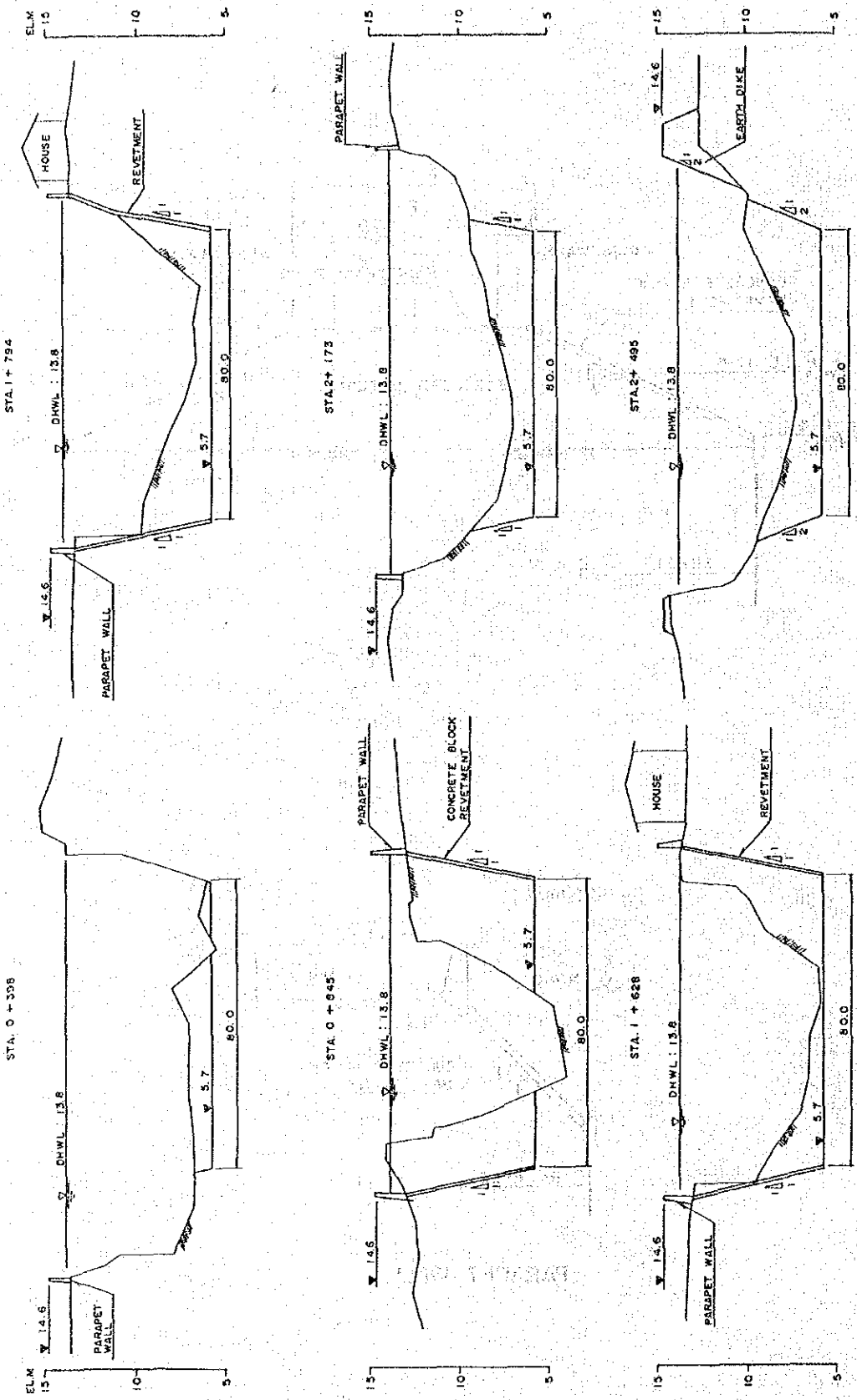
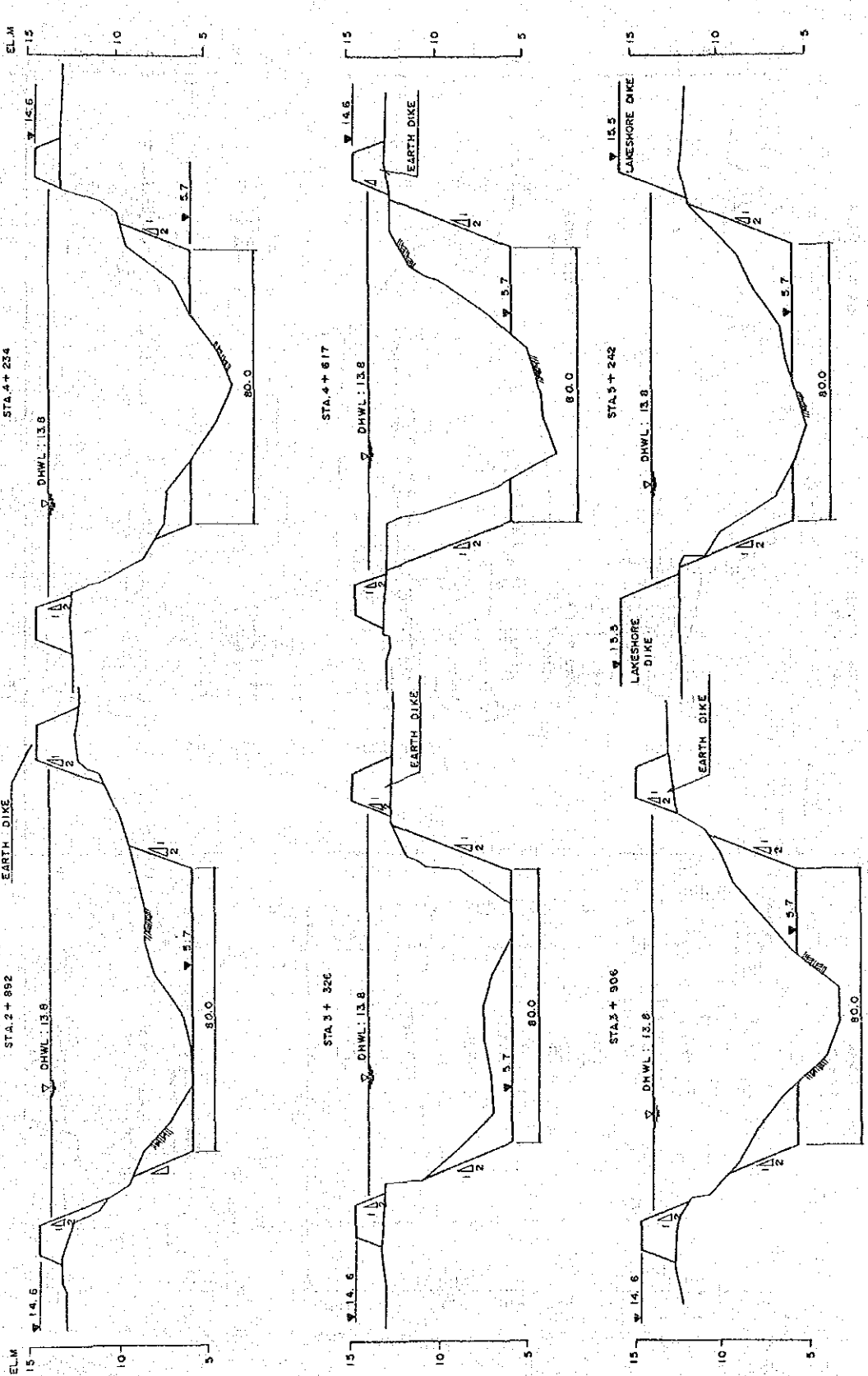


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

PROPOSED CROSS-SECTIONS OF BACKWATER DIKE (NAPINDAN CHANNEL(1/2))

Fig.7.2-6(1/3)

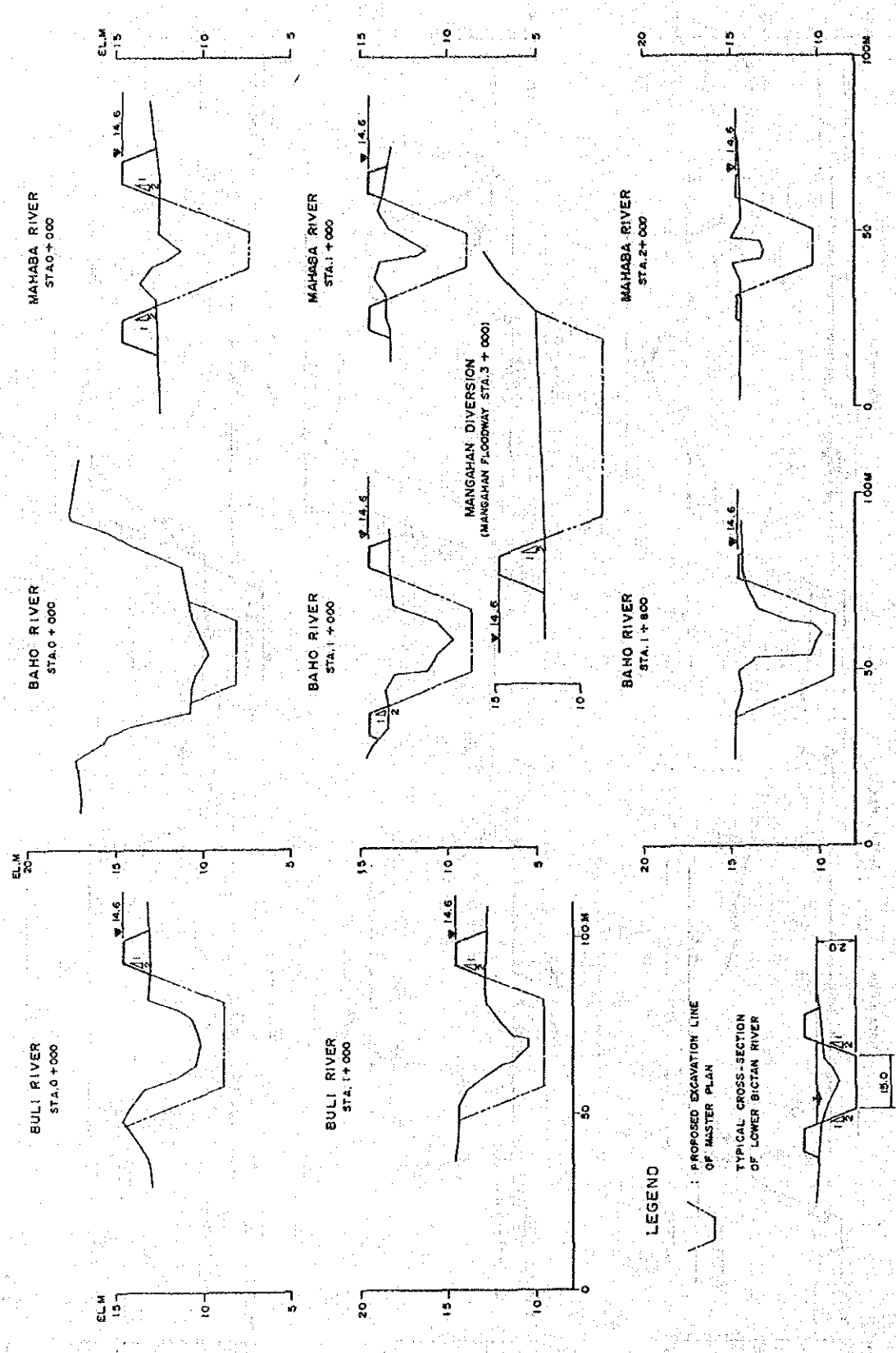


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

PROPOSED CROSS-SECTIONS OF BACKWATER DIKE (NAPINDAN CHANNEL(2/2))

Fig.7.2-6(2/3)

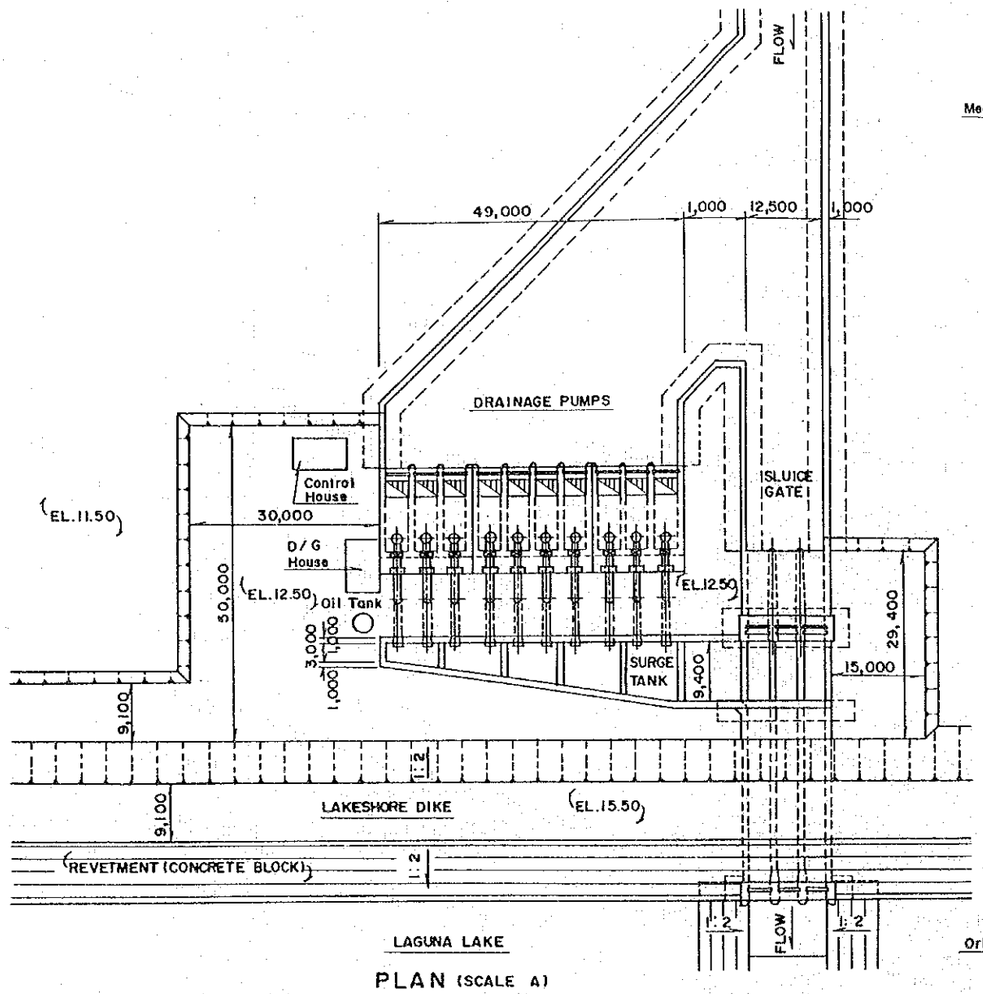


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

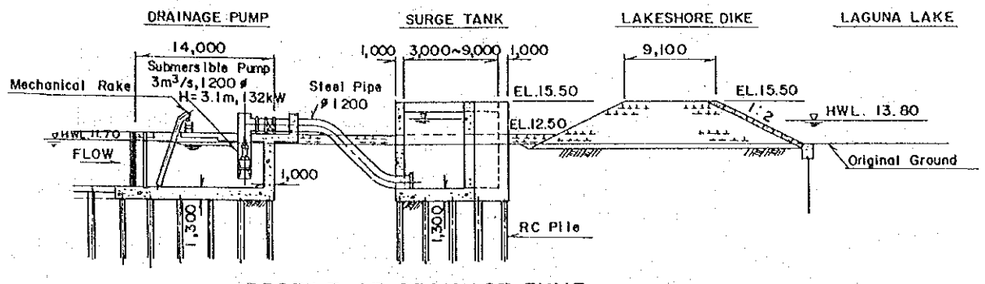
JAPAN INTERNATIONAL COOPERATION AGENCY

PROPOSED CROSS-SECTIONS OF BACKWATER DIKE

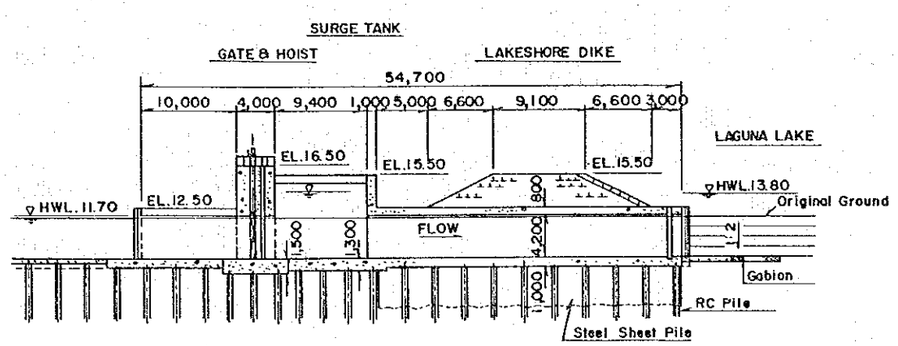
Fig.7.2-6(3/3)



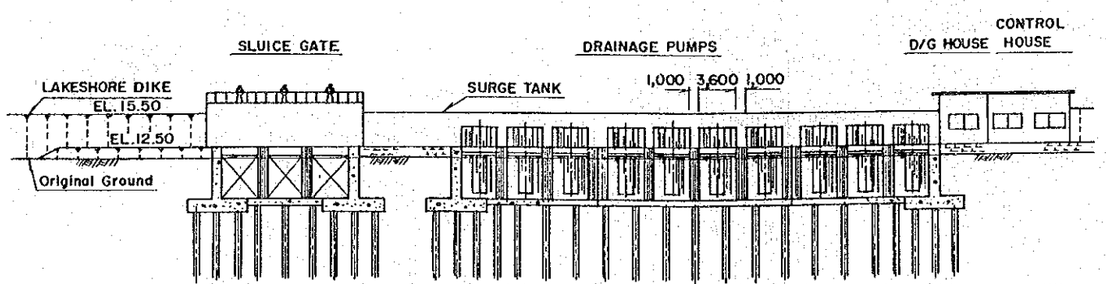
PLAN (SCALE A)



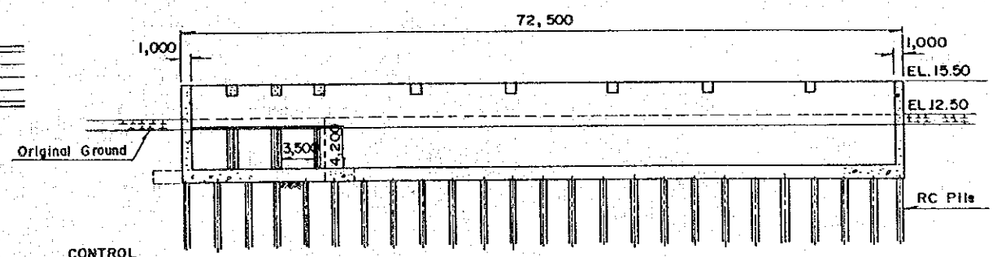
PROFILE OF DRAINAGE PUMP (SCALE B)



PROFILE OF SLUICE WAY (SCALE B)



FRONT VIEW (SCALE B)



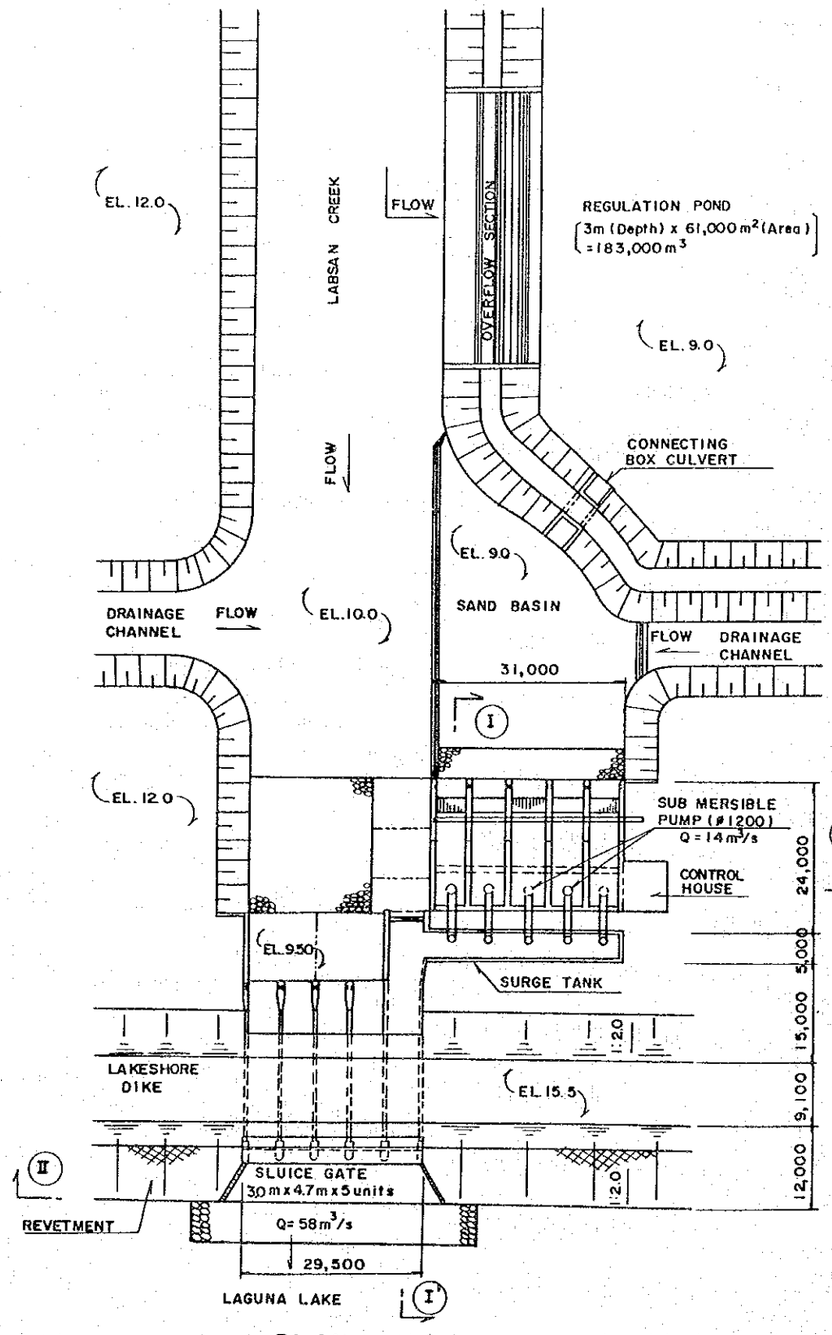
PROFILE OF SURGE TANK (SCALE B)

SCALE A 0 10 20 30 40 50 m

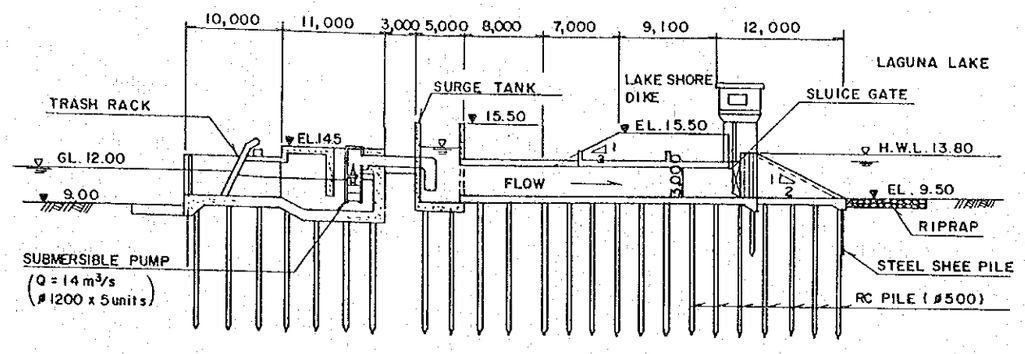
SCALE B 0 10 20 30m

COMPARISON STUDY OF PUMP STATION
TYPICAL MODEL OF SUBMERSIBLE TYPE PUMP STATION FOR EAST AND WEST OF MANGAHAN
($Q = 30.0 m^3/s$)

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	TYPICAL LAYOUT OF PUMP SATION (EAST AND WEST OF MANGAHAN) Fig.7.2-7

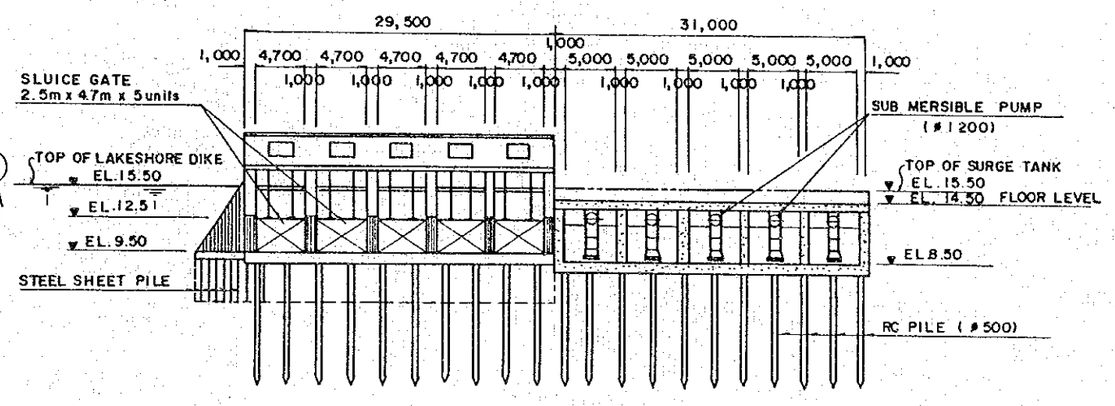


PLAN (SCALE A)



PROFILE OF PUMP STATION AND SLUICE GATE (SECTION Ⅰ - Ⅰ')

(SCALE B)



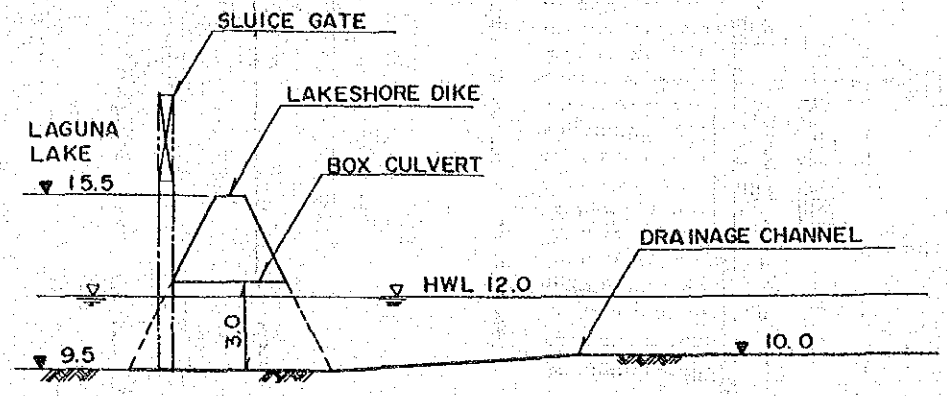
FRONT VIEW (SECTION Ⅱ - Ⅱ')

(SCALE B)

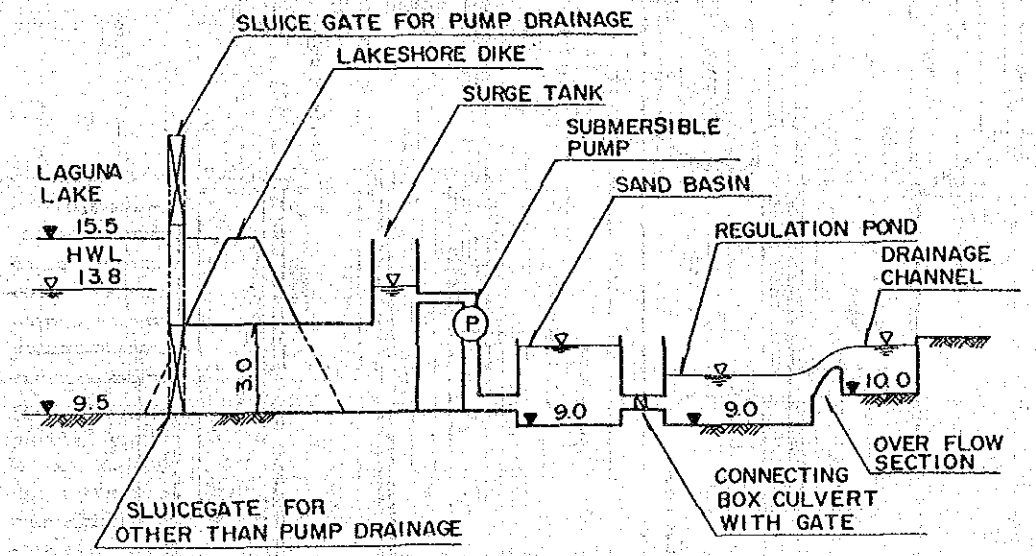
SCALE A : 0 10 20 30 40 50M

SCALE B : 0 10 20 30 M

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	GENERAL ARRANGEMENT OF REGULATION POND, PUMP STATION AND SLUICE GATE Fig.7.2-8

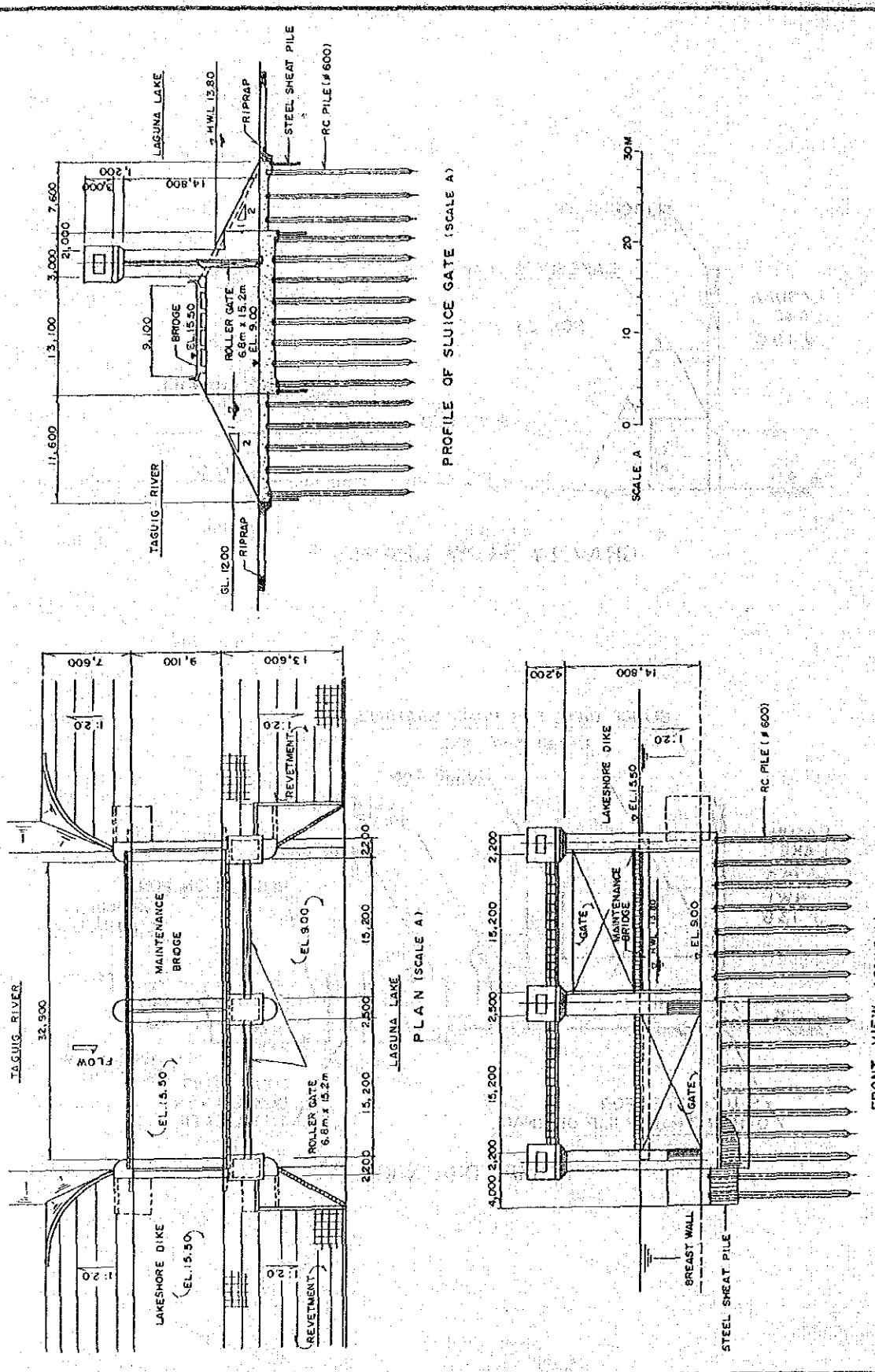


GRAVITY FLOW DRAINAGE



PUMP DRAINAGE

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	SCHEMATIC PROFILE OF REGULATION POND, PUMP STATION AND SLUICE GATE Fig.7.2-9

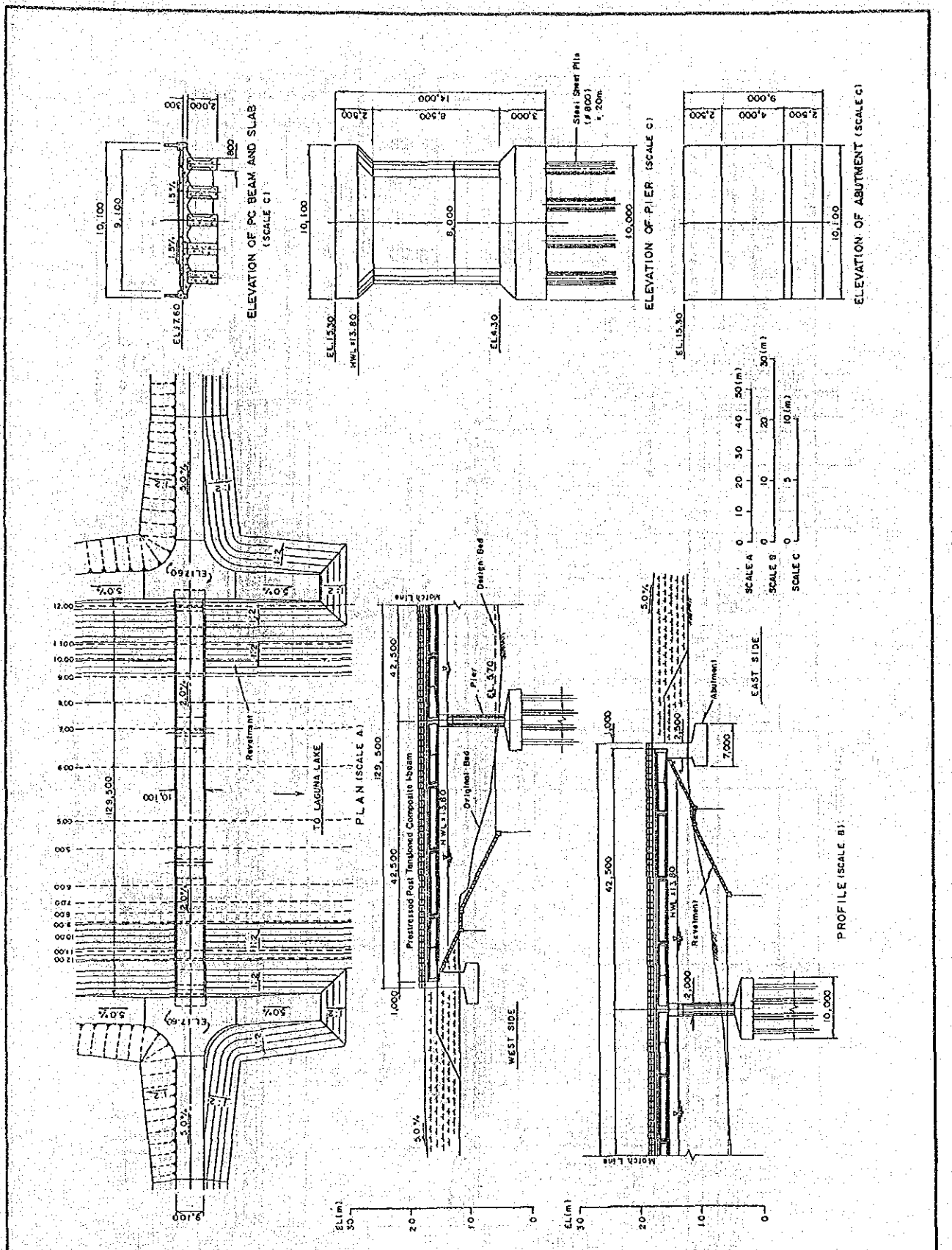


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

TYPICAL LAYOUT OF SLUICE GATE (EAST AND WEST OF MANGAHAN)

Fig.7.2-10

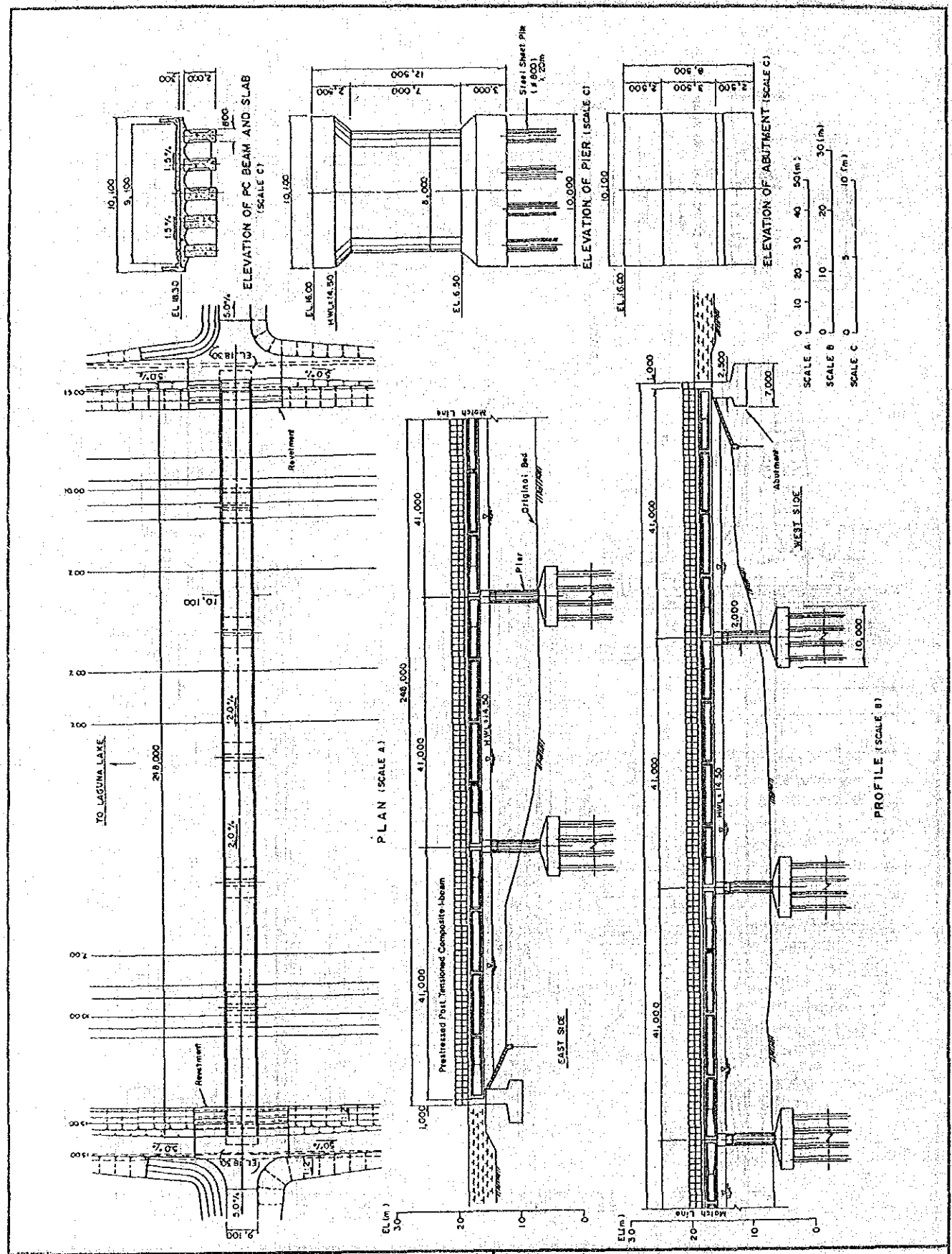


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

GENERAL DRAWING OF BRIDGE (NAPINDAN CHANNEL)

Fig.7.2-11(1/2)



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

GENERAL DRAWING OF BRIDGE (MANGAHAN FLOODWAY)

Fig.7.2-11(2/2)

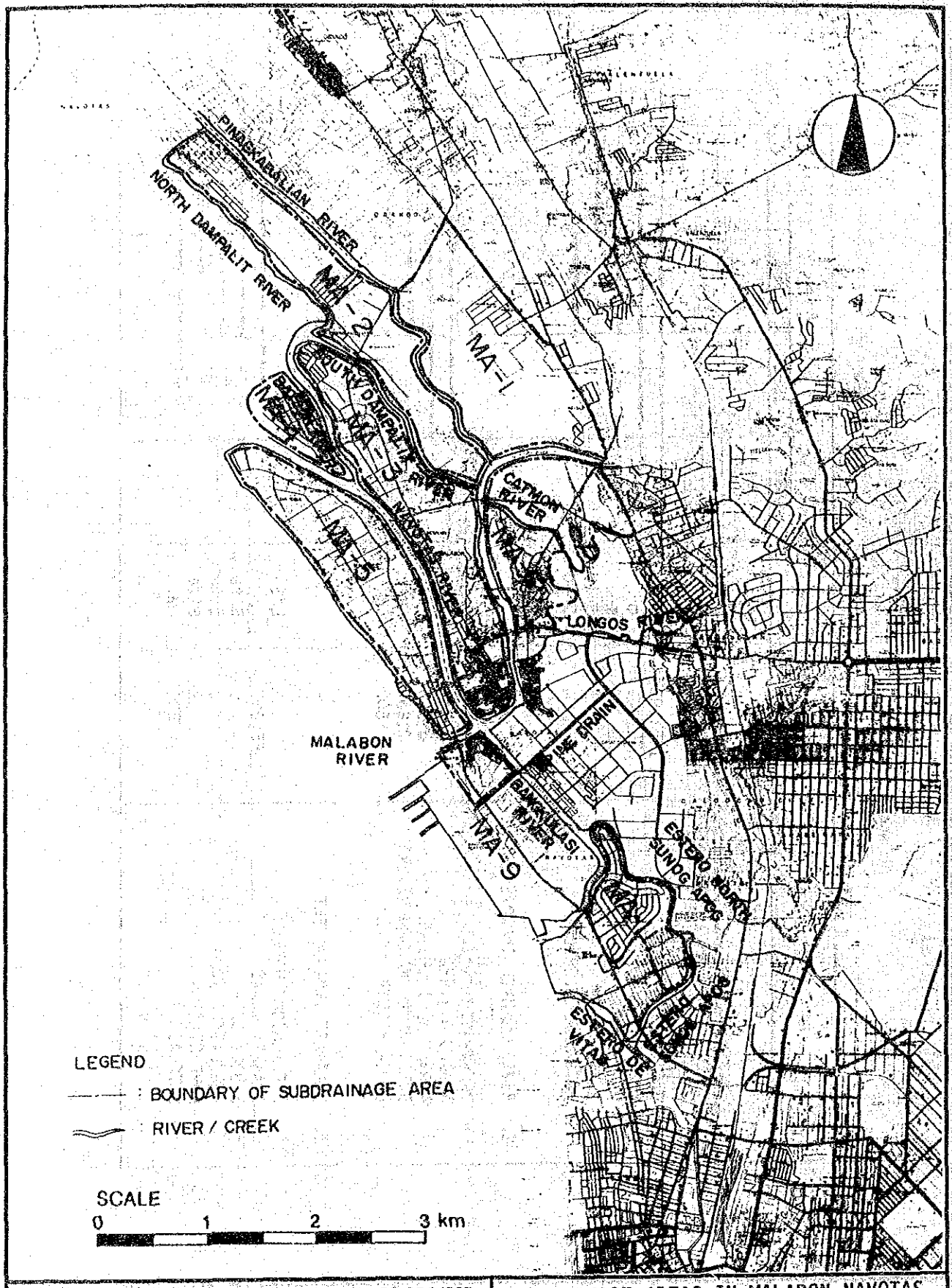
WORK ITEM	QUANTITY	UNIT
1. LAKESHORE DIKE		
PREPARATORY WORKS	1	L/S
EXCAVATION	145,000	m^3
EMBANKMENT	872,000	m^3
REVETMENT	80,000	m^2
SLUICE GATE	5	Site
MAINTENANCE BRIDGE	4	Site
2. RIVER CHANNEL IMPROVEMENT		
PREPARATORY WORKS	1	L/S
NAPINDAN RIVER	5,242	m
MANGAHAN DIVERSION	3,900	m
BULI, BAHO, MAHABA RIVERS	5,800	m
LOWER BICUTAN RIVER	800	m
3. DRAINAGE IMPROVEMENT		
PREPARATORY WORKS	1	L/S
CHANNEL WORKS	55,000	m
SLUICE GATE	9	Site
REGULATION POND	6	Site
PUMP STATION	9	Site
LATERAL	114,500	m

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

WORK SCHEDULE FOR EAST AND WEST OF MANGAHAN DRAINAGE IMPROVEMENT PROJECT

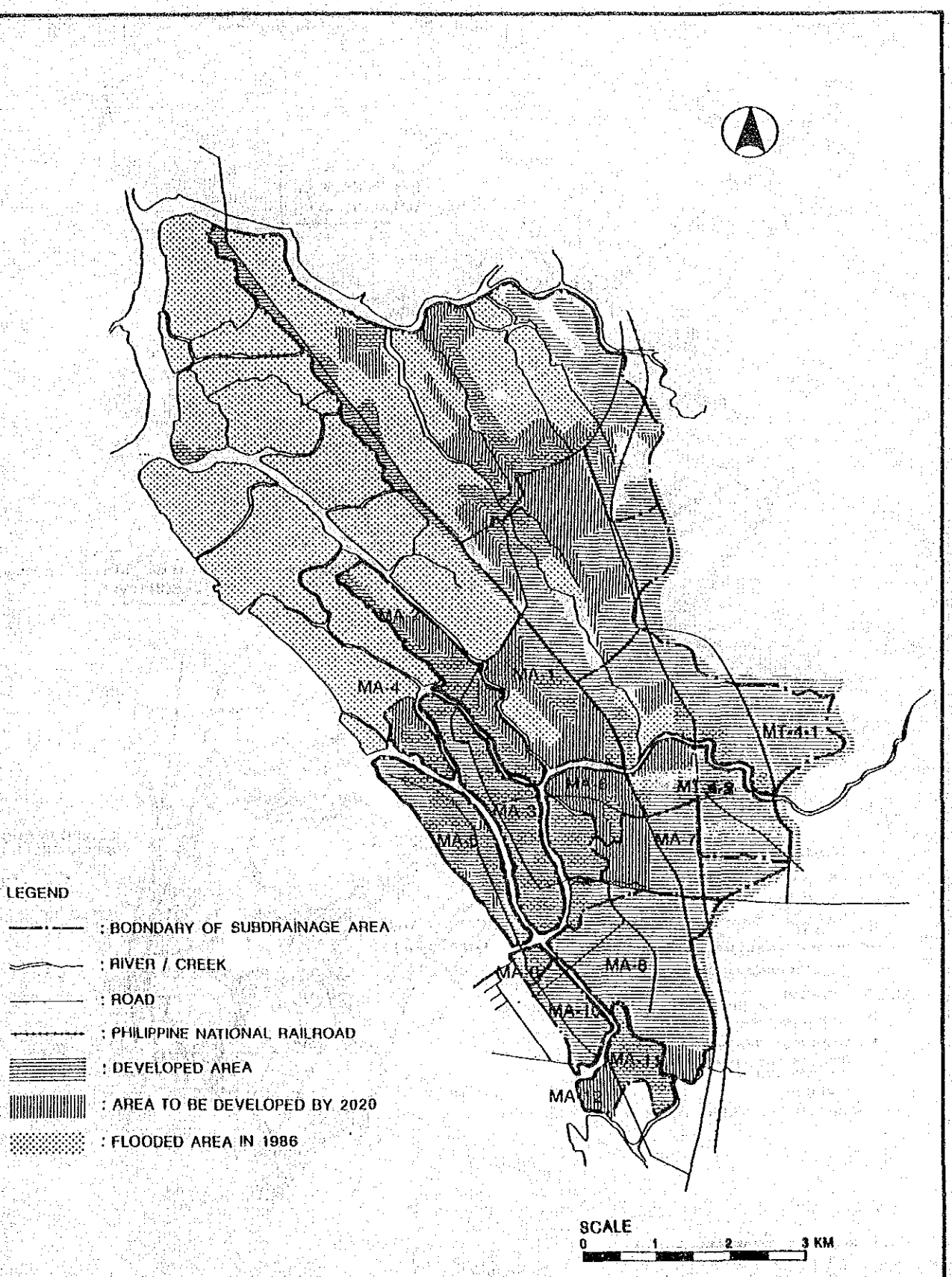
Fig.7.2-12



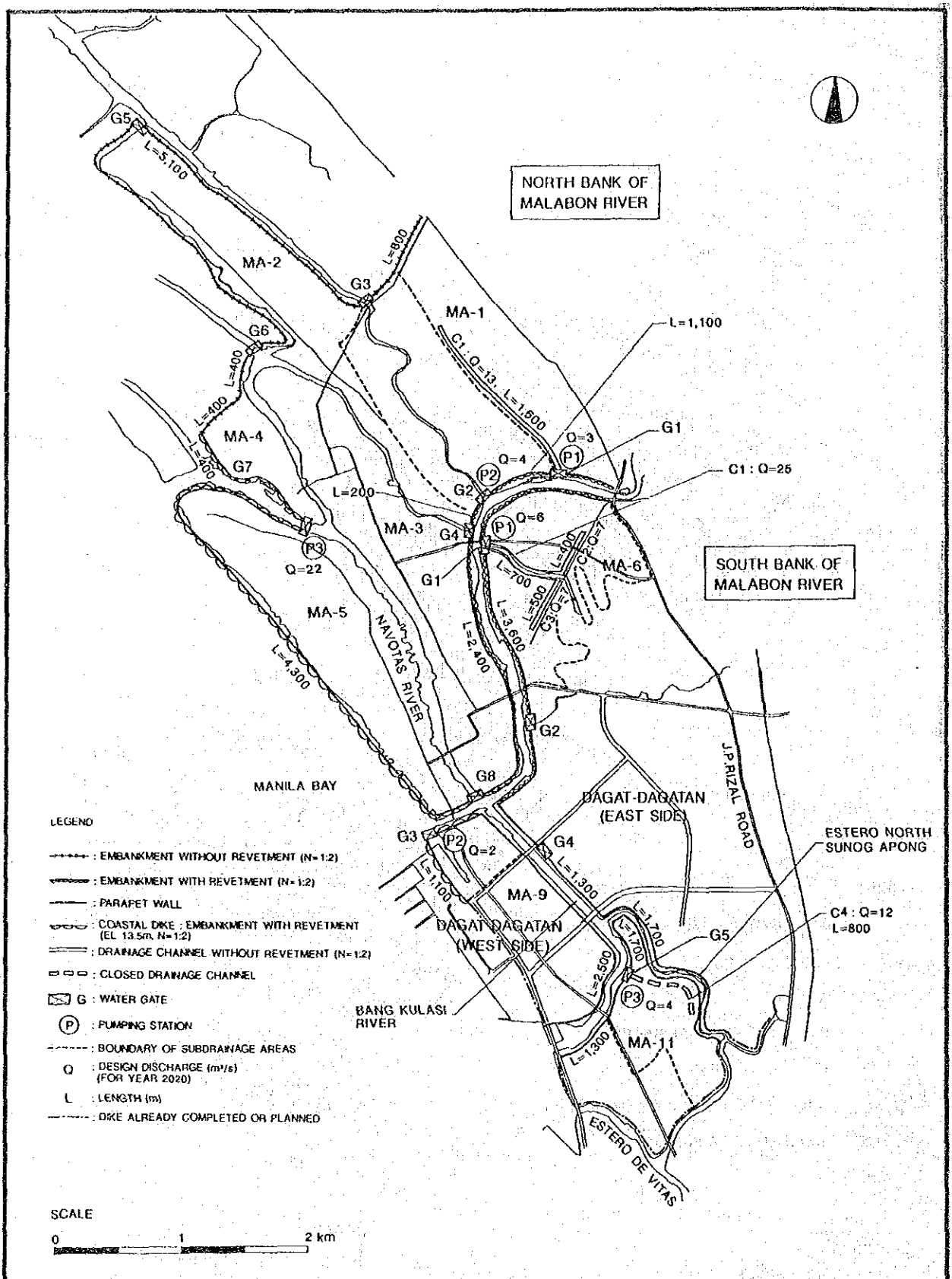
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

SUBDRAINAGE AREAS IN MALABON-NAVOTAS
Fig.7.3-1



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	DEVELOPMENT AND INUNDATION CONDITIONS IN MALABON-NAVOTAS Fig.7.3-2



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

OPTINUM DRAINAGE SYSTEMS IN MALABON-NAVOTAS

Fig.7.3-3

LEGEND

: BOUNDARY OF DRAINAGE AREA

: RING DIKE (EMBANKMENT W/O REVETMENT)

: RIVER DIKE/COASTAL DIKE (EMBANKMENT W/ REVETMENT)

: PARAPET/RIVER WALL

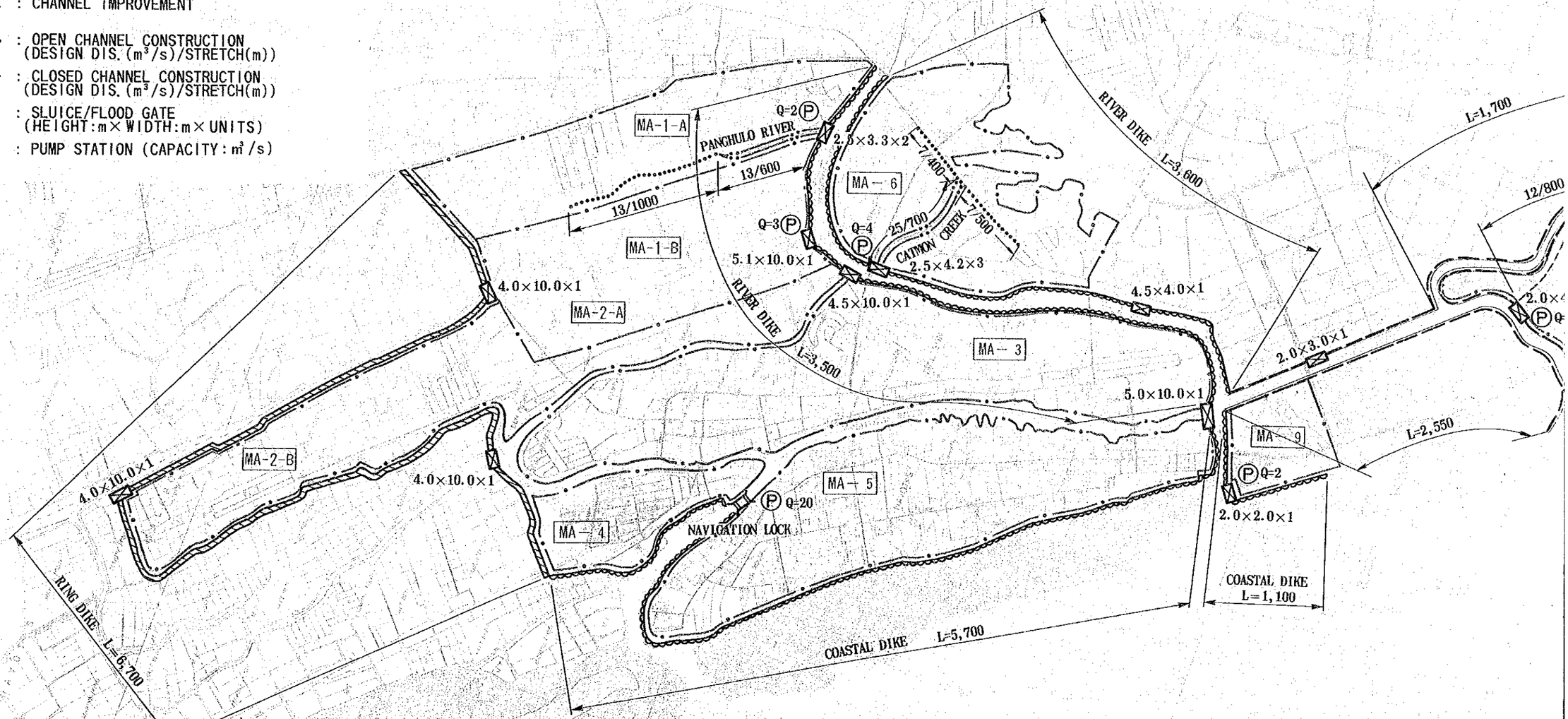
: CHANNEL IMPROVEMENT

10/800 : OPEN CHANNEL CONSTRUCTION (DESIGN DIS.(m³/s)/STRETCH(m))

15/900 : CLOSED CHANNEL CONSTRUCTION (DESIGN DIS.(m³/s)/STRETCH(m))

2.5×3.3×2 : SLUICE/FLOOD GATE (HEIGHT:m×WIDTH:m×UNITS)

Ⓟ Q=3 : PUMP STATION (CAPACITY:m³/s)



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES	LAYOUT OF MALABON-
JAPAN INTERNATIONAL COOPERATION AGENCY	

IAGE AREA

MENT W/O REVETMENT)

L DIKE (EMBANKMENT
W/ REVETMENT)

L

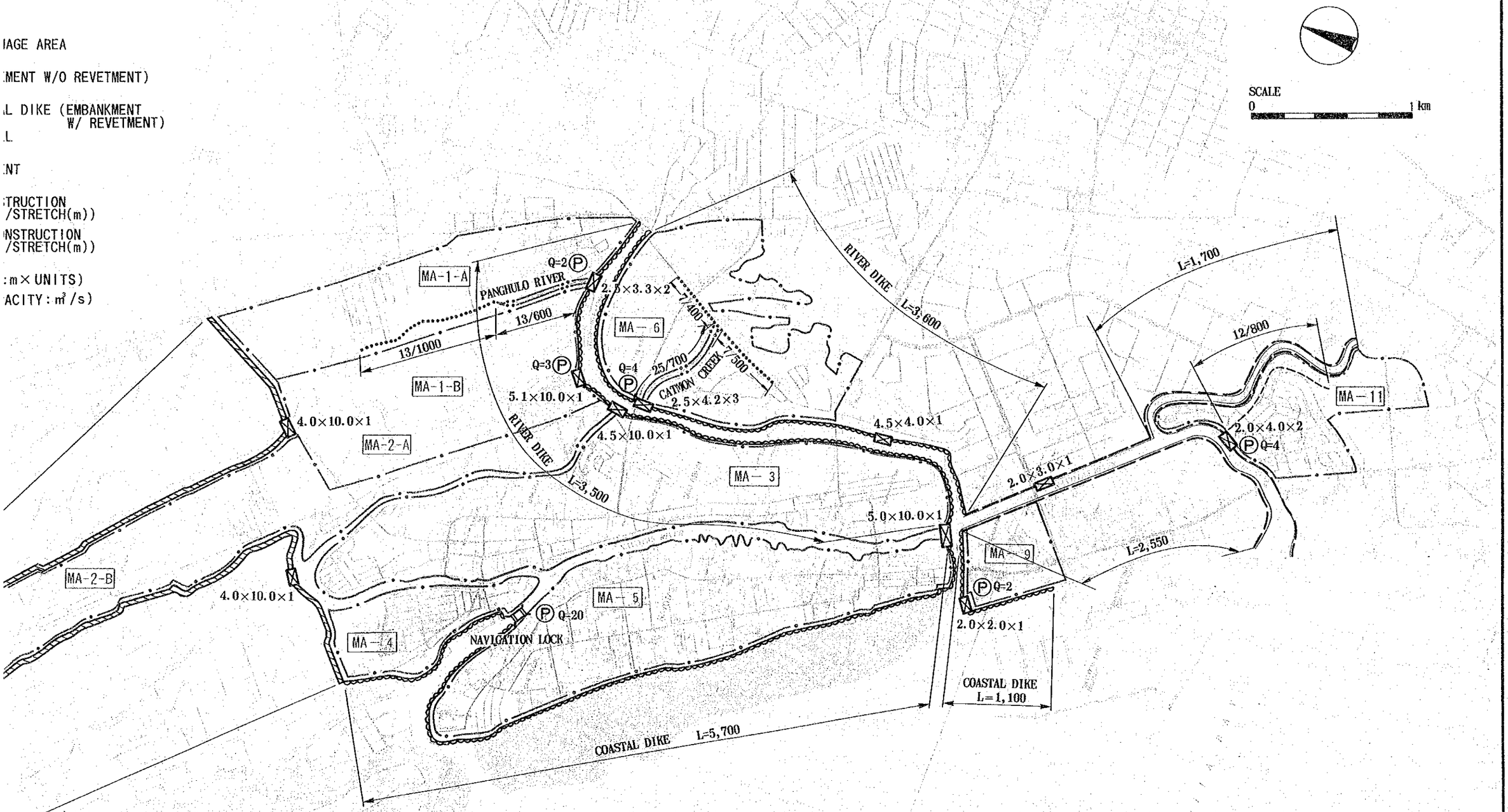
NT

TRUCTION
/STRETCH(m))

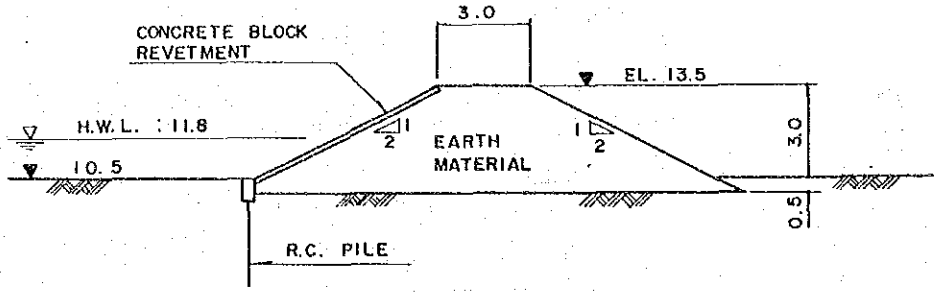
NSTRUCTION
/STRETCH(m))

:m×UNITS)

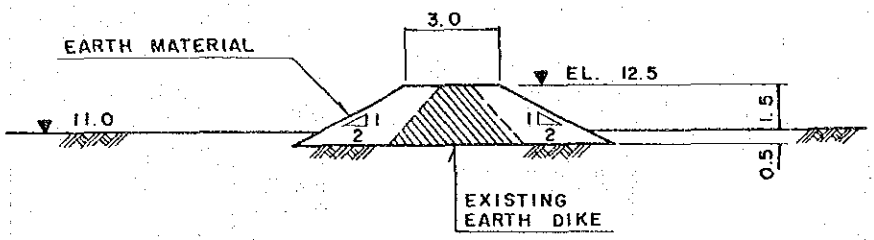
ACITY:m³/s)



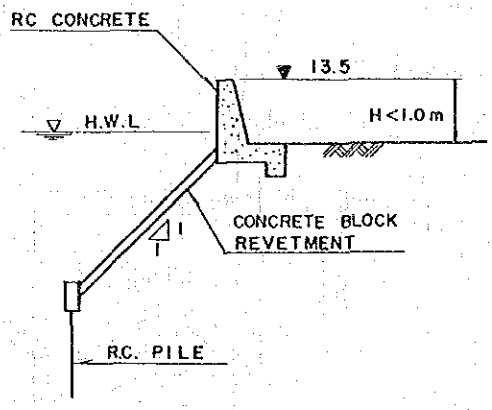
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	LAYOUT OF FACILITIES FOR MALABON-NAVOTAS Fig.7.3-4



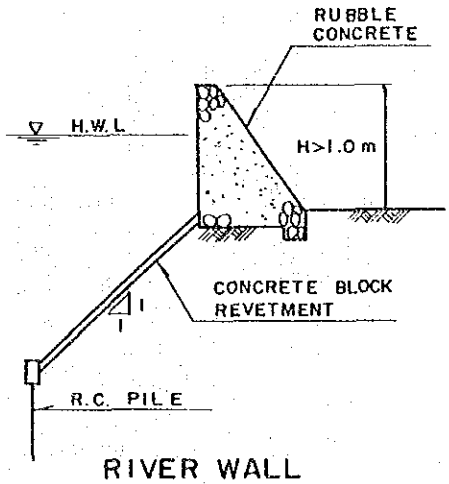
COASTAL DIKE



RING DIKE

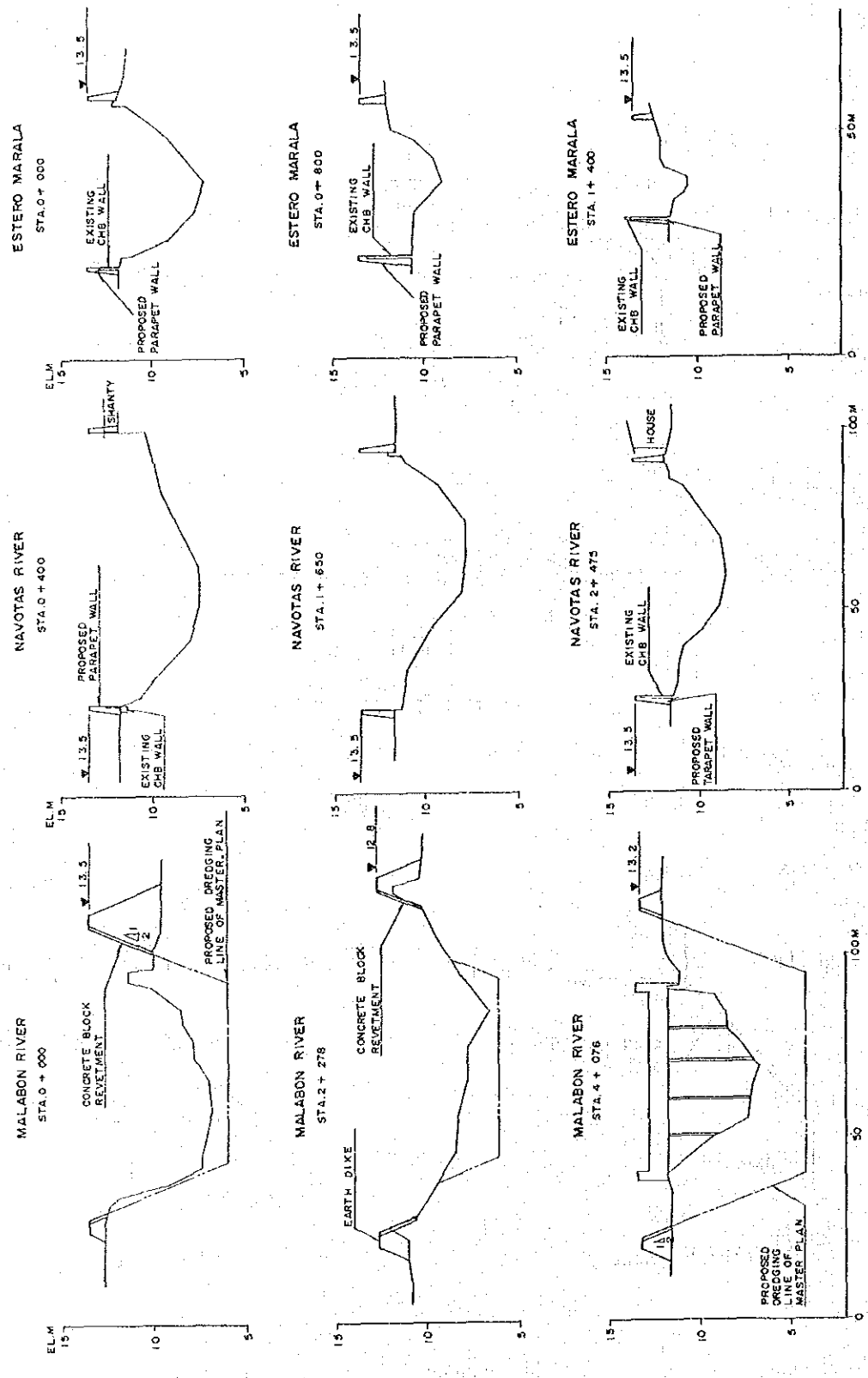


PARAPET WALL



RIVER WALL

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	TYPICAL CROSS-SECTIONS OF RING DIKE (MALABON-NAVOTAS) Fig.7.3-5

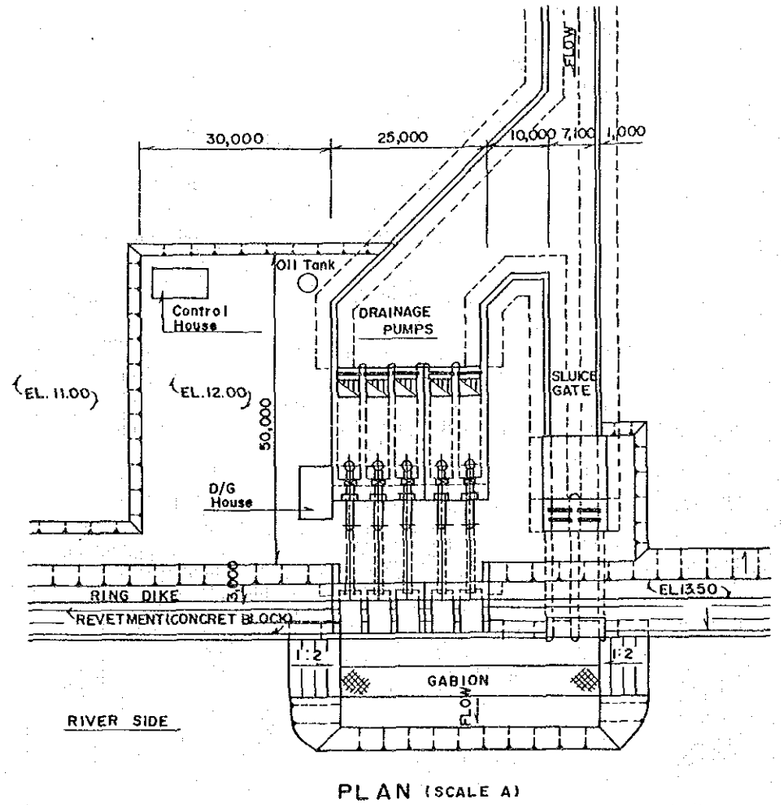


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

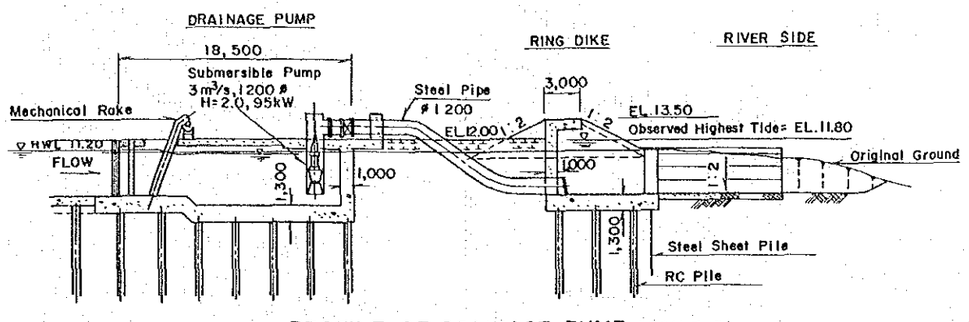
JAPAN INTERNATIONAL COOPERATION AGENCY

PROPOSED RIVER DIKE AND PARAPET WALL

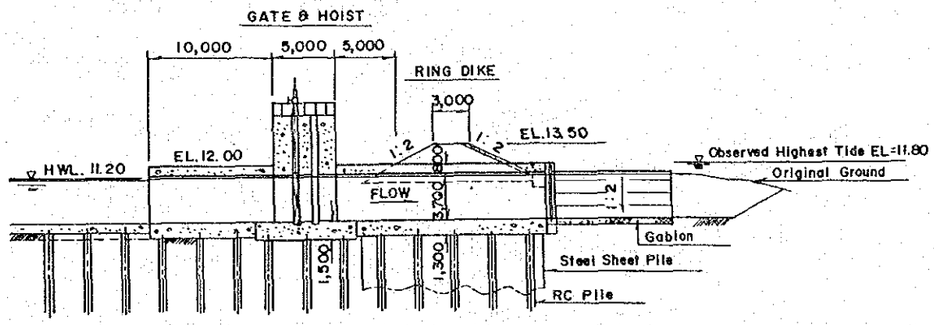
Fig.7.3-6



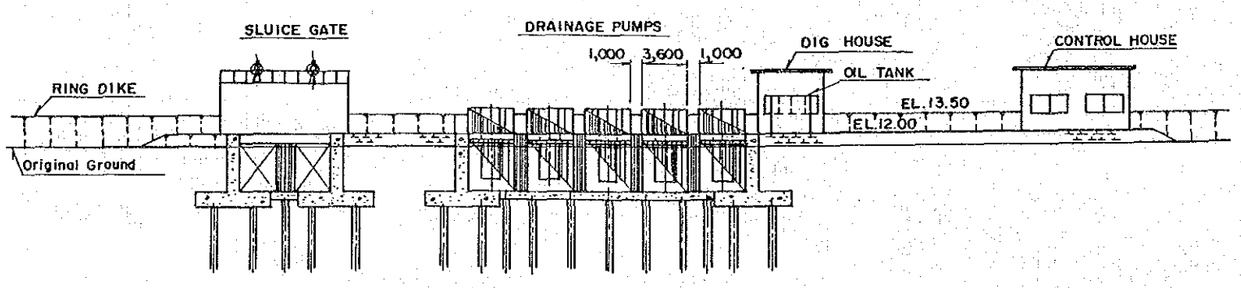
PLAN (SCALE A)



PROFILE OF DRAINAGE PUMP (SCALE B)



PROFILE OF SLUICE WAY (SCALE B)



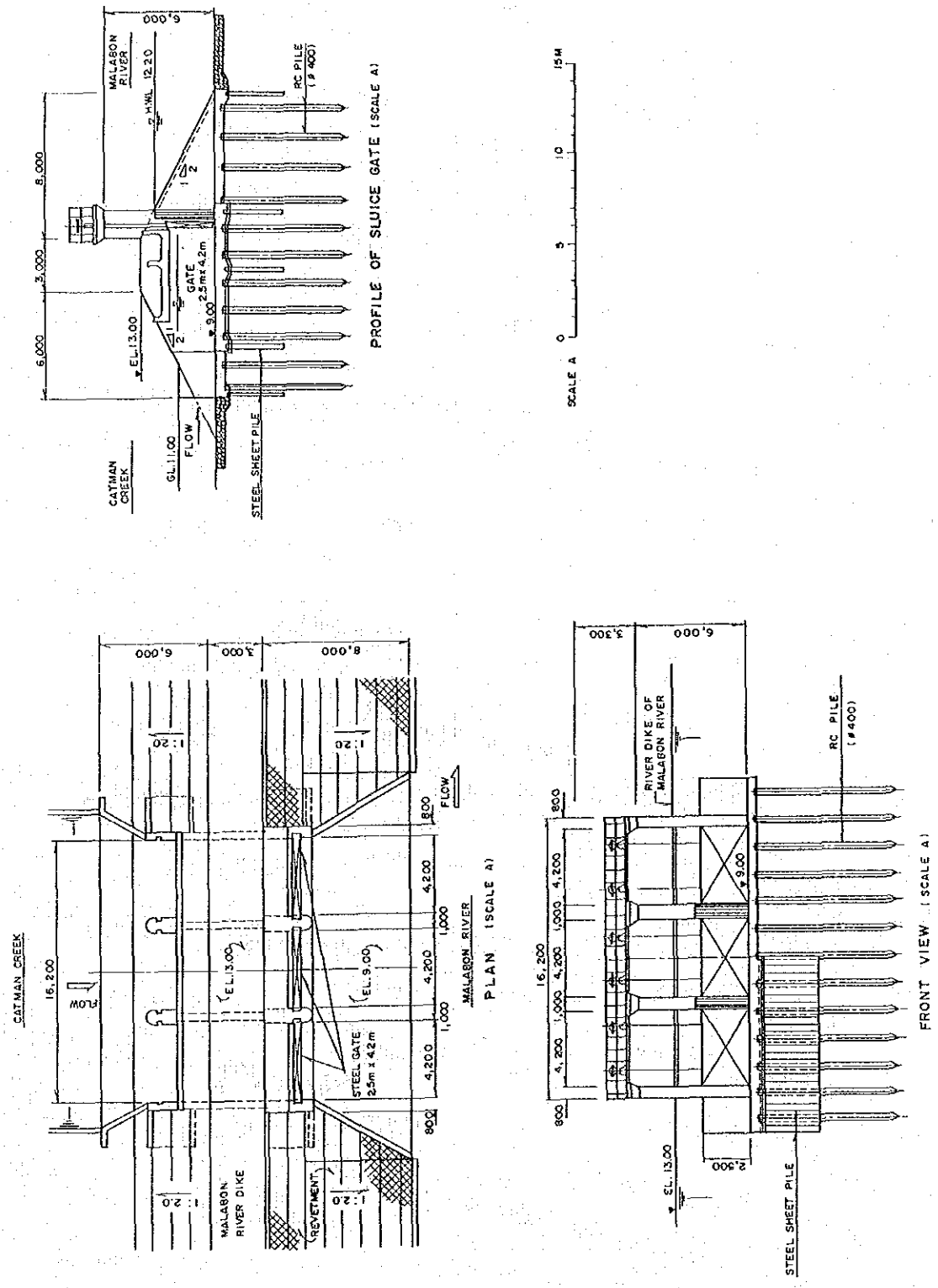
FRONT VIEW (SCALE B)

SCALE A 0 10 20 30 40 50m

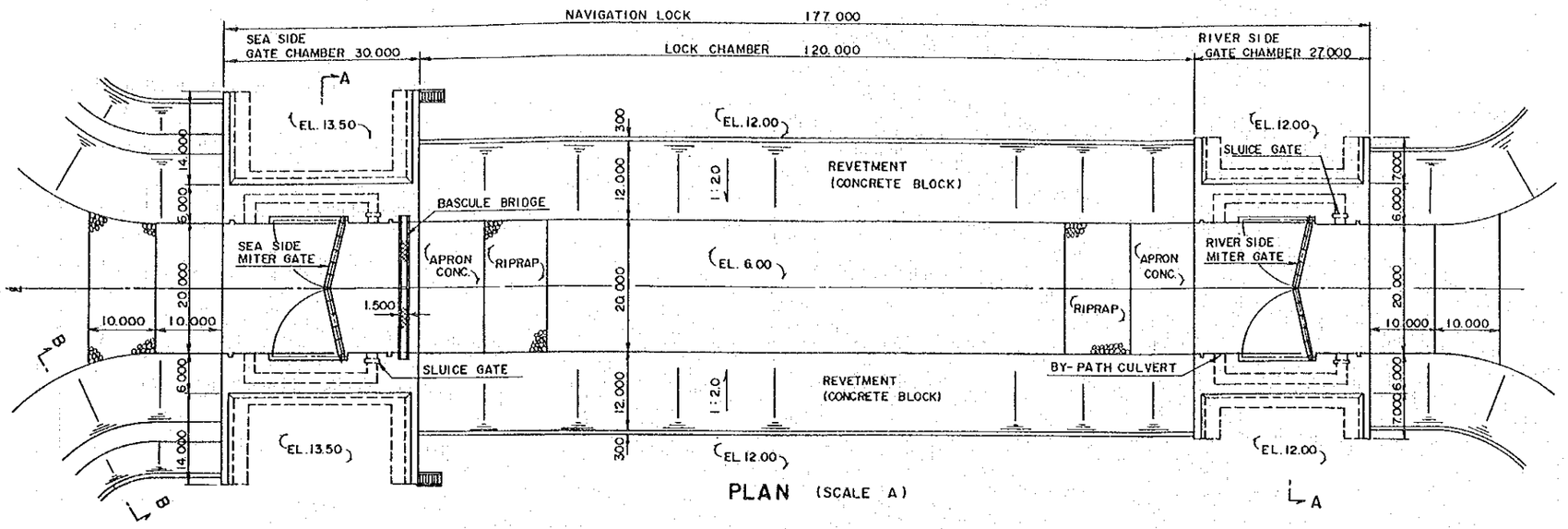
SCALE B 0 10 20 30m

COMPARISON STUDY OF PUMP STATION
TYPICAL MODEL OF SUBMERSIBLE-TYPE PUMP STATION
FOR MALABON-NAVOTAS
(Q = 15.0 m³/s)

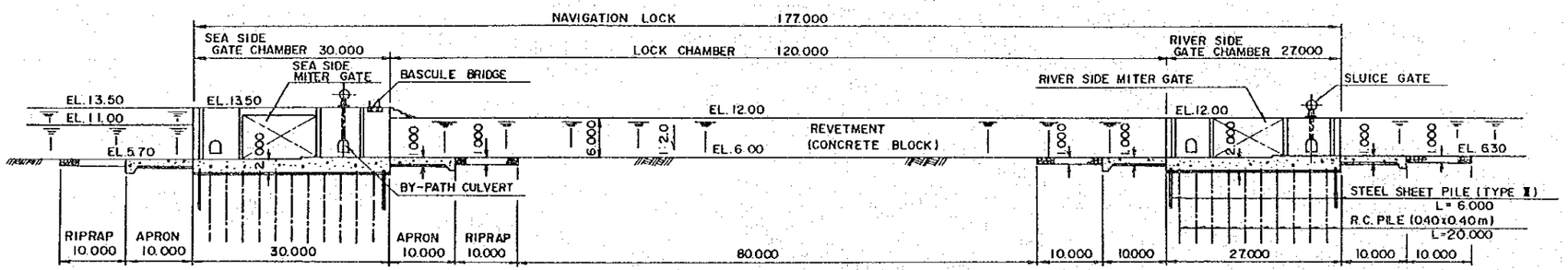
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	TYPICAL LAYOUT OF PUMP STATION (MALABON-NAVOTAS) Fig.7.3-7



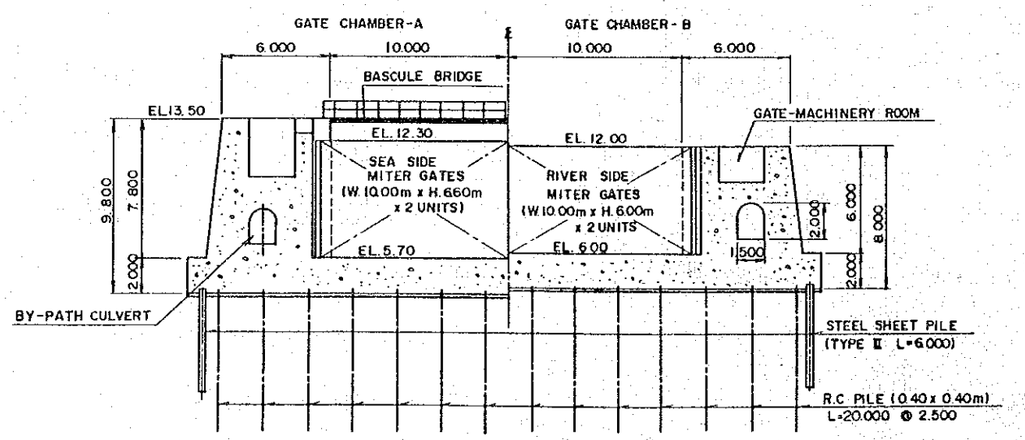
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	TYPICAL LAYOUT OF SLUICE GATE (MALABON-NAVOTAS) Fig.7.3-8



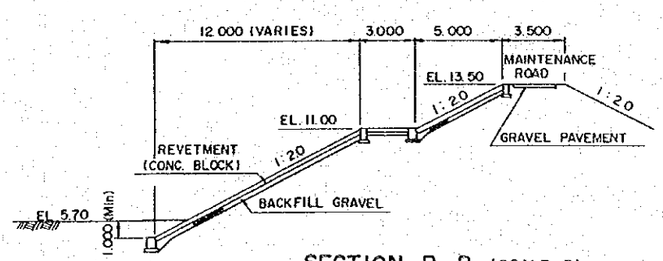
PLAN (SCALE A)



ELEVATION (SCALE A)



SECTION A-A (SCALE B)



SECTION B-B (SCALE B)

SCALE A 0 5 10 15 20 25 (m)

SCALE B 0 2 4 6 8 10 (m)

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	GENERAL DRAWING OF NAVOTAS NAVIGATION LOCK Fig.7.3-9

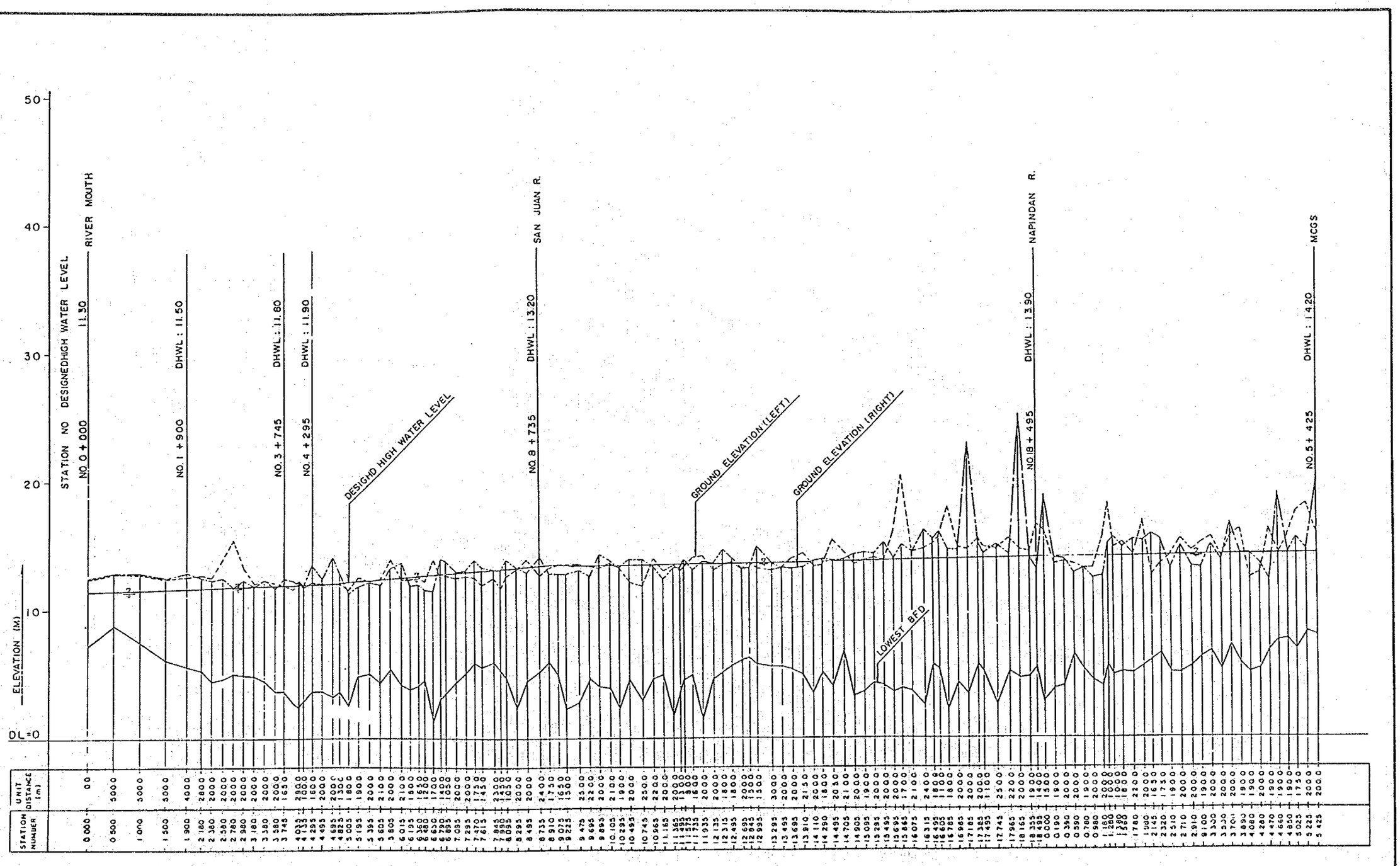
WORK ITEM	QUANTITY	UNIT	YEAR 1991	1992	1993	1994
1. NORTH OF MALABON RIVER						
PREPARATORY WORKS	1	L/S				
RING DIKE	15,900	m				
CHANNEL WORKS	1,600	m				
GATE	7	Site				
PUMP STATION	3	Site				
LATERAL	31,200	m				
2. NAVIGATION LOCK						
PREPARATORY WORKS	1	L/S				
EARTHWORKS	1	L/S				
CONCRETE WORKS	1	L/S				
GATE/EQUIPMENT	1	L/S				
3. SOUTH OF MALABON RIVER						
PREPARATORY WORKS	1	L/S				
RING DIKE	13,200	m				
CHANNEL WORKS	2,400	m				
GATE	5	Site				
PUMP STATION	3	Site				
LATERAL	5,900	m				

THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

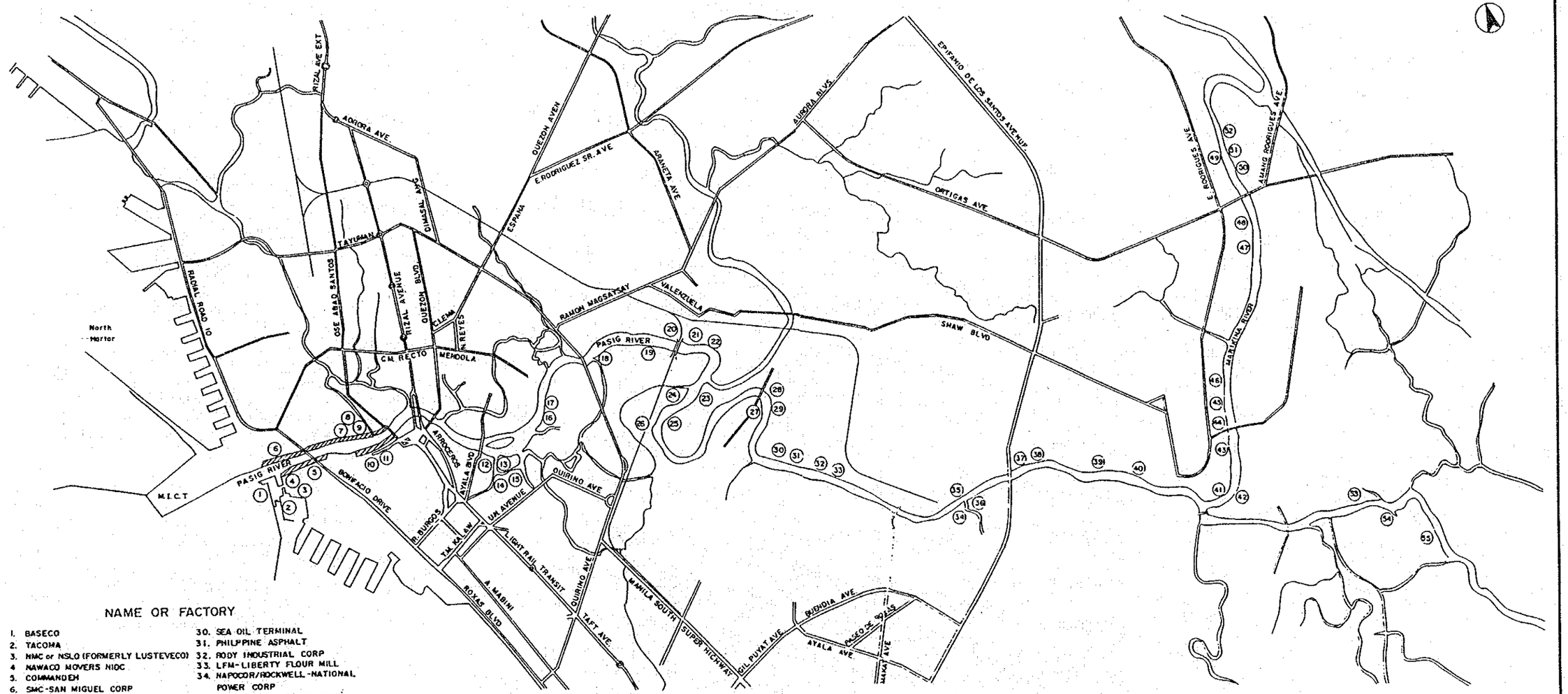
JAPAN INTERNATIONAL COOPERATION AGENCY

WORK SCHEDULE FOR MALABON-NAVOTAS DRAINAGE IMPROVEMENT PROJECT

Fig.7.3-10



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	DESIGNED HIGH WATER LEVEL Fig.7.4-1



NAME OR FACTORY

1. BASECO
2. TACOMA
3. NMC or NSLO (FORMERLY LUSTEVECO)
4. NAWACO MOVERS NIOC
5. COMMANDEH
6. SMC-SAN MIGUEL CORP
7. EDRALIN
8. ELIZALDE
9. FEDERATION
10. DELGADO
11. MAGALLANES
12. ROMUS
13. NAPOCOR-NPC-NATIONAL POWER CORPORATION
14. PRC-PHILIPPINI REFINING CO
15. TABACALERA WHARF
16. ANSCOR TERMINAL
17. CENVOCO
18. SHELL CHEMICAL CO (PHIL) INC
19. CALTEX (PRIL) INC.
20. PETROPHIL CO
21. SUNRIPE COCONUT PRODUCT INC.
22. CTI-(CONSOLIDATED TERMINAL INC.)
23. AG & P-ATLANTIC GULF & PACIFIC COMPANY
24. IVOC-IN VEGETABLE CO.
25. EXXON CHEMICALS
26. MABUHAY WAREHOUSE
27. ALCHEMCO ALLIED CHEMICALS CO.
28. PACIFIC ENAMELS & GLAS CORP.
29. UNION CARBIDE
30. SEA OIL TERMINAL
31. PHILIPPINE ASPHALT
32. RODY INDUSTRIAL CORP
33. LFM-LIBERTY FLOUR MILL
34. NAPOCOR/ROCKWELL-NATIONAL POWER CORP
35. INSUREFCO-INSULAR SUGAR REFINING CO.
36. COLGAFE PHIL
37. CTI-CONSOLIDATED TERMINALS. INC.
38. PU AT STEEL CORP.
39. RFM-REPUBLIC FLOUR MILLS CORP.
40. WFM-WELLINGTON FLOUR MILLS
41. JRC-UNIVERSAL ROBINA CORP.
42. AMPARTS
43. CALTEX (PHIL). INC
44. RESINS. INC
45. UNION GILASS & CONTAINER CORP.
46. FILIPINAS CEMENT
47. SMC- SAN MIGUEL CORP.
48. GMC-GENERAL MILLING CO.
49. REPUBLIC GLASS FACTORY-RGF
50. MARINDUQUE MINING
51. LITTON MILLS
52. PBM-PHILIPPINE BLOOMING MILLS
53. REPUBLIC GLASS CORP-RGC
54. NSC-NATIONAL STEEL CORP.
55. CHEMICAL INDUSTRIES

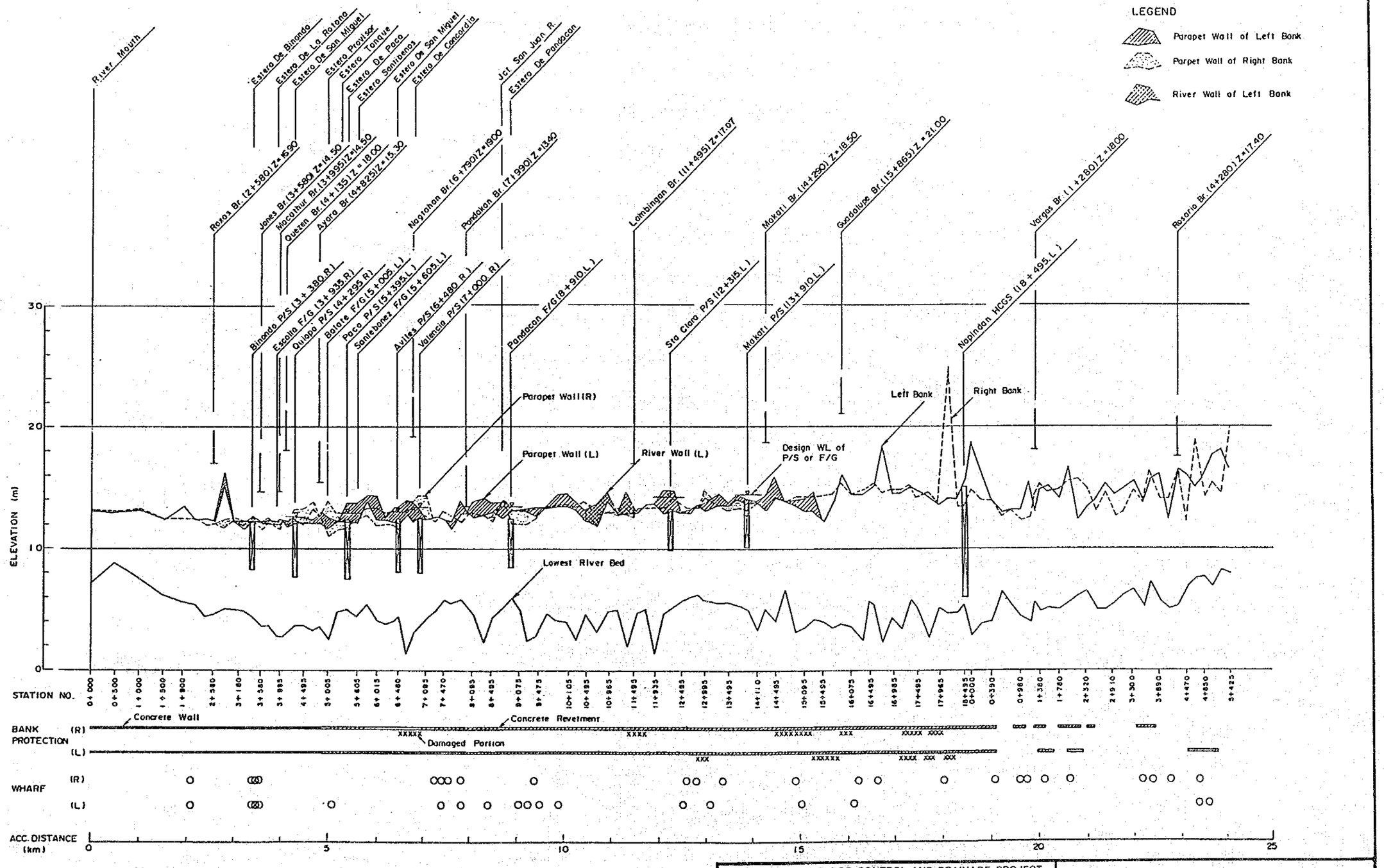
SCALE
0 500 1000 1500 2000m

PUBLIC FACILITIES UNDER PPA CONTROL

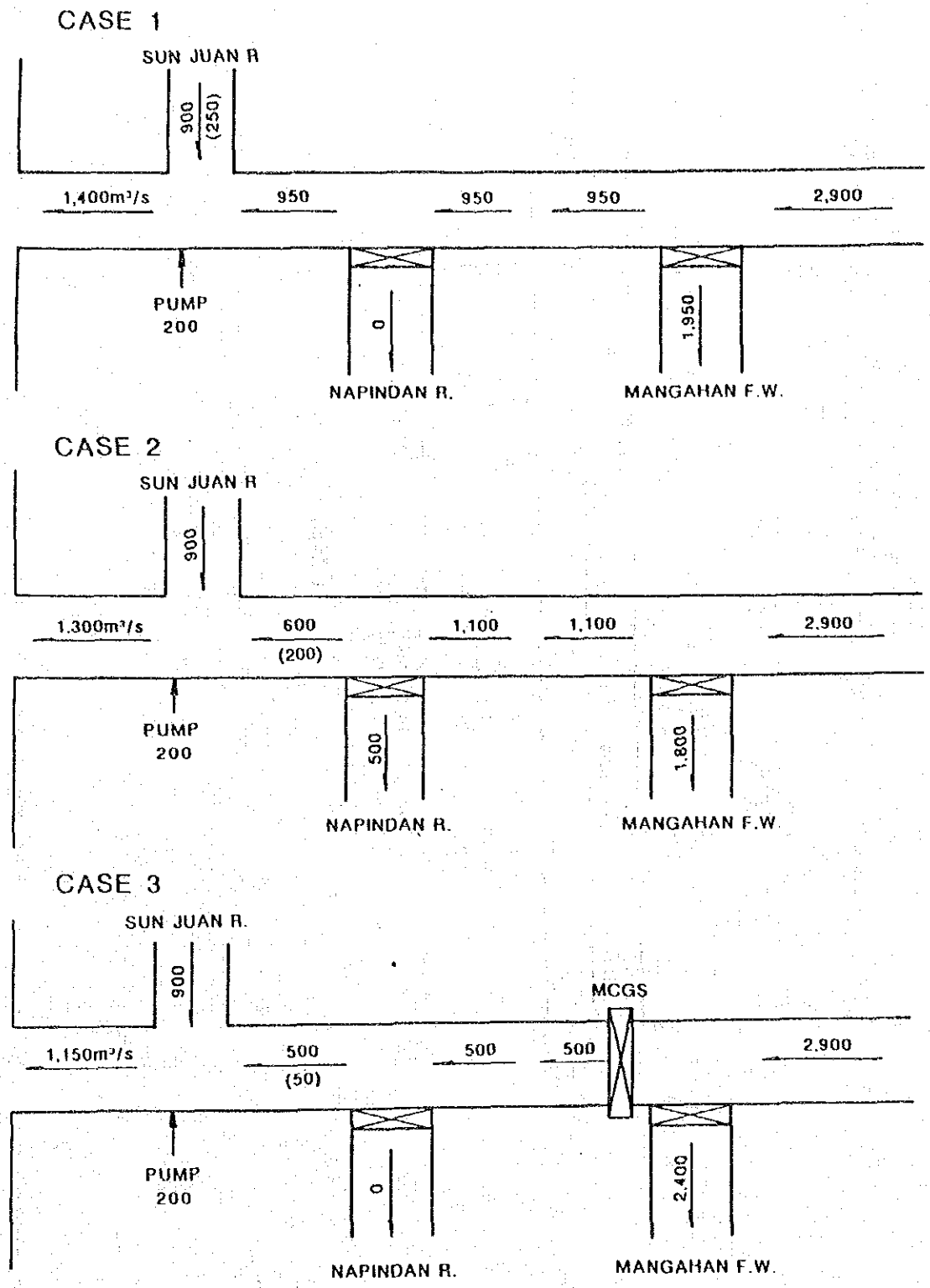
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

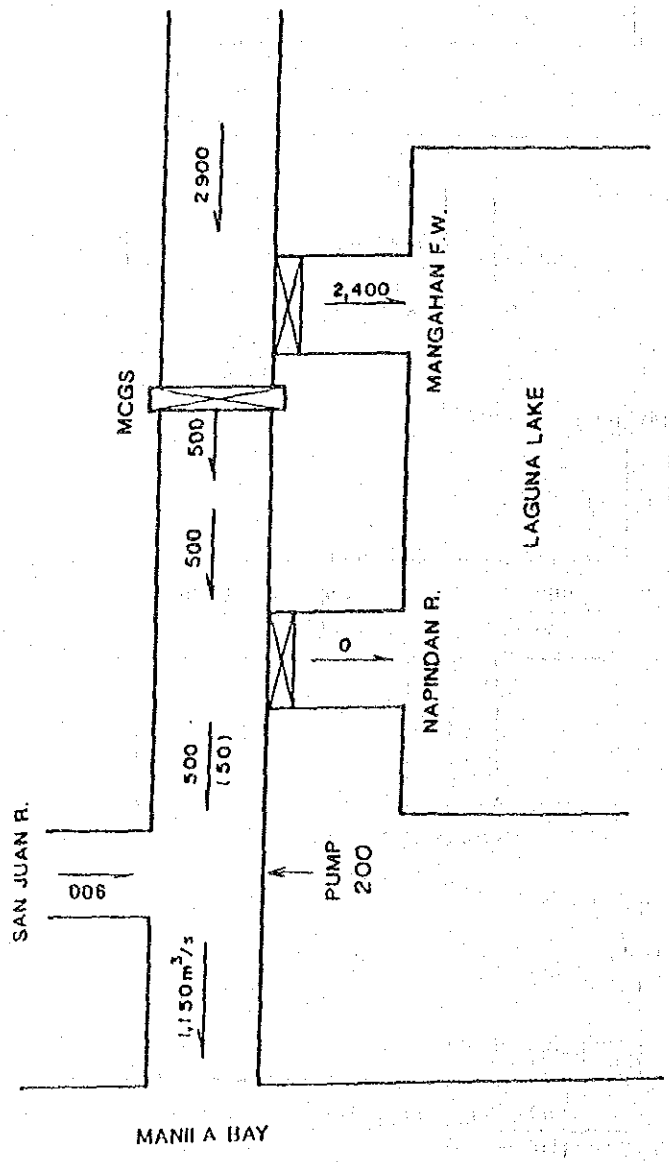
EXISTING PORT FACILITIES ALONG PASIG RIVER Fig.7.4-2



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	EXISTING RIPARIAN STRUCTURES ALONG PASIG RIVER Fig.7.4-3



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	DISCHARGE DISTRIBUTION OF THREE STUDY CASES Fig.7.4-4

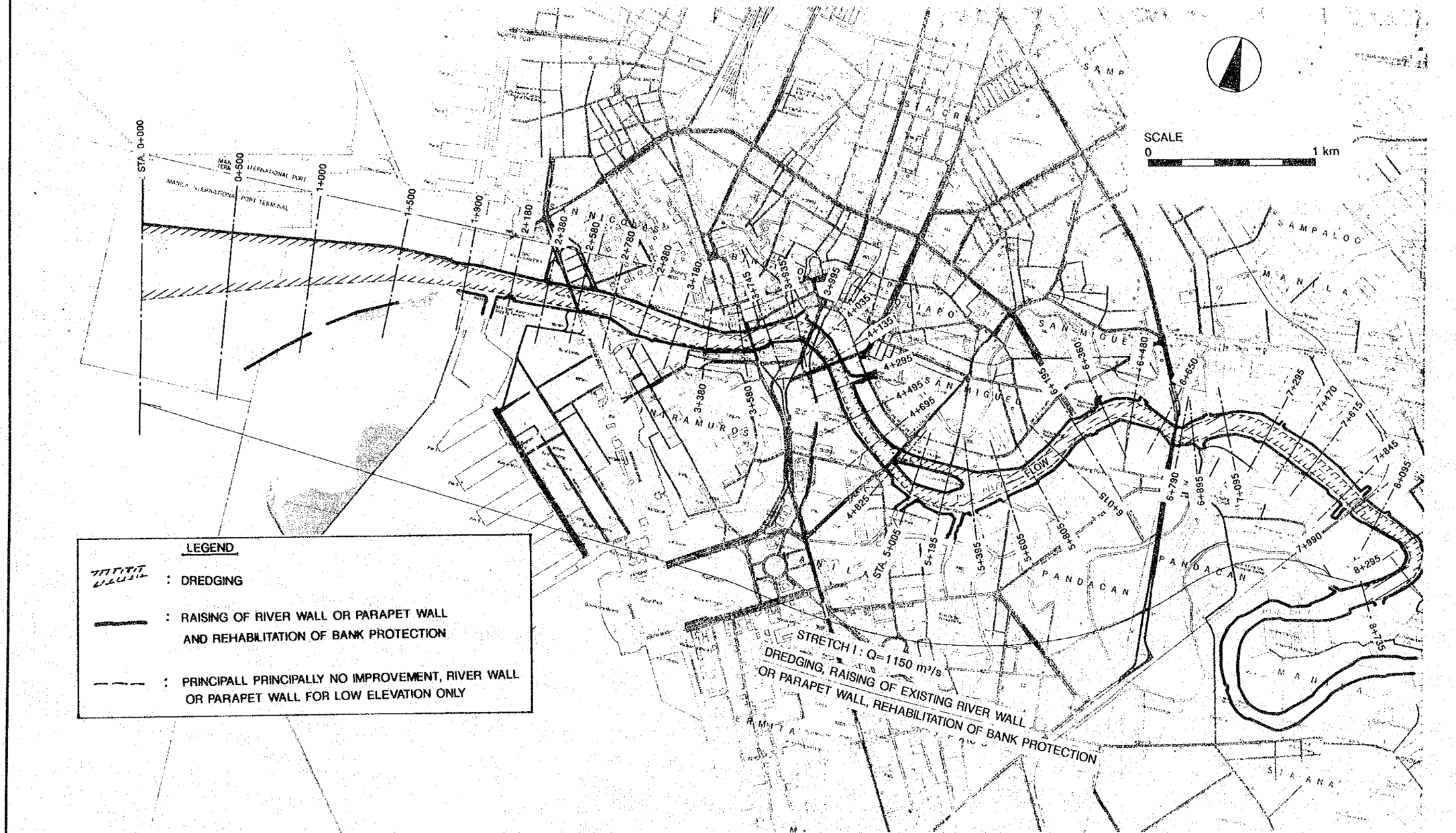


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

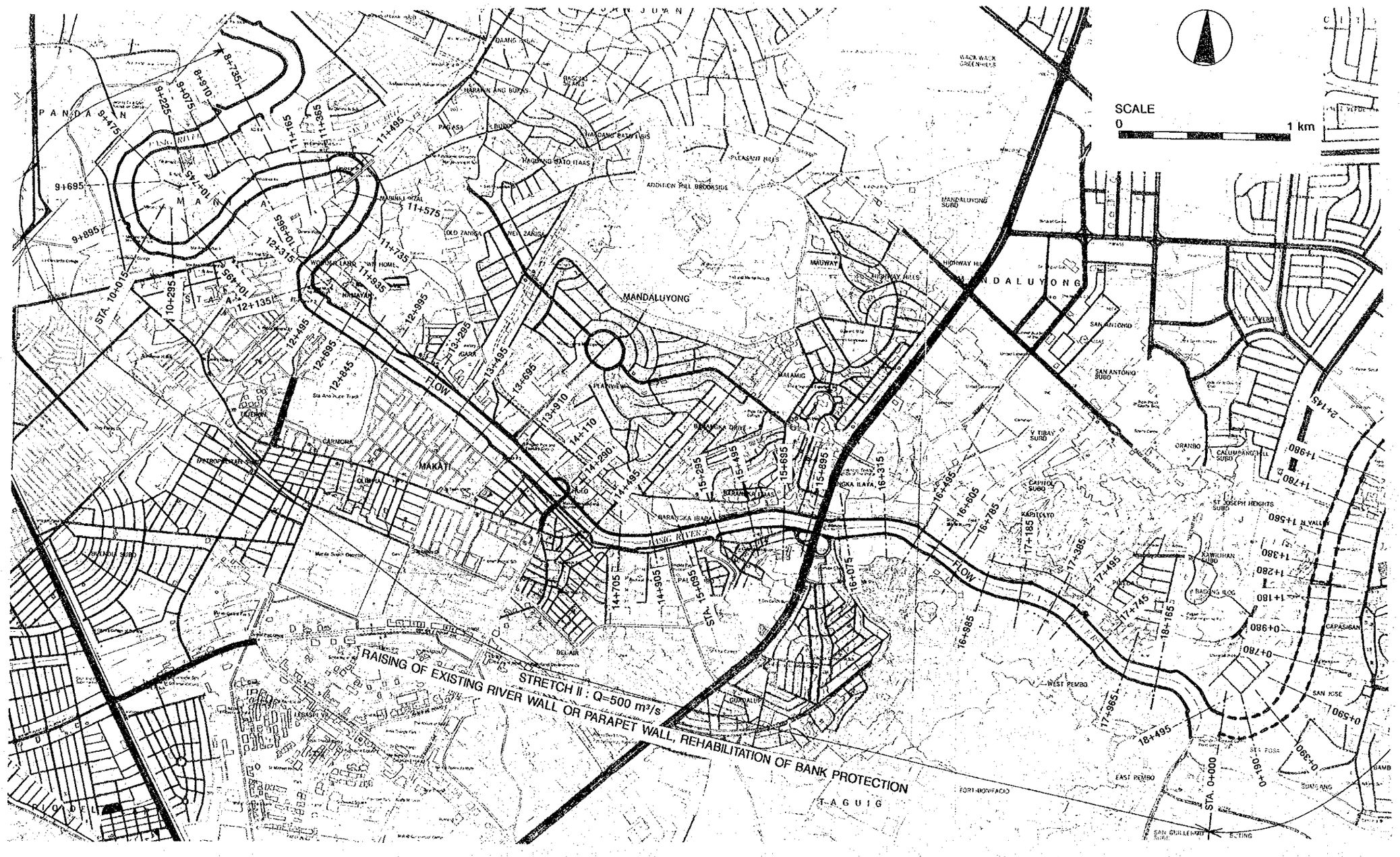
JAPAN INTERNATIONAL COOPERATION AGENCY

DESIGN DISCHARGE DISTRIBUTION

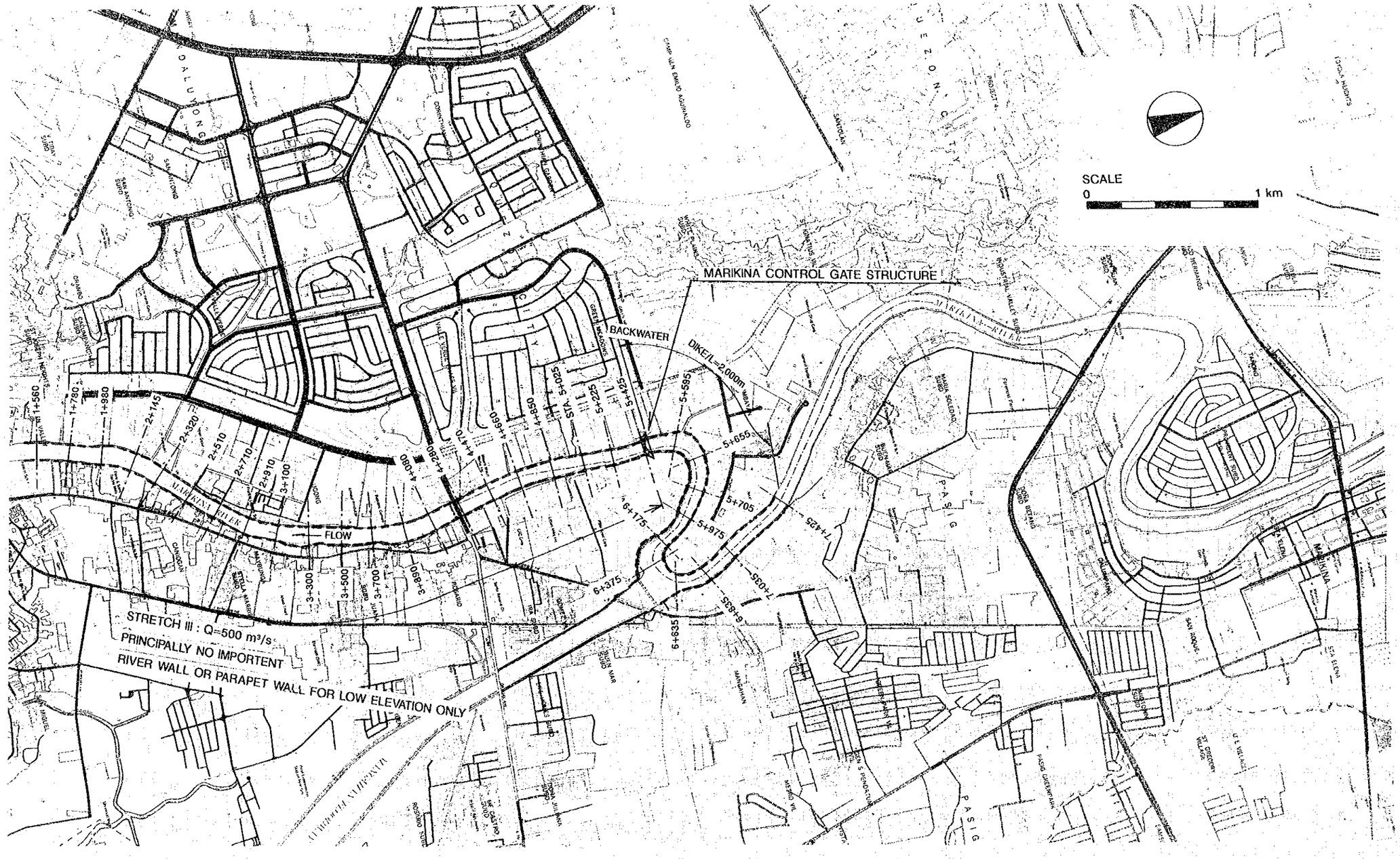
Fig.7.4-5



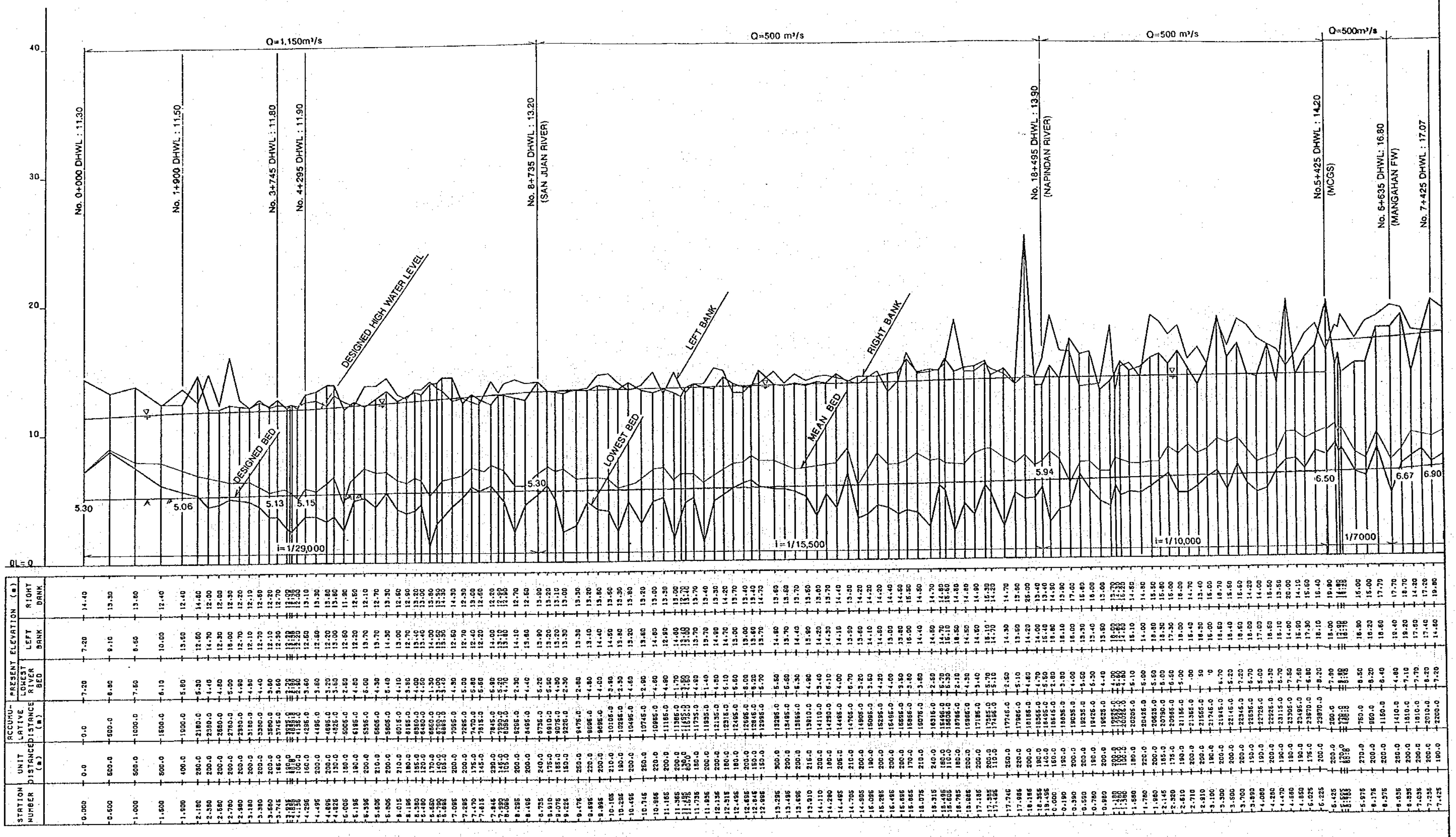
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	ALIGNMENT OF THE IMPROVEMENT PLAN Fig.7.4-6(1/3)



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	ALIGNMENT OF THE IMPROVEMENT PLAN Fig.7.4-6(2/3)



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	ALIGNMENT OF THE IMPROVEMENT PLAN Fig.7.4-6(3/3)

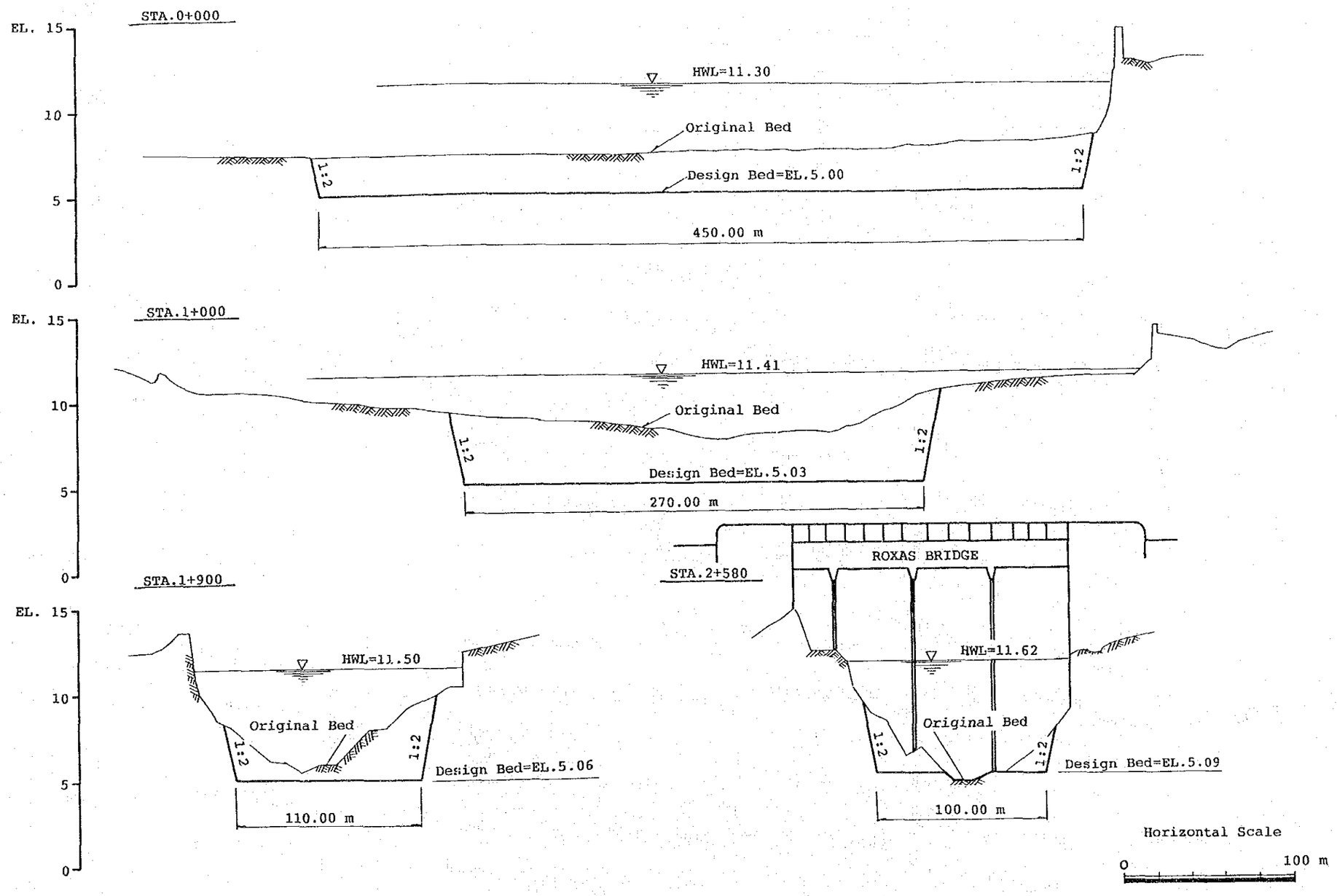


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

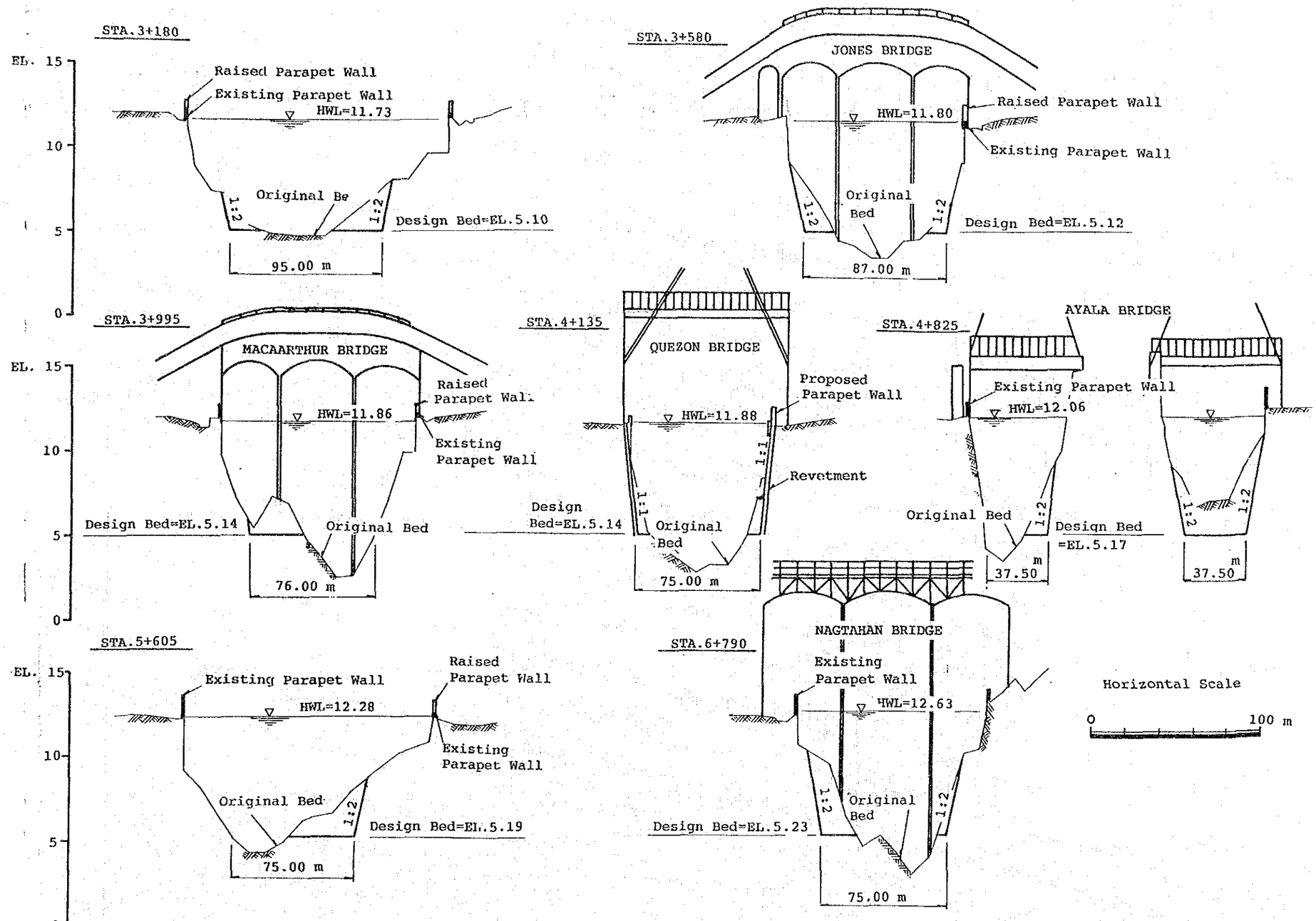
JAPAN INTERNATIONAL COOPERATION AGENCY

LONGITUDINAL PROFILE OF THE IMPROVEMENT PLAN

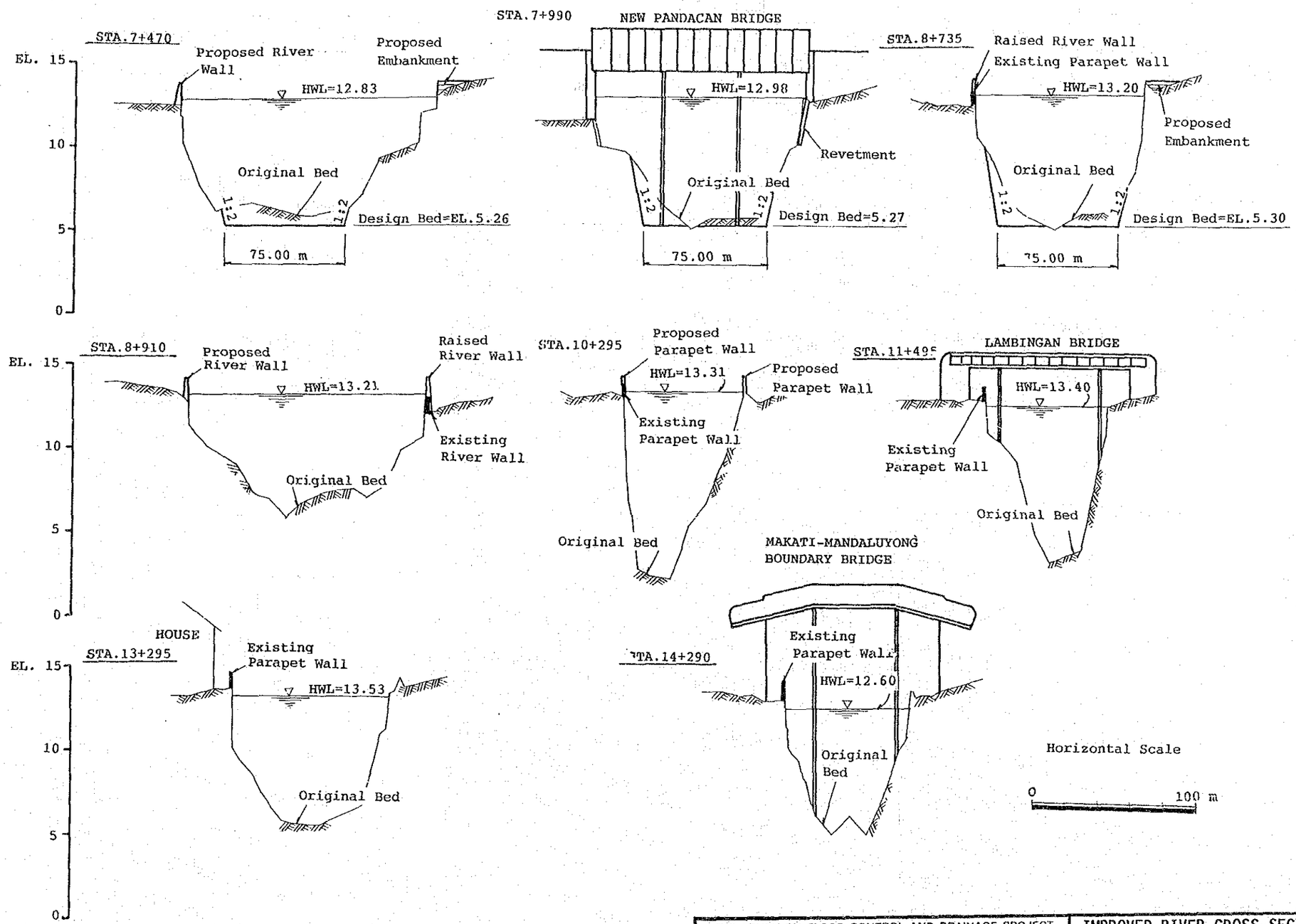
Fig.7.4-7



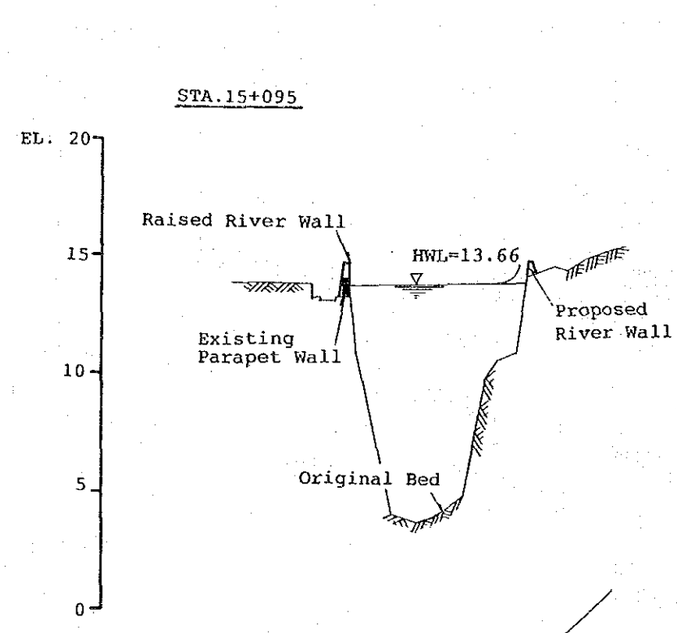
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (PASIG RIVER (1/4)) Fig.7.4-8(1/7)

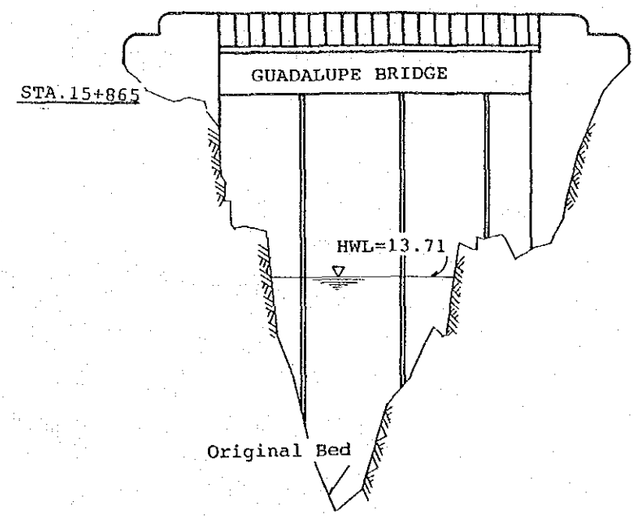


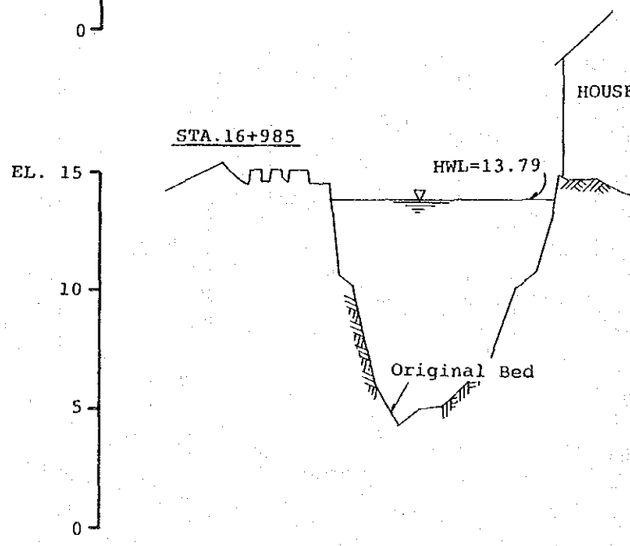
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (PASIG RIVER (2/4)) Fig.7.4-8(2/7)

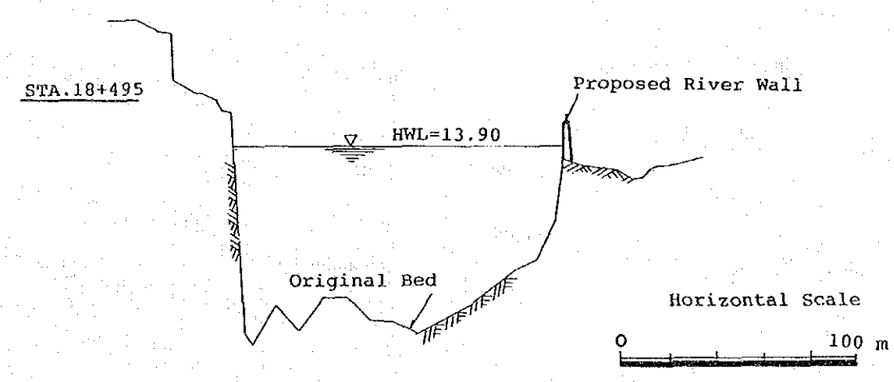


THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (PASIG RIVER (3/4)) Fig.7.4-8(3/7)

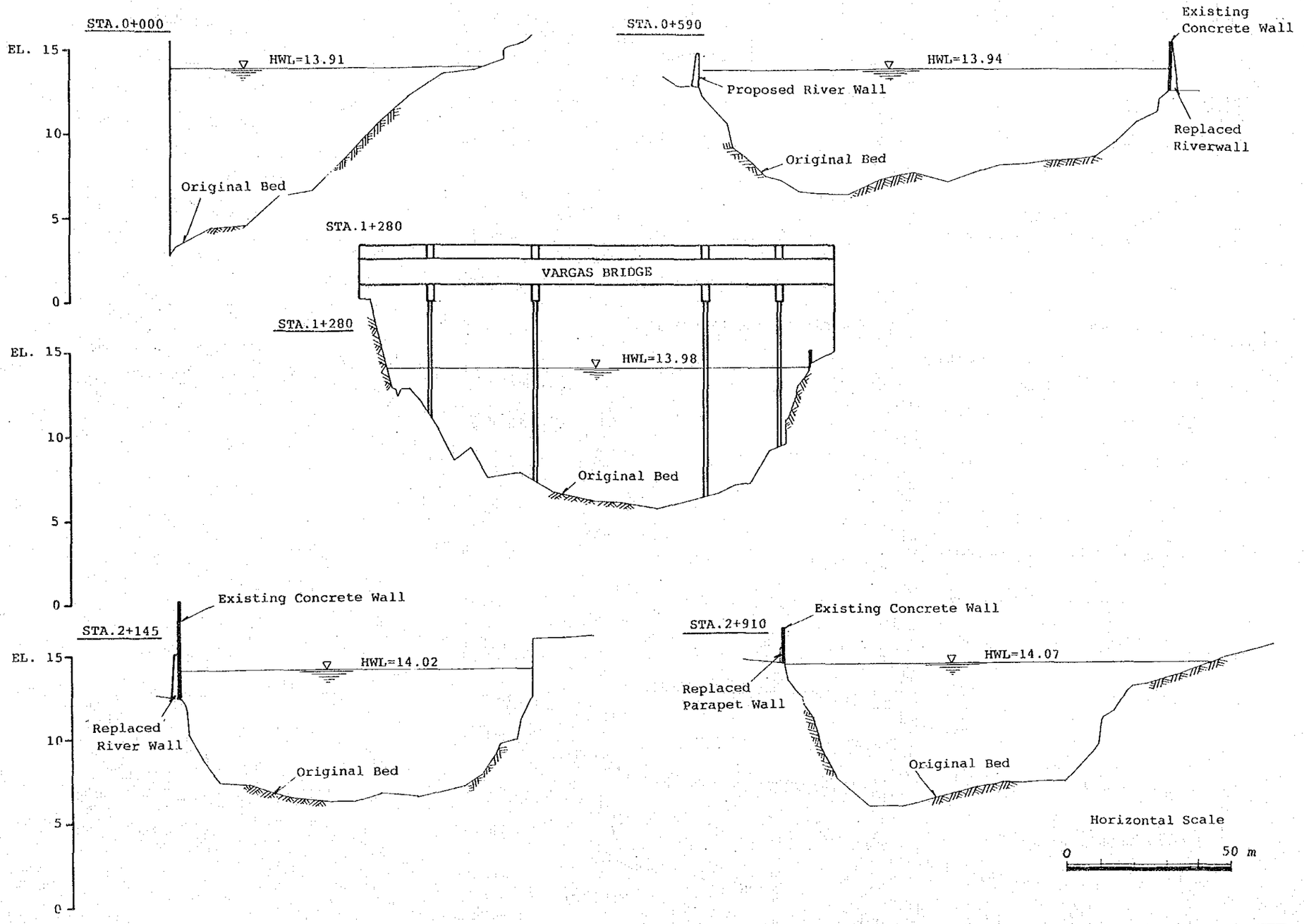




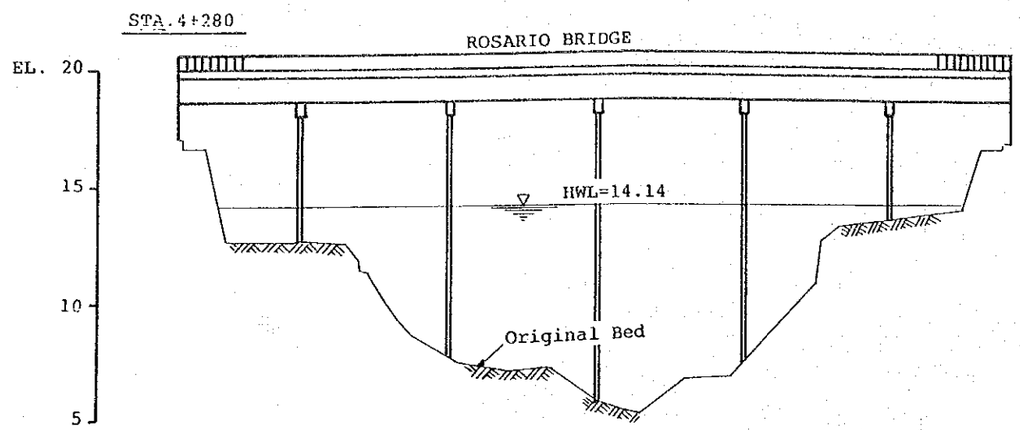


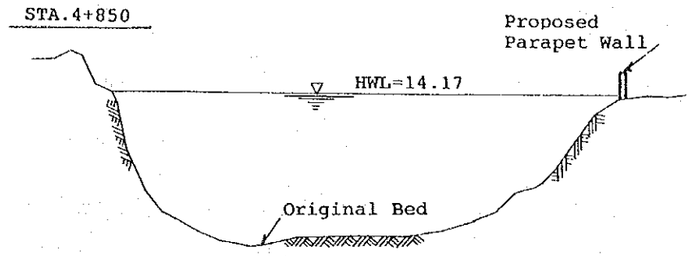


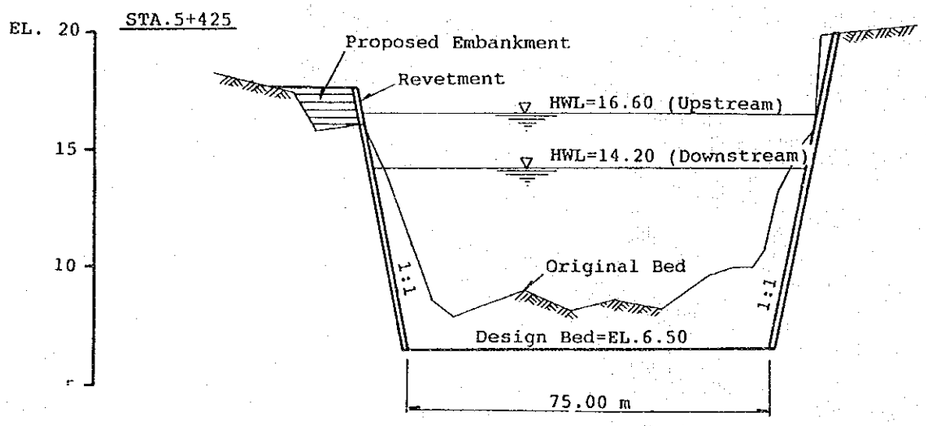
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (MARIKINA RIVER (4/4)) Fig.7.4-8(4/7)

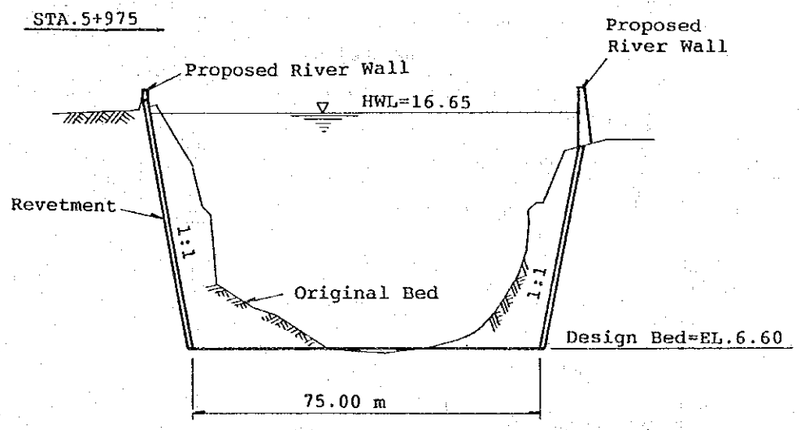


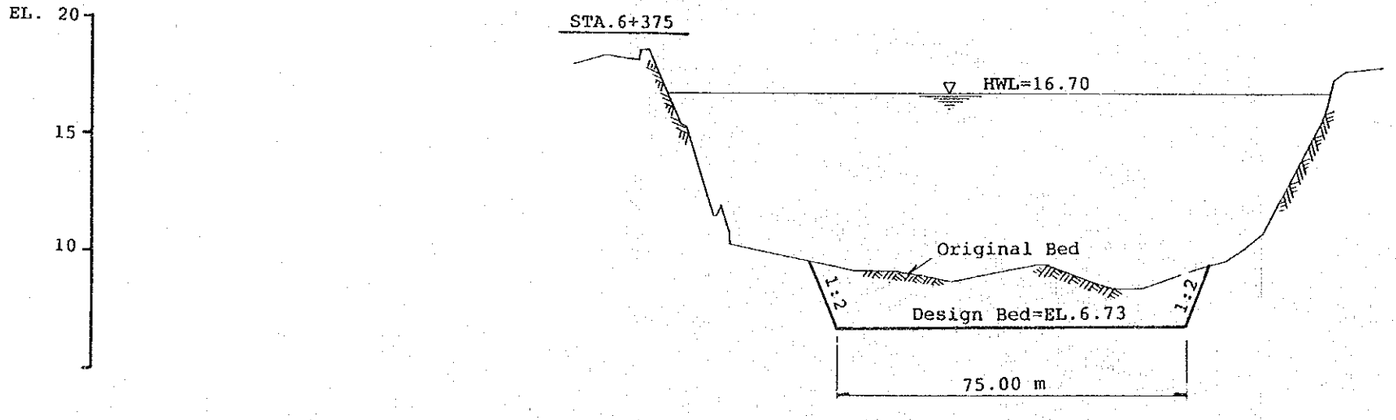
THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (MARIKINA RIVER (2/4)) Fig.7.4-8(5/7)

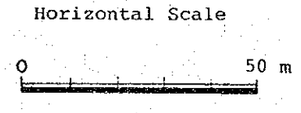




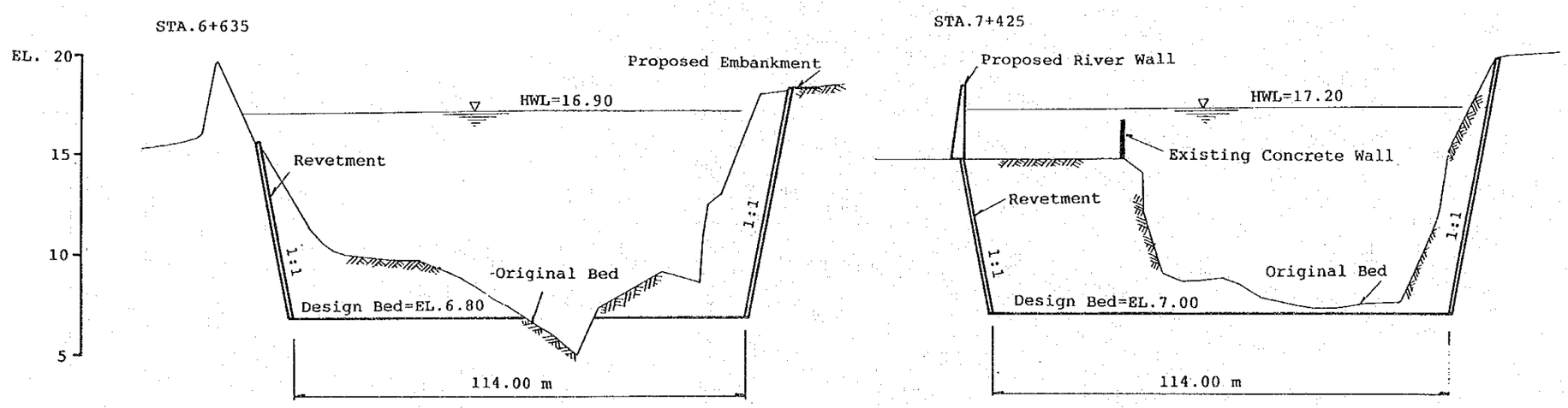




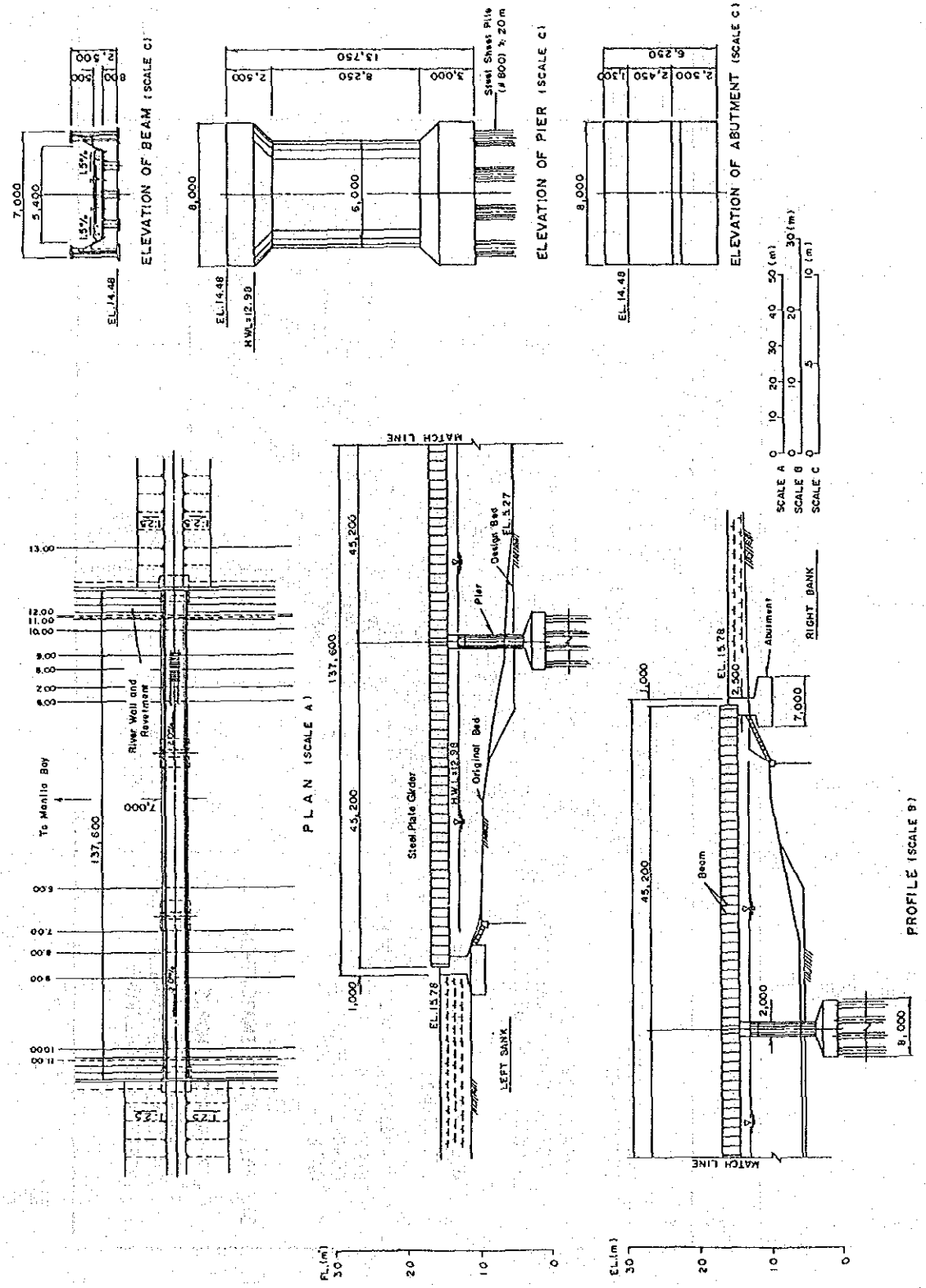




THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (MARIKINA RIVER (3/4)) Fig.7.4-8(6/7)



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES JAPAN INTERNATIONAL COOPERATION AGENCY	IMPROVED RIVER CROSS-SECTIONS OF THE PASIG-MARIKINA (MARIKINA RIVER (4/4)) Fig.7.4-8(7/7)



THE STUDY ON FLOOD CONTROL AND DRAINAGE PROJECT IN METRO MANILA, PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

GENERAL DRAWING OF RECONSTRUCTION OF PANDACAN BRIDGE

Fig.7.4-9