Chapter 7

PELIMINARY DESIGN OF REHABILITATION (OR URGENT RECOVERY) OF THE PROJECT ROAD

7.1 BACKGROUND AND PRE-DETERMINED CONDITIONS

The Government of Japan provided Non-Project Grant Aid in the amount of 14,600 Million Yen to the Government of Indonesia. Goods and services to be procured by this fund including fund allocation were agreed on April 11, 2005 by both parties. One of the services (projects) is "Urgent Recover of the West Coast Road Banda Aceh and Meulaboh". Fund allocated to this services (project) is 400 Billion Rp (or 4,705.9 Million Yen) which includes procurement of construction equipment, construction materials and civil work cost for Urgent Recovery of Calang and Meulaboh Section.

The Japan International Cooperation System (JICS) was officially nominated as the agent of the Government of Indonesia for the procurement of goods and services.

The JICA Study Team officially started the support works for the Urgent Recovery of the West Coast Road Banda Aceh and Meulaboh, particularly Calang – Meulaboh Section on May 10, 2005. Following were pre-determined as conditions for the JICA Study Team's support work;

- The route follows those restored by the military.
- The project should be completed by the end of December 2005 which was later shifted to by the end of February 2006.
- Procurement of construction equipment, construction materials and steel portable bridges will be done separately from the civil Work contract. The Contractor will be provided these materials and equipment free of charge by the Employer.
- Later, the Ministry of Public Works preferred to procure permanent steel bridges in stead of steel portable bridges. It was also agreed that bridges should not necessarily be steel bridges and concrete bridges are acceptable on the condition that construction can be completed within the specified time.
- It was also agreed that the Contractor for civil works will procure steel bridges by himself, thus the Contractor's construction schedule will not be controlled by the procurement schedule of other agency (JICS).

7.2 BASIC CONCEPT OF PRELIMINARY DESIGN

To complete the project by the target date (originally by the end of 2005 and later shifted to the end of February, 2006) was major focus in the preliminary design, particularly as follows:

- Road right-of-way acquisition shall be avoided.
- Relocation of people shall be totally avoided.

- To achieve above, the alignment will follow existing one. No improvement of horizontal alignment which requires ROW acquisition and resettlement of people is planned.
- Bridge structure will be as simple as possible, but strong against seismic forces.
- Road will be constructed as semi-permanent standards (about 4 years life), since reconstruction by USAID will be completed within 3 years after completion of this recovery road.
- Overlapped sections with USAID alignment (2 sections, L=6.7km) will be also rehabilitated, since this recovered road will be utilized until such time that the reconstruction road is completed.

7.3 SURVEYS UNDERTAKEN

The JICA Study Team members could not undertake the ground survey due to security situation. Video tapes and photographs were taken from a helicopter to assess general conditions of the project road. Video tape images were captured by computer and photo-mosaic was prepared along the project road.

In order to obtain more detailed information on site conditions, local engineers were sent to the project site and undertook the following:

- Photo-taking at 250m interval
- Measure coordinates by portable GPD
- Get information on material sources
- Measure pavement width, shoulder width and bridge length
- Get information on other aspects such as flooding

Information on material sources was collected. Aggregate material sources are limited as shown in **Figure 7.3-1**.

7.4 ROAD ALIGNMENT

Road alignment follows the one restored by the military and is shown in **Figure 7.4-1**. Road alignment consists of the following roads:

URGENT RECOVERY ROAD

Road Type	Km - Km	Length (km)	Existing Pavement Width (m)
Original Coastal Road	155+630 - 195+420	39.79	5.5 ~ 6.0
Re-aligned Road by Military	195+420 - 208+600	13.18	No pavement
Village Road (1)	208+600 - 212+150	3.55	5.5 ~ 6.0
Village Road (2)	212+150 - 214+500	2.35	5.0
Original Coastal Road	214+500 - 217+640	3.14	5.5 ~ 6.0
Village Road (3)	217+640 - 259+500	41.86	3.5
Village Road (4)	259+500 - 265+350	5.85	3.5
Village Road (5)	265+350 - 270+000	4.65	6.0
	TOTAL	**114.37**	

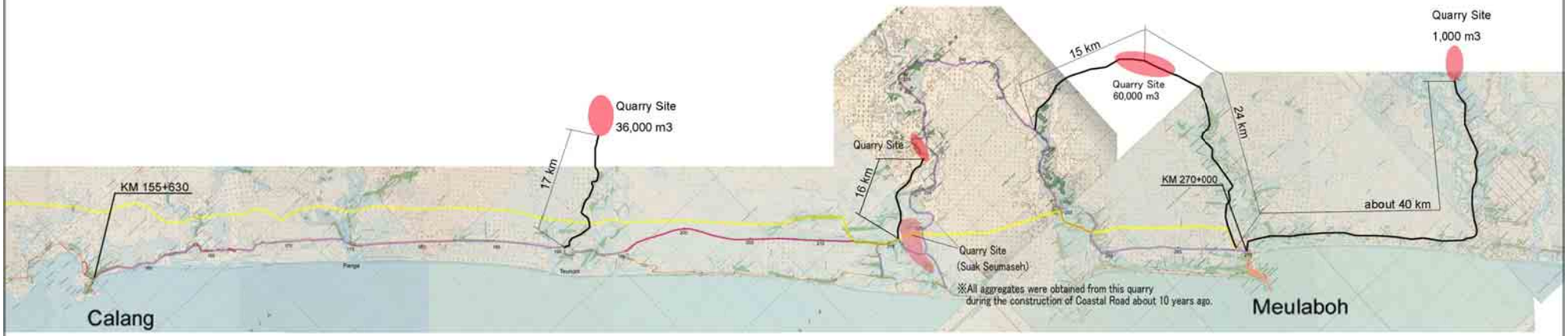


Figure 7.3-1 LOCATION MAP OF QUARRY SITES

LEGEND:

Rehabilitation Route (Japan's Non-Project Grant Aid): 122.3 km

Reconstruction Route (USAID) :

Re-Aligned Section (by Military) : 13.2 km

Original West Coast Road / Village Road : 109.1 km

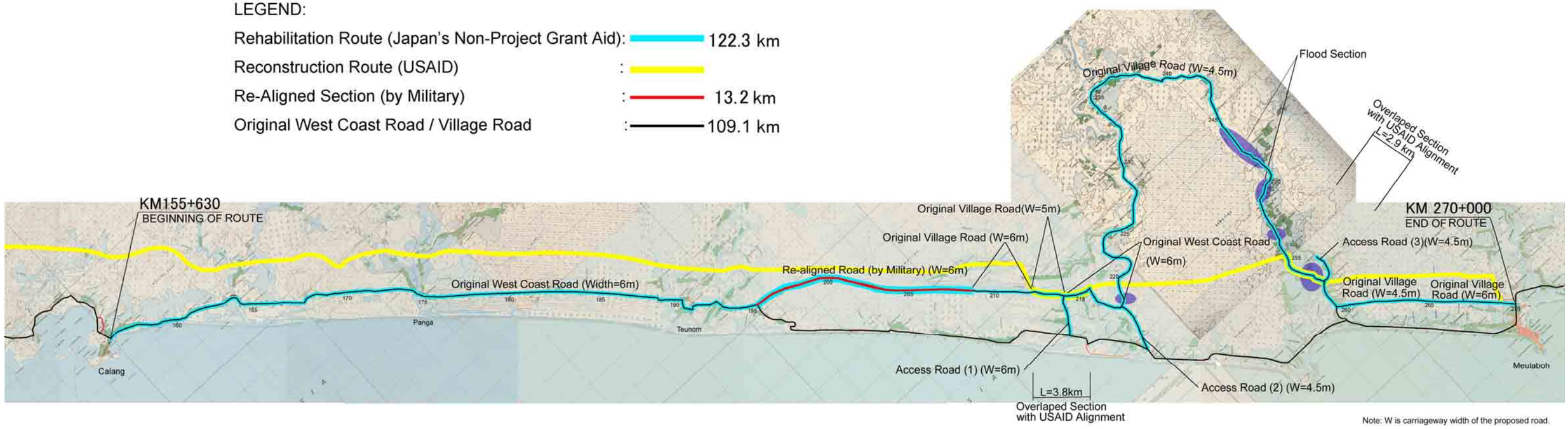


Figure 7.4-1 REHABILITATION (URGENT RECOVERY) ROUTE

Three access roads included in the project are as follows:

Access Road (1) : Previously a part of the coastal road. L=2.50km

Access Road (2) : Previously a part of the coastal road. L=3.1km

Access Road (3) : Village Road L = 2.35 km

Total Access Road Length = 7.95 km

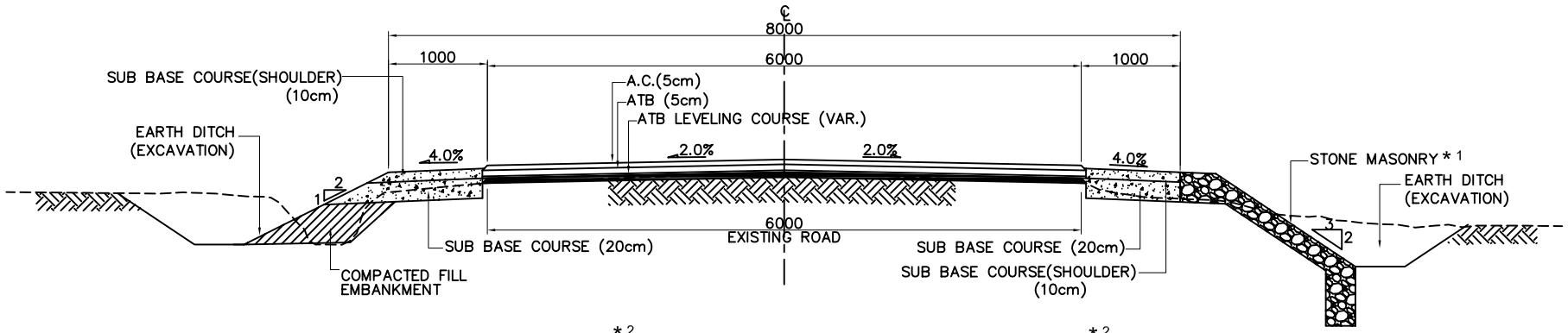
Grand Total Road Length = 122.32 km

7.5 ROAD DESIGN

A total of 19 typical cross sections were prepared to type with various conditions of existing road. Typical cross sections are shown in **Figure 7.5-1**. Applied road length for each type of typical cross section is summarized in **Table 7.5-1**.

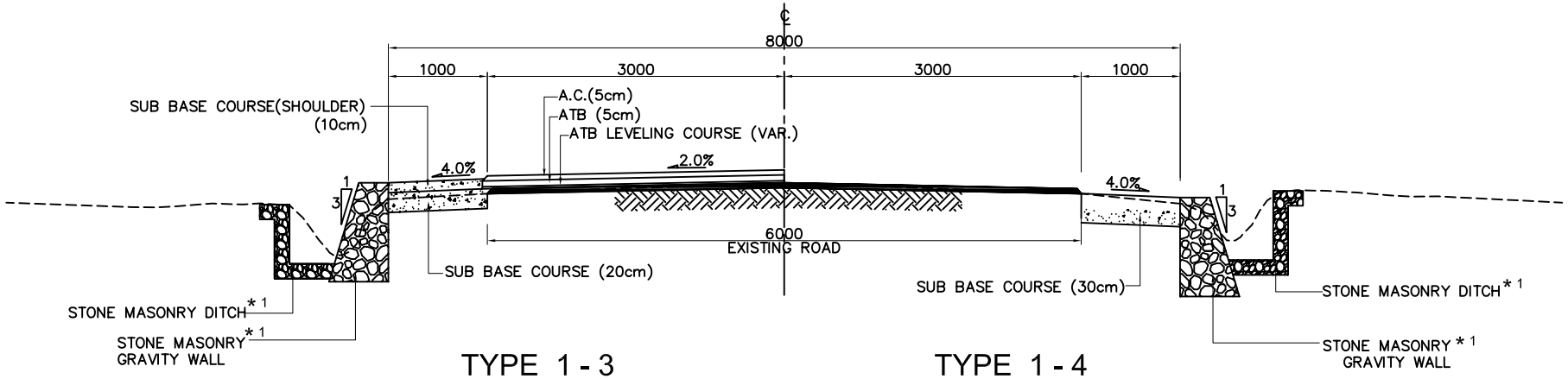
TABLE 7.5-1 TYPICAL CROSS SECTIONS AND APPLIED ROAD LENGTH

Proposed Pavement Width (m)	Applicable Road	Typical Cross Section Type No.	Major Works to be Implement	Applied Road Length (km)	
6.0	Coastal Road, Village Road (4), Access Road (1)	1-1	Overlay + Shoulder	9.43	52.61
		1-2	Overlay + Embank Protection	2.71	
		1-3	Overlay + Shoulder + Side Ditch (urban)	0	
		1-4	Shoulder + Side Ditch (urban)	4.52	
		2-1	Shoulder	31.17	
		2-2	Shoulder + Embank Protection	0.92	
		3-1	Bridge Approach (Low Embank)	2.25	
		3-2	Bridge Approach (High Embank)	1.61	
6.0	Re-aligned Road by Military	4	New Pavement	13.18	13.18
4.5	Village Road (2), Village Road (3), Access Road (2), Access Road (3)	5-1	Overlay + Shoulder + Side Ditch (urban)	12.54	52.49
		5-2	Overlay + Shoulder	8.68	
		6-1	New Pavement + Side Ditch (urban)	3.94	
		6-2	New Pavement _ Shoulder	7.33	
		6-3	Road Re-aligned (near the river)	0.20	
		6-4	Shoulder	5.10	
		7	Flood Section (Road elevation raised by about 1m)	3.46	
		8	Flood Section (Road elevation raised by about 1.5m)	1.24	
5.0	Village Road (1)	9-1	Overlay + Shoulder + Side Ditch (urban)	2.34	2.34
		9-2	Overlay + Shoulder	0	
No Work		-	-	1.70	
TOTAL		**-**	**-**	**122.32**	



TYPE 1 - 1 * 2

TYPE 1 - 2 * 2



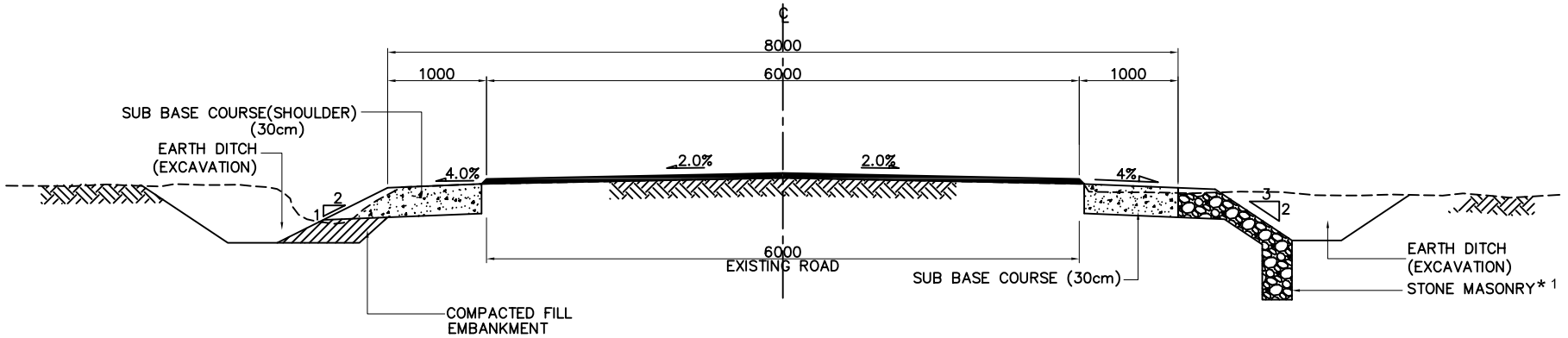
TYPE 1 - 3

TYPE 1 - 4

NOTE:
* 1. STRUCTURES WITH " * " SHALL BE INSTALLTED ONLY WHERE NECESSARY.
* 2. TYPE 1-1 SHALL BE REPLACED BY TYPE 2-1 WHERE EXISTING PAVEMENT IS IN GOOD CONDITION.
TYPE 1-2 SHALL BE REPLACED BY TYPE 2-2 WHERE EXISTING PAVEMENT IS IN GOOD CONDITION.
TYPE 1-3 SHALL BE REPLACED BY TYPE 1-4 WHERE EXISTING PAVEMENT IS IN GOOD CONDITION.

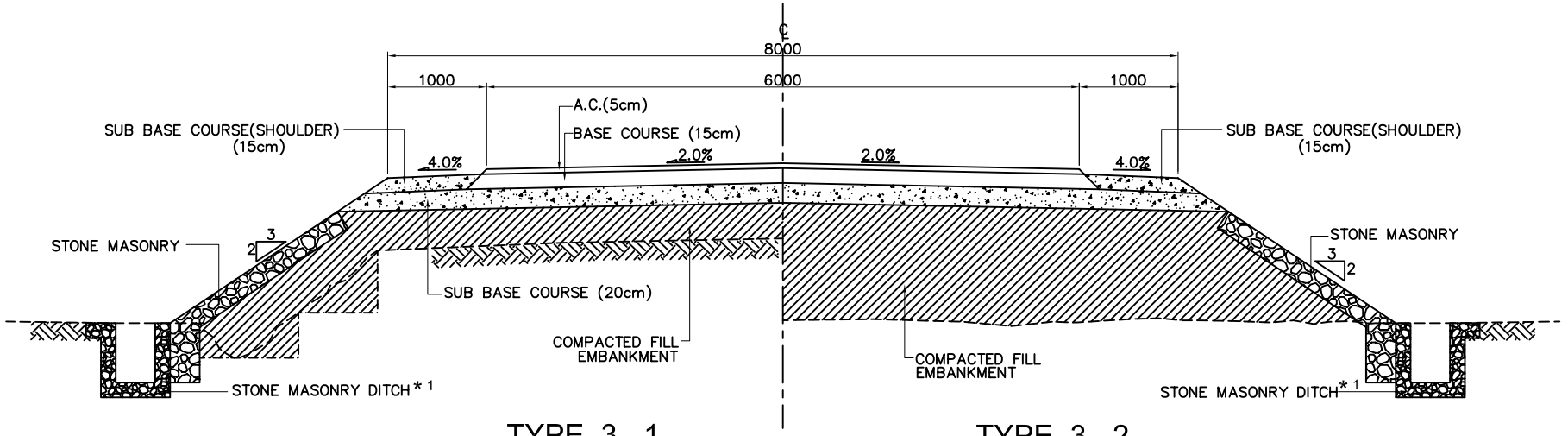
Figure 7.5-1 TYPICAL CROSS SECTION (1/6)

The Ministry of Public Works of The Republic of Indonesia Japan International Cooperation System	
Urgent Recovery of the West Coast Road BANDA ACEH AND MEULABOH	
TYPICAL CROSS SECTION - 1	Drawing No. A - 1
Data:	Scale: 1:60
Prepared by:	Checked by:
Katahira & Engineers International	



TYPE 2 - 1

TYPE 2 - 2



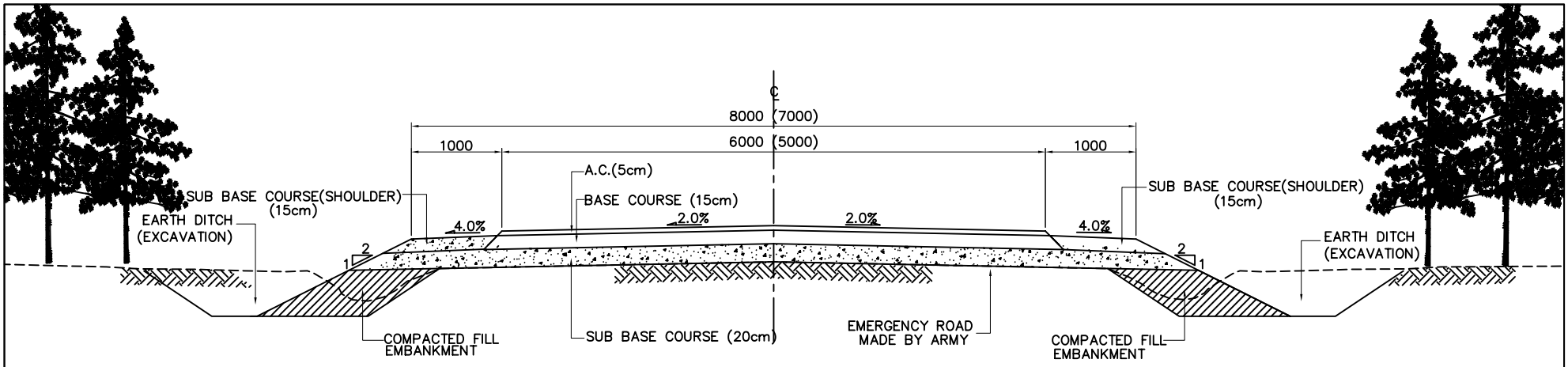
TYPE 3 - 1

TYPE 3 - 2

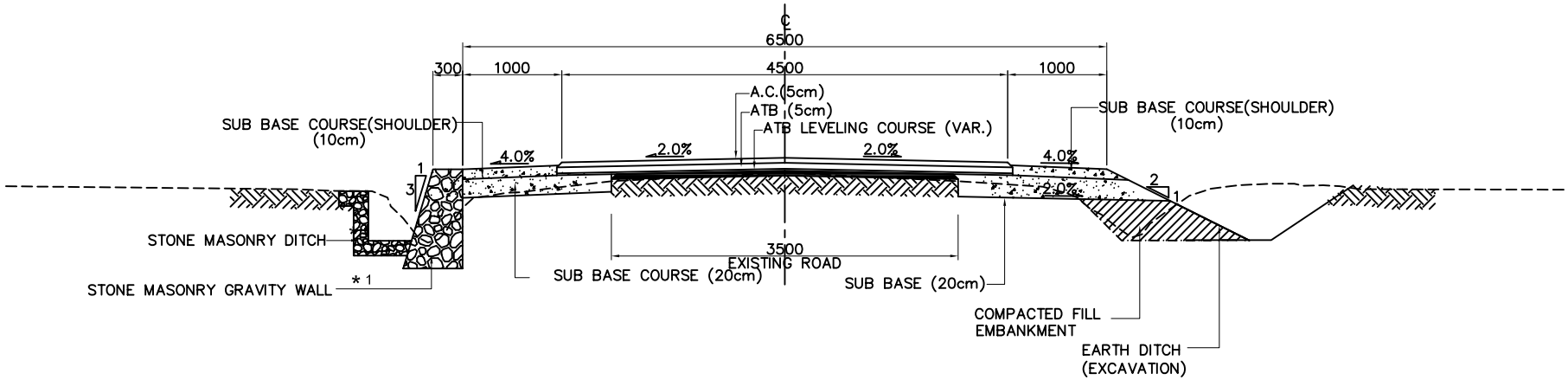
NOTE:
*1. STRUCTURES WITH " *" SHALL BE INSTALLED ONLY WHERE NECESSARY.

Figure 7.5-1 TYPICAL CROSS SECTION (2/6)

The Ministry of Public Works of The Republic of Indonesia Japan International Cooperation System	
Urgent Recovery of the West Coast Road BANDA ACEH AND MEULABOH	
TYPICAL CROSS SECTION - 2	Drawing No. A - 2
Data:	Scale: 1:60
Prepared by:	Checked by:
Katahira & Engineers International	



TYPE 4 (TYPE 4")



TYPE 5 - 1 *2

TYPE 5 - 2 *2

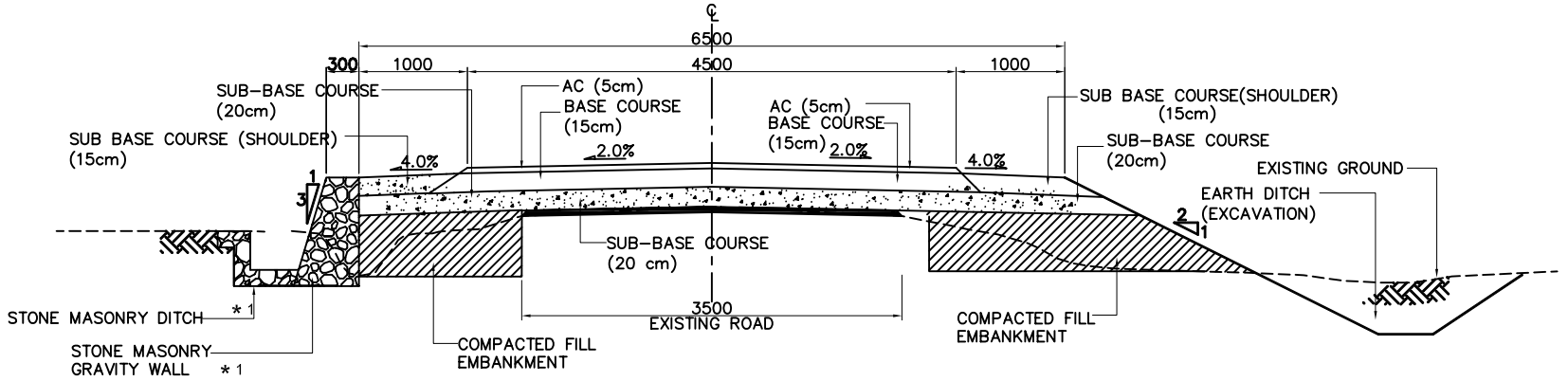
DETAIL B

DETAIL E

NOTE:
1. STRUCTURES WITH "" SHALL BE INSTALLED ONLY WHERE NECESSARY.
*2. TYPE 5-1 AND 5-2 SHALL BE REPLACED BY TYPE 6-4 WHERE EXISITING PAVEMENT IS IN GOOD CONDITION.

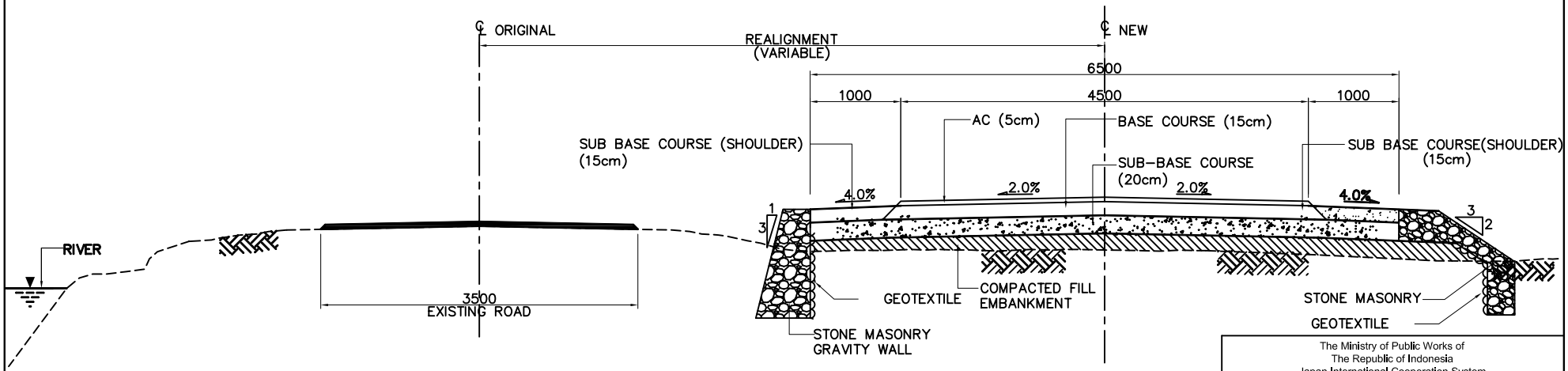
Figure 7.5-1 TYPICAL CROSS SECTION (3/6)

The Ministry of Public Works of The Republic of Indonesia Japan International Cooperation System	
Urgent Recovery of the West Coast Road BANDA ACEH AND MEULABOH	
TYPICAL CROSS SECTION - 3	Drawing No. A - 3
Data:	Scale: 1:60
Prepared by:	Checked by:
Katahira & Engineers International	



TYPE 6 - 1

TYPE 6 - 2

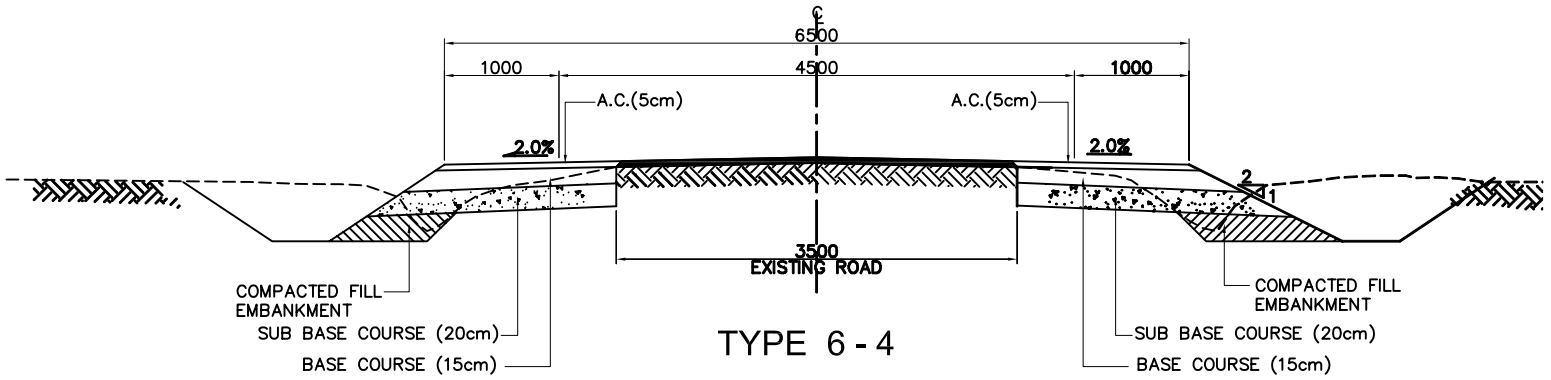


TYPE 6 - 3

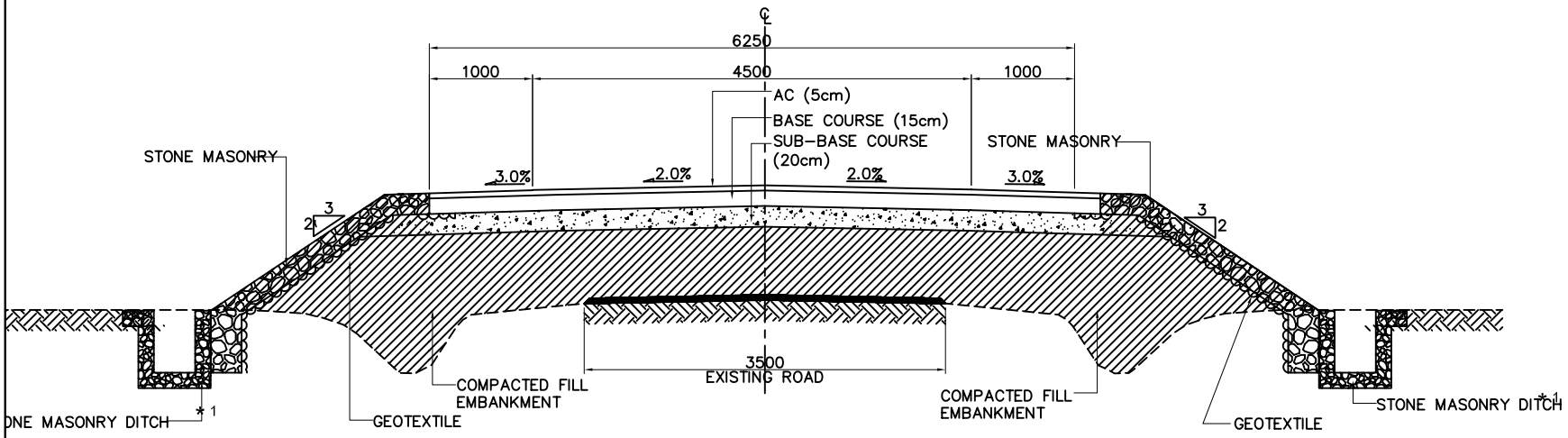
NOTE:
* 1. STRUCTURES WITH " * " SHALL BE INSTALLED ONLY WHERE NECESSARY.

Figure 7.5-1 TYPICAL CROSS SECTION (4/6)

The Ministry of Public Works of The Republic of Indonesia Japan International Cooperation System	
Urgent Recovery of the West Coast Road BANDA ACEH AND MEULABOH	
TYPICAL CROSS SECTION - 4	Drawing No. A - 4
Data:	Scale: 1:60
Prepared by:	Checked by:
Katahira & Engineers International	



TYPE 6 - 4

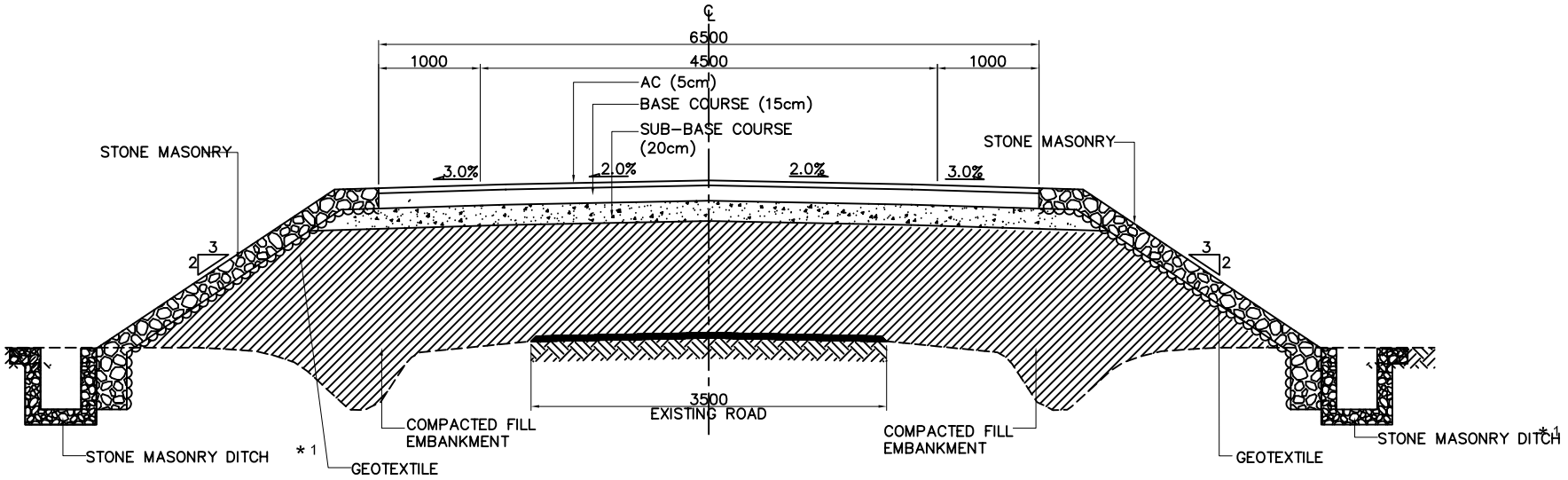


TYPE 7 (H=1.0m)

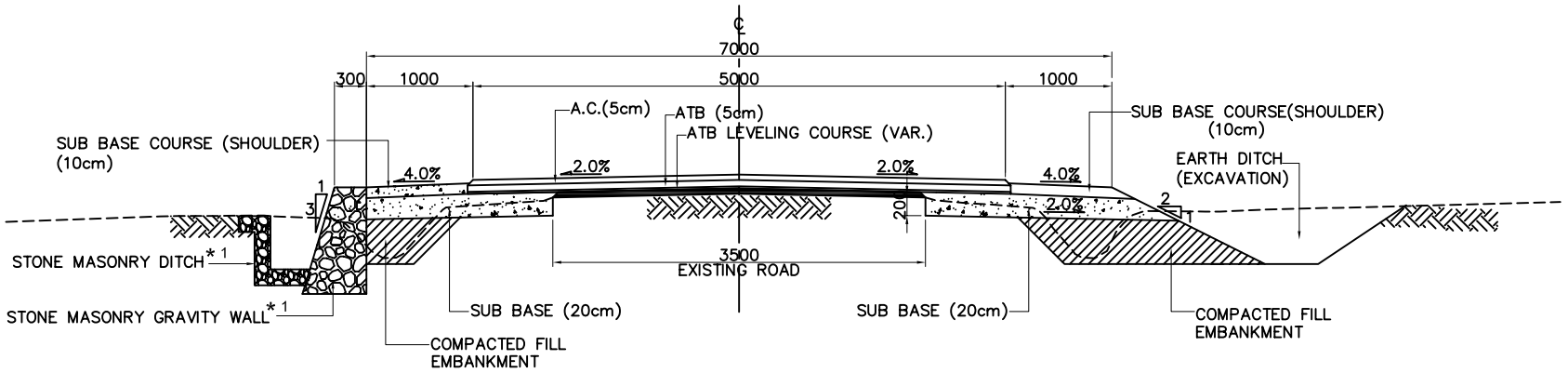
NOTE:
1. STRUCTURES WITH "" SHALL BE INSTALLED ONLY WHERE NECESSARY.

Figure 7.5-1 TYPICAL CROSS SECTION (5/6)

The Ministry of Public Works of The Republic of Indonesia Japan International Cooperation System	
Urgent Recovery of the West Coast Road BANDA ACEH AND MEULABOH	
TYPICAL CROSS SECTION - 5	Drawing No. A - 5
Data:	Scale: 1:60
Prepared by:	Checked by:
Katahira & Engineers International	



TYPE 8 (H=1.5m)



TYPE 9 - 1

TYPE 9 - 2

NOTE:
1. STRUCTURES WITH "" SHALL BE INSTALLED ONLY WHERE NECESSARY.

Figure 7.5-1 TYPICAL CROSS SECTION (6/6)

The Ministry of Public Works of The Republic of Indonesia Japan International Cooperation System	
Urgent Recovery of the West Coast Road BANDA ACEH AND MEULABOH	
TYPICAL CROSS SECTION - 6	Drawing No. A - 6
Data:	Scale: 1:60
Prepared by:	Checked by:
Katahira & Engineers International	

7.6 BRIDGE DESIGN

Bridges were planned based on the following factors:

1) Selection of bridge type to allow fast construction

- Bridge structure should be as simple as possible. Bridges which require complicated form works, several procedures and concreting work in a river such as construction of footings should be avoided.
- Bridges should be standardized as much as possible, so that fabrication and construction work can be simplified.
- For construction of bridges along Village Road, utilization of existing bridge as scaffolding was planned, thus time for construction scaffolding was planned, thus time for construction of scaffolding can be saved.
- For steel bridges, local fabrications' experiences were considered in selecting bridge type.
- Utilization of early-strength-cement was planned.

2) Bridges which is strong against earthquake

- For concrete bridges, integral type of bridge (superstructure and substructure are rigidly connected) was selected. Other advantage of this type of bridge is low maintenance cost, since it does not require bearing shoes and expansion joints.
- For steel bridges, retrofitting which prevent superstructure to fall down from substructure was planned.

3) Bridge length and span composition

<u>Bridges along coastal road</u>

- Bridge length before wash-out by tsunami was basically adopted.
- Water velocity of small rivers (width of 20m or les) and at lagoon crossings was judged slow, thus even short span length can be acceptable and will not disturb water flow so much. Span length of 10 ~13.5 m was adopted.
- For medium (over 60m) and large rivers (over 100m), longer span length was judged to be required, span length of 30m was adopted.

<u>Bridges along village road</u>

- Existing bridges are all short bridges ranging from 10m to 30m. Slightly longer bridge length was adopted.
- Existing span length is also short, thus 10 to 12m span length was selected.

4) Bridge Types

Bridge types selected are as follows:

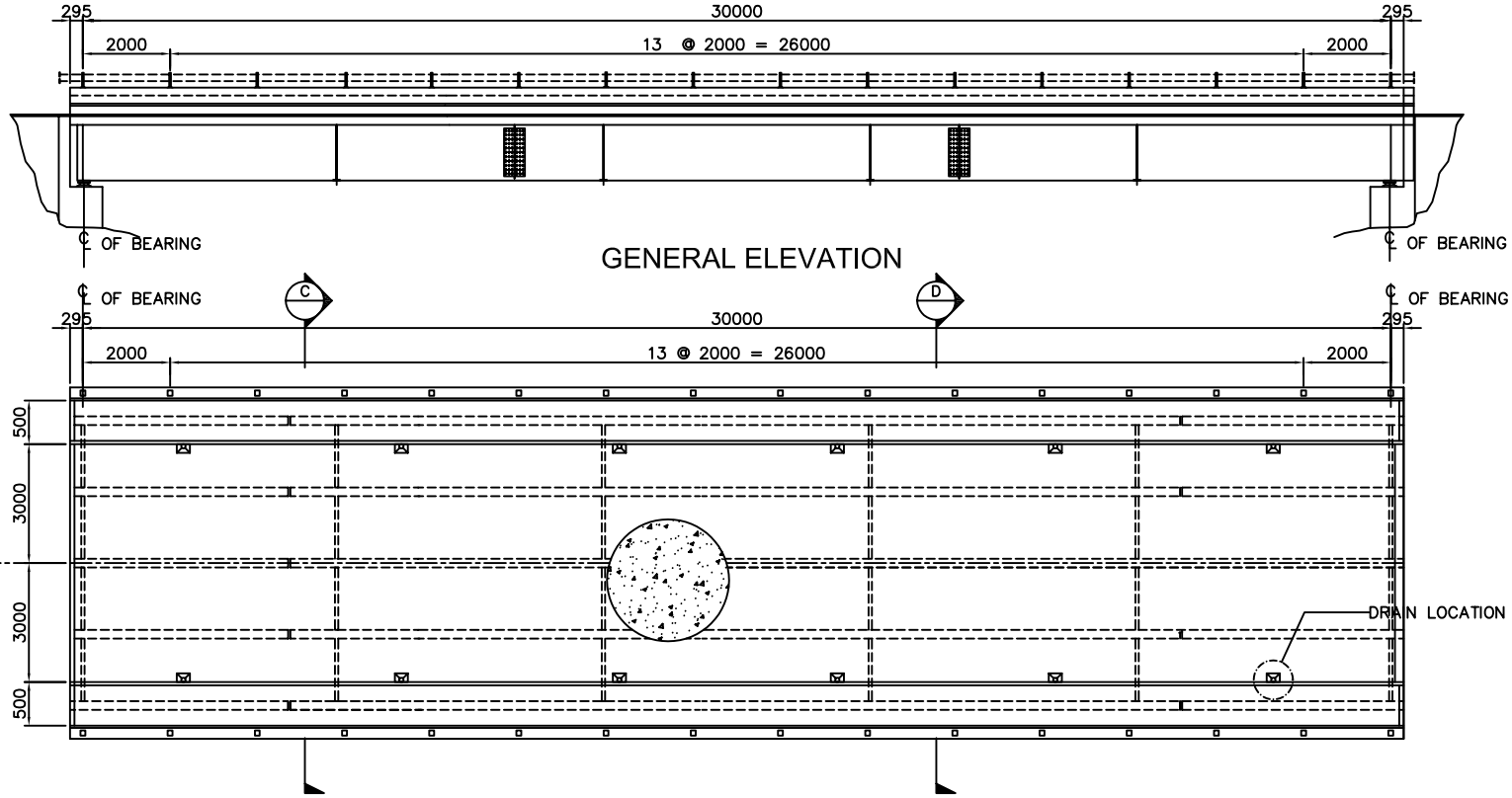
For 30m span	:	Steel Plate Girder (Indonesian Standard design available)
For 10 - 13.5 m span	:	Integral Type of RC Slab
Abutment	:	Pile bent type for steel bridges, integral type for RC slab bridges
Pier	:	Pile bent type for all types of bridges (construction of footings and pier wall / column avoided)

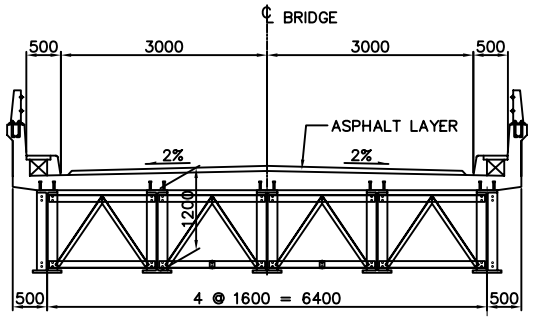
On the basis of above, bridge length, span length and bridge type was selected for each bridge as shown in **Table 7.6-1**.

Typical steel girder bridge and integral type of slab bridge is shown in **Figure 7.6-1** and **Figure 7.6-2**, respectively.

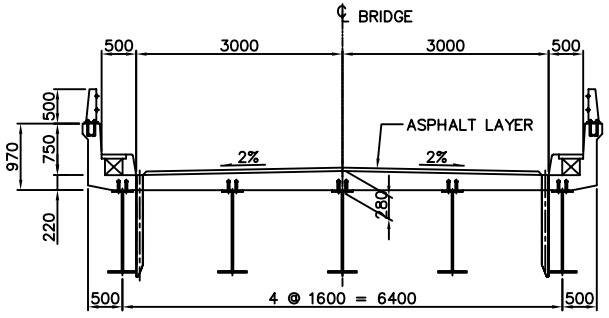
TABLE 7.6-1 PROPOSED BRIDGES AND BRIDGE TYPE

Road	Serial No.	Bridge Location	Bridge Name	Bridge Length Before Tsunami	Bridge Length under	Proposed Bridge	
						Bridge Length (m)	Bridge Type
Coastal Road	1	158+470	-	No Bridge	Causeway with pipes	2-span x 10m = 20m	Integral type of RC Slab
	2	159+250	Kuala Meurisi	L = 80m	Bailey Br. L=29m	3-span x 30m = 90m	Steel Plate Girder
	3	163+400	Krueng Sabe	L = 110m	Bailey Br. L=42m	4-span x 30m = 120m	Steel Plate Girder
	4	1644+535	Kabong 1	Pipe Culvert	Timber Br. L=10.5m	2-span x 10m = 20m	Integral type of RC Slab
	5	165+200	Kabong 2	Box Culver (L=6m)	Timber Br. L=13m	2-span x 10m = 20m	Integral type of RC Slab
	6	166+160	Kabong 3	L = 40m	Timber Br. L=13m	3-span x 13.5m = 40.5 m	Integral type of RC Slab
	7	174+905	Panga	L = 88m	Bailey Br. L=88m	3-span x 30 m = 9 m0	Steel Plate Girder
	Sub-total					100.5m 300.0m **400.5m**	RC Slab Steel Girder **Total**
Village Road	8	218+430	Krueng Sulak Paribu	RC L=12m Flooded	-	2-span x 10m = 20m	Integral Type of RC Slab
	9	236+181	Krueng Wayla	Steel+Timber Deck, L=10m	-	1-span x 12m = 12m	Integral Type of RC Slab
	10	240+374	Krueng PeuYong	Steel+Timber Deck, L=10m	-	2-span x 10m = 20m	Integral Type of RC Slab
	11	241+443	Krueng Peu Yong 2	Steel+Timber Deck, L=20m	-	2-span x 12m = 24m	Integral Type of RC Slab
	12	243+368	-	Steel+Timber Deck, L=10m	-	2-span x 10m = 20m	Integral Type of RC Slab
	13	243+851	-	Collapsed L=25m	-	3-span x 10m = 30m	Integral Type of RC Slab
	14	245+255	-	Steel+Timber Deck, L=10m	-	2-span x 10m = 20m	Integral Type of RC Slab
	15	245+918	-	RC, L=10m Flooded	-	2-span x 10m = 20m	Integral Type of RC Slab
	16	246+376	-	RC, L=10m Flooded	-	2-span x 10m = 20m	Integral Type of RC Slab
	17	246+840	-	RC, L=10m Flooded	-	2-span x 10m = 20m	Integral Type of RC Slab
	18	250+504	Kruang Sabee 1	Steel+Timber Deck, L=20m	-	2-span x 12m = 24m	Integral Type of RC Slab
	19	254+960	Kruang Masjid Baru	Steel+Timber Deck, L=15m	-	2-span x 10m = 20m	Integral Type of RC Slab
	20	255+863	Kruang Peuyong	Steel+Timber Deck, L=10m	-	2-span x 10m = 20m	Integral Type of RC Slab
	Sub-total					270m	Integral Type of RC Slab
TOTAL						**300m 370.5m 670.5m**	**Steel Girder RC Slab Total**





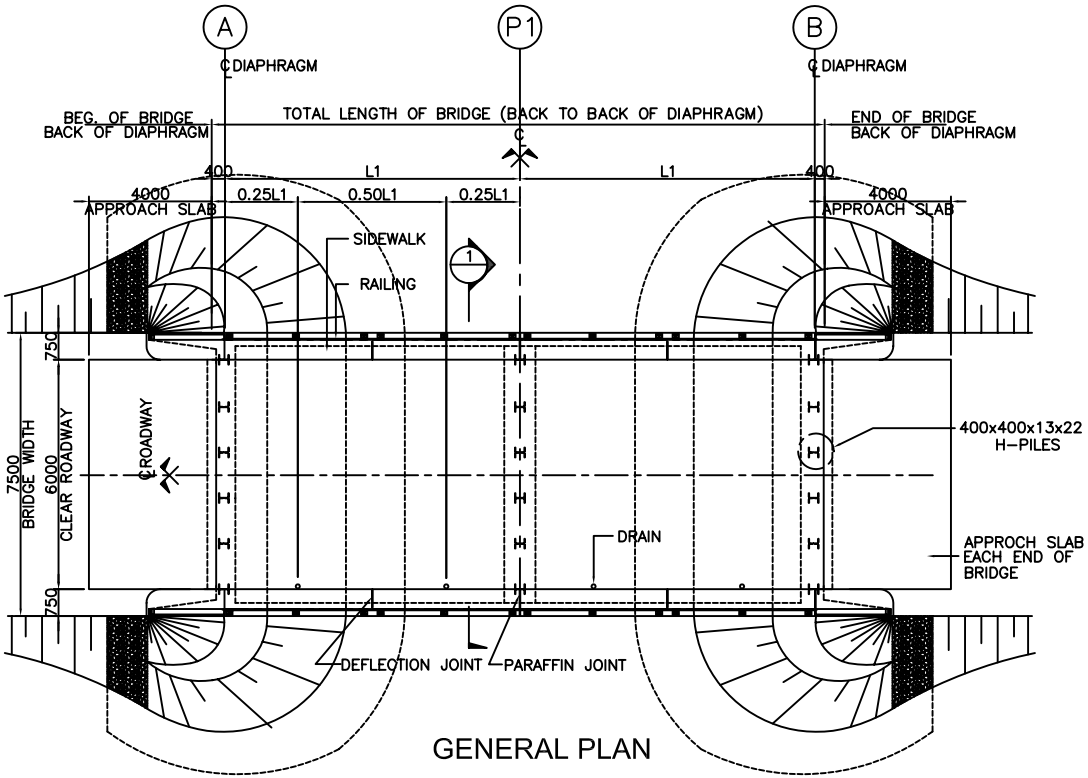
SECTION C



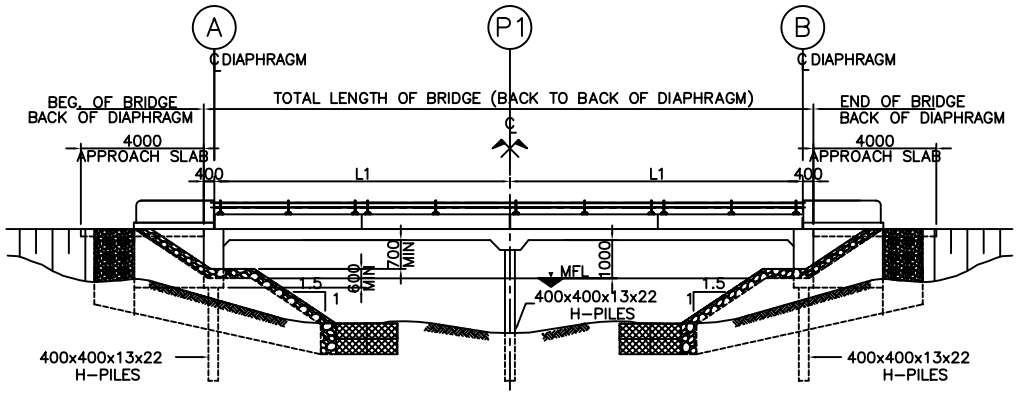
SECTION D

Figure 7.6-1 TYPICAL SUPERSTRUCTURE (30M SPAN STEEL GIRDER)

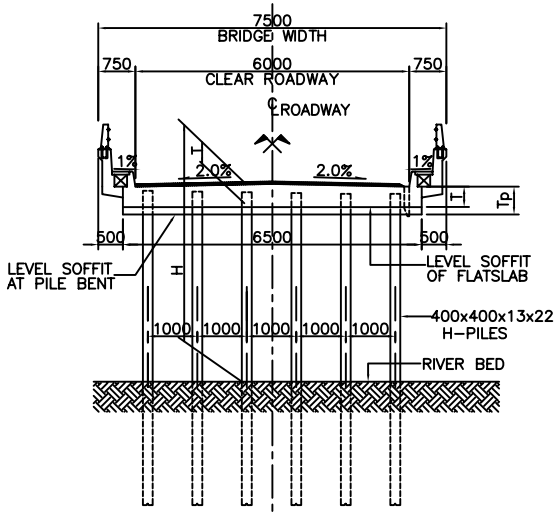
* The Ministry of Public Works of The Republic of Indonesia * Japan International Cooperation System	
Urgent Recovery of the West Coast Road, BANDA ACEH AND MEULABOH	
STANDARD STEEL I - GIRDER BRIDGE (SPAN 30M) - OPTION 1	Drawing No. D-2
Data:	Scale:
Prepared by:	Checked by:
Katahira and Engineers International	



GENERAL PLAN



GENERAL ELEVATION



SECTION 1

* The Ministry of Public Works of The Republic of Indonesia * Japan International Cooperation System	
Urgent Recovery of the West Coast Road, BANDA ACEH AND MEULABOH	
TYPICAL FLATSLAB (FOR 6M WIDE, 2-SPAN CONTINUOUS) (1)	Drawing No. D-18
Data:	Scale: AS SHOWN
Prepared by:	Checked by:
Katahira and Engineers International	

Figure 7.6-2 TYPICAL FLATSLAB (FOR 6M WIDE, 2-SPAN CONTINUOUS)

7.7 CONSTRUCTION PLAN

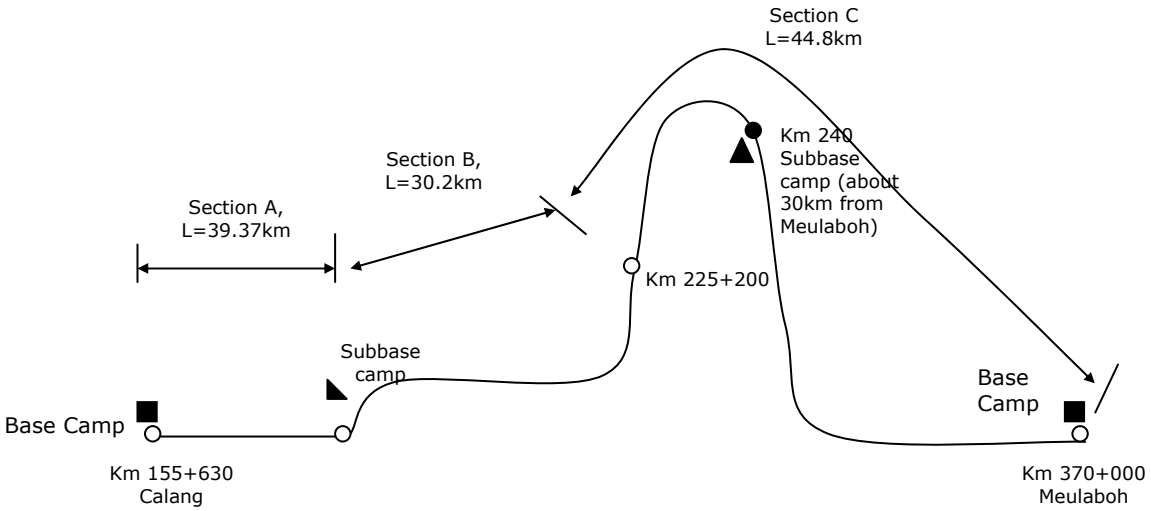
7.7.1 Characteristics of the Project

Characteristics of the Project are as follows:

- Construction period is quite short and is about 1/3 to ¼ of normal construction period. The Contractor is required to execute the project by fast-track program. Three to four times of more equipment/plants and workers than normal construction need to be mobilized.
- Rainy season starts from September and continues up to December. Relatively high rainfalls are expected even remaining season.
- There are four flood sections where water level reaches to about 1m from the road surface, and the road becomes impassable for 3 ~ 4 days.
- Aggregate sources which are all along the rivers are limited. When water elevation of a river goes up after heavy rain, aggregate sources become under water.
- Ramadan starts from the beginning of October to beginning of November. During this period, work efficiency will be reduced, particularly Ramadan Holidays at the beginning of November, all works need to be suspended for about 10 days.
- Existing detour bridges along the coast road do not have sufficient length to span over a river and about 2/3 of a river is crossed by a causeway which may be washed out during heavy rain, resulting in suspension of construction activities.
- The contractor will be required to adopt the shift working system from sunrise to sunset.

7.7.2 Contractor's Base camp

In consideration of easy and fast evacuation during emergency, the contractor's base camps are proposed to be located at Calang and Meulaboh and sub-base camps at about km. 195 and km. 240.



7.7.3 Construction Schedule

Construction schedule of road works is shown in **Table 7.7-1**. Construction schedule of bridge works is shown in **Table 7.7-2**.

7.8 CONTRACT PACKAGING

It was decided that number of contract package should be one due to the following reasons:

1) In view of quite severe construction period, highly qualified and experienced contractor must be selected. If a contract package size becomes small, small and less qualified contractor may have chance to win a contract.

2) Quarry sites are limited. When more than one contractors simultaneously work in the same areas and use the same quarry site, arrangements between (or among) contractors are hard to be agreed, particularly when local contractors are selected.

3) Based on the previous experiences, the Ministry of Public Works strongly recommended that the contract package should be one.

7.9 PREPARATION OF TENDER DOCUMENTS

Tender documents consisting of the following were prepared:

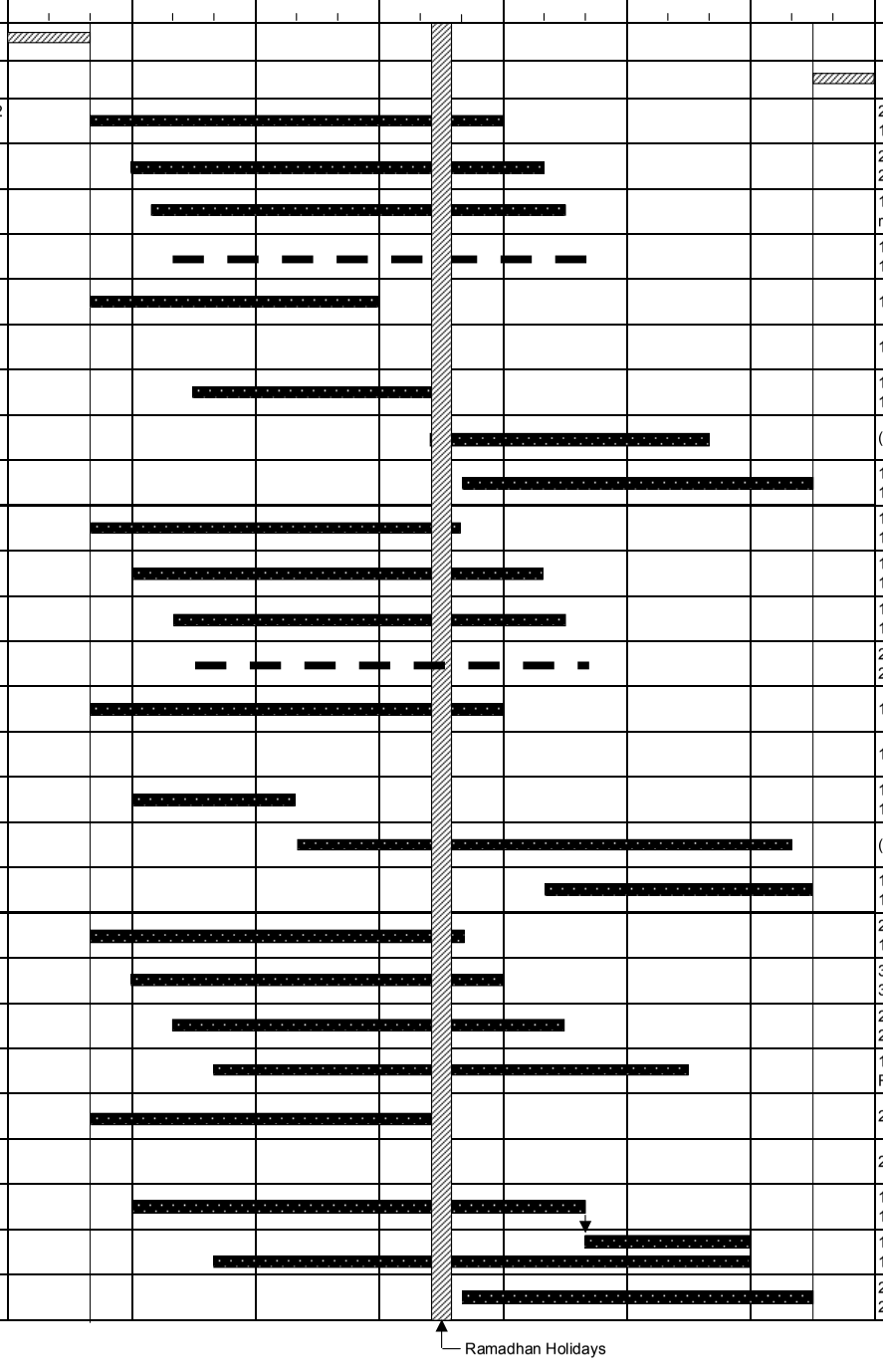
- Instruction to Tenderers
- Contract Agreement
- General Conditions
- Particular Conditions
- Technical Specifications
- Drawings
- Bill of Quantities and Schedules
- Form of Performance Security
- Letter of Tender and Appendix to Tender

7.10 COST ESTIMATE

Base cost for materials was basically obtained from the published documents. Equipment rental cost was gathered from the previous studies. Labor cost was obtained from the Public Works Office in Banda Aceh. Based on above base costs, a unit price analysis in accordance with the procedure commonly adopted in Indonesia for all pay items and unit prices were determined in due consideration of the characteristics of the project.

TABLE 7.7 - 1 ROAD WORK CONSTRUCTION SCHEDULE

		Quality	Output per day	No of Net Days	No of Months, No. of Shifts	No. of Equipment/Plants Required
Mobilization		-				
Demobilization		-				
	Excavation	79,300	300 m^3 (exc) 320 (Bull)	265	17.7 Months 2 shift x 3 --- 3.0 Months	2 - Excavator 1 - Buldozer
	Embankment	51,600	280 m^3	185	12.3 Months 2 shifts x 2 --- 3.1 Months	2 - Buldozer 2 - Tire Roller (Road Roller)
	Sub-base	23,400	250 m^3	94	6.3 Months 2 shifts --- 3.2 Months	1 - Motor Grader 1 - Macadam roller 1 - Tire Roller
Section A	Base Course	3,070	150 m^3	21	1.4 Months 1 shifts --- 1.4 Months	1 - Motor Grader 1 - Macadam roller 1 - Tire Roller 1 - Vibratory Roller
155+630	Aggregate Production	18,000 t	400 t/day	45	• 50 TPH x 0.8 x 12 hr • 1.9 Months 1 set	1 - Stone Crusher
|	Asphalt Production	-	320 t/day		• 50 TPH x 0.8 x 8 hr 1 set	1 - Asphalt Plant
195+200						
L = 39.6 km	ATB	4,190 m^3	100 m^3 (235 t)	42	2.8 Months 2 shift 1.4 Months	1 - Asphalt Finisher 1 - Road Roller 1 - Tire Roller 1 - Vibrator Roller
	AC	71,700	1,200 m^2 (141 t) (282 t)	60	4.0 Months 2 shifts 2.0 Months	(Same as above)
	Shoulder Marking, etc	8,000	100 m^3	80	5.4 Months 2 shifts, 2.7 Months	1 - Motor Grader 1 - Road Roller
	Excavation	50,500	300 m^3 320 m^3	169	11.3 Months 2 shifts x 2 --- 2.8 Months	1 - Excavator 1 - Buldozer
	Embankment	30,800	280 m^3	110	7.4 Months 2 shifts --- 2.9 Months	1 - Buldozer 1 - Tire Roller
	Sub-base	39, 220	250 m^3	157	10.5 Months 2 shifts x 2 --- 2.7 Months	1 - Motor Grader 1 - Macadam Roller 1 - Tire Roller
Section B	Base Course	16,650	150 m^3	111	7.4 Months 2 shifts x 2 --- 1.9 Months	2 - Motor Grader 2 - Macadam Roller 2 - Tire Roller
195+200	Aggregate Production	25,500	400 t/day	64	3.2 Months 1 set	1 - Stone Crusher
|	Asphalt Production	-	320 t/day	-	• 50 TPH x 0,8 x 8 hr 1 set	1 - Asphalt Plant
225+200						
L = 30 km	ATB	3,230	100 m^3 (235 t)	33	2.2 Months 2 shifts --> 1.1 Months	1 - Asphalt Finisher 1 - Road Roller 1 - Tire Roller 1 - Vibratory Roller
	AC	147,000	1,200 m2 (141 t) (282 t)	123	8.2 Months 2 shifts --> 4.1 Months	(Same as above)
	Shoulder Marking, etc	5,900	100 m^3	59	3.9 Months 2 shifts, 2.0 Months	1 - Motor Grader 1 - Road Roller
	Excavation	76,600	300 m^3 320 m^3	256	17.1 Months 2 shifts x 3 --> 2.9 Months	2 - Excavator 1 - Buldozer
	Embankment	59,800	280 m^3	214	14.3 Months 2 shifts x 3 --> 2.4 Months	3 - Buldozer 3 - Tire Roller (Road Roller)
	Sub-base	36,300	250 m^3	146	9.8 Months 2 shifts x 2 --> 2.5 Months	2 - Motor Grader 2 - Road Roller
Section C	Base Course	7,900	150 m^3	53	3.6 Months 1 shifts --> 3.6 Month	1 - Motor Grader 1 - Road Roller 1 - Vibratory Roller
225+200	Aggregate Production	42800 t	400 t/day 800 t/day	107	5.35 Months (1 set) 2.7 Months 2 set	2 - Stone Crusher
|	Asphalt Production	-	320 t/day 640 t/day	-	2 set	2 - Asphalt Plant
270+000						
L = 44.8 km	ATB	9,430	100 m^3 (235 t) (470 t)	95	6.4 Months 2 shift 3.2 Months (Separate Team from AC)	1 - Asphalt Finisher 1 - Road Roller 1 - Tire Roller 1 - Vibratory Roller
	AC	168,000	1,200 m^2 (141 t) (282 t)	140	9.4 Months 2 shifts --> 4.7 Months	1 - Asphalt Finisher 1 - Road Roller 1 - Tire Roller 1 - Vibratory Roller
	Shoulder Marking, etc	7,700	100 m^3	77	5.2 Months 1 shifts x 2 --- 2.6 Months	2 - Motor Grader 2 - Road Roller



Note : No. of workable days per month = 15 days

TABLE 7.7 - 2 (1/3)　　COASTAL ROAD BRIDGE CONSTRUCTION SCHEDULE

No	Proposed Bridge	Existing Bridge	Activity	1				2				3				4				5				6				7			
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
7	Steel Girder L=90m 30 X 3	(Bailey)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Erection																												
			⑦Forms																												
			⑧Slab concreting																												
			⑨Railing																												
			⑩AC Pavement																												
			⑪Removal of Forms/Scafolding																												
			⑫Backfilling																												
			⑬Approach slab																												
			⑭Removal of temporary Embankment																												
			⑮Abutment Protection																												
			⑯Removal of Existing Bridge/Detour																												
6	RC Slab L=40.5m 13.5 X 3	(Timber)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Re-bar/concreting																												
			⑦Railing																												
			⑧AC Pavement																												
			⑨Removal of Scafolding																												
			⑩Backfilling																												
			⑪Approach slab																												
			⑫Abutment Protection																												
			⑬Removal of temporary embankment																												
			⑭Removal of Existing Bridge/Detour																												
5	RC Slab L=20m 10 X 2	(Timber)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Re-bar/concreting																												
			⑦Railing																												
			⑧AC Pavement																												
			⑨Removal of Scafolding																												
			⑩Backfilling																												
			⑪Approach slab																												
			⑫Abutment Protection																												
			⑬Removal of temporary embankment																												
			⑭Removal of Existing Bridge/Detour																												
4	RC Slab L=20m 10 X 2	(Timber)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Re-bar/concreting																												
			⑦Railing																												
			⑧AC Pavement																												
			⑨Removal of Scafolding																												
			⑩Backfilling																												
			⑪Approach slab																												
			⑫Abutment Protection																												
			⑬Removal of temporary embankment																												
			⑭Removal of Existing Bridge/Detour																												
3	Steel Girder L=120m 30 X 4	(Bailey)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Erection																												
			⑦Forms																												
			⑧Slab concreting																												
			⑨Railing																												
			⑩AC Pavement																												
			⑪Removal of Forms																												
			⑫Backfilling																												
			⑬Approach slab																												
			⑭Removal of temporary Embankment																												
			⑮Abutment Protection																												
			⑯Removal of Existing Bridge/Detour																												
2	Steel Girder L=90m 30 X 3	(Bailey)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Erection																												
			⑦Forms																												
			⑧Slab concreting																												
			⑨Railing																												
			⑩AC Pavement																												
			⑪Removal of Forms																												
			⑫Backfilling																												
			⑬Approach slab																												
			⑭Removal of temporary Embankment																												
			⑮Abutment Protection																												
			⑯Removal of Existing Bridge/Detour																												
1	RC Slab L=20m 10 X 2	(RCPC)	①Embankment (Abut)																												
			②Embankment (temporary)																												
			③Piling																												
			④Abutment/Pier																												
			⑤Scaffolding																												
			⑥Re-bar/concreting																												
			⑦Railing																												
			⑧AC Pavement																												
			⑨Removal of Scafolding																												
			⑩Backfilling																												
			⑪Approach slab																												
			⑫Abutment Protection																												
			⑬Removal of temporary embankment																												
			⑭Removal of Existing Bridge/Detour																												

4-Team: ⑦, (4+5+6), ③, (1+2)
Pile Driver: 3 (4+5+6+7), ③, (1+2)

Delivery on Site :
- H Pile-after one month
- Steel Tubular Pile-after two months
- Bridge Girder- after three months

TABLE 7.7 – 2 (2/3)　　VILLAGE ROAD BRIDGE CONSTRUCTION SCHEDULE (1/2)

No	Proposed Bridge	Existing Bridge	Activity	1				2				3				4				5				6				7			
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
20	RC Slab L=20m 10 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing/AC Pavement																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
19	RC Slab L=20m 10 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
18	RC Slab L=24m 12 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing/AC Pavement																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
17	RC Slab L=20m 10 x 2	(RC Girder)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
16	RC Slab L=20m 10 x 2	(RC Girder)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
15	RC Slab L=20m 10 x 2	(RC Girder)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
14	RC Slab L=20m 10 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
13	RC Slab L=30m 10 x 3	Collupsed	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												

TABLE 7.7 – 2 (3/3)　　VILLAGE ROAD BRIDGE CONSTRUCTION SCHEDULE (2/2)

No	Proposed Bridge	Existing Bridge	Activity	1				2				3				4				5				6				7			
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
12	RC Slab L=20m 10 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
11	RC Slab L=24m 12 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
10	RC Slab L=20m 10 x 2	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
9	RC Slab L=12m 12 x 1	(stee+ Timber Deck)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												
8	RC Slab L=20m 10 x 2	(RC Girder)	Detour																												
			Removal of Existing Bridge																												
			Embankment																												
			Piling																												
			Abutment/Pier																												
			Scafolding/Form																												
			Superstructure Concreteing																												
			Railing																												
			Removal of Scafolding/Form																												
			Backfilling																												
			Approach slab																												
			Abutment Protection																												
			Removal of Detour																												

3 – Team for Village Road
3 – Pile Driver for Village Road

Chapter 8

TECHNICAL ADVICES TO RELEVANT INDONESIAN GOVERNMENT AGENCIES

The Study was undertaken with close coordination with the Ministry of National Development Planning, the Ministry of Public Works, the Public Works Office of Banda Aceh and the City Government of Banda Aceh. The Study Team has several discussion meeting with the officials of the Ministry of Public Works, particularly on the following:

- How to select the route for reconstruction
- Differences in route selection between USAID and the Study Team
- How to utilize Video Tape Images taken from a helicopter
- Design concepts for urgent recovery
- Bridge type selection
- Preparation of tender documents in consideration of Indonesian characteristics

Through above discussion, necessary advices were made and also Indonesian side suggestions and opinions were incorporated in the Study.