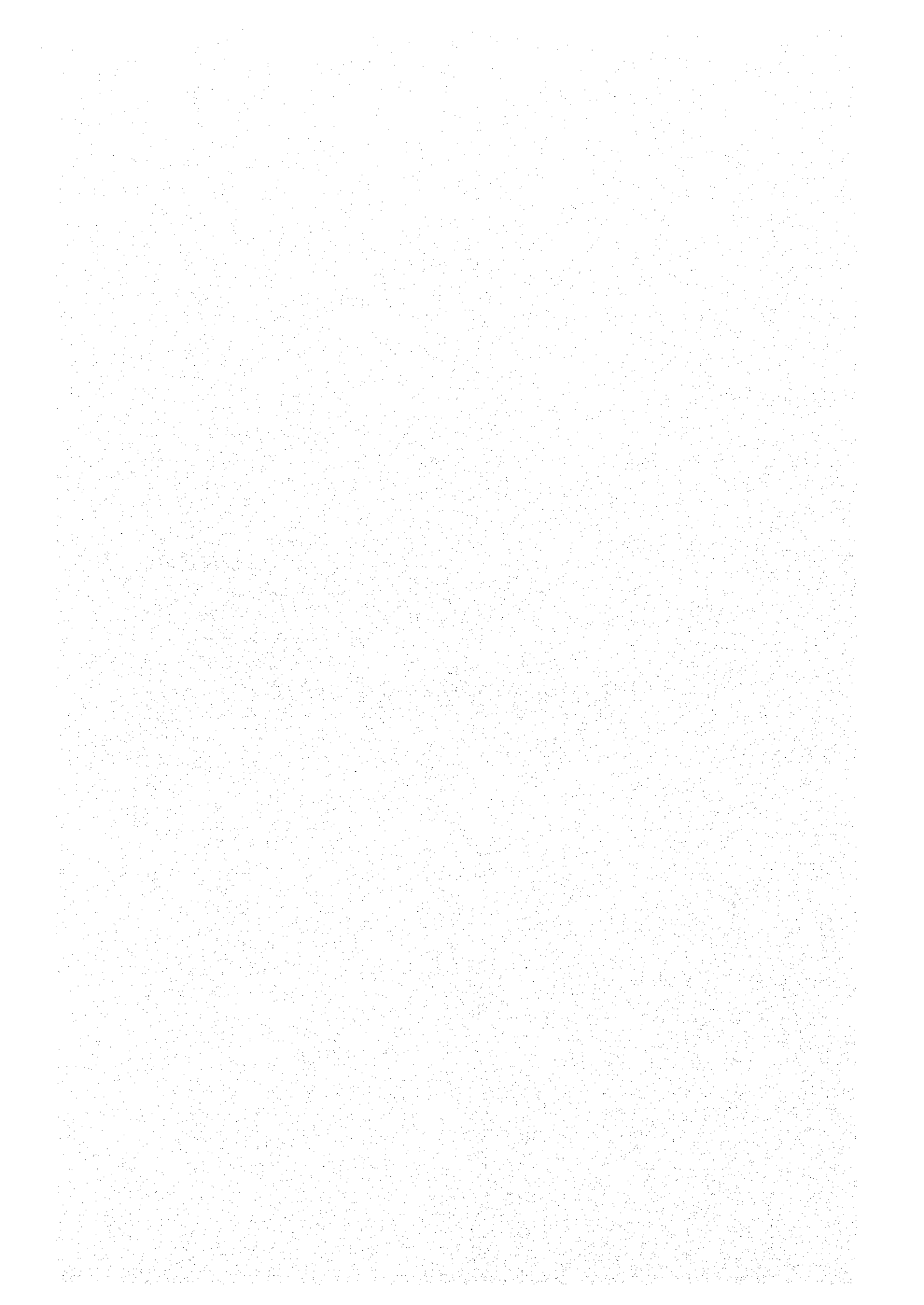
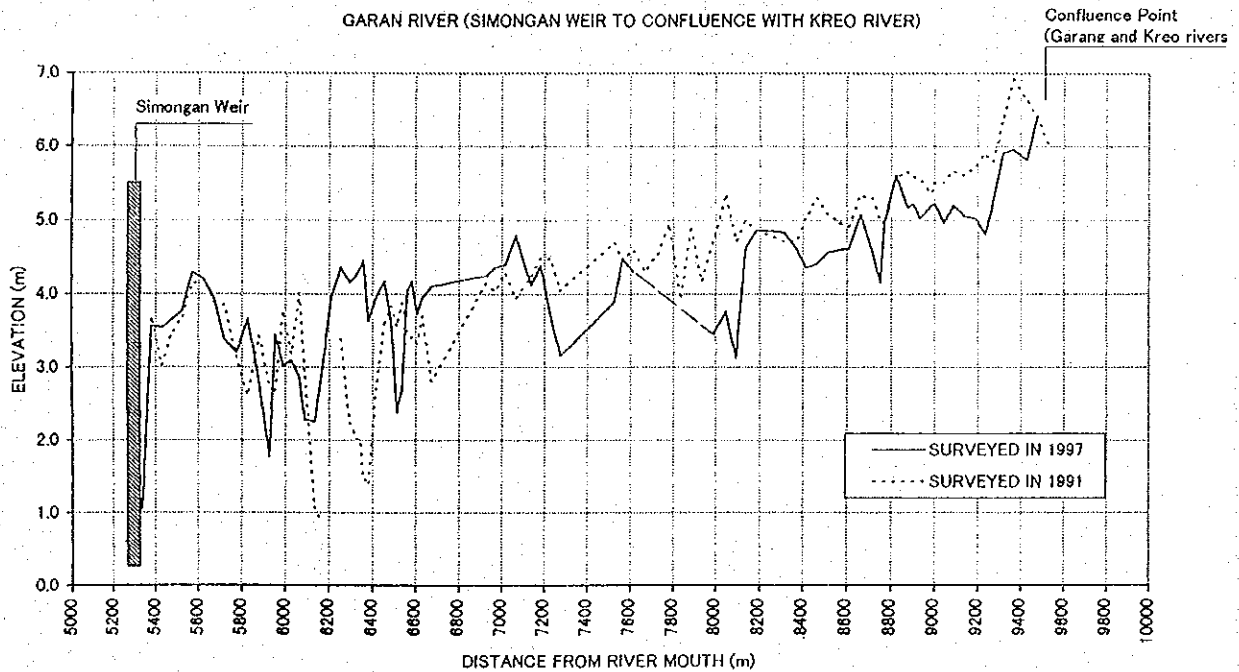
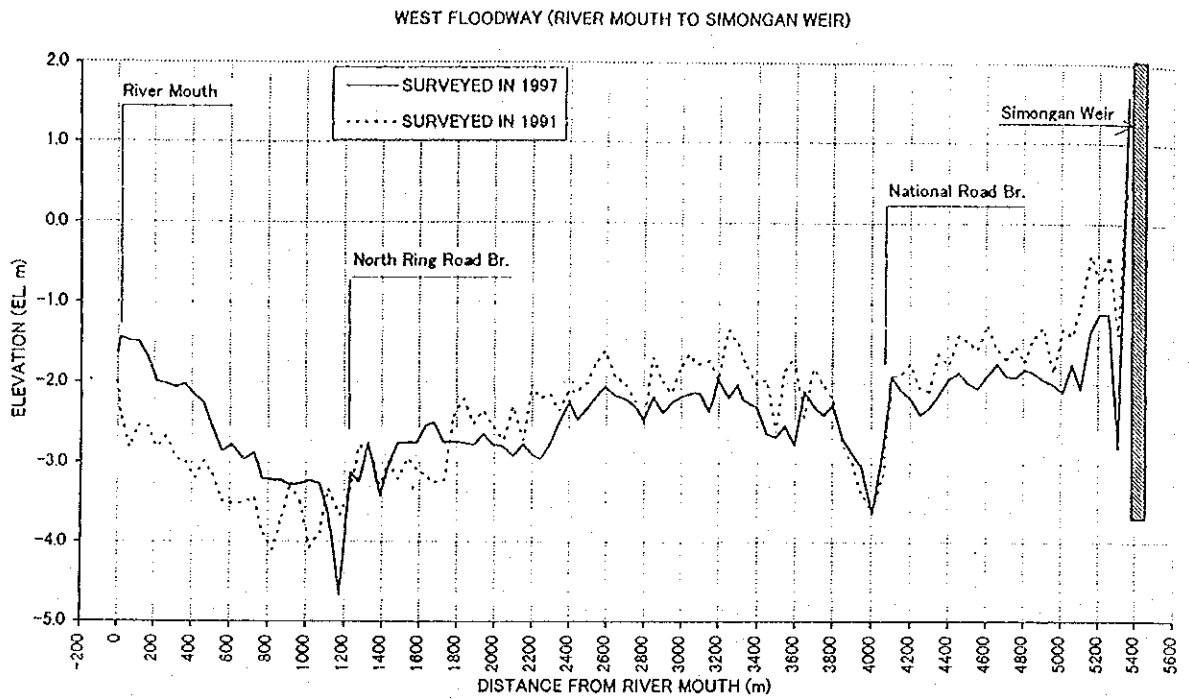


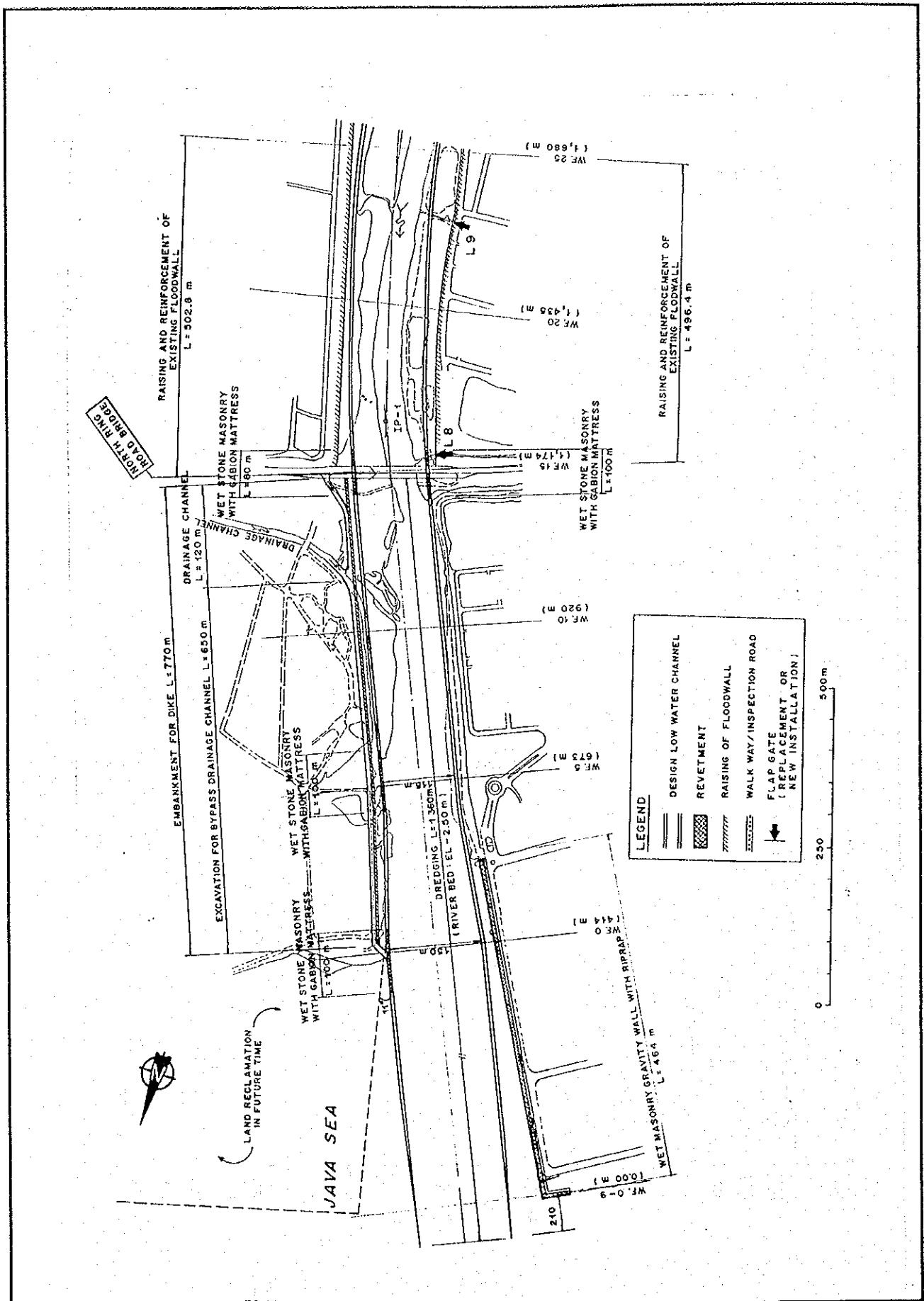
FIGURES

CHAPTER 4

FORMULATION OF DEFINITIVE PLAN

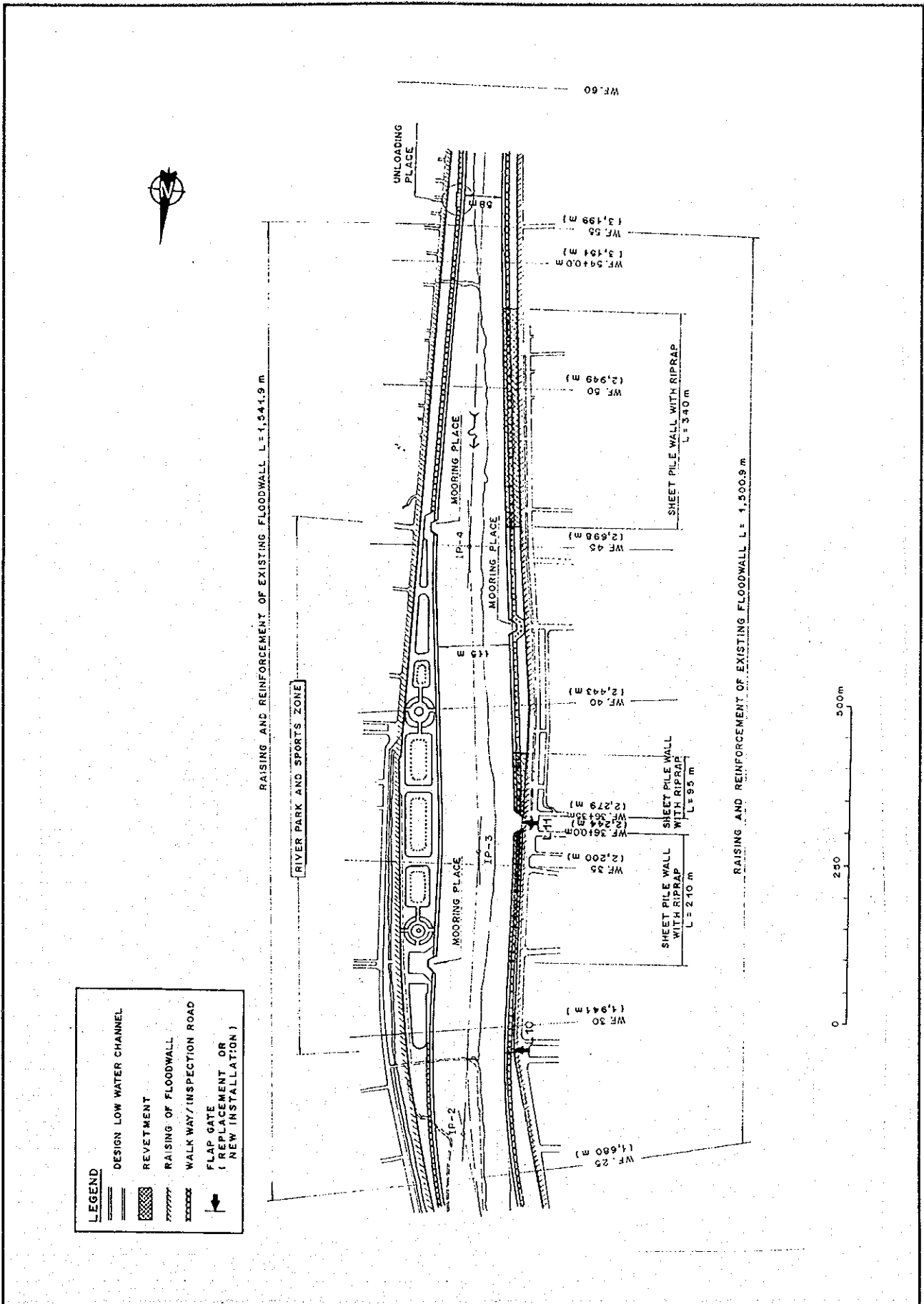






THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.1 (1/3)
PLAN FOR WEST FLOODWAY IMPROVEMENT

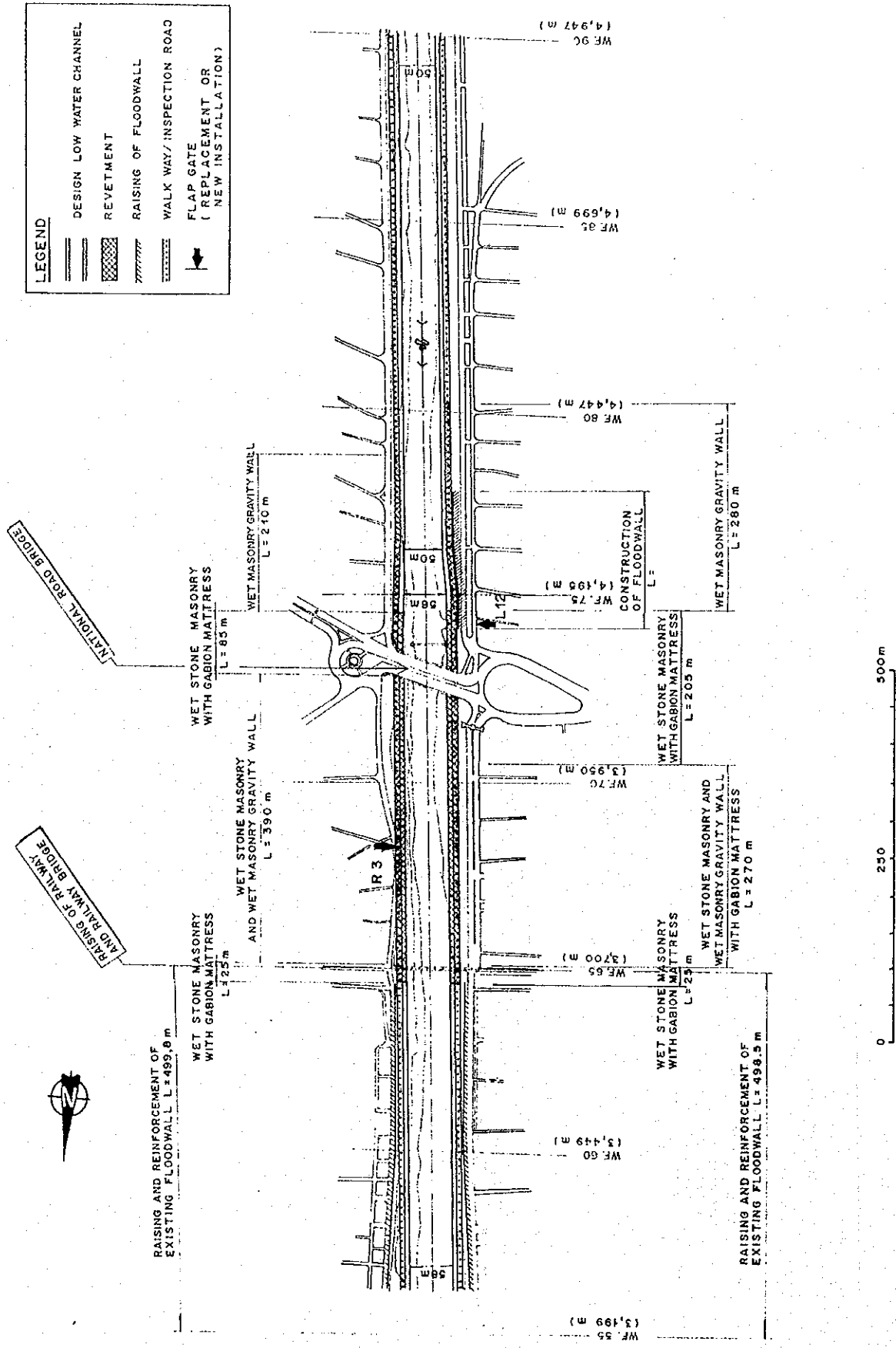


THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.1 (2/3)
PLAN FOR WEST FLOODWAY IMPROVEMENT

JAPAN INTERNATIONAL COOPERATION AGENCY

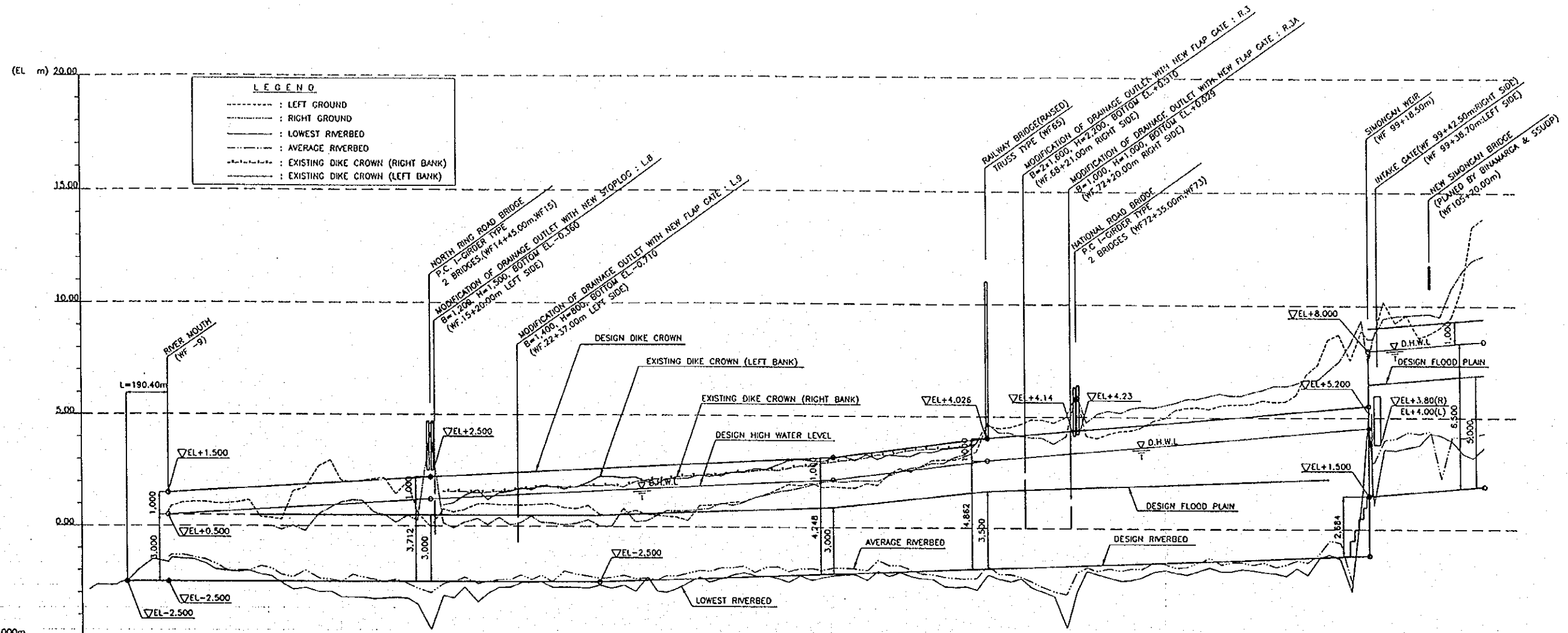
LEGEND	
	DESIGN LOW WATER CHANNEL
	REVETMENT
	RAISING OF FLOODWALL
	WALK WAY/INSPECTION ROAD
	FLAP GATE (REPLACEMENT OR NEW INSTALLATION)



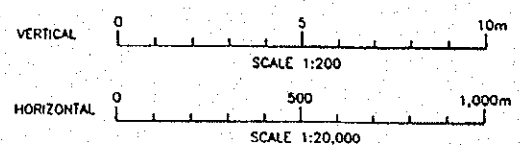
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.1 (3/3)
PLAN FOR WEST FLOODWAY IMPROVEMENT

JAPAN INTERNATIONAL COOPERATION AGENCY



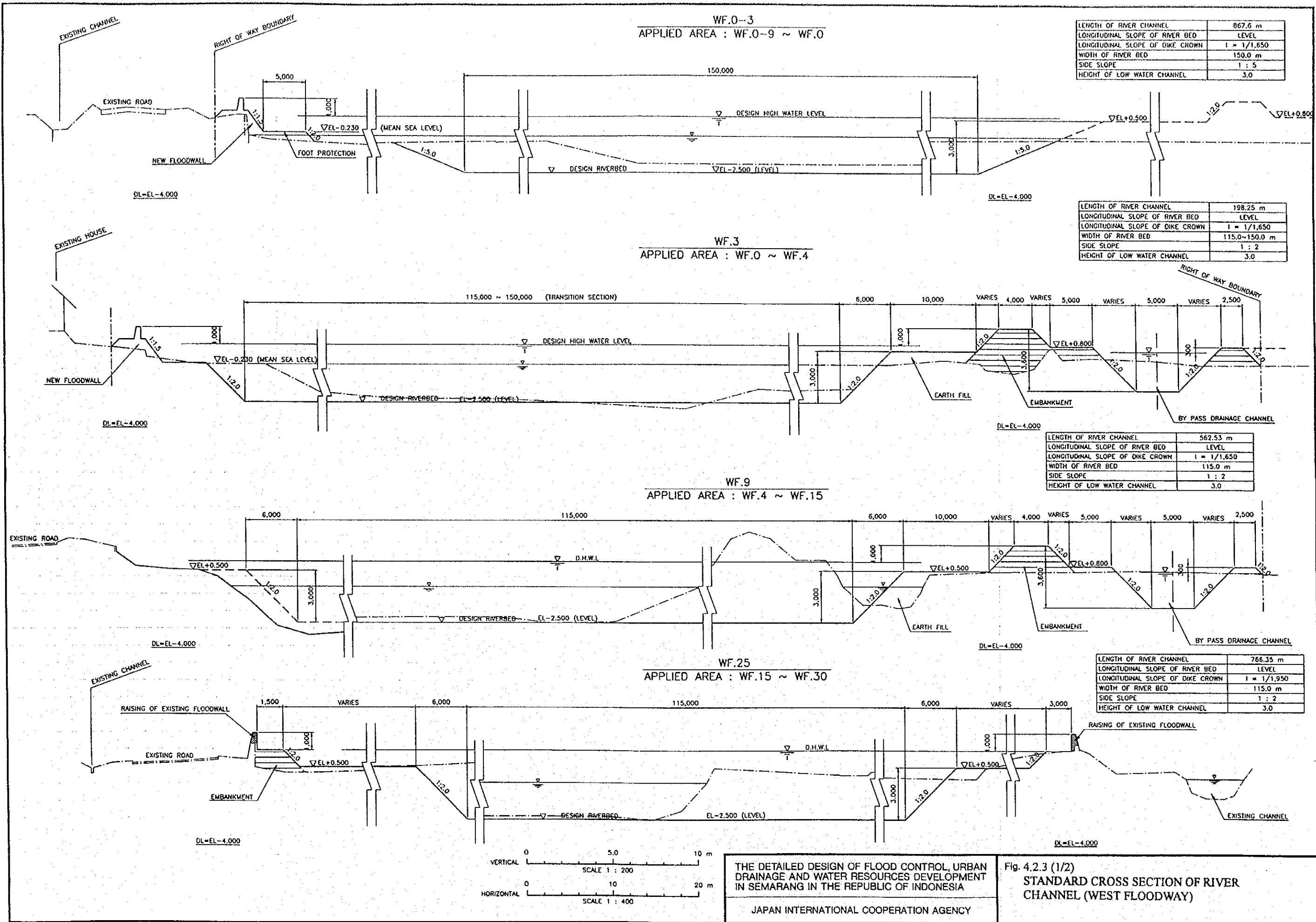
GRADIENT OF DESIGN H.W.L.		0.00	$i=1/1850$ $L=1174.38m$	1.212	$i=1/1950$ $L=1822.42m$	2.14	$i=1/800$ $L=703.39m$	3.07	$i=1/1150$ $L=1728.00m$	4.37	$i=1/1250$
GRADIENT OF DESIGN RIVERBED		-2.500	LEVEL $L=1940.73m$		-2.500	$i=1/2650$ $L=3487.46m$		-1.30	$i=1/1250$	-1.30	$i=1/1250$
DESIGN ELEVATION	DIKE CROWN	1.500	1.535	1.568	1.600	1.628	1.656	1.684	1.712	1.740	1.768
	HIGH WATER LEVEL	0.500	0.535	0.568	0.600	0.628	0.656	0.684	0.712	0.740	0.768
	RIVERBED	-2.500	-2.500	-2.500	-2.500	-2.500	-2.500	-2.500	-2.500	-2.500	-2.500
EXISTING ELEVATION	RIGHT GROUND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LEFT GROUND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	LOWEST RIVERBED	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50	-2.50
DISTANCE	ACCUMULATED (m)	-60.00	-74.00	-87.96	-100.00	-111.24	-120.72	-128.48	-134.52	-138.96	-141.76
	PARTIAL (m)	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00	-14.00
STATION NO.		1	2	3	4	5	6	7	8	9	10



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

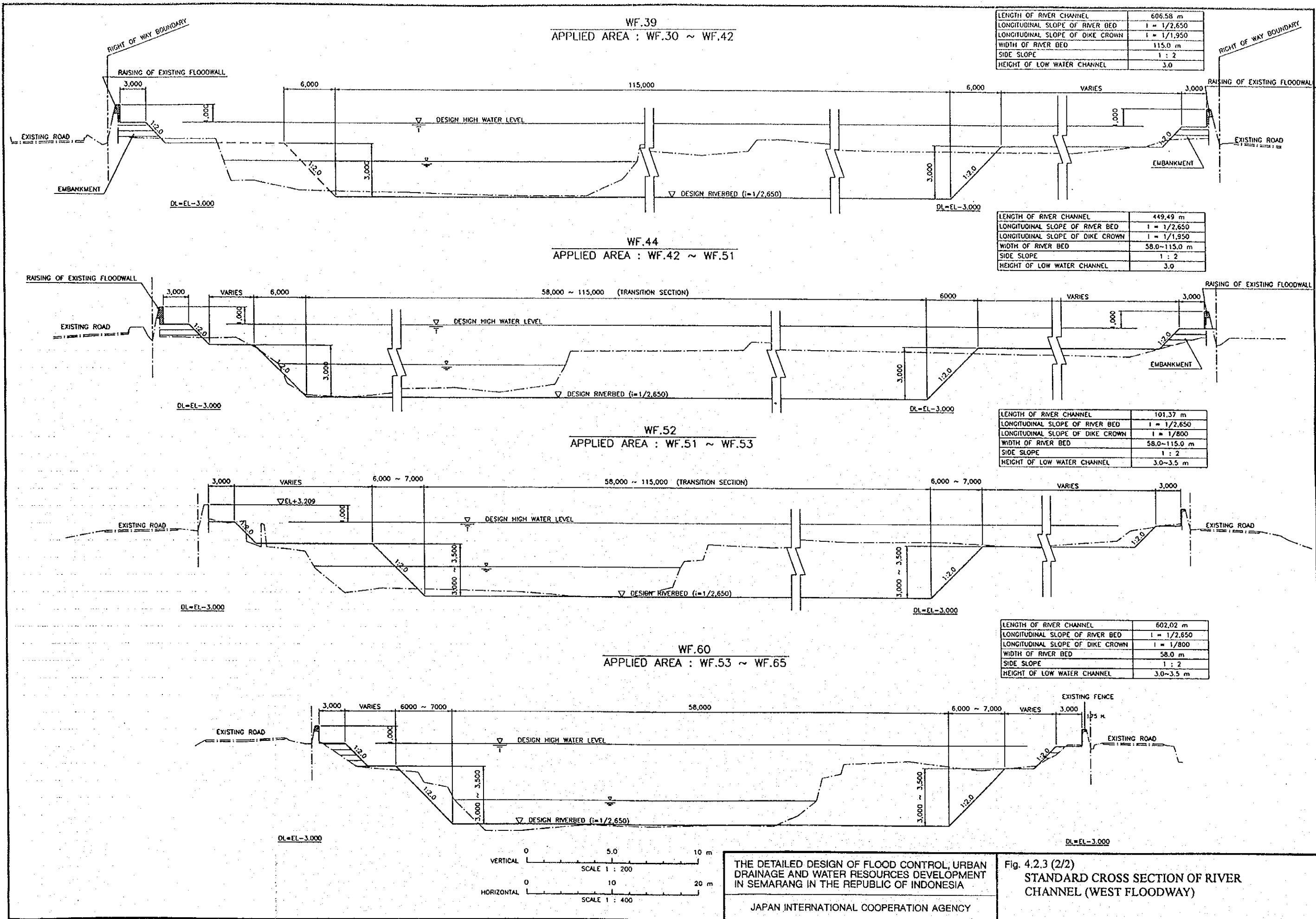
Fig. 4.2.2 DESIGN LONGITUDINAL PROFILE OF WEST FLOODWAY

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THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
JAPAN INTERNATIONAL COOPERATION AGENCY

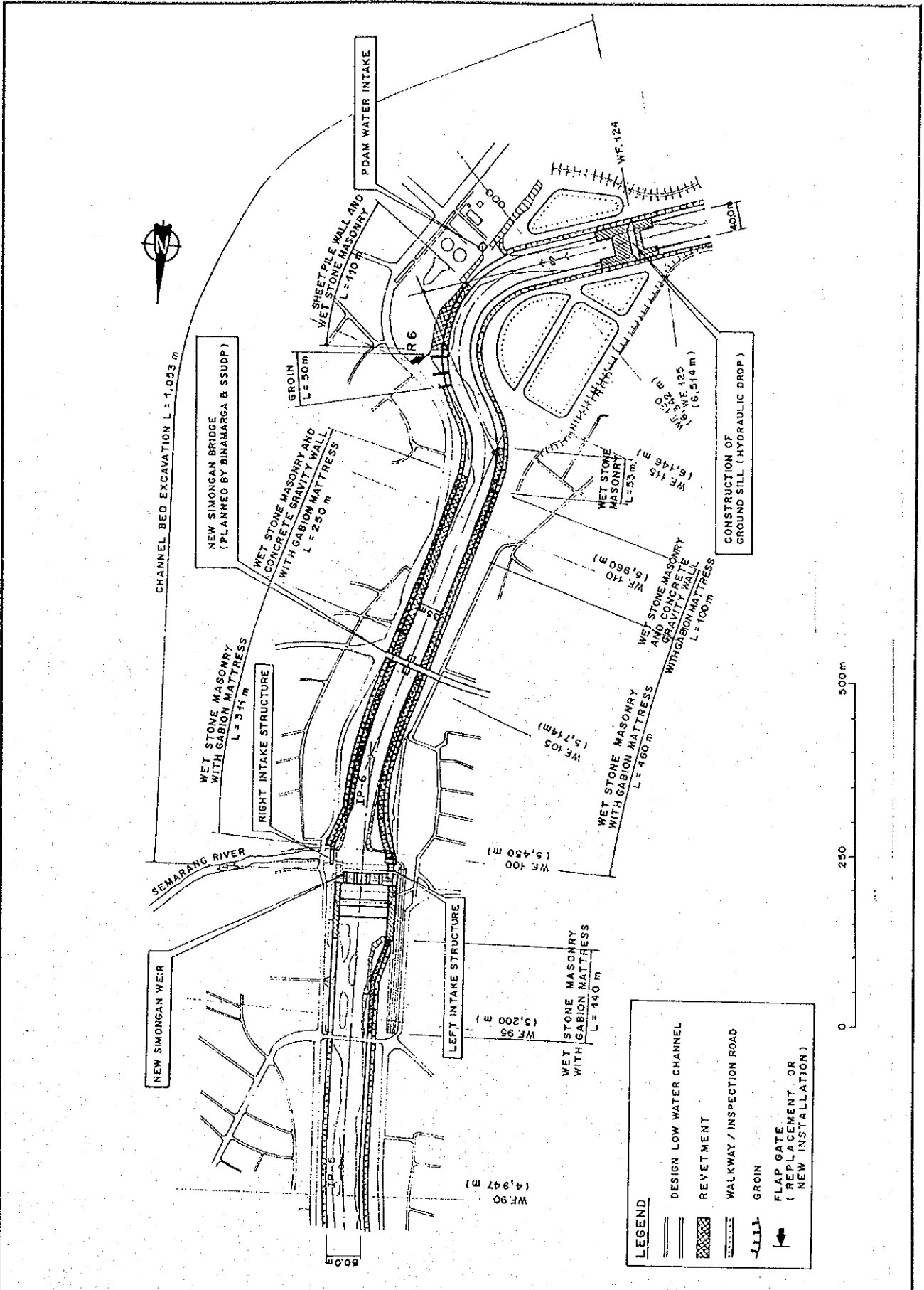
Fig. 4.2.3 (1/2)
STANDARD CROSS SECTION OF RIVER CHANNEL (WEST FLOODWAY)



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

JAPAN INTERNATIONAL COOPERATION AGENCY

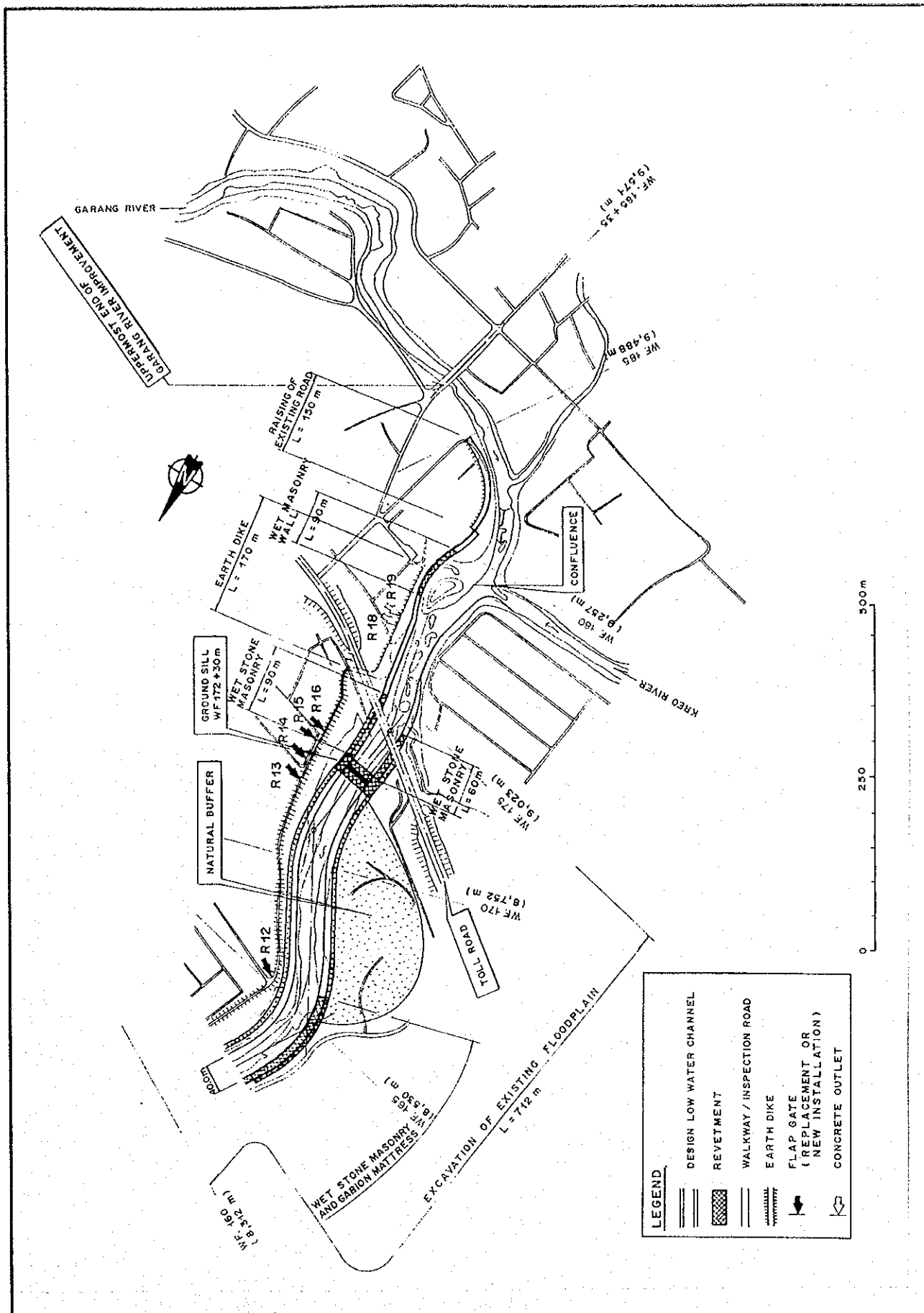
Fig. 4.2.3 (2/2)
STANDARD CROSS SECTION OF RIVER CHANNEL (WEST FLOODWAY)



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.4 (1/3)
PLAN FOR GARANG RIVER IMPROVEMENT

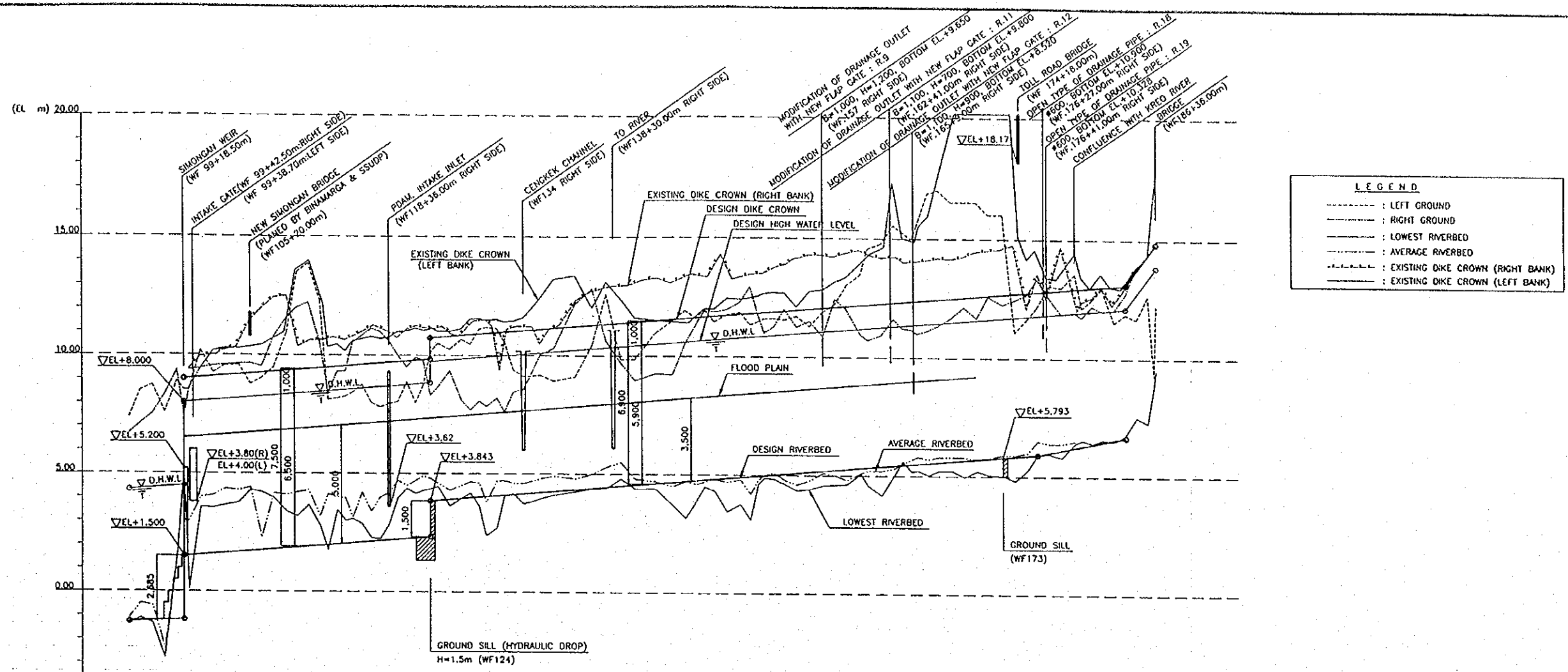
JAPAN INTERNATIONAL COOPERATION AGENCY



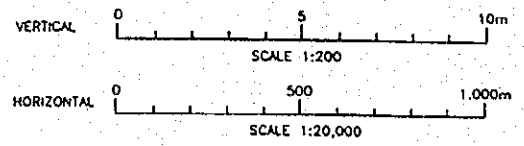
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.4 (3/3)
PLAN FOR GARANG RIVER IMPROVEMENT

JAPAN INTERNATIONAL COOPERATION AGENCY



GRADIENT OF DESIGN H.W.L.		GRADIENT OF DESIGN RIVERBED	
DESIGN ELEVATION	DIKE CROWN	5.330	13.830
	HIGH WATER LEVEL	4.330	12.830
	RIVERBED	1.500	10.000
EXISTING ELEVATION	RIGHT GROUND	8.20	13.77
	LEFT GROUND	7.29	12.77
	LOWEST RIVERBED	-1.32	8.97
DISTANCE	ACCUMULATED (m)	32.45	1000.00
	PARTIAL (m)	0.00	0.00
STATION NO.		95	1000



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 4.2.5 DESIGN LONGITUDINAL PROFILE OF GARANG RIVER

Uniform Flow Calculation

GARANG RIVER

River Section : WF101 to WF176

(1) Calculation Conditions

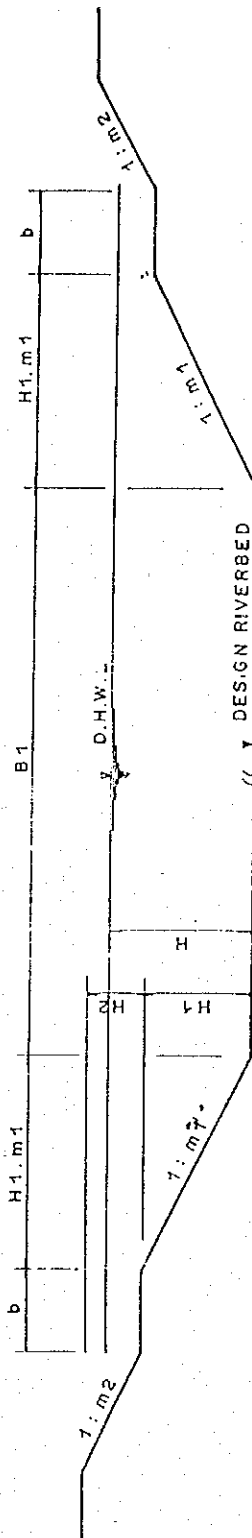
Roughness Coefficient	n =	0.030
River Bed Slope	i =	0.0008
River Bed Width	B ₁ =	35.00 m
Height 1	H ₁ =	5.00 m
Height 2	H ₂ =	3.00 m
Slope Gradient 1	m ₁ =	2.00 (1 : m ₁)
Slope Gradient 2	m ₂ =	2.00 (1 : m ₂)
Width of Berm	b =	4.00 m
Freeboard	F _b =	1.00 m
Water Depth (High water level - Design riverbed)	H =	6.50 m

(2) Calculation Formula

Hydraulic Radius	R = A/P
Velocity	$v = 1/n * R^{(2/3)} * I^{(1/2)}$
Discharge	Q = v x A

(3) Design Discharge

Priority Project
Qa = 790.00 (m³/s)



Calculation Table

	H m	B1 m	B2 m	B3 m	A1 m ²	A2 m ²	P m	R m	n	i	v m/s	Q m ³ /s
1	6.50	35.00	55.00	69.00	225.00	324.00	72.07	4.50	0.030	0.000800	2.57	832.08
2	5.90	40.00	54.00	71.60	164.50	324.82	74.39	4.37	0.030	0.000800	2.52	818.16

Section-1 WF101 to WF124

Q = 832.08 > 790.00 (m³/s) OK

Section-2 WF124 to WF176

Q = 818.16 > 790.00 (m³/s) OK

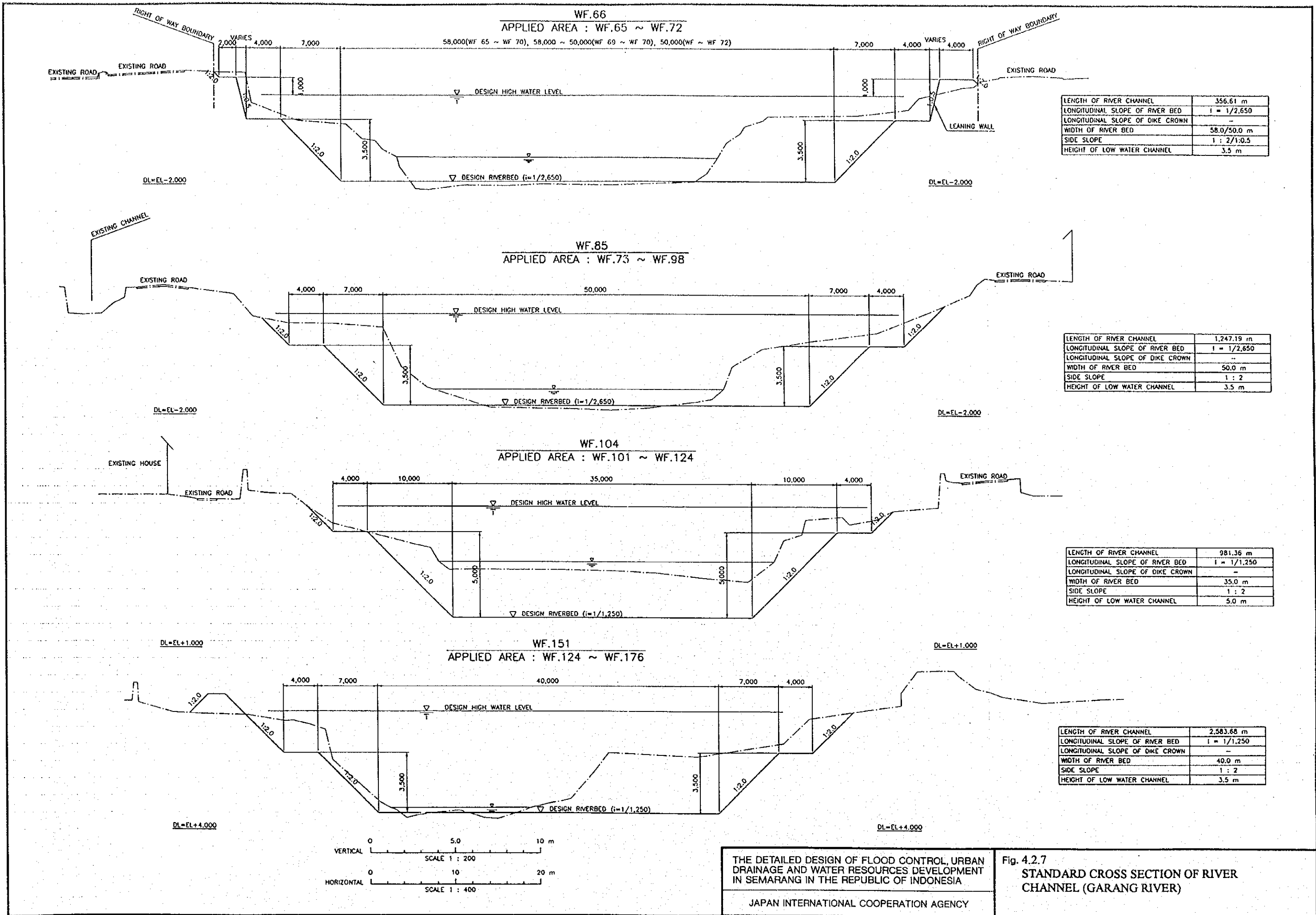
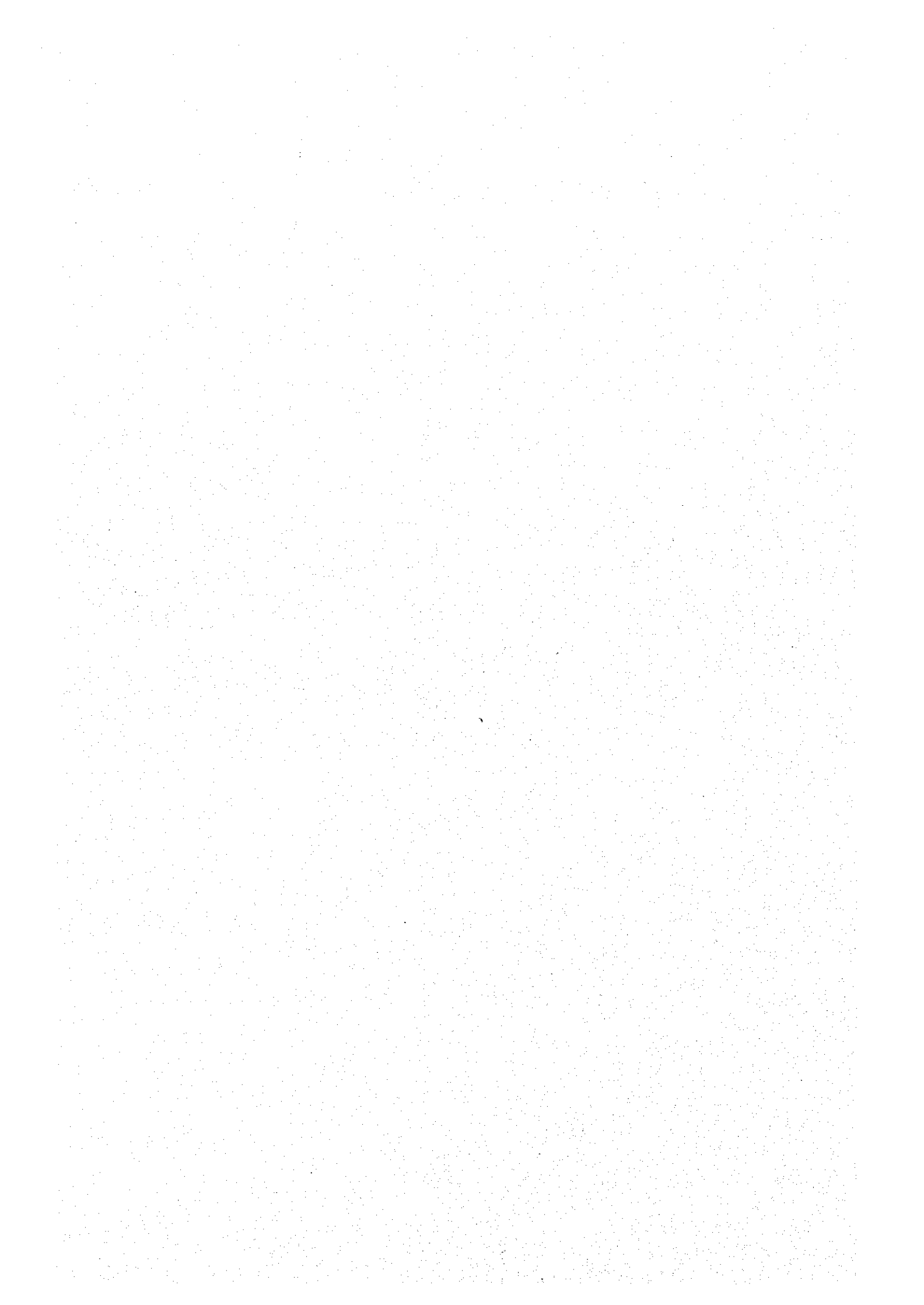
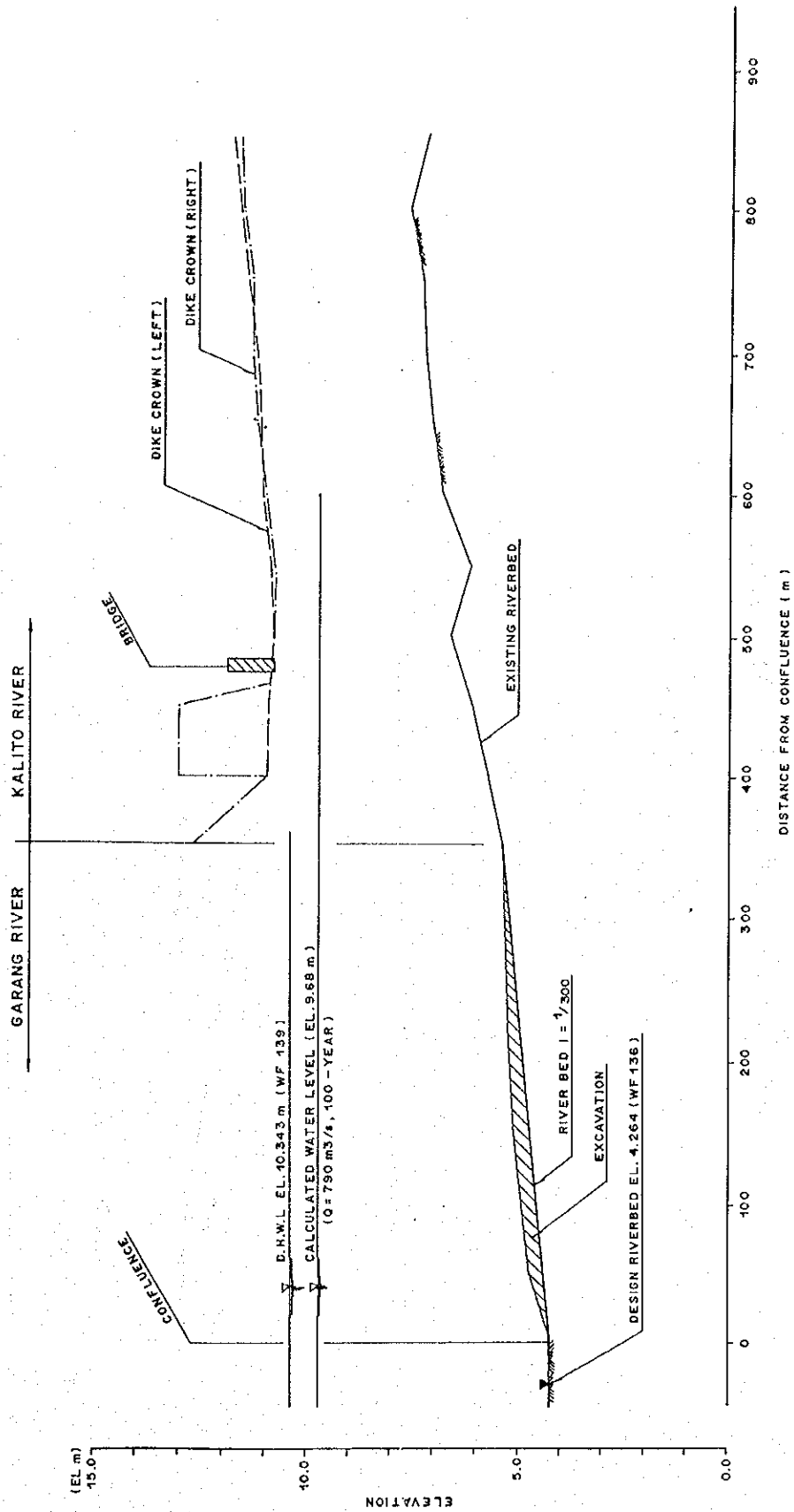


Fig. 4.2.7
STANDARD CROSS SECTION OF RIVER CHANNEL (GARANG RIVER)



LONGITUDINAL PROFILE OF KALITO RIVER



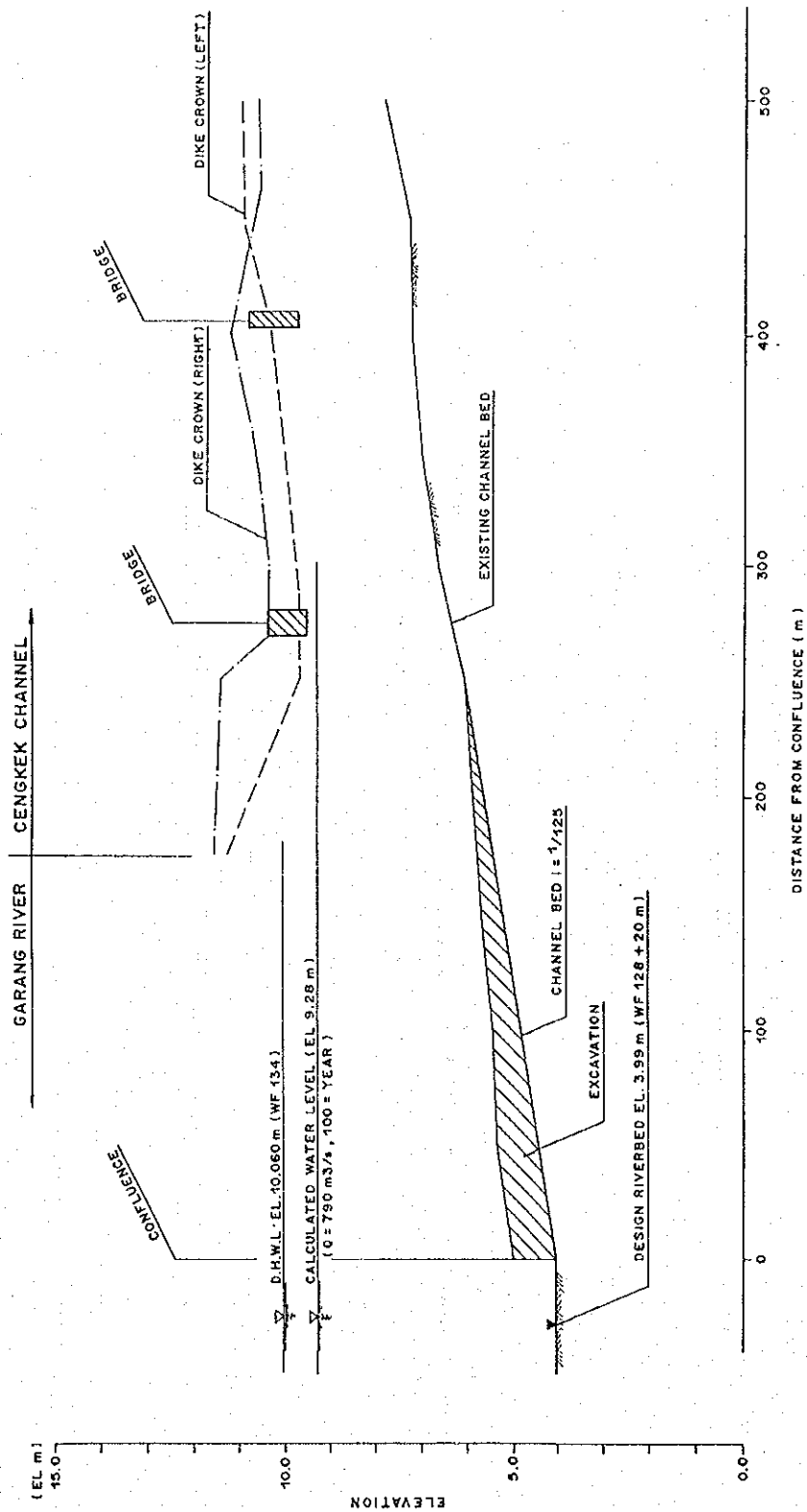
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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Fig. 4.2.8

LONGITUDINAL PROFILE OF KALITO RIVER AND WATER LEVEL OF GARANG RIVER

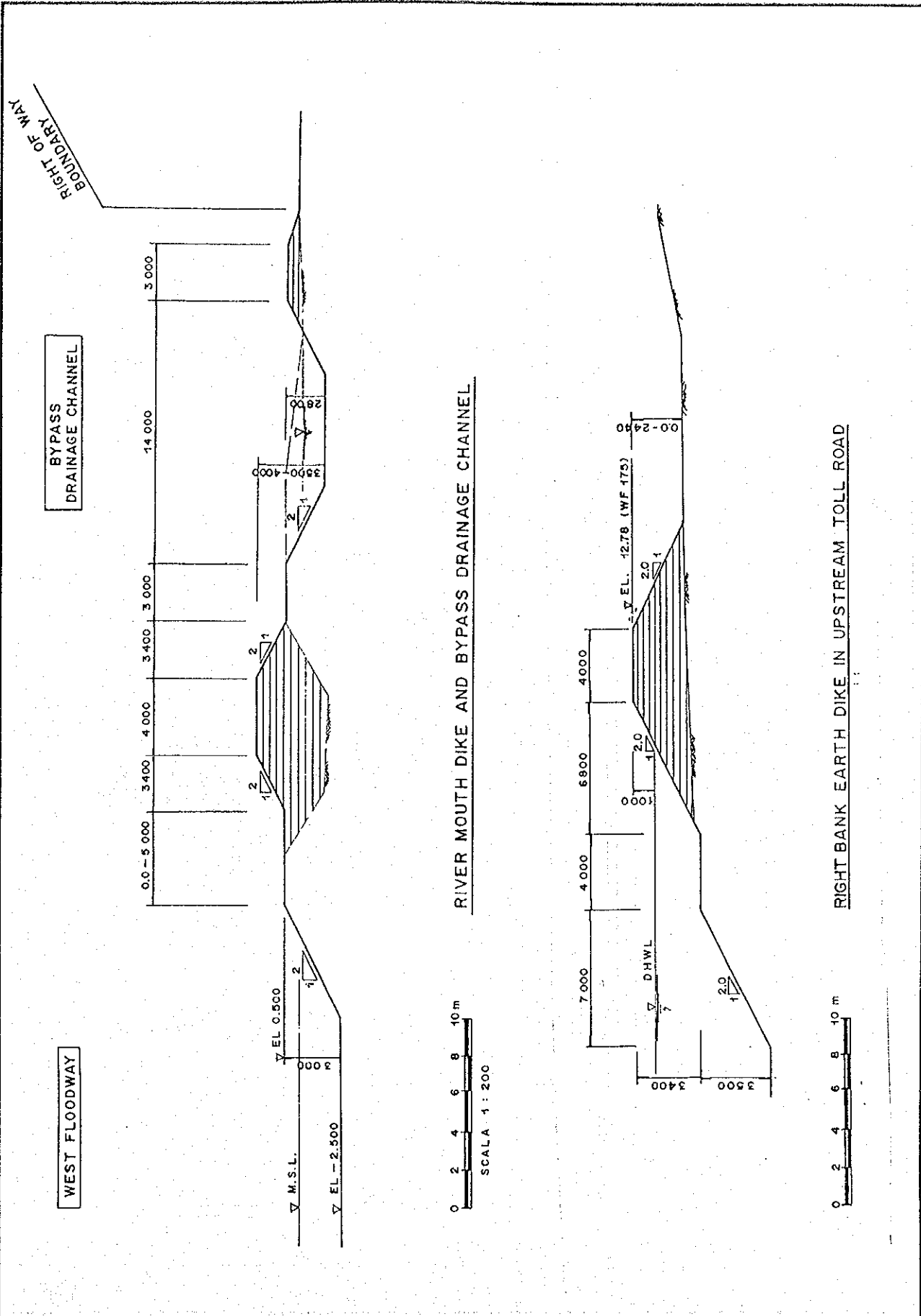
LONGITUDINAL PROFILE OF CENGKEK CHANNEL



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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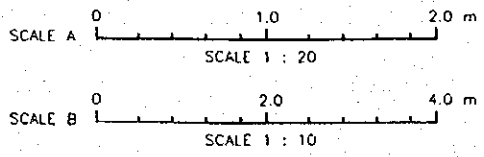
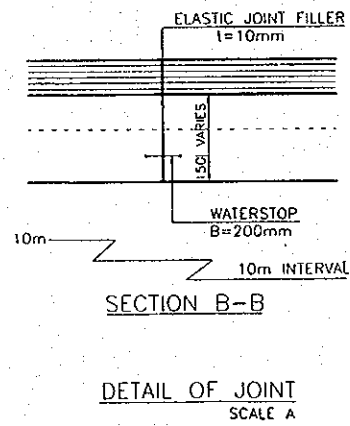
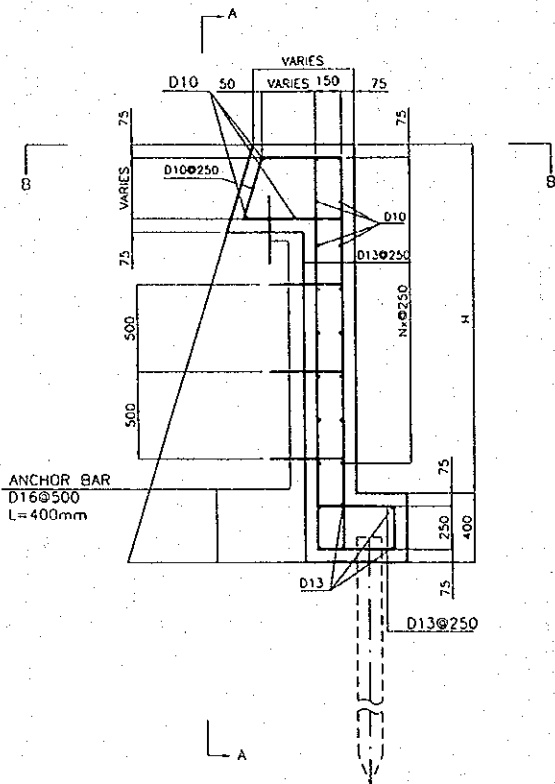
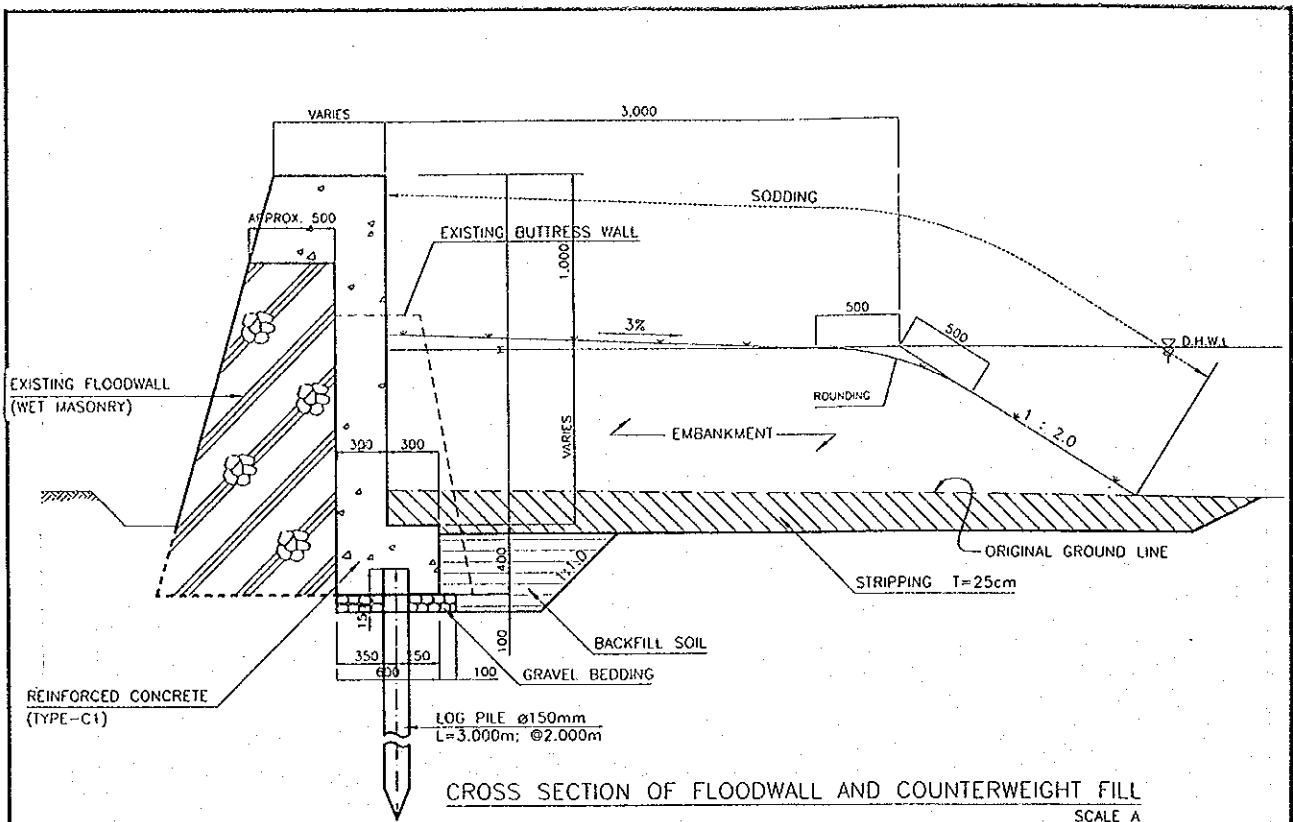
Fig. 4.2.9
LONGITUDINAL PROFILE OF CENGKEK CHANNEL AND WATER LEVEL OF GARANG RIVER



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.10
TYPICAL CROSS SECTION OF PROPOSED EARTH DIKE

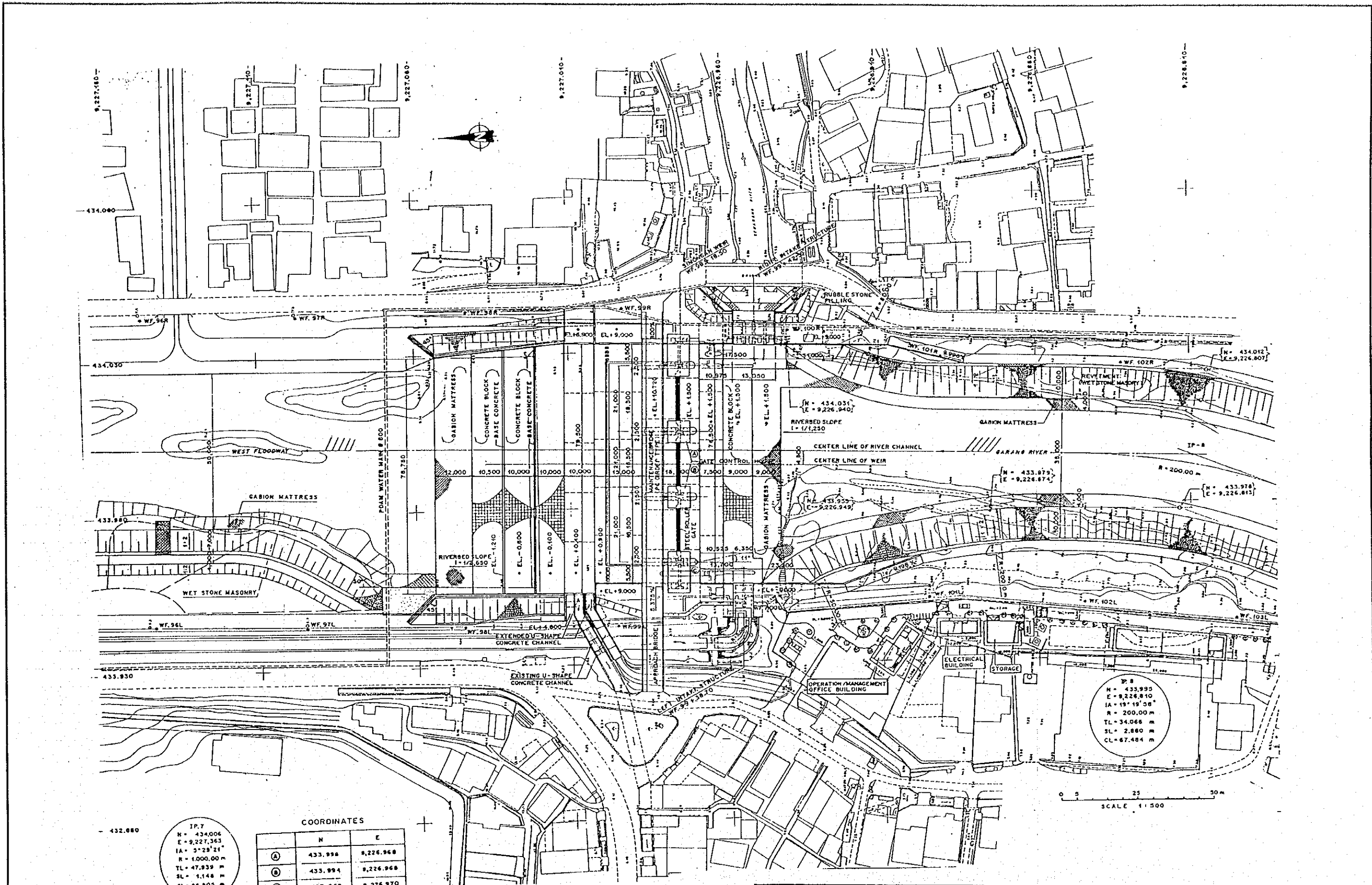
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THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

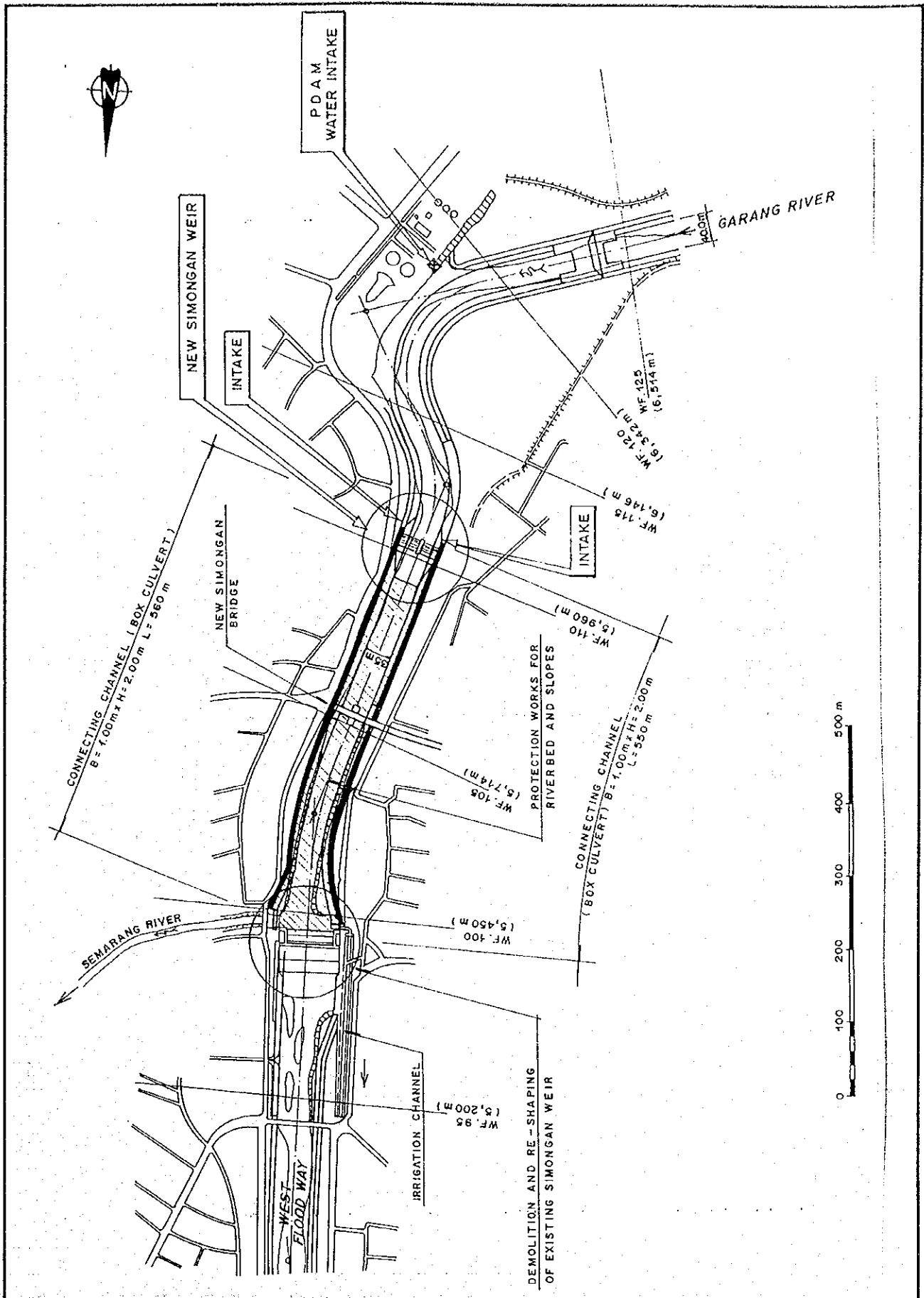
JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. 4.2.11
STRUCTURAL DETAILED DRAWINGS FOR FLOODWALL RAISING



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
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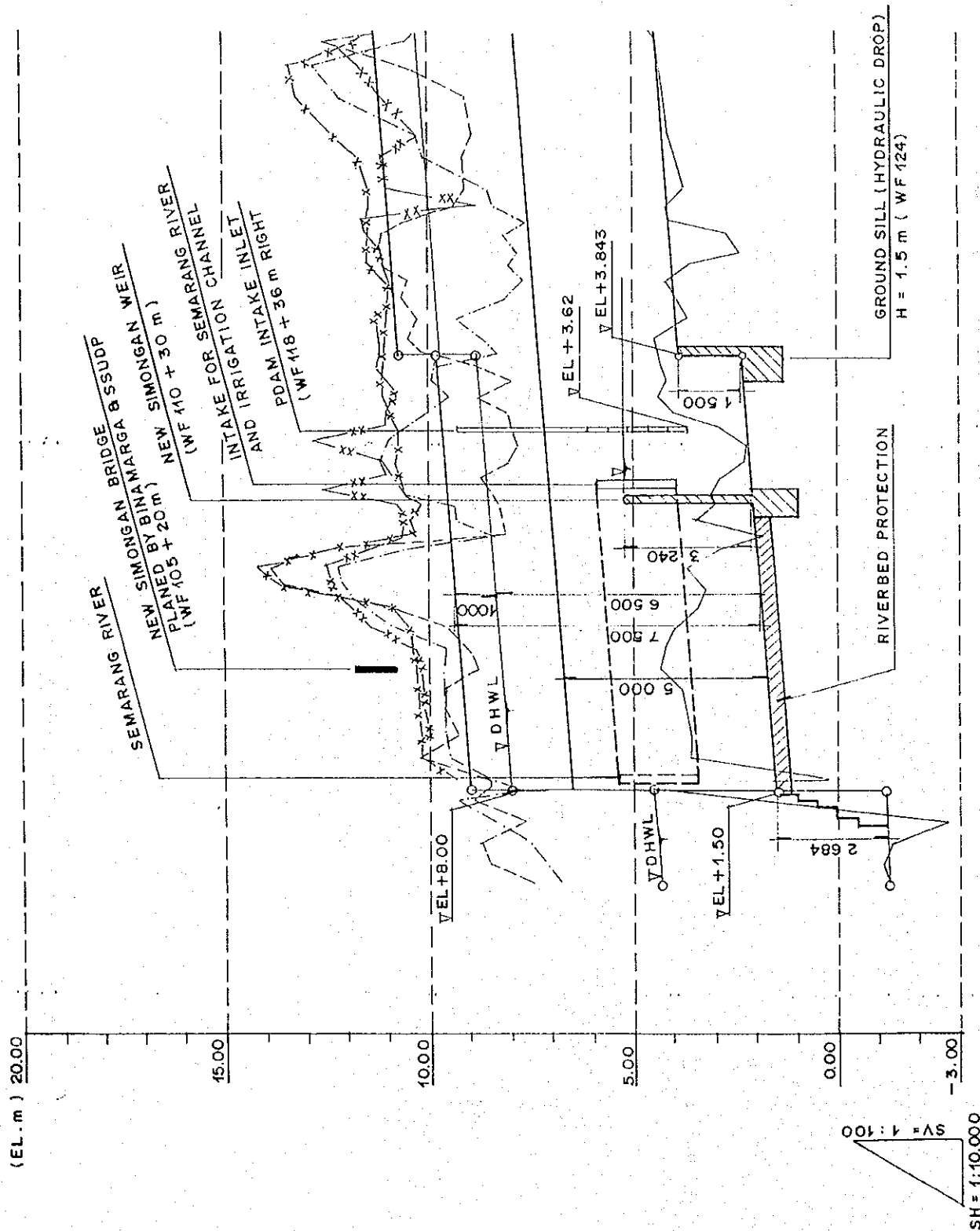
Fig. 4.2.12
 DESIGN PLAN FOR SIMONGAN WEIR



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.13 LOCATION OF WEIR (ALTERNATIVE-2)

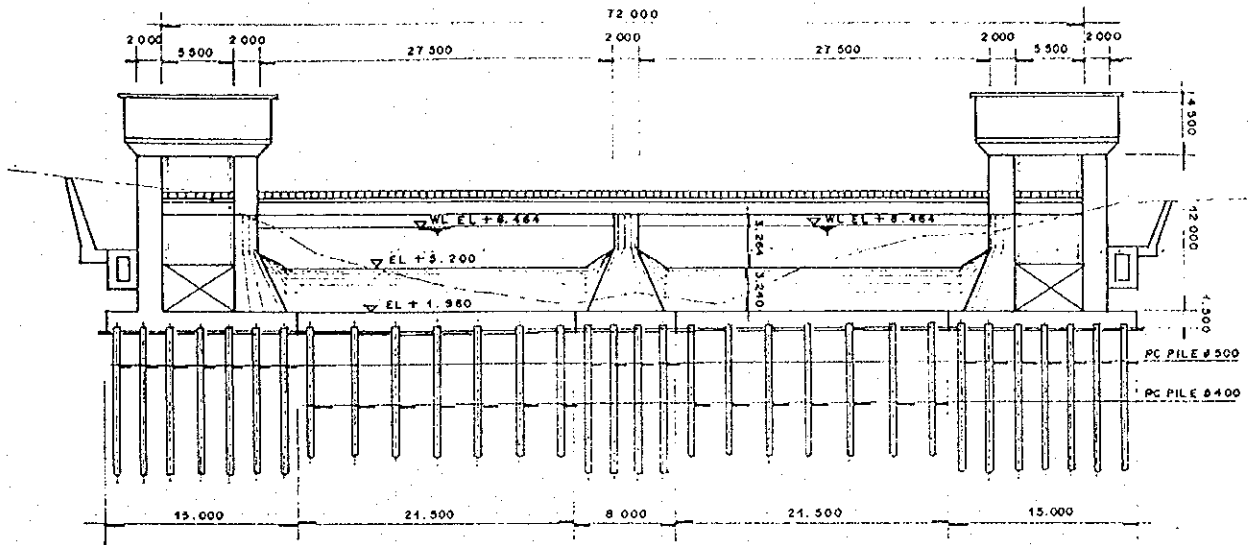
JAPAN INTERNATIONAL COOPERATION AGENCY



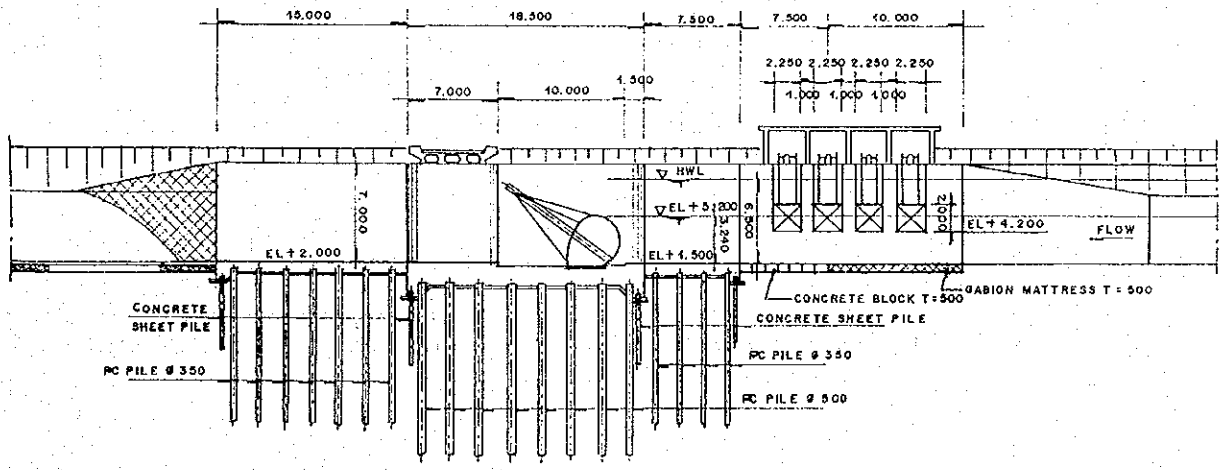
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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Fig. 4.2.14
LONGITUDINAL PROFILE OF GARANG RIVER CHANNEL (ALTERNATIVE-2)



FRONT ELEVATION

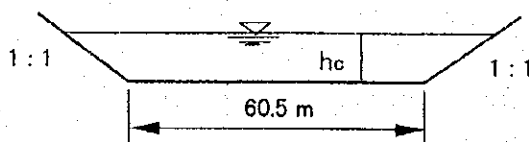
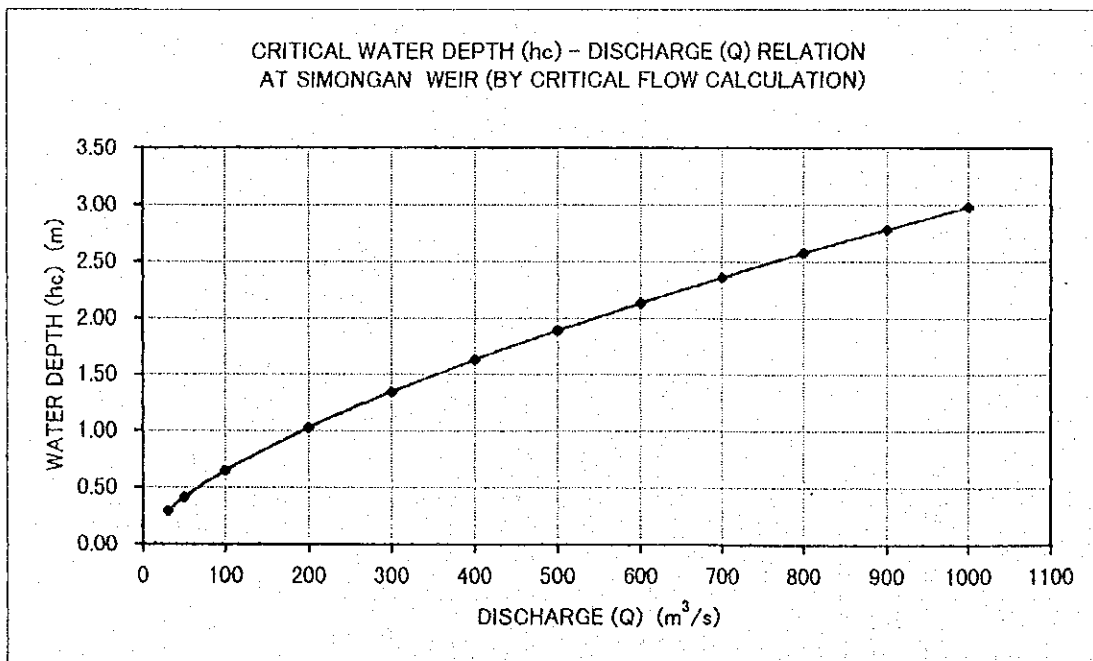
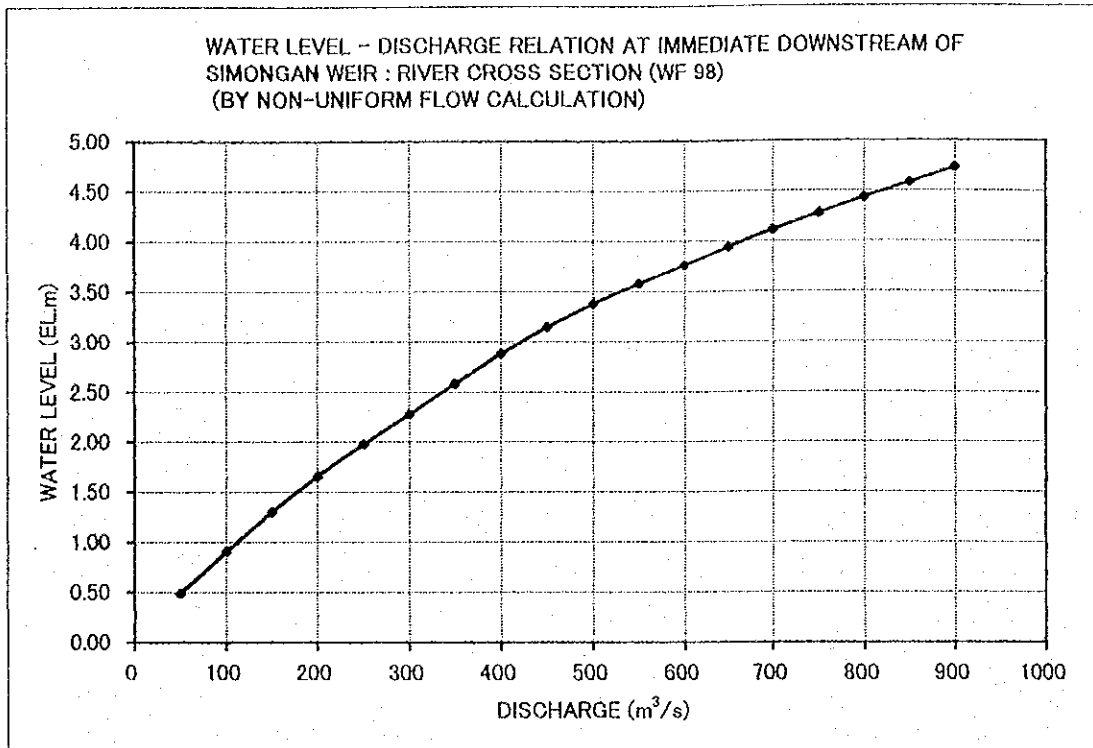


PROFILE

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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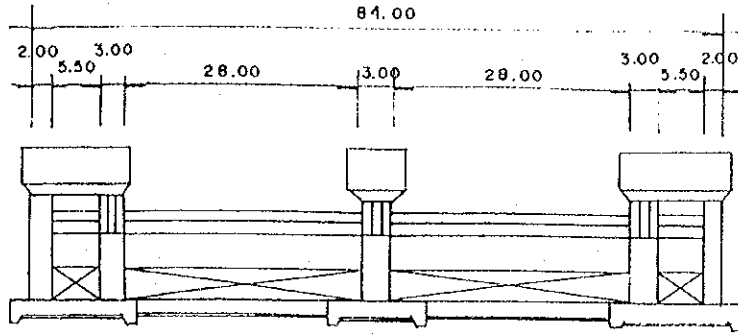
Fig. 4.2.15
GENERAL FEATURES OF WEIR (ALTERNATIVE-2)



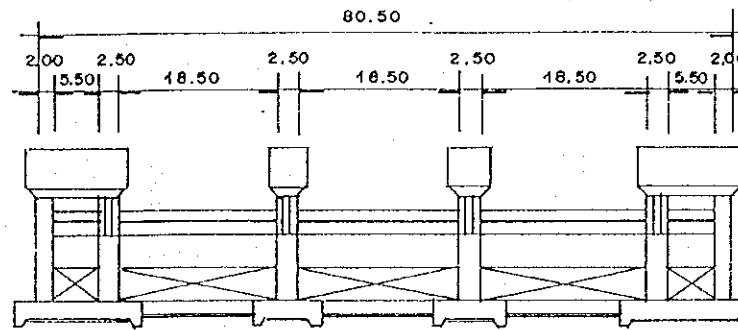
Calculation condition

- Riverbed slope : $1 = 1/26.01$
- Channel cross section : Trapezoid
- Riverbed width : 60.5 m

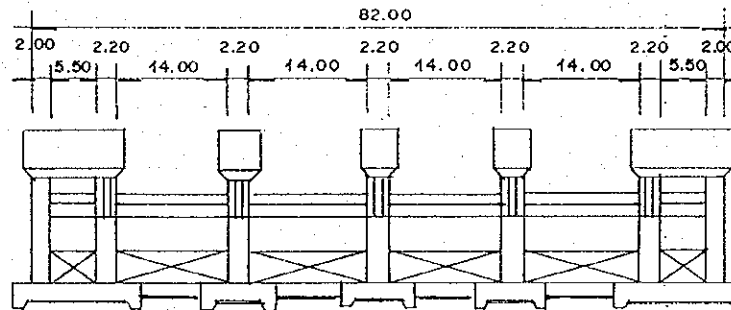
ALTERNATIVE
(I)



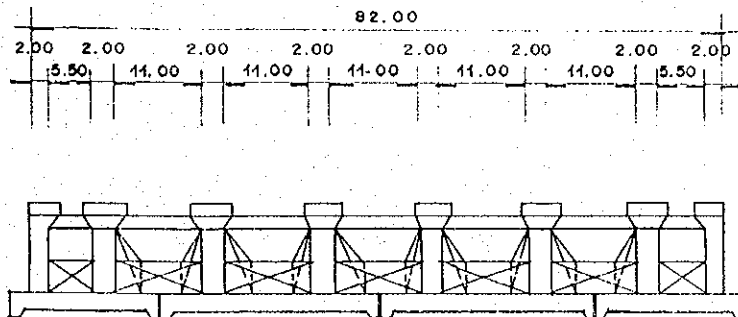
ALTERNATIVE
(II)



ALTERNATIVE
(III)



ALTERNATIVE
(IV)

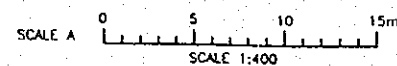
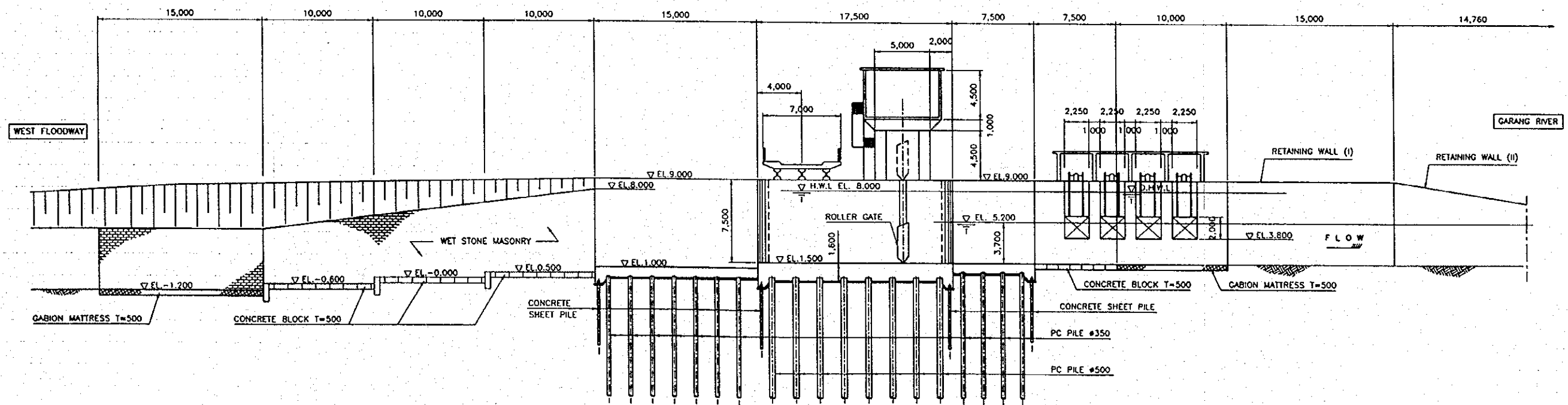
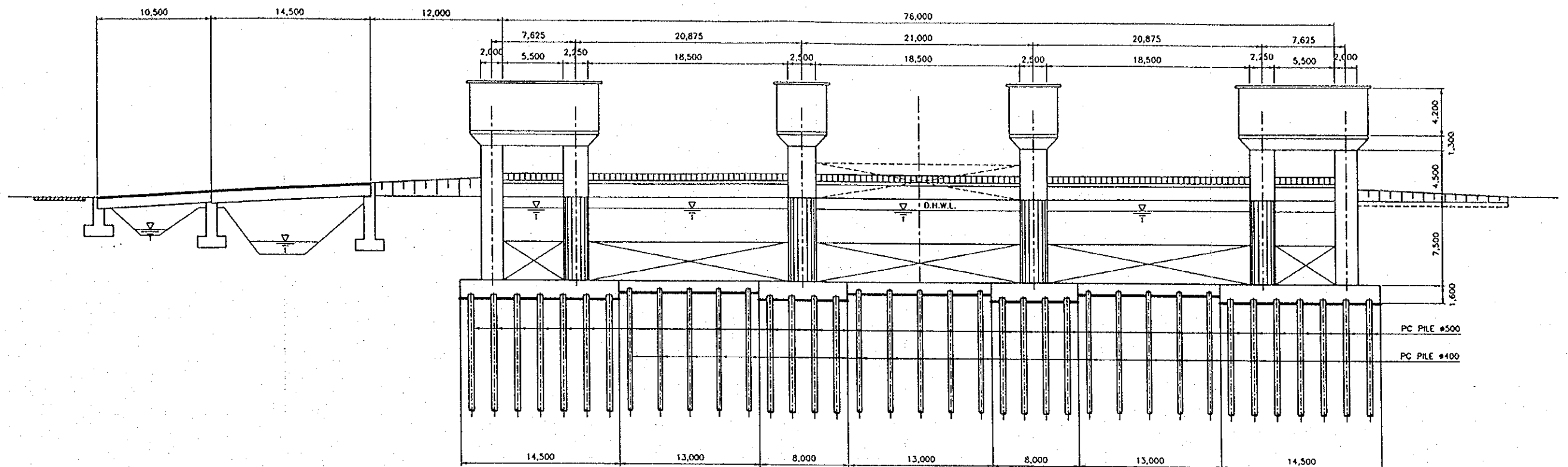


THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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Fig. 4.2.17

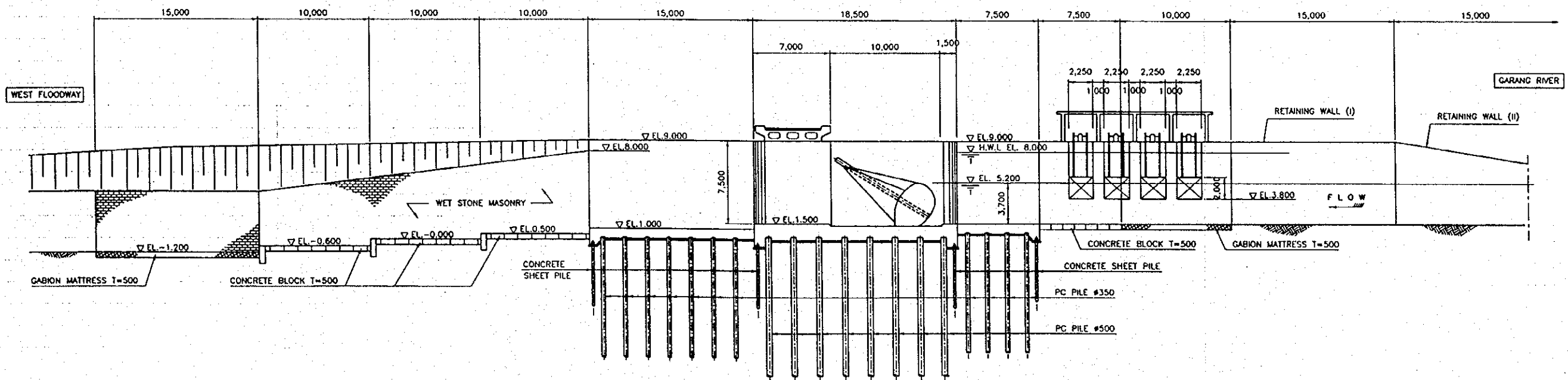
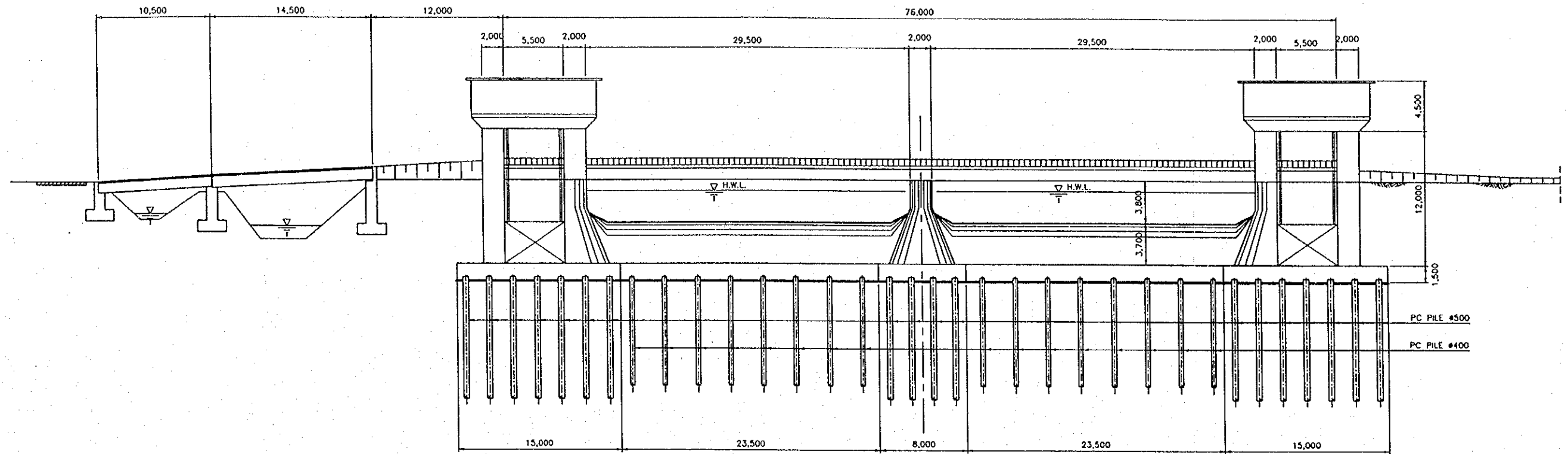
NUMBER OF PIER AND GATE LENGTH FOR ALTERNATIVES



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.18
STRUCTURAL FEATURES OF ALTERNATIVE 1

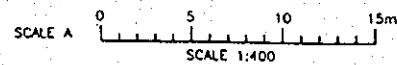
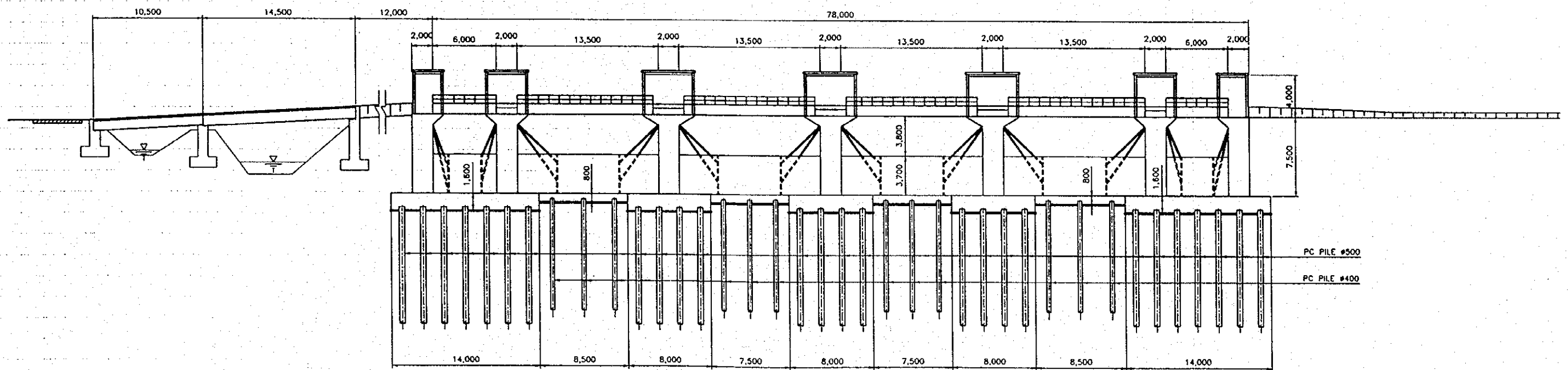
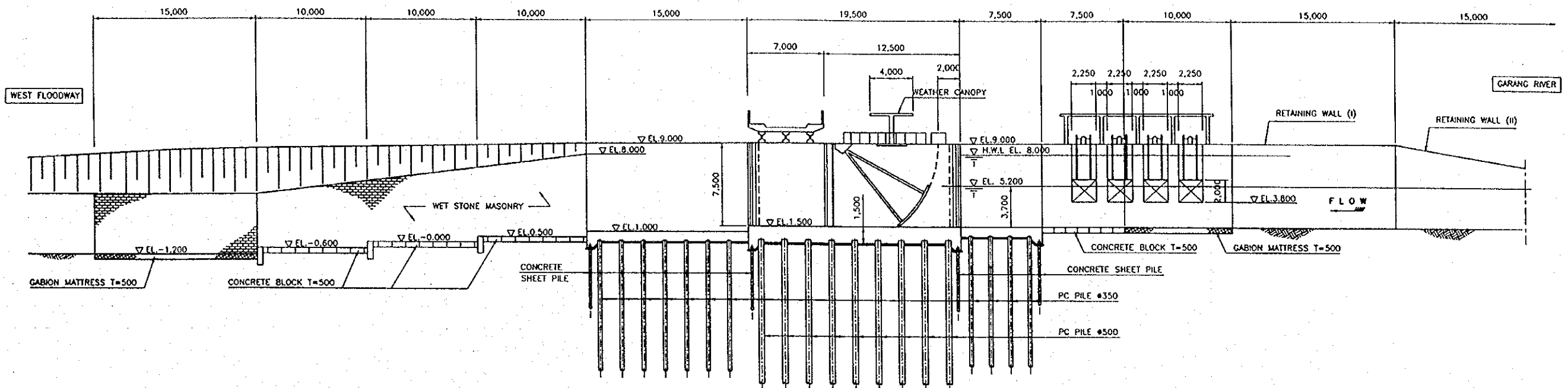
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SCALE A 0 5 10 15m
SCALE 1:400

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
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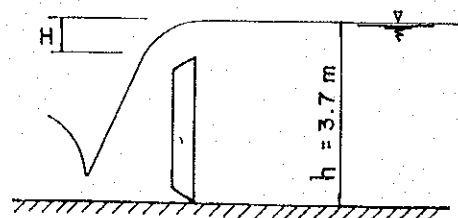
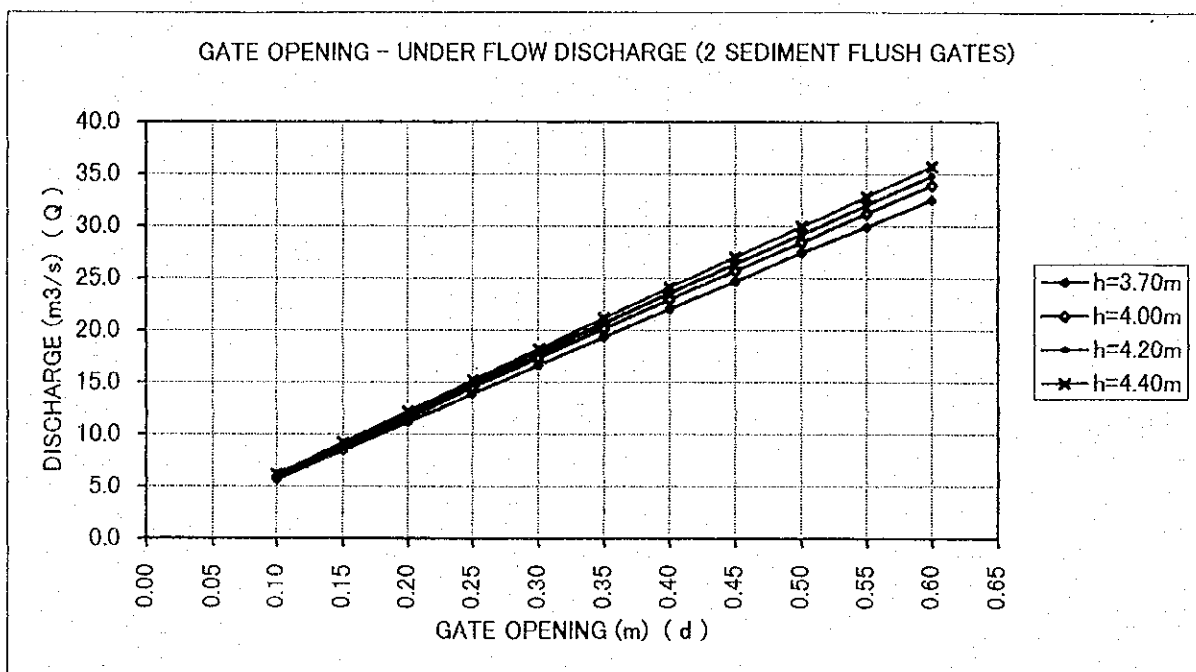
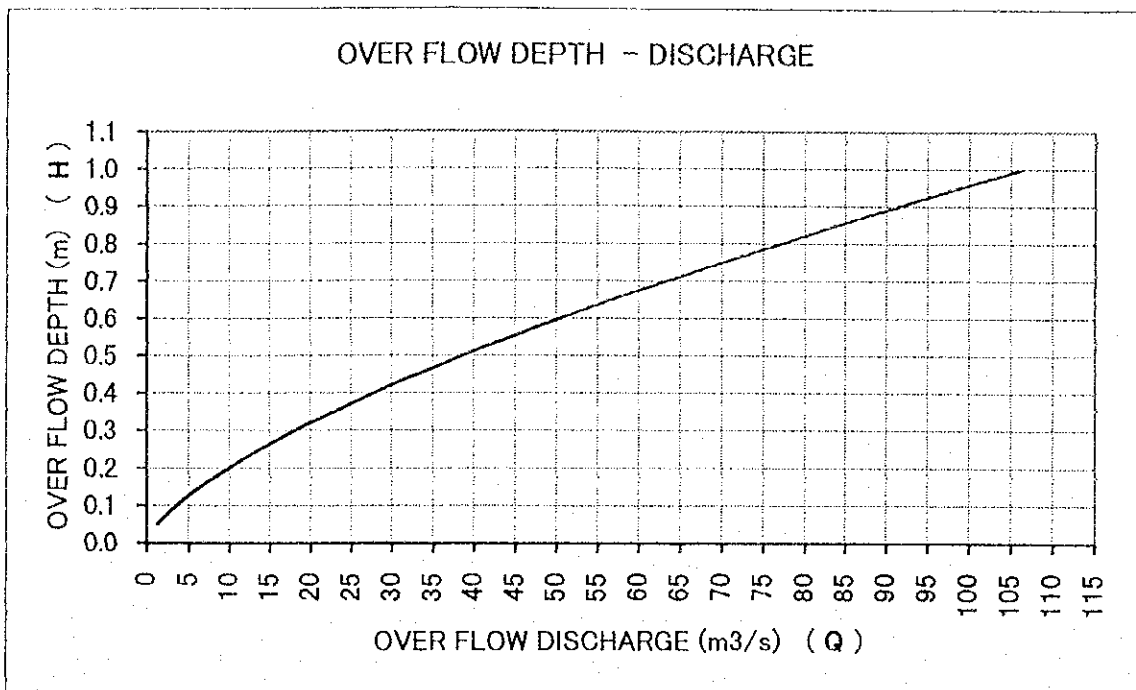
Fig. 4.2.19
STRUCTURAL FEATURES OF ALTERNATIVE 2



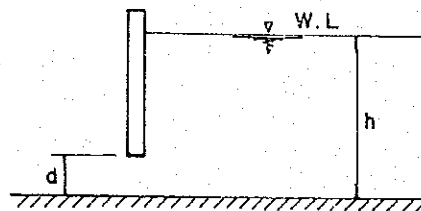
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.20
STRUCTURAL FEATURES OF ALTERNATIVE 3

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$$B = (18.5 - 1.5) \times 3 = 51.0 \text{ m}$$



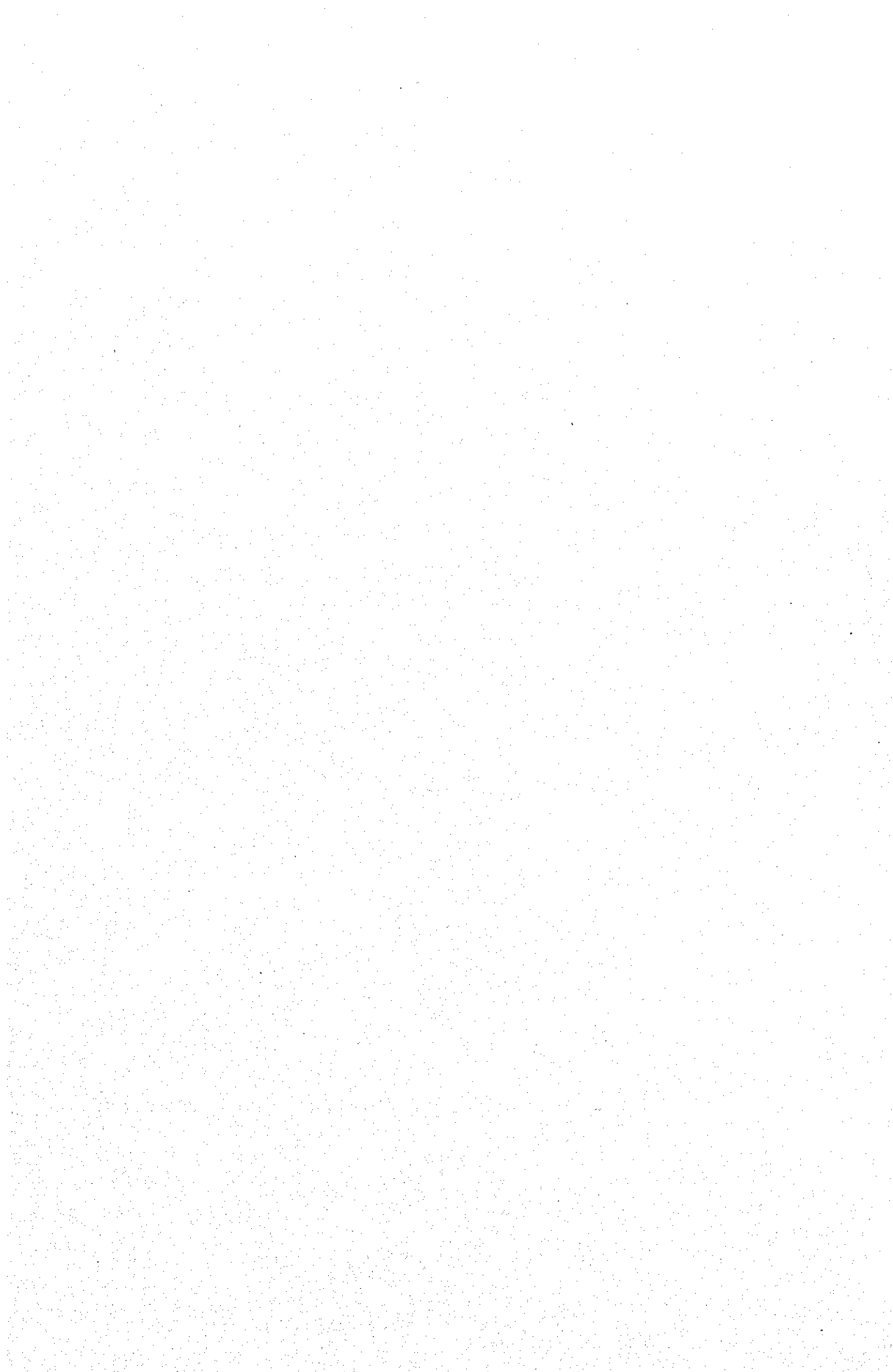
$$B = 5.5 \times 2 = 10.0 \text{ m}$$

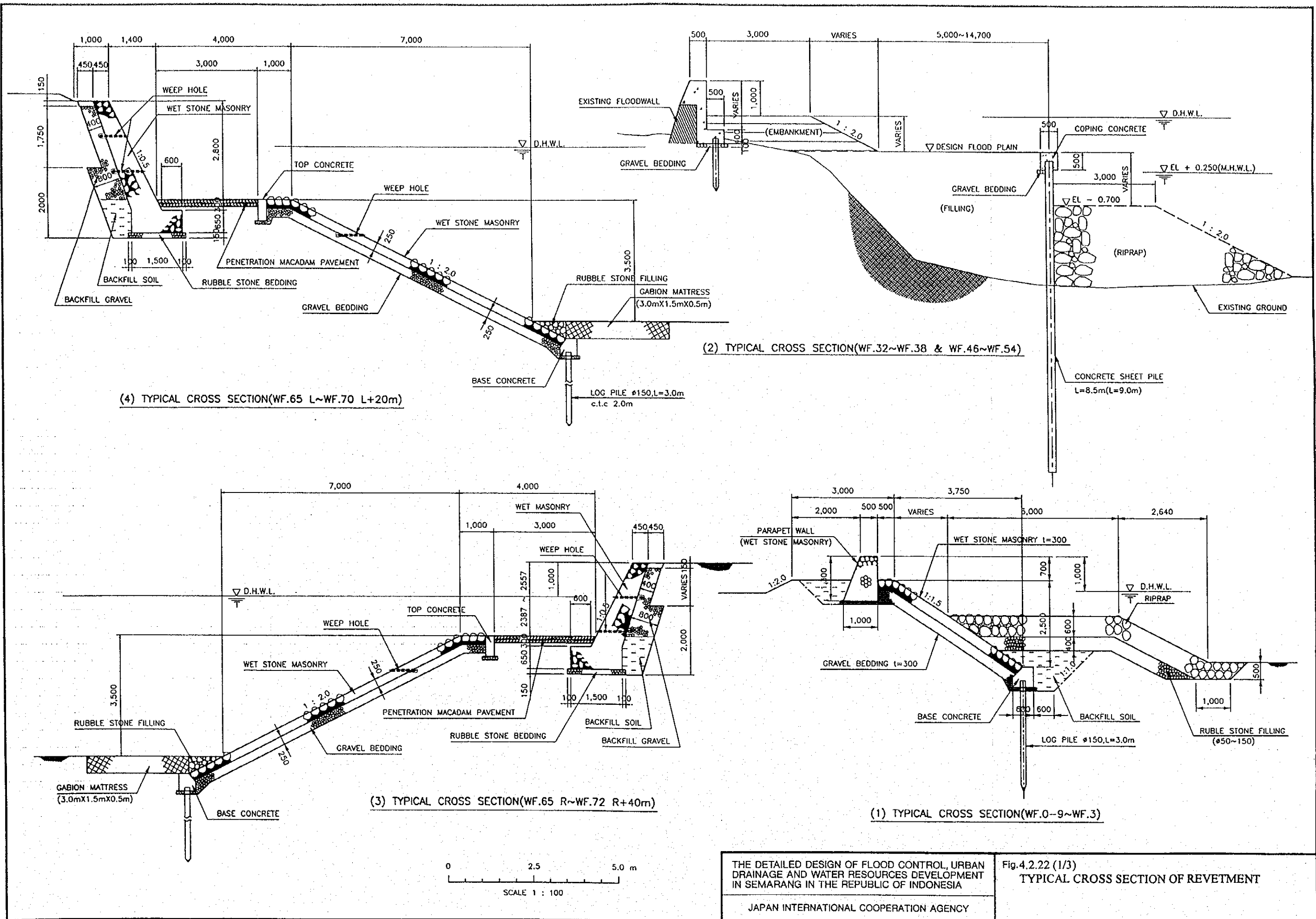
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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Fig. 4.2.21

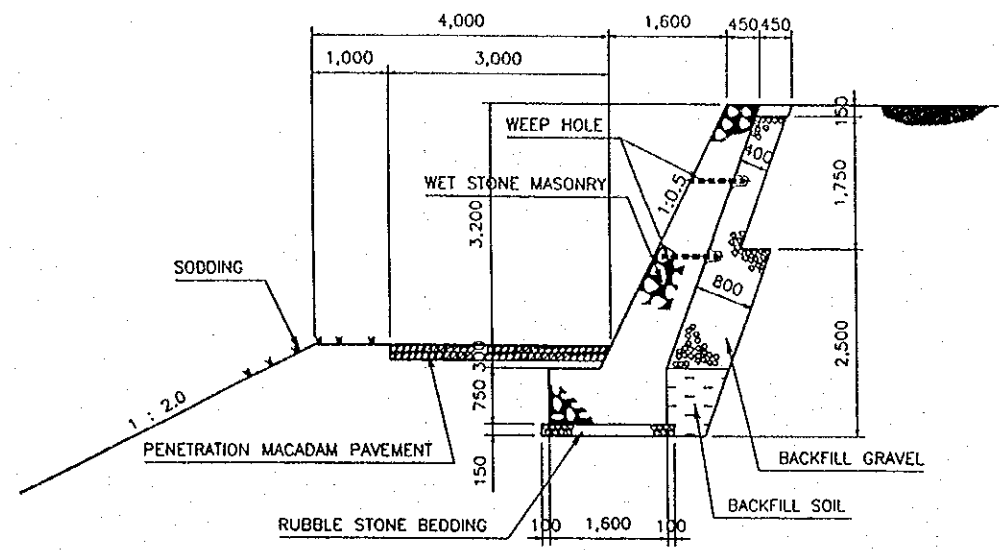
DISCHARGE RATING FOR FLOOD DISCHARGE GATE AND SEDIMENT FLUSH GATE



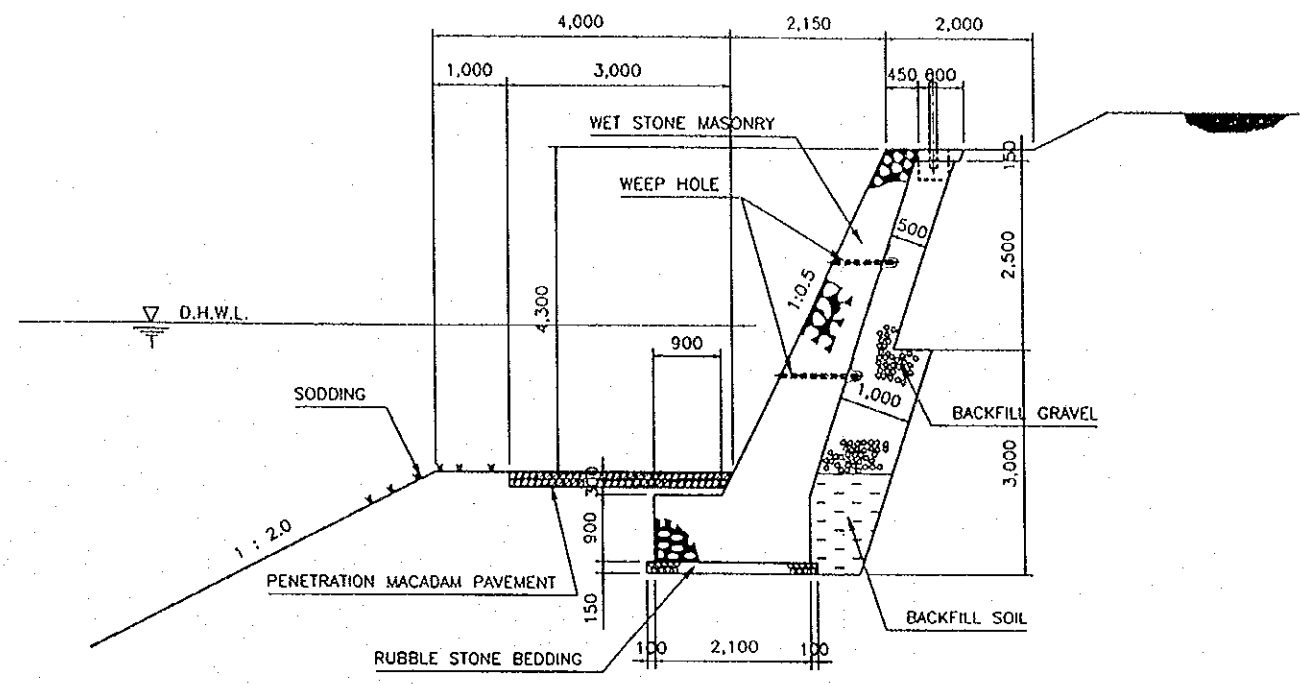


THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
 JAPAN INTERNATIONAL COOPERATION AGENCY

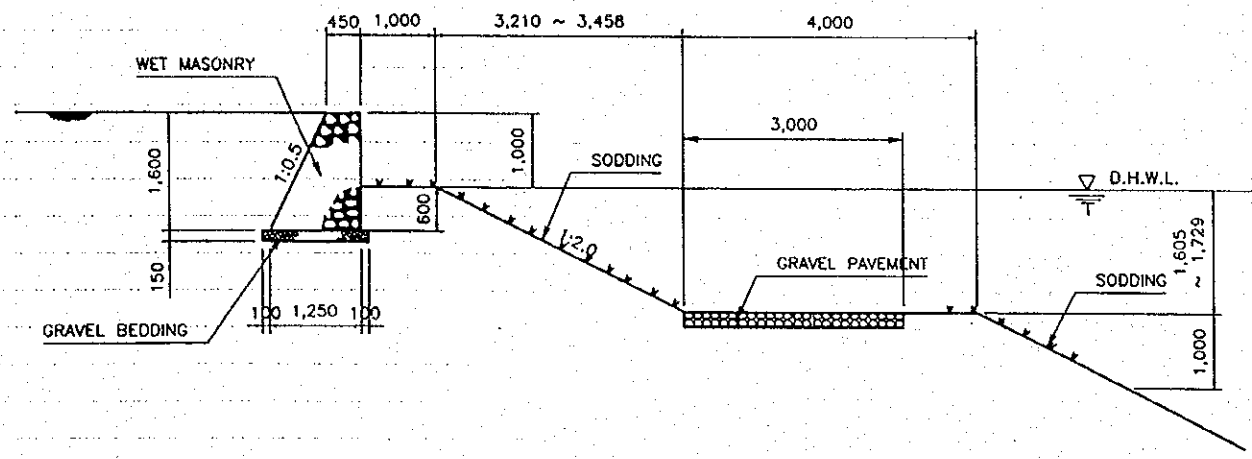
Fig.4.2.22 (1/3)
 TYPICAL CROSS SECTION OF REVETMENT



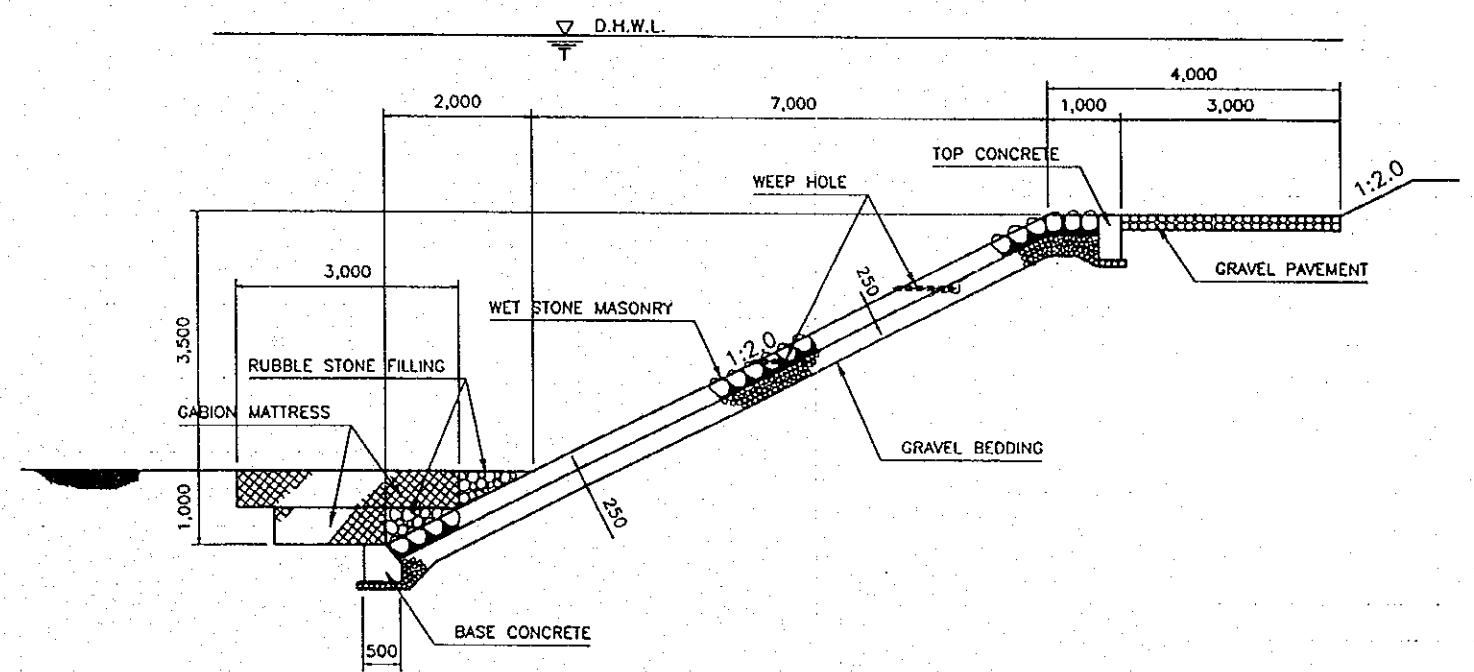
(5) TYPICAL CROSS SECTION(WF 75 R-20m~WF 78 R+20m)



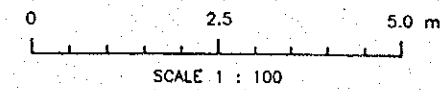
(7) TYPICAL CROSS SECTION(WF.92 R+30m~WF.94 R+22m)



(6) STANDARD CROSS SECTION(WF.75 L-20m~WF.80 L)

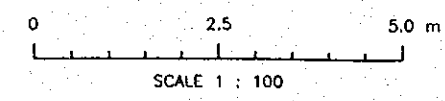
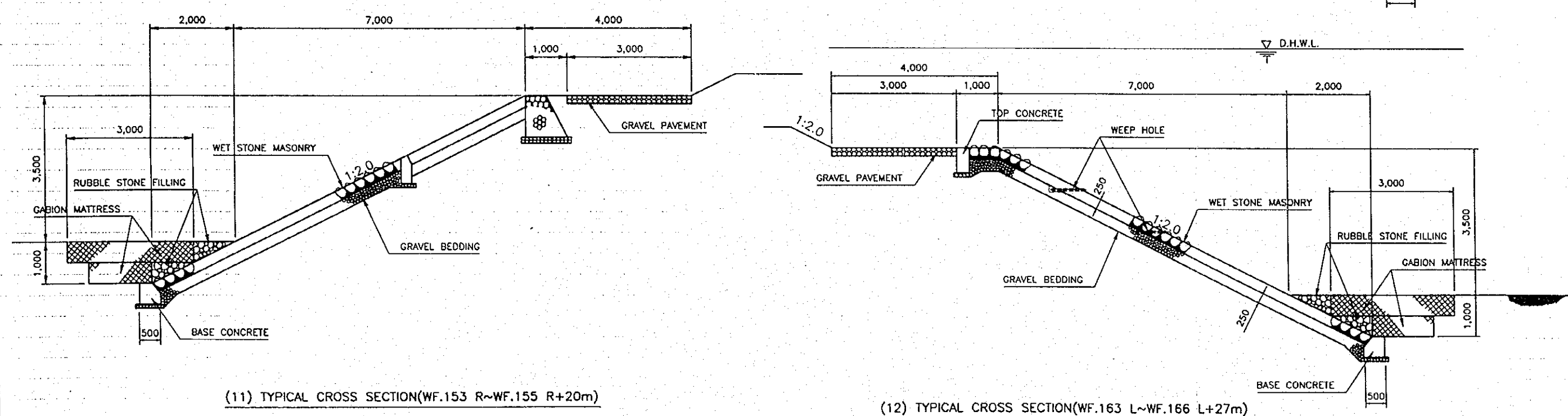
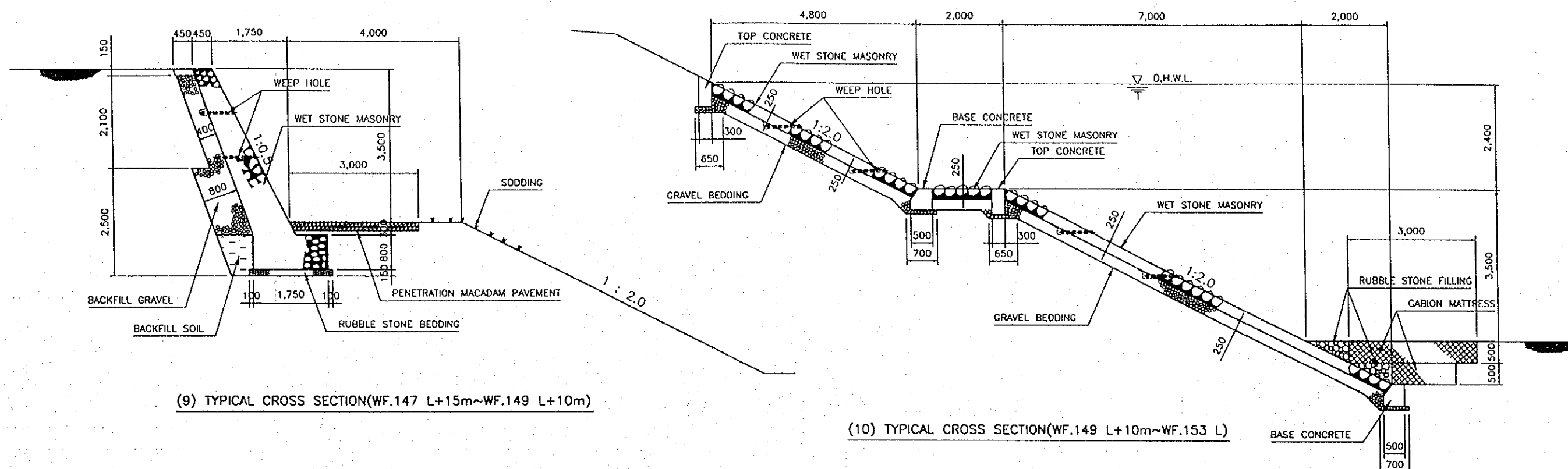


(8) STANDARD CROSS SECTION(WF.139 R~WF.140 R+50m)



THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
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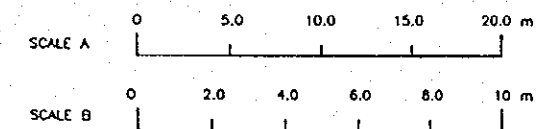
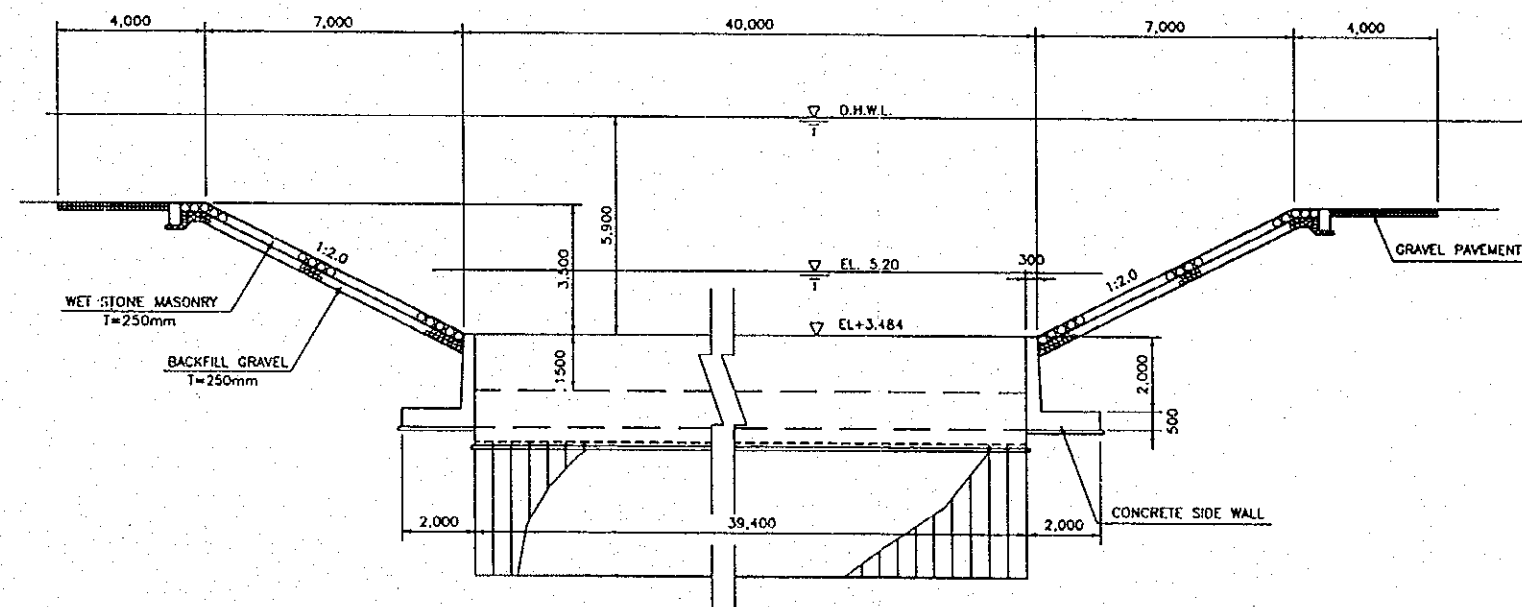
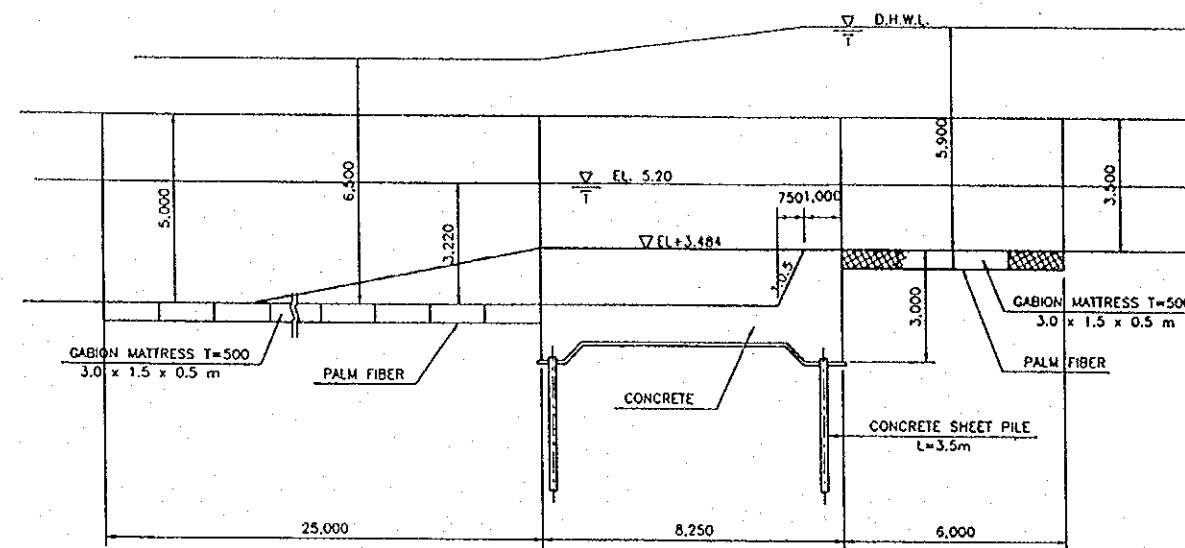
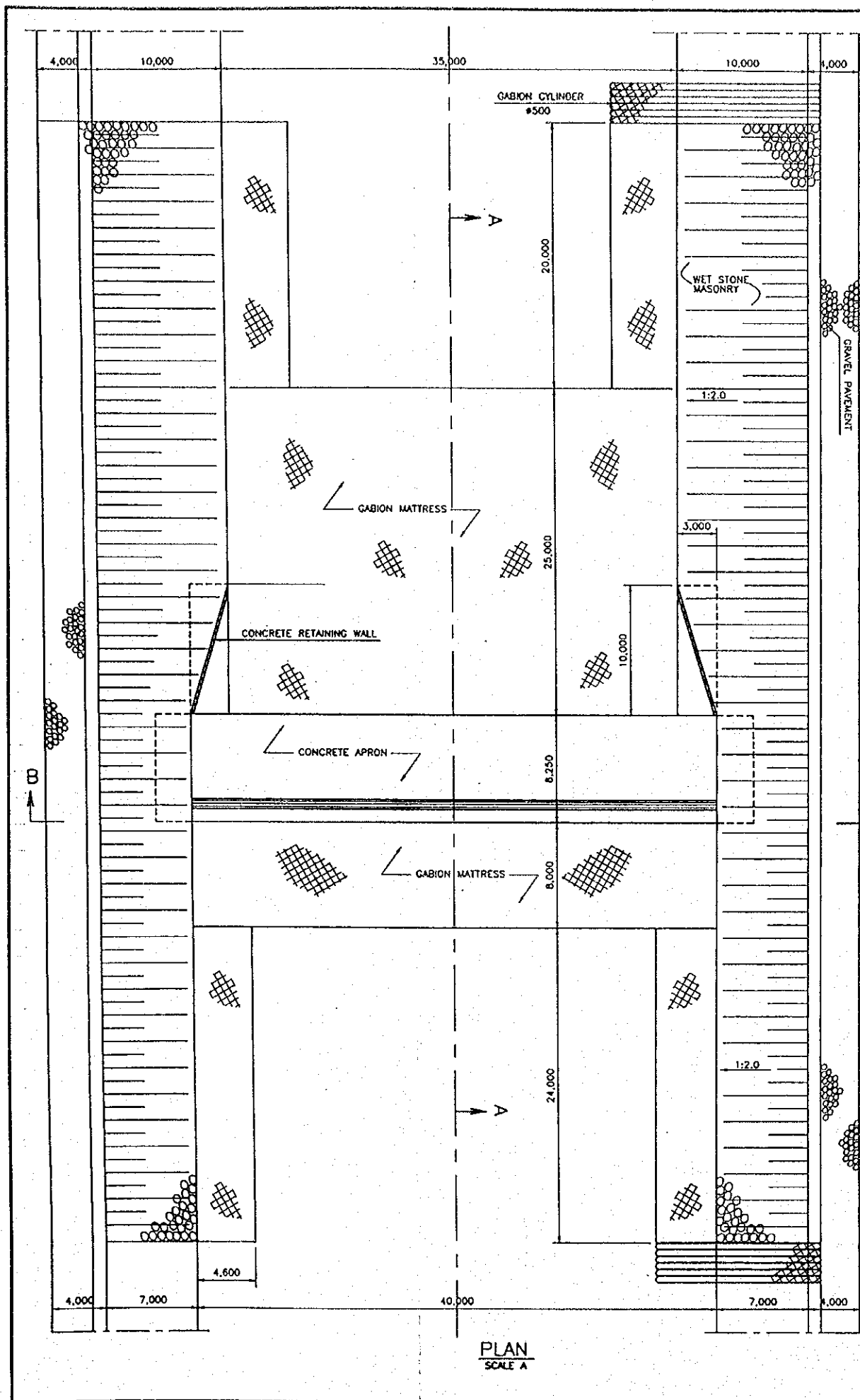
Fig. 4.2.22 (2/3)
TYPICAL CROSS SECTION OF REVETMENT



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Fig. 4.2.22 (3/3)
TYPICAL CROSS SECTION OF REVETMENT

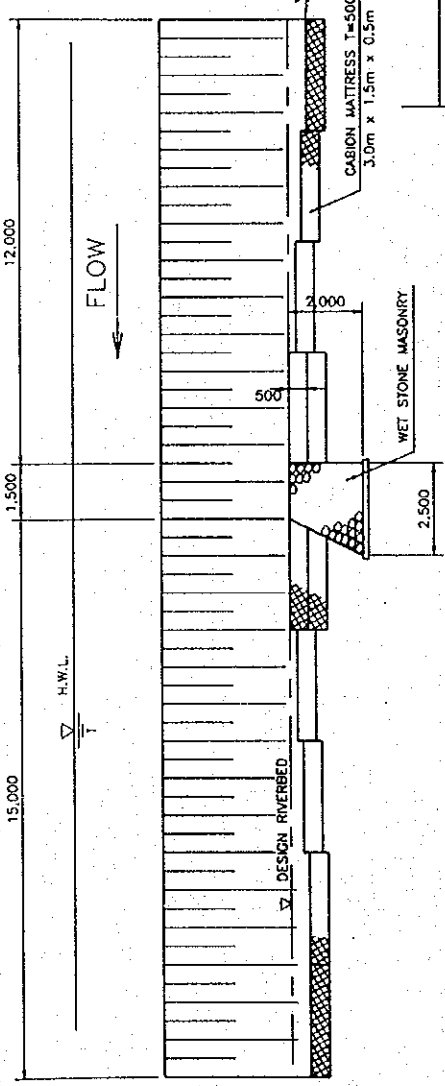
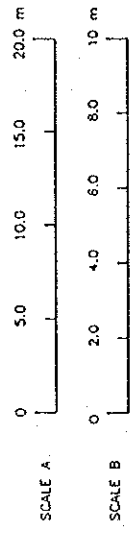


UNIT (mm)

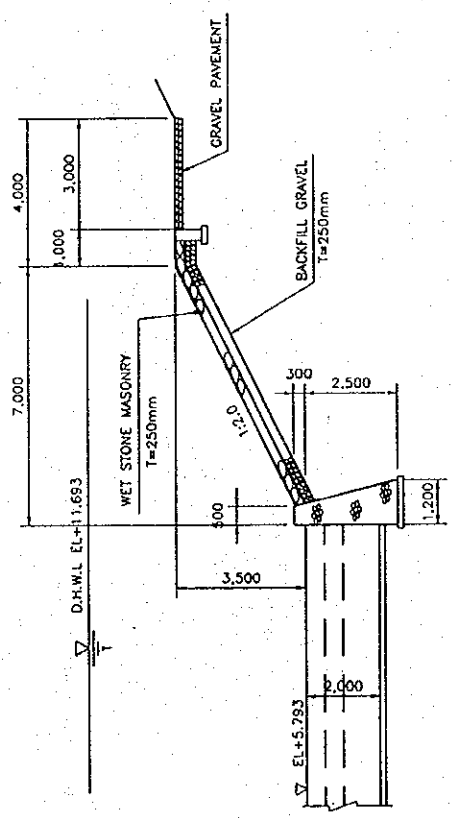
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.23
GENERAL FEATURE OF GROUND SILL (WF.124)

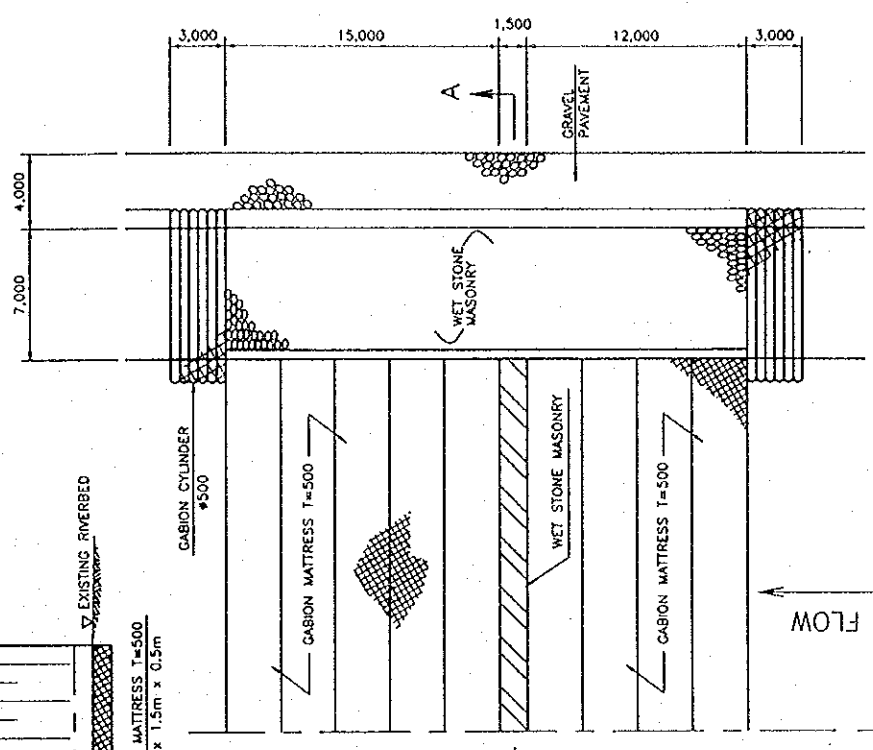
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SECTION B-B
SCALE B



SECTION A-A
SCALE B



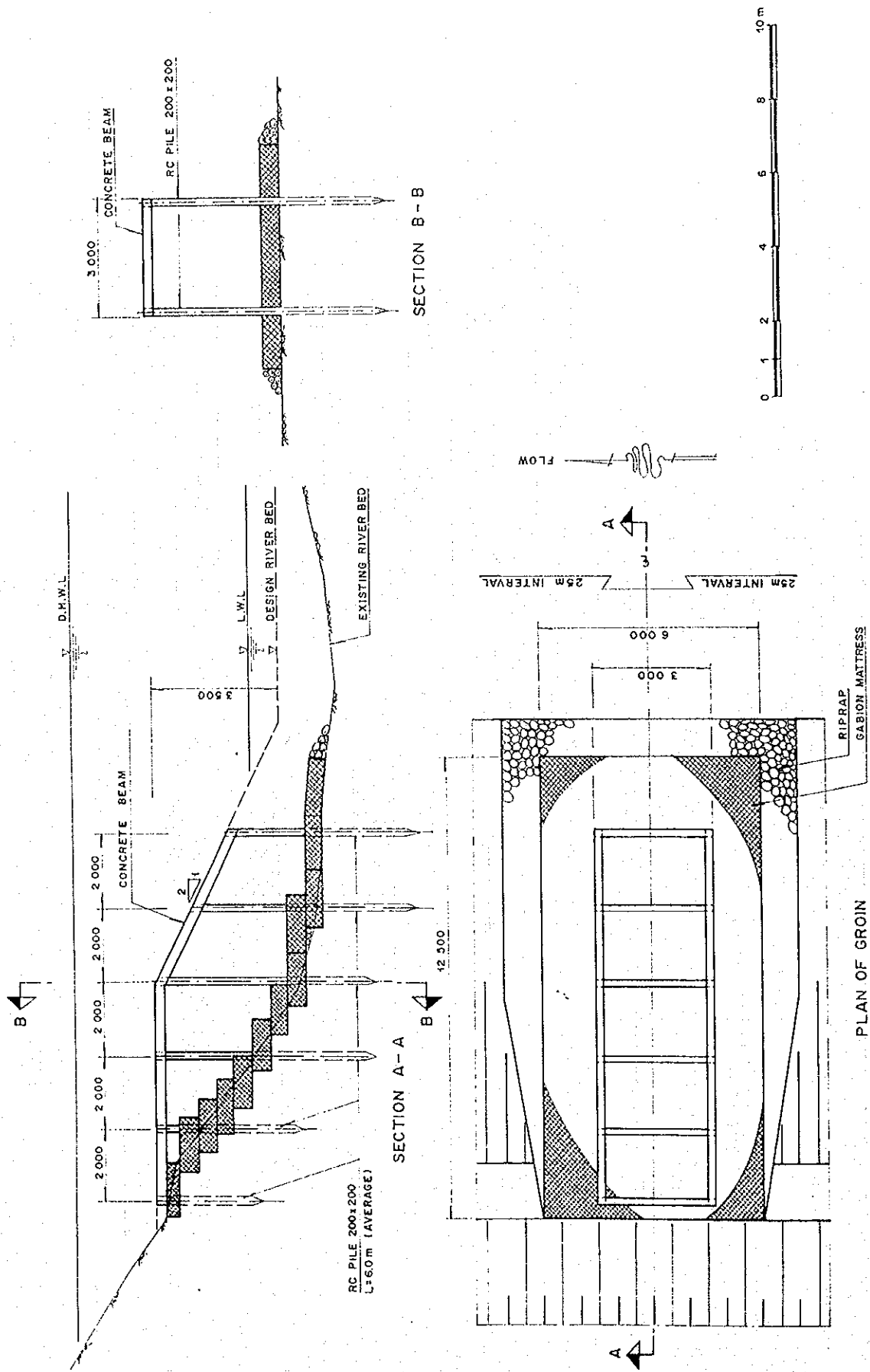
PLAN
SCALE A

UNIT (mm)

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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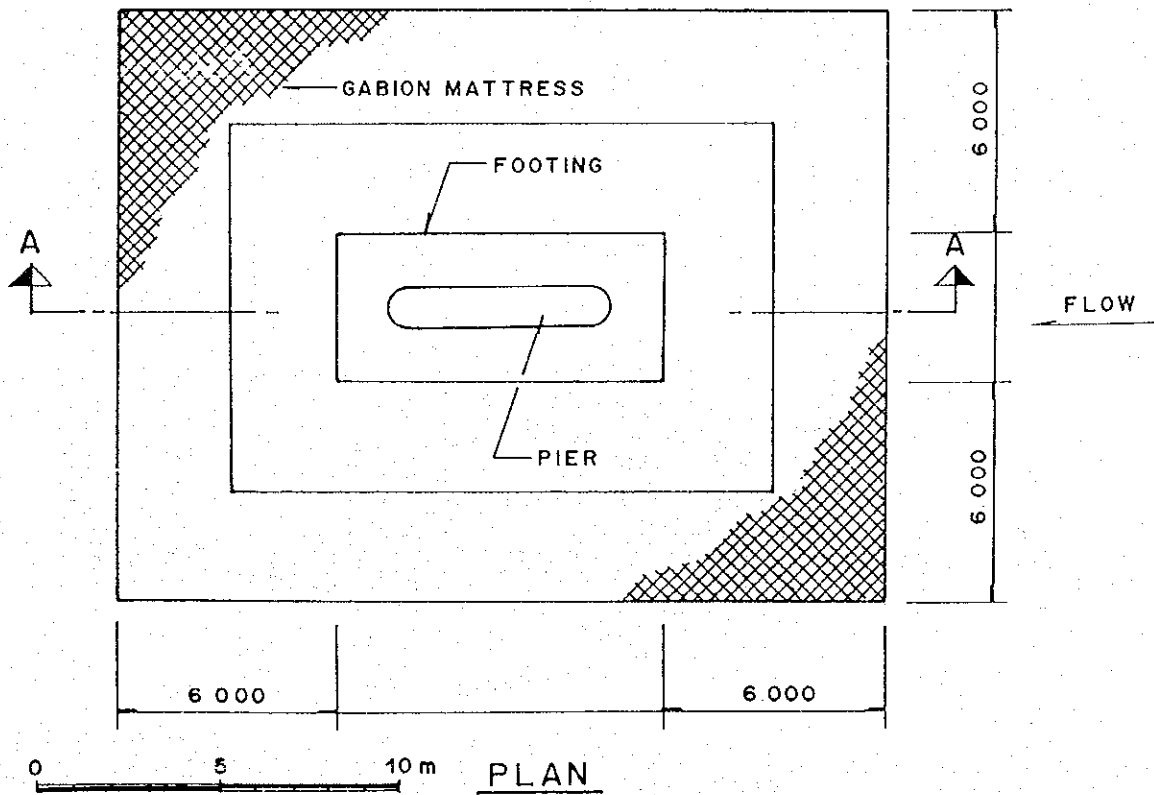
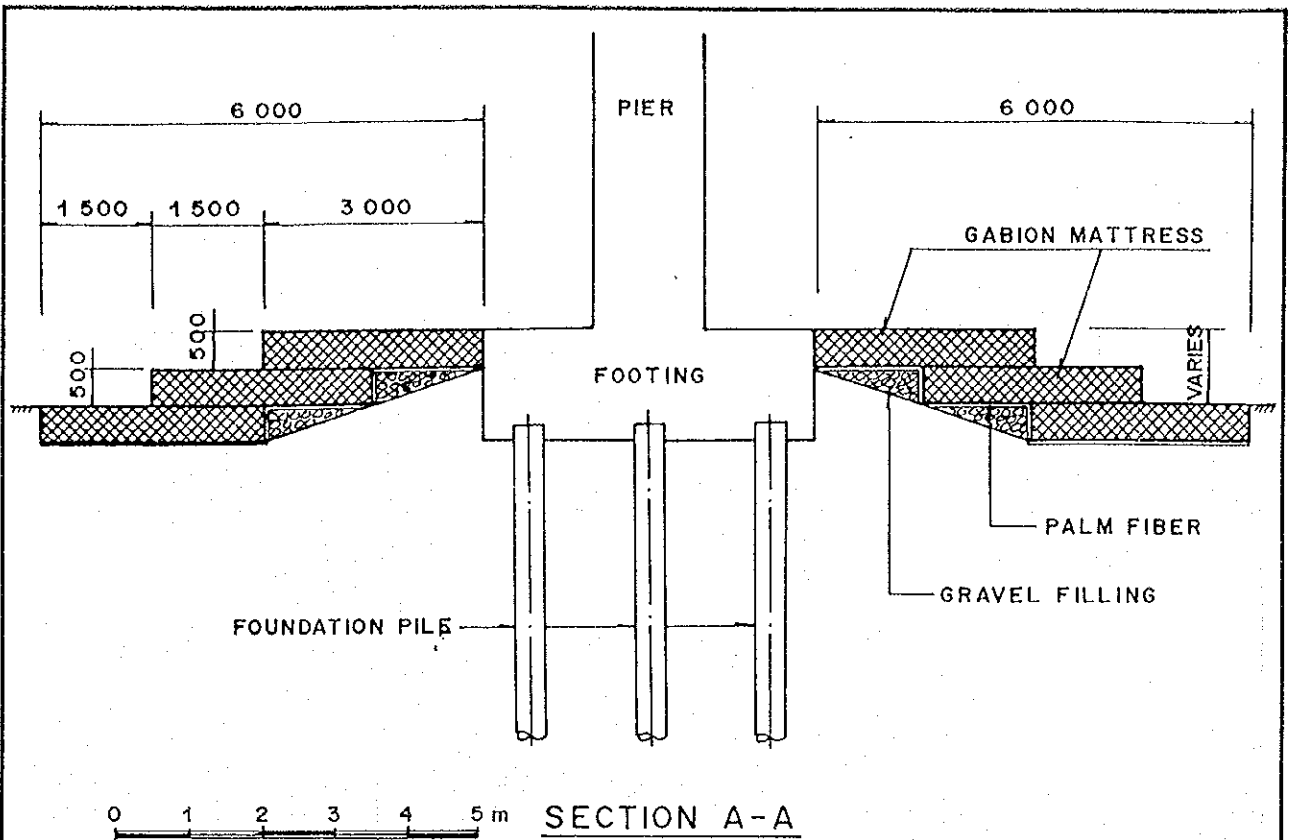
Fig. 4.2.24
GENERAL FEATURE OF GROUND SILL (WF.173)



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Fig. 4.2.25
GENERAL FEATURE OF GROIN

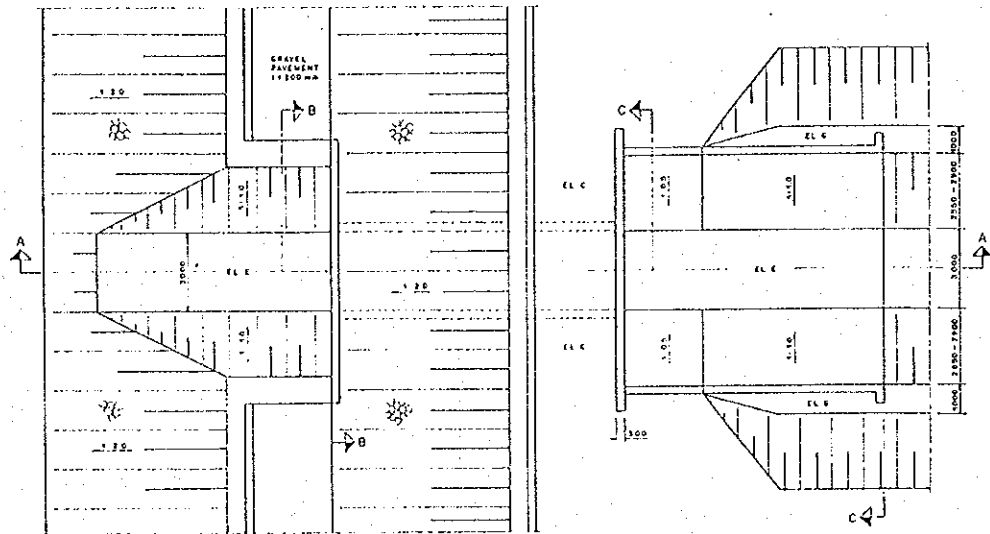
JAPAN INTERNATIONAL COOPERATION AGENCY



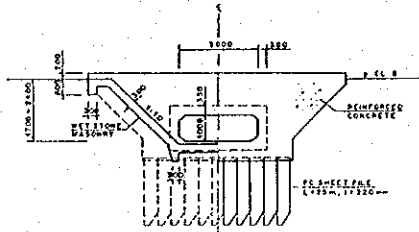
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

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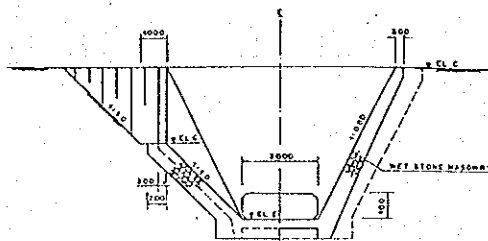
Fig. 4.2.26 RIVERBED PROTECTION AROUND BRIDGE PIER



PLAN

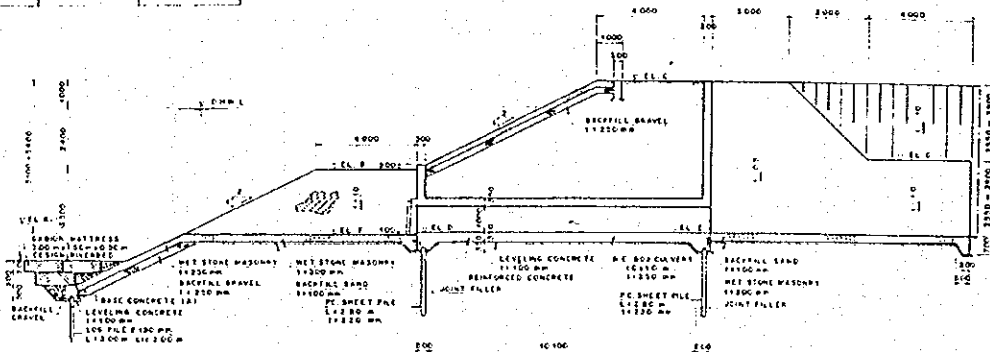


SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100

ELEVATION 1 m ±	WF 576.4 27 R	WF 576.4 46 R
EL A	+3.33	+1.28
EL B	+8.83	+8.10
EL C	+12.83	+12.85
EL D	+7.03	+7.25
EL E	+3.04	+2.78
EL F	+6.53	+7.45
EL G	+9.84	+10.35

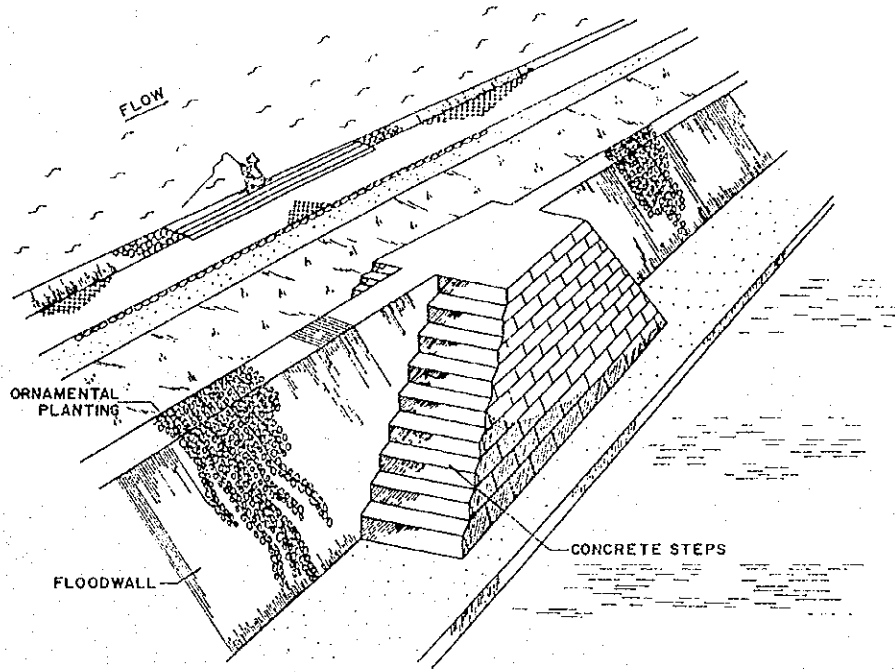


SECTION A-A
SCALE 1:100

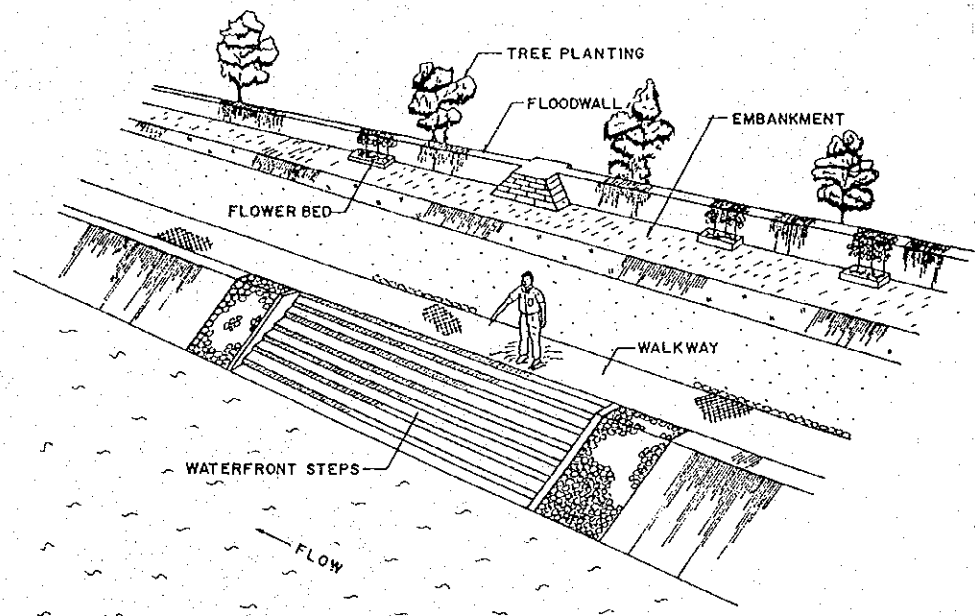
THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2.27
TYPICAL DRAWING FOR DRAINAGE OUTLET

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FLOODWALL AND APPROACH STEPS IN WEST FLOODWAY



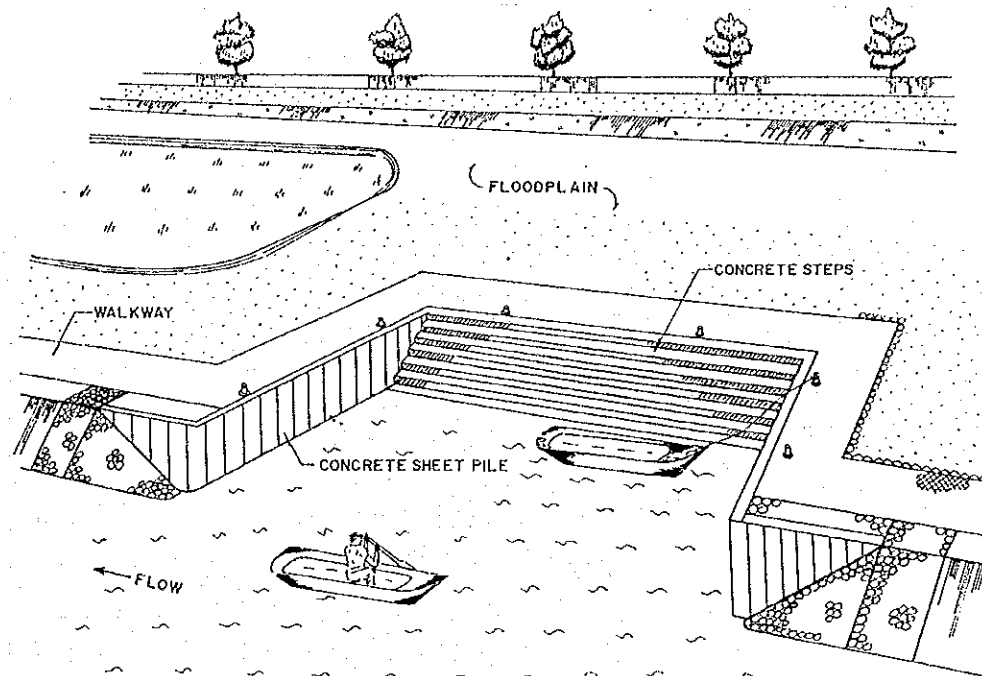
WATERFRONT STEPS IN WEST FLOODWAY

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

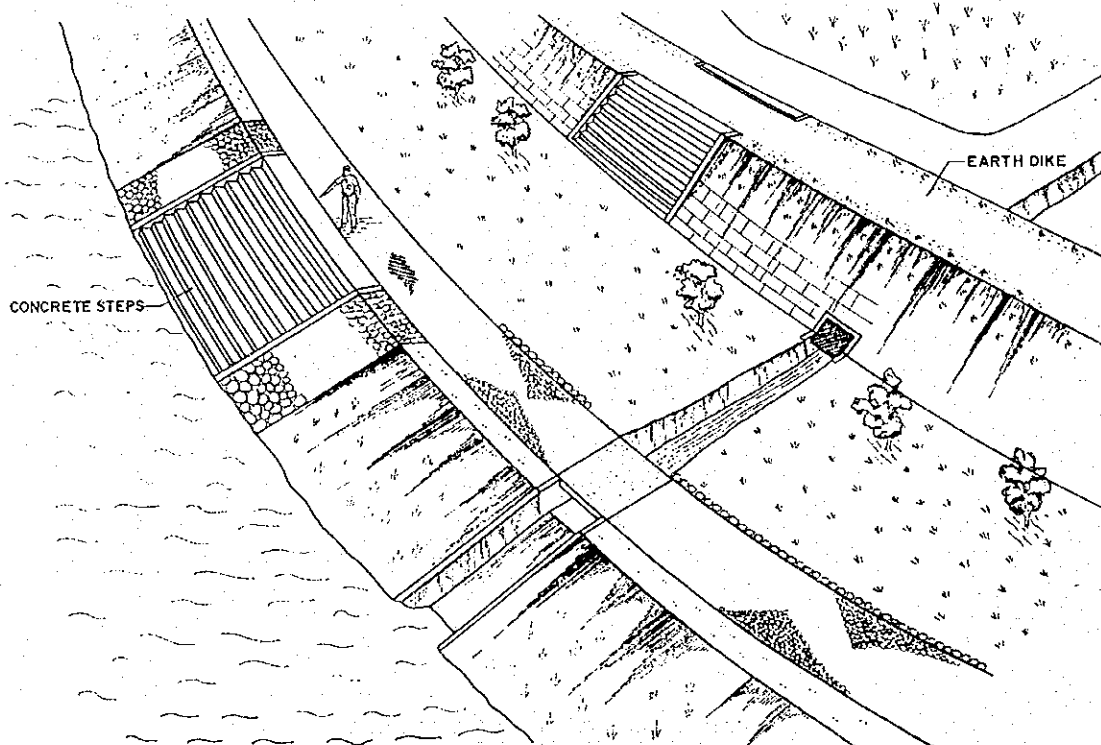
Fig. 4.2.28 (1/2)

WATERFRONT FACILITIES

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MOORING FACILITIES IN WEST FLOODWAY

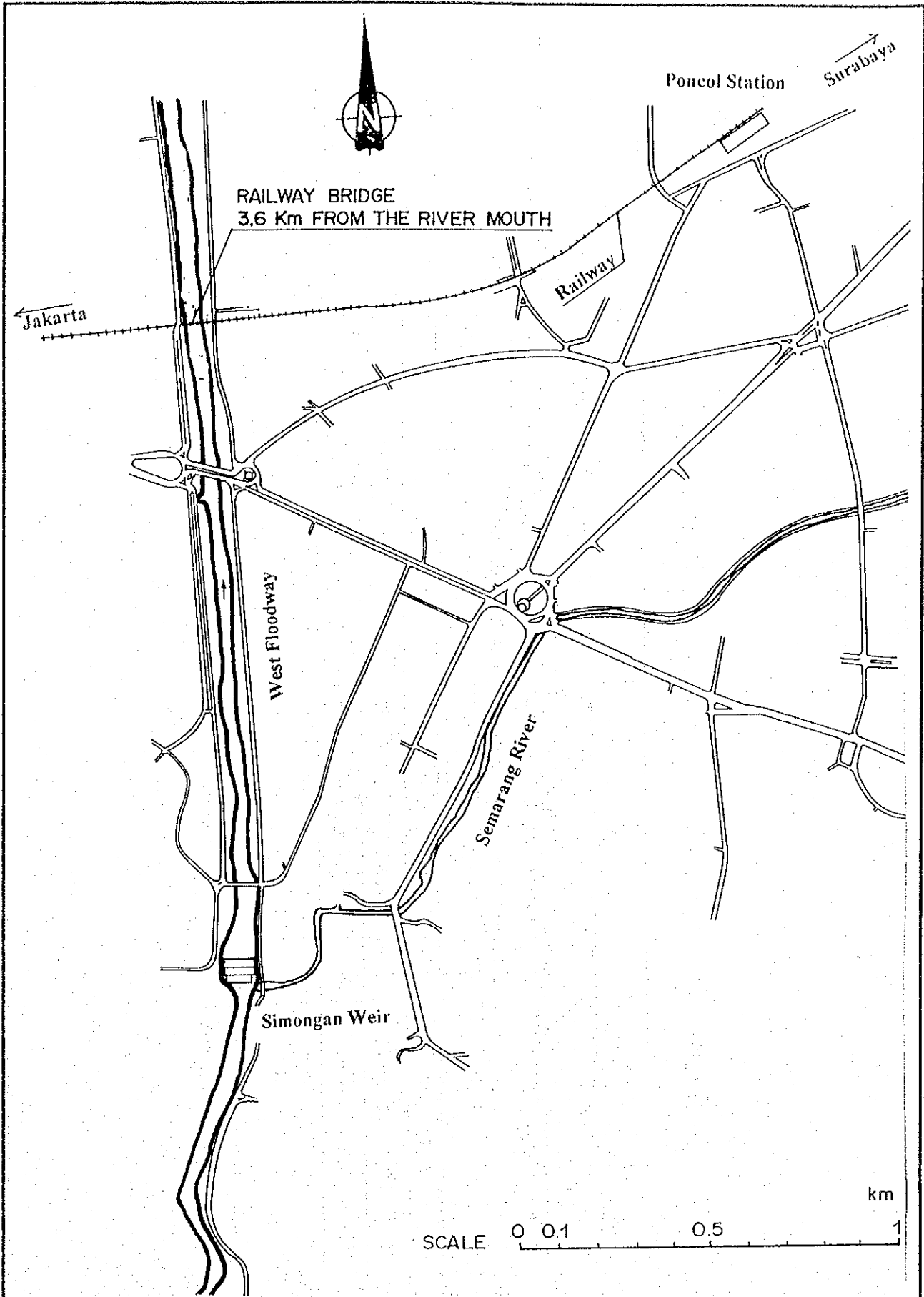


WATERFRONT AND APPROACH STEPS IN GARANG RIVER

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2:28 (2/2)
WATERFRONT FACILITIES

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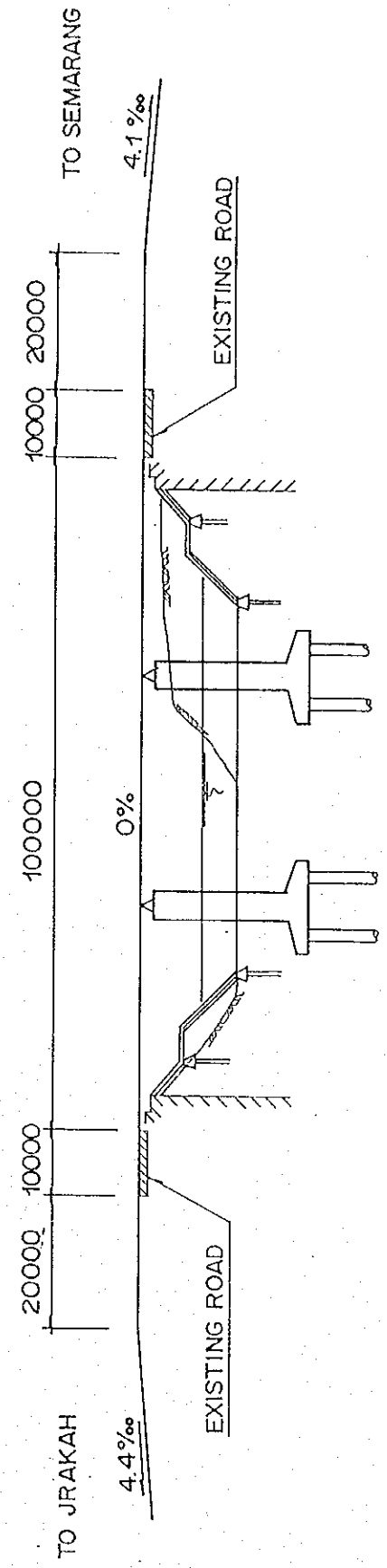


THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig. 4.2:29
LOCATION MAP OF RAILWAY BRIDGE

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RAILWAY BRIDGE



SCALE 1 : 100

THE DETAILED DESIGN OF FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA

Fig.4.2.31
DESIGN LONGITUDINAL PROFILE FOR APPROACH TRACK

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