Sub - Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m^2	324	-	-	-	-	534	324	1182
	- do - t = 0.075 m	m^2	-	-	-	-	-	-	-	-
	- do - t = 0.085 m	m^2	-	-	1806	-	-	-	-	1806
	Concrete volume	m^3	263	23	1860	40	40	444	263	2933
	Form area	m^2	1140	96	7536	169	169	1896	1140	12146
	Reinforcement bar	t	47.5	4.1	352.8	7.3	7.3	82.4	47.5	548.9
	Steel weight (Plate)	t	-	-	-	-	-	-	-	-
	Staging	m^3	1381	236	8282	300	270	2693	781	13943
	Timber	m^3	-	-	-	-	-	-	-	-
	Additional Work	set	1	1	1	1	1	1	1	1
Sub - Structure	Structural Work									
	Concrete volume	m^3	373	-	2102	-	-	605	375	3455
	Form area	m^2	531	-	2258	-	-	838	532	4159
	Reinforcement bar	t	19.0	-	99.2	-	-	30.4	19.0	167.6
	Pile (□0.4x0.4 RC)	m	1440	-	8658	-	-	1890	1260	13248
	Pile (□0.35x0.35 RC)	m	-	120	-	200	200	-	-	520
	Earth Work									
	Excavation (Machine)	m^3	153	-	222	-	-	158	123	646
	- do - (Man Power)	m^3	718	-	2127	-	-	1834	1195	5874
	Fill up soil	m^3	645	-	1249	-	-	1524	1016	4434
	Surplus soil	m^3	227	-	1100	-	-	460	302	2089
Other	Coffering Work									
	Sheet pile	m^2	1247	-	5182	-	-	2665	1648	10742
	Steel weight (Strut, Waling)	t	79	-	186	-	-	177	119	561
	Temporary bridge Work									
	Wooden bridge	m^2	-	-	-	-	-	252	-	252
	Steel bridge	m^2	-	-	-	-	-	-	-	-
	Removal Work									
	Steel weight	t	-	-	-	-	-	47	-	47
	Reinforced concrete (Super - Structure)	m^3	-	-	261	-	-	-	-	261
	-do- (Sub - Structure)	m^3	-	-	119	-	-	-	-	119
	Wet Masonry	m^3	-	-	62	-	-	737	-	799
	Banking Work									
	Approach road	m^3	2947	-	5943	-	-	3046	3499	15435
	Protection Work									
	Revetment	m^2	829	-	1042	-	-	829	829	3529
	Temporary Work									
	Staging (Wooden)	m^2		140	-	200	160	-	-	500
	Banking of access road	m^3	3150	1125	-	-	-	-	-	4275

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES(3/7)

Widas river

		Unit	k m 32.1+300	k m 33.1+350	k m 34.6+250	k m 37.1+120	k m 38.6+250	k m 40.1+ 50	Sub - Total	Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m^2	540	423	345	329	-	264	1901	3083
	- do - t = 0.075 m	m^2	-	-	-	-	540	-	540	540
	- do - t = 0.085 m	m^2	-	-	-	-	-	-	-	1806
	Concrete volume	m^3	385	308	305	270	385	216	1869	4802
	Form area	m^2	1650	1435	1250	1165	1650	932	8082	20228
	Reinforcement bar	t	70.0	56.0	55.0	49.0	70.0	39.2	339.2	888.1
	Steel weight (Plate)	t	-	-	-	-	-	-	-	-
	Staging	m^3	2571	640	1208	516	2112	257	7304	21247
	Timber	m^3	-	-	-	-	-	-	-	-
	Additional Work	set	1	1	1	1	1	1	1	1
Sub - Structure	Structural Work									
	Concrete volume	m^3	573	667	394	375	573	296	2878	6333
	Form area	m^2	706	922	558	532	706	429	3853	8012
	Reinforcement bar	t	29.0	33.8	20.2	19.0	29.0	15.2	146.2	313.8
	Pile (□0.4x0.4RC)	m	1920	1620	1260	840	1280	660	7580	20820
	Pile (□0.35x0.35RC)	m	-	-	-	-	-	-	-	520
	Earth Work									
	Excavation (Machine)	m^3	284	298	225	234	284	381	1706	2354
	- do - (Man Power)	m^3	1654	1883	877	1255	857	998	7524	13398
	Fill up soil	m^3	1449	1722	845	1169	848	1113	7146	11588
	Surplus soil	m^3	489	459	256	320	293	266	2083	4372
Other	Coffering Work									
	Sheet pile	m^2	2211	2563	1406	1709	1554	1338	10781	21523
	Steel weight (Strut, Waling)	t	161	188	95	125	83	100	752	1313
	Temporary bridge Work									
	Wooden bridge	m^2	188	-	-	-	155	-	343	595
	Steel bridge	m^2	-	-	-	-	-	-	-	-
	Removal Work									
	Steel weight	t	-	-	-	6	-	-	6	53
	Reinforced concrete (Super-Structure)	m^3	71	-	-	-	70	-	141	402
	-do- (Sub-Structure)	m^3	-	-	-	-	-	-	-	119
	Wet Masonry	m^3	1031	-	-	-	516	-	1547	2346
	Banking Work									
	Approach road	m^3	2627	1550	2176	2091	2601	1106	12151	27586
	Protection Work									
	Revetment	m^2	899	829	829	829	899	808	5093	8622
	Temporary Work									
	Staging (Wooden)	m^2	-	-	-	-	-	-	-	500
	Banking of access road	m^3	-	-	-	-	-	-	-	4275

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES (4/7)

Diversion channel

		Unit	Railway	National Road	Rural Road 1	Rural Road 2	Rural Road 3	Rural Road 4		Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m^2	-	-	-	-	126	-		126
	- do - t = 0.075 m	m^2	-	-	235	248	-	318		801
	- do - t = 0.085 m	m^2	-	368	-	-	-	-		368
	Concrete volume	m^3	-	534	190	207	97	216		1244
	Form area	m^2	-	1641	748	780	634	954		4757
	Reinforcement bar	t	-	107.0	35.6	38.4	19.6	39.6		240.2
	Steel weight (Plate)	t	72.0	-	-	-	-	-		72.0
	Staging	m^3	-	654	377	384	225	509		2149
	Timber	m^3	-	-	-	-	-	-		-
	Additional Work	set	1	1	1	1	1	1		1
Sub-Structure	Structural Work									
	Concrete volume	m^3	316	399	213	230	162	376		1696
	Form area	m^2	421	542	286	305	213	464		2231
	Reinforcement bar	t	22.2	21.7	11.1	12.0	7.3	18.8		93.1
	Pile (□0.4x0.4 RC)	m	900	1755	930	930	690	1260		6465
	Earth Work									
	Excavation (Machine)	m^3	-	372	262	222	176	213		1245
	-do- (Man Power)	m^3	610	726	413	403	306	807		3265
	Fill up soil	m^3	441	789	506	460	375	751		3322
	Surplus soil	m^3	168	309	170	165	108	268		1188
Other	Coffering Work									
	Plank	m^2	396	-	-	-	-	-		396
	Sheet pile	m^2	514	989	563	553	420	1106		4145
	Steel weight (Strut, Waling)	t	79	73	41	40	31	81		345
	Temporary bridge Work									
	Wooden bridge	m^2	-	-	-	-	-	-		-
	Steel bridge	m^2	-	-	-	-	-	-		-
	Removal Work									
	Steel weight	t	-	-	-	-	-	-		-
	Reinforced concrete (Super-Structure)	m^3	-	-	-	-	-	-		-
	-do- (Sub-Structure)	m^3	-	-	-	-	-	-		-
	Wet Masonry	m^3	-	-	-	-	-	-		-
	Banking Work									
	Approach road	m^3	-	4013	2851	3302	2631	3412		16209
	Protection Work									
	Revetment	m^2	1010	1162	1002	899	829	899		5801
	Temporary Work									
	Staging (Steel)	m^2	315	-	-	-	-	-		315
	Banking of access road	m^3	3110	1512	-	-	-	-		4622

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES (5/7)

Upper and lower Ulo

		Unit	k m 16.0+300	k m 18.0+300	k m 18.5+ 50	k m 19.5+250	Near to k m 3.0 + 0			Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m2	-	-	156	159	-			315
	- do - t = 0.075 m	m2	-	-	-	-	155			155
	- do - t = 0.085 m	m2	364	445	-	-	-			809
	Concrete volume	m3	189	448	98	99	78			912
	Form area	m2	936	1827	501	510	400			4174
	Reinforcement bar	t	33.9	84.9	18.0	18.6	14.0			169.4
	Steel weight (Plate)	t	-	-	-	-	-			-
	Staging	m3	525	927	291	322	276			2341
	Timber	m3	-	-	-	-	-			-
	Additional Work	set	1	1	1	1	1			1
Sub-Structure	Structural Work									
	Concrete volume	m3	438	674	219	219	230			1780
	Form area	m2	530	802	327	327	313			2299
	Reinforcement bar	t	22.6	35.6	11.4	11.4	12.3			93.3
	Pile (□0.4x0.4 RC)	m	960	1620	460	460	990			4490
	Earth Work									
	Excavation (Machine)	m3	420	358	247	247	189			1461
	-do- (Man Power)	m3	952	1200	605	605	379			3741
	Fill up soil	m3	1008	1095	673	673	391			3840
	Surplus soil	m3	364	463	178	178	177			1360
Other	Coffering Work									
	Sheet pile	m2	1360	1650	832	832	528			5202
	Steel weight (Strut, Waling)	t	95	120	60	60	38			373
	Temporary bridge Work									
	Wooden bridge	m2	-	-	49	-	-			49
	Steel bridge	m2	150	167	-	-	-			317
	Removal Work									
	Steel weight	t	-	-	4	-	-			4
	Reinforced concrete (Super-Structure)	m3	99	78	6	-	-			183
	-do- (Sub-Structure)	m3	15	17	-	-	-			32
	Wet Masonry	m3	1012	238	238	-	-			1488
	Banking Work									
	Approach road	m3	2519	4139	1919	1919	3051			13547
	Protection Work									
	Revetment	m2	844	989	786	786	783			4188

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES (6/7)

Kedungsoko river

		Unit	k m 3.5 + 200 Highway	k m 35.0+220 Railway	Near to k 5.0 + 0	k 7.0 +250				Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m^2	-	-	324	324				648
	-do- t = 0.075 m	m^2	-	-	-	-				-
	-do- t = 0.085 m	m^2	560	-	-	-				560
	Concrete volume	m^3	546	-	263	263				1072
	Form area	m^2	1835	-	1140	1140				4115
	Reinforcement bar	t	100.8	-	19.5	47.5				195.8
	Steel weight (Plate)	t	-	-	-	-				-
	Staging	m^3	1703	-	762	1049				3514
	Timber	m^3	-	-	-	-				-
	Additional Work	set	1	-	1	1				1
Sub-Structure	Structural Work									
	Concrete volume	m^3	886	-	350	379				1615
	Form area	m^2	1093	-	488	425				2005
	Reinforcement bar	t	46.3	-	17.8	19.5				83.6
	Pile (□0.4x0.4RC)	m	3150	-	1260	1260				5670
	Earth Work									
	Excavation (Machine)	m^3	662	-	123	87				872
	-do- (Man Power)	m^3	1358	-	1013	741				3112
	Fill up soil	m^3	1318	-	862	601				2781
	Surplus soil	m^3	701	-	274	227				1202
Other	Coffering Work									
	Sheet pile	m^2	2195	-	1466	1270				4931
	Steel weight (Strut, Waling)	t	145	-	101	74				320
	Temporary bridge Work									
	Wooden bridge	m^2	-	-	-	-				-
	Steel bridge	m^2	305	-	-	-				305
	Removal Work									
	Steel weight	t	65	-	-	-				65
	Reinforced concrete (Super-Structure)	m^3	86	-	-	-				86
	-do- (Sub-Structure)	m^3	33	-	-	-				33
	Wet Masonry	m^3	473	-	-	-				473
	Banking Work									
	Approach road	m^3	3436	-	3499	4279				11234
	Protection Work									
	Revetment	m^2	728	482	723	723				2656
	Riprap (t = 0.50 m)	m^3	-	391	-	-				391
	Temporary Work									
	Staging (Wooden)	m^2	-	300	-	-				300
	Banking of access road	m^3	1850	569	-	-				2419

Table 4.5.3 WORK QUANTITY OF PROPOSED BRIDGES (7/7)

Kuncir river

		Unit	k m 1.0 -50	k m 2.5 +120	k m 4.0 + 250	k m 5.5 + 0	k m 7.0 + 0	k m 9.5 +150	k m 10.5 + 0	Total
Super Structure	Structural Work									
	Pavement t = 0.065 m	m^2	156	-	-	-	-	-	-	156
	- do - t = 0.075 m	m^2	-	-	210	210	-	-	-	420
	- do - t = 0.085 m	m^2	-	-	-	-	312	294	294	900
	Concrete volume	m^3	172	-	143	143	218	191	191	1058
	Form area	m^2	600	-	634	634	896	830	830	4424
	Reinforcement bar	t	31.0	-	26.0	26.0	40.0	34.6	34.6	192.2
	Steel weight (Plate)	t	-	-	-	-	-	-	-	-
	Staging	m^3	449	-	683	706	555	986	1075	4454
	Timber	m^3	-	8.4	-	-	-	-	-	8.4
	Additional Work	set	1	1	1	1	1	1	1	1
Sub-Structure	Structural Work									
	Concrete volume	m^3	137	-	208	208	288	279	279	1399
	Form area	m^2	214	-	286	286	368	359	359	1614
	Reinforcement bar	t	7.3	-	11.1	11.1	15.7	14.8	14.8	74.8
	Pile (□0.4x0.4 RC)	m	380	-	600	600	840	840	840	4100
	Earth Work									
	Excavation (Machine)	m^3	130	-	160	160	234	278	224	1186
	-do- (Man Power)	m^3	144	-	174	142	426	198	142	1226
	Fill up soil	m^3	195	-	220	193	457	318	225	1226
	Surplus soil	m^3	78	-	115	109	203	158	141	804
Other	Coffering Work									
	Sheet pile	m^2	208	-	374	341	612	445	389	2369
	Steel weight (Strut, Waling)	t	18	-	22	19	43	26	-	128
	Temporary bridge Work									
	Wooden bridge	m^2	22	-	58	-	-	-	-	80
	Steel bridge	m^2	-	-	-	-	-	114	123	237
	Removal Work									
	Steel weight	t	-	-	-	-	-	-	32	32
	Reinforced concrete (Super-Structure)	m^3	-	-	8	-	-	77	43	128
	-do- (Sub-Structure)	m^3	-	-	-	-	-	25	335	360
	Wet Masonry	m^3	50	22	76	-	-	204	22	374
	Banking Work									
	Approach road	m^3	3310	-	4161	4161	4375	3818	3818	23643
	Protection Work									
	Revetment	m^2	701	-	760	760	819	819	819	4678

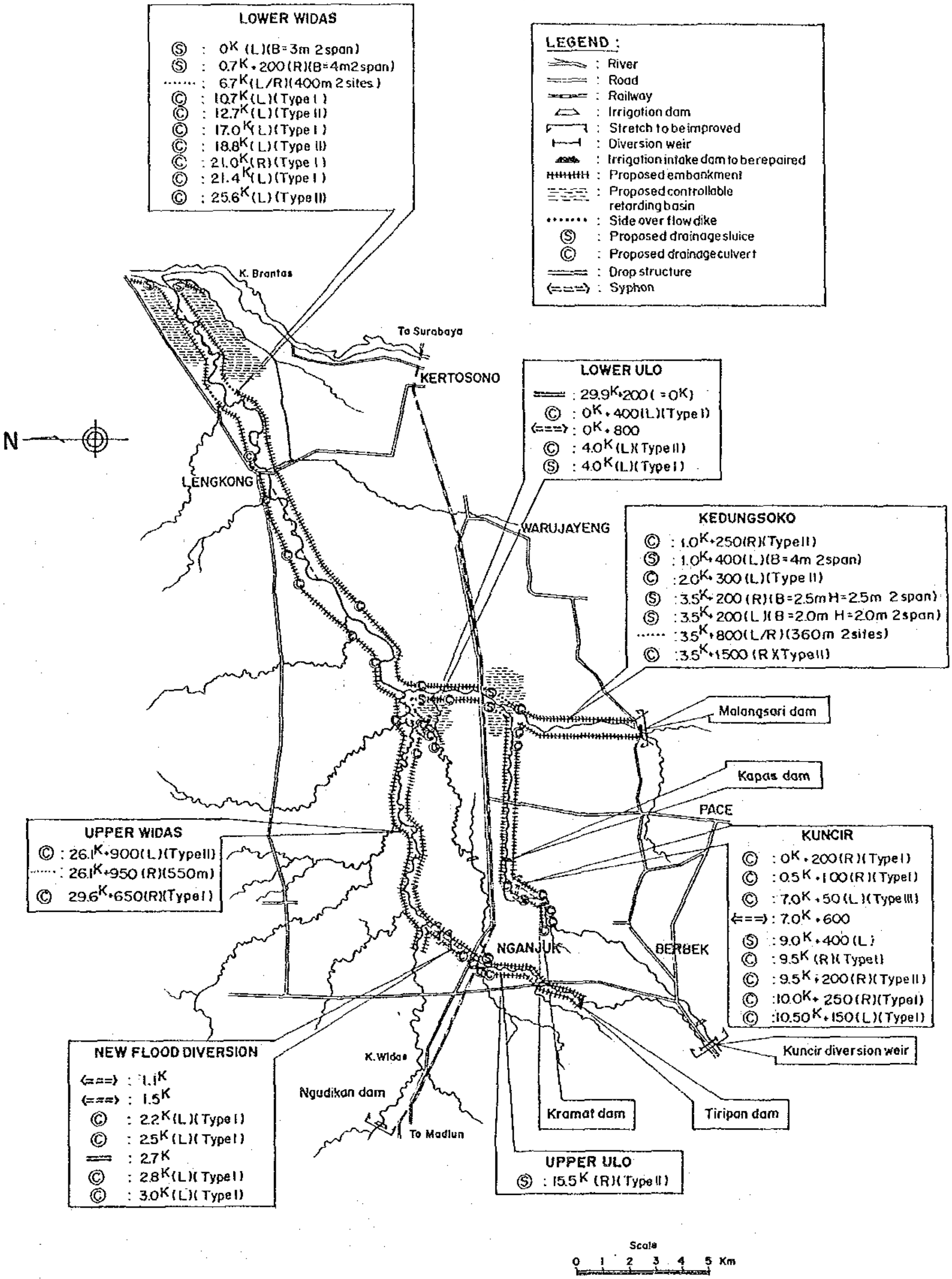


Fig. 4.5.1 OUTLINE OF PROPOSED STRUCTURES OF COMPREHENSIVE PLAN

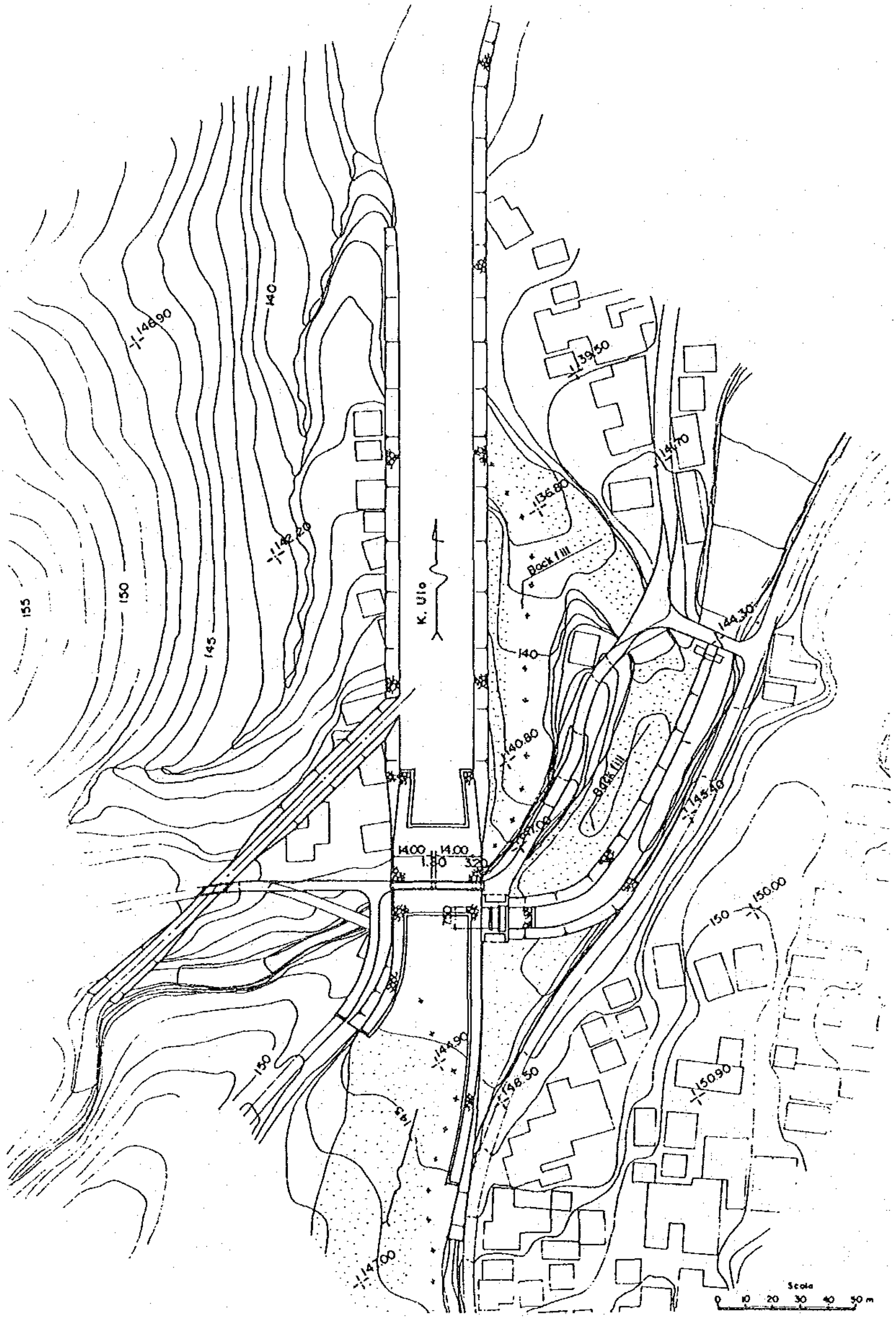


Fig. 4.5.2 PROPOSED DIVERSION WEIR AT UPPER ULO (1/2)

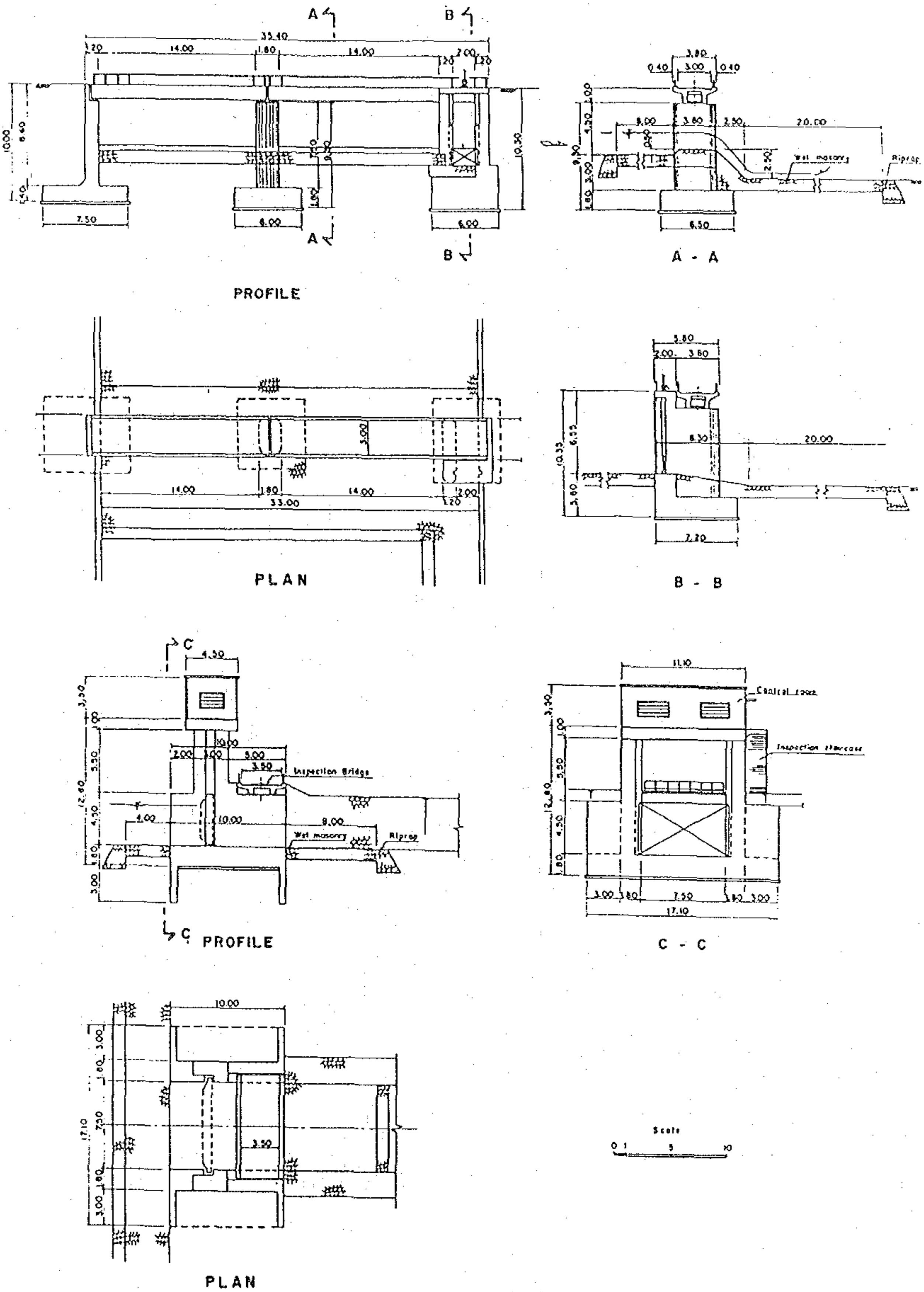


Fig.4.5.2 PROPOSED DIVERSION WEIR AT UPPER ULO (2/2)

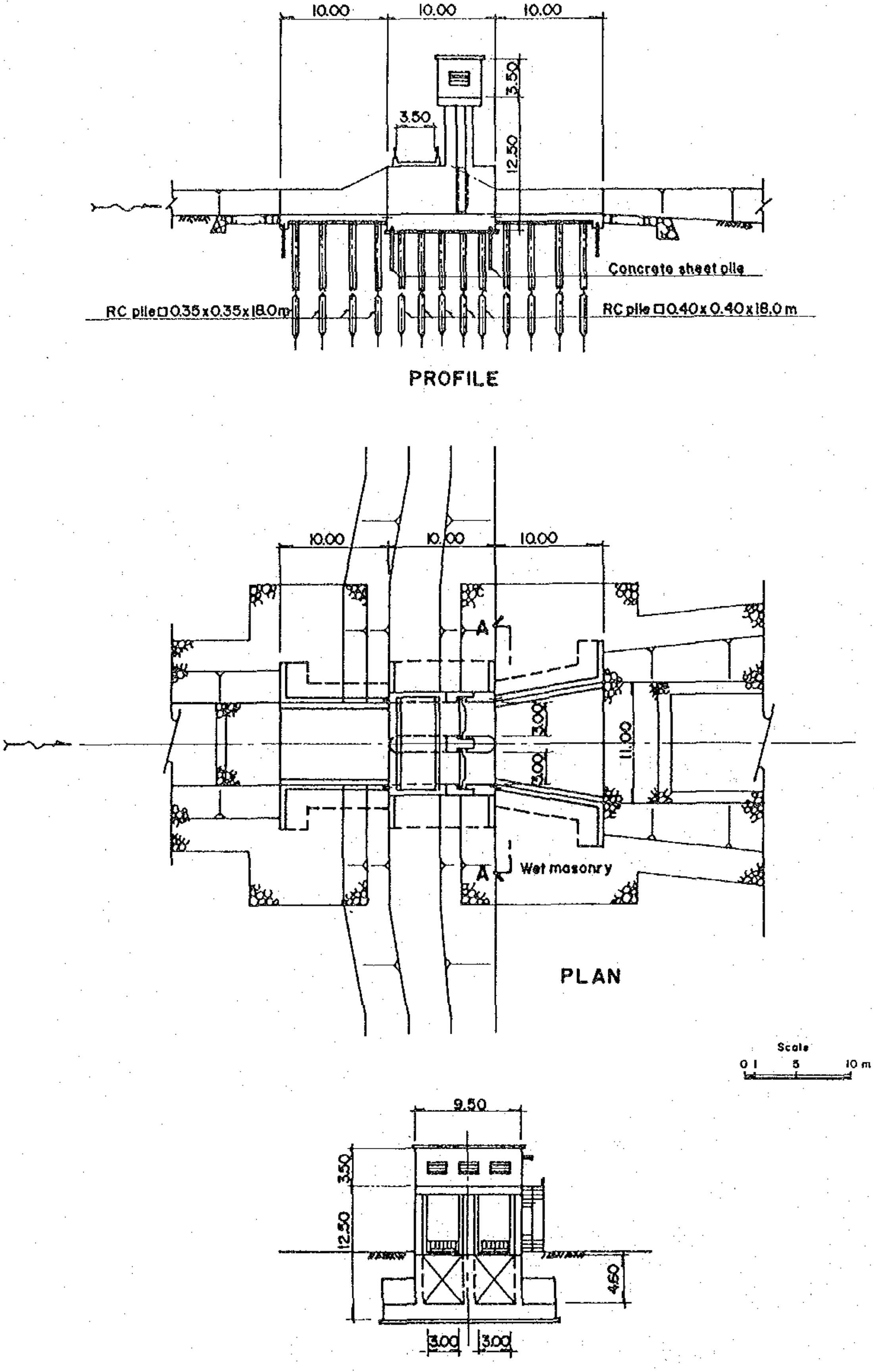


Fig. 4.5.3 PROPOSED DRAINAGE SLUICE IN WIDAS RETARDING BASIN (LEFT SIDE) (1/6)

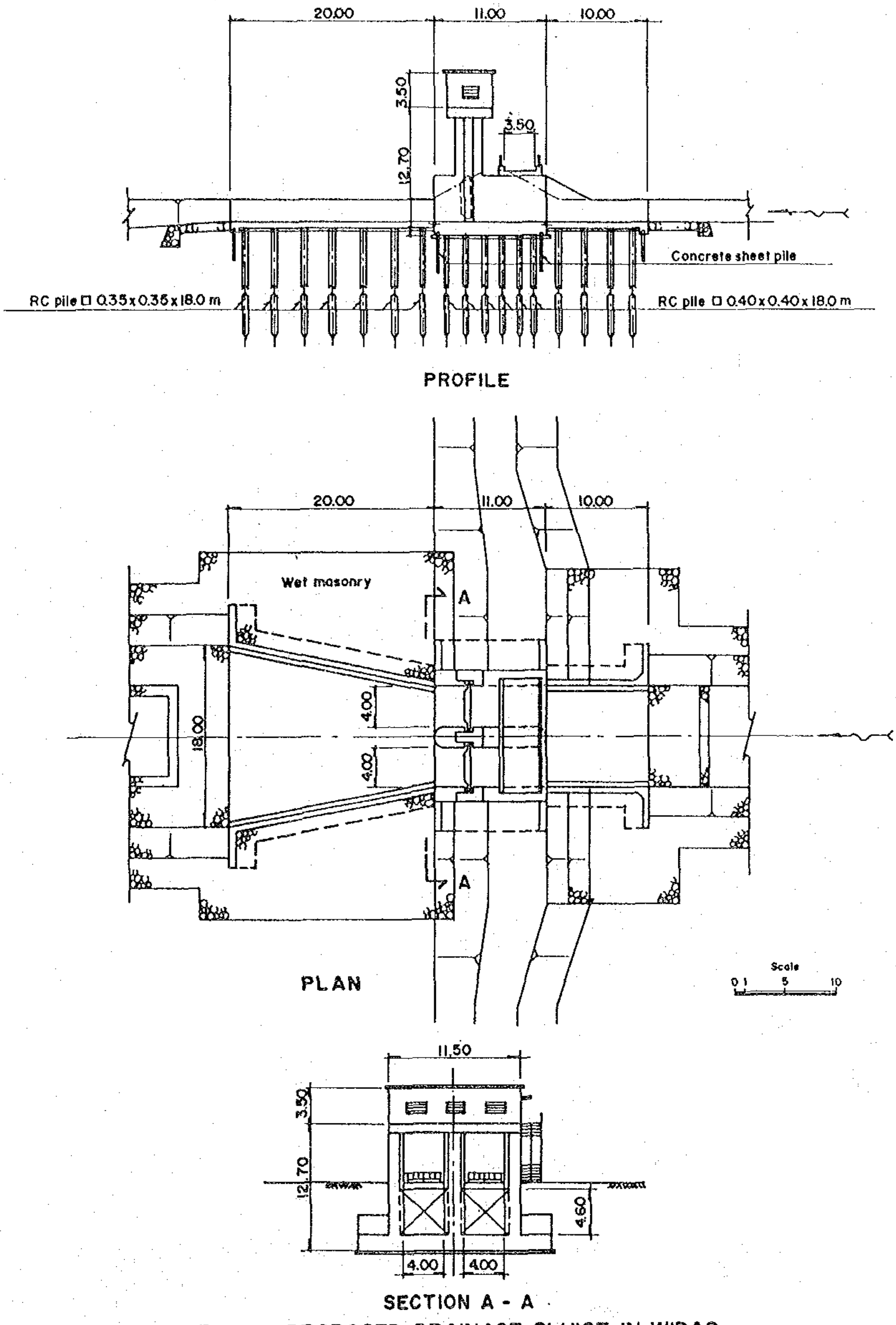
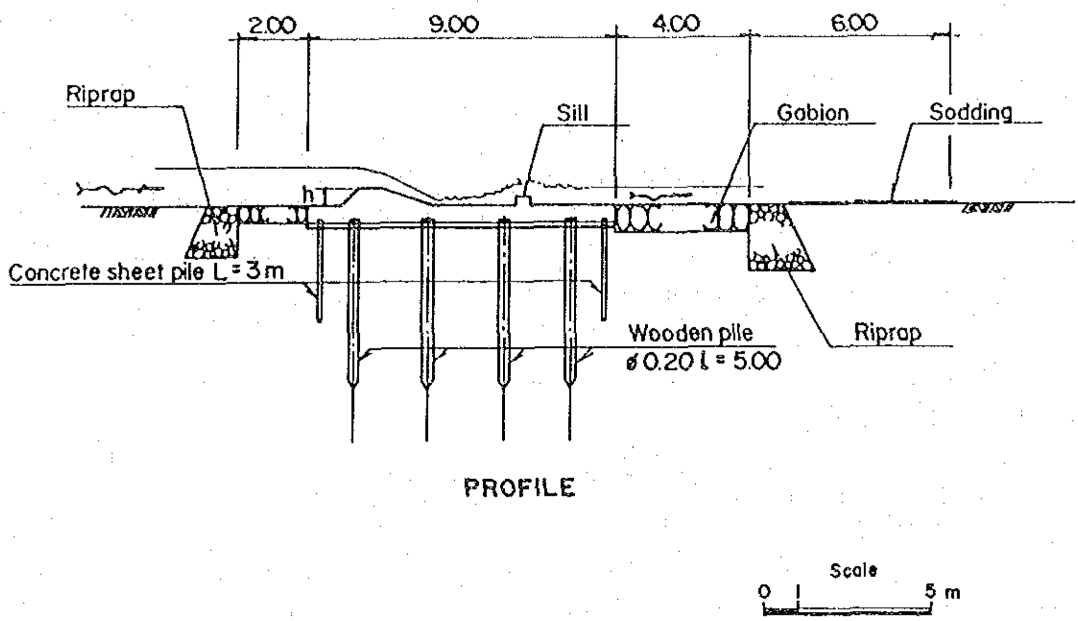


Fig. 4.5.3 PROPOSED DRAINAGE SLUICE IN WIDAS RETARDING BASIN (RIGHT SIDE) (2/6)



Retarding basin	Height of side overflow dike, h	Overflow depth
Widas	0.5 m	0.5 m
Ulo	0.2 m	0.5 m
Kedungsoko	0.4 m	0.5 m

Fig. 4.5.3 STANDARD DESIGN OF SIDE OVERFLOW DIKE (3/6)

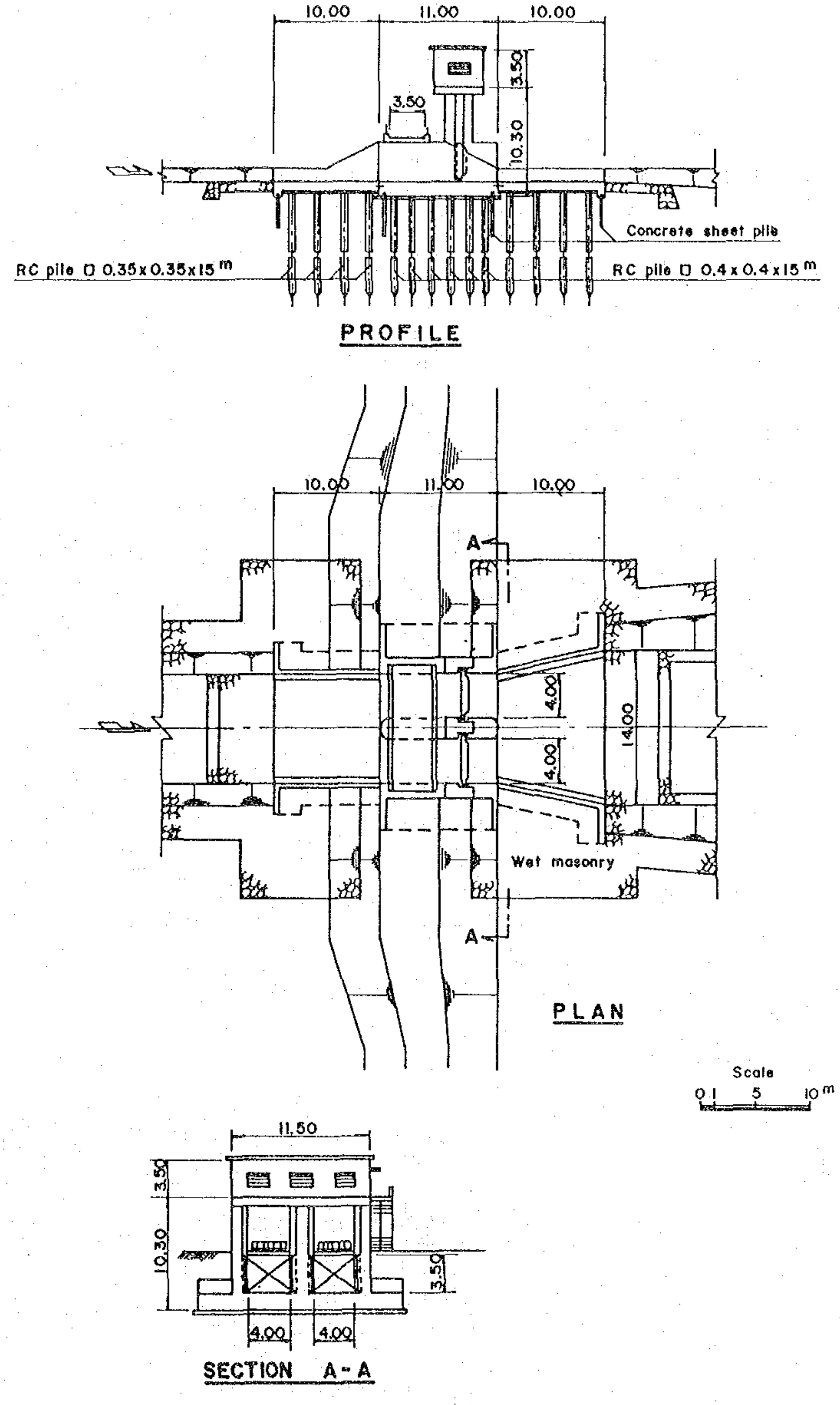


Fig. 4.5.3 PROPOSED DRAINAGE SLUICE IN ULO RETARDING BASIN (4/6)

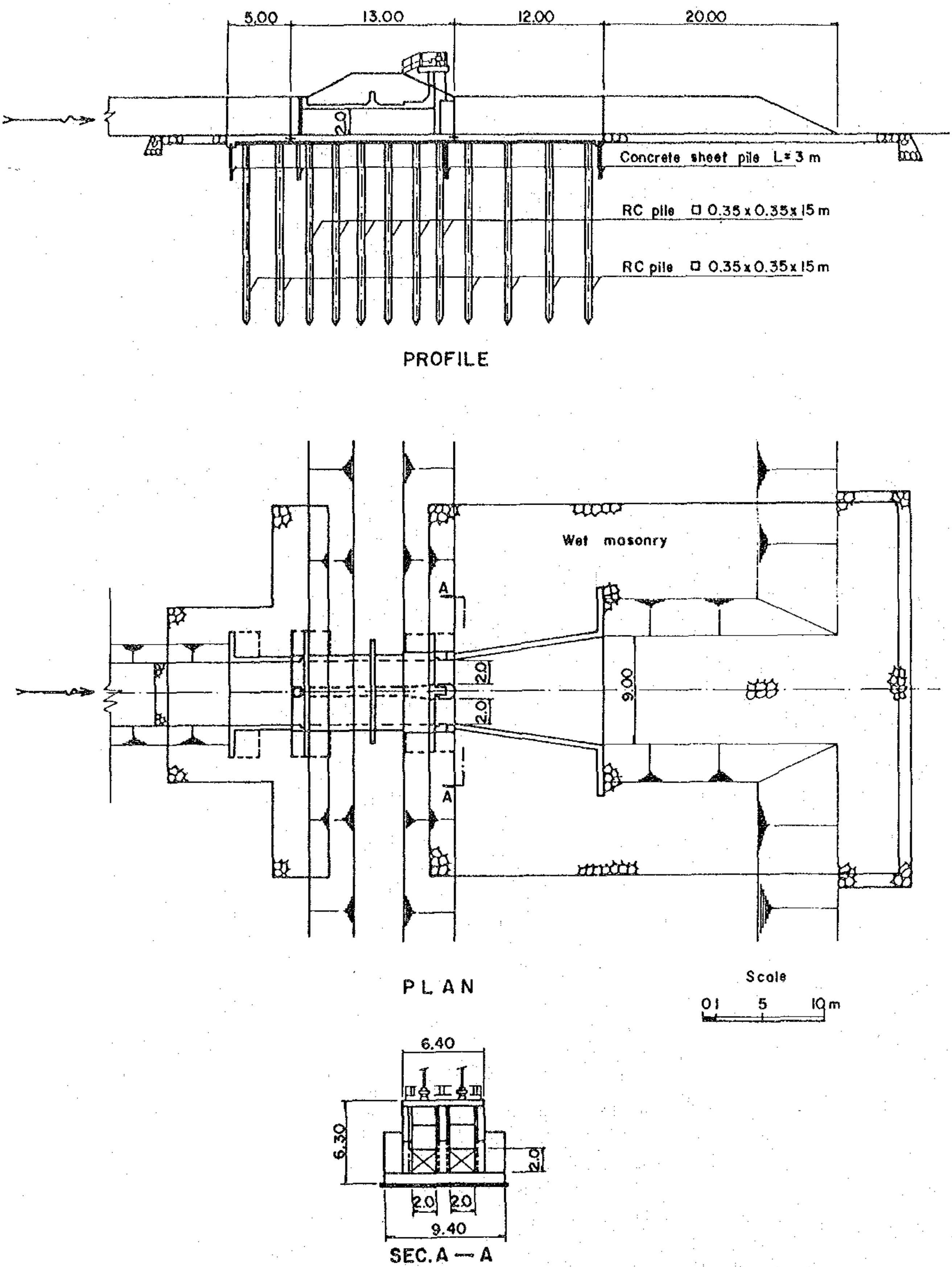
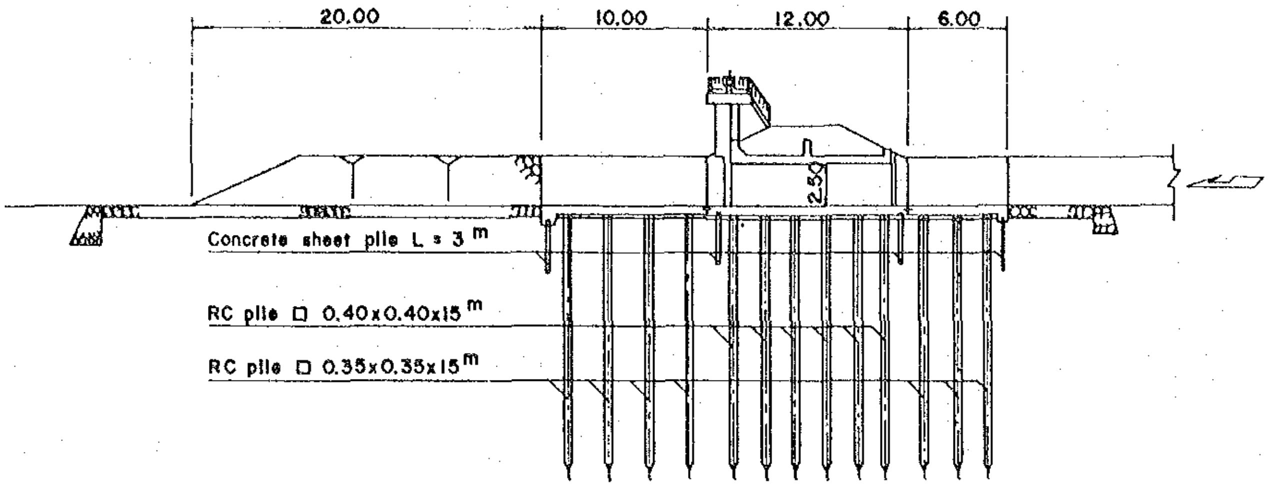
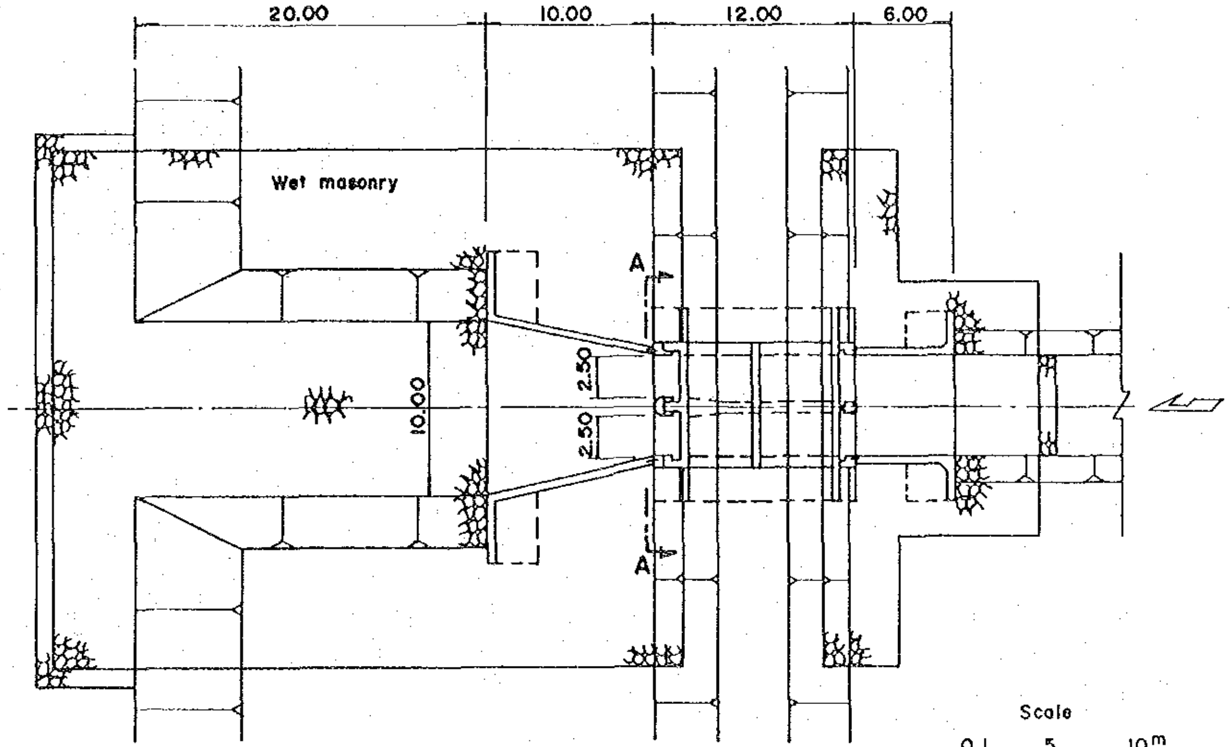


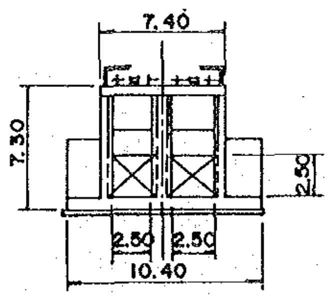
Fig. 4.5.3 PROPOSED DRAINAGE SLUICE IN KEDUNGSOKO RETARDING BASIN (LEFT SIDE) (5/6)



PROFILE



PLAN



SEC. A - A

Fig. 4.5.3 PROPOSED DRAINAGE SLUICE IN KEDUNGSOKO RETARDING BASIN (RIGHT SIDE) (6/6)

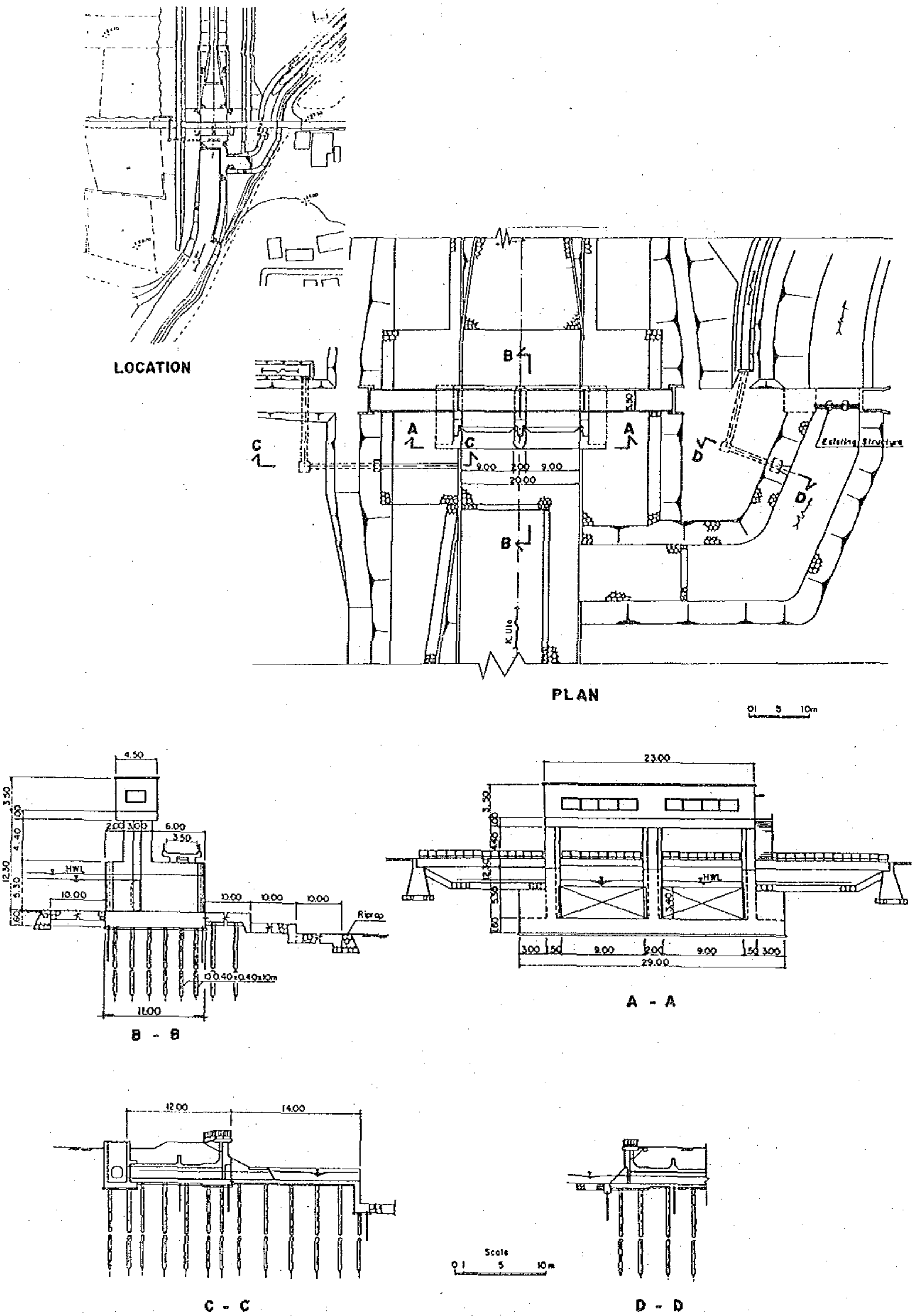


Fig. 4.5.4 PROPOSED TIRIPAN IRRIGATION HEAD WORKS (1/4)

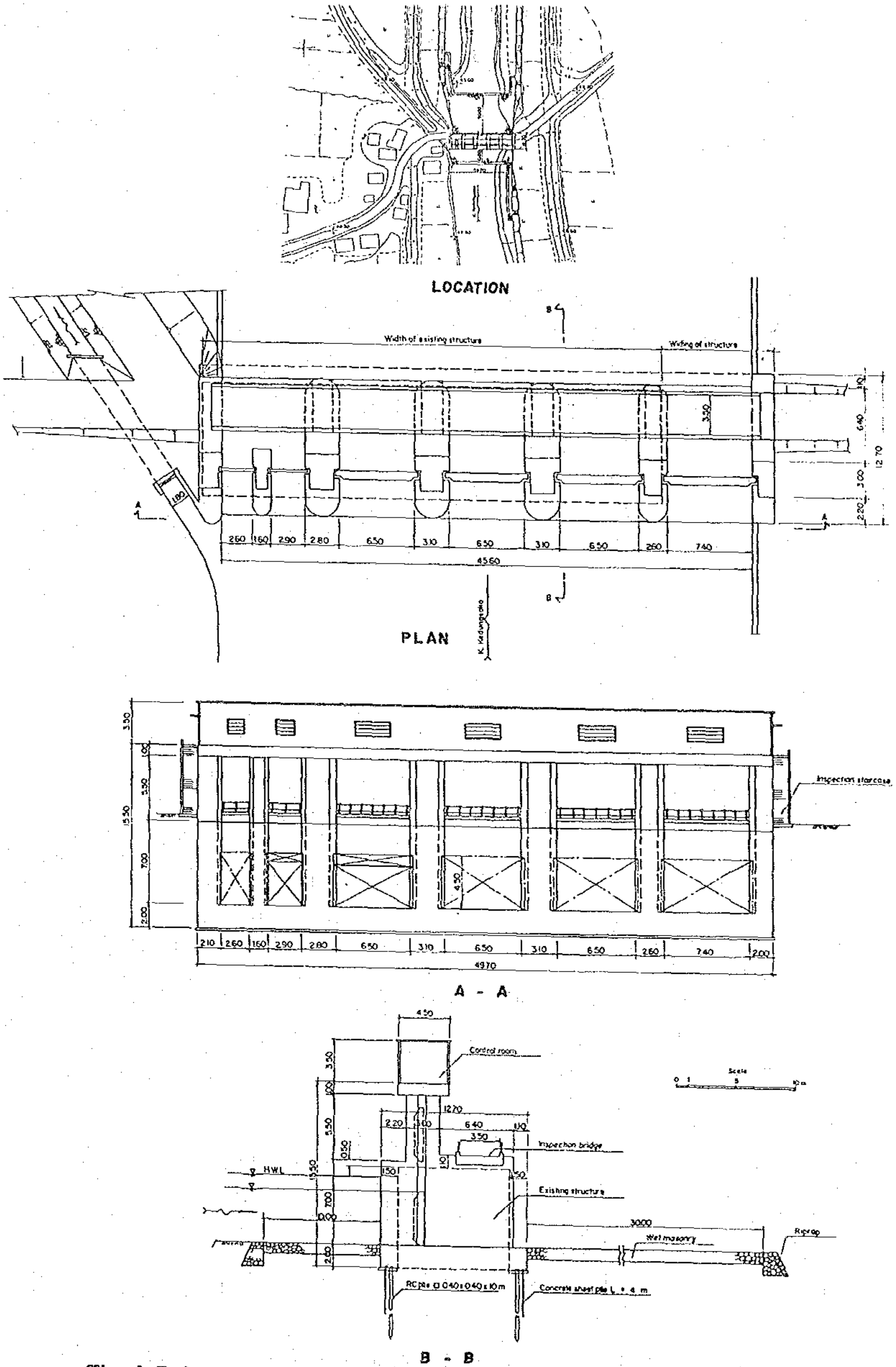


Fig. 4.5.4 PROPOSED MALANGSARI IRRIGATION HEAD WORKS (2/4)

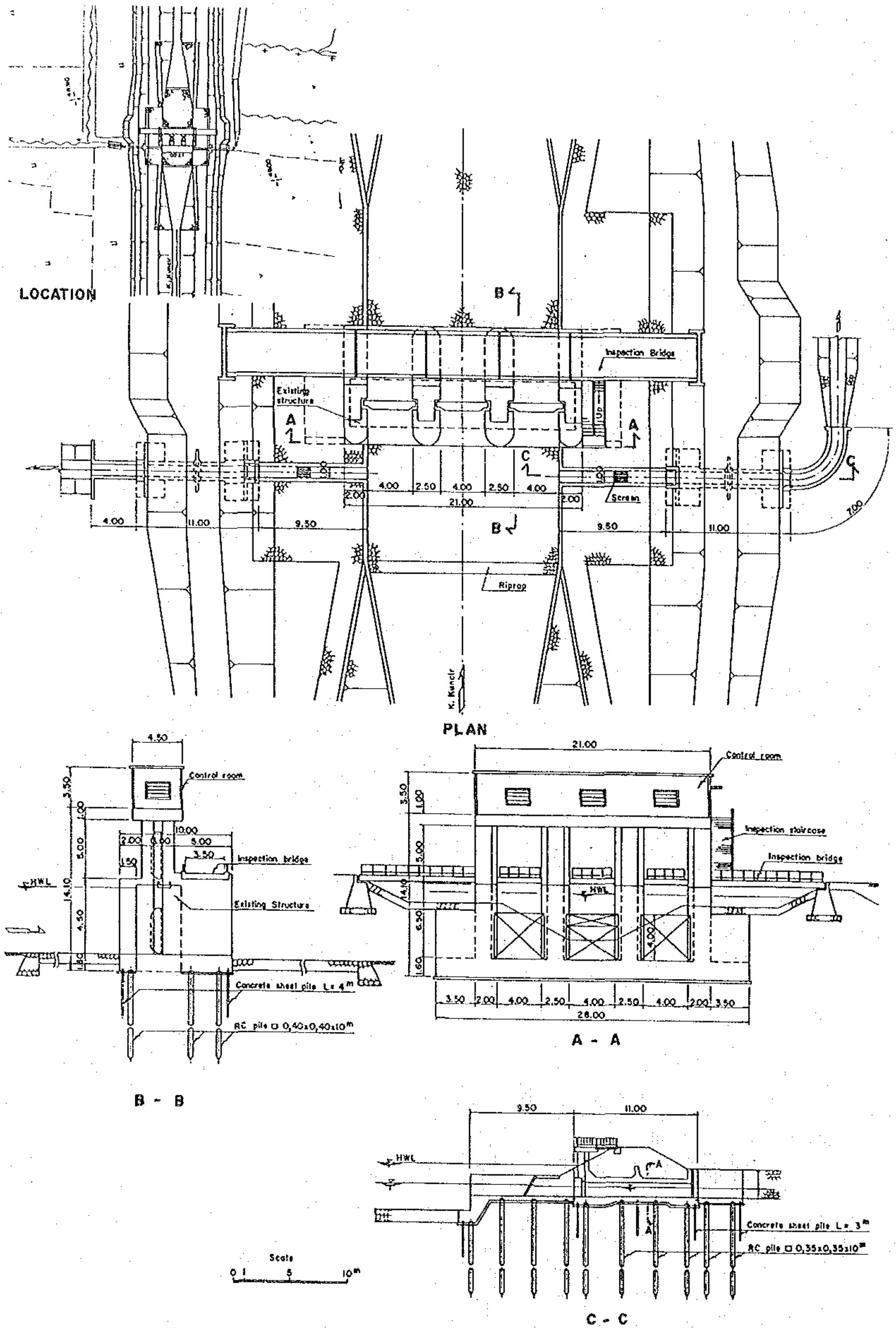


Fig. 4.5.4 PROPOSED KAPAS IRRIGATION HEAD WORKS (3/4)

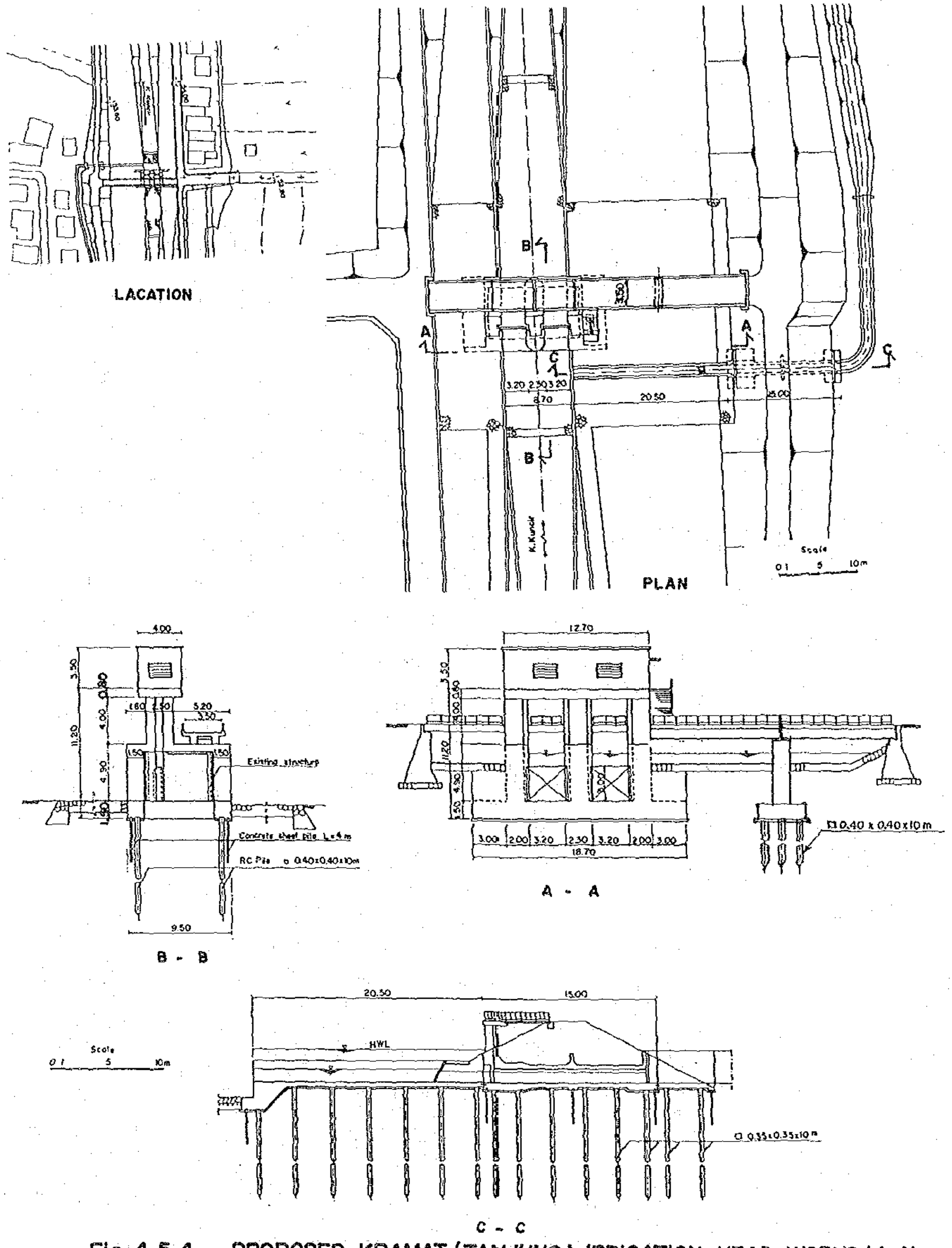


Fig. 4.5.4 PROPOSED KRAMAT (TANJUNG) IRRIGATION HEAD WORKS (4/4)

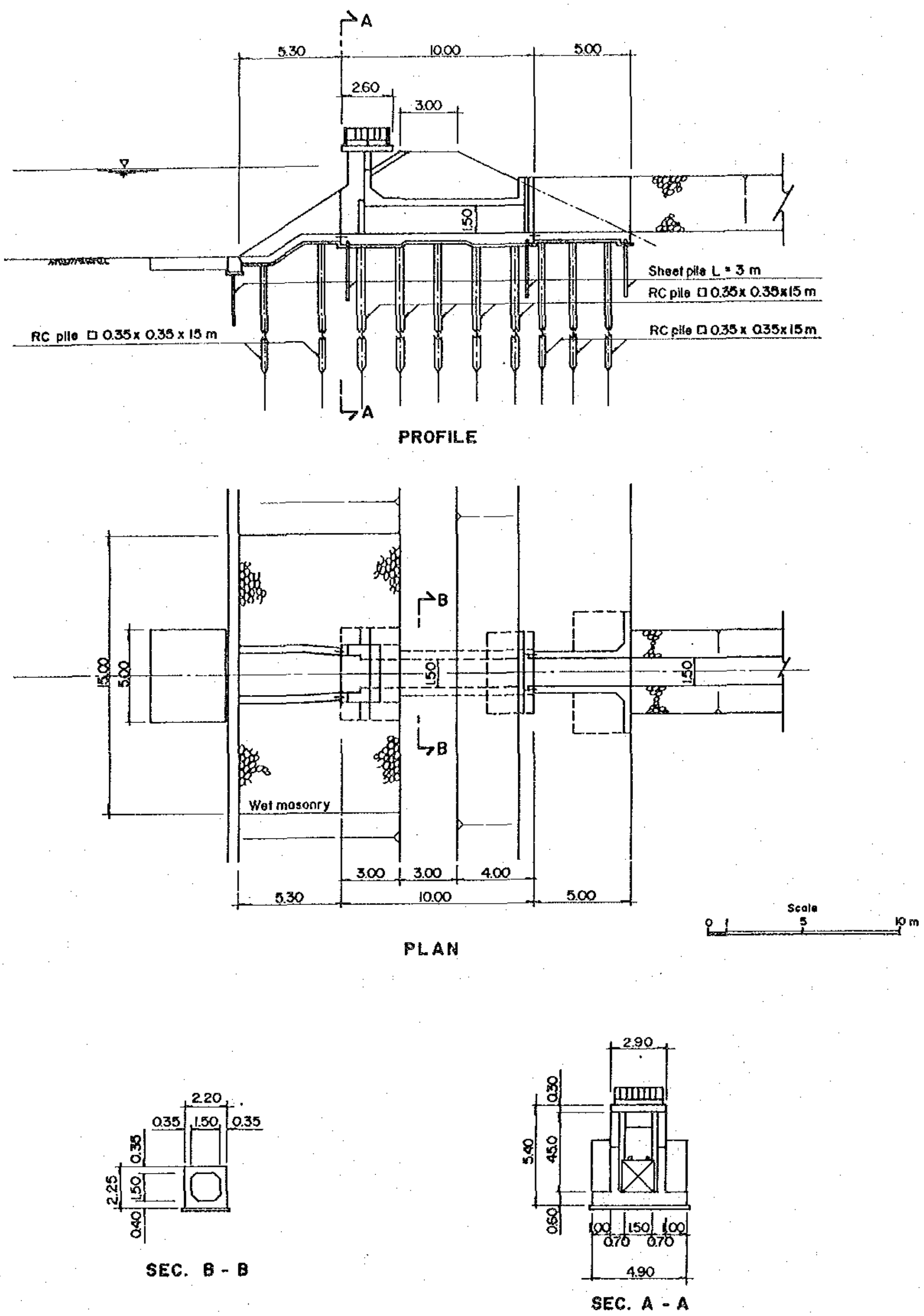


Fig. 4.5.5 STANDARD DESIGN OF DRAINAGE CULVERT TYPE 1 (1/3)

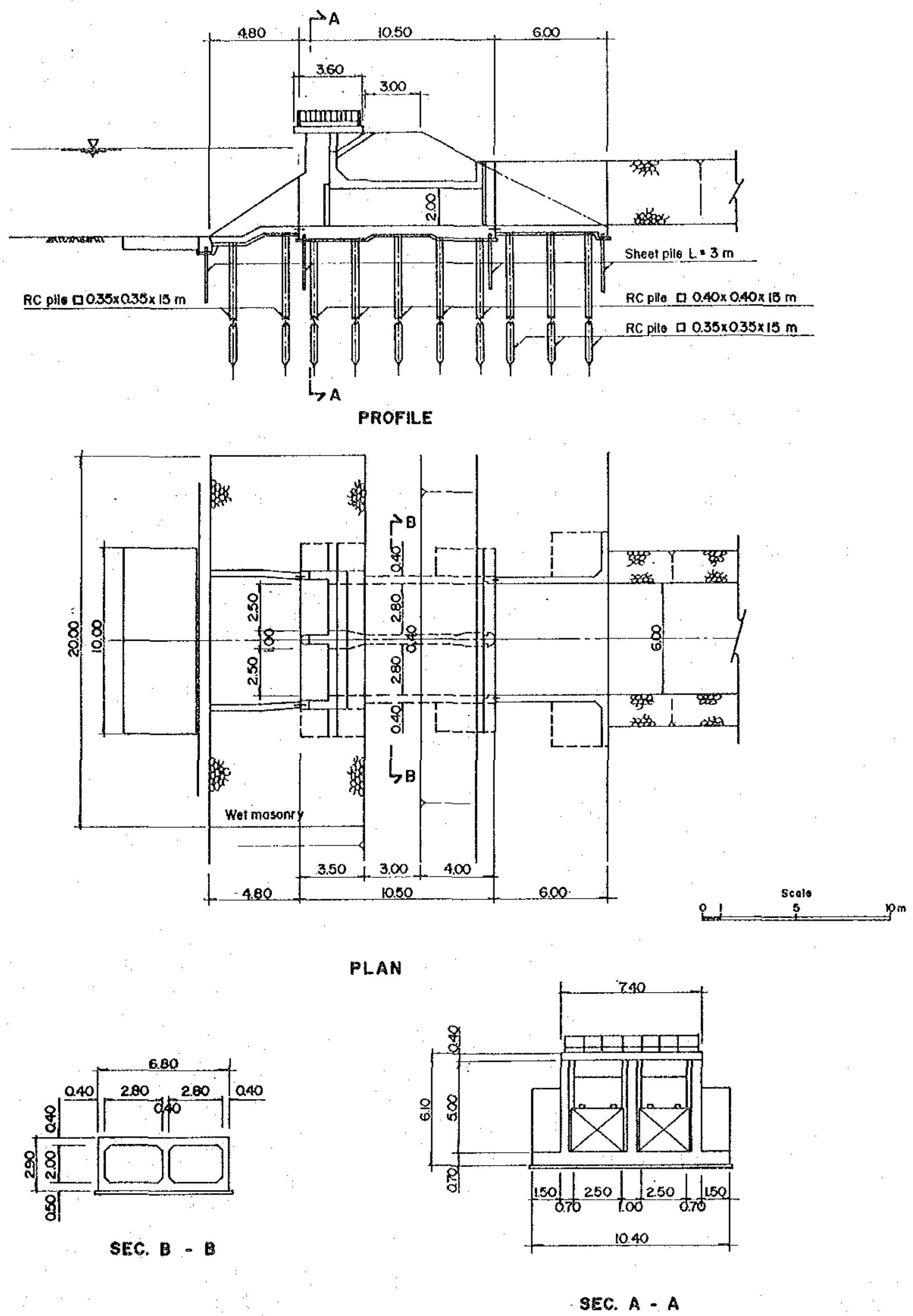


Fig. 4.5.5 STANDARD DESIGN OF DRAINAGE CULVERT TYPE II (2/3)

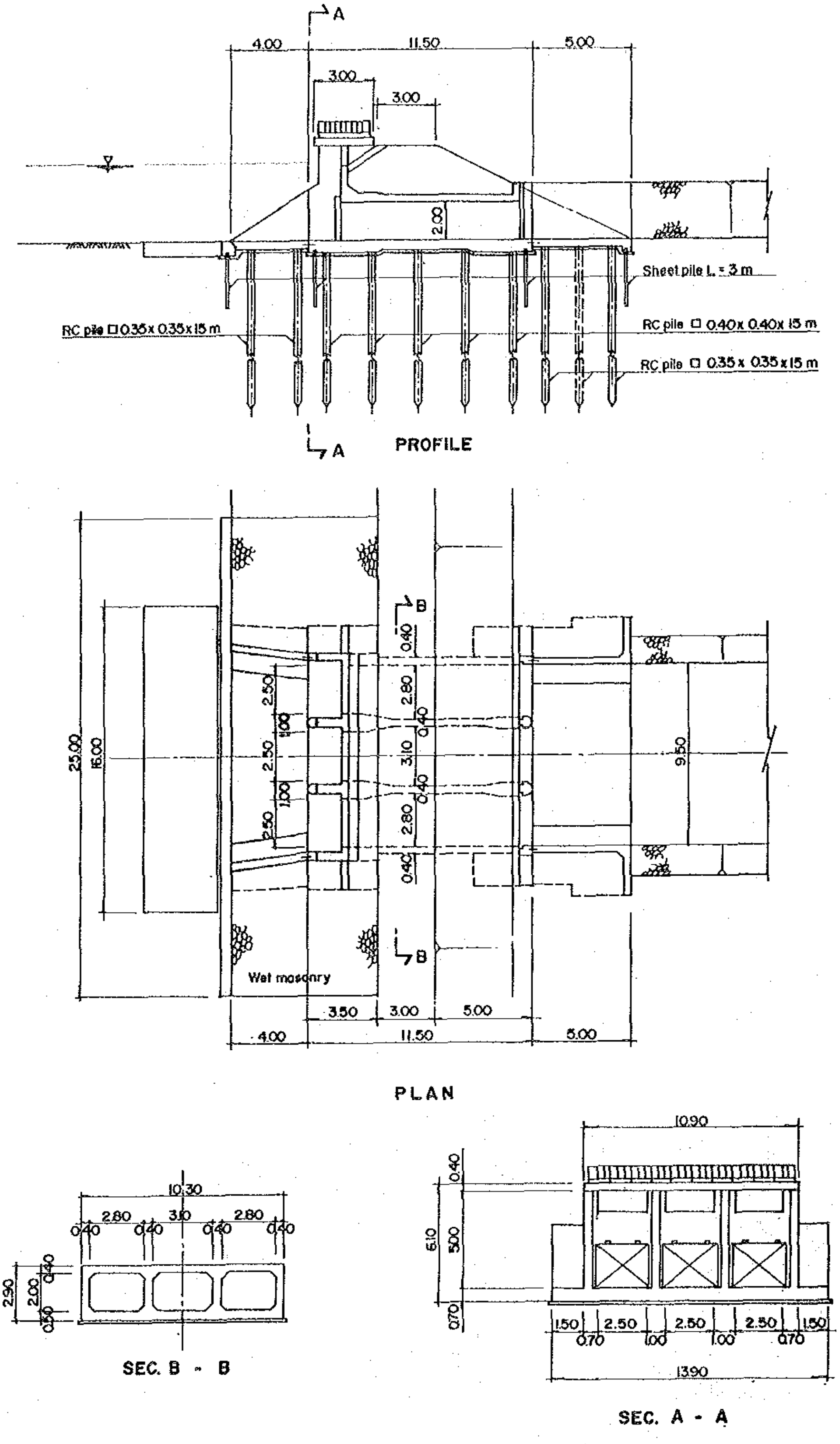


Fig. 4.5.5 STANDARD DESIGN OF DRAINAGE CULVERT TYPE III (3/3)

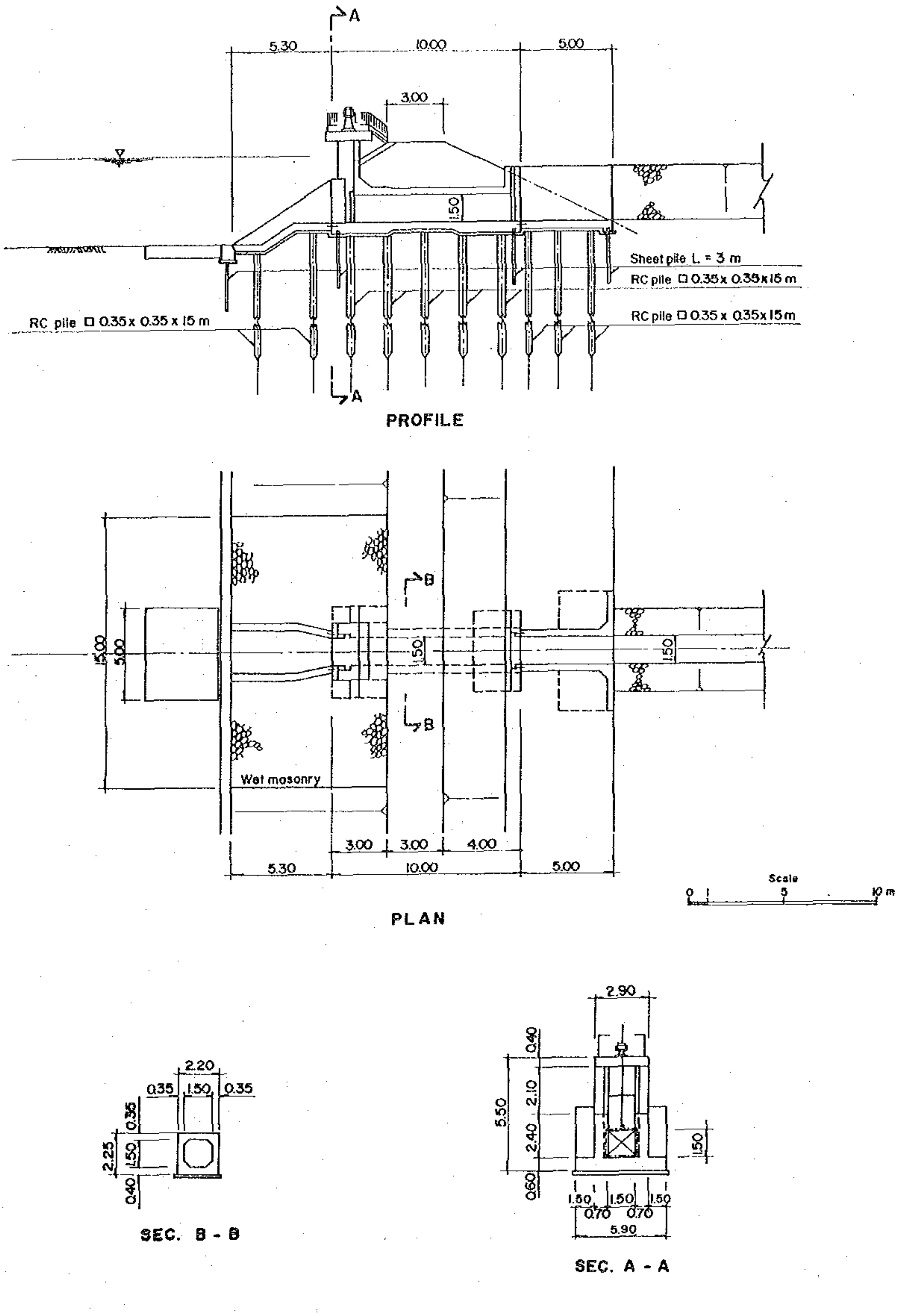
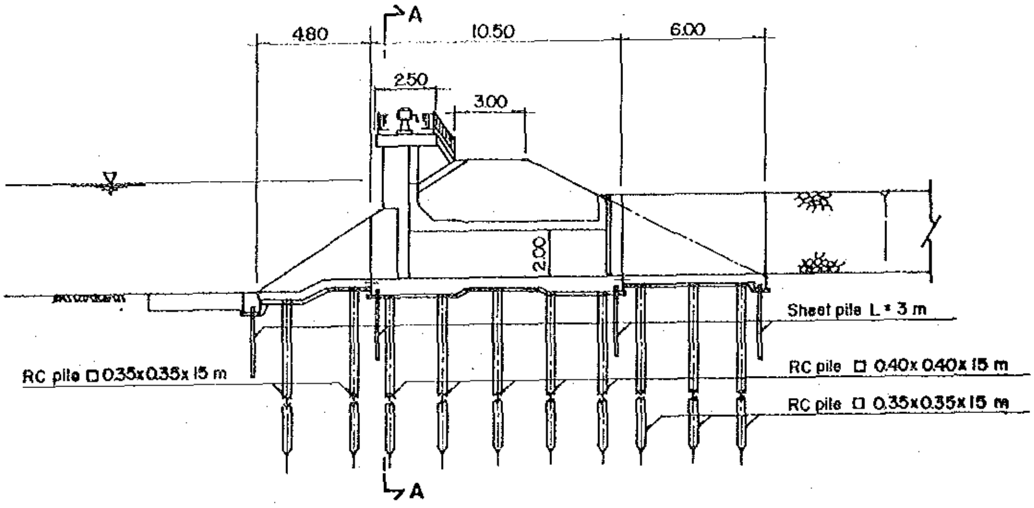
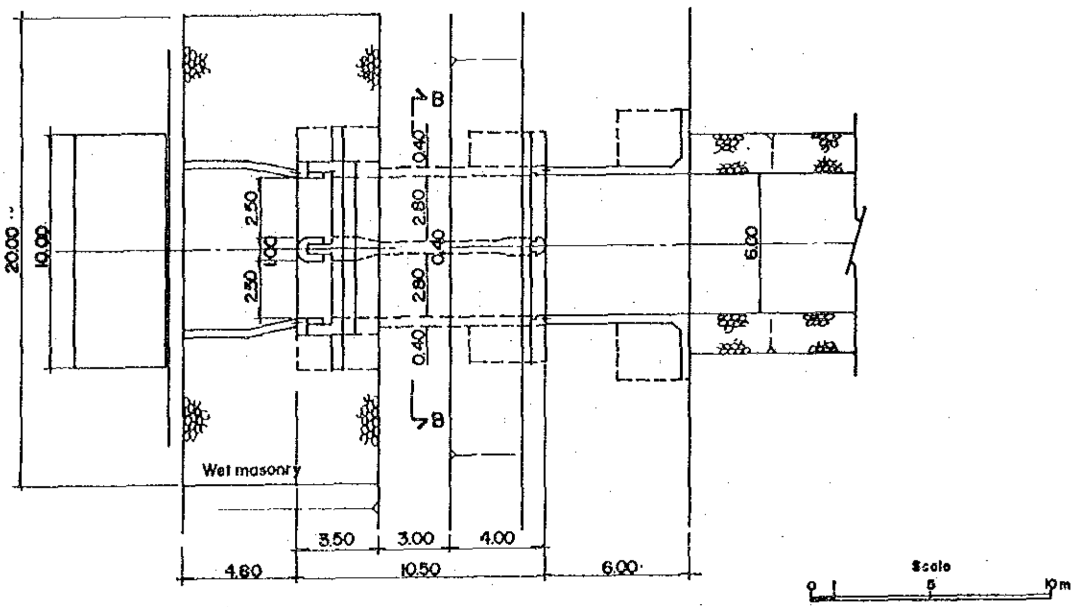


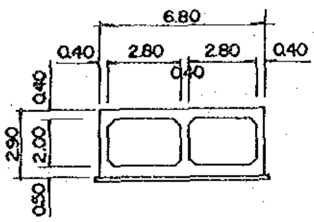
Fig. 4.5.6 STANDARD DESIGN OF INTAKE SLUICE TYPE I (1/2)



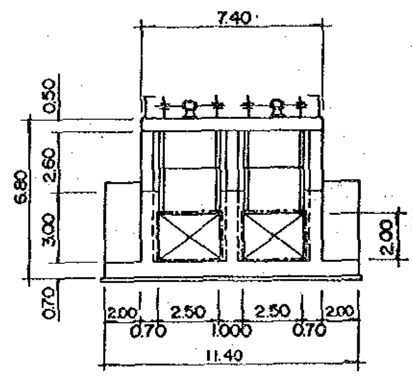
PROFILE



PLAN

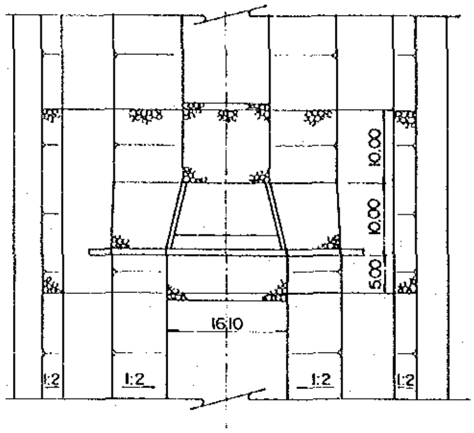


SEC. B - B

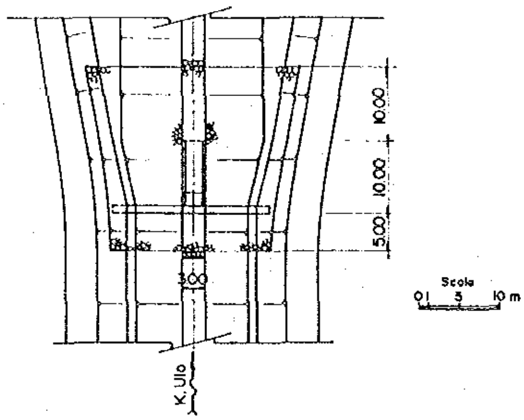


SEC. A - A

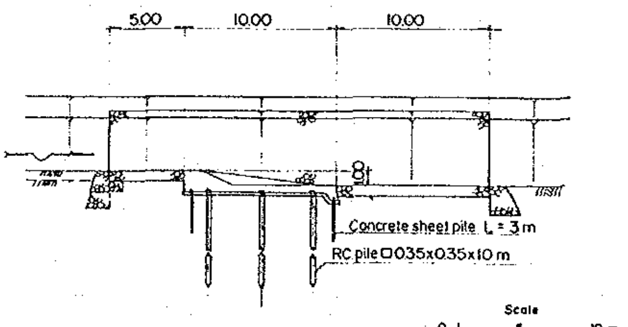
Fig. 4.5.6 STANDARD DESIGN OF INTAKE SLUICE TYPE II (2/2)



NEW DIVERSION CHANNEL

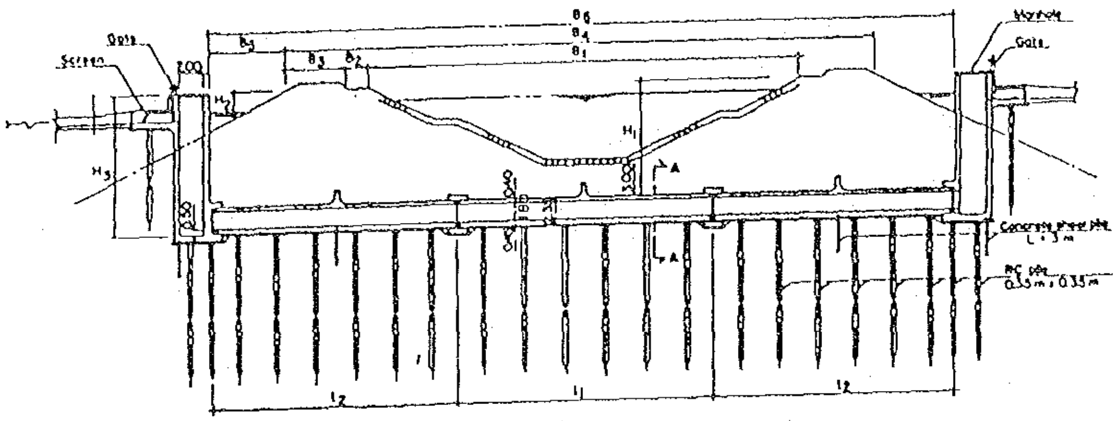


LOWER ULO

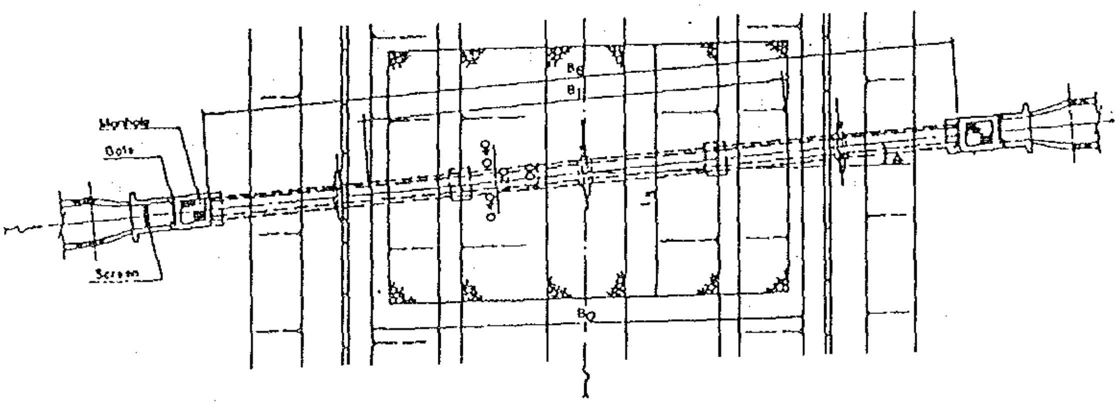


PROFILE

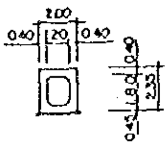
Fig. 4.5.7 STANDARD DESIGN OF DROP STRUCTURE



PROFILE



PLAN



SECTION. A - A

Location	B_0	θ	B_1	B_2	B_3	B_4	B_5	B_6
New Diversion channel	40 m	27°	44.89 m	5.05 m	6.17 m	67.5 m	2.24	71.8 m
Lower Ule	25	27°	28.06	0	4.49	370	7.18	51.4
Kunclr	40	20°	42.57	0	3.19	490	6.81	62.6

H_1	H_2	H_3	l_1	l_2	l_3	Pile length	Sec Φ	Remarks
6.0 m	0.5 m	11.70 m	24.0 m	24.0 m	4.0 m	10 m	11.223	2 Sites
4.5	1.8	10.20	17.0	17.2	3.5	10	11.223	
4.8	1.8	10.50	22.0	20.3	3.5	10	10.642	

Fig. 4.5.8 STANDARD DESIGN OF SYPHON

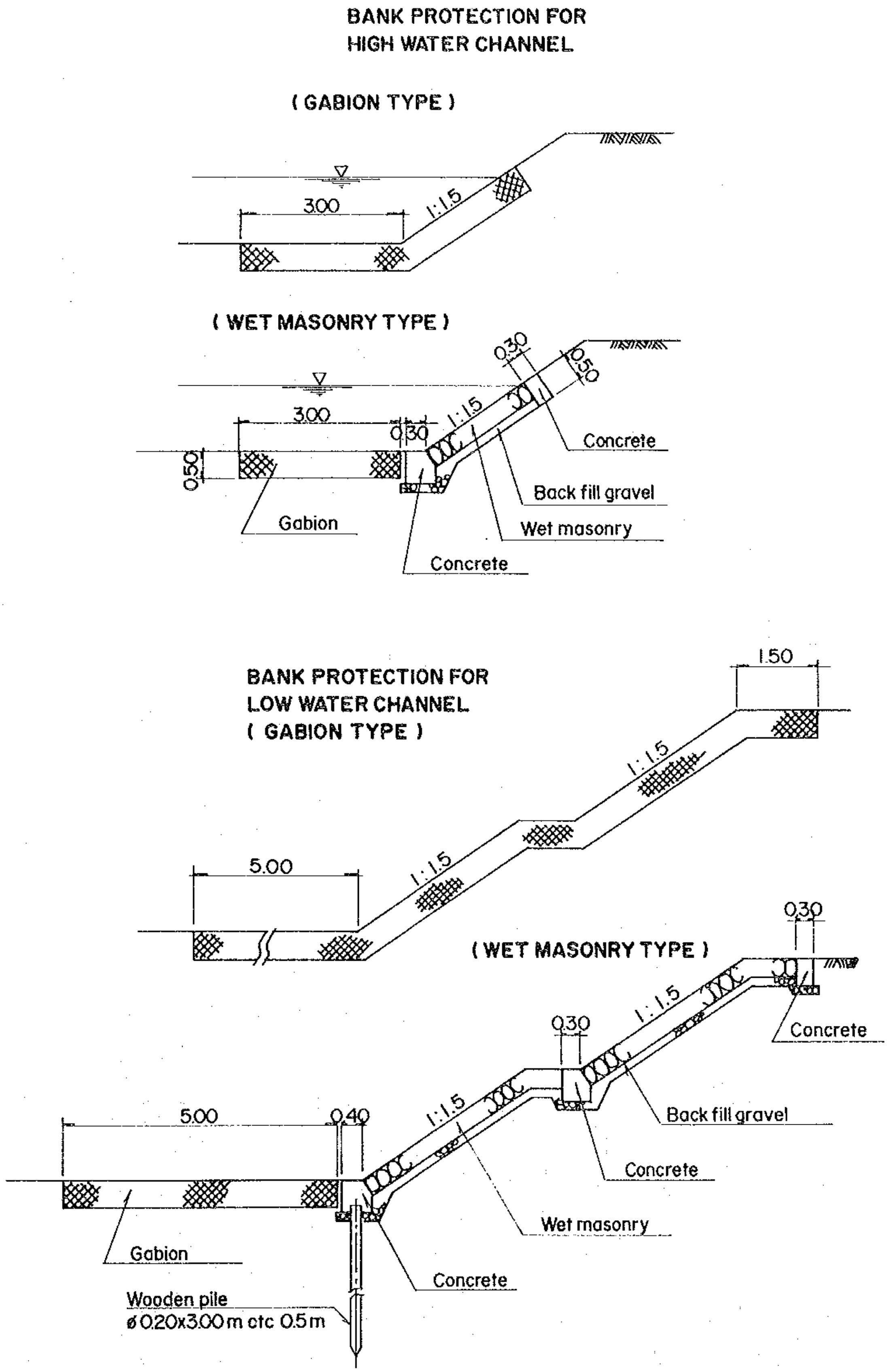


Fig.4.5.9 STANDARD DESIGN OF BANK PROTECTION

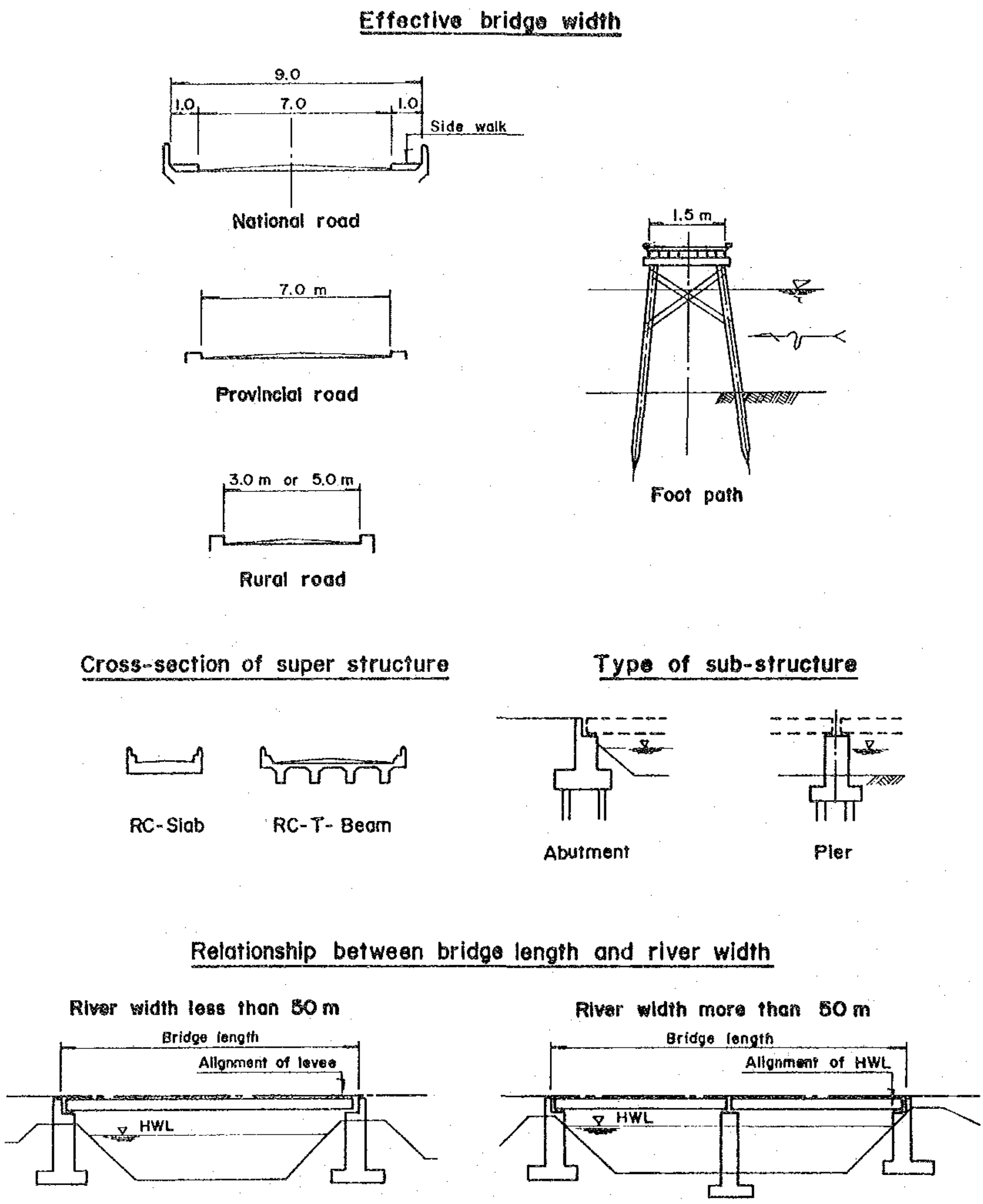


Fig. 4.5.10 CLASSIFICATION OF BRIDGES TO BE PLANNED

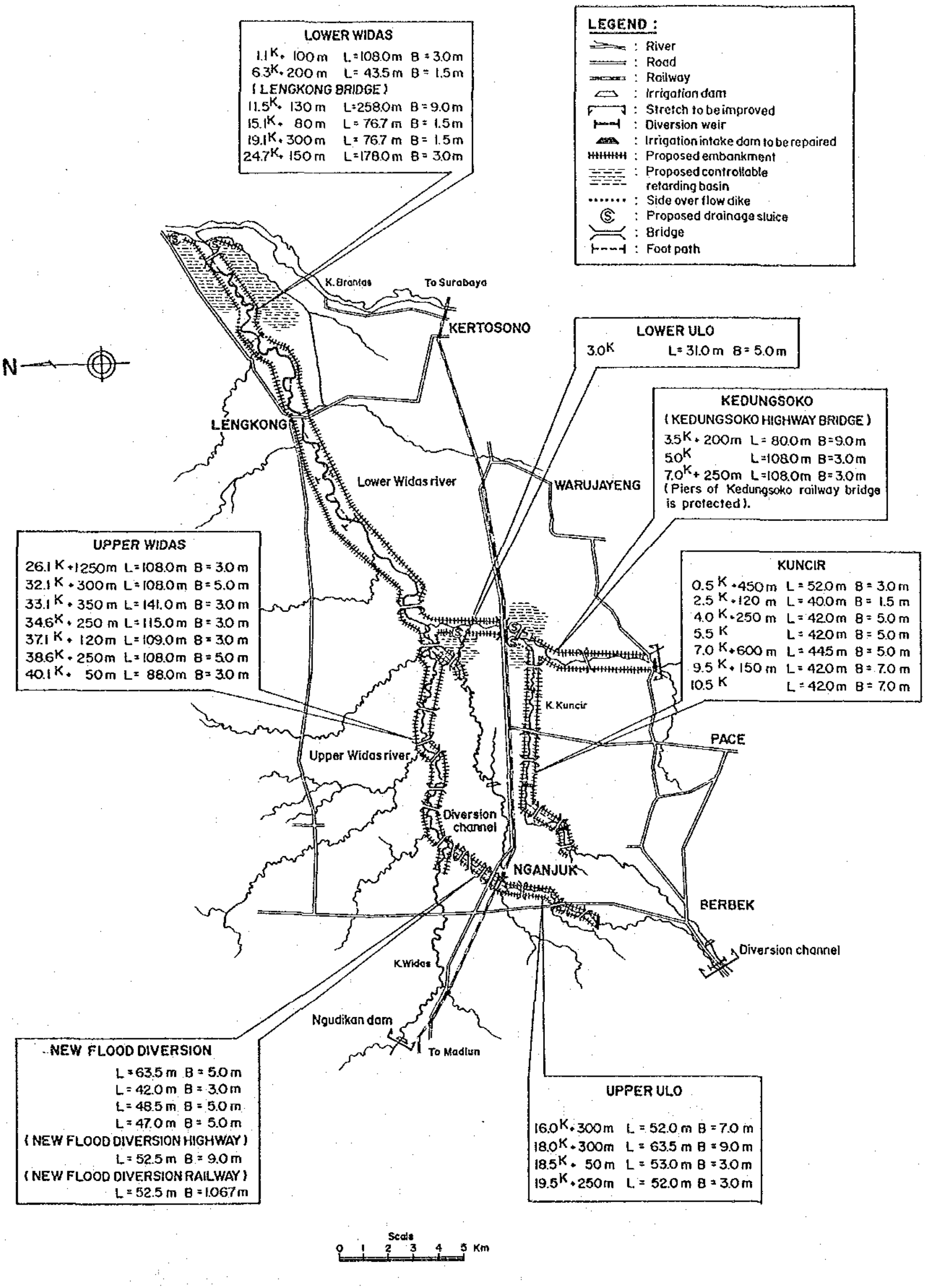


Fig. 4.5.11 OUTLINE OF PROPOSED BRIDGES OF COMPREHENSIVE PLAN

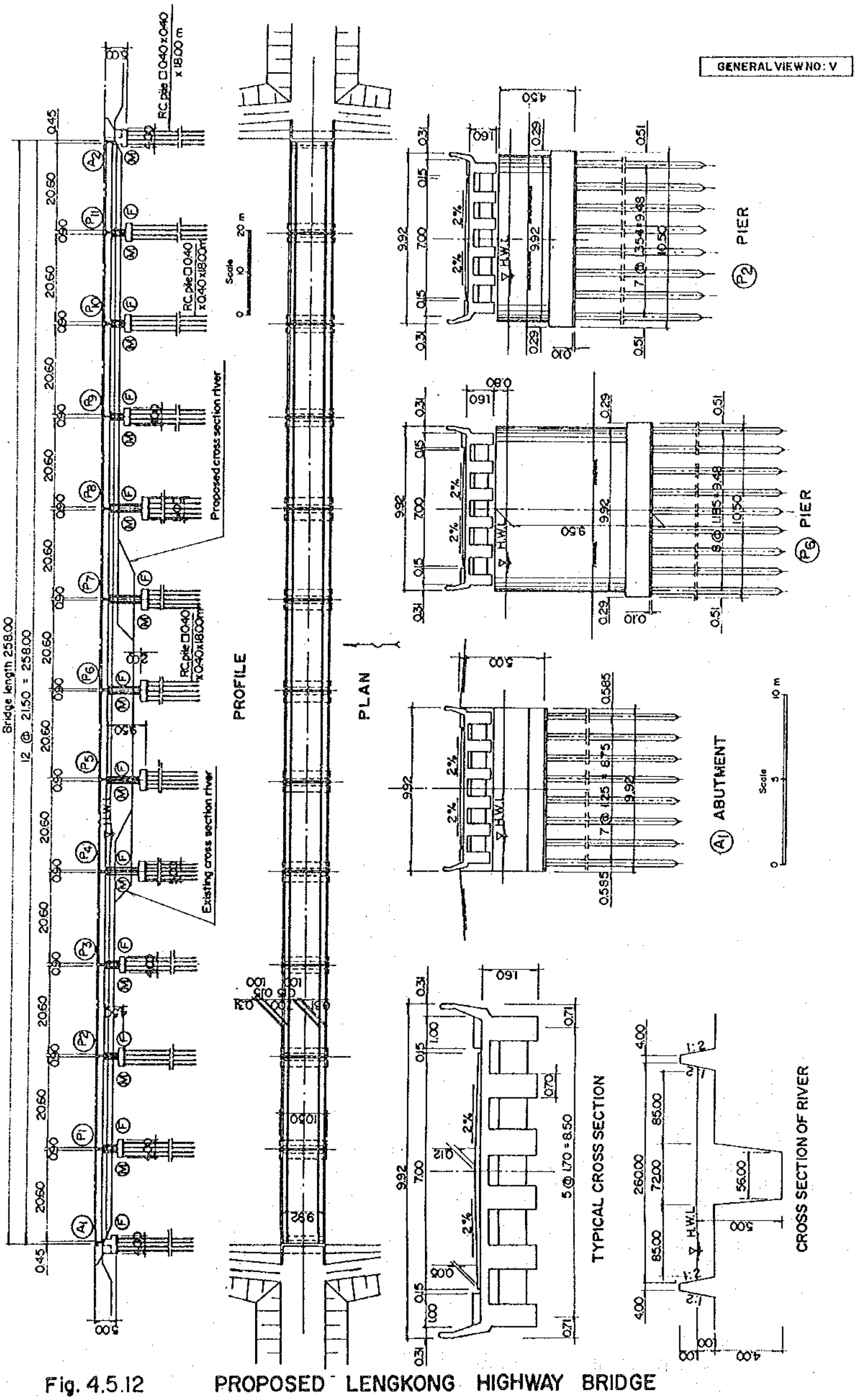


Fig. 4.5.12 PROPOSED LENGKONG HIGHWAY BRIDGE

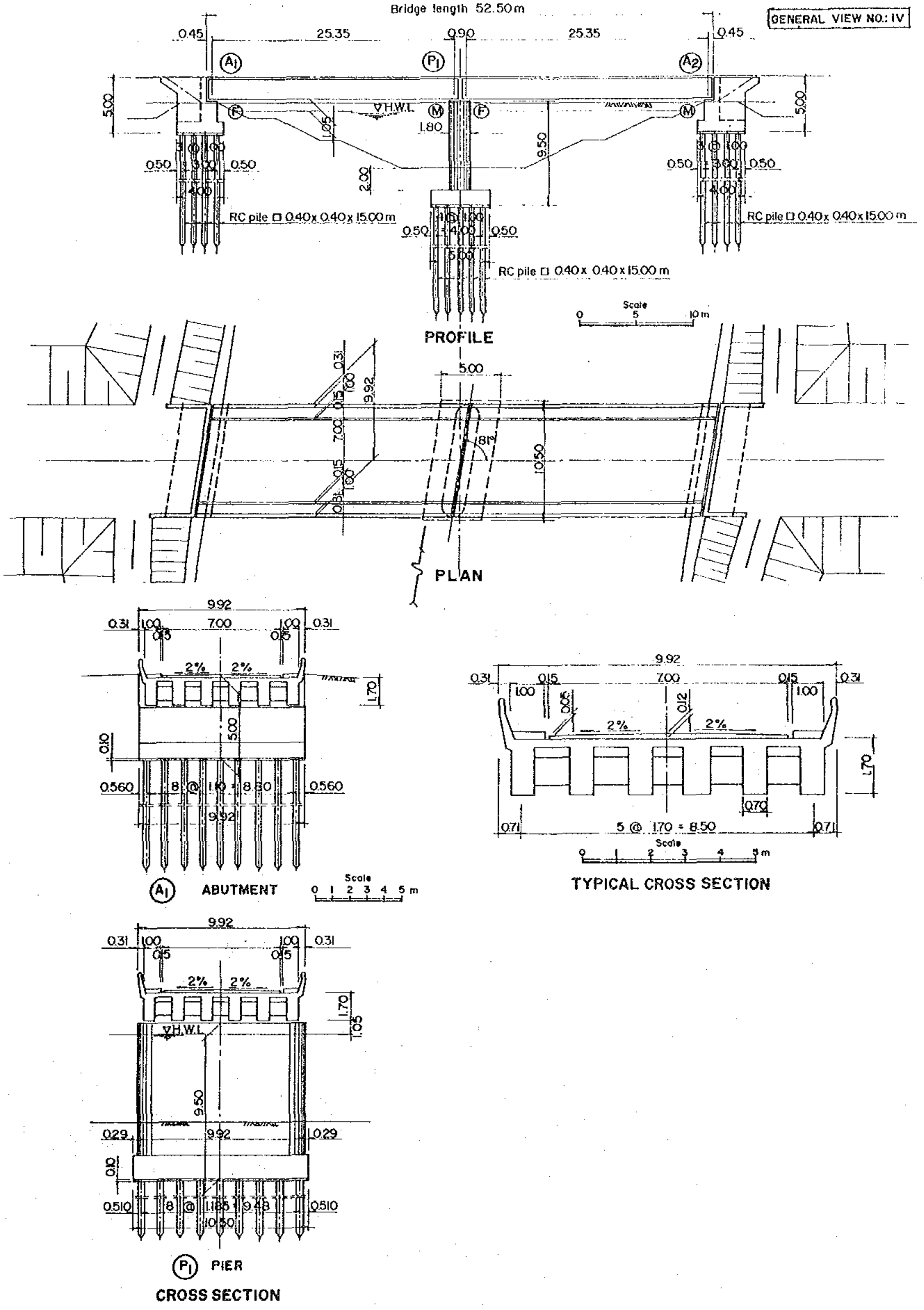


Fig. 4.5.13 PROPOSED HIGHWAY BRIDGE AT DIVERSION CHANNEL

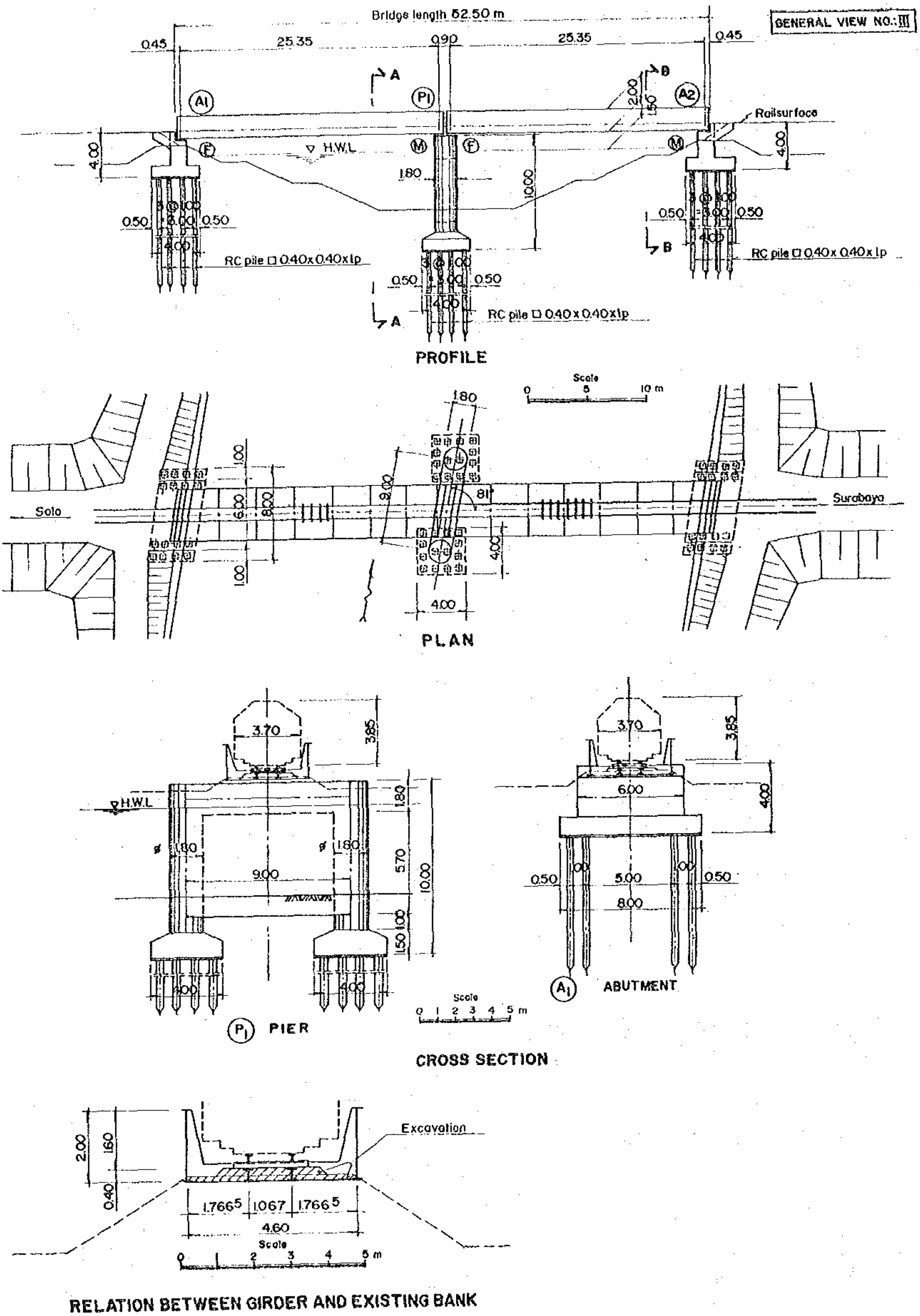


Fig. 4.5.14 PROPOSED RAILWAY BRIDGE AT DIVERSION CHANNEL

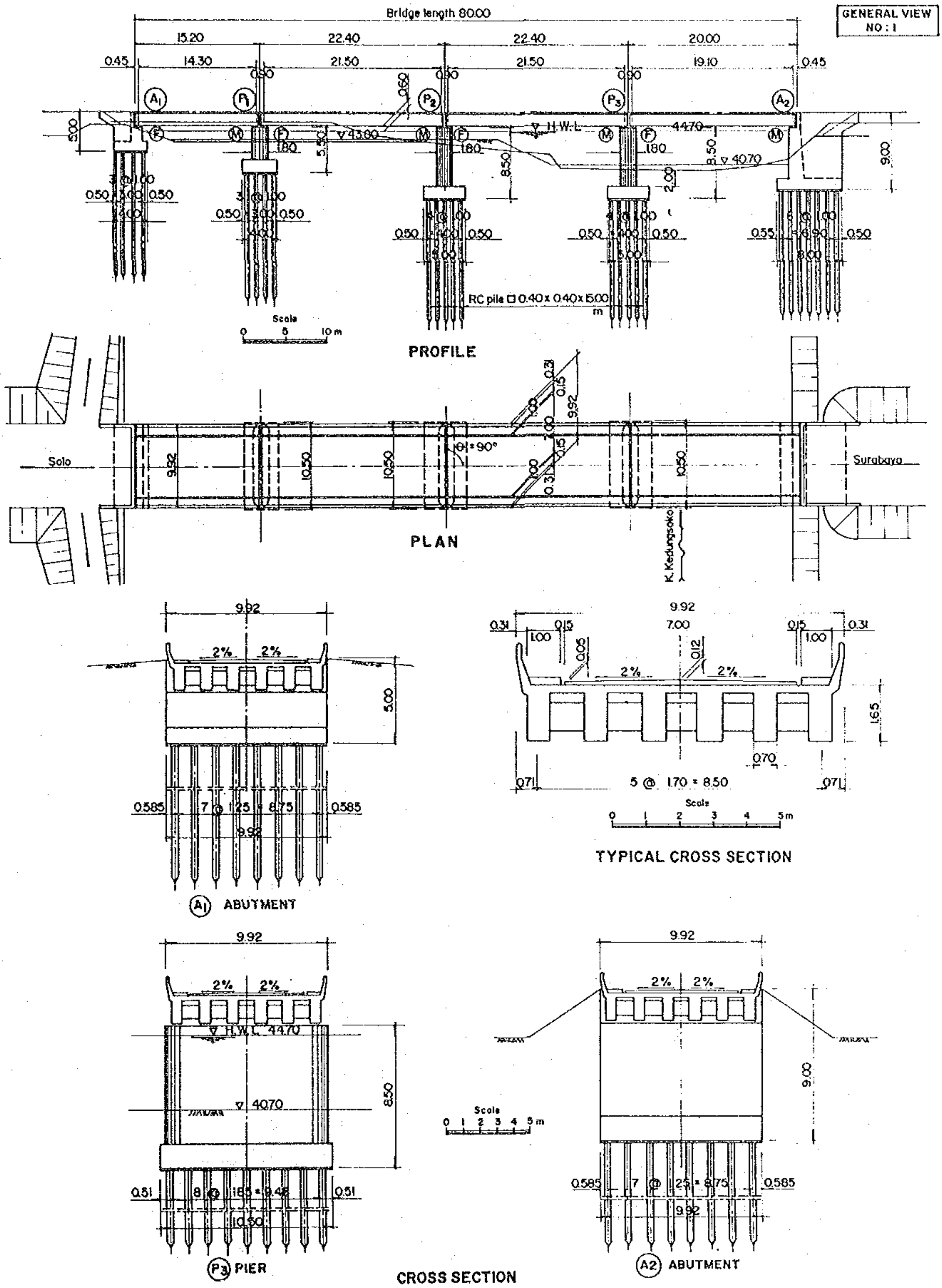
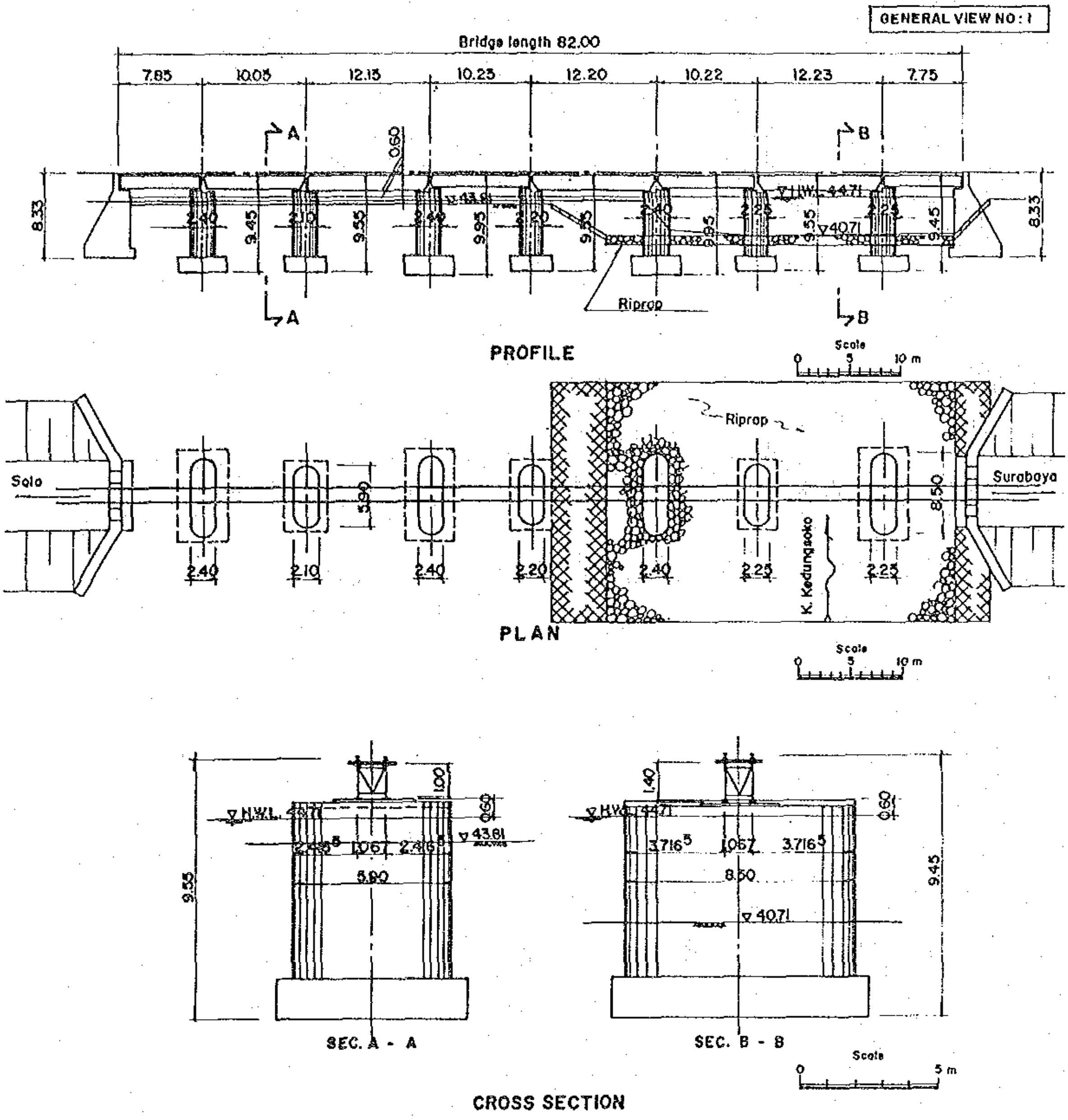


Fig. 4.5.15 PROPOSED KEDUNGSOKO HIGHWAY BRIDGE



Note: Base structure is based on data collected at PJKA office and data obtained from Warujayeng Project.

Fig. 4.5.16 PIER PROTECTION OF EXISTING KEDUNGSOKO RAILWAY BRIDGE

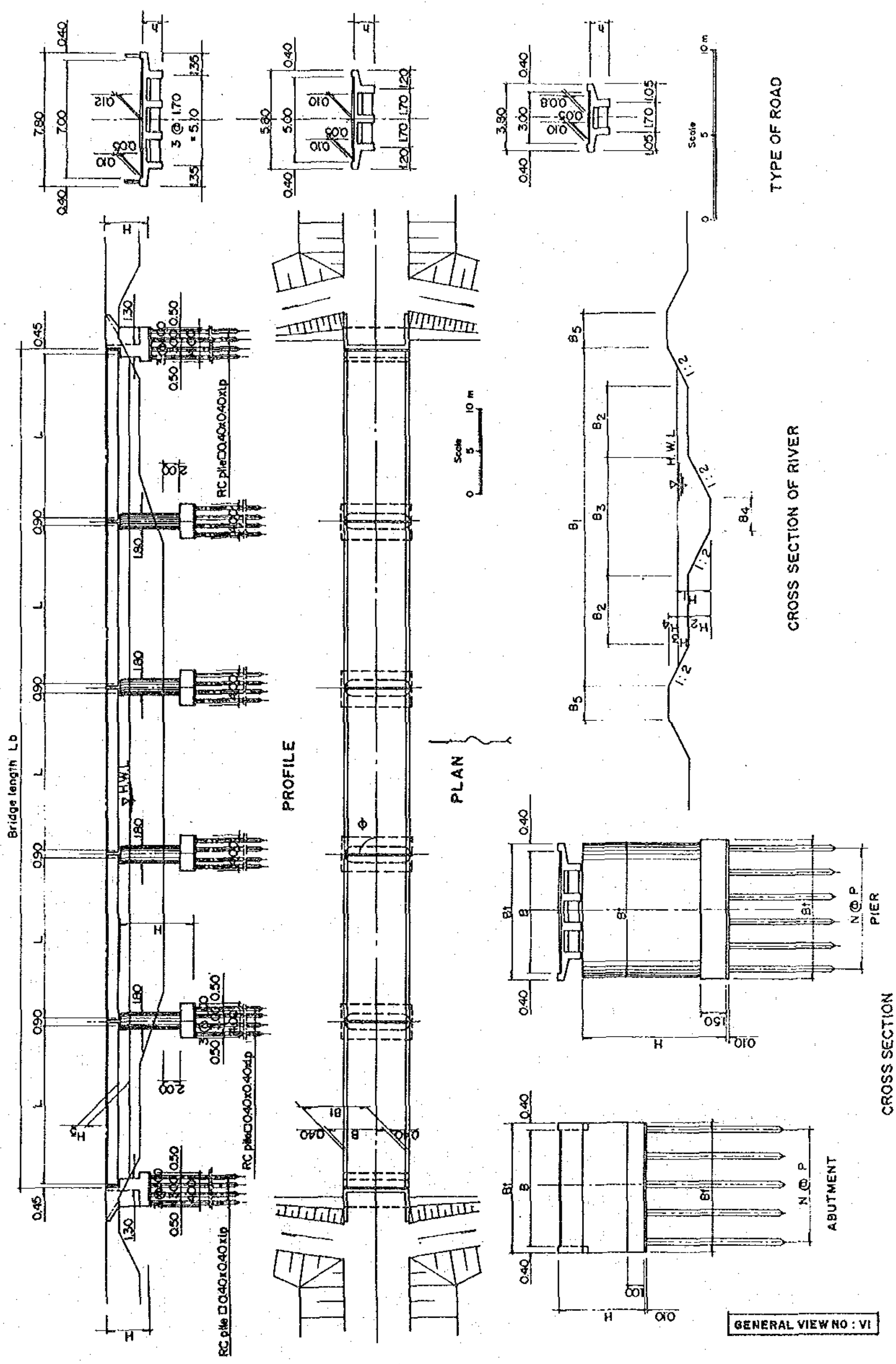


Fig. 4.5.17 STANDARD DESIGN OF BRIDGE (1/4)

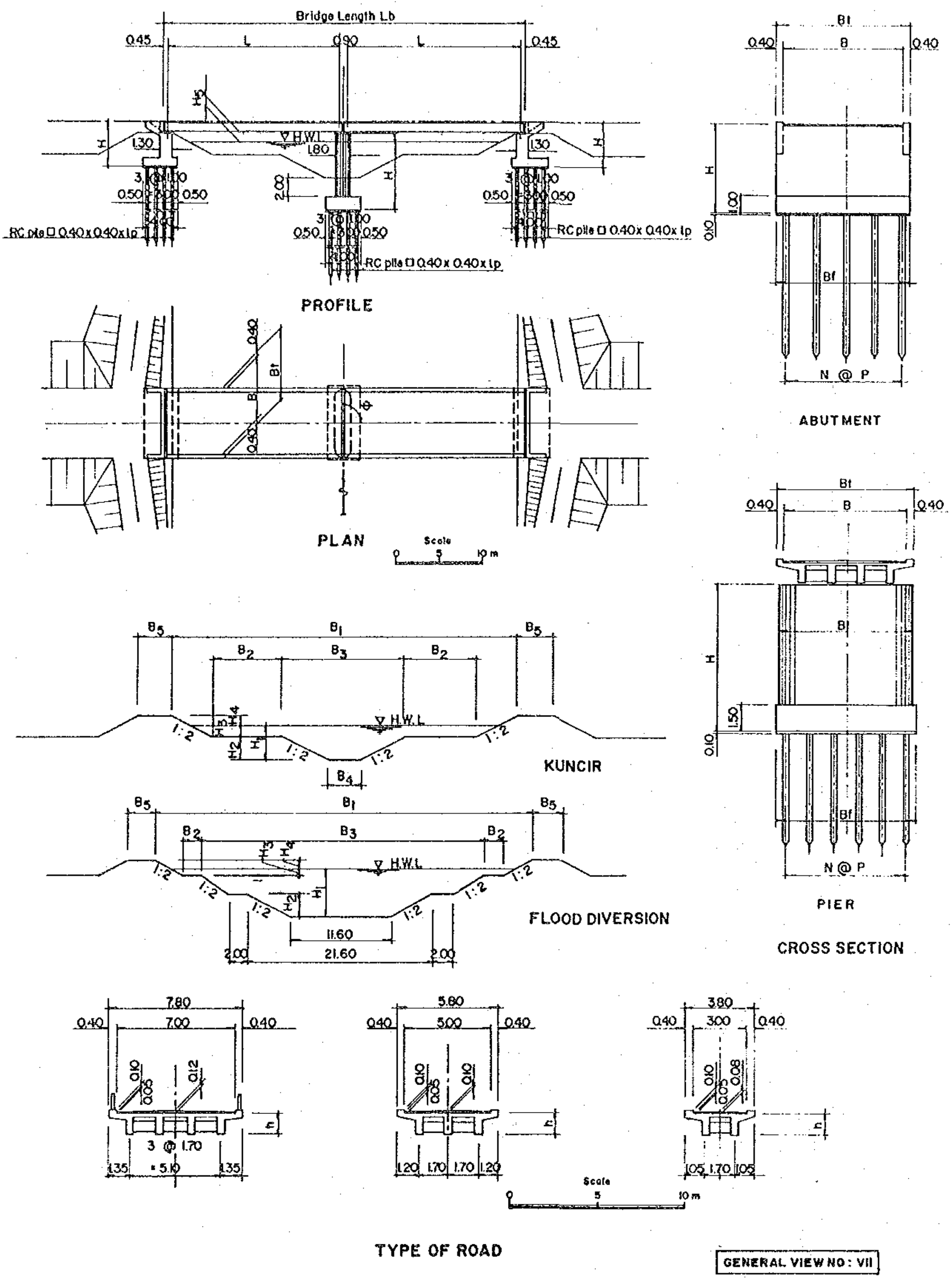


Fig. 4.5.17 STANDARD DESIGN OF BRIDGE (2/4)

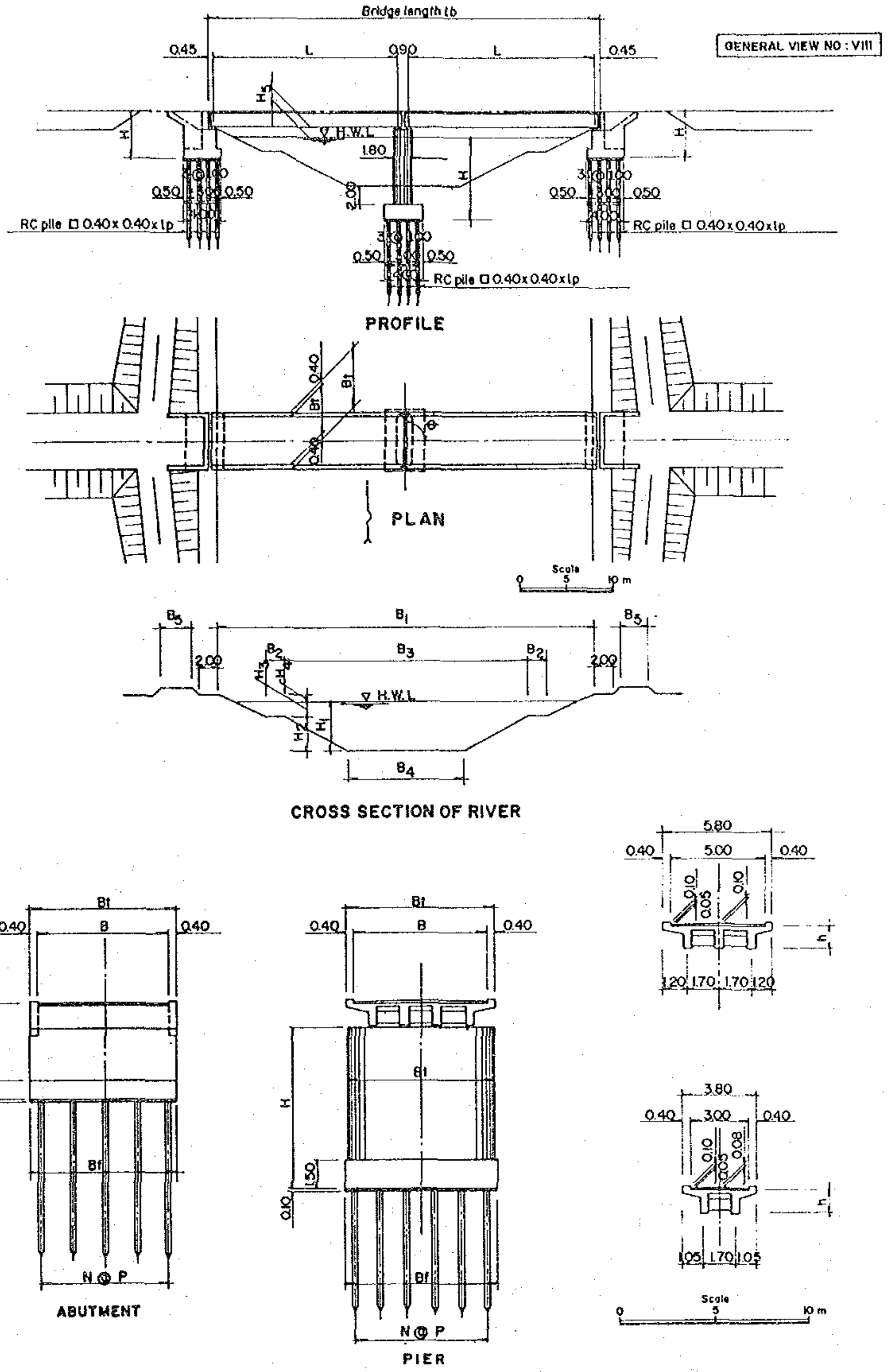


Fig. 4.5.17 STANDARD DESIGN OF BRIDGE (3/4)

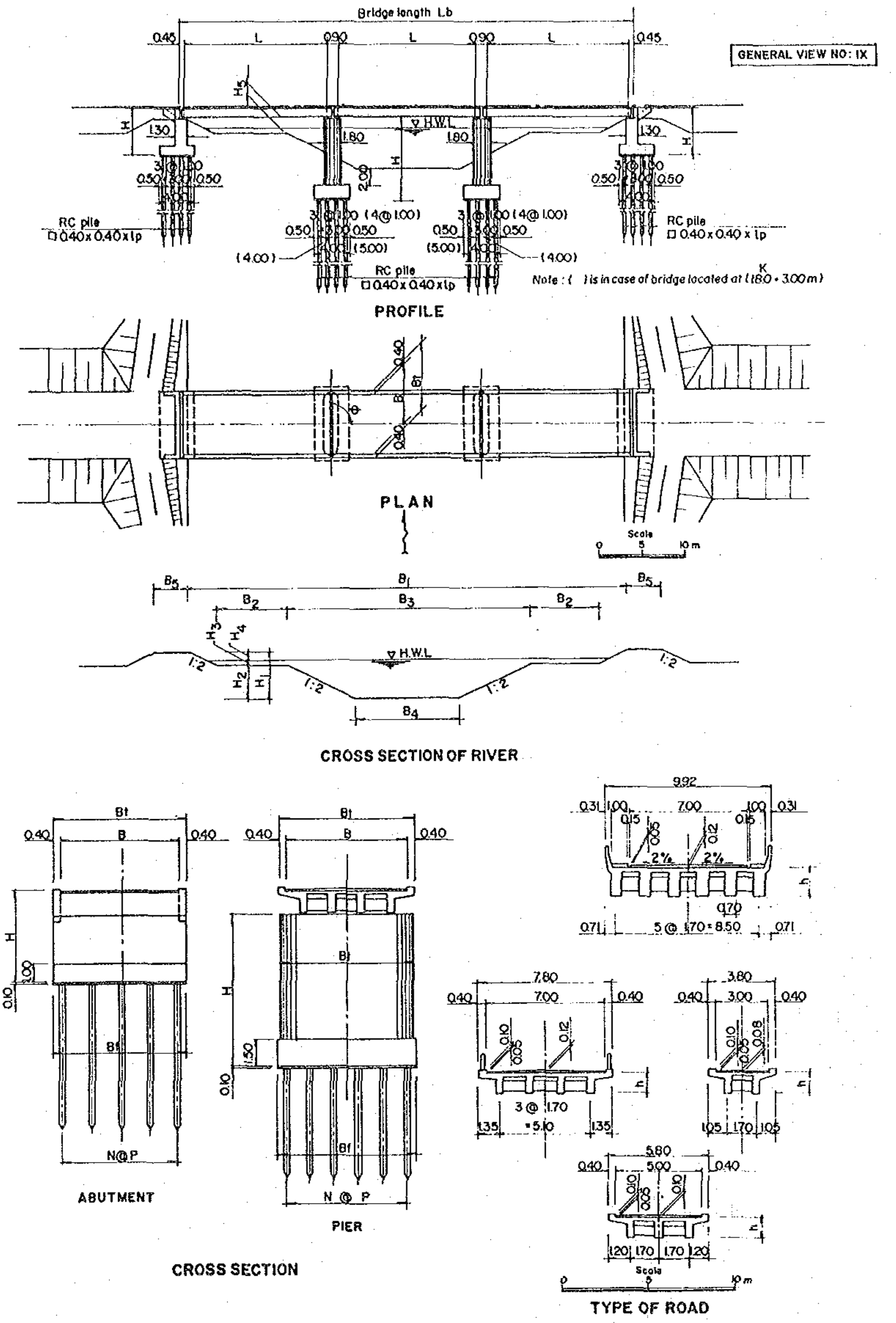


Fig. 4.5.17 STANDARD DESIGN OF BRIDGE (4/4)

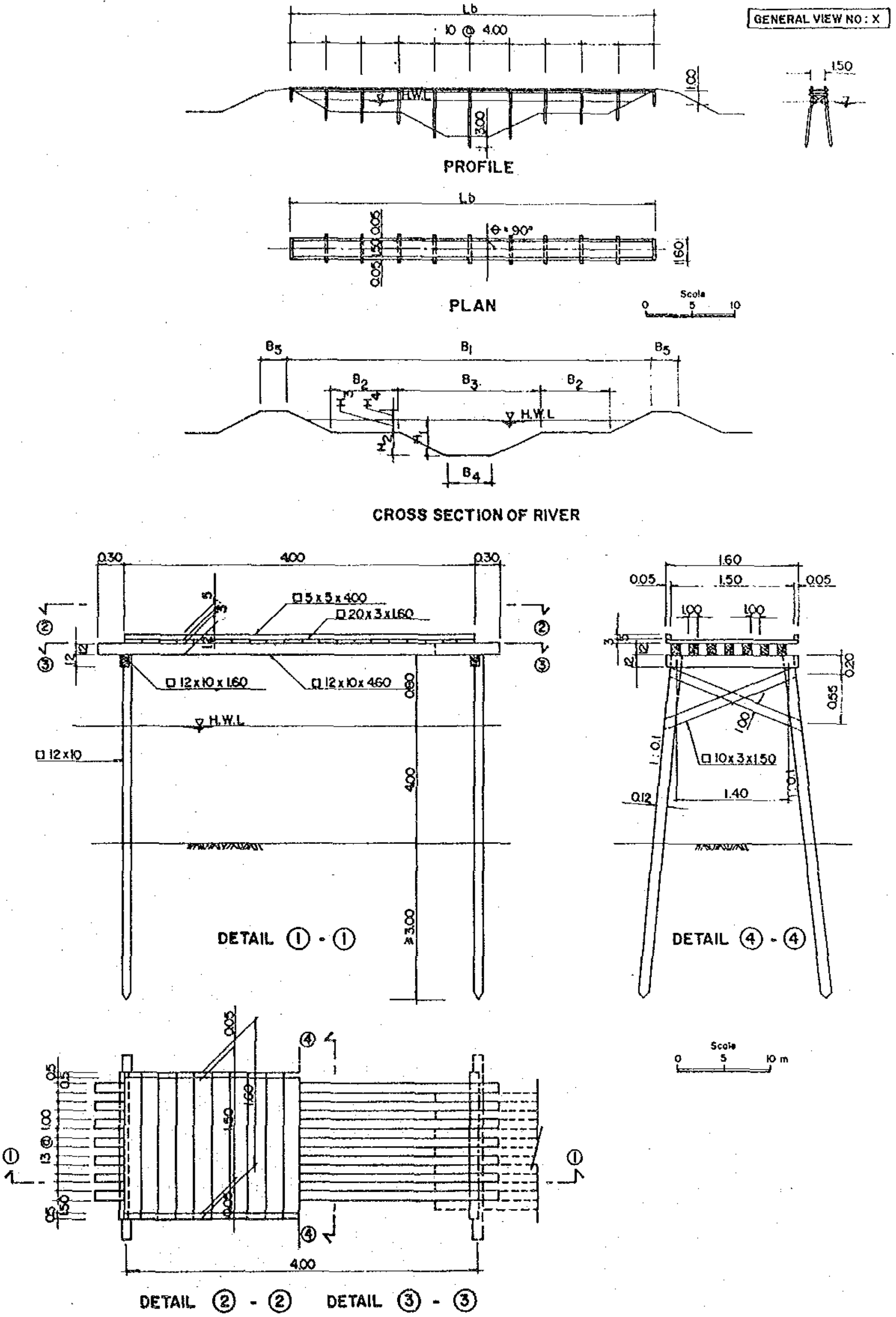
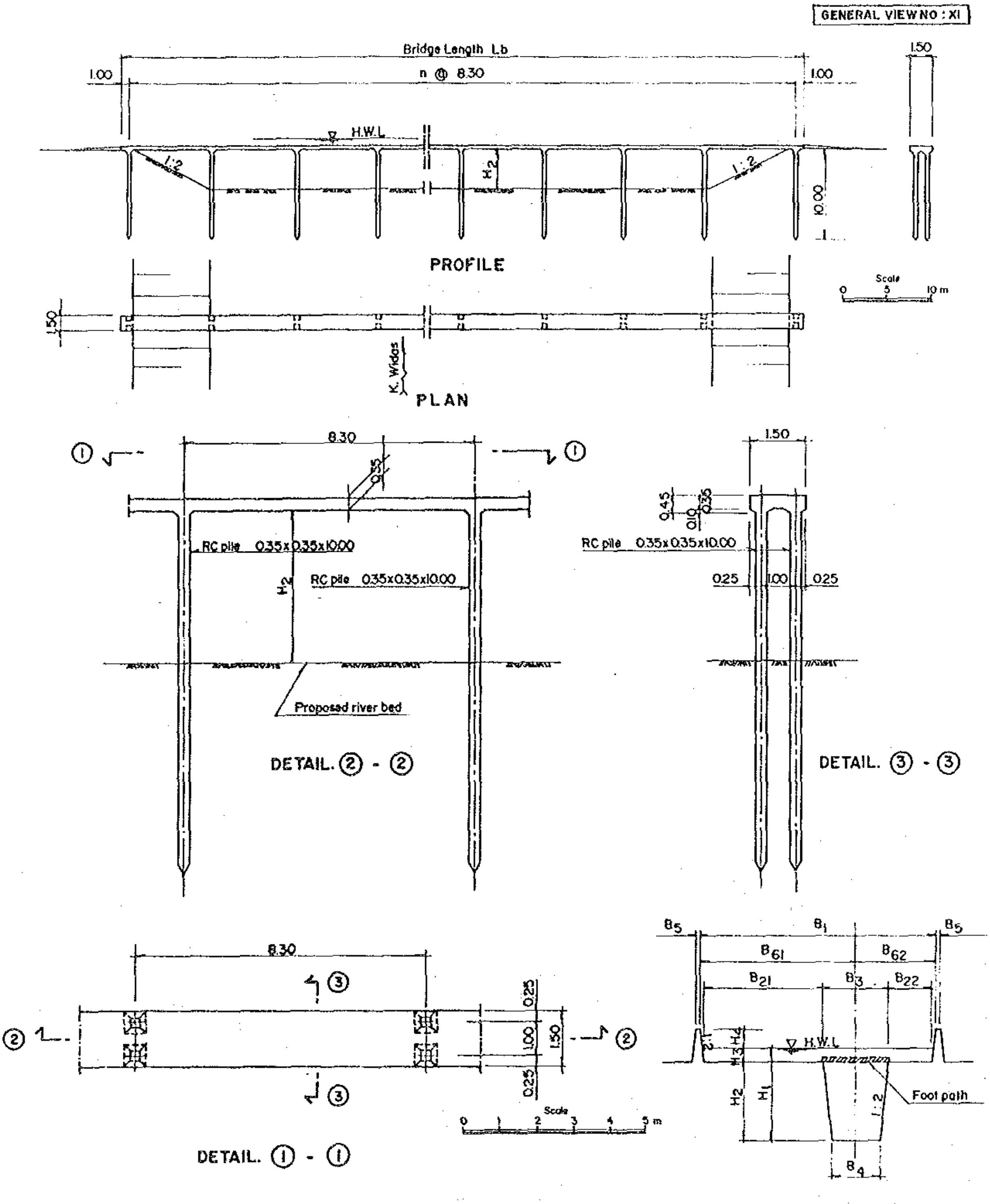


Fig. 4.5.18 STANDARD DESIGN OF FOOT PATH (1/2)



Location	Proposed River Condition (m)												Bridge Length (lb)	Nos. of Span
	B_1	B_{21}	B_{22}	B_3	B_4	B_5	B_{61}	B_{62}	H_1	H_2	H_3	H_4		
K 6.3 + 200 m	170	150.3	70.3	41	25	4.0	75	95	5.0	3.9	1.1	1.0	43.5	5
K 15.1 + 60 m	310	150.4	80.4	72	55	4.0	190	120	5.0	4.2	0.8	1.0	76.7	9
K 19.1 + 300 m	260	130.4	50.4	72	55	4.0	170	90	5.0	4.2	0.8	1.0	76.7	9

Fig. 4.5.18 STANDARD DESIGN OF FOOT PATH (2/2)

4.6 List of Data

Number	Name of Data	Author	Date of Issue
	River cross-section with 1 km interval		
	- Ngrempoh : Surveyed in 1985	BRBDEO	
	- Jaan : do	do	
	- Tributary : do	do	
	- Tretes : do	do	
	- Ngrembek : do	do	
	- Tributary : do	do	
	- Plangkeng : do	do	
	- Wotrangkul : do	do	
	- Secong : do	do	
	- Winong : do	do	
	- Gonggang-Malang : do	do	
	Inundation map for remarkable flood	PU East Java	
	Update project cost estimate for Waru-Turi project	Waru Turi Project	Oct. 1985
	Sketch of irrigation load works		
	- Kapas	PU East Java	
	- Kramat	do	
	- Kedunggerit	do	
	- Kuncir diversion weir	do	
	Construction drawing of highway bridge		
	- 8 provincial bridges	Binamarga Nganjuk	
	- Lengkong bridge	Binamarga, Nganjuk	
	- K.Soko bridge	do	
	- 2 railway bridges	PJKA Madiun	
	Proposed irrigation canal system around near diversion channel	EJIP	1985
	Operation diagram of railway connect Solo and Surabaya for 1985	PJKA Madiun	1984
	Classification of road in Kabupaten Nganjuk	PU East Java	
	Contour map in retarding basin (rought contour; 1/25,000)	BRBDEO	

ANNEX - 5

FLOOD DAMAGE

ANNEX - 5 FLOOD DAMAGE

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5. Analysis of Damageable Property Value

Since the summary of property value is presented in Main Report, this chapter explains the detailed procedures which are not clarified in main report. The explanation concerning Figures and Tables attached to main report is excluded in this chapter.

5.1 Unit Value of Crops

Since agricultural conditions are different by areas within the Widas river basin in terms of cropping pattern, unit yield and cropping intensity, farm land is classified into the following area.

- Ulo Retarding Basin
- Widas Retarding Basin
- Kedungsuko Retarding Basin
- Widas North
- Widas South
- Widas Extension Area.

For assessing unit value of crops, the selected crops are as follows.

- Paddy, Maize, and Soybean

The damageable value of crops specified above is calculated with te following parameters.

- Unit yield
- Cropping pattern
- Planted area
- Seasonal frequency of floods
- Economic prices of crops
- Production cost

Having discussed the procedures taken in the calculation of unit value of crops, several parameters mentioned above are examined in along with area classification.

(1) Unit yield

- Ulo, Widas and Kedungsuko Retarding Basin

Unit yield of selected crops is based on that in desa related to respective retarding basin. Data relating to crop yield is collected from Kecamatan office.

- Widas South

Unit yield of crops is based on that in Kec. Nganjuk since flood plain almost covers that area.

- Widas North

Crop yield is derived from that in Kec. Rejoso because north-west part of flood plain covers Kec. Rejoso.

- Warujayeng Area

Crop yield is derived from the average yield among Kecamatan relating Warujayeng area since flood plain covers those areas in the north-south direction.

- Widas Extension Area

Crop yield is based on average yield among desas relating to Widas Extension area.

Crop yields of selected crops are summarized by area as below.

Unit ton/ha

	Paddy	Maize	Soybean
Widas South	4.82	2.63	0.75
Widas North	4.79	2.51	0.83
Widas Extension Area	4.75	2.35	0.75
Warujayeng	5.10	3.30	0.87
Vlo Retarding basin	4.82	2.34	0.67
Widas Retarding basin	3.91	1.89	-
Kedungsoko Retarding basin	4.64	2.84	0.81

(2) Cropping Pattern

- Ulo, Widas and Kedungsoko Retarding basin

Cropping pattern is based on that in respective desa relating the above retarding basins. It is survayed by the Study Team.

- Widas South

Cropping pattern relating to Kec. Nganjuk is taken up as that in Widas South.

- Widas North

Cropping pattern relating to areas excluding Widas Extension Area is taken up as that in Widas North.

- Warujayeng

Average cropping pattern relating to areas which covers Warujayeng area is taken up as that in Warujayeng.

- Widas Extension Area

Average cropping pattern relating to four irrigation unit existing in Kec. Gondang and Lengkong is taken up as that in Widas Extension Area.

(3) Planted Area

- Ulo , Widas and Kedungsoko Retarding Basin

Owing to no information of cropping intensity within retarding basins, planted area is based on collected data on planted area and farm land of desa relating to retarding basins.

- Other areas

Planted area is based on cropping intensity which was already examined by the Study Team. Planted area of other crops except selected ones is incorporated into planted area of paddy or polowijo (maize or soybean).

(4) Seasonal frequency of floods

This is on the basis of rainfall data.

(5) Economic Price of crops

This is derived from Primary Price Prospect of Commodities issued by the World Bank.

(6) Production Cost

Farm inputs are based on the Kabpaten average amount of inputs.

Crop damage is defined as the difference in the net income of crops and accumulated production cost between in with-flood and in without-flood condition. The detailed results concerning unit value of crops by area are shown in Fig from 5.1.1 to 5.1.7 . The summary of these results is shown below.

Unit Value of Crops per Ha by Area

Unit : Rp

	Paddy	Maize	Soybean	Polowijo Avarage
Vlo retarding basin	72,130	6,660	2,600	4,752
Widas retarding basin	19,970	23,210	-	-
Kedungsoko retarding basin	85,840	23,040	460	16,720
Widas South	287,000	31,750	3,920	3,860
Widas North	309,300	4,800	7,600	6,850
Warujayeng	307,630	7,800	3,690	5,660
Widas Extension	214,720	3,440	1,070	2,560

Since the flood plain is also classified into & block areas which are different from area classification specified above, a recalculation is required to evaluate unit value of crops per ha by block area.

A manual work was carried out to examine to which area each mesh of farm land existing in the flood plain belongs. Then damageable value of crops was calculated by block areas. The results are shown below.

A_1 block	Paddy (No of mesh)	Damageable value (10^6Rp)	Polowijo (No of mesh)	Damageable value (10^6Rp)
Widas North	19	146.9	19 + 2	3.6
Widas Retarding Basin	14	25.2	14 + 1	1.2
Widas Extension	10	53.7	10 + 3	0.83
Warujayeng	17	130.7	17 + 3	2.83
T o t a l	60	356.5	69	8.5
Average value per mesh		5.94		0.12

A_2 Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Widas Extension	50	268.4	50 + 11	3.9
Warujayeng	93	715.2	93 + 19	15.8
T o t a l	143	983.6	173	19.7
Average value per mesh		6.88		0.11

C Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Widas North	62.5	483.3	62.5 + 2.5	11.13
Average value per mesh		7.73		0.17

C Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Widas North	10	77.3	10	1.71
Warujayeng	8.5	65.4	8.5	1.20
Vlo	4	7.2	4	0.48
Widas South	12	86.1	12	1.16
Kedungsoko	3	1.5	3	1.25
T o t a l	37.5	237.5	37.5	5.80
Average value per mesh		6.33		0.15

D Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Widas North	33.5	259.0	33.5	5.74
Widas South	11.0	78.9	11.0	1.06
T o t a l	44.5	337.9	44.5	6.80
Average value per mesh		7.59		0.15

E Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Warujayeng	31.5	242.3	31.5 + 3.5	4.95
Kedungsoko	3	1.5	3	1.25
Widas South	26	186.6	26 + 1	2.60
T o t a l	60.5	430.4	65	8.80
Average value per mesh		7.11		0.14

F Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Widas South	22	157.9	22	2.12
Average value per mesh		7.18		0.10

G Block	Paddy (No of Mesh)	Damageable value (10^6Rp)	Polowijo (No of Mesh)	Damageable value (10^6Rp)
Warujayeng	21.5	165.4	21.5	3.04
Widas South	30.5	218.8	30.5	2.94
T o t a l	52	572.3	52	5.98
Average value per mesh		7.39		0.12

The Reduction of Farm Land in the future

Economic or social development will stimulate the urbanization process which eventually leads to an increase of buildings in residential area. It is expected that farm land existing in urban desa will be reduced owing to the expansion of building area.

As the indication of upper limitation of building density for urban desa, present maximum building density (desa Baranam of Kec. Kertosono) can be regarded as upper point, which is shown as below.

Unit:Building/mesh Unit : m^2

House	Industry	Store	Restaurant	Public & Private	Total
501	117.5	41.3	8.75	3	71,000m^2

Further more, the same procedure is applied to get upper limitation of building density for rural desa. In this case, the minimum building density of present urban desa is considered, which is shown below (desa Baron of Kec. Baron)

Unit: Building/mesh Unit : m^2

House	Industry	Store	Restaurant	Public & Private	Total
98	3.75	6.75	3.25	1.5	13,135 m^2

Remarks : The standard size of building is shown in Main Report

Based on the above data, future building density per mesh of each block area is estimated by refering to increase rate of buildings. As a result, the reduction of farm land is assumed to take place in block area of D and F where urban desas exist. It is expected that the reduction of farm land would take place in around the year of 2025 in both areas of D and F. From geographical point of view, block D covers Kec. Nganjuk and block F is related to Kec. Sukomoro, Nganjuk, and Loceret.

5.2 Unit Value of Indoor Movables

Since economic data; on the above items are not available, unit value of indoor movables is estimated based on forecast of basic economic and social indicators. The summary of these indicators is shown below.

Forecast of GRDP in Kab. Nganjuk

	1985	1990	2000	2050
GRDP (10^6 Rp)	205,689	262,517	427,613	3038,910
Growth Rate p.a. (%)		5%	5%	4%

Remarks : - GRDP forecast is projected at 1985 constant price
- Nominal GRDP of the year 1985 is originated from Repelita IV of Kab. Nganjuk
- Real growth rate of GRDP is estimated at 5% p.a. between 1985 and 2000, at 4% p.a. after 2000

Forecast of Basic Indicators in Kab. Nganjuk

	1985	1990	2000	2050
Population				
Urban	99,400	112,500	143,900	494,600
Rural	830,400	861,600	904,300	498,700
	929,800	974,100	1,048,200	993,300
House				
Urban	20,620	23,340	29,850	102,600
Rural	177,820	184,500	193,640	106,790
	198,440	207,840	223,490	209,400
Family Size	4.7	4.7	4.7	4.7

Estimated Future Increase of Each Type of Building in Kab. Nganjuk

	1985	1990	2000	2050
Manufacturing Industry	13340	14,370	16,670	35,100
Store	4.960	5,200	5,600	5,240
Restaurant	3,800	3,980	4,280	4,000
Public & Private	1,850	1,940	2,090	1,960

Remark : 1 Manufacturing establishment is estimated to increase at 1.5 % p.a.
2 Other types of buildings are estimated to increase in proportion to an increase rate of houses

Per Capita Monthly Expenditure Survey of Kab. Nganjuk in 1984

Unit : 10^6Rp

No of People	Food	Fuel	Miscellaneous	Clothe	Durable	Total
27,292	234	52	19	20	16.5	360
	65%	14%	5%	6%	15%	100%

Remarks : 1 Total number of samples are about 27,300
2 Per capita monthly expenditure is calculated at about 13.200 Rp.
3. Since monthly per capita output is projected at 16,700 Rp in 1984. The ratio of per capita output to expenditure is estimated at 0.79

Projection of Per Capita Expenditure, House hold Expenditure

	1985	1990	2000	2050
GRDP (10^6Rp)	205,689	262,517	427,613	3,038,910
Population	929,800	974,100	1,048,200	993,300
Monthly percapita output (Rp)	18,400	22,300	34,000	255,000
Per capita expenditure	14,500	17,600	26,900	201,400
Monthly house hold expenditure (Rp)	68,200	82,700	126,400	946,600

(1) House hold effect

Questionaries were distributed in five desas in order to carry out property survey. Total number of samples are 125 with 25 questionaries in each desa. In our estimation of house hold effect, cars and motor cycles are excluded from our survey items. As a result, the average property value per household is projected at around 0.42 x 10^6Rp. Since our survey areas are mostly based on rural desas, and per capita expenditure in urban area was almost as twice as that in rural area (Statistik Indonesia), the value of household effect in urban desas is estimated to be 0.84 x 10^6Rp which is double of household effect value projected by our survey.

A simple assumption is applied to project future value of house effect in such a way that the value of household effect is increased in proportion to the growth of monthy house expenditure.

(2) Store

For the purpose of projecting stock value of store, the calculation basis is put on an estimation of how much a store must prepare goods which a person stock averagely. By using data on monthly per capita expenditure, average amount of stock, which are prepared by one store are worked out in terms of Rp. Assumptions are shown below.

- The average stock value of food per head is equivalent to half month's expenditure
- The average stock value of fuel per head is equivalent to half month's expenditure
- The average stock value of clothes per head is equivalent to four month's expenditure
- The average stock value of micellaneous goods per head is equivalent to four month's expenditure
- The average stock value of durable goods per head is equivalent to twelve month's expenditure

The procedure of calculation is shown below

14500 x 0.6 x 0.5 = 4350 (Food)
14500 x 0.14 x 0,5 = 1020 (Food)
14500 x 0.06 x 4 = 3480 (Clothes)
14500 x 0.05 x 4 = 2900 (Miscellaneous Goods)
14500 x 0.05 x 12 = 8700 (Durable Goods)
24,450 Rp

Then, how much store must stock is calculated by using data on population and the number of stores.

$20.445 \text{ Rp} \times 929800 - 4,960 = 3.8 \times 10^6 \text{ Rp}$

The above figure is the average stock value per store. The same procedure is taken up for the estimation of future stock value per store.

(3) Manufacturing Establishment

The following forecast of macro-economic conditions relating to manufacturing industry is required to estimate stock value per establishment.

	1985	1990	2000	2050
GRDP (10^6Rp)	205,689	262,517	427,623	3,038,910
GRDP share by industry (%) <1	4.4%	5.3%	7%	21.9%
GRDP of industry (10^6 Rp)	9,148	13,913	29,932	665,605
No of establishments	13,340	14,370	16,670	35,100
GRDP per establishment (10^6Rp)	0.69	0.69	1.79	18.9
Total labour cost per establishment (10^6Rp) < 2	0.45	0.57	0.94	6.68
Total capital cost per estiblishment (10^6Rp)	0.24	0.39	0.85	12.26

Remarks : < 1 GRDP share by industry is forecasted by Repelita IV
< 2 Labour forecast is estimated to increase in proportion to an growth rate of GRDP

The stock value per establishment is classified into three categories. At present level (1985), The estimation of stock value is shown the following way.

- The stock value of gross output
  $0.69 \times 2.89 \times 1/24 = 0.08$
  the ratio of gross output to value added is estimated to be 2.89, based on past statistical data. The stock value is estimated to be equivalent to half month's gross output.
- The stock value of raw materials
  $0.96 \times 1.89 \times 0.8 \times 1/12 = 0.09$
  The ratio of input costs to value added is estimated to be 1.89, based on past statistical data. Raw materials are estimated to constitute about 80% of all input costs. The stock value is estimated to be equivalent to one month's portion of raw materials.
- The value of equipments
  $$\frac{0.24 \times 5 \times 0.1 + 0.24 \times 5}{2} = 0.66$$
  The value of equipment is estimated to be equivalent to 5 year's expenditure. The real value of equipment is estimated to be the average between their market value and salvage value (10 %)

Then total stock value per establishment is estimated to be 0.83×10^6 Rp. The same procedure is taken up for estimating future stock value per establishment.

(4) Restaurant

Most of restaurants are making business as restaurants as well as food shops in the flood plain area. Kinds of stock value are, therefore, classified into 3 categories in the following.

- Indoor moveables inside a restaurant
- Food stock for sale
- Food stock for restaurant

The data surveyed or analyzed statistically are shown below, in order to estimate stock value per a restaurant.

(A) Value of Indoor Movals Unit : 10^6 Rp

1985	1990	2000	2050
1.3	1.6	2.4	18.0

The value of indoor movables was practically survey by the study team.

The value of them is expressed at the average between market and salvage value. Future value of them is estimated to increase in proportion to the growth rate of household espenditure.

(B) Food stock for restaurant

	1985	1990	2000	2050
GRDP of Restaurant (10^6Rp) < 1	3,266	4,035	7,047	49,916
Input Cost (10^6Rp) < 2	515	608	987	7,487
No.of Restaurant < 3	3,800	3,980	4,280	4,000
Stock value per restaurant	0,043	0,051	0,082	0,31

Note : < 1 From Repelita IV of Kab. Nganjuk
< 2 Derived from the ratio of input cost to GRDP of Restaurant
< 3 Assumed that the increase rate of restaurant will be the same as that of houses

From the above table, food stock value per restaurant can be estimated.

(C) Food stock for sale

	1985	1990	2000	2050
Per capita expenditure for food (Rp)	4350	5,280	8,070	60,420
Population	929,800	974,100	1,048,200	993,300
No of restaurant	3.800	3,980	4,280	
Stock value per restaurant (10^6Rp)	1.1	1.3	2.0	15.0

The method of the above item is based on how much a restaurant must prepare food which a person stocks averagely.

(5) Public and Private buildings

Types of building corresponding to the above item are the government and private (school, theater, private business and so on) buildings. The number of these buildings existing in flood plain area is statistically sounded.
In order to estimate unit value of indoor movables, the following macrodata are presented.

Public building

GRDP of Public Sector

	1985	1990	2000	2050
GRDP (10^6Rp)	205,688	262,517	427,613	3,038,910
GRDP share of Public Sector (%) < 1	8.7	9.0	9.8	9.8
GRDP of Public Sector (10^6RP)	17,918	23,626	41,906	297,813
Capital cost of Public Sector (10^6Rp) < 2	1453	1890	3352	23,825
No.of buildings < 3	1400	1470	1580	1480
Capital cost per building (10^6Rp)	1.04	1.29	2.12	16.1

Note : < 1 From Repelita IV of kab. Nganjuk
< 2 The ratio capital cost to value added was around 8%
< 3 The increase rate of buildings is assumed to be the same as that of houses

Having estimated capital cost per building, the stock value per building is estimated to be the average between the market value equivalent to 15 years' expenditure and its salvage value. The stock value is estimated to be 8.6 x 10^6 Rp in 1985.
The same estimation procedure is taken up to project future stock value.

Private Sector

	1985	1990	2000	2050
GRDP (10^6Rp)	205,689	262,517	427,613	3,038,910
GRDP share of Private Sector (%) < 1	6.4%	7.3%	9.1%	9.1%
GRDP of Private Sector (10^6Rp)	13,214	19,069	38,913	276,540
GRDP of Service Sub-Sector (10^6Rp) < 2	2,682	3,871	7,899	56,138
No.of Buildings < 3	450	470	510	480
GRDP per building (10^6Rp)	5.9	8.2	15.5	117.0
Total labour cost per building (10^6Rp) < 4	5.3	6.8	11.0	78.9
Total capital cost per building (10^6Rp)	0.6	1.4	4.5	38.0

Note : < 1 From Repelita IV of Kab. Nganjuk
< 2 The ratio of Service sub-sector to Private Sector is 20.3%
< 3 The increase rate of building is assumed to be the same as that of houses

< 4 Assuming that the number of persons is 6.6 per building labour cost would be 6.6 x 0.8 x 10^6 Rp per building. In this case per capita labour cost is assumed to be 0.8 x 10^6 Rp per year.

Based on the above table, the stock value per building is estimated to be the average between the market value equivalent to 15 years expenditure and its salvage value. The stock is estimated at 9.9 x 10^6 Rp in 1985. The same procedure is taken up to project future stock value per building.

After estimating the stock value per public and private buildings respectively, the average stock value between public and private building is projected.

5.3 This part of ANNEX presents data of each block in terms of probable flood hydrograph, overflow volume, inundation depth and flood damage, and flood damages with future growth.

Table 5.3.1

(1/4)

FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : A-1

			RETURN PERIOD (YEAR)					
DAY	HOUR	ANNUAL	1.4	5	10	25	50	100
1	6	84.9	113.2	113.2	113.2	113.2	113.2	113.2
1	12	85.8	114.4	114.4	114.4	114.4	114.4	114.4
1	18	84.3	112.5	111.1	112.2	111.2	111.2	111.2
1	24	73.8	98.5	98.8	101.2	99.5	99.9	100.1
2	6	72.6	96.9	98.6	100.7	100.7	104.0	104.9
2	12	78.7	105.0	108.4	100.9	115.0	118.3	120.2
2	18	82.8	110.5	115.4	86.6	123.6	127.4	130.1
2	24	83.1	110.8	116.9	77.2	126.1	130.2	133.9
3	6	80.3	107.1	115.0	123.3	125.1	129.3	133.7
3	12	73.5	98.0	112.1	180.0	126.4	131.3	137.6
3	18	68.2	91.0	109.2	202.1	133.1	140.4	148.8
3	24	69.2	92.3	118.5	201.7	136.2	148.2	159.6
4	6	120.6	160.9	185.8	194.7	223.1	238.3	251.1
4	12	140.0	186.7	213.2	184.4	256.7	272.6	288.6
4	18	133.2	177.7	199.4	167.9	240.7	255.4	270.7
4	24	121.7	162.3	184.0	151.9	213.9	231.6	245.1
5	6	117.4	156.6	176.7	168.9	200.8	211.4	233.1
5	12	114.7	153.0	169.9	181.5	192.5	200.5	219.0
5	18	108.0	144.1	158.4	170.4	181.9	190.3	205.0
5	24	102.1	136.2	149.2	156.5	177.0	191.5	211.9
6	6	99.5	132.7	147.2	158.8	181.7	198.7	224.3
6	12	95.6	127.5	143.1	164.3	179.9	197.2	221.8
6	18	85.6	114.2	135.4	154.3	172.5	189.9	210.2
6	24	78.3	104.5	131.9	151.7	183.5	202.8	228.5
7	6	76.2	101.6	128.2	143.5	194.9	224.6	251.5
7	12	79.5	106.0	128.9	160.3	204.9	238.6	267.4
7	18	82.6	110.2	129.5	168.7	202.7	235.5	263.8
7	24	88.3	117.8	133.1	165.4	191.1	215.5	245.9
8	6	87.0	116.1	128.7	153.4	175.9	194.7	218.9
8	12	80.0	106.7	117.2	136.3	153.4	175.8	192.7
8	18	69.2	92.3	101.2	116.3	132.6	151.3	170.4
8	24	68.3	91.1	79.6	96.6	109.8	130.9	145.3

FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : A-2

			RETURN PERIOD (YEAR)					
DAY	HOUR	ANNUAL	1.4	5	10	25	50	100
1	6	84.7	113.0	113.0	113.2	113.0	113.0	113.0
1	12	79.0	105.4	105.4	114.4	105.4	105.4	105.4
1	18	46.9	62.6	62.9	111.1	68.7	69.2	70.1
1	24	47.0	62.7	65.5	99.2	143.2	150.7	164.9
2	6	69.9	93.3	96.9	100.4	123.6	126.3	133.0
2	12	68.9	91.9	94.9	111.5	93.0	94.6	97.8
2	18	62.4	83.3	86.2	119.2	104.1	112.7	120.7
2	24	61.7	82.3	87.3	121.0	101.5	103.3	107.9
3	6	46.2	61.6	87.9	119.4	90.4	91.5	94.1
3	12	56.7	75.7	99.2	119.0	83.8	84.6	86.8
3	18	42.0	56.0	63.3	119.7	79.9	80.9	83.2
3	24	157.1	209.5	249.5	120.2	78.6	80.8	83.8
4	6	151.3	201.8	228.2	200.0	264.7	335.1	363.5
4	12	88.8	118.4	124.2	235.6	319.7	343.8	370.3
4	18	75.4	100.6	104.9	216.7	185.8	194.6	204.4
4	24	82.3	109.8	110.2	196.1	169.3	177.0	184.6
5	6	95.8	127.8	138.3	186.7	219.3	232.0	242.2
5	12	76.8	102.5	111.7	197.9	135.9	142.9	158.1
5	18	67.2	89.7	95.2	168.6	112.8	117.0	124.6
5	24	77.1	102.9	117.7	158.2	127.3	131.6	143.3
6	6	77.7	103.7	118.3	157.1	126.9	131.4	150.9
6	12	57.8	77.1	110.8	152.7	113.5	118.8	140.9
6	18	38.1	50.8	93.0	145.2	101.2	107.3	126.0
6	24	60.9	81.2	104.9	156.2	144.9	175.1	217.0
7	6	58.1	77.5	89.4	165.1	181.4	255.2	339.4
7	12	62.1	82.9	91.7	166.0	152.0	198.8	244.0
7	18	87.9	117.3	122.4	161.4	146.2	168.3	187.1
7	24	75.5	100.7	107.1	156.2	128.7	141.6	154.0
8	6	59.5	79.4	85.0	144.9	114.4	127.1	137.9
8	12	43.8	58.5	65.0	130.2	103.2	166.7	127.3
8	18	33.6	44.9	46.7	111.7	93.8	108.1	119.4
8	24	28.0	37.4	39.0	82.5	85.0	99.3	112.3

Table 5.3.1

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FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : B

			RETURN PERIOD (YEAR)					
DAY	HOUR	ANNUAL	1.4	5	10	25	50	100
1	6	38.1	50.9	50.9	50.9	50.9	50.9	50.9
1	12	20.4	27.2	27.2	27.2	27.2	27.2	27.2
1	18	15.9	21.3	18.0	18.8	20.6	21.4	23.6
1	24	41.2	55.0	16.7	81.7	91.6	95.9	104.6
2	6	19.9	26.6	33.4	34.4	36.4	37.3	38.9
2	12	18.6	24.8	25.2	26.8	29.1	30.1	32.4
2	18	21.3	28.4	36.5	39.8	43.6	45.5	49.3
2	24	14.9	19.9	22.4	23.8	25.1	28.2	27.1
3	6	10.2	13.6	14.8	15.5	16.2	16.5	17.1
3	12	7.4	9.9	10.7	11.0	11.5	11.6	12.0
3	18	5.7	7.7	8.2	8.4	8.7	8.8	9.1
3	24	25.3	33.8	47.2	59.2	75.7	89.3	104.3
4	6	137.0	182.7	224.5	258.7	294.8	322.2	349.1
4	12	62.7	83.6	92.0	97.7	104.2	109.1	114.3
4	18	38.4	51.2	55.0	58.2	61.4	64.1	65.9
4	24	92.4	123.3	137.7	152.0	165.8	178.0	185.5
5	6	45.6	60.8	63.8	66.0	69.0	71.5	73.4
5	12	22.1	29.5	30.4	31.1	31.9	32.5	33.5
5	18	18.4	24.6	25.6	26.0	27.0	27.4	29.1
5	24	29.3	39.1	41.5	41.8	44.3	44.6	53.0
6	6	21.6	28.8	32.1	32.2	33.8	34.3	48.2
6	12	15.4	20.6	21.4	21.4	22.1	22.8	34.0
6	18	10.7	14.3	14.8	14.9	15.3	16.2	25.2
6	24	43.6	58.2	67.6	77.5	110.4	190.1	274.3
7	6	26.9	35.9	39.1	43.5	65.2	102.4	144.5
7	12	37.2	49.7	52.8	55.7	60.3	70.8	81.2
7	18	32.6	43.5	45.6	47.5	49.3	52.0	53.3
7	24	24.4	32.6	33.9	35.1	36.1	37.3	37.8
8	6	18.9	25.2	25.9	26.6	27.2	28.0	28.3
8	12	15.1	20.2	20.7	21.2	21.7	22.3	22.4
8	18	12.4	16.6	17.0	17.3	17.6	18.0	18.1
8	24	10.5	14.0	20.7	14.6	14.9	15.2	15.2

FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : C

			RETURN PERIOD (YEAR)					
DAY	HOUR	ANNUAL	1.4	5	10	25	50	100
1	6	45.2	60.2	60.2	60.2	60.2	60.2	60.2
1	12	40.1	53.5	53.5	53.5	53.5	53.5	53.5
1	18	21.2	28.2	28.5	28.6	28.9	29.0	29.3
1	24	19.5	26.0	30.5	31.8	34.9	36.4	38.9
2	6	18.4	24.5	29.4	30.8	34.1	35.6	39.7
2	12	14.7	19.6	21.0	21.9	23.8	24.6	26.7
2	18	27.7	36.9	44.0	47.3	51.8	56.6	60.1
2	24	48.7	64.9	66.6	68.1	69.3	70.2	71.2
3	6	51.8	69.1	71.3	73.2	75.7	77.4	79.2
3	12	52.9	70.5	73.4	76.0	78.8	80.8	82.7
3	18	53.3	71.0	74.3	77.1	80.2	82.4	84.4
3	24	54.2	72.3	76.2	79.4	83.1	85.2	87.1
4	6	55.7	74.2	78.4	82.0	85.6	87.8	89.9
4	12	56.1	74.8	79.2	83.0	86.6	89.1	91.3
4	18	56.1	74.8	79.3	83.2	87.0	89.8	92.4
4	24	56.3	75.1	80.5	84.5	88.5	92.4	95.6
5	6	55.2	73.6	80.4	84.7	88.8	93.1	96.7
5	12	52.8	70.4	78.0	83.3	87.8	92.2	96.0
5	18	49.0	65.3	73.4	79.9	85.9	90.5	94.4
5	24	46.2	61.6	70.2	76.5	84.1	89.5	93.6
6	6	32.1	42.8	67.6	73.0	81.4	88.0	92.7
6	12	18.9	25.2	62.4	68.9	76.3	85.1	90.3
6	18	15.0	20.0	32.0	63.4	70.9	79.9	86.9
6	24	27.0	36.0	40.9	61.0	69.3	77.4	85.0
7	6	31.4	41.8	47.9	60.1	68.9	76.4	84.8
7	12	36.3	48.4	56.6	60.1	68.7	75.9	84.8
7	18	41.5	55.3	60.3	60.9	68.8	75.8	84.7
7	24	36.9	49.2	53.8	60.6	68.4	74.8	83.5
8	6	28.0	37.3	43.4	47.8	66.5	72.6	80.9
8	12	20.0	26.7	29.4	31.7	62.7	69.8	77.1
8	18	15.6	20.8	22.1	22.9	35.5	65.0	71.7
8	24	14.4	19.2	19.5	19.6	20.0	47.2	67.1

Table 5.3.1

(3/4)

FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : D

DAY	HOUR	ANNUAL	RETURN PERIOD (YEAR) 1.4	5	10	25	50	100
1	6	12.3	16.5	16.5	16.5	16.5	16.5	16.5
1	12	7.0	9.4	9.4	9.4	9.4	9.4	9.4
1	18	3.9	5.3	5.4	5.6	5.7	5.8	5.9
1	24	12.4	16.6	18.5	20.4	22.4	24.3	25.3
2	6	11.2	15.0	16.2	17.4	18.6	19.9	20.6
2	12	7.7	10.3	10.9	11.6	12.2	12.9	13.2
2	18	5.3	7.1	7.5	7.9	8.3	8.8	8.9
2	24	6.6	8.8	10.4	11.1	12.3	13.1	14.3
3	6	7.4	9.9	12.9	13.9	15.7	16.7	18.6
3	12	5.9	7.9	9.3	9.8	10.7	11.2	12.0
3	18	9.0	12.0	14.4	15.9	18.0	19.5	21.2
3	24	41.3	55.1	69.2	80.3	93.2	102.7	112.4
4	6	23.3	31.1	35.4	38.3	41.4	43.6	45.7
4	12	10.9	14.6	15.9	16.7	17.6	18.3	18.8
4	18	7.0	9.4	10.0	10.4	10.8	11.1	11.5
4	24	11.6	15.5	16.7	17.0	18.2	18.4	19.8
5	6	9.8	13.1	13.9	14.0	14.8	14.9	16.2
5	12	6.0	8.0	8.3	8.4	8.7	8.8	9.7
5	18	5.5	7.4	8.0	8.4	8.9	9.2	11.1
5	24	10.1	13.5	16.1	17.9	20.3	25.4	39.8
6	6	7.5	10.1	11.5	12.4	13.9	17.8	25.2
6	12	4.9	6.6	7.2	7.7	8.8	11.7	15.9
6	18	4.7	6.3	6.8	3.7	8.4	11.3	13.8
6	24	3.8	5.1	5.6	5.9	7.1	9.8	11.7
7	6	4.3	5.8	6.5	7.3	10.9	16.4	18.7
7	12	14.4	19.3	21.6	24.0	28.7	34.9	36.6
7	18	13.5	18.0	19.3	20.7	22.3	24.5	25.0
7	24	9.3	12.4	13.1	13.8	14.4	15.4	15.6
8	6	6.9	9.3	9.3	9.6	10.0	10.5	10.6
8	12	4.8	6.4	6.9	7.1	7.4	7.7	7.8
8	18	3.8	5.1	5.5	5.6	5.7	5.9	6.0
8	24	3.2	4.3	4.4	4.5	4.6	4.8	4.8

FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : E

DAY	HOUR	ANNUAL	RETURN PERIOD (YEAR) 1.4	5	10	25	50	100
1	6	35.1	46.9	46.9	46.9	46.9	46.9	46.9
1	12	25.7	34.3	34.3	34.3	34.3	34.3	34.3
1	18	11.0	14.7	15.8	16.1	16.8	17.1	18.0
1	24	15.7	21.0	25.6	26.9	30.1	31.6	34.2
2	6	11.1	14.8	17.4	18.1	19.8	20.5	22.6
2	12	7.9	10.6	12.0	12.4	13.3	13.7	14.5
2	18	39.2	52.3	59.5	62.1	64.2	65.7	66.8
2	24	52.3	69.8	75.5	79.6	83.6	85.9	88.1
3	6	52.2	69.7	75.5	79.7	83.8	86.2	88.5
3	12	50.5	67.4	71.4	76.0	80.5	83.6	86.0
3	18	48.6	64.9	68.8	72.1	77.4	80.6	83.6
3	24	50.1	66.9	70.9	75.9	80.6	84.1	86.4
4	6	49.9	66.6	70.6	75.5	80.3	83.9	86.3
4	12	47.6	63.5	68.3	71.5	76.9	80.6	83.7
4	18	45.0	60.0	66.5	69.2	73.7	78.4	81.5
4	24	37.6	50.2	63.0	66.9	69.8	74.3	78.8
5	6	28.0	37.4	52.8	62.9	66.9	69.6	74.0
5	12	12.8	17.1	39.2	51.6	62.4	66.5	69.3
5	18	11.0	14.7	19.8	37.0	50.4	61.7	66.1
5	24	20.3	27.1	29.4	34.5	45.1	56.9	64.2
6	6	13.8	18.4	19.5	20.6	33.9	48.7	59.5
6	12	9.2	12.3	12.8	13.0	14.9	34.1	47.4
6	18	14.5	19.4	22.3	24.3	28.5	33.8	40.5
6	24	26.1	34.8	38.7	41.5	47.8	50.6	57.9
7	6	22.6	30.2	36.7	39.6	16.9	51.1	60.1
7	12	30.2	40.3	45.2	48.2	51.1	55.0	61.6
7	18	30.0	40.0	44.4	47.5	50.5	53.1	60.0
7	24	26.7	35.6	38.0	40.2	44.8	48.7	52.0
8	6	16.6	22.2	26.2	30.7	35.2	37.9	43.2
8	12	12.5	16.7	17.9	18.7	20.2	22.1	29.2
8	18	10.1	13.5	14.1	14.5	15.0	15.2	16.1
8	24	8.4	11.2	11.7	12.0	12.2	12.4	12.6

Table 5.3.1

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FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : F

DAY	HOUR	ANNUAL	RETURN PERIOD (YEAR) 1.4	5	10	25	50	100
1	6	5.6	7.5	7.5	7.5	7.5	7.5	7.5
1	12	2.3	3.1	3.1	3.1	3.1	3.1	3.1
1	18	2.0	2.7	3.0	3.1	3.2	3.3	3.4
1	24	2.1	2.9	3.5	3.6	4.0	4.3	4.7
2	6	1.7	2.3	2.7	2.1	3.2	3.3	3.5
2	12	1.3	1.8	2.0	2.1	2.3	2.4	2.5
2	18	13.2	17.6	21.1	23.8	27.0	29.5	32.2
2	24	16.6	22.2	26.9	30.4	34.3	37.1	39.9
3	6	9.3	12.4	14.2	15.5	17.0	18.0	19.1
3	12	5.4	7.2	8.1	8.8	9.6	10.1	10.7
3	18	8.7	11.6	13.0	14.0	15.1	16.0	16.7
3	24	17.8	23.8	26.5	28.9	31.3	33.7	35.0
4	6	10.8	14.4	15.8	16.9	18.0	19.0	19.6
4	12	6.4	8.6	9.3	9.9	10.5	11.1	11.4
4	18	8.1	10.9	12.3	13.7	15.2	17.4	24.9
4	24	5.8	7.8	8.6	9.4	10.1	11.7	17.0
5	6	3.6	4.9	4.9	5.6	6.0	7.5	10.7
5	12	2.3	3.1	3.3	3.5	3.7	4.6	6.5
5	18	3.7	5.0	5.3	5.4	5.8	13.8	15.5
5	24	4.2	5.7	6.2	6.3	7.0	13.1	14.7
6	6	3.0	4.1	4.3	4.4	4.8	8.4	9.5
6	12	2.0	2.7	2.8	2.8	3.1	5.2	5.9
6	18	2.2	3.0	3.3	3.5	7.7	9.3	10.3
6	24	2.1	2.8	3.2	3.4	8.3	9.5	10.5
7	6	2.5	3.4	4.1	4.5	7.8	8.7	9.8
7	12	4.2	5.6	6.4	6.9	7.4	7.7	8.3
7	18	3.4	4.6	5.1	5.3	5.6	5.7	6.0
7	24	2.6	3.5	3.6	3.7	3.9	4.0	4.1
8	6	1.8	2.5	2.6	2.7	2.8	2.9	2.9
8	12	1.4	1.9	2.0	2.1	2.1	2.1	2.2
8	18	1.1	1.5	1.6	1.6	1.7	1.7	1.7
8	24	0.9	1.3	1.3	1.3	1.4	1.4	1.4

FLOOD HYDROGAPH FOR DAMAGE ESTIMATE

BLOCK NO : G

DAY	HOUR	ANNUAL	RETURN PERIOD (YEAR) 1.4	5	10	25	50	100
1	6	31.5	42.1	42.1	42.1	42.1	42.1	42.1
1	12	8.8	11.8	11.8	11.8	11.8	11.8	11.8
1	18	10.8	14.4	16.5	17.1	18.5	19.1	20.7
1	24	15.0	20.0	24.2	25.4	28.3	29.6	32.7
2	6	9.7	13.0	15.0	15.5	16.8	17.4	18.6
2	12	7.5	10.0	11.2	11.6	12.4	12.8	13.5
2	18	140.0	186.7	240.1	282.5	333.6	373.4	414.2
2	24	85.2	113.6	129.6	141.1	153.7	162.9	170.3
3	6	36.0	48.0	52.5	55.7	59.1	61.5	63.8
3	12	20.0	26.7	28.8	30.4	32.0	33.2	34.3
3	18	43.8	58.4	64.5	70.5	76.8	83.0	86.5
3	24	68.2	91.0	99.7	108.3	116.9	125.4	129.7
4	6	35.3	47.1	50.4	53.3	56.2	59.0	60.4
4	12	20.7	27.7	29.5	31.1	32.7	34.4	35.2
4	18	25.9	34.6	38.0	41.3	44.7	49.5	56.1
4	24	17.3	23.1	24.9	26.6	28.2	31.2	37.4
5	6	13.5	18.1	19.5	20.8	22.1	25.0	29.0
5	12	9.3	12.5	13.3	14.1	14.9	16.6	18.9
5	18	14.4	19.2	20.8	21.3	22.9	28.6	31.2
5	24	19.0	25.4	27.1	27.5	29.6	36.6	39.4
6	6	11.9	15.9	16.7	16.9	17.9	22.1	23.6
6	12	8.0	10.7	11.2	11.3	11.8	14.3	15.2
6	18	21.0	28.0	33.6	37.3	45.4	55.0	67.4
6	24	27.6	36.9	45.7	50.6	62.0	71.0	86.5
7	6	18.3	24.5	28.2	30.6	36.7	42.0	51.6
7	12	36.8	49.1	54.7	58.1	61.5	63.1	66.3
7	18	26.1	34.8	38.0	39.8	41.6	42.5	44.1
7	24	19.1	25.5	27.3	28.5	29.6	30.1	31.1
8	6	14.6	19.5	20.7	21.4	22.1	22.4	23.0
8	12	11.5	15.4	16.2	16.7	17.2	17.4	17.8
8	18	9.4	12.6	13.2	13.5	13.8	14.0	14.2
8	24	7.9	10.6	11.0	11.3	11.5	11.6	11.8

Table 5.3.2

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BLOCK NO. : A-2
BASE POINT : P41
DISCHARGE AND OVERFLOW VOLUME IN MCM
CAPACITY OF LOWWATER CHANNEL 130
MAXIMUM OUTFLOW IN MCM 67.392

		RECURRENCE PERIOD OF FLOOD (YEAR)													
		1.05		2		5		10		25		50		100	
1	6	84.7	0.0	113.0	0.0	113.0	0.0	113.2	0.0	113.0	0.0	113.0	0.0	113.0	0.0
1	12	79.0	0.0	105.4	0.0	105.4	0.0	114.4	0.0	105.4	0.0	105.4	0.0	105.4	0.0
1	18	46.9	0.0	62.6	0.0	62.9	0.0	111.1	0.0	68.7	0.0	69.2	0.0	70.1	0.0
1	24	47.0	0.0	62.7	0.0	65.5	0.0	99.2	0.0	143.2	0.0	150.7	0.0	164.9	0.1
2	6	69.9	0.0	93.3	0.0	96.9	0.0	100.4	0.0	123.6	0.1	126.3	0.2	133.0	0.5
2	12	68.9	0.0	91.9	0.0	94.9	0.0	111.5	0.0	93.0	0.0	94.6	0.1	97.8	0.5
2	18	62.4	0.0	83.3	0.0	86.2	0.0	119.2	0.0	104.1	0.0	112.7	0.0	120.7	0.3
2	24	61.7	0.0	82.3	0.0	87.3	0.0	121.0	0.0	101.5	0.0	103.3	0.0	107.9	0.2
3	6	46.2	0.0	61.6	0.0	87.9	0.0	119.4	0.0	90.4	0.0	91.5	0.0	94.1	0.0
3	12	56.7	0.0	75.7	0.0	99.2	0.0	119.0	0.0	83.8	0.0	84.6	0.0	86.8	0.0
3	18	42.0	0.0	56.0	0.0	63.3	0.0	119.7	0.0	79.9	0.0	80.9	0.0	83.2	0.0
3	24	157.1	0.0	209.5	0.4	249.5	0.8	120.2	0.0	78.6	0.0	80.8	0.0	83.8	0.0
4	6	151.3	0.5	201.8	2.0	228.2	3.1	200.0	0.6	264.7	1.0	335.1	1.7	363.5	2.1
4	12	88.8	0.6	118.4	2.7	124.2	4.1	235.6	2.5	319.7	4.5	343.8	6.3	370.3	7.2
4	18	75.4	0.1	100.6	2.5	104.9	4.0	216.7	4.6	185.8	7.2	194.6	9.3	204.4	10.6
4	24	82.3	0.0	109.8	2.3	110.2	3.8	196.1	6.2	169.3	8.2	177.0	10.5	184.6	12.0
5	6	95.8	0.0	127.8	2.2	138.3	3.8	186.7	7.6	219.3	9.6	232.0	12.1	242.2	13.8
5	12	76.8	0.0	102.5	2.2	111.7	3.8	197.9	8.9	135.9	10.6	142.9	13.3	158.1	15.3
5	18	67.2	0.0	89.7	1.8	95.2	3.6	168.6	10.1	112.8	10.6	117.0	13.4	124.6	15.5
5	24	77.1	0.0	102.9	1.5	117.7	3.4	158.2	10.8	127.3	10.6	131.6	13.4	143.3	15.6
6	6	77.7	0.0	103.7	1.2	118.3	3.3	157.1	11.4	126.9	10.5	131.4	13.4	150.9	16.0
6	12	57.8	0.0	77.1	0.8	110.8	3.1	152.7	11.9	113.5	10.5	118.8	13.4	140.9	16.4
6	18	38.1	0.0	50.8	0.1	93.0	2.8	145.2	12.3	101.2	10.3	107.3	13.3	126.0	16.4
6	24	60.9	0.0	81.2	0.0	104.9	2.5	156.2	12.8	144.9	10.3	175.1	13.6	217.0	17.3
7	6	58.1	0.0	77.5	0.0	89.4	2.2	165.1	13.4	181.4	11.0	255.2	15.4	339.4	20.5
7	12	62.1	0.0	82.9	0.0	91.7	1.7	166.0	14.2	152.0	11.8	198.8	17.5	244.0	24.0
7	18	87.9	0.0	117.3	0.0	122.4	1.6	161.4	14.9	146.2	12.2	168.3	18.7	187.1	25.9
7	24	75.5	0.0	100.7	0.0	107.1	1.5	156.2	15.6	128.7	12.4	141.6	19.2	154.0	26.8
8	6	59.5	0.0	79.4	0.0	85.0	1.2	144.9	16.0	114.4	12.4	127.1	19.3	137.9	27.1
8	12	43.8	0.0	58.5	0.0	65.0	0.6	130.2	16.2	103.2	12.2	166.7	19.7	127.3	27.2
8	18	33.6	0.0	44.9	0.0	46.7	0.0	111.7	16.2	93.8	11.8	108.1	19.9	119.4	27.1
8	24	28.0	0.0	37.4	0.0	39.0	0.0	82.5	15.9	85.0	11.4	99.3	19.7	112.3	27.0
9	6	46.9	0.0	62.6	0.0	62.9	0.0	111.1	15.6	68.7	10.8	69.2	19.2	70.1	26.7
9	12	47.0	0.0	62.7	0.0	65.5	0.0	99.2	15.3	143.2	10.9	150.7	19.3	164.9	26.8
9	18	69.9	0.0	93.3	0.0	96.9	0.0	100.4	15.0	123.6	10.9	126.3	19.5	133.0	27.2
9	24	68.9	0.0	91.9	0.0	94.9	0.0	111.5	14.8	93.0	10.8	94.6	19.4	97.8	27.2
10	6	62.4	0.0	83.3	0.0	86.2	0.0	119.2	14.6	104.1	10.5	112.7	19.1	120.7	27.1
10	12	61.7	0.0	82.3	0.0	87.3	0.0	121.0	14.5	101.5	10.2	103.3	18.9	107.9	26.9
10	18	46.2	0.0	61.6	0.0	87.9	0.0	119.4	14.4	90.4	9.8	91.5	18.6	94.1	26.6
10	24	56.7	0.0	75.7	0.0	99.2	0.0	119.0	14.3	83.8	9.4	84.6	18.1	86.8	26.2

Table 5.3.2

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BLOCK NO. : B
BASE POINT : P35
DISCHARGE AND OVERFLOW VOLUME IN MCM
CAPACITY OF LOWWATER CHANNEL 100
MAXIMUM OUTFLOW IN MCM 51.84

		RECURRENCE PERIOD OF FLOOD (YEAR)													
		1.05		2		5		10		25		50		100	
1	6	38.1	0.0	50.9	0.0	50.9	0.0	50.9	0.0	50.9	0.0	50.9	0.0	50.9	0.0
1	12	20.4	0.0	27.2	0.0	27.2	0.0	27.2	0.0	27.2	0.0	27.2	0.0	27.2	0.0
1	18	15.9	0.0	21.3	0.0	18.0	0.0	18.8	0.0	20.6	0.0	21.4	0.0	23.6	0.0
1	24	41.2	0.0	55.0	0.0	16.7	0.0	81.7	0.0	91.6	0.0	95.9	0.0	104.6	0.0
2	6	19.9	0.0	26.6	0.0	33.4	0.0	34.4	0.0	36.4	0.0	37.3	0.0	38.9	0.0
2	12	18.6	0.0	24.8	0.0	25.2	0.0	26.8	0.0	29.1	0.0	30.1	0.0	32.4	0.0
2	18	21.3	0.0	28.4	0.0	36.5	0.0	39.8	0.0	43.6	0.0	45.5	0.0	49.3	0.0
2	24	14.9	0.0	19.9	0.0	22.4	0.0	23.8	0.0	25.1	0.0	28.2	0.0	27.1	0.0
3	6	10.2	0.0	13.6	0.0	14.8	0.0	15.5	0.0	16.2	0.0	16.5	0.0	17.1	0.0
3	12	7.4	0.0	9.9	0.0	10.7	0.0	11.0	0.0	11.5	0.0	11.6	0.0	12.0	0.0
3	18	5.7	0.0	7.7	0.0	8.2	0.0	8.4	0.0	8.7	0.0	8.8	0.0	9.1	0.0
3	24	25.3	0.0	33.8	0.0	47.2	0.0	59.2	0.0	75.7	0.0	89.3	0.0	104.3	0.0
4	6	137.0	0.1	182.7	0.4	224.5	0.9	258.7	1.3	294.8	1.8	322.2	2.2	349.1	2.7
4	12	62.7	0.3	83.6	1.2	92.0	2.2	97.7	3.0	104.2	4.0	109.1	4.7	114.3	5.5
4	18	38.4	0.0	51.2	0.9	55.0	2.0	58.2	3.0	61.4	4.0	64.1	4.8	65.9	5.6
4	24	92.4	0.0	123.3	1.0	137.7	2.2	152.0	3.3	165.8	4.4	178.0	5.3	185.5	6.2
5	6	45.6	0.0	60.8	1.1	63.8	2.4	66.0	3.6	69.0	4.9	71.5	6.0	73.4	6.9
5	12	22.1	0.0	29.5	0.6	30.4	1.9	31.1	3.1	31.9	4.4	32.5	5.5	33.5	6.5
5	18	18.4	0.0	24.6	0.0	25.6	1.1	26.0	2.3	27.0	3.7	27.4	4.8	29.1	5.8
5	24	29.3	0.0	39.1	0.0	41.5	0.4	41.8	1.6	44.3	3.0	44.6	4.1	53.0	5.2
6	6	21.6	0.0	28.8	0.0	32.1	0.0	32.2	1.0	33.8	2.3	34.3	3.4	48.2	4.6
6	12	15.4	0.0	20.6	0.0	21.4	0.0	21.4	0.2	22.1	1.6	22.8	2.7	34.0	4.0
6	18	10.7	0.0	14.3	0.0	14.8	0.0	14.9	0.0	15.3	0.7	16.2	1.8	25.2	3.3
6	24	43.6	0.0	58.2	0.0	67.6	0.0	77.5	0.0	110.4	0.7	190.1	2.3	274.3	4.6
7	6	26.9	0.0	35.9	0.0	39.1	0.0	43.5	0.0	65.2	0.7	102.4	3.3	144.5	6.9
7	12	37.2	0.0	49.7	0.0	52.8	0.0	55.7	0.0	60.3	0.3	70.8	3.3	81.2	7.3
7	18	32.6	0.0	43.5	0.0	45.6	0.0	47.5	0.0	49.3	0.0	52.0	2.9	53.3	7.0
7	24	24.4	0.0	32.6	0.0	33.9	0.0	35.1	0.0	36.1	0.0	37.3	2.3	37.8	6.4
8	6	18.9	0.0	25.2	0.0	25.9	0.0	26.6	0.0	27.2	0.0	28.0	1.6	28.3	5.7
8	12	15.1	0.0	20.2	0.0	20.7	0.0	21.2	0.0	21.7	0.0	22.3	0.8	22.4	4.9
8	18	12.4	0.0	16.6	0.0	17.0	0.0	17.3	0.0	17.6	0.0	18.0	0.0	18.1	4.0
8	24	10.5	0.0	14.0	0.0	20.7	0.0	14.6	0.0	14.9	0.0	15.2	0.0	15.2	3.1
9	6	15.9	0.0	21.3	0.0	18.0	0.0	18.8	0.0	20.6	0.0	21.4	0.0	23.6	2.3
9	12	41.2	0.0	55.0	0.0	16.7	0.0	81.7	0.0	91.6	0.0	95.9	0.0	104.6	2.3
9	18	19.9	0.0	26.6	0.0	33.4	0.0	34.4	0.0	36.4	0.0	37.3	0.0	38.9	2.3
9	24	18.6	0.0	24.8	0.0	25.2	0.0	26.8	0.0	29.1	0.0	30.1	0.0	32.4	1.6
10	6	21.3	0.0	28.4	0.0	36.5	0.0	39.8	0.0	43.6	0.0	45.5	0.0	49.3	1.0
10	12	14.9	0.0	19.9	0.0	22.4	0.0	23.8	0.0	25.1	0.0	28.2	0.0	27.1	0.3
10	18	10.2	0.0	13.6	0.0	14.8	0.0	15.5	0.0	16.2	0.0	16.5	0.0	17.1	0.0
10	24	7.4	0.0	9.9	0.0	10.7	0.0	11.0	0.0	11.5	0.0	11.6	0.0	12.0	0.0

Table 5.3.2

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BLOCK NO. : D
BASE POINT : P26
DISCHARGE AND OVERFLOW VOLUME IN MCM
CAPACITY OF LOWWATER CHANNEL 20
MAXIMUM OUTFLOW IN MCM 10.368

		RECURRENCE PERIOD OF FLOOD (YEAR)													
		1.05		2		5		10		25		50		100	
1	6	12.3	0.0	16.5	0.0	16.5	0.0	16.5	0.0	16.5	0.0	16.5	0.0	16.5	0.0
1	12	7.0	0.0	9.4	0.0	9.4	0.0	9.4	0.0	9.4	0.0	9.4	0.0	9.4	0.0
1	18	3.9	0.0	5.3	0.0	5.4	0.0	5.6	0.0	5.7	0.0	5.8	0.0	5.9	0.0
1	24	12.4	0.0	16.6	0.0	18.5	0.0	20.4	0.0	22.4	0.0	24.3	0.0	25.3	0.0
2	6	11.2	0.0	15.0	0.0	16.2	0.0	17.4	0.0	18.6	0.0	19.9	0.0	20.6	0.0
2	12	7.7	0.0	10.3	0.0	10.9	0.0	11.6	0.0	12.2	0.0	12.9	0.0	13.2	0.0
2	18	5.3	0.0	7.1	0.0	7.5	0.0	7.9	0.0	8.3	0.0	8.8	0.0	8.9	0.0
2	24	6.6	0.0	8.8	0.0	10.4	0.0	11.1	0.0	12.3	0.0	13.1	0.0	14.3	0.0
3	6	7.4	0.0	9.9	0.0	12.9	0.0	13.9	0.0	15.7	0.0	16.7	0.0	18.6	0.0
3	12	5.9	0.0	7.9	0.0	9.3	0.0	9.8	0.0	10.7	0.0	11.2	0.0	12.0	0.0
3	18	9.0	0.0	12.0	0.0	14.4	0.0	15.9	0.0	18.0	0.0	19.5	0.0	21.2	0.0
3	24	41.3	0.1	55.1	0.3	69.2	0.4	80.3	0.6	93.2	0.7	102.7	0.8	112.4	1.0
4	6	23.3	0.4	31.1	0.8	35.4	1.1	38.3	1.4	41.4	1.7	43.6	2.0	45.7	2.2
4	12	10.9	0.4	14.6	0.8	15.9	1.3	16.7	1.6	17.6	1.9	18.3	2.2	18.8	2.5
4	18	7.0	0.3	9.4	0.8	10.0	1.2	10.4	1.5	10.8	1.9	11.1	2.2	11.5	2.5
4	24	11.6	0.2	15.5	0.7	16.7	1.1	17.0	1.5	18.2	1.9	18.4	2.2	19.8	2.5
5	6	9.8	0.1	13.1	0.6	13.9	1.1	14.0	1.4	14.8	1.8	14.9	2.1	16.2	2.5
5	12	6.0	0.0	8.0	0.5	8.3	1.0	8.4	1.3	8.7	1.8	8.8	2.1	9.7	2.4
5	18	5.5	0.0	7.4	0.4	8.0	0.9	8.4	1.2	8.9	1.6	9.2	1.9	11.1	2.3
5	24	10.1	0.0	13.5	0.3	16.1	0.8	17.9	1.2	20.3	1.6	25.4	2.0	39.8	2.5
6	6	7.5	0.0	10.1	0.2	11.5	0.8	12.4	1.1	13.9	1.6	17.8	2.0	25.2	2.7
6	12	4.9	0.0	6.6	0.1	7.2	0.6	7.7	1.0	8.8	1.6	11.7	2.0	15.9	2.8
6	18	4.7	0.0	6.3	0.0	6.8	0.5	3.7	0.9	8.4	1.4	11.3	1.9	13.8	2.7
6	24	3.8	0.0	5.1	0.0	5.6	0.4	5.9	0.7	7.1	1.3	9.8	1.8	11.7	2.6
7	6	4.3	0.0	5.8	0.0	6.5	0.2	7.3	0.6	10.9	1.2	16.4	1.7	18.7	2.6
7	12	14.4	0.0	19.3	0.0	21.6	0.2	24.0	0.6	28.7	1.2	34.9	1.8	36.6	2.8
7	18	13.5	0.0	18.0	0.0	19.3	0.2	20.7	0.6	22.3	1.4	24.5	2.1	25.0	3.0
7	24	9.3	0.0	12.4	0.0	13.1	0.2	13.8	0.6	14.4	1.4	15.4	2.1	15.6	3.0
8	6	6.9	0.0	9.3	0.0	9.3	0.1	9.6	0.6	10.0	1.3	10.5	2.0	10.6	3.0
8	12	4.8	0.0	6.4	0.0	6.9	0.0	7.1	0.4	7.4	1.2	7.7	1.9	7.8	2.9
8	18	3.8	0.0	5.1	0.0	5.5	0.0	5.6	0.3	5.7	1.0	5.9	1.8	6.0	2.7
8	24	3.2	0.0	4.3	0.0	4.4	0.0	4.5	0.1	4.6	0.9	4.8	1.6	4.8	2.6
9	6	3.9	0.0	5.3	0.0	5.4	0.0	5.6	0.0	5.7	0.7	5.8	1.4	5.9	2.4
9	12	12.4	0.0	16.6	0.0	18.5	0.0	20.4	0.0	22.4	0.7	24.3	1.4	25.3	2.4
9	18	11.2	0.0	15.0	0.0	16.2	0.0	17.4	0.0	18.6	0.7	19.9	1.5	20.6	2.5
9	24	7.7	0.0	10.3	0.0	10.9	0.0	11.6	0.0	12.2	0.7	12.9	1.5	13.2	2.5
10	6	5.3	0.0	7.1	0.0	7.5	0.0	7.9	0.0	8.3	0.6	8.8	1.4	8.9	2.4
10	12	6.6	0.0	8.8	0.0	10.4	0.0	11.1	0.0	12.3	0.5	13.1	1.3	14.3	2.3
10	18	7.4	0.0	9.9	0.0	12.9	0.0	13.9	0.0	15.7	0.4	16.7	1.3	18.6	2.3
10	24	5.9	0.0	7.9	0.0	9.3	0.0	9.8	0.0	10.7	0.4	11.2	1.2	12.0	2.3

Table 5.3.2

BLOCK NO. : F
BASE POINT : P12
DISCHARGE AND OVERFLOW VOLUME IN MCM
CAPACITY OF LOWWATER CHANNEL 10
MAXIMUM OUTFLOW IN MCM 5.184

		RECURRENCE PERIOD OF FLOOD (YEAR)													
		1.05		2		5		10		25		50		100	
1	6	5.6	0.0	7.5	0.0	7.5	0.0	7.5	0.0	7.5	0.0	7.5	0.0	7.5	0.0
1	12	2.3	0.0	3.1	0.0	3.1	0.0	3.1	0.0	3.1	0.0	3.1	0.0	3.1	0.0
1	18	2.0	0.0	2.7	0.0	3.0	0.0	3.1	0.0	3.2	0.0	3.3	0.0	3.4	0.0
1	24	2.1	0.0	2.9	0.0	3.5	0.0	3.6	0.0	4.0	0.0	4.3	0.0	4.7	0.0
2	6	1.7	0.0	2.3	0.0	2.7	0.0	2.1	0.0	3.2	0.0	3.3	0.0	3.5	0.0
2	12	1.3	0.0	1.8	0.0	2.0	0.0	2.1	0.0	2.3	0.0	2.4	0.0	2.5	0.0
2	18	13.2	0.0	17.6	0.0	21.1	0.0	23.8	0.0	27.0	0.1	29.5	0.1	32.2	0.1
2	24	16.6	0.1	22.2	0.2	26.9	0.3	30.4	0.4	34.3	0.5	37.1	0.6	39.9	0.7
3	6	9.3	0.1	12.4	0.4	14.2	0.5	15.5	0.7	17.0	0.9	18.0	1.0	19.1	1.1
3	12	5.4	0.1	7.2	0.4	8.1	0.6	8.8	0.7	9.6	0.9	10.1	1.1	10.7	1.2
3	18	8.7	0.1	11.6	0.4	13.0	0.6	14.0	0.8	15.1	1.0	16.0	1.1	16.7	1.3
3	24	17.8	0.2	23.8	0.5	26.5	0.8	28.9	1.0	31.3	1.3	33.7	1.5	35.0	1.6
4	6	10.8	0.3	14.4	0.7	15.8	1.1	16.9	1.3	18.0	1.6	19.0	1.8	19.6	2.0
4	12	6.4	0.3	8.6	0.8	9.3	1.1	9.9	1.4	10.5	1.7	11.1	1.9	11.4	2.1
4	18	8.1	0.2	10.9	0.8	12.3	1.1	13.7	1.4	15.2	1.7	17.4	2.0	24.9	2.3
4	24	5.8	0.2	7.8	0.8	8.6	1.1	9.4	1.4	10.1	1.8	11.7	2.1	17.0	2.5
5	6	3.6	0.2	4.9	0.8	4.9	1.1	5.6	1.4	6.0	1.8	7.5	2.1	10.7	2.6
5	12	2.3	0.1	3.1	0.7	3.3	1.1	3.5	1.4	3.7	1.7	4.6	2.1	6.5	2.6
5	18	3.7	0.0	5.0	0.6	5.3	1.0	5.4	1.3	5.8	1.7	13.8	2.1	15.5	2.7
5	24	4.2	0.0	5.7	0.6	6.2	1.0	6.3	1.3	7.0	1.7	13.1	2.2	14.7	2.8
6	6	3.0	0.0	4.1	0.5	4.3	0.9	4.4	1.2	4.8	1.6	8.4	2.2	9.5	2.8
6	12	2.0	0.0	2.7	0.5	2.8	0.8	2.8	1.2	3.1	1.5	5.2	2.2	5.9	2.8
6	18	2.2	0.0	3.0	0.4	3.3	0.8	3.5	1.1	7.7	1.5	9.3	2.2	10.3	2.8
6	24	2.1	0.0	2.8	0.3	3.2	0.7	3.4	1.0	8.3	1.5	9.5	2.1	10.5	2.8
7	6	2.5	0.0	3.4	0.2	4.1	0.6	4.5	1.0	7.8	1.5	8.7	2.1	9.8	2.8
7	12	4.2	0.0	5.6	0.2	6.4	0.6	6.9	0.9	7.4	1.4	7.7	2.1	8.3	2.8
7	18	3.4	0.0	4.6	0.1	5.1	0.5	5.3	0.9	5.6	1.4	5.7	2.1	6.0	2.8
7	24	2.6	0.0	3.5	0.1	3.6	0.5	3.7	0.8	3.9	1.3	4.0	2.0	4.1	2.7
8	6	1.8	0.0	2.5	0.0	2.6	0.4	2.7	0.7	2.8	1.3	2.9	2.0	2.9	2.7
8	12	1.4	0.0	1.9	0.0	2.0	0.3	2.1	0.7	2.1	1.2	2.1	1.9	2.2	2.6
8	18	1.1	0.0	1.5	0.0	1.6	0.2	1.6	0.6	1.7	1.1	1.7	1.8	1.7	2.5
8	24	0.9	0.0	1.3	0.0	1.3	0.1	1.3	0.5	1.4	1.0	1.4	1.7	1.4	2.4
9	6	2.0	0.0	2.7	0.0	3.0	0.0	3.1	0.4	3.2	0.9	3.3	1.6	3.4	2.3
9	12	2.1	0.0	2.9	0.0	3.5	0.0	3.6	0.3	4.0	0.9	4.3	1.6	4.7	2.3
9	18	1.7	0.0	2.3	0.0	2.7	0.0	2.1	0.2	3.2	0.8	3.3	1.5	3.5	2.2
9	24	1.3	0.0	1.8	0.0	2.0	0.0	2.1	0.2	2.3	0.7	2.4	1.4	2.5	2.1
10	6	13.2	0.0	17.6	0.0	21.1	0.0	23.8	0.3	27.0	0.8	29.5	1.6	32.2	2.3
10	12	16.6	0.1	22.2	0.2	26.9	0.3	30.4	0.6	34.3	1.3	37.1	2.1	39.9	2.9
10	18	9.3	0.1	12.4	0.4	14.2	0.5	15.5	0.9	17.0	1.6	18.0	2.4	19.1	3.3
10	24	5.4	0.1	7.2	0.4	8.1	0.6	8.8	1.0	9.6	1.7	10.1	2.5	10.7	3.4

Table 5.3.2

(5/5)

BLOCK NO. : 6
BASE POINT : P13
DISCHARGE AND OVERFLOW VOLUME IN MCM
CAPACITY OF LOWWATER CHANNEL 70
MAXIMUM OUTFLOW IN MCM 36.288

		RECURRENCE PERIOD OF FLOOD (YEAR)													
		1.05		2		5		10		25		50		100	
1	6	31.5	0.0	42.1	0.0	42.1	0.0	42.1	0.0	42.1	0.0	42.1	0.0	42.1	0.0
1	12	8.8	0.0	11.8	0.0	11.8	0.0	11.8	0.0	11.8	0.0	11.8	0.0	11.8	0.0
1	18	10.8	0.0	14.4	0.0	16.5	0.0	17.1	0.0	18.5	0.0	19.1	0.0	20.7	0.0
1	24	15.0	0.0	20.0	0.0	24.2	0.0	25.4	0.0	28.3	0.0	29.6	0.0	32.7	0.0
2	6	9.7	0.0	13.0	0.0	15.0	0.0	15.5	0.0	16.8	0.0	17.4	0.0	18.6	0.0
2	12	7.5	0.0	10.0	0.0	11.2	0.0	11.6	0.0	12.4	0.0	12.8	0.0	13.5	0.0
2	18	140.0	0.3	186.7	0.8	240.1	1.3	282.5	1.8	333.6	2.3	373.4	2.7	414.2	3.1
2	24	85.2	1.3	113.6	2.5	129.6	3.8	141.1	4.8	153.7	6.0	162.9	7.0	170.3	7.9
3	6	36.0	1.3	48.0	2.8	52.5	4.3	55.7	5.5	59.1	6.8	61.5	7.9	63.8	9.0
3	12	20.0	0.9	26.7	2.5	28.8	4.0	30.4	5.2	32.0	6.7	33.2	7.8	34.3	8.8
3	18	43.8	0.5	58.4	2.3	64.5	3.9	70.5	5.2	76.8	6.7	83.0	7.8	86.5	8.9
3	24	68.2	0.5	91.0	2.5	99.7	4.2	108.3	5.6	116.9	7.2	125.4	8.5	129.7	9.7
4	6	35.3	0.4	47.1	2.6	50.4	4.4	53.3	5.9	56.2	7.6	59.0	9.0	60.4	10.3
4	12	20.7	0.0	27.7	2.2	29.5	4.1	31.1	5.7	32.7	7.4	34.4	8.9	35.2	10.1
4	18	25.9	0.0	34.6	1.8	38.0	3.7	41.3	5.3	44.7	7.1	49.5	8.6	56.1	9.9
4	24	17.3	0.0	23.1	1.4	24.9	3.3	26.6	5.0	28.2	6.8	31.2	8.3	37.4	9.7
5	6	13.5	0.0	18.1	0.9	19.5	2.8	20.8	4.5	22.1	6.3	25.0	7.8	29.0	9.3
5	12	9.3	0.0	12.5	0.3	13.3	2.2	14.1	3.9	14.9	5.7	16.6	7.3	18.9	8.8
5	18	14.4	0.0	19.2	0.0	20.8	1.7	21.3	3.3	22.9	5.2	28.6	6.8	31.2	8.3
5	24	19.0	0.0	25.4	0.0	27.1	1.2	27.5	2.8	29.6	4.7	36.6	6.4	39.4	8.0
6	6	11.9	0.0	15.9	0.0	16.7	0.6	16.9	2.3	17.9	4.2	22.1	6.0	23.6	7.6
6	12	8.0	0.0	10.7	0.0	11.2	0.0	11.3	1.7	11.8	3.6	14.3	5.4	15.2	7.0
6	18	21.0	0.0	28.0	0.0	33.6	0.0	37.3	1.3	45.4	3.2	55.0	5.2	67.4	7.0
6	24	27.6	0.0	36.9	0.0	45.7	0.0	50.6	1.0	62.0	3.1	71.0	5.2	86.5	7.1
7	6	18.3	0.0	24.5	0.0	28.2	0.0	30.6	0.7	36.7	3.0	42.0	5.2	51.6	7.2
7	12	36.8	0.0	49.1	0.0	54.7	0.0	58.1	0.5	61.5	2.8	63.1	5.0	66.3	7.1
7	18	26.1	0.0	34.8	0.0	38.0	0.0	39.8	0.3	41.6	2.7	42.5	4.9	44.1	7.1
7	24	19.1	0.0	25.5	0.0	27.3	0.0	28.5	0.0	29.6	2.3	30.1	4.6	31.1	6.7
8	6	14.6	0.0	19.5	0.0	20.7	0.0	21.4	0.0	22.1	1.8	22.4	4.1	23.0	6.3
8	12	11.5	0.0	15.4	0.0	16.2	0.0	16.7	0.0	17.2	1.3	17.4	3.6	17.8	5.7
8	18	9.4	0.0	12.6	0.0	13.2	0.0	13.5	0.0	13.8	0.7	14.0	3.0	14.2	5.2
8	24	7.9	0.0	10.6	0.0	11.0	0.0	11.3	0.0	11.5	0.1	11.6	2.4	11.8	4.5
9	6	10.8	0.0	14.4	0.0	16.5	0.0	17.1	0.0	18.5	0.0	19.1	1.8	20.7	4.0
9	12	15.0	0.0	20.0	0.0	24.2	0.0	25.4	0.0	28.3	0.0	29.6	1.3	32.7	3.5
9	18	9.7	0.0	13.0	0.0	15.0	0.0	15.5	0.0	16.8	0.0	17.4	0.8	18.6	3.0
9	24	7.5	0.0	10.0	0.0	11.2	0.0	11.6	0.0	12.4	0.0	12.8	0.2	13.5	2.5
10	6	140.0	0.3	186.7	0.8	240.1	1.3	282.5	1.8	333.6	2.3	373.4	3.0	414.2	5.7
10	12	85.2	1.3	113.6	2.5	129.6	3.8	141.1	4.8	153.7	6.0	162.9	7.2	170.3	10.5
10	18	36.0	1.3	48.0	2.8	52.5	4.3	55.7	5.5	59.1	6.8	61.5	8.2	63.8	11.5
10	24	20.0	0.9	26.7	2.5	28.8	4.0	30.4	5.2	32.0	6.7	33.2	8.0	34.3	11.4