5.7 Design of Pavement Structures

5.7.1 Design Criteria

. Design Specification: AASHTO Guide for Design of Pavement Structure 1986, AASHTO

. Serviceability of PCC Pavement: initial 4.5
terminal 2.5

. Pavement Layer Characteristics:
modulus of subbase: 8000 psi
modulus of elasticity of PCC:
328×10^6 psi

. PCC Modulus of Rupture: 580 psi

. Drainage Coefficient: 0.9

. Load Transfer Coefficient: 4

. Loss of Support: 1

5.7.2 Types of Pavement

Since the length of roads to be constructed under the Project is short, Portland Cement Concrete (PCC) pavement is recommended, as shown in Figure 5.7-1.

However, since the analysis resulted in a complete settlement of 28 cm for San Roque Bridge, Asphalt Concrete Pavement was proposed, as the pavement type for that bridge, as shown in Figure 5.7-2.

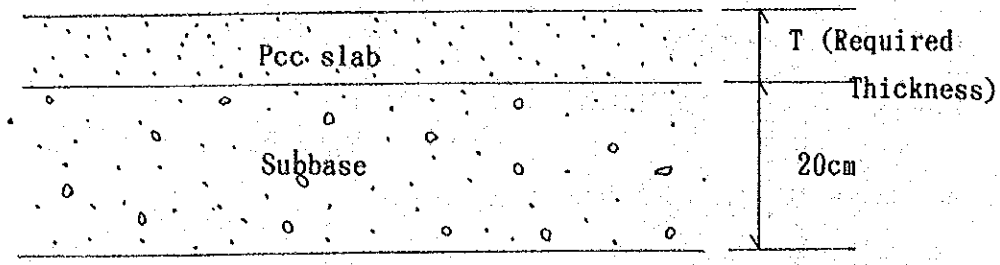


FIGURE 5.7-1 TYPICAL CROSS SECTION OF PCC PAVEMENT

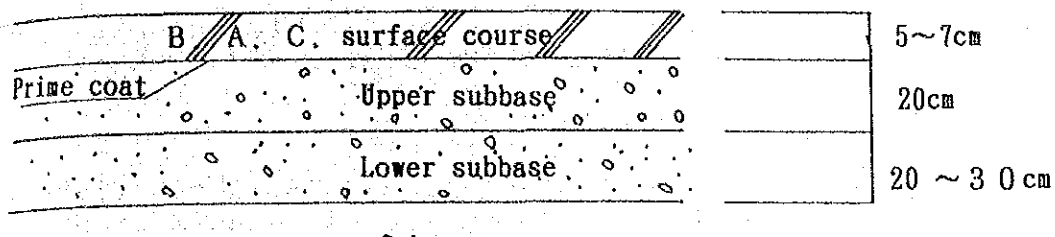
The required thickness of PCC slab will be designed to carry the expected number of traffic volume and loadings. Table 5.7-1 summarizes the recommendation based on the outputs of the Feasibility Study of the Road Improvement on the Pan-Philippine Highway conducted by JICA on September 1987.

TABLE 5.7-1 RECOMMENDED THICKNESS BY PCC SLAB

PCC Thickness

Traffice loading class (×10⁶) \ CBR		2	3	4	5	6	8	10	15	20	Performance Period
Light traffic Loading	L-1 (0.005)	Apply min. 20 cm.									More than 25 Years
	L-2 (0.01)										
	L-3 (0.03)										
Heavy traffic loading	A (0.1)	23cm									15 Years
	B (0.2)	25cm									
	C (0.4)	28cm			25cm						
	D (0.7)	28cm									
	E (1.0)	30cm									
Extra Heavy traffic	F-d (1.5-3.5)	30 or 33 or 35									5-12 Years

NOTE: Traffic loading class is express in number of ESAL
(18- kip equivalent single axle loads)



Subgrade

(When subgrade is weak, filter layer method / soil replacement method / soil stabilization method shall be employed.)

Surfase course;Bibulous asphalt concrete
Upper subbase ;Mechanical stabilized crushed stone
Lower subbase ;crushed stone

FIGURE 5.7-2 TYPICAL CROSS SECTION OF AC PAVEMENT

5.8 Design of River Protection

5.8.1 Required Area of Water Opening

The discussion on required water opening to run-off flood discharge is presented in Section 5.2.2.

5.8.2 Type of River Bank Protection

As planned for the Phase I and Phase II Bridges, riverbank protection at the front of abutments is constructed when the velocity of water is over 3 m per second or when erosion and scouring are anticipated.

Considering the availability of local materials, grouted riprap protection is adopted for the Project. Since grouted riprap as a structure is not expected to prevent soil embankments from failure, it must be placed at a slope equal to or flatter than the natural angle of repose of the supporting soil. In design, a slope of 1.5 : 1 is proposed.

Grouted riprap foundations must be extended to bedrock or below the scour depth anticipated. Figure 5.8-1 shows a typical cross section of grouted riprap.

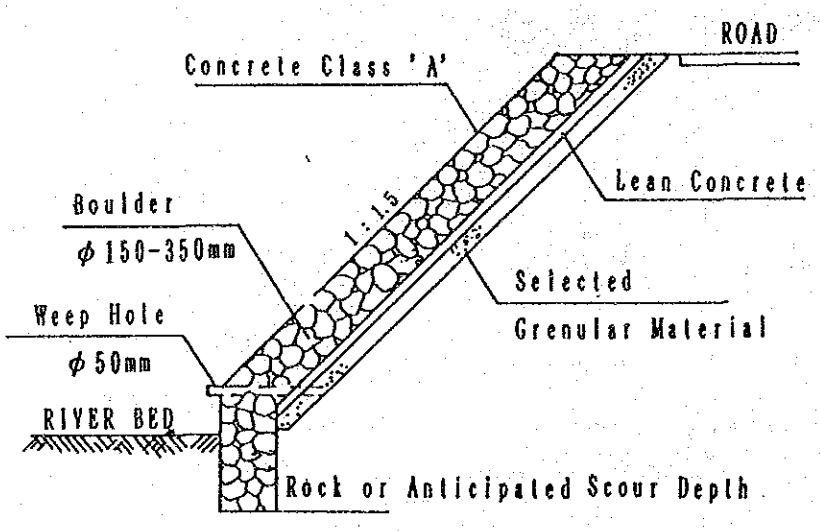


FIGURE 5.8-1 RIVERBANK PROTECTION

5.9 Implementation Plan

5.9.1 Group 1 Bridges

(1) Transportation of Steel Materials

The steel materials provided under Japan Grant Aid will be delivered from Japan to the designated ports of entry in the Philippines.

After discussions with DPWH officials, the following three (3) ports were designated for the Project:

- Manila North Harbor
- Port of Batangas
- Port of Puerto Princes (Palawan Island)

As a result of investigating the transportation condition in the Philippines by ship, the transportation of the materials from Manila to each international port (Batangas and Puerto Princes) will be by barge, following customs formalities.

(2) Erection of Steel Girders

Based on data furnished by DPWH, erection methods of steel girders were studied. The estimated maximum weight of one steel girder is 3 tons and the maximum length is 8.5 m.

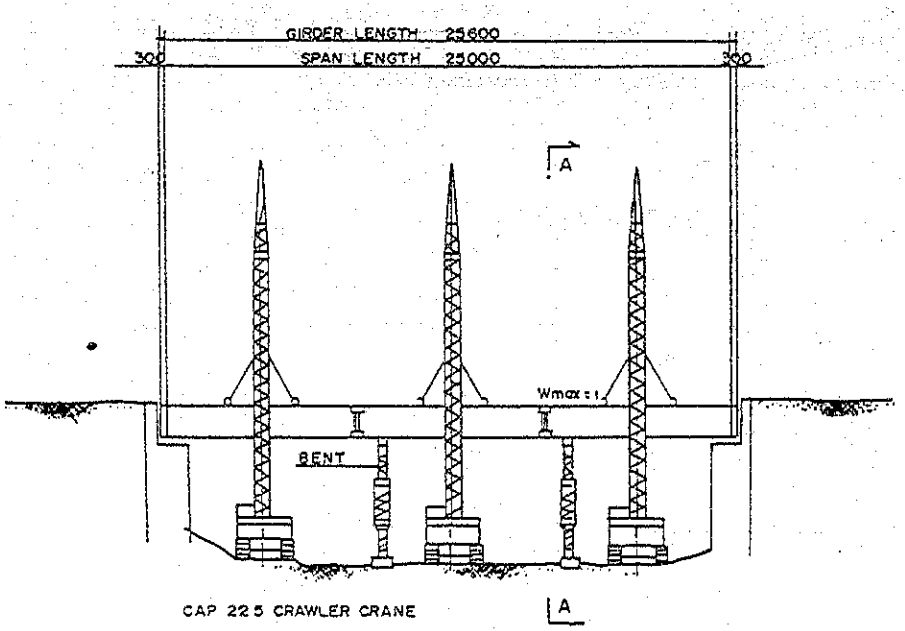
Figure 5.9-1 demonstrates the direct erection method (1) from the riverbed using a 22.5 ton crawler crane. This is the simplest method and recommended wherever the crawler crane can go in onto the riverbed.

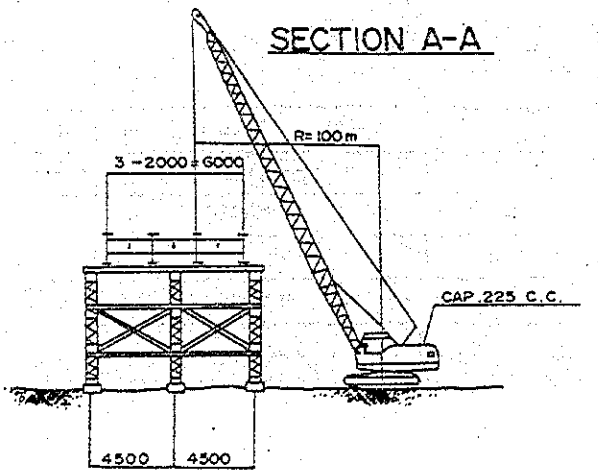
Figure 5.9-2 shows the direct erection method (2) from the approaching road. This method requires a crawler crane of 40 ton capacity. Therefore, this method is recommended only where the crawler crane cannot go onto the riverbed.

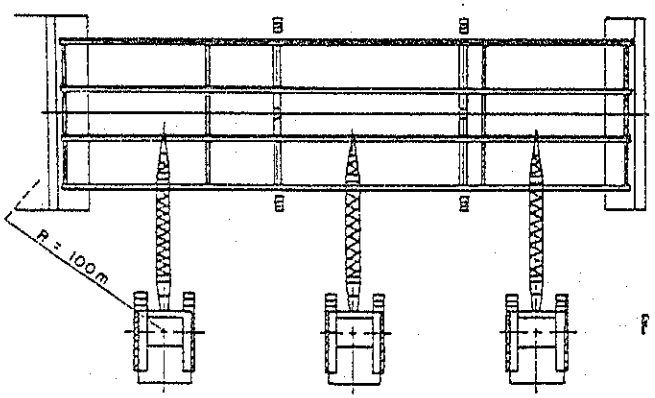
Figure 5.9-3(1),(2) illustrates the towing-cable erection method. This method does not require any crawler crane of large capacity and bents inside river poles, but shifting devices, jacks, rails, carriers, etc. are required. Therefore, this is a relatively expensive method.

Figure 5.9-4 illustrates the launching erection method which requires an erection nose made of steel girders. Therefore, this method is not recommended. It is only recommended when the direct erection method (2) cannot be applied.

Based on the characteristics of each erection method, the erection methods were tentatively proposed as shown in Table 5.9-1. Direct Erection Method (1).





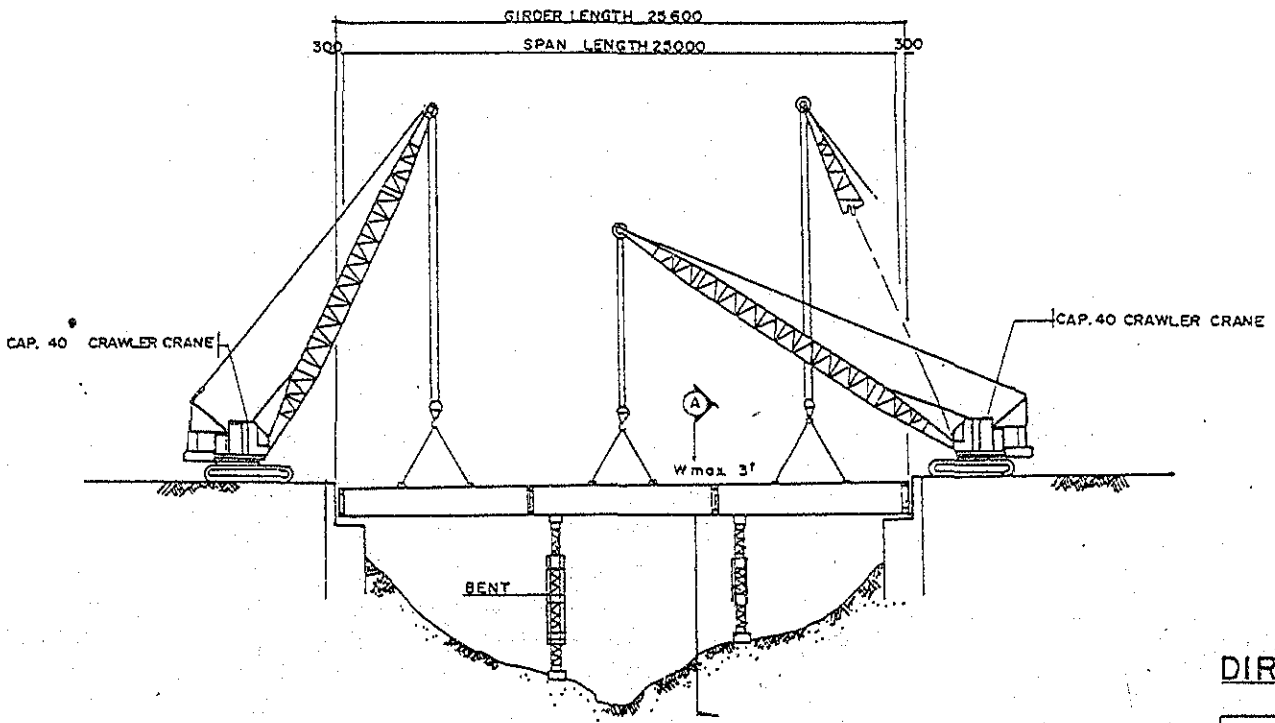


MAIN MACHINE / TOOL

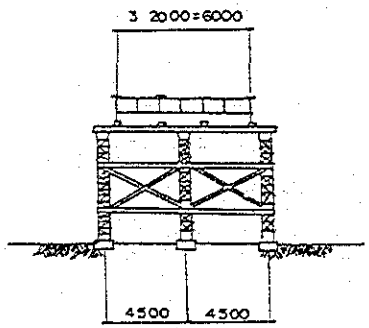
1	CRAWLER CRANE 22.5T	1
2	BENT	2
3	STEEL BLOCK	some
4	TORQUE WRENCH	1
5	WIRE ROPE 16Ø	1

FIGURE 5.9-1 DIRECT ERECTION METHOD (1)

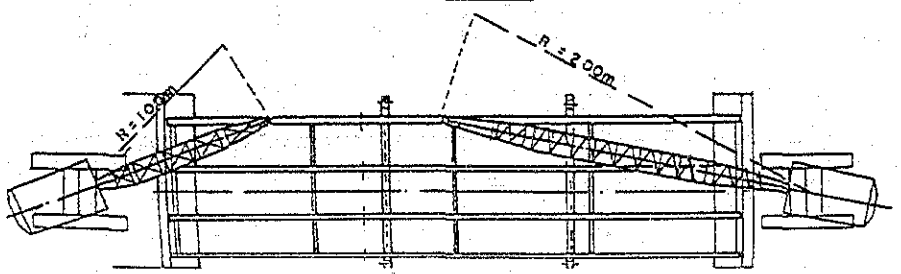
ELEVATION s=1:200



SECTION A-A



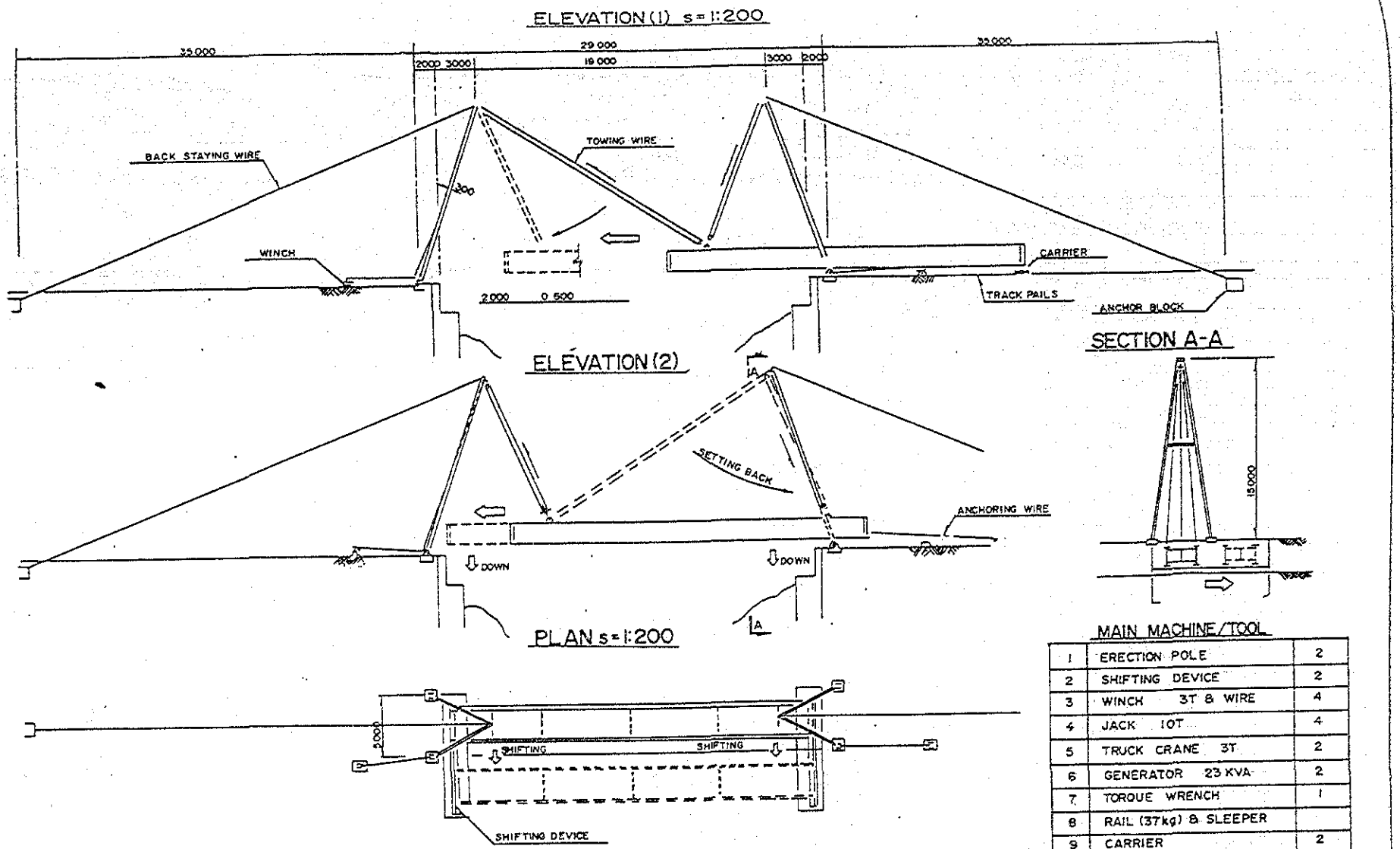
PLAN s=1:200



DIRECT ERECTION METHOD (2)

1	CRAWLER CRANE 40T	1
2	BENT	2
3	STEEL BLOCK	SAME
4	TORQUE WRENCH	1
5	WIRE ROPE 16φ	1

FIGURE 5.9-2 DIRECT ERECTION METHOD (2)



MAIN MACHINE/TOOL

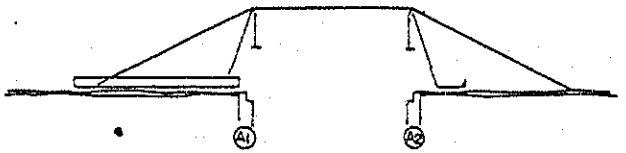
1	ERECTION POLE	2
2	SHIFTING DEVICE	2
3	WINCH 3T & WIRE	4
4	JACK 10T	4
5	TRUCK CRANE 3T	2
6	GENERATOR 23 KVA	2
7	TORQUE WRENCH	1
8	RAIL (37kg) & SLEEPER	
9	CARRIER	2

FIGURE 5.9-3(1) TOWING-CABLE METHOD

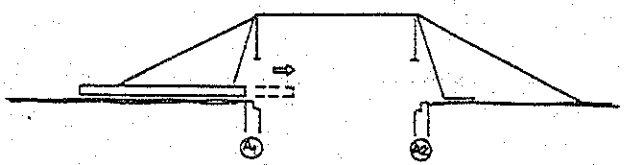
PROCEDURE DIAGRAM

STEP 1 ERECTION OF ERECTIONING POLE

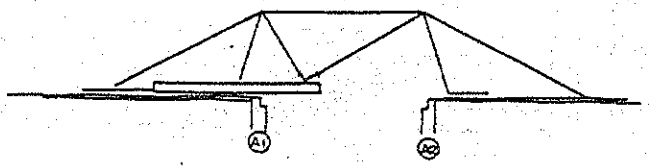
STEP 2 FABRICATION OF GIRDERS AND FASTENING OF H.T. BOLTS



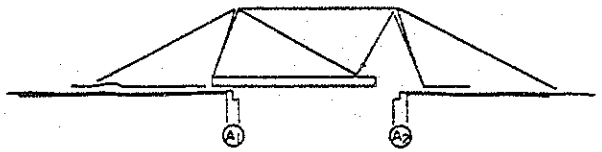
STEP 3 FORWARDING OF MAIN GIRDER



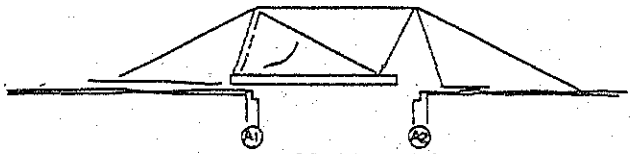
STEP 4 HANGING BY MAIN WIRES



STEP 5 FURTHER FORWARDING

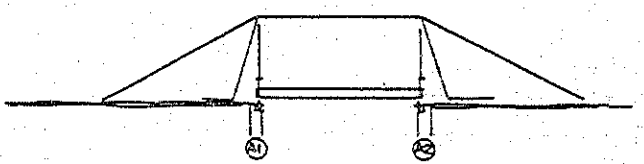


STEP 6 RELOCATION OF ONE MAIN WIRE

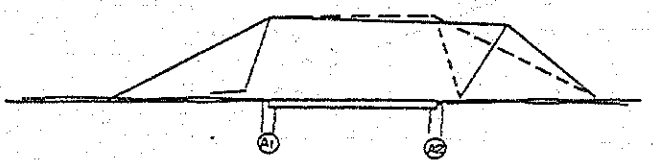


REMOVAL OF SADDLE

STEP 7 SETTLEMENT OF MAIN GIRDER



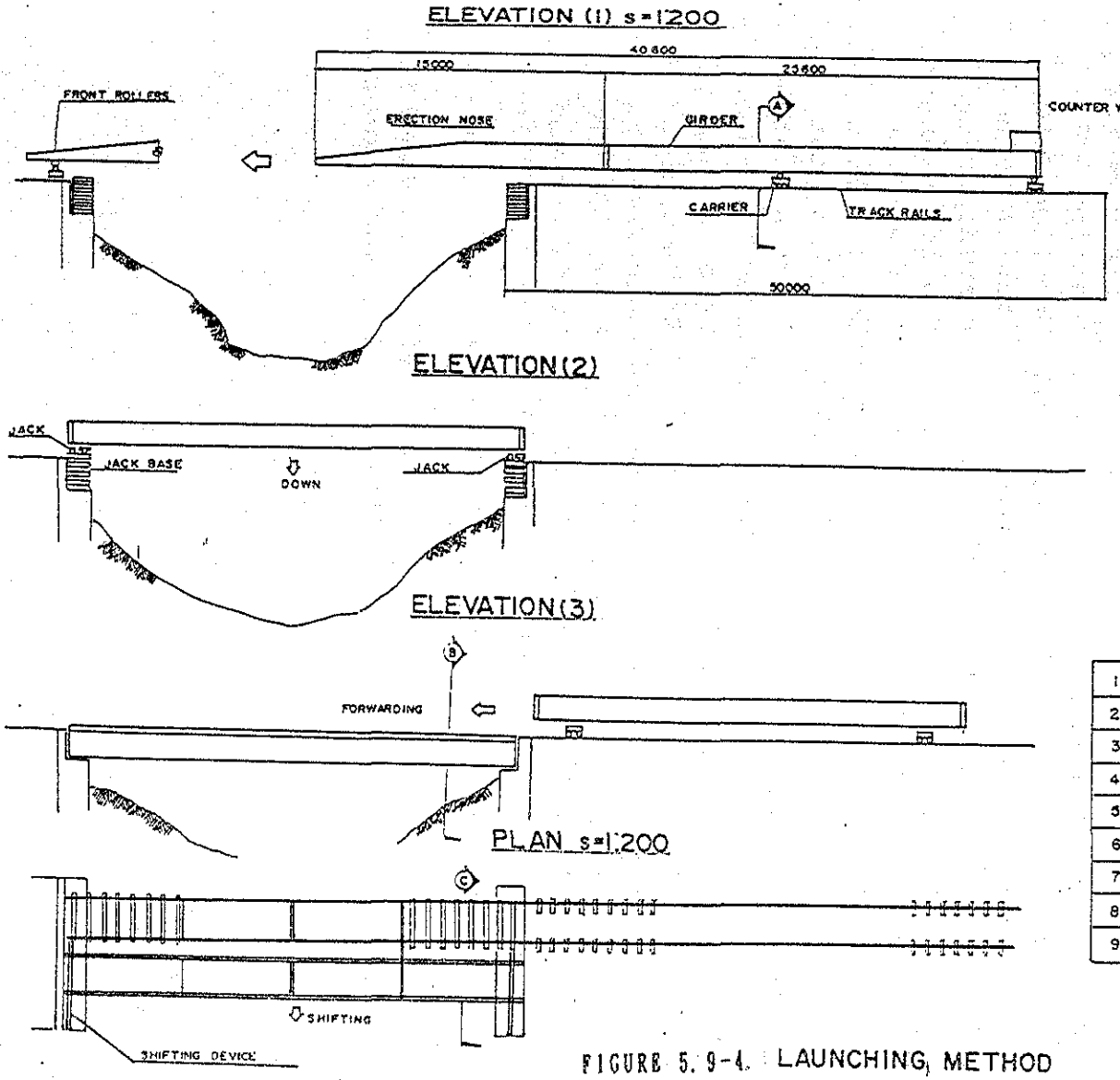
STEP 8 DISMANTLE AND REMOVAL OF ERECTIONING POLE



FLOW CHART

PREPARATION OF FOUNDATION FOR ERECTIONING POLE. PREPATION OF ANCHORAGE FOR BRACING WIRE.
↓
FABRICATION OF ERECTIONING POLE ON THE GROUND SURFACE.
↓
PREPATION AND FIXING OF WINCH.
↓
PREPARATION OF WOODEN SHEAR LEGS FOR ERECTION OF ERECTIONING POLE.
↓
WIRING AND FIXING OF MAIN WIRE.
↓
ERECTION OF ERECTIONING POLE.
↓
PREPARATION OF RAILING AND ROLLER.
↓
FABRICATION OF GIRDERS AND FASTENING OF HIGH STRENGTH BOLTS.
↓
TEMPORAL ARRANGEMENT BEARING SHOE.
↓
PREPARATION OF SIDE SLIDING UNIT (FOR 4 MAIN GIRDER BRIDGE ONLY.
↓
PREPARATION OF SADDLE ON THE ABUTMENTS.
↓
FORWARDING OF MAIN GIRDER.
↓
HANGING BY MAIN WIRES, FURTHER FORWARDING, RELOCATION OF ONE WIRE, FINAL LOCATING.
↓
REMOVAL OF SADDLE ON THE ABUTMENTS.
↓
SIDE SLIDING OF MAIN GIRDER (FOR 4 GIRDER BRIDGE ONLY.
↓
FIXING OF CROSS BEAMS.
↓
DISMANTLING OF SIDE SLIDING UNIT (FOR 4 GIRDER BRIDGE ONLY)
↓
PREPARATION OF SHEAR LEGS FOR LAYING DOWN OF ERECTIONING POLE.
↓
LAYING DOWN, DISMANTLE AND REMOVAL OF ERECTIONING POLE.
↓

FIGURE 5.9-3 (2) TOWING—CABLE METHOD



MAIN MACHINE/TOOL

1	ERECTION NOSE	1
2	SHIFTING DEVICE	2
3	JACK LOT	4
4	RAIL (37 Kg.) & SLEEPER	
5	STEEL BLOCK	SOME
6	CARRIER	2
7	ROLLER	2
8	TRUCK CRANE 3t	1
9	TORQUE WRENCH	1

FIGURE 5.9-4. LAUNCHING METHOD

TABLE 5.9-1 PROPOSED ERECTION METHOD

BRIDGE NO.	BRIDGE NAME	SPAN (m)	ERECTION DEVICE	TYPE
1. 03.01	PANGULISANIN BRIDGE	24.0	Crane & Bent	2
2. 03.04	TIGBE BRIDGE	22.0	Crane & Bent	1
3. 03.06	BALASING BRIDGE	15.0+23.0	Erection Pole	2. 3
4. 03.08	PLAS BRIDGE	23.0+23.0	Crane & Bent	1
5. 03.11	PULO BRIDGE	23.0	Crane & Bent	1
6. 03.18	SINDOL BRIDGE	15.0+15.0	Crawler Crane	2
7. 04.01a	SAN JUAN BRIDGE	23.0	Crane & Bent	2
8. 04.02a	TABONG-BATONG BRIDGE	22.0	Crane & Bent	1
9. 04.04a	CAGLATE BRIDGE	23.0	Crane & Bent	2
10. 04.06a	BUENAVISTA BRIDGE	24.0	Crane & Bent	2
11. 04.09a	ISABANG BRIDGE	24.0+14.0	Erection Pole	3
12. 04.10a	PANSIPIT BRIDGE	22.0+22.0	Erection Pole	2. 3
13. 04.11a	SAN DIEGO BRIDGE	15.0+15.0	Crawler Crane	2
14. 04.13a	BAGONG POOK BRIDGE	24.0	Crawler Crane	2. 3
15. 04.16a	PINGIT BRIDGE	21.0+21.0	Crawler Crane	2. 3
16. 04.17a	SALAY BRIDGE	15.0+15.0	Crawler Crane	2. 3
17. 04.18a	MIJARES BRIDGE	23.0	Crane & Bent	2
18. 04.19a	PALAYAN BRIDGE	24.0 Skew	Crane & Bent	2
29. 04.21a	TARAK BRIDGE	24.0	Crane & Bent	2
20. 04.22a	STO. NINO BRIDGE	23.0	Erection Pole	3
21. 04.23a	DEL PILAR BRIDGE	24.0	Crane & Bent	2
22. 04.03b	MARUYUGON BRIDGE	24.0	Crane & Bent	1
23. 04.04b	DAKOTON BRIDGE	18.0+18.0	Crawler Crane	1
24. 04.06b	MADALAG BRIDGE	24.0	Erection Pole	3
25. 04.08b	PANIQUE BRIDGE	18.0+18.0	Crawler Crane	1
26. 04.09b	MARANLIG BRIDGE	15.0+15.0	Erection Pole	2. 3

[NOTE] Type 1: Direct Erection Method 1 (22.5 ton crawler crane)
Type 2: Direct Erection Method 2 (40.0 ton crawler crane)
Type 3: Launching Erection Method

5.9.2 Group 2 Bridges

(1) Transportation of Steel Materials

Steel materials supplied by Japan Grant Aid will be shipped by sea from Japan to ports of entry in the Philippines, and then delivered to bridge construction sites by land. The transportation routes and existing conditions of the roads are presented in Table 5.9-2 (1/2) - (2/2).

As described in the Minutes of Discussions, the Philippine Government will keep the access roads including bridges therein to the following bridge sites passable for the transport of materials and equipment:

- 03.13 Mangkuyog Bridge: Reinforce one Bailey bridge
  Reinforce two timber bridges
  Level riverbed for one non-existing bridge.
- 04.07a Camagong Bridge: Reinforce two Bailey bridges
  Reinforce six timber bridges
- 04.07b Tan-Agan Bridge: Reinforce one Bailey bridge

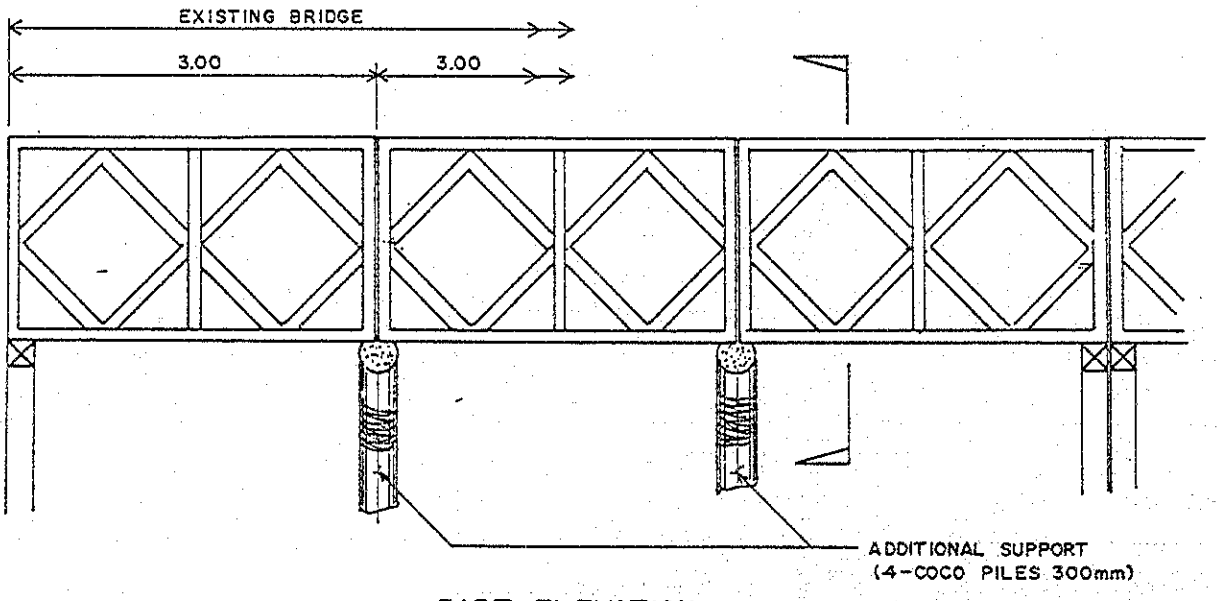
Several measures to reinforce these dilapidated bridges can be proposed, and the following measures are presented as examples. Figures 5.9-5 and 5.9-6 illustrate measures to reinforce Bailey and timber bridges, respectively.

TABLE 5.9-2 THE ROUTES OF TRANSPORTATION AND THE ROAD CONDITION (1/2)

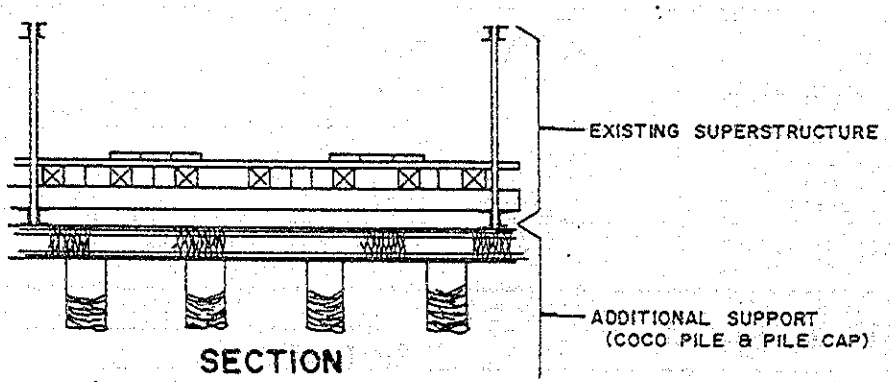
BRIDGE No.	NAME OF BRIDGE	PORT OF LANDING	INLAND ROUTE		EXISTING CONDITION LAND ROUTE
			SEA ROUTE	LAND ROUTE	
01.02	Maphilindo Br.	Manial	none	• Manila Site • 201 km from Manila	• Paved, Good cndition
03.03	Bacong Br.	Manila	- do -	• Manila Site • 115 km from Manila	• - do -
03.07	San Roque Br.	Manila	• Manila→Hagonoy • By Barge	none	none
03.10	Dolores Br.	Manila	none	• Manila Site • 115 km from Manila	• Paved, Good cndition
03.13	Mangkuyog Br.	Manila	- do -	• • - do -	• 126 km from Manila Paved, Good condition • 126 km from Manila 1 dilapidated Baileybridge 2 dilapidated Timberbridge 1 fordcrossing
03.17	Sula Br.	Manila	- do -	- do -	• 129 km from Manila Paved, Good condition • 129 km→ site Paved, Good condition

TABLE 5.9-2 THE ROUTES OF TRANSPORTATION AND THE ROAD CONDITION (2/2)

BRIDGE No.	NAME OF BRIDGE	PORT OF LANDING	INLAND ROUTE		EXISTING CONDITION LAND ROUTE
			SEA ROUTE	LAND ROUTE	
04.07a	Camagong Br.	Manial	• Manila→Qnezon	• Quezon→site • 19km from Manila	• Un-Paved, Bad condition • 2 dilapidated Baileybridges • 6 dilapidated Timberbridges
04.20a	Paragusan Br.	Manila	none	• Manila→site • 94km from Manila	• Paved, Good condition
04.07b	Tan-Agan Br.	Manila	• Manila→Odiongan	• Odiongan→site • 13km from Manila	• Paved, Good condition • 1 dilapidated Baileybridge
04.10b-2	Ihatub Br.	Manila	• Manila→Cawit	• Cawit →site • 6km from Manila	• Paved, Good condition



PART ELEVATION



SECTION

FIGURE 5.9-5 ADDITIONAL SUPPORT FOR WEAK BAILY BRIDGE

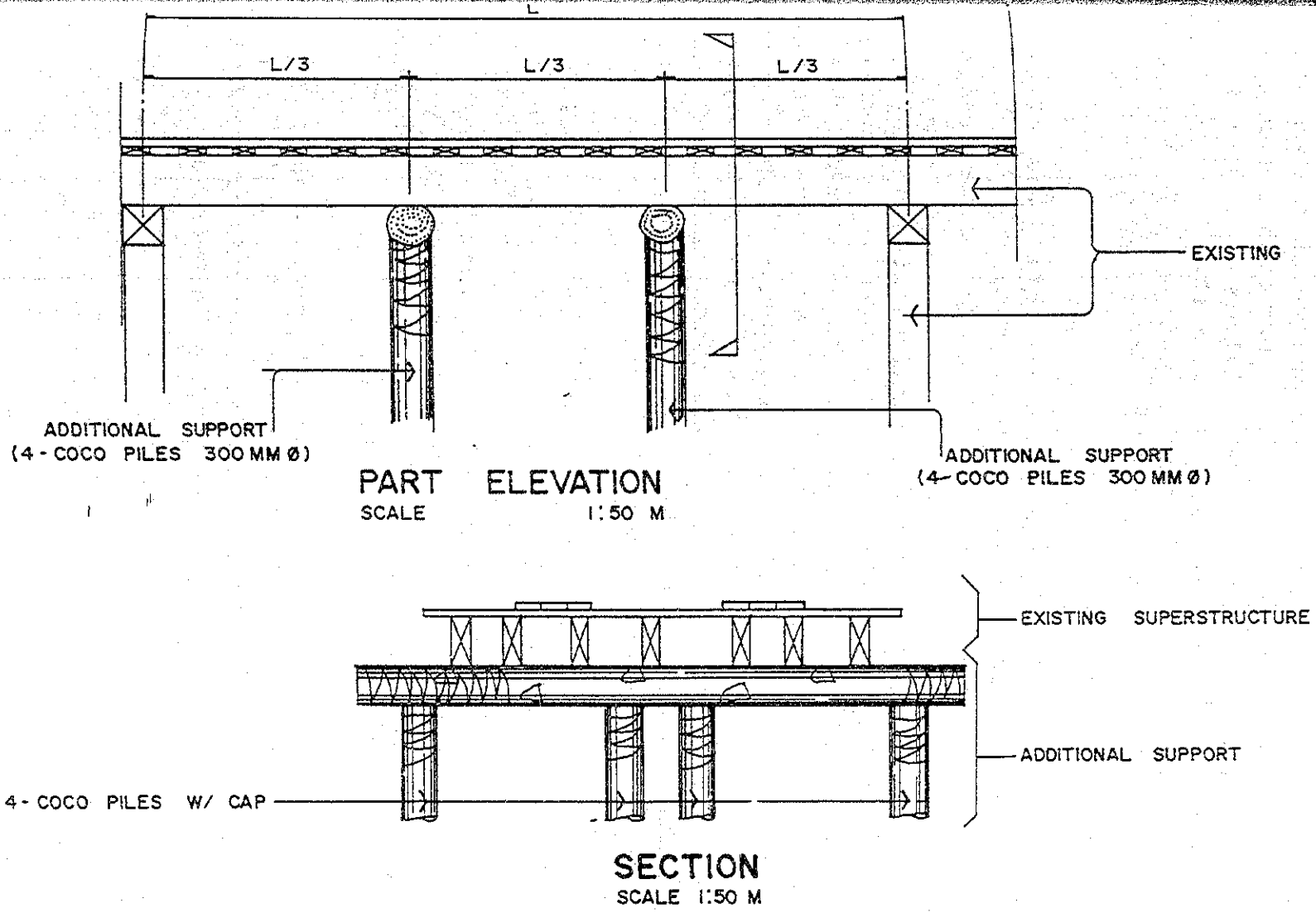


FIGURE 5.9-6

ADDITIONAL SUPPORT FOR WEAK TIMBER BRIDGE

(2) Erection of Steel Girderd

The methods which can be adopted to erect the steel girders include the direct erection method which uses a crawler crane from the riverbed or from approach roads and the towing-cable erection method. Given the magnitude of construction and other conditions, the direct erection method from the riverbed using a crawler crane was adopted in this Study. The scheme of the method is illustrated in Figure 5.9-1(1), (2).

Since the crawler crane needs to enter the river, an approach road leading the crawler crane to the river was planned to be constructed with a temporary embankment.

However, in the case of high ordinary water levels or wide rivers, a temporary platform was planned to be constructed for the erection. The height of the embankment should be one meter higher than the ordinary level of water considering flooding in the rainy season. But the crane without aupported by boat was adopted for the erection of the San Roque Bridge, because the river basin is a sealane for ships and since it is difficult to ensure land for the approach of a temporary bridge.

With this method, bents are required to hold steel girders while erecting. Coconut trees which are available will be used instead of steel bents. Since it is difficult to build saddles on the riverbeds during the rainy season, it is planned to drive coconut tree piles into the riverbeds during the dry season, and the piles can serve as erection girders even during the rainy season.

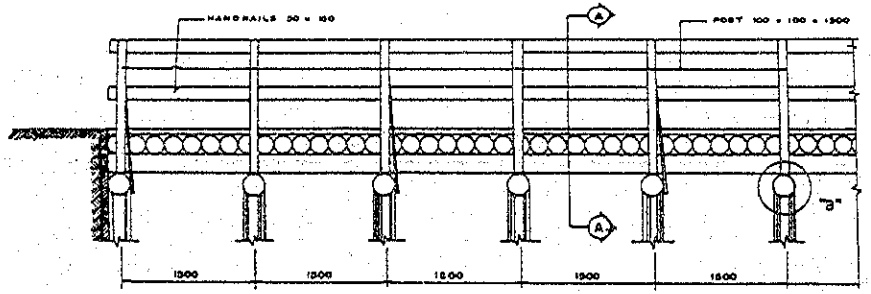
The plan of erection method for the steel girders and yard for construction is shown in Table 5.9-3 (1/2),(2/2). Temporary timber bridge and standard drawing of timber bents are shown in Figures 5.9-7 and 5.9-8, respectively.

TABLE 5-5-3 PLAN OF ELECTION METHOD FOR THE STEEL GIRDER AND YARD FOR CONSTRUCTION (1/2)

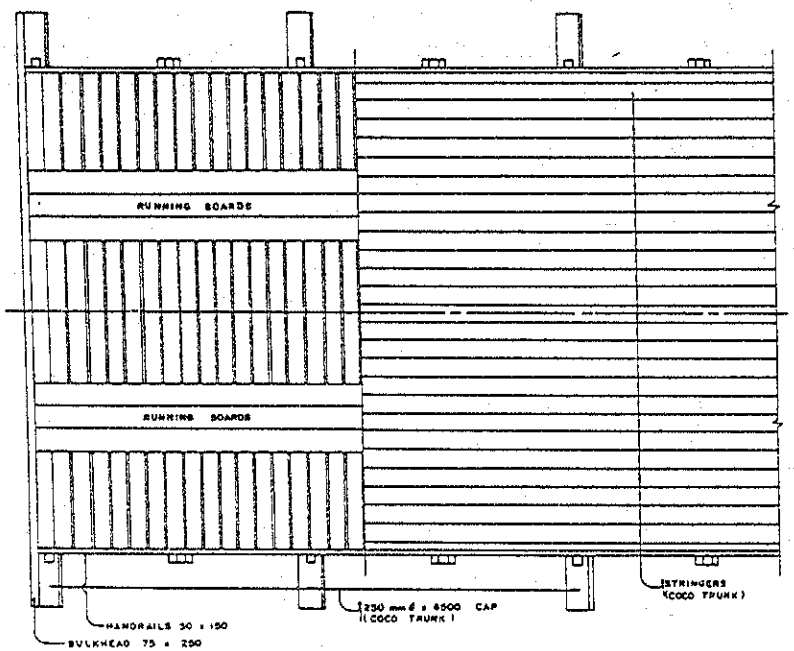
BRIDGE NO.	NAME OF BRIDGE	STEEL GIRDER		METHOD OF ELECTION	TYPE OF BEND	TYPE OF YARD	REMARKS
		TYPE	No. OF JOINT				
01. 02	Maphilindo Bridge	Built-Up Beam L=5@32m= 160m	15	Bent by Track Crene	Wooder Bent	Temporary Timber Platform + Approach Road	
03. 03	Bacong Bridge	Built-Up Beam L=2@26m= 52m	4	- do -	- do -	Exsting Tember Bridge + Temporary Timber Platform	
03. 07	San Roqun Bridge	H-Beam L=3@18m= 54m	6	Bent by Crane Ponton	- do -	Crane Ponton	Temporary Cofferdam, Pile driving, Excavation, and Election by Crane Ponton
03. 10	Dolores Bridge	H-Beam L=2@24m= 48m	4	Bent by Track Crane	- do -	Filled Cofferdam	
03. 13	Mangkuyog Bredge	H-Beam L=4@24m= 96m	8	- do -	- do -	River Bed Clearance	
03. 17	Sula Bridge	H-Beam L=3@20m= 60m	6	- do -	- do -	Tenporary Timber-Platform + Approach Road	
04. 07a soil	Camagong Bridge	H-Beam L=2@22m= 44m	4	- do -	- do -	Filled Cofferdam	Required Excavation Soil

TABLE 5.9-3 PLAN OF ELECTION METHOD FOR THE STEEL GIRDER AND YARD FOR CONSTRUCTION (2/2)

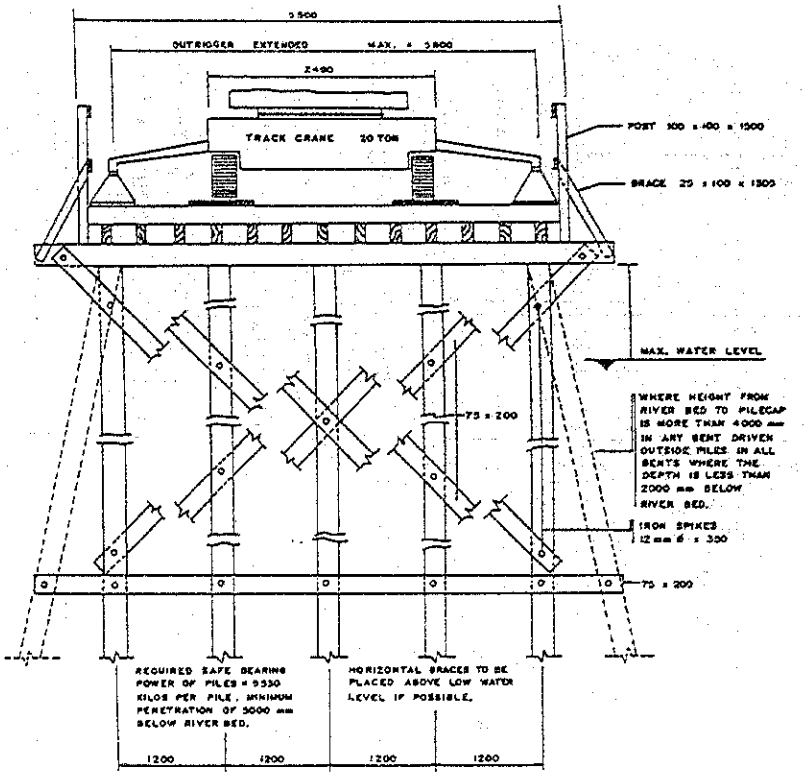
BRIDGE NO.	NAME OF BRIDGE	STEEL GIRDER		METHOD OF ELECTION	TYPE OF BEND	TYPE OF YARD	REMARKS
		TYPE	No. OF JOINT				
04.20a	Paragusan Bridge	H-Beam, Built-Up Beam L=15m+30m=45m	4	Bent by Track Crane	Wooder Bent+ Stage	Temporary Timber-Platform + Approach Road	Glen River
04.07b	Tan-Agan Bridge	H-Beam L=2@18m= 36m	4	- do -	Wooder Bent	Filled Cofferdan	Required Excavation Soil
04.10b-2	Ihatub Bridge	H-Beam L=2@23m= 46m	4	- do -	- do -	Existing Spillway	



PART ELEVATION



PART PLAN

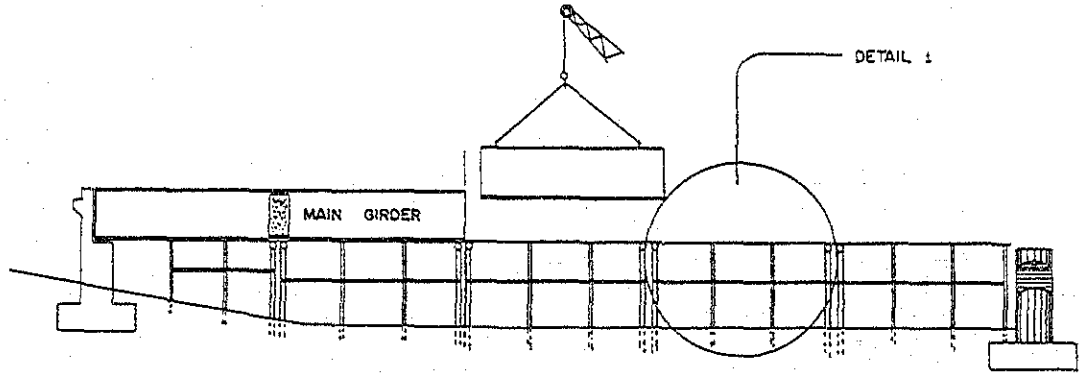


SECTION "A - A"

BILL OF MATERIALS FOR 10 M LENGTH

LUMBER				
NUMBER SINGLE SPAN	SIZE	LENGTH	REMARKS	QUANTITY
12 pcs	50 x 150	5000	HANDRAIL	0.45 m³
18 pcs	100 x 100	1300	POST	0.24 m³
10 pcs	25 x 100	1300	BRACING (RAILING)	0.02 m³
12 pcs	50 x 250	5000	RUNNING BOARD	0.75 m³
40 pcs	250 mm ø	5200	FLOOR PLANK (COCO)	10.21 m³
13 pcs	200 x 300	10000	STRINGER	7.80 m³
8 pcs	250 mm ø	6500	PILE CAP (COCO TRUNK)	2.55 m³
8 pcs	75 x 20	6000	BRACING (HORIZONTAL)	0.78 m³
16 pcs	75 x 200	6000	BRACING (DIAGONAL)	1.56 m³
48 pcs	250 mm ø	6000	PILE (COCO TRUNK)	14.13 m³
HARDWARE				
80 pcs	16 mm ø	500	STEEL FASTENER	620 kg
225 pcs	12 mm ø	500	IRON SPIKE	112 kg
140 pcs	12 mm ø	300	IRON SPIKE	42 kg
900 pcs	200 mm ø	100	WIRE NAIL	111 kg

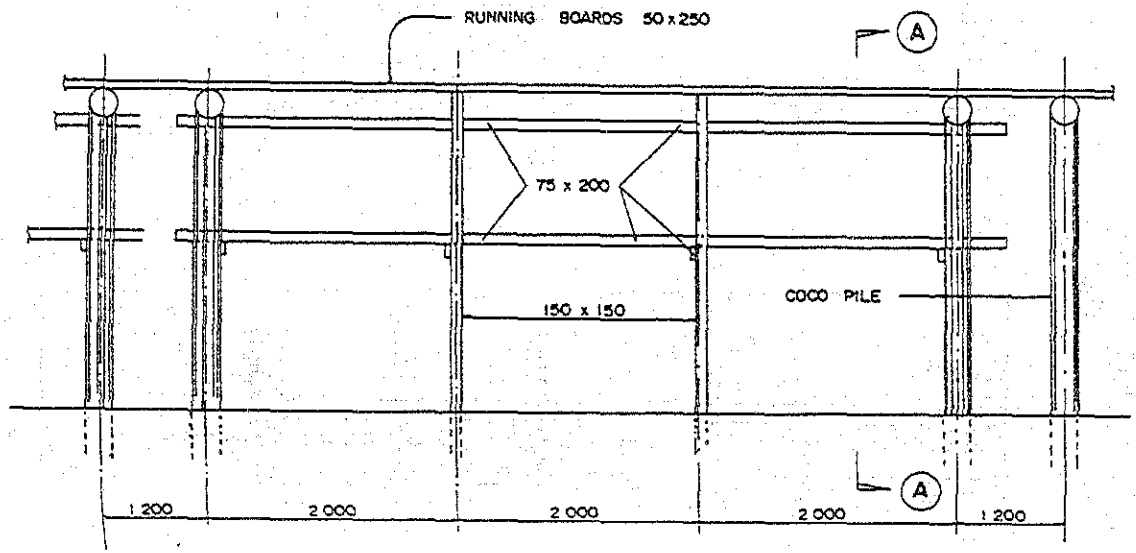
FIGURE 5.9-7 TYPICAL SECTION OF TIMBER BRIDGE AND TEMPORARY BAILEY DETOUR BRIDGE



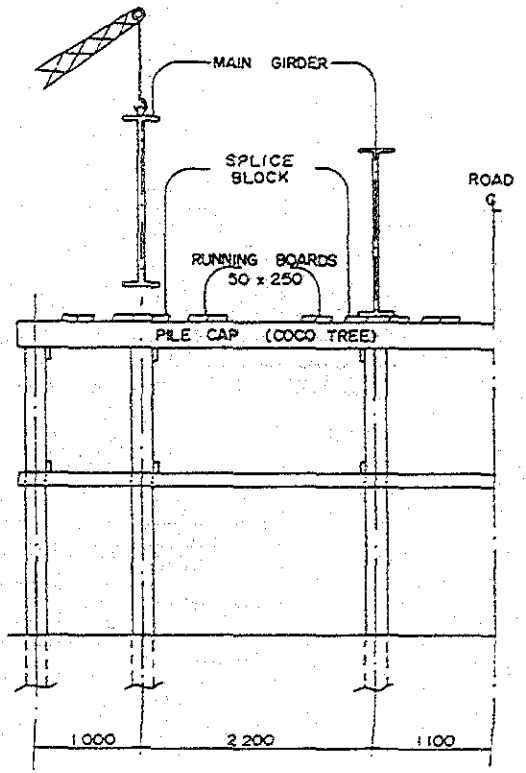
BILL OF MATERIAL FOR WOODEN BENT

FOR 7m. LENGTH

REMARKS	NO.	SIZE	LENGTH	QUANTITY
COCO PILE	12	Ø200	5 000	1.884 m^3
PILE CAP	2	Ø200	9 200	0.578 m^3
HORIZONTAL BRACE	12	75x200	7 000	1.260 m^3
HORIZONTAL BRACE	4	75x200	9 200	0.552 m^3
RUNNING BOARD	16	50x250	7 000	1.400 m^3
LUMBER PILE	16	150x150	5 000	1.800 m^3



DETAIL 1



SECTION A-A

(3) Construction of Cofferdams

Construction of substructures and river protection are planned to be implemented in the dry season because this means not only reducing construction costs but also the safety and quality of construction. However, where the ordinary water level is high during high tide, temporary cofferdams will be required during construction of substructures and river protection.

The fill type is basically employed for cofferdams; however, sheet piles are employed where the ordinary water level is relatively high or the river is wide. The proposed sheet piles and temporary cofferdams are shown in Figures 5.9-9 and 5.9-10, respectively.

The bridges whose substructures and river protection require cofferdams during construction are listed in Table 5.9-4.

Cofferdam

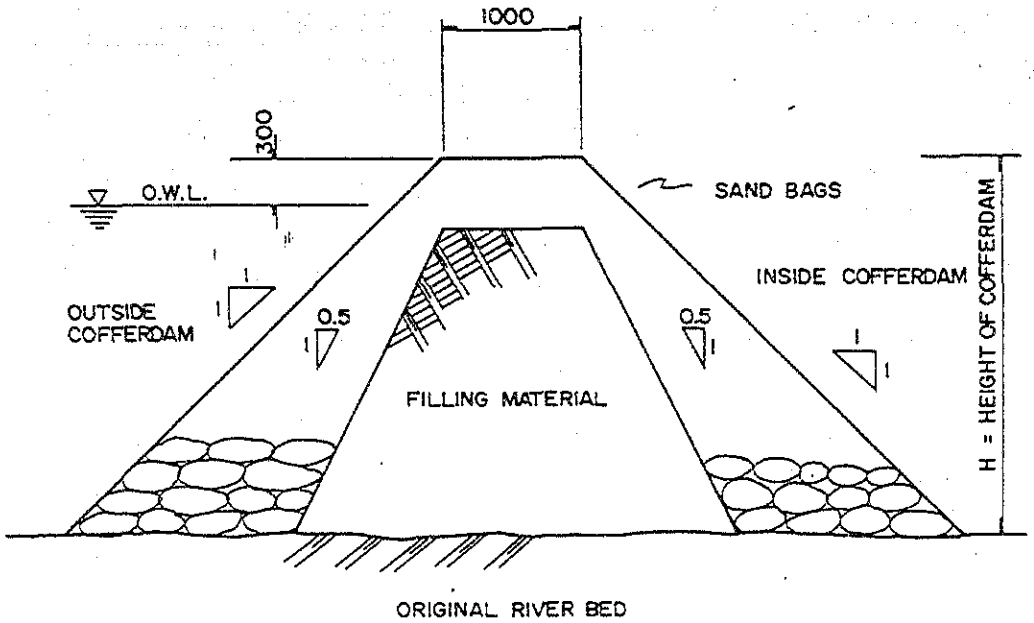
01.02	Maphilindo Br.	1 - Pier
03.10	Dolores Br.	2 - Abutment
		1 - Pier
		2 - River Bank Protection
03.17	Sula Br.	2 - Abutment
		2 - Pier
		2 - River Bank Protection
04.07a	Camagong Br.	1 - Pier
		2 - River Bank Protection
04.07b	Tan-Agan Br.	1 - Pier
04.10b-2	Ihatub Br.	1 - Pier
		2 - River Bank Protection

Steel Sheet Pile

01.02	Maphilindo Br.	3 - Pier
03.03	Bacong Br.	2 - Abutment (Permanent)
03.07	San Roque Br.	2 - Abutment (Permanent)

TABLE 5.9-4 PLANNING OF COFFERDAM

BRIDGE No.	NAME OF BRIDGE	ABUTMENT A_1	ABUTMENT A_2	PIER P_1	PIER P_2	PIER P_3	PIER P_4	RIVER BANK A_1 PROTECTION	RIVER BANK A_2 PROTECTION
01.02	Maphilindo Bridge	No need	No need	Filled Cofferdam	Steelsheet Pile	Steelsheet Pile	Steelsheet Pile	No need	No need
03.03	Bacong Bridge	Sheetpile Cofferdam	Sheetpile Cofferdam	No need	—	—	—	Steel Sheetpile (Permanent)	Steel Sheetpile (Permanent)
03.07	San Roque Bridge	- do -	- do -	No need	No need	—	—	Steel Sheet Pile	Steel Sheet Pile
03.10	Dolores Bridge	Filled Cofferdam	Filled Cofferdam	Filled Cofferdam	—	—	—	Filled Cofferdam	Filled Cofferdam
03.13	Mangkuyog Bridge	No need	No need	No need	No need	No need	—	No need	No need
03.17	Sula Bridge	- do -	Filled Cofferdam	Filled Cofferdam	Filled offerdam	—	—	Filled Cofferdam	Filled Cofferdam
04.07a	Camagong Bridge	- do -	- do -	- do -	—	—	—	- do -	- do -
04.20a	Paragusan Bridge	- do -	- do -	No need	—	—	—	No need	No need
04.07b	Tan-Agan Bridge	- do -	- do -	Filled Cofferdam	—	—	—	- do -	- do -
04.10b -2	Ihatnb Bridge	- do -	- do -	- do -	—	—	—	Filled Cofferdam	Filled Cofferdam



5.9-9 FILLED COFFERDAM

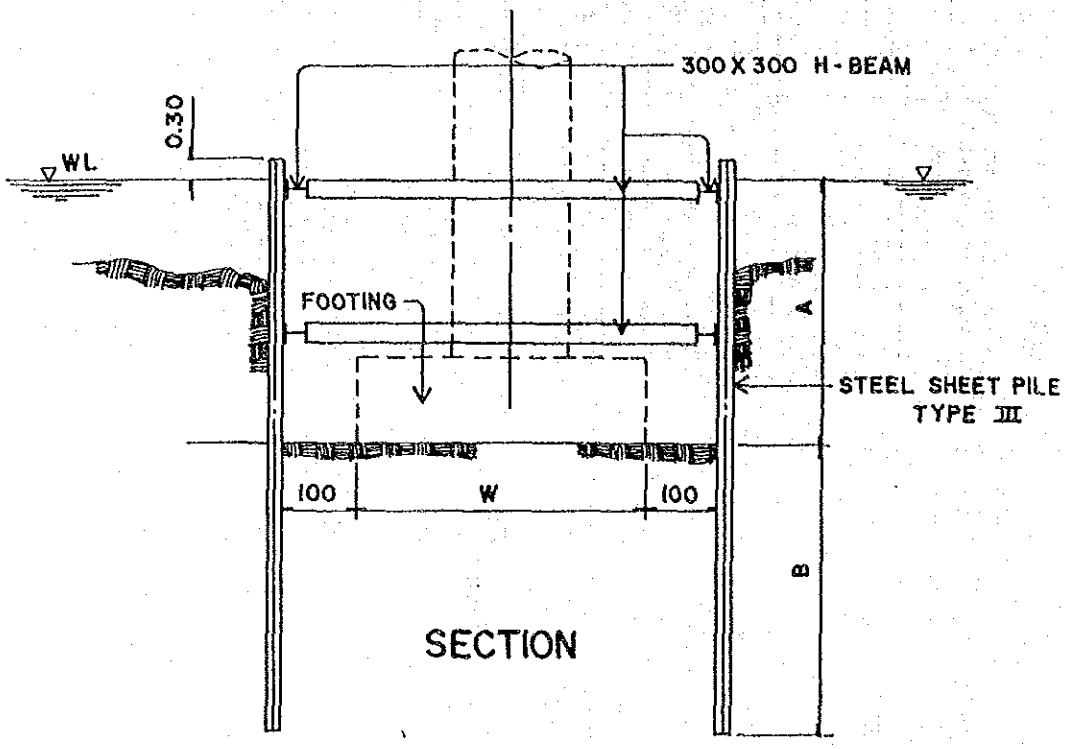
BILL OF MATERIALS FOR COFFERDAM

FOR 1 m LENGTH

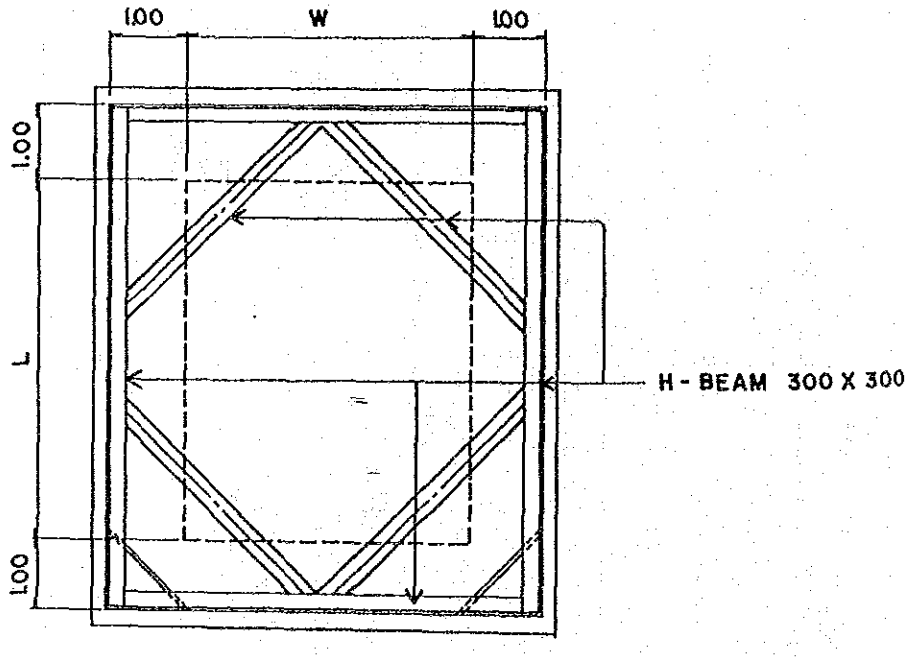
HEIGHT OF COFFERDAM H (mm)	SAND BAGS (m^3)	FILL (m^3)
500	0.75	0
1,000	1.38	0.63
1,100	1.53	1.78
1,200	1.70	0.95
1,300	1.87	1.12
1,400	2.10	1.31
1,500	2.25	1.50
1,600	2.46	1.71
1,700	2.67	1.92
1,800	2.90	2.15
1,900	3.13	2.38
2,000	3.38	2.63
2,200	3.90	3.15
2,400	4.46	3.71
2,600	5.06	4.31
2,800	5.70	4.95
3,000	6.38	5.63
3,200	7.10	6.35
3,400	7.86	7.11
3,600	8.66	7.91
3,800	91.50	8.75
4,000	10.38	9.63

FIGURE 5.9-10

SINGLE SHEET PILE COFF. DAM



SECTION



PLAN

(4) Make Sure of Traffic During Construction

Detour roads are planned to provide for traffic during construction except can use to existing bridge. The serviceability of the detour roads need to be at the present level to maintain the functions of the roads.

Table 5.9-5 shows the existing conditions of the bridges and their detour roads. According to the table, the detour roads can be categorized as follows:

1) Existing bridges/spillways to be utilized
(New bridge to be construct to shift from existing bridge)

- 01.02 Maphilindo Bridge
- 03.03 Bacong Bridge
- 03.10 Dolores Bridge
- 04.10b-2 Ihatub Bridge

2) Ford crossing (no bridge exists)

- 03.13 Mankuyog Bridge
- 03.17 Sula Bridge

3) Barge (to be closed to traffic)

- 03.07 San Roque Bridge

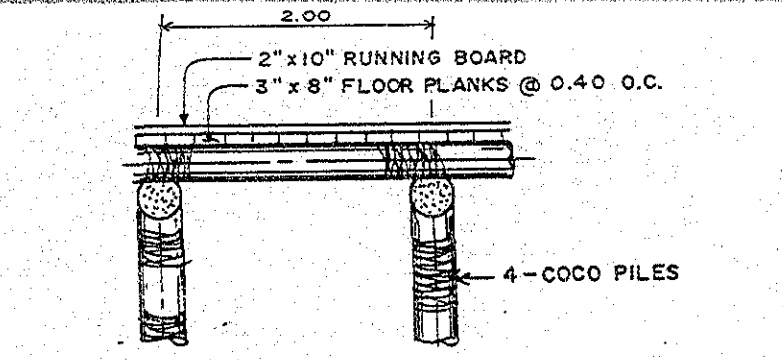
4) Temporary bridges to be constructed

- 04.07a Camagong Bridge
- 04.20a Paragusan Bridge
- 04.76b Tan-Agan Bridge

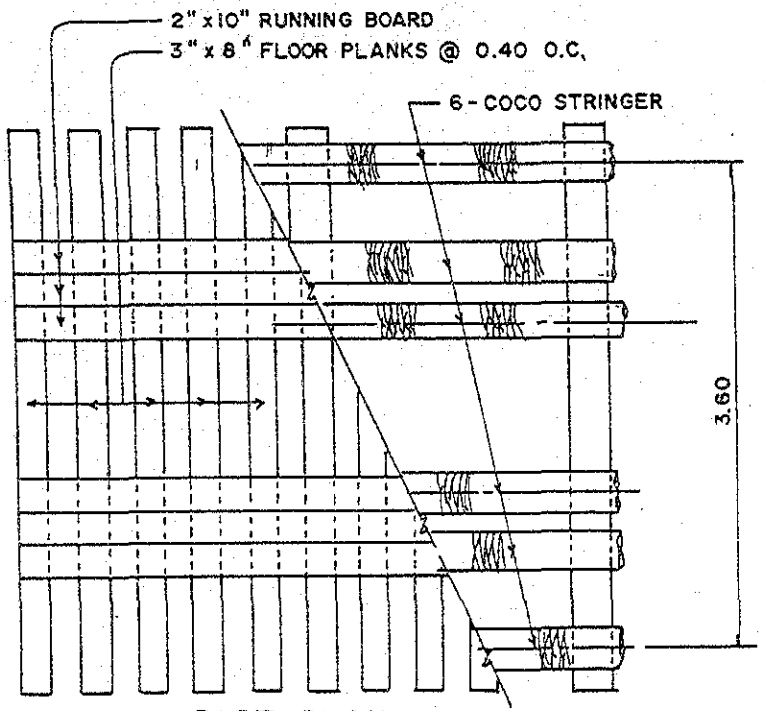
The wooden temporary bridges are illustrated in Figure 5.9-11.

TABLE 5.9-5 DETOUR AND EXISTING CONDITIONS

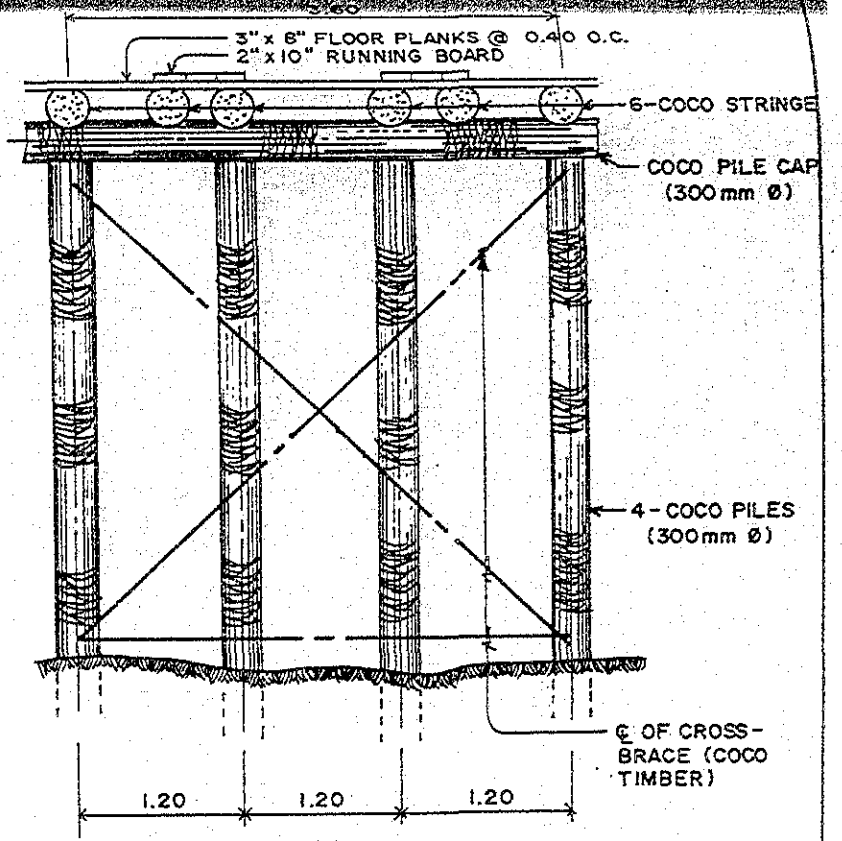
Br. No.	Name of Bridge	Exighting Condition	Detour Rood
01.02	Maphilindo Bridge	Fair bailey bridge	Use existing bridge
03.03	Bacong Bridge	- do -	- do -
03.07	San Roque Bridge	Timber bridge	After discussed with DPWH, durung construction unpassble
03.10	Dolores Bridge	- do -	Use existing bridge
03.13	Mangkuyog Bridge	No existing bridge	Ford-crossing
03.17	Sula Bridge	- do -	- do -
04.07a	Camagong Bridge	Fair bailey bridge	Temporary road and with wooden stage, downstream side
04.20a	Paragusan Bridge	- do -	- do -
04.07b	Tan-Agan Bridge	- do -	- do -
04.10b-2	Ihatub Bridge	Spillway	Use existing spillway



PART ELEVATION
SCALE . 1:50



PART PLAN
SCALE 1:50



SECTION
SCALE 1:50

FIGURE 5.9-11

TIMBER DETOUR BRIDGE

(5) Demolition of Existing Bridges

Existing bridges will be demolished as necessary either before construction including relocation of top water pipe and electric power line is undertaken by the Philippine side, or after completion of construction, also by the Philippine side, as follows:

1) Existing bridges will be demolished before construction

- 03.07 San Roque Bridge
- 04.07a Camagong Bridge
- 04.20a Paragusan Bridge
- 04.07b Tan-Agan Bridge

2) Existing bridges will be demolished after construction

- 01.02 Maphilindo Bridge
- 03.03 Bacong Bridge
- 03.10 Dolores Bridge
- 04.10b-2 Ihatub Bridge

3) No existing bridge

- 03.13 Mangkuyog Bridge
- 03.17 Sula Bridge

CHAPTER 6

IMPLEMENTING ARRANGEMENT

CHAPTER 6

IMPLEMENTING ARRANGEMENT

6.1 Executing Agency and Organization

The Department of Public Works and Highways (DPWH) is the executing agency for the Project for Constructing Bridges along Rural Roads, Phase I - III.

The DPWH is headed by the Secretary who is assisted by five (5) Undersecretaries and six (6) Assistant Secretaries. In the Department, there are six (6) Service Offices - Planning, Controllership and Financial Management, Administrative and Manpower Development, Legal, Monitoring and Information, and Internal Audit; and five (5) Bureaus - Design, Construction, Maintenance, Equipment, and Research and Standards. Refer to Figure 6.1-1: Organization of the DPWH.

The five (5) Bureaus have the following major functions:

- Bureau of Design ..... undertakes project development, engineering surveys and designs of infrastructure facilities.

- Bureau of Construction . provides technical services for the construction, rehabilitation, betterment and improvement of infrastructure facilities.

- Bureau of Maintenance .. provides technical services and supervision on the maintenance and repair of roads and bridges and other associated structures.

- Bureau of Equipment .... manages all Government construction and maintenance of equipment, including procurement and dispersement to the regions.

. Bureau of Research and Standards ....
provides research and technical services on quality control and on the management of materials, plants and ancillary facilities for the production and processing of construction and maintenance materials.

At the regional level where the infrastructure projects are implemented, the DPWH has 14 Regional Offices each headed by a Regional Director. In addition, there are 92 District Offices and 59 City Engineering Offices, Regional Equipment Centers and Workshops. The latter are under the supervision of the Regional Director concerned. These offices serve as the implementing arms of the DPWH. The organization of a Regional office is shown in Figure 6.1-2.

The locations of regional offices of this project are shown below.

Region I	Office	San Fernand, LA UNION
Region III	Office	San Fernand, PANPANGA
Region IV-A	Office	Quezon City, METRO MANILA
Region IV-B	Office	Quezon City, METRO MANILA

Figure 6.1-1 ORGANIZATION CHART

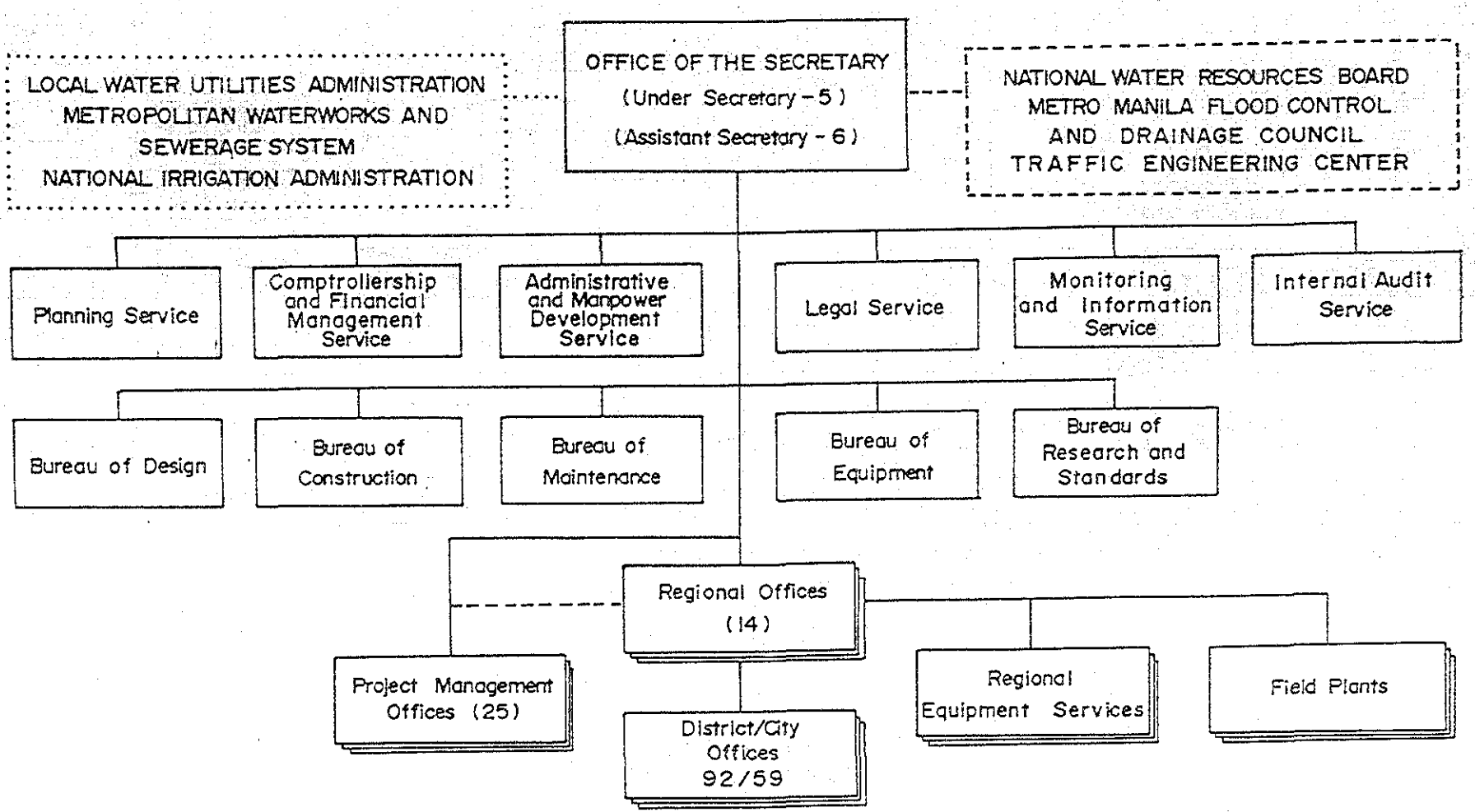
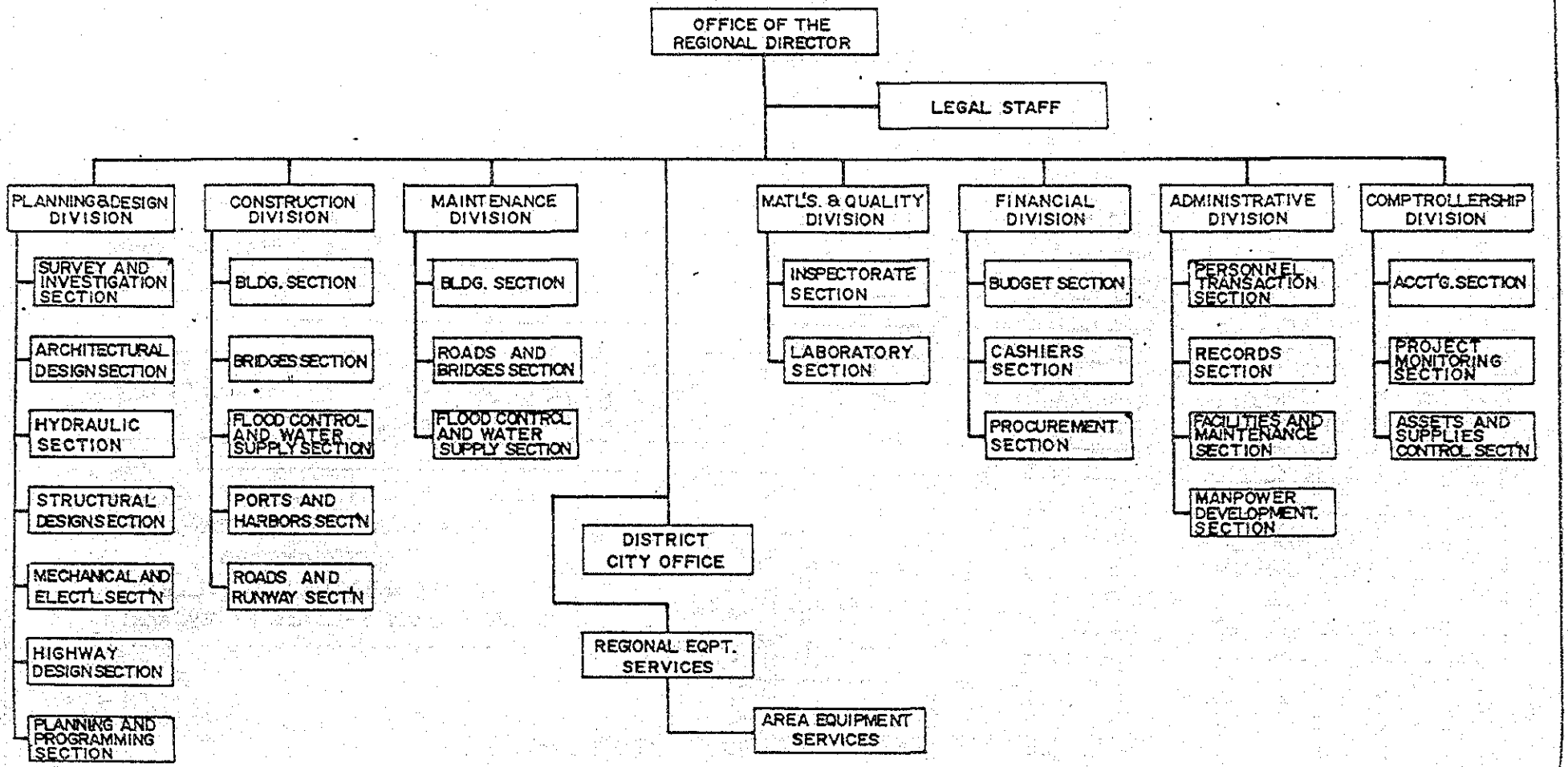


Figure 6.1-2 ORGANIZATIONAL CHART
OFFICE OF THE REGIONAL DIRECTOR



2.2 Undertaking of Both Governments

Group 1 and Group 2 cover the following length and number of bridges:

Group	Number of Bridge (each)	Total Length of Bridges (m)	Average Length of Bridges (m)	Number of Span (each)	Remarks
1	27	785	29.1	38	Phase 1 24 Br.750 m
2	10	641	64.1	27	Phase 2 10 Br.517 m
Total	37	1426	38.5	65	

2.2.1 Scope of Grant Aid by the Government of Japan

1) Group 1 Bridges

The Government of Japan intends to provide Grant Aid which covers the following steel materials:

- H-Beams
- Cross Beams
- Shoes
- Drain Boxes
- Torque Wrenches and Calibrators
- Steel Railings and Posts for Bridge Approaches

The steel materials will be delivered from Japan to the designated ports of entry in the Philippines.

The following three (3) ports were designated for the Project:

- Manila North Harbor
- Port of Batangas
- Port of Puerto Princesa

1) The main steel materials are as follows:

a) H-Beam

Span Length (m)	Number of Spans	Size of H-Beams (mm)	Weight of H-Beams per Beam (kg)	Total Weight of H-Beams (kg)
15.0	9	700 x 300	15,935	143,415
18.0	4	792 x 300	19,411	76,564
21.0	2	900 x 300	24,618	49,236
22.0	4	900 x 300	25,615	102,460
23.0	8	912 x 302	30,636	245,088
24.0	11	912 x 300	35,748	393,228
Total	38 Spans (16 Br-1 span, 11 Br-2 span)			1,009,911 kg

b) Drain Boxes and Pipes

Item	Size (mm)	Quantity (each)	Unit Weight (kg)	Total Weight (kg)
Drain Box	150 x 150	27 Br 38 span x 4 = 152	5.5	836
Drain Pipe	100Ax 940	27 Br 38 span x 4 = 152	11.0	1672
Total		152	16.5 kg	2508 kg

c) Steel Railings for Bridge Approaches

27 Bridges x 17 m x 4 locations = 1836 m

d) Torque Wrenches and Calibrators

Item	Size	Quantity
Torque Wrenches	M 24	27
Calibratprs		8

(2) Group 2 Bridges

The scope of Grant Aid by the Government of Japan for the Phase III Bridges covers construction of bridges, access roads and related structures, including the supply of steel materials. The major construction works are as follows:

1) Major Construction Works

a) Construction of Superstructures

. Supply, delivery and erection of steel materials, construction of concrete slabs and handrails

b) Construction of Substructures

. Construction of abutments and piers (including piles)
. Temporary works (sheet pile cofferdams)

c) Construction of Approach Roads
(Scope is limited to connecting new bridges to existing roads with smooth alignment.)

. Earth works and construction of pavement structures
. Installation of drainage facilities
. Supply, delivery and installation of steel railings

d) Construction of River Bank Protection
(Scope is limited to abutments.)

The major construction quantities of the Group 2 Bridges are shown in Table 6.2-1.

TABLE 6.2-1 SUMMARY OF QUANTITIES FOR GROUP 2 BRIDGES

BRIDGE NO.	NAME OF BRIDGE	SUBSTRUCTURE		SUPERSTRUCTURE				APPROACH ROAD		RIVER BANK PROTECTION	
		STEEL WEIGHT (t)	CONCRETE DECK SLAB (m²)	ABUTMENT (Height) (m) A 1	ABUTMENT (Height) (m) A 2	PIER (Height) (m)	RC PILE RC、□ 400 mm × 400mm Length (m) x Number=Length (m)	SHEET PILE (TYPEⅢ) (t)	A 1 (m)	A 2 (m)	A 1 (m²)	A 2 (m²)
01.02	MAPHILINDO Br. Pangasinan	Built-Up Beam 238.0 (Weathering Steel) 32+32+32+32+32=160m	1,342.7	A1 ; =5.0	A2 ; =4.5	P1;H= 5.0 P2;H= 5.5 P3;H= 6.5 P4;H= 6.5	A1; 24.0×12 = 288.0 P1; 22.0×10 = 220.0 P2; 22.0×10 = 220.0 P3; 21.0×10 = 210.0 P4; 21.0×10 = 210.0 A2; 24.0×12 = 288.0	• Sheet Pile ; 70 (3piers)	146.78	144.00	972.0	1,038.0
03.03	BACONG Br. Bataan	Built-Up Beam 67.6 (Weathering Steel) 26+26=52m	438.4	A1 ; =4.5	A2 ; =4.5		A1; 24.0×12 = 288.0 P1; 16.0× 4 = 64.0 A2; 24.0×12 = 288.0	• Sheet Pile ; 58 (2Abutments)	140.00	122.11	501.0 (Sheet Pile) 250.0	513.0 (Sheet Pile) 250.0
03.07	SAN ROQUE Br. Bulacan	H-Beam 57.3 (Weathering Steel) 18+18+18=54	456.9	A1 ; =3.5	A2 ; =3.5		A1; 24.0× 8 = 192.0 P1; 30.0× 4 = 120.0 P2; 30.0× 4 = 120.0 A2; 24.0× 8 = 192.0	• Sheet Pile ; 54 (2Abutments)	64.54	64.54	718.0 (Sheet Pile) 230.0	492.0 (Sheet Pile) 230.0
03.10	DOLORES Br. Pampanga	H-Beam 75.8 24+24=48m	405.1	A1 ; =5.0	A2 ; =5.0	P1;H= 5.0	A1; 12.0×12 = 144.0 P1; 16.0× 8 = 128.0 A2; 16.0×12 = 192.0	—	125.10	124.41	269.0	249.0
03.13	MANGKUYOG Br. Nueva Ecija	H-Beam 151.6 24+24+24+24=96m	808.3	A1 ; =5.0	A2 ; =5.0	P1;H= 4.0 P2;H= 5.0 P3;H= 4.0	A1; 8.0×10 = 80.0 P1; 8.0× 8 = 64.0 P2; 8.0× 8 = 64.0 P3; 8.0× 8 = 64.0 A2; 8.0×10 = 80.0	—	109.90	121.75	641.0	701.0
03.17	SULA Br. Tarlac	H-Beam 76.2 20+20+20=60m	506.9	A1 ; =5.5	A2 ; =5.5	P1;H= 5.5 P2;H= 5.5	A1; 6.0×10 = 60.0 P1; 6.0× 8 = 48.0 P2; 6.0× 8 = 48.0 A2; 6.0×10 = 60.0	—	134.90	123.18	1,149.0	985.0
04.07a	CAMAGONG Br. Quezon	H-Beam (Weathering Steel) 51.2 22+22=44m	371.8	A1 ; =4.5	A2 ; =4.5	P1;H= 6.5	A1; 7.0×10 = 70.0 P1; 6.0× 8 = 48.0 A2; 7.0×10 = 70.0	—	135.30	139.21	1,060.0	878.0
04.20a	PARAGUSAN Br. Laguna	H-Beam+Built-Up Beam 58.7 (15.0+30.0=45.0)	380.1	A1 ; =3.5	A2 ; =4.0	P1;H=11.0	A1; 5.0× 8 = 40.0 P1; Spread foundation 0 A2; 7.0×10 = 70.0	—	123.20	124.93	453.0	336.0
04.07b	TAN-AGAN Br. Romblon	H-Beam (Weathering Steel) 38.2 18+18=36m	305.3	A1 ; =3.5	A2 ; =3.5	P1;H= 5.0	A1; 8.0× 8 = 64.0 P1; 12.0× 8 = 96.0 A2; 11.0× 8 = 88.0	—	120.90	121.61	378.0	346.0
04.10b-2	IHATUB Br. Marinduque	H-Beam (Weathering Steel) 61.2 23+23=46m	388.5	A1 ; =3.5	A2 ; =3.5	P1;H= 5.0	A1; 7.0×10 = 70.0 P1; 5.0× 8 = 40.0 A2; 5.0×10 = 50.0	—	122.80	124.71	183.0	223.0
合 計	10 Bridges	Built-Up Beam 242m、348.4 H-Beam 399m、527.4	5,404.0	10 Abuts	10 Abuts	17 Piers	RC Pile 400mmx400m L;4,134m Number;314piles Steel Pile φ600 L;304m Number;12piles	182	1,233.42	1,210.45	6,324.0 (Sheet Pile) 480.0	5,761.0 (Sheet Pile) 480.0

2) Major Steel Materials

i) Steel Girders

. H-Beams

Span Length (m)	Number of Spans	Size of H-Beams (mm)	Total Weight of H-Beams (kg)
15.0	1	700 x 300	1 x 15.9 = 15.9
18.0	5	792 x 300	5 x 19.1 = 95.5
21.0	3	900 x 300	3 x 25.4 = 76.2
22.0	2	900 x 300	2 x 25.6 = 51.2
23.0	2	912 x 302	2 x 30.6 = 61.2
24.0	6	912 x 300	6 x 35.7 =214.2
Total	19	-	514.2

. Plate Girders

Span Length (m)	Number of Spans (each)	Weight of H-Beams per Beam (kg)	Total Weight of H-Beams (kg)
26.0	2	1,400	2 x 33.8 = 67.6
30.0	1	1,500	1 x 42.8 = 42.8
32.0	5	1,550	5 x 47.6 =238.0
Total	8	-	348.4 t

ii) Sheet Piles and Steel Piles for Piers

. Sheet Pile (Type III) 7 piers x 26 t/each
= 182 ton

. Sheet Pile (4600 t = 14 mm) 4 piles x 16.0 m +
8 piles x 30.0 m
= 304 m

6.2.2 Undertaking of the Government of Philippines

(1) Group 1 Bridges

1) Contents of the undertaking works.

The undertaking of the Government of the Philippines is as follows:

- Design and construction of substructures
- Transportation of steel materials (from designated ports to bridge sites) and erection work
- Design and construction of slabs and walls
- Design and construction of river bank protection
- Design and construction of drainage system and culverts
- Design and construction of bridge approaches

2) Major Structures

Construction	Item	Height of Structures	Quantity
Abutments	Height (m)	H = 3.5	29 Abutments
		H = 4.0	2 Abutments
		H = 5.0	11 Abutments
		H = 6.0	2 Abutments
Total			54 Abutments
Piers	Height (m)	H = 4.0	1 Pier
		H = 5.0	2 Piers
		H = 6.0	3 Piers
		H = 7.0	1 Pier
		H = 8.0	2 Piers
		H =10.0	2 Piers
Total		-	11 Piers
RC Pile	400 mm x 400 mm, l = 10.0 m		
Abutment	54 x 10 piles		540 Piles
Pier	7 x 12 piles		84 Piles
Pier	4 x 8 piles		32 Piles
Total			656 Piles
Concrete Slabs			6,801 m^2
Approach Roads			405 m
Culverts			23 Culverts
River Protection			10,125 m^2

3) Estimate Construction Cost

The construction to be borne by the Government of the Philippines is roughly estimated as shown in the following table.

Item	Quantity	Unit Cost (P)	Cost (P)
Abutment (each)			
H = 3.5 m	39	297,500	11,602,500
H = 4.0 m	2	340,000	680,000
H = 5.0 m	11	425,000	4,675,000
H = 6.0 m	2	509,550	1,019,100
Sub-Total	54	-	17,976,600
Pier (each)			
H = 4.0 m	1	212,000	212,000
H = 5.0 m	2	265,000	530,000
H = 6.0 m	3	318,000	954,000
H = 7.0 m	1	371,400	371,400
H = 8.0 m	2	424,000	848,000
H = 10.0 m	2	530,000	1,060,000
Sub-Total	11	-	3,975,400
Pile (each)			
Abutment	540	2,700	1,458,000
Pier	84	2,700	226,800
Pier	32	2,700	86,400
Sub-Total	565	-	1,771,200
P.C.C. Pavement (m)	6,801	2,900	19,722,900
Bridge Approaches (m)	405	9,200	3,726,000
Culvert Boxes (each)	23	120,000	2,760,000
River Protection (m^2)	10,125	180	1,822,500
Sub-Total			28,031,400

Item	Quantity	Unit Cost (P)	Cost (P)
Transportation of Steel Materials (t)	1,010	5,155	5,206,550
Erection of Steel Materials (t)	1,010	3,436	3,470,360
Sub-Total			8,676,910
Overhead	-	-	12,086,000
Total Cost	(¥485,867,317)		P72,517,510

Note: P1 = ¥6.7

4) The Government of the Philipines, on the other hand, is responsible for the construction of Phase I bridges within the period of one (1) year after delivery of steel materials at designated ports of entry provided under the grant aid, as well as necessary measures stated in the Minutes of Discussions.

(2) Group 2 Bridges

The scope of undertaking of the Government of the Philippines for the Group 2 Bridges is as follows:

1) Scope of Major Undertakings

a) To ensure the exemption of custom duties, internal taxes and other fiscal levies for the supply of materials under Japan Grant Aid.

b) To acquire the right-of-way and to provide necessary land area for the construction works.

c) To demolish obstacles including houses within the right-of-way that affect the implementation of the Project.

d) To make passable all roads and bridges leading to the project sites for the transportation of materials and equipment provided under Japan Grant Aid.

e) To demolish obstacle existing bridges and relocation of incidental facilities.

2) Land Acquisition and Obstacle Demolition

The acquisition of right-of-way, the demolition of obstacles including houses and the temporary provision of necessary land area for construction works are shown in Table 6.2-2.

3) Maintenance of Bridges and Roads for Transportation of Materials

The bridges and roads leading to the project sites for the transportation of materials and equipment that must be made passable are shown in Article 5.9.1. The major maintenance works are as follows:

. 03.13 Mangkuyog Bridge
- Rehabilitation of three (3) dilapidated bridges
- Crossing riverbed with one (1) bridge

. 04.07 Camagong Bridge
- Rehabilitation of eight (8) dilapidated bridges

. 04.07b Tan-Agan Bridge
- Rehabilitation of one (1) dilapidated bridge

4) Demolish of existing bridge

o 03.07 San Roque Bridge
o 04.07a Camagong Bridge
o 04.20a Paragusan Bridge
o 04.07b Tan-Agan Bridge

5) Relocation of incidental facilities

Relocation of electric wire and tap water pipe which is obstacle for the bridge construction are shown in Article 5.9.2(5). The major works are as follows:

o	01.02	Maphilindo Bridge	Relocation of electric wire
o	03.07	San Roque Bridge	Relocation of tap water pipe
o	04.20a	Paragusan Bridge	Relocation of electric wire
o	04.10b-2	Ihatub Bridge	Relocation of electric wire

TABLE 6.2-2 LAND ACQUISITION, HOUSE DEMOLITION AND TEMPORARY LAND FOR CONSTRUCTION WORKS

Bridge No.	Name of Bridge	LAND Acquisition (m²)	HOUSE Demolition	Temporary for works (m²)
01.02	Maphilindo Br.	3,000	0	600
03.03	Bacong Br.	4,500	0	600
03.07	San Roque Br.	960	3 (Concrete) 6 (Wooden)	600
03.10	Dolores Br.	3,600	2 (Wooden)	600
03.13	Mangkuyog Br.	2,060	0	600
03.17	Sula Br.	3,600	0	600
04.07a	Camagong Br.	2,640	0	600
04.20a	Paragusan Br.	2,880	0	600
04.07b	Tan-Agan Br.	2,160	0	600
04.10b-2	Ihatub Br.	1,100	2 (Wooden)	600
Total		26,500	3 (Concrete) 10 (Wooden)	6,000

3 Implementation Schedule

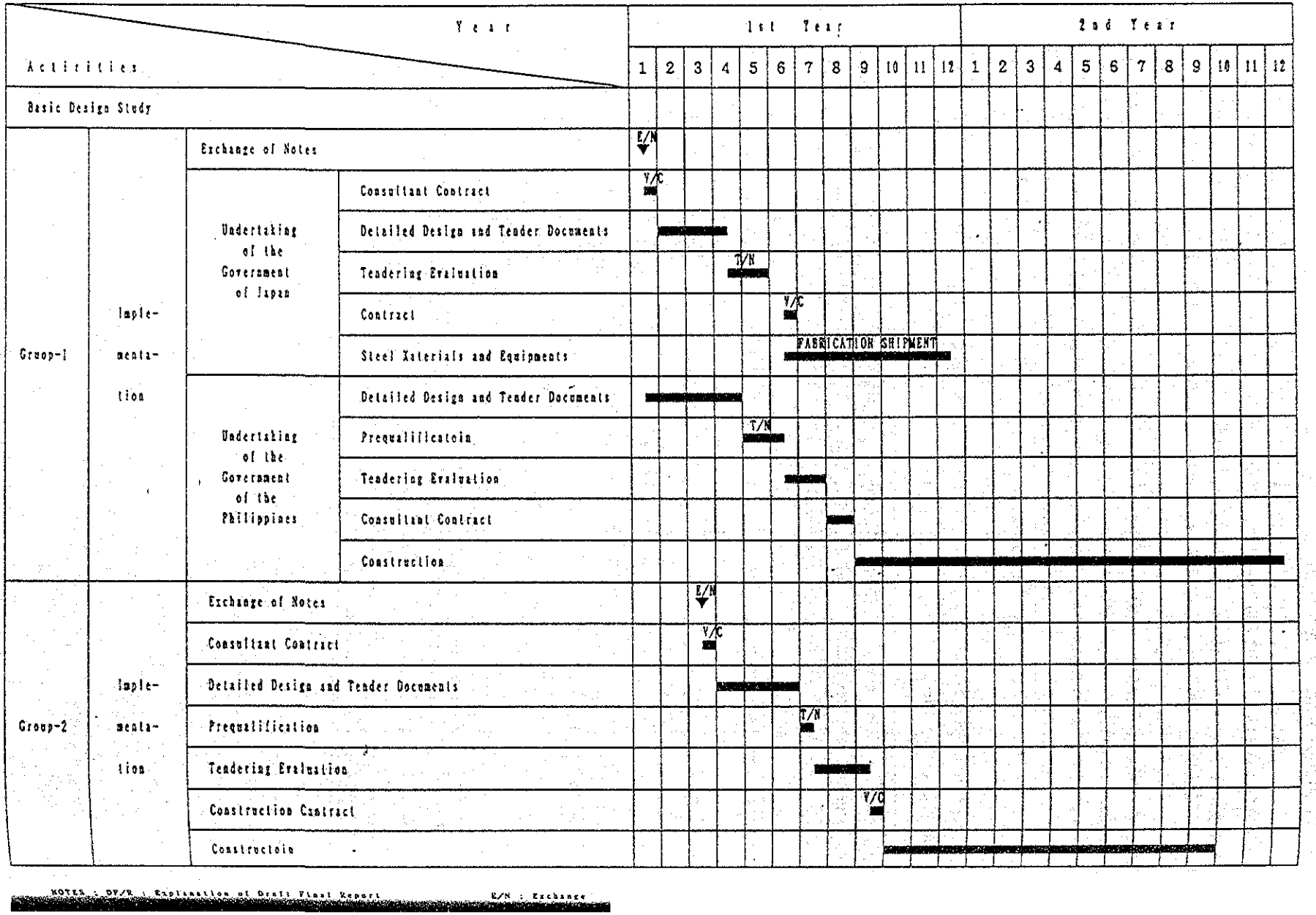
The implementation schedule, to be considered several factors, especially taking into consideration dry season (December to May), rainy season (June to May).

The construction schedule, especially for the piers inside rivers, should be executed during the dry season: otherwise, the use of cofferdams may be required. Soil compaction for the embankments of approach roads is also recommended to be done during the dry season.

The dry season differs by project site is basically from December to May.

Based on the above conditions, construction is scheduled for twelve (12) months. The proposed implementation schedule of Group 1 and 2 Bridges is shown in Figure 6.3-1.

FIGURE 6. 3-1 IMPLEMENTATION SCHEDULE



6.4 Fund Preparation

The fund preparation for the Project by the Government of the Philippines is approximately 7.3 million pesos for Group 1 and 6.6 million pesos for Group 2. The public investment program (PIP) of the Philippines includes the budget allocated for the Project as shown in Table 6.4-1.

TABLE 6.4-1 BUDGET ALLOCATED FOR THE PROJECT

(unit: million pesos)

	1990	1991	1992	Total
TP	20	50	65	135
P	20	50	65	135
S	0	0	0	0

Note : TP = total pesos
P = peso portion
S = foreign portion

The budget allocated for the Project for the fiscal 1989 and 1990 is 70 million pesos, and 9.6 million pesos are lacking. The DPWH representatives indicated that the budget for fiscal 1990 was already fixed, but that for 1991 can be adjusted.

It is, therefore, recommended that the budget for 1991 be ammended in accordance with the construction cost estimated through the detailed design.

6.5 Design and Construction Supervision Plan

The Planning service is responsible for the execution of the project under the instructions of the DPWH.

6.5.1 Group 1 Bridges

The Bureau of Design will be in charge of design works for the Project including the following major works:

- Design and cost estimates of substructures
- Cost estimates of transport of steel materials and erection work
- Design and cost estimates of slabs and walls
- Design and cost estimates of drainage systems and culvert
- Design and cost estimates of river bank protection
- Design and cost estimates of bridge approaches

The Bureau of construction shall be in charge of tendering for the project including the following services.

- Preparation of contract documents such as price analysis, specification, pre-qualification formats, etc.
- Execution of tendering

The Regional offices concerned will be involved in the construction supervision of bridge construction in their respective regions. The regional directors/their representatives will directly oversee the workmanship of construction by contractors.

6.5.2 Group 2 Bridges

Design and construction supervision will be executed by a Japanese Consultant and construction by a Japanese Contractor. Contracts for consultancy and construction will be concluded by the DPWH.

The Government of the Philippines has designated the following organizations for the execution of the Project under the Planning Service for Planning as follows:

- Bureau of Design : Design and cost estimates
- Bureau of Construction: Specifications and tendering
- Regional Offices : Direction and supervision of construction.
- Bureau of Maintenance : Maintenance

The four (4) Executive Bureaus are to have discussions and to contact and make adjustments with the Japanese Consultant in order to complete the Project.

6 Maintenance Plan

The Bureau of Maintenance is responsible for the maintenance of national roads and bridges in the Philippines.

There are four (4) categories of maintenance in the DPWH as follows:

- Routine Maintenance : Day-to-day basis throughout the year
- Periodic Maintenance : Recurrent time cycle of more than one year
- Emergency Maintenance : Unprogrammed activities required in the aftermath of slides, floods, etc.
- Special Maintenance : Outside the scope of normal maintenance operations

In the Philippine Highway Maintenance Management System (PHMMS), there are 56 work activities at present, of which eight (8) activities are related to bridge maintenance, as shown in Table 6.6-1.

TABLE 6.6-1 MAINTENANCE ACTIVITIES FOR BRIDGES

Activity No.	Activity
151	Cleaning of Bridges
152	Patching of (PC) Concrete Decks
153	Repair of Concrete Bridges
154	Repair of Steel Bridges
155	Repair of Bailey Bridges
157	Clearing Bridge Waterways
402	Initial Response to Emergencies - Bridges
65X	Bridge Repainting

6.7 Construction Cost

6.7.1 Group 1 Bridges

The construction cost to be borne by the Government of th Philippines is roughly estimated as 73 million pesos, a shown in Table 6.7-1.

TABLE 6.7-1 COST TO THE GOVERNMENT OF THE PHILIPPINES

Item	Quantity	Unit Cost	Cost
Abutments	54 each	332,900 P	17,976,600
Piers	11 each	361,400 P	3,975,000
RC Piles	656 each	2,700 P	1,771,200
Inland Transportation and Erection of Steel Girders	1,010 t	8,591 P	8,676,910
P.C.C. Slabs and Others	6,801 m^2	2,900 P	19,722,900
Bridge Approaches	405 m	9,200 P	3,726,000
Culvert Boxes and Others	23 each	120,000 P	2,760,000
River Protection	10,125 m^2	180 P	1,822,500
Others			12,086,000
Total			72,517,510

7.2 Group 2 Bridges

The cost to be borne by the Government of the Philippines is roughly estimated at 6.6 million pesos, as shown in Table 6.7-2.

TABLE 6.7-2 CONSTRUCTION COST TO THE GOVERNMENT OF THE PHILIPPINES

Item	Quantity	Unit Cost (pesos)	Cost (pesos)
Rehabilitation of Roads Leading to Project Sites	31 km		3,458,000
Rehabilitation of Bridges Leading to Project Sites	12 bridges		136,000
Road Maintenance	920 km	600	552,000
Land Acquisition	26,500 m^2	60	1,590,000
House Demolition	13 houses	60,000	780,000
Necessary Land Rental for Construction Works	6,000 m^2	15	90,000
Total			6,606,000

CHAPTER 7

EVALUATION AND RECOMMENDATION OF THE PROJECT

CHAPTER 7

EVALUATION AND RECOMMENDATION OF THE PROJECT

7.1 Evaluation of the Project

The Project (Phase III) is a continuation of Phase I (The Project for Constructing Bridges along Rural Roads of Phase I was prepared in January 1988) and Phase II (The Project for Constructing Bridges along Rural Roads of Phase II was prepared in June 1988.)

It aims to promote active growth of socio-economic development. The Government of the Philippines is eager to complete the Project which can be evaluated as follows.

Traffic interruption due to the failure of old and weak bridges imposes direct and indirect constraints upon people's activities, as well as on the economic and development activities within the influence area of the bridges. This leads to a lack of confidence in road reliability which in turn, discourages, to a certain degree, the private sector's plans to invest in these areas.

The Project, when completed, is envisioned to provide basic transport access in rural areas with rich potential, especially improved transport facilities, which will eliminate severe constraints to increased productivity and social advancement.

The effects of the Project, therefore, should be evaluated not only from their impact on traffic function, but also from the socio-economic point of view.

1) Direct Effects

The direct effects that will derive from the Project accrue mainly from direct reductions in traffic costs to road users. This includes vehicle operation, travel time, accidents and discomfort. As for government administrative costs, maintenance and restoration cost savings and salvage value can be expected.

The actual benefits of this Project are as follows:

1) The problem of traffic closure during the rainy seas will be solved.

2) Travel time will be shortened.

3) The safe passage of heavy construction equipment, hea trucks, etc. will be ensured.

4) The function of the rural road network will be improve

5) Traffic safety will be considerably improved.

(2) Indirect Effects

The various indirect effects of the Project which cannot quantified are likewise assessed from the point of view socio-economic impact. These effects are as follows:

1) Contributing to attaining a better life

2) Activating social activities

3) Generating greater opportunities for employment

4) Minimizing disparities between localities

5) Stabilizing commodity prices

6) Developing agricultural and industrial productivity

7) Promoting rich investment from the private sector

Overall, the Project will serve as an incentive f increased participation by the rural population in econom activities. Further, it will have the impact of bringi people living in isolated and remote areas into t mainstream of the social and economic activities of t country.

12 Conclusion and Recommendation

12.1 Conclusion

The Government of the Republic of the Philippines has given high priority to the improvement of rural roads (farm to market roads) in the highway sector of the Development Plan.

In line with this policy, the Government of the Philippines has formulated a Five-Year Comprehensive Bridge Reconstruction Program for Secondary Roads. The Program basically calls for the replacement of old and dilapidated bridges along secondary roads with permanent structures with the aim of promoting development and to sustain economic growth in the rural areas.

The Program which will ensure safe and efficient transport of people and agricultural products in the rural areas throughout the dry and wet seasons is expected to have a considerable impact on the development of the country. Implementation of this project therefore under Japan's Grant Aid is considered justified and appropriate.

12.2.2 Recommendation

From the experience of Phase I and II, some measures are considered necessary for the smooth implementation of the projects under Program, viz:

1) The establishment of the proper organization, commitment of technical resources and selection of contractors in the implementation of the projects.

- At present, regional offices are responsible for supervising the construction of Phase I bridges. However, it is suggested that the Bureau of Construction and Bureau of Design of the DPWH should have greater role and participate more aggresively in the implementation of the Program.

- For the proper implementation of this Project, DPWH should commit the necessary number and level of engineers required by the project.

- o Local contractors should be carefully selected and th reasonable construction cost should be analyzed. An delay in construction due to changes in the contractor should be avoided.

(2) The Government of the Philippines should allocate th necessary budget for implementation of the project.

(3) Prior to the commencement of the Project, the followin works should already be completed:

- o Acquisition of right-of-ways
- o Demolition of houses
- o Rental of land for construction works

APPENDIX 1

MISSION FOR BASIC DESIGN STUDY

. MEMBERS AND ITINERARY OF THE BASIC DESIGN STUDY TEAM
. LIST OF PERSONS MET

I. BASIC DESIGN TEAM IN THE PHILIPPINES

II. EXPLANATION AND DISCUSSION FOR THE DRAFT FINAL REPORT

BASIC DESIGN STUDY IN THE PHILIPPINES

Member of the Study Team

. Leader:

Mr. Michio Okahara

Chief, Foundation Engineering Division, Structure and Bridge Department, Public Works Research Institute, Ministry of Construction.

. Bridge Planner:

Mr. Choji Tsukuda

Deputy Head, Second Engineering Devision, Engineering Department, Honshu-Shikoku Bridge Authority.

. Project Coordinator:

Mr. Akihiro Matsumoto

Second Basic Design Study Division, Grant Aid Planning & Survey Department, JICA.

. Bridge Planner:

Mr. Tsuneo Bekki

Katahira & Engineering Inc.

. Bridge Designer:

Mr. Mitsumasa Mitani

Katahira & Engineering Inc.

. Bridge Designer:

Mr. Nobuyuki Uchida

Katahira & Engineering Inc.

. Geotechnical Surveyor:

Mr. Ken Kusano

Katahira & Engineering Inc.

. Topographic Surveyor:

Mr. Kozo Ueno

Katahira & Engineering Inc.

. Construction Planning:

Mr. Masaru Iwaki

Katahira & Engineering Inc.

Itinerary

No.	Date	Study Team	Geological Survey	Topographic Survey
1.	19th,Nov. Sun 1989	.Messrs,Okahara, Tsukuda,Matsumoto, Bekki,Mitani and Uchida arrived in Manila		
2.	20th,Nov. Mon 1989	.Meeting at JICA .Meeting with DPWH Explanation of Inception Report Collection/Review of Data		
3.	21st,Nov. Tue 1989	.Meeting with DPWH Review of Data .Discussion among Study Team		
4.	22nd,Nov. Wed 1989	.Discussion among Study Team .Meeting with DPWH Review of Data Explanation of Collection Discussion about Delay of Phase I Bridges		
5.	23rd Nov. Thu 1989	.Site Investigation Two Bridges under Construction (Phase II Bridge) 04,01a Binambang Bridge 04,03a Leviste Bridge Phase III Bridge 04.11a San Diego Bridge (G-1) 04.13a Bagong Bridge (G-2) .Discussion among Study Team		
6.	24th,Nov. Fri 1989	.Review of Collection Data .Meeting with DPWH		

No.	Date	Study Team	Geological Survey	Topograph Survey
7.	25th,Nov. Sat 1989	.Messrs.Kusano and Ueno arrived in Manila .Discussion among Study Team		
8.	26th,Nov. Sun 1989	.Review of Collection Data .Discussion among Study Team		
9.	27th,Nov. Mon 1989	.Meeting with DPWH Explanation and Discussion about the reason of Group 1,2 Bridge Selection Discussion about Draft of Minutes		
10.	28th,Nov. Tue 1989	.Minutes signed		
11.	29th,Nov. Wed 1989	.Meeting at Embassy of Japan and JICA		
12.	30th,Nov. Thu 1989	.Messrs.Okahara, Tsukuda and Matsumoto returned to Japan (Outbreak a coup Detat at Midnight)		
13.	1st,Dec. Fri 1989	.Circumstantial Confirmation at Manila Office in the morning .Refuge and Waiting at Hotel in the afternoon		
14.	2nd,Dec. Sat 1989	.Waiting at Hotel		

	Date		Study Team	Geological Survey	Topographic Survey
5.	3rd,Dec. 1989	Sun	.Waiting at Hotel		
6.	4th,Dec. 1989	Mon	.Waiting at Hotel .Site Confirmation with DPWH Discussion about schedule		
7.	5th,Dec. 1989	Tue	.Refuge at Ramada Hotel from a Lodging House		
8.	6th,Dec. 1989	Wed	.Discussion with DPWH about schedule .Review of Bridge Planning at DPWH, Quezon City Office .Stay at Ramada Hotel		
9.	7th,Dec. 1989	Thu	.Re-discussion with DPWH about schedule .Stay at Ramada Hotel		
10.	8th,Dec. 1989	Fri	.Bekki returned to Japan .Collection of Data and Discussion at Nueva Ecija District Engineer Office .Kusano and Ueno Site Survey Bridge No.03.13 .Instruction and Supervision of Geological Survey & Topographic Survey Bridge No.03.13 .Review of Bridge Planning at DPWH, Quezon City Office .Remove from Ramada Hotel to a Lodging House and stay	.Commence-ment of Survey Bridge No. 03.13	.Commence-ment of Survey Bridge No. 03.13

No.	Date	Study Team	Geological Survey	Topograph Survey
21.	9th,Dec. Sat 1989	.Basic Planning of Group 1 Bridge .Discussion among Study Team Discussion about Schedule of Geological Survey and Topographic Survey		
22.	10th,Dec. Sun 1989	.Basic Planning of Group 1 Bridge .Confirmation of Conclusion of Topographic Survey Bridge No. 03.13 (Ueno) .Analysis of Collected Data		.Commenc ment of Survey Bridge 03.13
23.	11th,Dec Mon 1989	.Discussion of an unloading Port of Construction Material with DPWH .Collection of Data at Zambales District Engineer Office .Messrs.Kusano and Ueno Site Survey Bridge No.03.19 .Instruction and Supervision of Geological Survey and Topographic Survey Bridge No. 03.19 .Kusano Confirmation of Conclusion of Geological Survey Bridge No.03.13	.Commencement of Survey Bridge No. 03.19 .Conclusion of Survey Bridge No. 03.13	.Commenc ment of Survey Bridge 03.19

No.	Date	Study Team	Geological Survey	Topographic Survey
4.	12th,Dec Tue 1989	.Discussion of Bridge No.03.19 with DPWH .Collection of Data and Discussion at Pangasinan secondary engineer office .Messrs.Kusano and Ueno Site Survey Bridge No.01.02 .Instruction and Supervision of Geological Survey & Topographic Survey Bridge No.01.02 .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge .Analysis of Results of Geological Survey & Topographic Survey	.Commencement of Bridge No. 01.02	.Commencement of Bridge No. 01.02
5.	13rd,Dec. Wed 1989	.Re-discussion of Bridge No.03.19 with DPWH .Collection of Data and Discussion at Bataan District Engineer Office .Collection of Data and Discussion at Pampanga District Engineer Office .Messrs Kusano and Ueno Site Survey Bridge No.03.03, 03.08 03.10,03.11 .Instruction and Supervision of Geological Survey and Topographic Survey Bridge No. 03.03,03,10,03.08, 03.11 .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Commencement of	.Commencement of

No.	Date	Study Team	Geological Survey	Topograph Survey
26.	14th,Dec. Thu	.Collection of Data at Tarlac Disctrict Engineer Office .Messrs Kusano and Ueno Site Survey Bridge No.03.17 .Instruction and Supervision of Geological Survey & Topographic Survey Bridge No.03.17 .Mr.Ueno Confirmation of Conclusion of Topographic Survey Bridge No.03.19 .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Commence-ment of Survey Bridge No. 03.17	.Commence ment of Survey Bridge N 03.17 .Conclusi of Sarve Bridge N 03.19
27.	15th,Dec. Fri 1989	.Collection of Data at Quezon Secondary District Office .Mr.Iwaki arrived at Manila .Messrs.Kusano and Ueno Site Survey Bridge No.04.07a, 04.06a and 04.09a Instruction and Supervision of Geo-logical Survey and Topographic Survey Bridge No.04.07a, 04.06a and 04.09a (Group I) Instruction and Super-vision of Geological Survey and Topographic Survey Bridge No.04.07a, 04.06a and 04.09a(Group I) .Mr.Ueno Confir-mation of Conclu-sion of Topographic Survey Bridge No. 01.02 .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Commence-ment of Survey Bridge No. 04.07a	.Commence ment of Survey Bridge N 04.07a .Conclusi of Surve Bridge N 01.02

Date	Study Team	Geological Survey	Topographic Survey
16th,Dec. Sat 1989	.Messrs.Kusano and Ueno Confirmation of Conclusion of Geological Survey and Topographic Survey Bridge No. 03.19,03.03,03,10 .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge .Analysis of Results of Geological Survey and Topographic Survey .Review of Excusion Planning .Analysis of Collected Data		
17th,Dec. Sun 1989	.Messrs.Kusano and Ueno Confirmation of Conclusion of Geological Survey and Topographic Survey .Review of Excusion Planning .Analysis of Results of Geological Survey & Topographic Survey .Basic Planning of Group 1 two (2) Bridges	.Conclusion of Survey Bridge No. 01.02, 03.03, 03.10	.Conclusion of Survey Bridge No. 03.17, 04.07a

No.	Date	Study Team	Geological Survey	Topograph Survey
30.	18th,Dec. Mon 1989	.Collection of Data and Discussion at Marinduque District Engineer Office .Messrs.Mitani, Kusano and Ueno Site Survey Bridge No.04.10b-2, 04.09b and 04.10b-1 (Group I) .Instruction and Supervision of Geological Survey and Topographic Survey Bridge No. 04.10b-2,04.09b and 04.10b-1 .Basic Planning of Group 1 two (2) Bridges	.Commencement of Survey Bridge No. 04.10b-2	.Commence ment of Survey Bridge 04.10b-2
31.	19th,Dec. Tue 1989	.Mr.Kusano Confirmation of Conclusion of Geological Survey,Bridge No. 03.17 .Analysis of Geological Survey Results .Review of Excusion Planning .Basic Planning of Group 1 Bridges .Basic Planning of Group 2 Bridges	.Conclusion of Survey Bridge No. 03.17	

No.	Date	Study Team	Geological Survey	Topographic Survey
2.	20th,Dec. Wed 1989	.Collection of Data and Discussion at Romblon District Engineer Office .Messrs.Mitani, Kusano and Ueno Site Survey Bridge No.04.07b .Instruction and Supervision of Geological Survey and Topographic Survey Bridge No. 04.07b .Review of Excusion Planning .Analysis of Collected Data .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Commence-ment of Survey Bridge No. 04.07b	.Commence ment of Survey Bridge No. 04.07b
3.	21st,Dec. Thu 1989	.Collection of Data and Discussion at District Engineer Office (Malolos) .Messrs.Kusano and Ueno Site Survey Bridge No.03.07, 03.04 and 03.06 (Group 1) .Instruction and Supervision of Geological Survey and Topographic Survey .Review of Excusion Planning .Basic Planning of Group 1,2 Bridge	.Commencement of Survey Bridge No. 03.07	.Commencement of Survey Bridge No. 03.07

No.	Date	Study Team	Geological Survey	Topograph Survey
34.	22nd,Dec. Fri 1989	.Messrs.Kusano and Ueno Confirmation of Conclusion of Geological Survey and Topographic Survey .Analysis of Geological Survey and Topographic Survey Results .Review of Excusion Planning .Basic Planning of Group 1 Bridge .BAsic Planning of Group 2 Bridge	.Conclusion of Survey Bridge No. 04.10b-2	.Conclusion of Survey Bridge 04.10b-
35.	23rd,Dec. Sat 1989	.Messrs.Kusano and Ueno Confirmation of Conclusion of Geological Survey and Topographic Survey .Analysis of Geological Survey and Topographic Survey Results .Review of Excusion Planning .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Conclusion of Survey Bridge No. 04.10b-2	.Conclusion of Survey Bridge 04.10b-
36.	24th,Dec. Sun 1989	.Messrs.Iwaki and Ueno Site Survey Bridge No.03.13 for view of Excusion Planning .Mr.Kusano Confirmation of Conclusion of Geological Survey .Analysis of Geological Survey .Basic Planning of Group 1,2 Bridge	.Conclusion of Survey Bridge No. 03.07 .Commencement of Survey Bridge No. 04.20a	.Conclusion of Survey Bridge 03.07 .Commenc ment of Survey Bridge 04.20a

Date	Study Team	Geological Survey	Topographic Survey
25th,Dec. Mon 1989	.Messrs.Kusano and Ueno confirmation of conclusion of Geological Survey and Topographic Survey .Collection of Data and Discussion at San Pablo District Engineer Office .Messrs.Kusano and Ueno Site Survey Bridge No.04.20a, 04.10a,04.19a and 04.21 (Group I) .Instruction and Supervision of Geological Survey and Topographic Survey .Analysis of Geological Survey and Topographic Survey Results .Review of Excusion Planning .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Conclusion of Survey Bridge No. 03.07 .Commencement of Survey Bridge No. 04.20a	.Conclusion of Survey Bridge No. 03.07 .Commencement of Survey Bridge No. 04.20a
26th,Dec. Tue	.Messrs.Mitani and Iwaki Site Survey Bridge No. 04.07 for view of Ex-Cusion Planning .Mr.Uchida Site Survey Bridge No. 04.11a,04.13a, 04.01a and 04.03a (Group 1) .Analysis of Geological Survey and Topographic Survey Results .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge		

No.	Date	Study Team	Geological Survey	Topograph Survey
39.	27th,Dec. Wed 1989	.Messrs.Mitani and Iwaki Site Survey Bridge No.03.13b for view of Excusion Planning .Analysis of Geological Survey and Topographic Survey Results .Mr.Ueno Confirmation of Conclusion to Topographic Survey .Basic Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge		.Conclusi of Surve Bridge N 04.20a
40.	28th,Dec. Thu	.Analysis of Geological Survey and Topographic Survey Results .Basic Planning of Group 1 Bridge .Basic planning of Group 2 Bridge		
41.	29th,Dec. Fri	.Mr. Uchida returned to Japan .Messrs.Kusano and Ueno Site Confirmation of conclusion of Geological Survey .Basisc Planning of Group 1 Bridge .Basic Planning of Group 2 Bridge	.Conclusion of Survey Bridge No. 04.20a	
42.	30th,Dec. Sat	.Review of Excusion Planning .Analysis of Geological Survey and Topographic Survey Resulsts .Meeting at Embassy of Japan		

	Date	Study Team	Geological Survey	Topographic Survey
3.	31st,Dec. Sun	.Messrs.Mitani, Iwaki Kusano and Ueno returned to Japan		

3. List of Persons MET

Name and Organization	Position
Embassy of Japan in Philippines	
Mr. Koji Kaminaga	First Secretary
JICA Office in Philippines	
Mr. Katsuhiko Ozawa	Assistant Resident Representative
DPWH	
Mr. Romulo M. Del Rosario	Undersecretary
Mr. Teodoro T. Encarnacion	Undersecretary
Mr. Edmundo V. Mir	Undersecretary
Mr. Jose F. Mabanta	Undersecretary
Mr. Manuel M. Bonoan	Asst. Secretary for P
Mr. Franciscon N. Pascual	Director, Bureau of D
Mr. Manuel B. Mapa	Director, Bureau of Construction
Miss. Linda M. Templo	Cheif Civil Engineer, Planning Service
Mr. Jaime Magnaye	Head Civil Engineer, Planning Service
Mr. Geronimo S. Alonzo	Chief Civil Engineer, PMO-Feasibility Study
Mr. Paciano D. Tubal	Supv'g. Civil Engineer Bureau of Constructio
Mr. Carlos V. Rodriguez	Cheif Civil Engineer, Bureau of Design
Mr. Juanito S. Zulueta	Cheif Civil Engineer, Bureau of Constructio

Name and Organization	Position
Mr. Rufino D. Valiente	Supv'g. Civil Engineer, Bureau of Design
Mr. Hideo Tsuji	JICA Expert (Highway Traffic)
Mr. Kuniaki Nakamura	JICA Expert (Pavement)
DPWH	
Malolos (Bulacan), District Engineer Office	
Mr. Saturnino De Leon	District Engineer
Mr. Ambrosio Gonzales	Asst. District Engineer
Mr. Cesar Villanueva	Cheif MPDC
Mr. Resty Galangy	Cicil Engineer
San Pablo (Laguna), District Engineer Office	
Mr. Mainsenance Bugir	Assistant District Engineer
Mr. Pol N. Delos Santos	Civil Engineer
Nueva Ecija, District Engineer Office	
Mr. Manuel Y. Alejo, Jr.	Assistant District Engineer
Mr. Edgardo Villanueva	Cheif, Maintenance Section
Mr. Florante Centino	Maintenance Foreman
Zambales, District Engineer Office	
Mr. Jessica Sahagun	Cheif, Planning and Design
Mr. Leticia Quejada	OIC, Provincial Engineering
Mr. Bonifacio Camat	Assistant to the OIC Provincial Engineering Office
Pangasinan, Second District Engineer Office	
Mr. Justio R. Belmonte. Jr.	Asst, District Engineer

Name and Organization	Position
Mr. Fernando E. Gonzales	Cheif, Planning and De Section
Mr. Florasol C. Carillo	Senior Civil Engineer
Bataan, District Engineer Office	
Mr. Rogelio Fernando	District Engineer
Mr. Marita Bernaldo	Supervising C.E.I.
Mr. Ruel Mallari	Senior Civil Engineer
Mr. Sergio Dizon	Supv'g Civil Engineer
Mr. Orlando Iigas	Civil Engineer
Pampanga, District Engineer Office	
Mr. Rafael S. Ponio	District Engineer
Mr. Leonardo Magtoto	Cheif, Construction Se
Mr. Adewison Guevarra	Senior Civil Engineer
Tarlac, District Engineer Office	
Mr. Godofredo Caritativo, Jr	District Engineer
Mr. Abelardo Mati	Cheif, Maintenance Sec
Mr. Benjamin Lopez	Cheif, Construction Se
Mr. Antonio Bacani	Senior Civil Engineer
Mr. Rosauro Ocampo	Construction Foreman
Mr. Nestor Landingin	Instrumentman
Mr. Ariel Tabano	Survey Aide
Quezon, Second District Engineer Office	
Mr. Lorenzo C. Revadulla	Supv'g Civil Engineer

Name and Organization	Position
Mr. Fred P. Mercado	Supv'g Civil Engineer II
Mr. Sonny Saniel	Instrumentman
Marinduque, District Engineer Office	
Mr. Romeo L. Alcala	District Engineer
Mr. Honorio Salazar	Asst. District Engineer
Mr. Romer EStudillo	Senior Civil Engineer
Romblon, District Engineer Office	
Mr. Melvin Meniano	Cheif Maintenance Engineer
Other Offices	
Mr. Federio P. Vono	Barangay Captain, Laguna
Mr. Amor Veloso	Governor, Zambales
Mr. Dominador Mandia	Mayor, Gobaldon, Nueva Ecija
Mr. Miguel Nanagan	Office of the Mayor Cabaldon Nueva Ecija
Mr. Manolito S. Mendoza	Vice-Mayor, Dunalupihan Bataan
Mr. Cesar Cucheapin	Mayor, Paniqui, Tarlac

II. EXPLANATION AND DISCUSSION FOR THE DRAFT FINAL REPORT

1. Member of the Study Team

o Leader:

Mr. Michio Ohara

Chief, Foundation Engineering Division, Structure and Bridge Department, Public Works Research Institute, Ministry of Construction.

o Planning, Manager:

Mr. Seiichi Miyoshi

First Grant Aid Project Management Division Grant Aid Project Management Department JICA

o Bridge Planner:

Mr. Tsuneo Bekki

Katahira & Engineering Inc.

o Bridge Designer:

Mr. Mitsumasa Mitani

Katahira & Engineering Inc.

o Construction Planning:

Mr. Masaru Iwaki

Katahira & Engineering Inc.

Itenerary

No.	Date	Study Team
1	1st March 1989 (Thu.)	o Messrs. Okahara, Miyoshi Bekki, Mitani, Iwaki arrived in Manila
2	2nd March (Fri.)	o Meeting at JICA Explanation and Discussion of Draft Final Report o Meeting at DPWH Explanation and Discussion of Draft Final Report
3	3rd March (Sat.)	o Discussion amont Study Team o Evaluation for progress of Phase I Bridges (24 bridges)
4	4th March (Sun.)	o Messrs. Okahara, Miyoshi, Mitani Site investigation of Lagnasan Bridge (Cebu) o Meeting at Region VII Office Discussion of progress of 3 bridges o Messrs. Bekki, Iwaki at Manila Evaluation for progress of Phase I Bridges
5	5th March (Mon.)	o Meeting at Region VII Office Discussion of progress of 3 bridges o Messrs. Okahara, Miyoshi, Mitani Arrived in Manila
6	6th March (Tues.)	o Discussion among Study Team about Minutes of Meeting o Meeting with DPWH o Minutes signed

No.	Date	Study Team
7	7th March (Wed.)	o Discussion among Study Team Evaluation of Phase I, II Bridge Discussion about Basic Design of Phase III o Meeting at Japan Embassy and JICA Office
8	8th March (Thurs.)	o Study Team returned to Japan

3. List of Persons MET

Embassy of Japan in the Philippines

Mr. Koji Kaminaga	First Secretary

JICA Office in the Philippines

Mr. Katsuhiko Ohshima	Resident Representative
Mr. Katsuhiko Osawa	Assistant Resident Representative

DPWH

Mr. Manuel M. Bonoan	Asst. Secretary for Planning
Mr. Manuel B. Mapa	Director, Bureau of Construction
Miss Linda M. Templo	Chief, Civil Engineer, DPD, Planning Service
Mr. Paciano D. Tubal	Supv'g. Civil Engineer, Bureau of Construction
Mr. Carlos V. Rodriquez	Chief Civil Engineer, Bureau of Design
Mr. Juanito S. Zulueta	Chief Civil Engineer, Bureau of Construction
Mr. Hideo Tsuji	JICA Expert (Highway, Traffic)

Region VIII Office of DPWH

Mr. Bashir D. Rasuman	Director
Mr. Jesus Viray	Asst. Director
Mr. Ernesto Raos	Asst. Director
Mr. Jorge Boco	Reg. Pro. Manager
Mr. Simeon V. Mendoza	Chief Engineer