

9.7 維持管理計画

9.7.1 ラオスの維持管理能力

1) 道 路

ヴィエンチャン市の道路の維持管理はD C T C及びその管轄下の公社が行っている。維持管理組織は図9.2に示したとおりである。

実施されている維持管理作業は、アスファルト表面処理の補修、穴埋め、草刈りなどであり、年間30-40kmの維持補修作業を行っている。従って、修理班はD B S T及びS B S Tの補修作業に手慣れており、本計画案件の道路維持補修に関して不安は無いと考える。

2) 橋 梁

採用された橋梁形式は維持補修の手間が殆ど掛からないものであるが、交通の安全を考慮するならば、以下の維持管理作業が必要である。

- a) 排水工周辺の泥及び塵芥の除去
- b) 床板・橋面上の泥及び塵芥の除去
- c) ジョイント部分及び支承部分の泥・塵芥の除去

日常の維持管理を通じて、これら構造部分の清掃を、雨期開始前に行うことが必要である。

9.7.2 維持管理費

1) 道 路

本計画道路の維持管理費の主要部分は、プロジェクトの耐用年数を通じて、表層の維持管理（即ち表面の再処理、穴埋め、再舗装）に費やされるであろう。また維持管理費の一部は、草刈、側溝整備・清掃、路肩の整備、道路表示、交通標識等の整備補修に使用される。

これら維持管理の費用は通常費用と、定期的維持管理費とに分けて算出された。

維持管理種別	維持管理費
通常の維持管理作業 (年間費用)	4,400 U S \$
定期的維持管理費 (各7年毎)	73,500 U S \$

表9.1 事業費の総括表 (エコノミックコストを含む)

	Financial Cost ('00US\$)	Economic Cost ('00US\$)	1st Year	2nd Year	3rd Year	4th Year
I CONSTRUCTION COST ('00YS\$)	129,758	116,106		40,338	45,547	30,221
1. Direct Construction Cost ('00US\$)	70,184	61,498				
Foreign portion ('0000Yen)	64,354	61,137				
Material	29,468	27,995				
Equipment	34,886	33,142				
Local Portion ('00US\$)	28,123	21,539				
Labour	7,543	3,107				
Material	16,679	15,011				
Equipment	3,901	3,511				
2. Indirect Construction Cost ('00US\$)	59,574	54,608				
Foreign portion ('0000Yen)	64,352	62,666				
Material	60,010	58,551				
Equipment	4,332	4,115				
Local Portion ('00US\$)	17,520	13,649				
Labour	5,660	2,264				
Material	10,704	10,345				
Equipment	1,156	1,040				
II LAND ACQUISITION COST						
Local portion ('00US\$)	952	857	857			
III ENGINEERING SERVICE COST ('00US\$)	16,338	16,186	2,900	4,430	4,430	4,426
Foreign portion ('000Yen)	24,144	24,123				
Local portion ('00US\$)	558	419				
Labour	166	66				
Material	392	353				
IV CONTINGENCY, 5% of (I) ('00US\$)	6,479	5,805		2,017	2,277	1,511
Total	153,527	138,954	3,757	46,705	52,254	36,158

Note: (1) Foreign currency is expressed in Japanese Yen, while local currency is represented in US dollars.

(2) Average Tokyo Bank TTS rate February through July of 1990 of US dollars is adopted: 1US\$ = 153Yen

(3) 5% of the foreign portion's material and equipment cost is eliminated as import tax.

(4) The economic cost of local labour is obtained by applying 0.4 to market cost.

(5) 0.9 of conversion factor is applied for the market cost of local material and equipment.

(6) The total figuer is expressed in US dollars for the convenience of calculation.

表 9.2 建設費 (1)

Description (Conversion Factor)	Foreign Cost Component (10,000yen)				Local Cost Component (100US\$)			Total (100US\$)	Economic Cost (100US\$)
	Material (0.95)		Equipment (0.95)		Labour (0.4)	Material (0.9)	Equipment (0.9)		
I CONSTRUCTION COST									
1. Direct Construction Cost									
1.1 Bridge									
1.1.1 Superstructure									
1) Bridge deck slab	2,530 m ²	178	15	926	994	7			
2) Main girder, fabrication	30 nr	9,934	106	1,743	3,817	35			
3) Main girder, scaffolding	30 nr	115	-	76	-	-			
4) Main girder, temporary setting	30 nr	-	-	61	2	-			
5) Manufacturing platform, main girder	123 m	62	12	33	260	3			
6) Adjustable work for platform	30 nr	-	-	22	1	-			
7) Setting and removing of p. crane	2 nr	300	50	140	1,003	12			
8) Railwork for portal crane	sum	-	-	34	1	-			
9) Rubber bearing work	30 nr	260	-	20	2	-			
10) Erection of main girder	30 nr	31	15	475	14	22			
11) Cross beam	sum	672	5	365	362	3			
12) Equipment ownership cost/PC girder	30 nr	-	8,842	-	-	-			
13) Equipment ownership cost/concreting	sum	-	754	-	-	-			
Total of Superstructure		11,552	9,799	3,895	6,456	86	24,392	20,703	
1.1.2 Substructure									
1) Abutments									
(1) Concrete placing by truck crane	255 m ³	7	21	22	415	5			
(2) Formwork	643 m ²	-	18	75	11	6			
(3) Reinforcement work	34 t	195	-	55	3	-			
(4) Levelling concrete	13 m ³	-	1	1	-	18			
(5) Scaffolding	734 m ²	75	11	42	-	4			
(6) Pipe timbering	26 m ³	-	-	2	-	-			
(7) Excavation	10,636 m ³	-	275	-	-	151			
(8) Backfill	14,221 m ³	-	429	17	4	242			
(9) Equipment ownership cost/concreting	sum	-	1,257	-	-	-			
(10) Equipment ownership cost/earthwork	sum	-	1,194	-	-	-			
Total of abutments		277	3,206	214	433	426	3,349	3,021	

表 9.3 建設費 (2)

Description (Conversion Factor)	Financial Cost						Economic Cost (100US\$)
	Foreign Cost Component (10,000yen)		Local Cost Component (100US\$)			Total (100US\$)	
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)		
2) Piers							
(1) Concrete placing by truck crane	739 m ³	61	65	1,202	14		
(2) Formwork	1,177 m ²	33	138	19	11		
(3) Reinforcement work	163 t	-	263	13	-		
(4) Scaffolding	2,011 m ²	29	115	-	10		
(5) Footing concrete, placing by truck crane	554 m ³	46	49	902	11		
(6) Footing concrete, formwork	259 m ²	7	30	4	2		
(7) Footing concrete, reinforcement work	21 t	-	33	2	-		
(8) Equipment, ownership cost/concrete	sum	723	-	-	-		
Total of piers		899	693	2,142	48	4,398	3,687
3) In situ concrete pile, reverse circulation drill							
(1) ISCP, L = 15m, submergible	24 nr	979	575	1,181	326		
(2) ISCP, L = 13m, on land	6 nr	164	128	327	28		
(3) Ownership cost, standpile	sum	1,400	-	-	-		
(4) Equipment, ownership cost/drill	sum	4,676	-	-	-		
(5) Equipment, ownership cost/concrete	sum	408	-	-	-		
Total ISCP		7,627	703	1,508	354	9,151	8,214
4) U-shape wall							
(1) Concrete placing by truck crane	1,285 m ³	106	113	2,091	25		
(2) Formwork	782 m ²	22	92	13	7		
(3) Reinforcement work	40 t	-	64	3	-		
Total of U-shape wall		128	269	2,107	32	2,662	2,274
Total of Substructure		11,860	1,879	6,190	860	19,560	17,196
Total of Bridge (1.1)		21,659	5,774	12,646	946	43,952	38,899

表 9.4 建設費 (3)

Description (Conversion Factor)	Financial Cost						Economic Cost (100US\$)
	Foreign Cost Component (10,000yen)		Local Cost Component (100US\$)			Total (100US\$)	
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)		
1.2 Approach road							
1) Pavement work	26,868 m ²	398	454	228	322		
2) Subgrade	33,585 m ²	4,171	306	40	2,133		
3) Base course	31,234 m ²	59	31	1,415	78		
4) Culvert, $\phi = 800$, corrugated	8 nr	47	94	1,012	15		
5) Culvert, $\phi = 1,000$, corrugated	2 nr	12	23	253	4		
6) Side ditch	6,000 m	30	237	799	10		
7) Road marking	9,000 m	—	1	—	—		
8) Guardrail	1,400 m	531	179	—	—		
9) Equipment ownership cost/earthwork	sum	3,017	—	—	—		
Total of Approach Road (1.2)		991	1,325	3,747	2,562	13,337	11,626
1.3 Temporary Bridge							
1) EL 166.00 Temporary bridge	sum	407	250	17	155		
2) EL 155.70 platform	sum	64	42	11	6		
3) EL 160.00 Temporary landing pier	sum	65	42	10	9		
4) Equipment ownership cost/pile driver	sum	4,555	—	—	—		
5) Material ownership cost/EL166 T/B	sum	5,322	—	—	—		
6) ditto/EL 155.70 platform	sum	722	—	—	—		
7) ditto/EL 160.00 T. landing pier	sum	669	—	—	—		
Total of Temporary Bridge (1.3)		6,717	334	38	170	8,260	7,653

表 9.5 建設費 (4)

Description	Financial Cost							Economic Cost (100US\$)
	Foreign Cost Component (10,000yen)		Local Cost Component (100US\$)			Total (100US\$)		
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)			
1.4 Rivetment work (Conversion Factor)								
1) Excavation	9,372 m ³	243	-	-	133			
2) Refill	5,271 m ³	159	6	2	90			
3) Concrete block pitching	4,337 m ³	5,802	104	246	-			
Total of Rivetment work (1.4)	5,802	402	110	248	223	4,636	4,320	
Total of Direct Construction Cost (1)		29,468 (27,995)	7,543 (3,017)	16,679 (15,011)	3,901 (3,511)	70,184	(61,498)	

表 9.6 建設費 (5)

Description	Financial Cost						Economic Cost (100US\$)
	Foreign Cost Component (10,000yen)		Local Cost Component (100US\$)			Total (100US\$)	
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)		
2. Indirect Construction Cost							
2.1 Preliminaries and general items							
1) Temporary facilities							
(1) Temporary facilities	6,988	843	1,543	1,376	766		
(2) Security	1,371	-	278	545	-		
(3) Technical administrative	667	-	980	-	-		
sum							
Total of preliminaries and general items (2.1)	9,026	843	2,801	1,921	766	11,938	9,667
2.2 Packing and transport cost							
Total of Packing and Transport Cost (2.2)	11,713	-	-	7,115	-	14,771	14,771
2.3 Dispatch of expatriate technician							
1) Remuneration	16,313	-	-	-	-		
2) Allowance	2,318	-	-	-	-		
3) Traveling expenses	499	-	-	-	-		
sum							
Total of despatch of Expatriate technician (2.3)	19,130	-	-	-	-	12,503	12,503

表 9.7 建設費 (6)

Description (Conversion Factor)	Financial Cost						Economic Cost (100US\$)
	Foreign Cost Component (10,000yen)		Local Cost Component (100US\$)			Total (100US\$)	
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)		
2.4 Site costs							
1) Insurance	1,144	-	-	-	-	-	
2) Remuneration of expatriate engineers	12,397	-	-	-	-	-	
3) Remuneration of local staff	-	-	1,483	-	-	-	
4) Welfare cost	257	-	-	-	-	-	
5) Office equipment cost	635	-	-	-	-	-	
6) Communication expenses	163	-	-	-	-	-	
7) Traveling expenses expatriate staff	260	-	-	-	-	-	
8) Communication and transport cost	381	-	622	-	-	-	
9) Furniture of staff quarters	44	-	-	-	-	-	
Total of site cost (2.4)	15,281	-	2,105	-	-	-	12,093
2.5 Overhead cost							
10% of sum of direct construction cost and despatch cost of expatriate technician							
Total of overhead cost (2.4)	4,860	3,489	754	1,668	390		7,338
Total of Indirect Construction Cost (2) Economic Converted Cost	60,010 (58,551)	4,332 (4,115)	5,660 (2,264)	10,704 (10,345)	1,156 (1,040)		59,574
Total of Construction Cost	89,478	39,218	13,203	27,383	5,057		129,758
							¥ 1,985,296

表 9. 8 建設費 (7)

Description (Conversion Factor)	Financial Cost					Economic Cost (100US\$)	
	Foreign Cost Component (10,000yen)		Local Cost Component (100US\$)				Total (100US\$)
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)		
<p>II. MAINTENANCE COST</p> <p>Note: No maintenance work will be substantially required for the bridge works. We assume both routine and periodical maintenance be required only for the pavement of the roadway.</p> <p>1. Routine Maintenance Cost Note: It is assumed 3% of the pavement surface course area (995m²) be repaired at the unit price 5.97US\$/m² every year. (total : 5,970US\$)</p> <p>Maintenance cost, routine (composition)</p> <p>Economic Converted cost (every year)</p>			19 (31.5%)	17 (28.0%)	24 (40.5%)	60 (100.0%)	44
<p>2. Periodic Maintenance Cost Note: 50% of the pavement surface course area (33,160m²) will be assumed to be reconstruct at the unit price 5.97US\$/m² at every 7 years after completion. (total : 98,983US\$)</p> <p>Maintenance cost, periodic (composition)</p> <p>Economic converted cost (every 7 years)</p>			312 (31.5%)	277 (28%)	401 (40.5%)	990 (100%)	735

表 9.9 用地費及び施工管理費

Description	Financial Cost					Economic Cost (100US\$)	
	Foreign Cost Component (10,000Yen)		Local Cost Component (100US\$)				Total (100US\$)
	Material (0.95)	Equipment (0.95)	Labour (0.4)	Material (0.9)	Equipment (0.9)		
<p>III. Land Acquisition and Compensation Cost</p> <p>Note: Since it is difficult to obtain the clearout figure of the productivity foregone for each farm and paddy field, the conversion rate 0.9 will be uniformly their economic cost is established by applying to the financial cost.</p> <p>1. Residential are 2. Paddy field 3. Farm 4. Orchard 5. Residence</p> <p>Total of Land Acquisition Cost Economic converted cost</p>							
	(@ 1.15US\$) 1,500 m ²			17			
	(@ 0.86US\$) 6,200 m ²			53			
	(@ 0.58US\$) 42,000 m ²			24			
	(@ 1.15US\$) 12,000 m ²			138			
	(@10,000US\$) 5 nr			500			
				952		952	
				(857)		(857)	
<p>IV. Engineering Service Cost</p> <p>1. Detailed design 2. Supervision</p> <p>Total of Engineering Service</p>							
	4,430 (CF= 1.0)		166	392			
	208 (CF= 0.9)						
	19,506 (CF= 1.0)						
	24,144		166	392		16,338	
	(24,123)		(66)	(353)		(99.1%) (16,186)	

表 9.11 費目別単価の内訳(2)

	Unit	Amount	Foreign Component						Local Component					
			Material cost		Equipment cost		Labour cost		Material cost		Equipment cost			
			Unit Cost	Cost	Unit Cost	Cost	Unit Cost	Cost	Unit Cost	Cost	Unit Cost	Cost		
Approach road	sqm	26868	99	2,659,932	148	3,976,464	1.69	45406.92	0.85	22837.80	1.20	32241.60		
Approach road, pavement	sqm	33585	0	0	1,242	14,712,570	0.91	30562.35	0.12	4030.20	6.35	213264.75		
Approach road, subgrade	sqm	31234	0	0	19	593,446	0.10	3123.40	4.53	141490.02	0.25	7808.50		
Approach road, base course	nr	8	157,926	1,263,408	58,390	467,120	1174.98	9399.84	12647.74	101181.92	186.10	1488.80		
Culvert, dia=800	2	2	157,926	315,852	58,390	116,780	1174.98	2349.96	12647.74	25295.48	186.10	372.20		
Culvert, dia=1000	m	6000	18	108,000	50	300,000	3.95	23700.00	13.31	79860.00	0.16	960.00		
Side ditch	m	9000	28	252,000	0	363	0.01	90.00	0.63	0.00	0.00	0.00		
Road marking	m	1400	3,790	5,306,000	0	0	12.77	17878.00	0.00	0.00	0.00	0.00		
Guardrail	m	1400	3,790	9,905,192	0	47,166,743	12.77	132510.47	0.00	374696.05	0.00	256135.85		
Total of approach road	sum	1	0	0	4,066,600	4,066,600	24983.42	24983.42	1668.75	1668.75	15501.06	15501.06		
Temporary bridge	sum	1	24,462	24,462	640,433	640,433	4193.94	4193.94	1137.69	1137.69	565.14	565.14		
Temporary bridge platform	sum	1	19,070	19,070	650,917	650,917	4209.65	4209.65	1027.88	1027.88	877.31	877.31		
Temporary landing pier	sum	1	43,532	43,532	5,357,950	5,357,950	33387.01	33387.01	3834.32	3834.32	16943.51	16943.51		
Total of temporary bridge	sum	3	47,042	47,042	11,064,800	11,064,800	48413.99	48413.99	12683.32	12683.32	8598.01	8598.01		
Rivertment Work	cum	9372	0	0	2,427,348	2,427,348	0.00	0.00	0.00	0.00	1.42	13308.24		
Rivertment work, excavation	cum	5271	0	0	302	1,591,842	0.12	632.52	0.00	158.13	1.70	8960.70		
Rivertment work, refill	cum	4337	13,379	58,024,723	0	0	2.36	10365.43	0.03	24590.79	0.00	0.00		
Rivertment work, concrete block	sqm	4337	13,379	58,024,723	0	4,019,190	10997.95	10997.95	5.67	24748.92	0.00	22268.94		
Total of rivertment work	sqm	4337	13,379	58,024,723	0	4,019,190	10997.95	10997.95	5.67	24748.92	0.00	22268.94		
Total	sum		27,550,773	27,550,773	80,601,468	80,601,468	754475.66	754475.66	1667720.41	1667720.41	389731.34	389731.34		

表 9.12 機械損料 (1)

Description		Quantity	Owing days			Remarks
			Day	Owing cost	Cost	
Earthwork						
Back hoe	1.0m ³	1	540	13,410	7,241,400	
Wheel loader	1.2m ³	1	540	4,662	2,517,480	
Bulldozer	21 t	1	540	17,370	9,379,800	
Vibration roller	1.0 t	1	540	1,116	602,640	
Compactor	50~60kg	1	540	180	97,200	
Tamper	80kg	1	540	266	143,370	
Pick hammer	-	2	540	50	53,460	
Macadam roller	10~12 t	1	540	596	3,227,040	
Tyre roller	8~20 t	1	540	5,499	2,969,460	
Grader	3.1m	1	540	7,857	4,242,780	
Dump truck	11 t	2	540	5,616	6,065,280	
Dump truck	4 t	1	540	3,681	1,987,740	Abutment 4months 31%
Earthwork total					38,527,650	Approach road 9months 69%
Abutment Total					11,943,572	
					26,584,079	
Pavement work						
Distributor	-	1	180	2,421	435,780	
Chipsereader	-	1	180	535	96,228	
Road sweeper	-	1	180	12,150	2,187,000	
Line maker	-	2	180	239	97,038	
Truck	2 t	1	180	1,512	544,320	
Compressor	3.7m ³			1,278	230,040	
Pavement total					3,590,406	
Approach road Total					30,174,485	
Temporary bridge						
Crawler crane	50 t	1	525	25,650	13,466,250	
Truck crane	25 t	1	525	21,240	11,151,000	
Diesel humer	2.5 t	1	525	9,540	5,008,500	
Vibro humer	40 t	1	525	9,270	4,866,750	
Trailer	32 t	1	525	10,350	5,433,750	
Unic truck	4 t	1	525	3,681	1,932,525	
Truck	10 t	1	525	5,301	3,783,025	
Generater	60KVA	1	525	1,728	907,200	
Total					45,549,000	

表 9.13 機械損料 (2)

Description		Quantity	Owing days			Remarks
			Day	Owing cost	Cost	
FC girder						
Portal crane	60t	2	450	12,690	11,421,000	
Girder hanging	60t	2	450	21,060	18,954,000	
Metal fitting	60t	2	450	191	171,720	
Lateral transfer	60t	2	450	1,404	1,263,600	
Erection girder	-	100	450	493	22,194,000	
Bent	-	12	450	462	2,493,180	
Winch	5t	2	450	12,600	11,340,000	
Hydraulic jack	75t	8	450	1,080	3,888,000	
Hydraulic pump	75t	4	450	881	1,585,980	
Carriage	60t	2	450	1,710	1,539,000	
Roller	60t	10	450	1,395	6,277,500	
Expansion pump	1T19.3	3	450	878	1,185,840	
Rail	-	14.7	450	170	1,125,212	
Cutter	-	1	-	-	292,500	
Bender	-	1	-	-	299,250	
Working table	-	1	-	-	89,100	
Gas cutter	-	1	-	-	34,650	
High speed cutter	-	1	-	-	37,238	
Electric saw	-	1	-	-	66,150	
Disk sander	FD-150A	1	450	191	12,465	
Pilot attachment	-	1	450	44	85,860	
Electric drill	-	1	450	313	19,845	
Grouting mixer	200	1	450	497	140,940	
Grouting pump	30	1	450	896	223,560	
Chain block	5.0t	4	450	516	1,611,900	
Chain block	2.0t	4	450	80	928,260	
Lever block	5.0t	3	450	123	108,135	
Lever block	3.0t	2	450	190	110,970	
Lever block	1.5t	1	450	134	85,455	
Chill hall	3.0t	1	450	215	60,345	
Chill hall	1.6t	1	450	86	96,795	
Pulley	300	5	450	213	194,400	
Pulley	400	5	450	-	479,925	
Total					88,416,774	

表 9.14 機械損料 (3)

Description		Quantity	Owing days			Remarks
			Day	Owing cost	Cost	
Concrete work						
Concrete plant	30m ³ /hr	1	735	13,500	9,922,500	
Cement silo	30t	1	735	1,341	985,635	
Bucket elevator	20t/hr	1	735	900	661,500	
Screw Conveyor	20t/hr	2	735	475	698,544	
Generator	200KVA	1	735	4,158	3,056,130	
Generator	100KVA	1	735	2,178	1,600,830	
Compressor	10.6m ³	1	735	3,564	2,619,540	
Welder	300A	1	735	84	61,520	
Converter	12A	2	735	163	239,463	
Vibrator	40	10	735	143	1,051,785	
Underwater pump	#4	3	735	137	301,644	
Underwater pump	#3	2	735	200	293,706	
Underwater pump	#2	4	735	284	836,136	
Washer	11kw	1	735	754	554,337	
Concrete bucket	0.6	1	735	336	246,740	
Concrete bucket	1.0	1	735	479	351,918	
Truck mixer	4.5m ³	2	735	5,400	7,938,000	
Total					31,419,927	
					7,540,782	Superstructure 24%
					12,567,971	Abutment 40%
					7,226,583	Pier 23%
					4,084,591	In situ concrete pile 13%
In situ concrete pile						
Crawler crane	50t	1	210	25,650	5,386,500	
Truck crane	25t	1	210	21,240	4,460,400	
Vibro hammer	40t	1	210	9,270	1,946,700	
Trailer	32t	1	210	10,350	2,173,500	
Truck	4t	1	210	3,681	773,010	
Truck	10t	1	210	5,301	1,113,210	
Generator	200KVA	1	210	1,728	362,880	
Boat	15t	1	210	7,542	1,583,820	
Float	10t	20	210	1,458	6,123,600	
Welder	150A	1	210	287	60,291	
Winch	5t	3	210	12,600	7,938,000	
Reverse circulation	-	1	210	19,620	4,120,200	
Hammer grab	1500	1	210	27,180	5,707,800	
Hammer crown	-	1	210	4,968	1,043,280	
Underwater pump	-	1	210	1,477	310,149	
Tremie pipe	250	12	210	245	616,896	
Drill pipe	200	12	210	1,206	3,039,120	
Total					46,759,356	

表 9.15 資材損料 (1)

Description	Size	Quantities	Weight	Month	Purchase		Rental		Maintenance		Remarks	
					Unit	Cost	Unit	Cost	Unit	Cost		
1. Temporary Bridge											EL=161.00	
Pile	H350x350x13x19	1904	260.848	24			2,850	17,842,003	3,100	808,629		
Beam	H350x350x13x19	840	115.080	24			2,850	7,871,472	3,100	356,748		
Deck plate	1000x2000x200	1260	236.880	24			600	18,144,000	1,200	1,512,000		
Section steel	I300x90x10	602	26.367			83,000		2,188,461				
	I200x90x 8		17.998			79,000		1,421,842				
	I100x100x10		28.796			73,000		210,378				
	I100x100x10		1.621			350		567				
	FR12x350x310		1.226			150,000		183,900				
	FR16x147x310		1.373			150,000		205,950				
	FR 9x270x310		0.709			150,000		106,350				
	FR12x250x270		0.096			150,000		14,400				
Bolt	EN60, 70xM22		1.040			70,000		72,800				
	HDB(F10T)		1.347			180,000		242,460				
	HFB(F10T)		0.462			170,000		78,540				
	HDB(F10T)		0.412			160,000		65,920				
Sub total			694.245					6,682,568		43,857,475	2,677,377	Total 53,217,420

表 9.16 資材損料 (2)

Description	Size	Quantities	Weight	Month	Purchase		Rental		Maintenance		Remarks
					Unit	Cost	Unit	Cost	Unit	Cost	
2. Platform											EL=155.70
Pile	H350x350x12x19	63	8.631				2,850	590,360	3,100	26,756	
Beam	H350x350x12x19	27	3.699				2,850	253,012	3,100	11,467	
Deck plate	1000x3000x200	48	10.208				600	691,200	1,200	57,600	
Section steel	I300x90x10	6	1.840		83,000	152,720					
	I200x90x 8		0.050		160,000	8,000					
	L100x100x10		0.083		160,000	13,280					
Sub total			24.511			174,000		1,534,572		95,823	
Platform 4hr			98.044			696,000		6,138,288		383,292	Total 7,217,580
3. Landing Pier											EL=160.00
Pile	H350x350x12x19	3045	41.717	24			2,850	2,853,443	3,100	129,323	
Beam	H350x350x12x19	91	12.467	24			2,850	852,743	3,100	38,648	
Deck plate	1000x2000x200	144	27.072	24			600	2,073,600	1,200	172,800	
Section steel	I300x90x10	84	3.201		83,000	265,683					
	I200x90x 8	42	1.273		79,000	100,567					
	L100x100x10	144	2.146		73,000	156,658					
Bolt	HTB(F10T)		0.200		170,000	34,000					
	HTB(F10T)		0.103		160,000	16,480					
Sub total			88.179			573,388		5,779,786		340,770	Total 6,693,944

表 9.17 櫃包輸送費

No.	Item	Quantity	unit	F/T	Packing	Shipping	Ship's cargo	Customs	On land	Total	
										¥	\$
	Mobilization	1.00	sum	4457	¥ 38,674,800	¥ 31,199,000	¥ 47,255,121	\$ 1671	\$ 379,198	117,128,921	380,869.00
	Demobilization	1.00	sum	2916	\$ 138,039	\$ 133,413	\$ 201,568	\$ 1671	\$ 243,771	0	718,462.00
	Sub-total									117,128,921	1,099,331.00
	Reduction										
	Rail	1.00	sum	500	\$ 25,000	\$ 22,876	\$ 41,882		\$ 55,000		- 144,758.00
	H-beam	1.00	sum	880	\$ 44,000	\$ 40,262	\$ 61,992		\$ 96,800		- 243,054.00
	Sub-total										- 387,812.00
	Total									117,128,921	711,519.00

Packing (¥/FT) Case (CA) ¥ 15,850/FT Crate (CR) ¥ 14,250/FT Skid/Bundle (S/B) ¥ 7,650/FT Marking (M) ¥ 4,750/FT
 Shipping (¥/FT) General cargo ¥ 7,000/FT Self-propelled vehicles ¥ 7,000/FT Plants ¥ 7,000/FT
 Ship's cargo (¥/FT) Referred to Estimate Cost.
 Customs (\$/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 On land (\$/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT

表9.18 梱包輸送費内訳(1)

No.	Item	Quantity	unit	F/T	Packing (¥)	Shipping (¥)	Ship's cargo (¥)	Customs (\$)	On land (\$)	Total	
										¥	\$
1	Crawler crane 50t	2	nr	130	M 617,500	910,000	1,992,062		10,400.00	3,519,562	12,071.00
2	Truck crane 25t	2	nr	110	M 522,500	770,000	1,660,051		3,850.00	2,952,551	3,850.00
3	Back hoe	1	nr	54	M 256,500	378,000	691,688		4,320.00	1,326,188	4,320.00
4	Wheel loader	1	nr	44	M 209,000	308,000	309,439		3,520.00	826,439	3,520.00
5	Bulldozer 21t	1	nr	60	M 285,000	420,000	830,025		4,800.00	1,535,025	4,800.00
6	Vibration roller	1	nr	3	M 14,250	21,000	33,027		240.00	68,277	240.00
7	Vibrating compactor	1	nr	3	CR 42,750	21,000	33,027		261.00	96,777	261.00
8	Tamper	1	nr								
9	Pick hammer	2	nr								
10	Diesel hammer	1	nr	6	CR 85,500	42,000	66,055		480.00	193,555	480.00
11	Pile Hammer & head	2	nr	12	CR 171,000	84,000	132,109		960.00	387,109	960.00
12	Vibro pile driver	1	nr	8	CR 114,000	56,000	88,073		640.00	258,073	640.00
13	Boat FRP 15t	1	nr	200	S/BL 530,000	1,400,000	1,652,400		16,000.00	4,582,400	16,000.00
14	Boom of crawler crane	1	sum	30	CR 427,500	210,000	330,270		2,610.00	967,773	2,610.00
15	Generator 175KVA	1	nr	8	CR 114,000	56,000	88,073		696.00	258,073	696.00
16	Generator 100KVA	1	nr	7	CR 99,750	49,000	77,064		609.00	225,814	609.00
17	Generator 60KVA	1	nr	4	CR 57,000	28,000	44,036		348.00	129,036	348.00

Packing (¥/FT) Case (CA) ¥ 15,850/FT Crate (CR) ¥ 14,250/FT Skid/Bundle (S/B) ¥ 7,650/FT Marking (M) ¥ 4,750/FT
 Shipping (¥/FT) General cargo ¥ 7,000/FT Self-propelled vehicles ¥ 7,000/FT Plants ¥ 7,000/FT
 Ship's cargo (¥/FT) Referred to Estimate Cost.
 Customs (\$/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 On land (\$/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT

表 9.19 梱包輸送費内訳 (2)

No.	Item	Quantity	unit	F/T	Packing (¥)	Shipping (¥)	Ship's cargo (¥)	Customs (\$)	On land (\$)	Total	
										¥	\$
18	Compressor	2	nr	6	CR 59,400	42,000	66,055		522.00	167,455	522.00
19	Compressor	1	nr	8	CR 79,200	56,000	88,073		696.00	223,273	696.00
20	Welder 500A+150A	2	nr	}	CA 31,700	14,000	22,018		174.00	67,718	174.00
21	Converter	2	nr								
22	Vibrator	6	nr								
23	Underwater pump	9	nr	}	CA 79,250	35,000	55,046		435.00	169,296	435.00
24	High pressure washer	1	nr								
25	Concrete plant	1	nr	240	CA 2,760,000	1,680,000	2,642,188		20,880.00	7,082,188	20,880.00
26	Cement silo	1	nr	10	CA 158,500	70,000	110,091		870.00	338,591	870.00
27	Bucket elevator	1	nr	5	CA 79,250	35,000	55,046		435.00	169,296	435.00
28	Screw coeveyor	2	nr	5	CA 79,250	35,000	55,046		435.00	169,296	435.00
29	Concrete bucket	2	nr	2	CA 31,700	14,000	22,018		174.00	67,718	174.00
30	Dump truck 11t	2	nr	160	M 760,000	1,120,000	1,092,236		5,600.00	2,972,236	5,600.00
31	Truck mixer	2	nr	160	M 760,000	1,120,000	1,092,236		5,600.00	2,972,236	5,600.00
32	Truck 10t	1	nr	80	M 380,000	560,000	546,118		2,800.00	1,486,118	2,800.00
33	Truck crane 5t	1	nr	45	M 321,750	315,000	364,044		1,575.00	1,000,794	1,575.00
34	Trailer 32t	1	nr	140	M 665,000	980,000	996,031		4,900.00	2,641,031	4,900.00

Packing (¥/FT) ¥ 15,850/FT Crate (CR) ¥ 14,250/FT Skid/Bundle (S/B) ¥ 7,650/FT Marking (M) ¥ 4,750/FT
 Shipping (¥/FT) ¥ 7,000/FT Self-propelled vehicles ¥ 7,000/FT Plants ¥ 7,000/FT
 Ship's cargo (¥/FT) Referred to Estimate Cost.
 Customs (\$/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 On land (\$/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT

表 9.20 梱包輸送費内訳 (3)

No.	Item	Quantity	unit	F/T	Packing (¥)	Shipping (¥)	Ship's cargo (¥)	Customs (\$)	On land (\$)	Total	
										¥	\$
35	Truck 2t	2	nr	50	M 357,500	350,000	324,765		1,750.00	1,032,265	1,750.00
36	Van 2200cc	2	nr	16	M 114,400	112,000	594,612		1,435.00	821,012	1,435.00
37	Mini bus (15 persons)	1	nr	15	M 107,250	105,000					
38	Mini bus (29 persons)	1	nr	20	M 143,000	140,000					
39	Portal crane	2	nr								
40	Girder hanging	2	nr								
41	Metal fitting	2	set	180	CA 2,070,000	1,260,000	1,981,641		15,660.00	5,311,641	15,660.00
42	Lateral transfer	2	nr								
43	Election girder	1	nr								
44	Bent	3	nr								
45	Winch	5	nr								
46	Hydraulic jack	4	nr								
47	HYdraulic pump	4	nr	400	CA 4,600,000	2,800,000	4,403,646		34,800.00	11,803,646	34,800.00
48	Carriage	2	nr								
49	Roller	10	nr								

Packing (¥/FT) Case (CA) ¥ 15,850/FT. Crate (CR) ¥ 14,250/FT Skid/Bundle (S/B) ¥ 7,650/FT Marking (M) ¥ 4,750/FT
 Shipping (¥/FT) General cargo ¥ 7,000/FT Self-propelled vehicles ¥ 7,000/FT Plants ¥ 7,000/FT
 Ship's cargo (¥/FT) Referred to Estimate Cost.
 Customs (\$/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 On land (\$/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT

表 9.21 梱包輸送費内訳 (4)

No.	Item	Quantity	unit	F/T	Packing (¥)	Shipping (¥)	Ship's cargo (¥)	Customs (\$)	On land (\$)	Total	
										¥	\$
50	Chain blick 5t	4									
51	Chain blick 2t	4									
52	Lever block 1.5t	3									
53	Lever block 3t	2		2	CA 31,700	14,070	22,018		174.00	67,718	174.00
54	Lever block 5t	1									
55	Chill hall 1.6t	1									
56	Chill hall 1.6t	1									
57	Pulley (oak) φ 300	5									
58	Pulley (shackle) φ 300	5									
59	Pulley (oak) φ 400	5		2	CA 31,700	14,070	22,018		174.00	67,718	174.00
60	Pulley (shackle) φ 400	5									
61	Derformed reinforcing bar	78.5	ton								
62	PC wire 12T-12.4	36.9	ton		120	S/B 918,000	840,000	1,321,094	13,200.00	3,079,094	13,200.00
63	PC wire 1T-19.3	6.5	ton								

Packing (¥/FT) Case (CA) ¥ 15,850/FT Crate (CR) ¥ 14,250/FT Skid/Bundle (S/B) ¥ 7,650/FT Marking (M) ¥ 4,750/FT
 Shipping (¥/FT) General cargo ¥ 7,000/FT Self-propelled vehicles ¥ 7,000/FT Plants ¥ 7,000/FT
 Ship's cargo (¥/FT) Referred to Estimate Cost.
 Customs (S/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 On land (S/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT

表9.22 梱包輸送費内訳(5)

No.	Item	Quantity	unit	F/T	Packing (¥)	Shipping (¥)	Ship's cargo (¥)	Customs (\$)	On land (\$)	Total	
										¥	\$
64	Sheath φ 65										
65	Sheath φ 35										
66	Fixing equipment	200	nr	80	CA 920,000	560,000	880,729		6,960.00	2,360,729	6,960.00
67	Fixing equipment	780	nr								
68	Rubber bareing	40	nr								
69	Anchor bolt	1	sum								
70	Equipment for tensioning	2	nr								
71	Equipment for main girder fabrication	1	sum		CA 2,875,000	1,750,000	2,752,279		21,750.00	7,377,279	21,750.00
72	Main girder formwork	1	sum								
73	Instruments	1	sum	56	CA 747,500	455,000	715,592		5,655.00	1,918,092	5,655.00
74	Consumption material	1	sum	230	CA 3,645,500	1,610,000	2,532,096		20,010.00	7,787,596	20,010.00
75	Rail	100	t	100	S/B 765,000	700,000	578,340		11,000.00	2,043,340	11,000.00
76	H-beam	880	t	880	S/B 6732,000	6,160,000	9,484,776		96,800.00	22,376,776	96,800.00
77	Steel box	500	t	500	S/B 3825,000	3,500,000	6,407,870		55,000.00	13,732,870	55,000.00

Packing (\$/FT) Case (CA) \$ 103,600/FT Crate (CR) \$ 93,137/FT Skid/Bundle (S/B) \$ 50,000/FT Marking (M) \$ 31,046/FT
 Shipping (\$/FT) General cargo \$ 45,752/FT Self-propelled vehicles \$ 45,752/FT Plants \$ 45,752/FT
 Ship's cargo (\$/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 Customs (\$/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT
 On land (\$/FT)

表 9.23 梱包輸送費内訳 (6)

No.	Item	Quantity	unit	F/T	Packing (\$)	Shipping (\$)	Ship's cargo (\$)	Customs (\$)	On land (\$)	Total	
										(\$)	(\$)
1	Crawler crane 50t	1	nr	130	M	4,036	5,948	13,020	10,400		35,075
2	Truck crane 25t	1	nr	110	M	3,415	5,033	10,850	3,850		23,148
3	Back hoe	1	nr	54	M	1,676	2,471	4,521	4,320		12,988
4	Wheel loader	1	nr	44	M	1,366	2,013	2,022	3,520		8,921
5	Bulldozer	1	nr	60	M	1,863	2,745	5,425	4,800		14,833
6	Vibration roller	1	nr	3	M	93	137	216	240		686
7	Diesel hammer	1	nr	6	CR	559	275	432	480		1,745
8	Pile hammer & head	2	nr	12	CR	1,118	549	863	960		3,490
9	vibro pile hammer	1	nr	8	CR	745	366	576	640		2,327
10	Boom of crawler crane	1		30	CR	2,794	1,373	2,159	2,610		8,936
11	Generator 175KVA	1	nr	8	CR	745	366	576	696		2,383
12	Generator 100KVA	1	nr	7	CR	652	320	504	609		2,085
13	Generator 60KVA	1	nr	4	CR	373	183	288	348		1,192
14	Compressor 3m ³	2	nr	6	CR	388	275	432	522		1,617
15	Compressor 10m ³	1	nr	8	CR	517	366	576	696		2,155
16	Concrete plant	1	nr	240	CA	18,039	10,980	17,269	20,880		67,169
17	Cement silo	1	nr	10	CA	1,036	458	720	870		3,084

Packing (\$/FT) Case (CA) \$ 103,600/FT Crate (CR) \$ 93,137/FT Skid/Bundle (S/B) \$ 50,000/FT Marking (M) \$ 31,046/FT
 Shipping (\$/FT) General cargo \$ 45,752/FT Self-propelled vehicles \$ 45,752/FT Plants \$ 45,752/FT
 Ship's cargo (\$/FT) Sum of Port charge, Customs and Storage charge \$ 1671
 Customs (\$/FT) General cargo \$ 87/FT, Self-propelled vehicles \$ 35/FT, Plants \$ 80/FT, Steel \$ 110/FT
 On land (\$/FT)

表 9.24 梱包輸送費内訳 (7)

No.	Item	Quantity	unit	F/T	Packing (\$)	Shipping (\$)	Ship's cargo (\$)	Customs (\$)	On land (\$)	Total	
										(\$)	(\$)
18	Bucket elevator	1	nr	5	CA 518	229	360		435		1,542
19	Screw conveyor	2	nr	5	CA 518	229	360		435		1,542
20	Dump truck 11t	2	nr	160	B 4,967	7,320	7,139		5,600		25,026
21	Truck mixer 5m³	2	nr	160	B 4,967	7,320	7,139		5,600		25,026
22	Truck 10t	1	nr	80	B 2,484	3,660	3,690		2,800		12,513
23	Truck crane 5t	1	nr	45	B 2,103	2,058	2,379		1,575		8,115
24	Trailer 32t	1	nr	140	B 4,346	6,405	6,510		4,900		22,161
25	Diesel truck 2t	2	nr	50	B 2,337	2,288	2,123		1,750		8,498
26	Van 2000cc	2	nr	16	B 748	732	3,886		1,435		10,038
27	Mini bus (15 persons)	1	nr	15	B 701	686					
28	Mini bus (29 persons)	1	nr	20	B 935	915					
29	Rail	100	t	100	S/B 5,000	4,575	3,780		11,000		24,355
30	H-beam	880	t	880	S/B 44,000	40,262	61,992		96,800		243,054
31	Steel box	500	t	500	S/B 25,000	22,876	41,882		55,000		144,758

表 9.25 設計費

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	
Direct personnel expenses	sum	1.00		2,395,000			
Project manager	sum	1.00		6,015,000			
Bridge engineer	sum	1.00		1,560,000			
Highway engineer	sum	1.00		1,203,000			
Geologist	sum	1.00		936,000			
Surveyor	sum	1.00		2,005,000			
Specification and tender document	sum	1.00		936,000			
Cost estimate	sum	1.00		15,050,000			
Sub-total							
Direct expenses	sum	1.00		4,557,000			
Traveling expenses	sum	1.00		3,621,000			
Investigation expenses	sum	1.00		8,178,000			
Sub-total							
Overhead cost	sum	1.00		15,050,000			L.Cx 100%
Technical administrative expense	sum	1.00		6,020,000			(L.C+O.C)x20%
Total				44,298,000			

表 9.26 設計費内訳 (1)

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		TOTAL (US\$)	REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT		
Direct personnel expense	Grade	Unit Price	Man-Month	Amount				
Position				Amount				
Project manager	2	958	2.5	2,395				
Bridge engineer (A)	3	802	2.5	2,005				
Bridge engineer (B)	3	802	2.5	2,005				
Bridge engineer (C)	3	802	2.5	2,005				
Highway engineer	4	624	2.5	1,560				
Geologist	3	802	1.5	1,203				
Surveyor	4	624	1.5	936				
Specification and tender document	3	802	2.5	2,005				
Cost estimate	4	624	1.5	936				
TOTAL			19.5	15,050				

表 9.27 設計費内訳 (2)

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		TOTAL (US\$)	REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT		
Travelling expenses	Grade	day	Travel cost	Allowance	Hotel charges	Amount		
Position								
Project manager	2	30+0.9 × 15=43.5	258,100 × 1 = 258,100	4,500 × 43.5= 195,750	13,500 × 44= 594,000	1,047,850		
Bridge engineer (A)	3	30+0.9 × 15=43.5	258,100 × 1 = 258,100	3,800 × 43.5= 165,300	11,600 × 44= 510,000	933,800		
Highway engineer	4	30+0.9 × 15=43.5	258,100 × 1 = 258,100	3,800 × 43.5= 165,300	11,600 × 44= 510,000	933,800		
Geologist	3	30	258,100 × 1 = 258,100	3,800 × 30 = 114,000	11,600 × 29= 336,400	708,500		
Surveyor	4	30+0.9 × 15=43.5	258,100 × 1 = 258,100	3,800 × 43.5= 165,300	11,600 × 44= 510,000	933,800		
TOTAL			1,290,500	805,650	2,461,600	4,557,750		

表 9.28 設計費内訳 (3)

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		TOTAL (US\$)	REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT		
Investigation expenses								
① Local labour cost	day	41.0	3,500	143,500				
② Vehicle rental (A)	day	41.0	3,500	143,500				
(B)				287,000				
Sub total								
③ Transport cost		-		-				
④ Materials and equipment		-		-				
⑤ Consumption goods		-		-				
⑥ Printing and filing for B/Q	sum	1.0	99,100	99,100				
Inking for tender drawing	nr	60.0	11,000	660,000				A1 size
Reducing for tender drawings	nr	60.0	130	7,800				A3 size
Printing and filing for tender document (report)	nr	5.0	6,100	30,500				A4 200x 25+ 11.00
(drawings)	nr	5.0	19,500	97,500				A3 120x 110+ 6300
Sub total				894,900				
⑦ Miscellaneous	sum	1.0		2,440,000				Ref. estimate sheet
Total				3,621,000				

表 9.29 設計費内訳 (4)

Item	Printing				Filing			
	Unit	Unit Price	Quantity	Amount	Unit	Unit Price	Quantity	Amount
Design Report	nr	8	500	4,000	nr	5	125	625
Superstructure D/R	nr	8	500	4,000	nr	5	200	1,000
Superstructure B/Q	nr	8	25	200	nr	5	125	625
Substructure D/R	nr	8	400	3,200	nr	5	170	850
Substructure B/Q	nr	8	250	2,000	nr	5	125	625
Accessories D/R	nr	8	150	1,200	nr	5	95	475
Approach road D/R	nr	8	200	1,600	nr	5	110	550
Drawings	nr	45	1,200	54,000	nr	5	800	4,000
Tender Document	nr	8	2,000	16,000	nr	5	350	1,750
Preliminary evaluation report	nr	8	100	800	nr	5	80	400
Evaluation Report	nr	8	100	800	nr	5	80	400
Total	87,800				11,300			
	99,100							

表 9.30 設計費内訳 (5)

	Man-Month										
	6	7	8	9	10	11	Domestic	Site	Total		
Project Manager	■						1.0	1.5	2.5		
Bridge Engineer (A)	■						1.0	1.5	2.5		
Bridge Engineer (B)	□						2.5		2.5		
Bridge Engineer (C)	□						2.5		2.5		
Highway Engineer	■						1.0	1.5	2.5		
Geologist	■						0.5	1.0	1.5		
Surveyor	■							1.5	1.5		
Spec. Writer	□						2.5		2.5		
Cost Estimator	□						1.5		1.5		
Total man-month for detail design							12.5	7.0	19.5		

■ : Domestic

□ : Site

表 9.31 施工管理费

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT	
Direct personnel expenses	sum	1.00		3,353,000			
Project Manager	sum	1.00		30,476,000			
Resident Engineer	sum	1.00		21,840,000			
Highway Engineer	sum	1.00		20,852,000			
Bridge Engineer	sum	1.00		76,521,000			
Sub-total							
Direct expenses	sum	1.00		11,410,000			
Traveling expenses	sum	1.00		2,082,000		54,937.90	
Investigation expenses	sum	1.00		13,492,000			
Sub-total							
Overhead cost	sum	1.00		76,521,000			L.CX 100%
Technical administrative expense	sum	1.00		30,608,000			(L.C+O.C)X20%
Total				197,142,000		54,937.90	

表 9.32 施工管理費内訳(1)

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		TOTAL (US\$)	REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT		
Direct personnel expenses								
Position	Grade	Unit Price	Man-Month	Amount				
Project Manager	2	958	3.5	3,353				
Resident Engineer	3	802	38	30,476				
Highway Engineer	4	624	35	21,840				
Bridge Engineer	3	802	26	20,852				
Total			102.5	76,521				

表 9.38 施工管理費内訳 (2)

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		TOTAL (US\$)	REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT		
Position	Grade		Travel cost	Allowance			Amount	
Position	Grade		Travel cost	Allowance			Amount	
Project Manager	2	30 + 15 + 30 + 30 = 105	258,100 × 4 = 1,032,400	4,500 × 105 = 472,500			1,504,900	
Resident Engineer	3	30 + 30 × 0.9 + 30 × 0.8 × 36 = 921	258,100 × 1 = 258,100	3,800 × 921 = 3,499,800			3,757,900	
Highway Engineer	4	30 + 30 × 0.9 + 30 × 0.8 × 33 = 849	258,100 × 1 = 258,100	3,800 × 849 = 3,226,200			3,484,300	
Bridge Engineer	3	30 + 30 × 0.9 + 30 × 0.8 × 24 = 633	258,100 × 1 = 258,100	3,800 × 633 = 2,405,400			2,663,500	
Total			1,806,700	9,603,900			11,410,600	

表 9.34. 施工管理費内訳 (3)

DESCRIPTION	UNIT	QUANTITY	FOREIGN PORTION (¥)		LOCAL PORTION (US\$)		TOTAL (US\$)	REMARKS
			UNIT PRICE	AMOUNT	UNIT PRICE	AMOUNT		
Investigation expenses								
① Local labour cost								
Typist	M/M	38.0			117.00	4,446.00	4,446.00	
Civil Engineer	M/M	35.0			220.00	7,700.00	7,700.00	
Driver	M/M	38.0			117.00	4,446.00	4,446.00	
Sub total						16,592.00	16,592.00	
② Rental Vehicle	nr	1.0	1,224,165	1,224,165			8,001.08	
Van	nr	1.0			857.00	857.00	857.00	
transportation								
Fuel	ℓ	13,300			0.233	3,098.90	3,098.90	0.233 \$/ℓ
Office rental	M	38.0			850.00	32,300.00	32,300.00	850 \$/M
Sub total				1,224,165		36,255.00	44,256.98	
③ Transport cost	nr	-						200nr/mx 38M
④ Material and equipment	nr	7,600	8	60,800			397.39	for copy
⑤ Communication expense	nr	38.0			55.00	2,090.00	2,090.00	1nr/Mx 38M,
⑥ Printing and filing	nr	266.0	3,000	798,000			5,215.69	55\$/nr
Total				2,082,965		54,937.90	68,552.06	7nr/Mx 38M

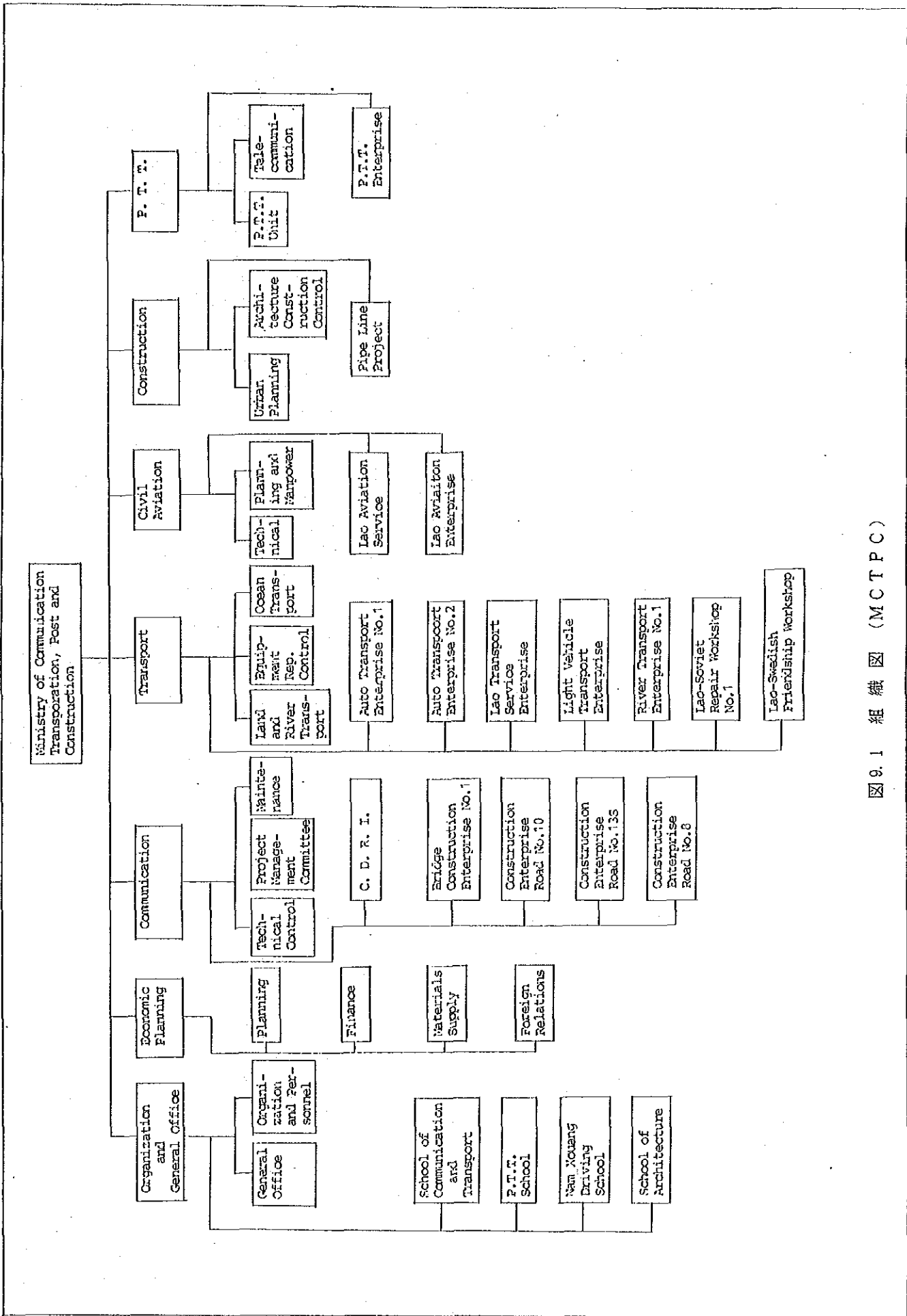


图 9. 1 组 织 图 (MCTPC)

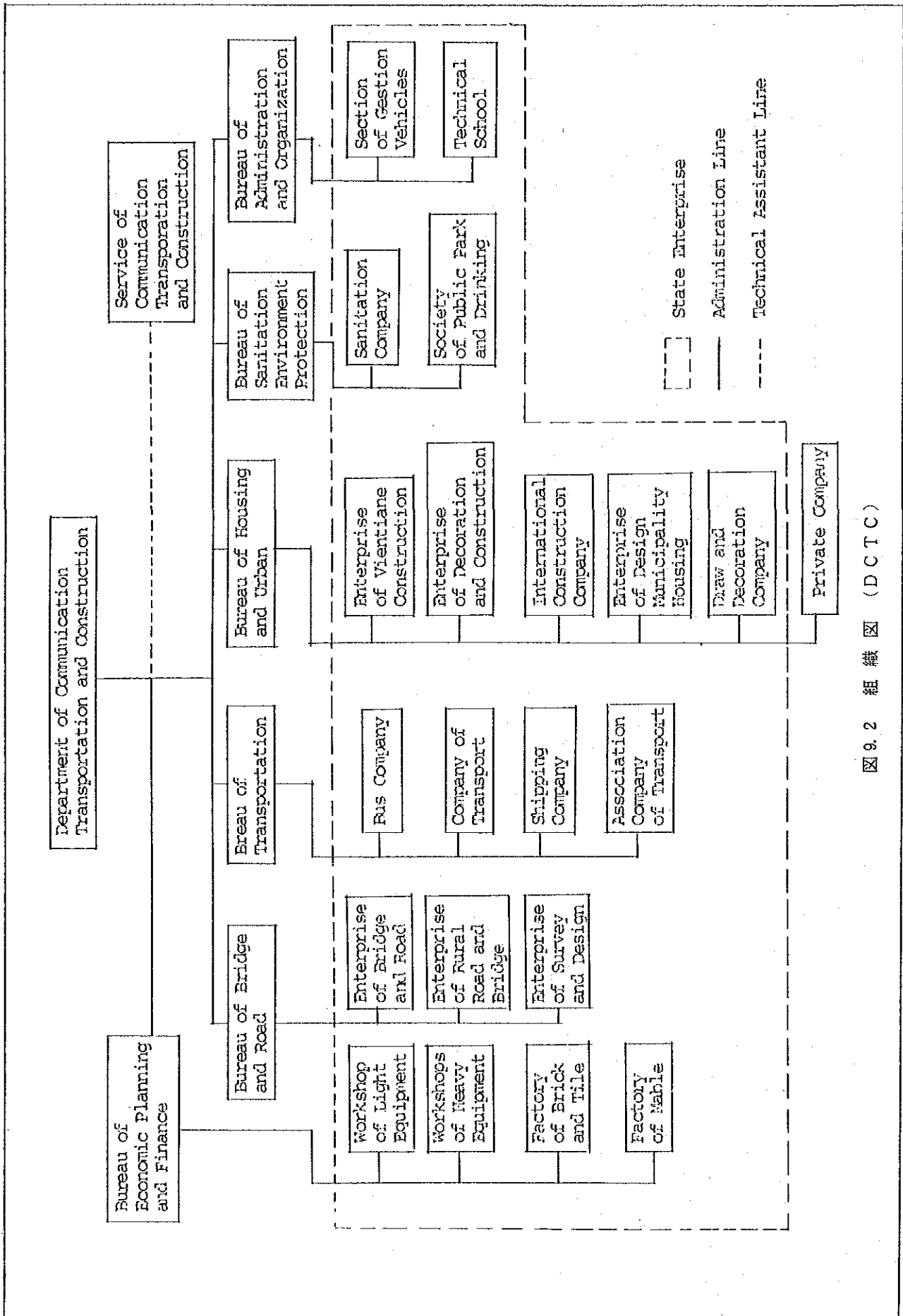


图 9.2 組織图 (DCTC)

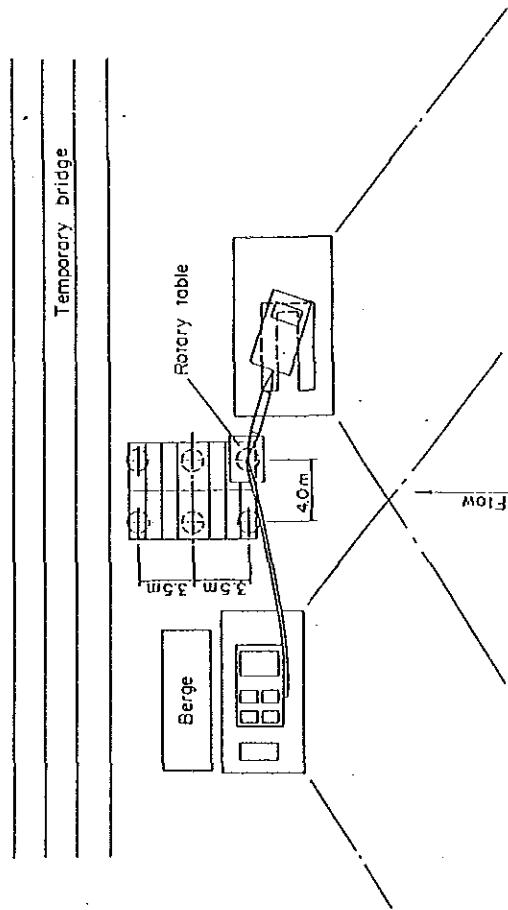
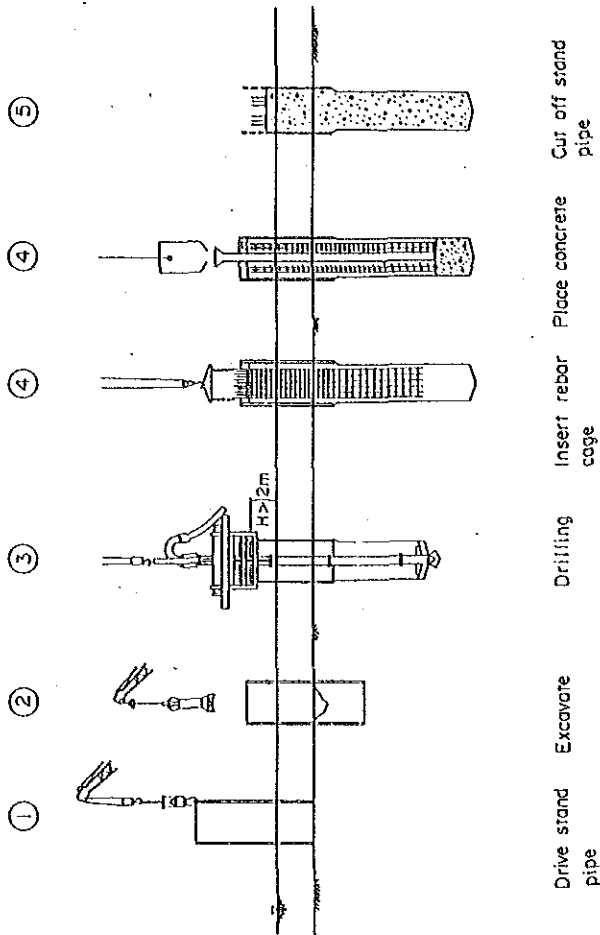
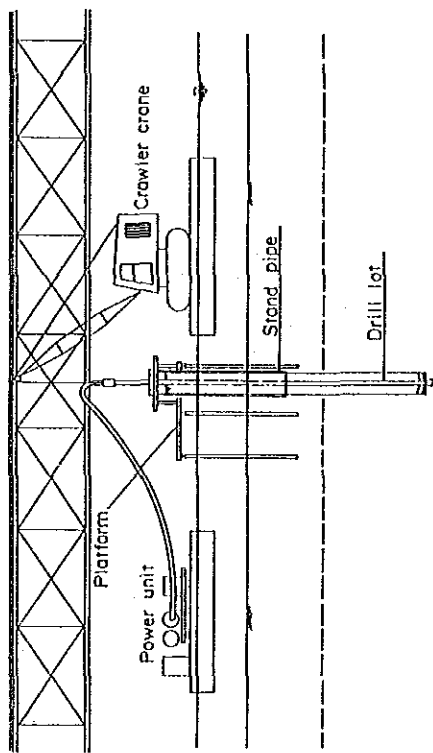


图 9.3 基础杭施工图

Description	Year																																																					
	1st Year												2nd Year												3rd Year												4th Year												5th year					
	Calendar Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
1. Design and Tendering																																																						
Contract of Consultant	▽																																																					
Detailed Design																																																						
Preparation of Tender Documents																																																						
Advertising				▽																																																		
Prequalification																																																						
Approval of Prequalification																																																						
Distribution of Tender Documents																																																						
Tendering																																																						
Evaluation																																																						
Negotiation																																																						
2. Construction																																																						
Preparatory Work & Mobilization																																																						
Temporary Bridge																																																						
Temporary Landing Pier																																																						
Platform																																																						
A1 Abutment																																																						
P1 Pier																																																						
P2 Pier																																																						
P3 Pier																																																						
P4 Pier																																																						
A2 Abutment																																																						
Fabrication of Girder																																																						
Erection of Gider																																																						
Deck slab																																																						
Rivetment Work (Right)																																																						
Rivetment Work (Left)																																																						
Roadway Work (Ridgt.)																																																						
Roadway Work (left)																																																						
Demobilization																																																						

图9.4 工程表

第10章 経 済 評 価

第10章 経済評価

10.1 経済評価

10.1.1 一般事項

本プロジェクトは、国民経済の視点から、次の仮定・条件に基づいて評価される。

- a) プロジェクト・ライフは竣工より20年間とする。
- b) すべての価格は1990年の固定価格で表される。
- c) 為替レートは1990年8月のものを用いる。すなわち、1ドル=715Kip=153円。
- d) 本プロジェクトは1992年に開始し、タゴン橋は1995年の初めに開通する。

経済便益は次の2つに大別される。

- a) 本プロジェクトを実施しない場合に発生する経済費用の節約
- b) 本プロジェクト実施によってもたらされる経済便益

主要な経済便益は、走行経費及び時間費用の節約である。上記2種類の便益は、各々の場合の交通量をベースに推定される。

10.1.2 軽量化される経済便益

1) 本プロジェクトを実施しない場合の経済費用

a) ナムグム河をタゴンで渡る通行人の時間費用

ナムグム河をタゴンで渡るには多少時間がかかる。オートバイ、乗用車及びバスの乗客は時間費用の負担をしいられる。

全国交通調査によると、時間費用は時間あたり平均 3.5セントである。

b) フェリー運休時の経済損失

フェリーは年間10年間運休すると仮定する。オートバイ以外は代替ルートをとらなくてはならない。つまり、余分な走行経費と時間費用が発生する。

c) 10号線から13号線へ転換することによる余計な走行経費と時間費用

ナムグム河の平均渡河時間が一時間を超えたら、一部の交通は10号線から13号線へと移ると思われる。この転換交通は余計な走行経費と時間費用を支払わねばならない。

- d) プロジェクト実施により13号線から10号線へ転換するであろう交通の余計な走行経費と時間費用

タゴン橋の開通により、13号線の一部の交通量は10号線へ転換する。本プロジェクト実施なしでは、この転換するであろう交通量は、余計に走行経費及び時間費用をかけて13号線を走り続けることになる。

- e) フェリーの運行及び補修費用

第4章で述べたように、経済的運行経費は 2,100ドル/月と推定される。

運転開始5年後に、フェリーはドック入りする必要がある。そのコストはフェリー・ボートの価格の20%と言われている。また、ナムグム河両側の乗船路の坂道の補修のため、年間 1,400ドル必要である。

- f) フェリー・ボートの更新

フェリー・ボートの寿命は10年と言われている。新しいフェリーの値段は、造船会社によると約 779,000ドルである。

2) 本プロジェクト実施に伴う経済便益

- a) 誘発・開始交通の走行経費の節約

本プロジェクトの実施により、第5章で述べたように誘発及び開発交通が生じる。消費者余剰の考えに基づいて、それらの交通の走行経費の半分を経済便益と見なすことができる。

- b) フェリー・ボートの残存価値

本プロジェクトの完成に伴い、フェリーは他の地点で使われるようになる。

フェリーの残存価値は 72,000 ドルと推定される。

- c) タゴン橋とアプローチ道路の残存価値

プロジェクト・ライフ収量時のタゴン橋とアプローチ道路の残存価値は、建設費の15%と用地買収費の 100%の合計とする。

10.1.3 経済費用

財務的プロジェクト・コストは、次のような条件・仮定に基づいて経済的成本に変換される。

- a) 税金や補助金のような費用の転換分は除外する。
- b) 建設費の外貨分の5%は輸入関税とみなし除外する。
- c) 国内市場の価格の歪みを調整するため、ラオス国内で調達する建設資材及び建設労働者の費用には、IFADの農村融資プロジェクトのアプライザルを参考にして、標準変換係数として、0.9を乗ずる。
- d) 建設労働者のシャドー・ウェージ・レートは、過去の関連調査を参考にして、0.4とする。

10.1.4 経済評価の結果

プロジェクト・ライフ期間中の経済便益及び費用は表10.1に示すとおりである。経済的内部収益率（EIRR）は11.64%である。8%の割引率で求めた本プロジェクトの純現在価値（NPV）は8.1百万ドルである。また、B/C Ratioは1.62である。

主要な要素を変化させることによりEIRR及びNPVがどのように変わるかをみるため、以下のケースを検討した。

- ケース1-1 初期投資額が10%上昇した場合
- ケース1-2 初期投資額が25%上昇した場合
- ケース2 交通量の増加率が予測値の90%であった場合
- ケース3 スピード施工（工期2年間）を採用した場合

工事費の10%上昇によりEIRRは10.91%に低下する。交通増加率が即値の90%の場合、EIRRは9.19%に低下する。つまり、本プロジェクトは将来交通量に比較的センシティブといえる。また、スピード施工は、国民経済の観点からも3年施工案に劣ると言える。

10.2 その他の経済便益

本プロジェクトは以下のような経済的インパクトももたらす。これらは経済便益との軽量が難しいが、一部は将来交通量の予測のベースとなっている。

a) 農産物の増産

本プロジェクトにより輸送コストが低下し、ナムグム河左岸の農産物の庭先価格が上昇する。価格の上昇は当然農業生産高を高める。その結果、本プロジェクトはナム

グム河左岸の農家の収入を高める。

b) 観光の改善

現在、タラット地区へのバスツアーは行きは13号線を走り、帰りは10号線を通る。タゴンのフェリーが止まると、バスツアーも被害を受ける。本プロジェクトの実施は、予期せぬ遅れなしに行きと異なったルートを走れることを保証し、バスツアーの価値を高める。ひいては観光客の増加につながる。また、本プロジェクトの実施により、タラット-ナムグム湖地域の観光開発を促進するものと思われる。

c) ナムグム河左岸の開発プロジェクトの促進

ラオス政府は簡単にアクセスできる地域に、開発に関するプライオリティーを置いている。具体的には、農務省とヴィエンチャン市は、タゴン橋の開通後、ナムグム河左岸の開発プロジェクトを実施する意向を持っている。これらのプロジェクトのコストは、プロジェクト・サイトへのアクセスの改善により減少する。

d) 市場経済の普及

本プロジェクトによるヴィエンチャンと影響地域の永久的な接続は市場経済システムの普及を加速すると思われる。

10.3 社会的インパクト

経済的インパクトのほかに、本プロジェクトはプロジェクト地域に次のような社会的インパクトをもたらす。

a) タゴン橋はナムグム河の両岸を物理的にだけでなく心理的にもつなげる。

トゥラコム地区からヴィエンチャンまでの心理的距離は、本プロジェクトにより著しく減少する。したがって、トゥラコム地区とヴィエンチャンの間の交通量は大幅に増加する。

b) 本プロジェクトの実施により、一日を通してフェリーの待ち時間は解消される。永久的な両岸の接続は医療のように緊急を要する交通を可能にする。

c) 本プロジェクトにより、バンタゴンは交通の観点から見ると、ターミナルから通過地点へと変わる。フェリー乗り場近くの商店はタゴン橋のたもとに移るものと思われる。商店の構造は簡単なものなので移転費用は僅かである。バンタゴン自体は農産物の集積地として今後も発展するであろう。また、バンタゴンの中心部から通過交通は

姿を消す。

- d) ヴィエンチャンへアクセスの改善と市場経済の普及はナムグム河左岸の生活条件の改善につながると思われる。

表10.1 プロジェクト・ライフ期間中の経済便益及び費用

(in US\$ 1,000)

Year	COST		BENEFIT									
	Construc-tion	Mainte-nance	Normal Traffic	Loss by Diversion no Ferry to Rt.13	Diverted Traffic	Ferry Operation	Generated Traffic	Salvage Value	Sum			
	Time Save	Sum	Time Save	VOC Save	Time Save	O/M Cost	New Ferry	VOC Save	Ferry	Bridge & Road	Sum	
1992	375.7	375.7									0.0	
1993	4,670.5	4,670.5									0.0	
1994	5,225.4	5,225.4									0.0	
1995	3,615.8	3,615.8									0.0	
1996		4.4	5.4	80.5	0.0	1.1	26.3	6.6	36.0		184.3	
1997		4.4	6.4	89.5	0.0	1.4	26.3	7.3			562.5	
1998		4.4	16.7	99.5	0.0	1.6	26.3	8.2			187.5	
1999		4.4	30.2	105.5	177.0	1.9	26.3	9.1			389.1	
2000		4.4	22.0	120.4	66.9	2.3	26.3	10.2			291.7	
2001		4.4	23.4	120.9	454.8	2.7	26.3	11.2			687.0	
2002		77.9	24.9	121.3	881.7	3.2	106.3	12.3			1,202.0	
2003		4.4	26.5	121.8	1,351.4	3.7	26.3	13.5			1,600.5	
2004		4.4	28.3	122.3	1,867.9	4.4	26.3	14.9			2,126.9	
2005		4.4	30.3	122.7	2,435.9	5.2	26.3	16.4			2,705.6	
2006		4.4	32.5	123.2	3,060.4	6.1	26.3	18.0			3,341.9	
2007		4.4	34.9	123.6	3,746.9	7.2	26.3	19.8			4,441.4	
2008		4.4	37.5	124.1	4,501.5	8.4	26.3	21.7			4,810.1	
2009		77.9	40.4	124.5	5,330.7	9.9	26.3	23.9			5,655.0	
2010		4.4	43.6	125.0	6,242.0	11.7	26.3	26.3			6,583.8	
2011		4.4	46.0	125.1	6,905.1	13.1	26.3	28.0			7,259.3	
2012		4.4	48.5	125.3	7,610.9	14.7	106.3	29.8			8,058.4	
2013		4.4	51.2	125.5	8,362.2	16.4	26.3	31.7			8,743.9	
2014		4.4	54.1	125.7	9,161.9	18.4	26.3	33.7			9,558.9	
2015		4.4	57.1	125.8	10,013.0	20.6	26.3	35.9		1,388.7	11,814.8	
Sum	13,887.4	235.0	659.9	2,352.2	72,170.2	1,579.1	800.0	378.5	36.0	1,388.7	80,204.6	

第11章 結論と提言

第11章 結論と提言

11.1 結論

国内総生産

ラオスの経済は1982～1986年の間、比較的早いスピードで成長した。1987年には大規模な干ばつがラオス経済を直撃したが、その後著しい回復を見せ、1982～1989年の年平均経済成長率は4.9%であり、人口成長率を大きく上回っている。

年	1982	1983	1984	1985	1986	1987	1988	1989
GDP (10億 Kip)*	190	196	205	221	244	223	228	265
成長率 (%)		3.0	4.5	7.7	10.4	-8.2	2.1	16.0

注) * : 1988年固定価格

産業部門別のGDPのシェアを見ると、農林業が約60%と最も大きい。工業及びサービス部門はそれぞれ約20%である。運輸、倉庫、通信、卸売及び小売の部門は、5年間にシェアを1%伸ばしている。

交通量

現況交通量調査、及び社会経済指標に基づき推定された将来交通は以下に示す通りである。

年	オートバイ	乗用車	ピックアップ	中型	大型	小型	小型	合計	
				トラック	トラック	バス	バス	単純計	乗用車換算
1990	228	61	58	23	79	14	16	479	576
1996	649	155	144	71	224	27	32	653	1,552
2000	1,172	248	232	121	384	45	53	2,255	2,661
2005	1,766	344	326	178	567	65	75	3,321	3,901
2010	2,948	520	492	288	916	102	117	5,383	6,279
2015	4,021	690	653	393	1,249	139	159	7,304	8,517

概略設計

比較的順調な経済成長の下で、10号線に目を向けるとタゴン河渡河はフェリーに依っているのが現状であり、これが対象地域の社会経済の発展に対し大きな阻害要因となっている。この阻害要因を取り除くためにタゴン架橋計画がある。調査の結果として、架橋位置を含めた路線は代替案として選定されたもののうち、第4案が採用された。橋梁は230mの延長を持つ、5径間のプレストレスコンクリートT桁橋梁であり、下部構造はリバースサーキュレーションドリル工法による杭基礎としている。上部の構成は3.0mの車道を2車線、2.5mの歩道とバルコニーを上流側に持つ総幅員11mである。

工事計画及び概算工事費

工事は雨期を考慮して3年とし、この施工計画に基づいて概算工事費が算出された。算出された工事費を以下に示す。

橋梁工	4,395,000 US\$
道路工	1,333,700 US\$
仮設橋梁工	826,000 US\$
その他工事	463,600 US\$
直接工事費合計	7,018,400 US\$
間接工事費	5,957,400 US\$
用地費	95,200 US\$
設計施工管理費	1,633,800 US\$
予備費	647,900 US\$
合計	15,352,700 US\$

便益

本プロジェクトの経済便益は、本プロジェクトを実施しない場合の経済費用の節約と、本プロジェクト実施によってもたらされる経済便益の合計である。節約される経済費用は、以下のとおりである。

- 1) ナムグム河をタゴンのフェリーで渡る乗客が負担する時間費用
- 2) フェリーの運休による経済損失
- 3) フェリーの待ち時間増加により10号線から13号線へ転換した交通に要する余分な走行経費と時間費用

9.3.2 下部工

1) 仮栈橋

6 m幅員の仮栈橋を、場所打ち杭及び橋脚の施工の為に、E L = 161.00m 付近にナムグム河を横断して仮設する。この仮栈橋は、年間を通じて（可能な限り）資材を右岸から左岸に運搬する目的にも使用される。この仮栈橋はH鋼、Hパイル及び覆工板を用いて仮設され、杭は振動杭打機にて打ち込まれる。この他、E L = 156 m 付近に場所打ち杭の施工のため、各橋脚に総計4基のプラットフォームを設ける。

2) 場所打ち杭

場所打ち杭は橋脚の基礎及び左岸橋台の基礎として施工される。杭径は 1,500mm、杭長は15mとし、リバースサーキュレーションドリル工法により施工される。この施工にはパワーユニットとクレーンを各々別個の台船上設置し、ロータリーテーブルをプラットフォーム上にセットして行う。詳細は図9.3に示す。

この施工順序は以下のとおりである。

- a) 振動杭打ち機によるスタンドパイプ打ち込み
- b) リバースサーキュレーションドリルによる掘削
- c) 検測及びスライム除去
- d) 鉄筋籠の設置
- e) トレミー管によるコンクリート打設

3) フーチング及び橋脚

フーチングは杭基礎の上に建設される。この下端は、水位の上下による乾湿から品質の低下が発生するものを防ぐ意味で、推定低水位である 154.5m 以下の水中にあるものとする。

9.3.3 取付道路

1) 左岸側

約46,000の盛土が必要である。横方向流用盛土はその全数量を賄うに不足している。従って不足分はハットキャン周辺の土取場からの搬入盛土とする。盛土を必要とする地域は軟弱地盤であるため、1日当り10cm程度の盛土速度とする。舗装工は、盛土完了後6ヵ月間圧密沈下安定期間を取った後に行う。又、路床材料として、良

質の材料を選定、使用する。

2) 右岸側

架橋地点へのアクセス道路として、バンナから架橋地点迄の道路が必要である。
又、主桁の製作・保管ヤードとして約40,000㎡の用地がこのアクセス道路に沿って必要となる。これらの作業から発生した残土処理は、周辺の低地に捨土することで解消される。これら右岸側の作業に付添した作業として以下に述べるものがある。

- a) タゴンマーケット周辺のバス停留所の整備
- b) 歩道と側溝の整備
- c) 交差点部の拡幅

9.3.4 工事用アクセス道路

右岸側では、現況のタゴンマーケットから養魚場を經由してタゴン農場へ向かう道路を、初期のアクセス道路として使用する。この現道は6mの車道幅員と両側に1mの路肩を有している。舗装は表面処理に過ぎず、かなり破損していることから、事前の維持管理・補修作業が必要となる。

左岸側では、ナムグム渡河後北約200mに、幅員5mの土道が橋梁仮設地点へ向かっている。バンハイ側での架橋地点へのアクセス道路としては初期段階でこの現道が利用できる。しかし土道でもあり、周辺住民が利用していることから、日常の維持管理が必要である。

9.4 建設資材と機械

9.4.1 ラオスで調達可能な資機材

ラオス国内で調達可能な資機材は以下のとおりである。

1) 資材

砂及びコンクリート用骨材、木材、燃料及び瀝青材

2) 建設機械

ブルドーザ、グレーダ、タイヤローラ、マカダムローラ及びダンプトラック

9.4.2 外国からの持込み資機材

APPENDIX

APPENDIX

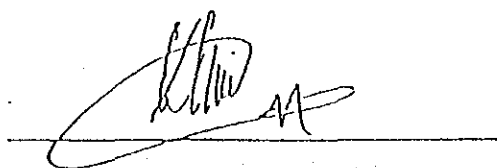
APPENDIX - 1	SCOPE OF WORK
APPENDIX - 2	MINUTES OF MEETING(S/W)
APPENDIX - 3	MINUTES OF MEETING(Inception Report)
APPENDIX - 4	MINUTES OF MEETING(Interim Report-I)
APPENDIX - 5	MINUTES OF MEETING(Interim Report-II)
APPENDIX - 6	MINUTES OF MEETING(Draft Final Report)

APPENDIX - 1
SCOPE OF WORK

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
THA NGON BRIDGE CONSTRUCTION PROJECT
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

AGREED UPON BETWEEN
VIENTIANE MUNICIPALITY
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

DATED THE 13TH SEPTEMBER 1989
AT VIENTIANE



Mr. Khamla SAYAVONGSA
Deputy Director of
Department of Communication,
Transport, and
Construction,
Vientiane Municipality



Mr. Takaaki NAMBU
Leader of the Preliminary
Study Team,
Japan International
Cooperation Agency



In response to the request of the Government of Lao People Democratic Republic, (hereinafter referred to as "the Government of Lao PDR"); the Government of Japan decided to implement the Feasibility Study on Tha Ngon Bridge Construction Project (here after referred to as "the Study"), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study, in close cooperation with the authorities concerned of the the Government of Lao PDR.

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVE OF THE STUDY

The objective of the Study is to conduct feasibility study for the construction project of Tha Ngon Bridge including its approaches.

III. SCOPE OF THE STUDY

In order to achieve the objective mentioned above, the Study shall cover the following items:

1. Data collection and analysis

- (1) Socio-economic data
- (2) Traffic and transport data
- (3) Soil and geological data
- (4) Hydrological data
- (5) Topographic data

JICA

(7)Others

2.Preliminary survey

- (1)Traffic survey
- (2)Topographic survey
- (3)Soil and geological survey
- (4)Hydrological survey
- (5)Other necessary surveys

3.Traffic forecast

- (1)Forecast of future economic activities
- (2)Forecast of future traffic demand

4.Preliminary comparative study of alternatives
(routes, location, bridge type, etc.)

5.Detailed field survey

- (1)Topographic survey
- (2)Soil and geological survey

6.Preliminary design

- (1)Design criteria
- (2)Bridge design
- (3)Approach roads design
- (4)Quantity estimate

7.Planning and scheduling of construction

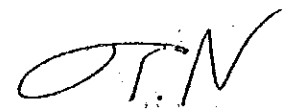
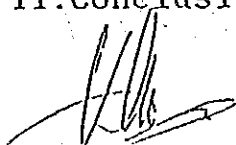
8.Cost estimate

9.Socio-economic evaluation

- (1)Economic analysis
- (2)Social impact analysis

10.Implementation program

11.Conclusions and recommendations



The Study shall be conducted according to the attached tentative schedule.

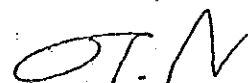
V. REPORTS

JICA shall prepare and submit the following reports in English to the Government of Lao PDR.

1. Inception Report
thirty (30) copies at the commencement of the Study
2. Interim Report
thirty (30) copies within six (6) months after the commencement of the Study.
3. Draft Final Report
thirty (30) copies within eleven (11) months after the commencement of the Study. Vientiane Municipality will submit their comments within one month after receipt of the Draft Final Report
4. Final Report
fifty (50) copies within two (2) months after the receipt of the said comments on the Draft Final Report.

VI. UNDERTAKINGS OF THE GOVERNMENT OF LAO PDR

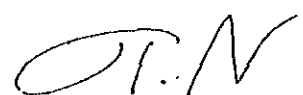
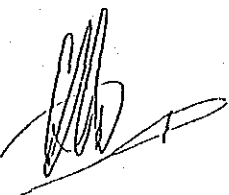
1. To facilitate smooth conduct of the Study, the Government of Lao PDR shall take necessary measures :
 - (1) To secure the safety of the Japanese study team (hereinafter referred to as "the Team")



- (2) To permit the members of the Team to enter, leave and sojourn in Lao PDR for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees
- (3) To exempt the members of the Team from taxes, duties and any other charges on equipment, machinery and other materials brought into Lao PDR for the conduct of the Study
- (4) To exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowance paid to the members of the Team for their services in connection with the implementation of the Study
- (5) To provide necessary facilities to the Team for remittance as well as utilization of the funds introduced into Lao PDR from Japan in connection with the implementation of the Study
- (6) To secure permission for entry into private properties or restricted areas for the conduct of the Study
- (7) To secure permission to take all data and documents (including maps and photographs) related to the Study out of Lao PDR to Japan, and
- (8) To provide medical services as needed. Its expenses will be chargeable on members of the Team.

2. The Government of Lao PDR shall bear claims, if any arises, against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.

3. Vientiane Municipality shall act as counterpart agency to the Team and also as coordination body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study.



4. Vientiane Municipality shall, at its own expense, provide the Team with the followings, in cooperation with other relevant organizations:

- (1) available data and information related to the Study
- (2) counterpart personnel
- (3) suitable office space with necessary equipment in Vientiane
- (4) credentials or identification cards

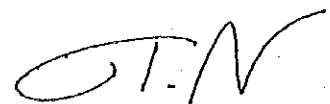
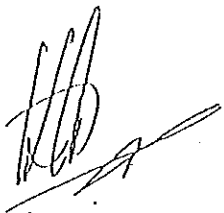
VII. UNDERTAKINGS OF JICA

For the implementation of the Study, JICA shall take the following measures :

1. To dispatch, at its own expense, a study team to Lao PDR.
2. To pursue technology transfer to the Lao counterpart personnel in the course of the Study

VIII. CONSULTATION

JICA and Vientiane Municipality shall consult with each other in respect of any matter that may arise from or in connection with the Study.



ATTACHMENT

TENTATIVE SCHEDULE

Month	1	2	3	4	5	6	7	8	9	10	11	12	13
Work in Laos	[Bar]					[Bar]					[Bar]		
Work in Japan	[Bar]				[Bar]				[Bar]				[Bar]
Report Presentation	IC/R ▲					IT/R ▲					DF/R ▲		F/R ▲

IC/R : Inception Report
 IT/R : Interim Report
 DF/R : Draft Final Report
 F/R : Final Report

OT-N


[Handwritten signature]

APPENDIX - 2
MINUTES OF MEETING(S/W)

MINUTES OF MEETINGS
ON
THE FEASIBILITY STUDY
ON
THA NGON BRIDGE CONSTRUCTION PROJECT
IN
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

BETWEEN
VIENTIANE MUNICIPALITY
AND
PRELIMINARY STUDY TEAM

VIENTIANE, SEPTEMBER 13, 1989



Mr. Khamla SAYAVONGSA
Deputy Director of
Department of Communication,
Transport, and
Construction,
Vientiane Municipality



Mr. Takaaki NAMBU
Leader of the Preliminary
Study Team,
Japan International
Cooperation Agency

In response to the request of the Government of Lao People's Democratic Republic, the Preliminary Study Team of Japan International Cooperation Agency (JICA) visited Lao PDR from September 7 to 14, 1989, to agree on the Scope of Work for the Feasibility Study of Tha Ngon Bridge Construction Project (herein after referred to as "the Study").

The Preliminary Study Team headed by Mr. Takaaki NAMBU carried out the field reconnaissance survey on the Study area and had a series of discussion on the Scope of Work (S/W) with the officials of Lao side headed by Mr. Khamla SAYAVONGSA.

The final meeting was held on September 13, 1989 at the office of the Department of Communication, Transport, and Construction, Vientiane Municipality (hereinafter referred to as "the Department"). The list of attendants is shown in Appendix. Both Japanese and Lao sides agreed on the Scope of Work.

The main issues which were confirmed are as follows;

1. Bridge construction site

Lao side suggested that the location of the bridge could be close to the existing Ferry site.

Both sides agreed that alternative bridge locations (including Lao side's suggestion) would be considered in the course of the Study and be compared from various points of view.

2. Study schedule

Both sides agreed that JICA would inform, as soon as possible after the approval of finance, the time of the commencement of the Study, a list of the equipments to bring to Lao PDR, and the number of the members of the Study Team, so that the Department could prepare the office and take procedures necessary to the Study.

A handwritten signature and the initials "OTV" are present in the bottom right corner of the page.

3. Counterpart personnel and topographic survey

Both sides agreed that the Department would provide the Japanese Study Team with about three counterpart personnel and that the Japanese Study Team would do the topographic survey at its own expense.

4. Office space

Both sides agreed that the Department would provide the Japanese Study Team with the same office that another JICA Study Team (the Feasibility Study on Improvement of Drainage System) was using at that time, or another equivalent office.

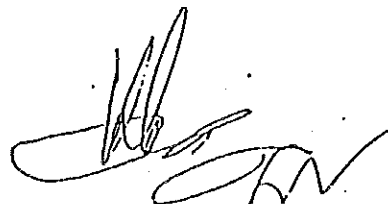
5. Vehicles

Japanese side requested Lao side to provide vehicles with driver for the Japanese Study Team. However, Lao side explained that because of its financial difficulties, the Department could not provide vehicles, and suggested that the Japanese Study Team should bring a 4WD vehicle from Japan, then the Department would provide a driver for that vehicle at its own expense.

Japanese side took note of it and agreed to convey the suggestion of Lao side to JICA headquarters.

6. Training in Japan

Lao side strongly requested Japanese side to accept two trainees in the training program in Japan as a part of technology transfer. Japanese side took note of it and agreed to convey the request to JICA headquarters.

A handwritten signature in black ink, appearing to be a stylized name or set of initials, located in the bottom right corner of the page.

APPENDIX - 3

MINUTES OF MEETING(Inception Report)

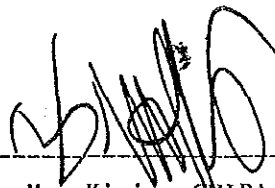
MINUTES OF MEETINGS
ON
THE FEASIBILITY STUDY
ON
THA NGON BRIDGE CONSTRUCTION PROJECT

BETWEEN
VIENTIANE MUNICIPALITY
AND
JICA FEASIBILITY STUDY TEAM

VIENTIANE, FEBRUARY 8, 1990



Mr. Khamla SAYAVONGSA
Deputy Director of
Department of Communication,
Transport and Construction
Vientiane Municipality



Mr. Kimio CRIBA
Team Leader of
The JICA Feasibility Study Team
Japan International
Cooperation Agency

In response to the request of the Government of Lao People's Democratic Republic, the Government of Japan decided to conduct a Feasibility Study on the Project for Tha Ngon Bridge Construction (hereinafter referred to as "the Project"), and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA"). JICA sent the Feasibility Study Team headed by Mr. Kimio CHIBA, to carry out the study from 4th of February 1990.

Following the introduction of all attendants to the meeting by Mr. Khamla SAYAVONGSA for Lao and Mr. CHIBA for JICA respectively, the meeting was opened by the chair of Mr. CHIBA, the Leader of Feasibility Study Team. (hereinafter the Attendants List is attached.)

The JICA Feasibility Study Team submitted the Inception Report and had a series of discussions for exchanging the views and opinions on the Project with the officials concerned of the Government of Lao People's Democratic Republic, at the office of the Department of Communication, Transport and Construction, Vientiane Municipality (hereinafter referred to as "the Department").

As the results of the above, the both sides have agreed and confirmed the following points:

1. JICA Team submitted the Inception Report for the Feasibility Study on the Tha Ngon Bridge Construction Project. Team Leader, Mr. CHIBA explained the process and aims of the study in detail. The Department understood and accepted the Inception Report.
2. The working schedule of the Feasibility Study Team also explained by Mr. CHIBA based upon the Inception Report. The Department agreed and accepted on this matter.

3. Feasibility Study Team submitted questionnaires and explained necessity of the data, information and other required assistance of the Department, for the implementation of the Feasibility Study.

The Department expressed to provide necessary data and information required by the Study Team and also confirmed the UNDERTAKINGS OF THE GOVERNMENT OF LAO PDR mentioned in the Scope of Works which had been signed on 13th September.

4. The Study Team also asked to issue the ID card to secure the member of the Study Team from any kind of objection/protest during the site investigation. The Department (DCTC) agreed and requested necessary personal data and material from member of the Study Team, such Passport Number, Full Name, Permanent Address, Date and Place of Birth etc.

ATTENDANTS LIST

A) THE GOVERNMENT OF LAO/VIENTIANE MUNICIPALITY

1. His excellency, Mr. Sisavath KEOBOUNPHANE
Chairman, Vientiane Municipality
2. Mr. Sithone SIBOUNHEUNG
Vice Minister of Administrative Committee
Director, Dept. of Economic Planning and Finance
Vientiane Municipality
3. Mr. Phila KHAMKOHOMKHAM
Acting Director, Dept. of CTC,
Vientiane Municipality
4. Mr. Khamla SAYAVONGSA
Deputy Director, Dept. of CTC,
Vientiane Municipality
5. Mr. Oudone VATHANAXAY
Officer, Dept. of CTC, Vientiane Municipality
6. Mr. Phomma SIGNANONH
Civil Engineer, chief of Division of Planning and
Finance, Dept. of CTC, Vientiane Municipality
7. Mr. Himmakone MANOTHAM
Vice Minister, Ministry of Communication, Trans-
port, Post and Construction(MCTPC)
8. Mr. Boualay SOUKALOUN
Director, Ministry of Communication, Transport,
Post and Construction(MCTPC)
9. Mrs. Somsanouk VONGSACK
Dept. No2, Ministry of Foreign Affairs
10. Dr. Bountheune MOULASY
Acting Director, Department of Economic External
Relation

ATTENDANTS LIST

B) JICA FEASIBILITY STUDY TEAM

1. Mr. Kimio CHIBA
Bridge Planner, Team Leader of JICA Feasibility Study Team
2. Mr. Sadao HARA
Road Engineer, Member of JICA Feasibility Study Team
3. Mr. Nobuhisa TAIRA
Economist, Member of JICA Feasibility Study Team

C) ADVISORY COMMITTEE

1. Mr. Takaaki NAMBU
Chairman of Advisory Committee
2. Mr. Mitsugu OKUDA
Member of Advisory Committee

D) JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

1. Mr. Shin-ichi MORI
Coordinator of JICA Study Team

E) EMBASSY OF JAPAN

1. Mr. Hirofumi TANIGUCHI
Second Secretary

APPENDIX - 4

MINUTES OF MEETING(Interim Report-I)

MINUTES OF MEETING

1. Date : 27th of June 1990
2. Time : 09:10 am - 12:30 pm
3. Place : Conference room of DCTC
4. Attendants :
 - Lao Government/Vientiane Municipality
 - a. Mr. Phila KHAMKOHOMPHANH
Acting Director, Dept. of CTC
Vientiane Municipality
 - b. Mr. Khamla SAYAVONGSA
Deputy Director, Dept. of CTC
Vientiane Municipality
 - c. Mr. Phomma SIGNANONH
Highway Engineer, Chief of Planning and
Finance Division, Dept. of CTC, Vientiane
Municipality
 - d. Mr. Kambay CHAREUN
Deputy Director, Dept. of Economy, Planning
and Finance, Vientiane Municipality
 - e. Mr. Dapkeo DOUANGPRACHANH
Chief of Bridge and Road Division,
Dept. of CTC, Vientiane Municipality
 - f. Mr. Math SOUNMALA
Project Management Committee,
Dept. of Communication, Ministry of Communi-
cation, Transport, Post and Construction
 - g. Mr. Hom ONE
Department of Communication,
Ministry of Communication, Transport, Post
and Construction

JICA Feasibility Study Team

- a. Mr. Kimio CHIBA
Team Leader of Feasibility Study Team
- b. Mr. Sadao HARA
Road Engineer, Member of the Team
- c. Mr. Nobuhisa TAIRA
Economist, Member of the Team
- d. Mr. Nobuyuki SUZUKI
Bridge Engineer, Member of the Team
- e. Mr. Kazutoshi YOSHITANI
Surveyor, Member of the Team

Advisory Committee

- a. Mr. Mitsugu OKUDA
Acting Chairman of Advisory Committee
- b. Mr. Hirohisa IMAGI
Member of Advisory Committee

Japan International Cooperation Agency

- a. Mr. Shin-ichi MORI
Coordinator

Embassy of Japan

- a. Mr. Hirofumi TANIGUCHI
Second Secretary

5. Itinerary

The meeting was chaired by Mr. Khamla, the Deputy Director of Department of Communication, Transport and Construction (DCTC) at the conference room of DCTC.

The DCTC, Mr. Khamla expressed his gratitude for Japanese Government and also stated welcome the Study Team and Advisory Committee to the Lao PDR.

Mr. CHIBA, the Team Leader introduced new member of the team (Mr. YOSHITANI as Surveyor), and informed about Mr. NISHINAKAMURA as Bridge Engineer coming on the 1st of July. He also expressed his appreciation for kind cooperation in last stage (February and March 1990) and also expressed pleasure to return to the Lao PDR for second stage of the works.

5.1 Interim Report (I)

The Study Team submitted twenty five (25) copies of Interim Report (I) (totally thirty (30) copies) to the DCTC and DCTC received those reports with highly appreciation.

5.2 Confirmation on the Minutes of Discussion

Team Leader, Mr. CHIBA explained again contents of the Interim Report (I) item by item to the DCTC and both parties confirmed the Minutes of Discussion concerning the Interim Report (I), signed on 21st of June between the DCTC and the Study Team.

5.3 Type of Bridge

The Study Team explained the types of bridge, firstly the span of bridge and considerable bridge type by span, as mentioned followings:


5.3.1 Considerable types of bridge by number of span

Types of bridge by number of span were explained as follows.

- 1) Three (3) span bridge
 - a. Continuous prestressed concrete girder bridge
 - b. Continuous steel box girder bridge
 - c. Steel Langer girder bridge with steel girder for both side span

- 2) Four(1) span bridge
 - a. Continuous prestressed concrete box girder bridge
 - b. Continuous steel box girder bridge
- 3) Five(5) span bridge
 - a. Post-tensioning prestressed concrete simple girder bridge
 - b. Continuous steel girder bridge
- 4) Six(6) span bridge
 - a. Post-tensioning prestressed concrete simple girder bridge
 - b. Two set of three(3) span continuous steel girder bridge
- 5) Seven(7) span bridge
 - a. Connected continuous post-tensioning prestressed T-beam bridge
 - b. Three(3) span continuous steel girder and four(4) span continuous steel girder bridge

Among the eleven considerable types of bridge mentioned above, the Study Team will select two(2) or three(3) types of bridge as final alternatives with work flow shown in next page.



WORK FLOW FOR SELECTION OF BRIDGE TYPE

Eleven Alternative Bridge Types

Type of Pier/Foundation

Evaluation

1. Construction Cost
2. Construction Period
3. Ease of Construction
4. Bridge Esthetics
5. Maintenance Aspect
6. Technology Transfer
7. Employment Opportunity
8. Affect on River

Final Selection
Two(2)-Three(3) Alternatives

Evaluation

1. Construction Cost
2. Construction Period
3. Simplicity in Structure
4. Ease of Construction
5. Maintenance Aspect
6. Technology Transfer
7. Employment Opportunity
8. Bridge Esthetics
9. Use of Local Material
10. Affect on River
11. Ease of Attachment of Service Line
12. Smoothness of Bridge Surface
13. Conformity to Approach Road
14. Total Evaluation and Ranking

Recommendation

5.3.2 Type of pier/foundation

Several possible alternatives for foundation are proposed as below.

- a. Spread foundation on dense gravel with coffering by double sheet-piles
- b. Multi-column foundation by reinforced concrete piles or prestressed concrete piles.
- c. Multi-column foundation by reverse circulation drill method concrete piles
- d. Reinforced concrete or prestressed concrete piles with coffering by single sheet-piles
- e. Reverse circulation drill method concrete piles with coffering by single sheet-piles
- f. Steel caisson method

Concerning the above six(6) alternatives for foundation, comparative study will be made. As same of bridge type by span, two(2) to three(3) final alternatives will be selected.

According to the site conditions of the Project, however, Multi-column foundation by reverse circulation drill method may be employed with number of pier two(2) to six(6), among the foundation methods indicated above.

During this stage II in Lao PDR, the Study Team will nominate several types and methods both for bridge type by span and foundation, through discussion with the DCTC. Those alternatives will be brought back to Japan and more deliberate comparison study will be made.

5.3.3 DCTC's Comment(Type, Span and Foundation of Bridge)

The DCTC agreed the Study Team's concept on the bridge types by span and also method of foundation which are considered by the Study Team. The DCTC will have internal meetings with authorities concerned and inform the Study Team of comments, if any.

5.4. Design Standard

Design standards for road and bridge which are being pondered to employ in the Project were explained to the DCTC.

5.4.1 Road design standard

The Study Team presented differences and similarities between Japanese standard and standard previously recommended by SMEC for route 10(see Table 1).

It was clearly expressed that Design standard shall be decided after completion of comparative study among the standards employed in Lao PDR. From view point of actual traffic volume and circumstances of the project site, however, the standard will newly be established with Grade 3, Class 3, Grade 3, Class 1 and Class IV mentioned in attached Table 1. Other figures for elements of horizontal and longitudinal alignment will be fixed based upon the Grade 3, Class 1 of Japanese Standard.

Following standard is tentatively considered.

Item	Value
Average Daily Traffic(for Design)	500 - 4,000
Terrain	Flat
Design Speed(Km/hr)	80
WIDTH	
One Lane(m)	3.0
Shoulder(m)	1.5
Side Walk(m)	
Pedestrian and Bicycle Way(m)	
Roadway(m)	9.0
Bridge-way(m)	7.50(7.00)
Minimum Radius(m)	400
Maximum Gradient(%)	4%
SIGHT DISTANCE	
Overtaking(m)	160
Braking(m)	500

5.4.2 Load for bridge

Considerable loads for bridge for the Tha Ngon Bridge are clarified to the DCTC, as follows.

- | | |
|----------------------|-----------------------|
| a. Dead load | b. Live load |
| c. Impact | d. Prestress |
| e. Creep of concrete | f. Shrinkage |
| g. Earth pressure | h. Hydraulic Pressure |
| i. Up-lift | j. Wind load |
| k. Thermal affect | l. Braking load |
| m. Erection load | n. Collision load |

No Earthquake, snow load, affect by movement of ground and support, wave pressure and centrifugal force are considered.

As same process of road design standard explanation, different and similar points of the design load were explained(see Table 1).

TT-43 load is being used only for bridges which is located near container terminal or where many container trailers are running. TL-20 load is being applied for most bridges on National road in Japan. Because the projected road is Provincial Road and only 20% of actual traffic volume is heavy vehicle, it is understandable that Design Load of TL-20 shall be employed for Tha Ngon Bridge.

Provisional Design Load is as follows.

Design Live Load	TL-20
Axle Load Limit(kgf)	16,000

Table 1 Comparison of Design Standard

	National Road & Provincial Road	National Road	Provincial Road	Provincial Road
Average Daily Traffic(for Design)	500 - 4,000	> 20,000	300 - 1,000	1,000 - 3,000
Terrain	Flat	Hilly	Hilly	Hilly
Design Class	Grade 3, Class 3	Grade 3, Class I	IV	III
Design Speed(km/hr)	60	80	80	60
WIDTH				
One lane(m)	3.0	3.5	3.0	3.0
Shoulder(m)	L=0.75(0.50) R=0.5	L=1.25(0.75) R=0.5	1.5	2.5
Side Walk(m)	1.50(0.75)	1.50(0.75)		
Pedestrian and Bicycle Way(m)	2.00(1.50)	2.00(1.50)		
Roadway(m)	7.5	9.5	9.0	11.5
Bridge-way(m)	7.50(7.00)	9.50(8.50)	7.50-8.20	8.30-9.30
Minimum Radius(m)	200	400		
Maximum Gradient(%)	5%	4%	6%	5%
SIGHT DISTANCE				
Overtaking(m)	75	160		
Braking(m)	250	500		
Design Live Load	TL-20, TT-43	TL-20, TT-43	HS 20-44	ES 20-44
Axle Load Limit(kgf)	16,000 or 13,000	16,000 or 13,000	9,000	9,000

5.4.3 Comment of DCTC for Design Standards

The DCTC fundamentally agreed upon the opinion of the Study Team. The DCTC will hold internal meetings with authorities concerned for this matter and inform the Study Team of comments, if any.

5.5 Request of the DCTC

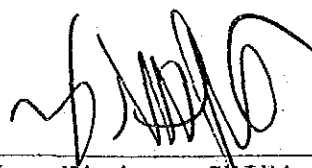
The DCTC requested that after completion of the study, the Study Team would donate the Car and Photocopy Machine to the DCTC which were supplied by JICA. It was, therefore, replied that the Study Team would convey the request of DCTC to JICA.

5.6 Conclusion

The DCTC and the Study Team agreed on the contents of Interim Report(1) and results of this meeting. Two(2) copies of the Minutes of Meeting were made and signed by both parties in Vientiane on 27th June 1990.



Mr. Khamla SAYAVONGSA
Deputy Director of
Department of Communication,
Transport and Construction
Vientiane Municipality



Mr. Kimio CHIBA
Team Leader of
The Feasibility Study Team
Japan International
Cooperation Agency

APPENDIX - 5

MINUTES OF MEETING(Interim Report-II)

MINUTES OF MEETING

1. Project : Feasibility Study on Tha Ngon Bridge Construction Project
2. Date : September 8th, 1990
3. Place : Conference Room of DCTC
4. Attendants :

Lao PDR/Vientiane Municipality
Department of Communication, Transport and Construction
Mr. Phila KHAMKHOHOMPHANH
Acting Director, Department of CTC

Mr. Khamla SAYAVONGSA
Deputy Director, Department of CTC

Mr. Phomma SIGNANONH
Civil Engineer, Chief of Planning and Finance
Division, Department of CTC

Mr. Home ONE
Department of Communication
Ministry of CTPC

The Study Team

Mr. CHIBA Kimio
Team Leader of the Study Team

Mr. HARA Sadao
Member of the Study Team

Mr. TAIRA Nobuhisa
Member of the Study Team

Mr. SUZUKI Nobuyuki
Member of the Study Team

Advisory Committee

Mr. NAMBU Taka-aki
Chairman of the Advisory Committee

JICA

Mr. MORI Shin-ichi

Embassy of Japan

Mr. TANIGUCHI Hirofumi
Second Secretary

5. Itinerary

Meeting was held on 7th and 8th of September 1990, chaired by Mr. Phila in the conference room of DCTC, Vientiane Municipality.

Mr. CHIBA, Team Leader of the Study Team, explained process of the study and results mentioned in the Interim Report(II) to the DCTC.

The Mission which consists of the Study Team, Advisory Committee and JICA confirmed the Minutes of Discussion signed on 4th of September 1990 between the Study Team and DCTC.

DCTC verified said Minutes of Discussion and made comments/requests on the following matters again to the Mission:

- 1) to make a comparison table between the selected route (same as the route proposed in the Interim Report(II)) and right-angled existing route(use as an alternative access road)
- 2) to repave/reseal the existing road between crossing in front of the public market and crossing with the proposed access road(close to the meteorology station)
- 3) to make the top of side wall round or sharp shape to prevent pedestrian from sitting on it
- 4) to make a comparison table among kinds of side wall such as concrete wall, pole and rail, etc.
- 5) to set up a fence or guard-rail between side walk and carriageway for safety of cyclists and pedestrians
- 6) to provide lighting on the bridge
- 7) to consider/check service line space on the bridge (electricity/telephone line, water-supply pipe)

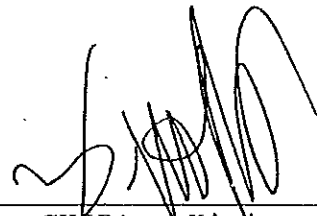
6. Conclusion

The Mission replies that the Study Team takes note of the comments/requests made by DCTC. All the comments/requests made by DCTC will be taken into consideration in the Draft Final Report.

Both parties understood each other and were satisfied with the results from this meeting and signed on 8th of September 1990 in Vientiane, Lao PDR.



Khamla SAYAVONGSA
Deputy Director,
Department of CTC
Vientiane Municipality



CHIBA, Kimio
Team Leader of
the JICA Study Team

APPENDIX - 6

MINUTES OF MEETING(Draft Final Report)

MINUTES OF MEETING

Date : 19th December 1990
Place : DCTC's Conference Room
Re. : Draft Final Report (DFR) of Feasibility
Study on Tha Ngon Bridge Construction
Project

Attendants :

Lao PDR side

DCTC

Mr. Xay PHAKAXOUN
Director of DCTC
Mr. Khamla SAYAVONGSA
Deputy Director
Mr. Phomma SINGNANONH
Civil Engineer

MCTPC

Mr. Bounthong PRASEUTSAK
Civil Engineer, Department of Communication

Japan side

Study Team

Mr. CHIBA Kimio, Team Leader
Mr. HARA Sadao
Dr. TAIRA Nobuhisa
Mr. SUZUKI Nobuyuki

Advisory Committee

Mr. NAMBU Taka-aki, Chairman of Committee
Mr. OKUDA Mitsugu
Mr. IMAGI Hirohisa

JICA

Mr. MORI Shin-ichi

A. General

The meeting was held on 17th and 18th of December at the conference room of Department of Communication, Transport and Construction(DCTC) of Vientiane Municipality, chaired by Mr. Xay.

The Study Team explained contents of the Draft Final Report to the DCTC and DFR was generally accepted by DCTC.

In those meetings, several discussions were made among the Study Team, Advisory Committee and DCTC concerning mainly construction cost and other new idea to use existing road as approach. Followings are details of the discussions.

B. Construction Cost

DCTC agreed upon the construction costs for the Project, mentioned in the DFR. DCTC asked whether the expenses of staff of DCTC for the Project implementation are being included. The Team answered that it is to be discussed at the implementation stage. DCTC accepted the answer.

C. Other Idea to Use Existing Road as Approach

The Team explained that the right angled existing road would need more land acquisition and compensation costs than selected route in the DFR. DCTC requested to involve this explanation in the Main Report.

The Team replied that the idea of using the existing road could not be considered as an alternative route from the view point of the design standards agreed for this project, and thus this comparison study would be mentioned in ANNEX. DCTC agreed on this matter.

D. Separation of Carriageway and Side Walk

DCTC requested the Team to install fence/rail between carriageway and side walk for safety of pedestrians. The Team replied that separation by mound-up sidewalk is, at present, enough for safety of pedestrians. But, in future, it would be considered. Thus both parties agreed that the Team will calculate the weight and prepare necessary space for future installation of fence/rail.

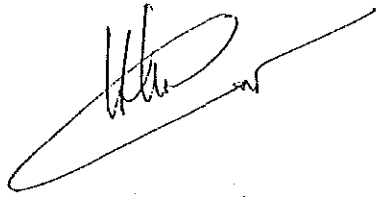
E. Comment(s) on DFR by DCTC

DCTC noted that comment(s) on details of the DFR shall be submitted to the JICA through the Embassy of Japan in Vientiane by January 15th 1991.

F. Conclusion

Finally, DCTC expressed its thanking to the JICA and the Team also expressed appreciation for the full cooperation made by DCTC for the Team through the Study.

On this day 19th December 1990, the Team and DCTC signed on and exchanged this Minutes of Meeting.



Khamla SAYAVONGSA
Deputy Director
Department of
Communication, Transport
and Construction
Vientiane Municipality
Lao P.D.R.



CHIBA Kimio
Team Leader
Feasibility Study on
Tha Ngon Bridge
Construction Project
Japan International
Cooperation Agency

REFERENCE

16

2

ບົດລາຍງານຂອງການປະຊຸມ

ວັນທີ

: 19 ທັນວາ 1990

ສະຖານທີ່

: ຫ້ອງປະຊຸມຂອງ ພະແນກຄົມມະນາຄົມຂົນສົ່ງແລະກໍ່ສ້າງ ກຳແພງ.

ເລື່ອງ

: ສ້າງສະລຸບລາຍງານ ຂັ້ນສູດທ້າຍ ຂອງການສຳຮວດໂຄງການກໍ່ສ້າງຂົວທາງອຸມ.

ລະຫວ່າງຝ່າຍລາວ

ພະແນກຄົມມະນາຄົມຂົນສົ່ງແລະກໍ່ສ້າງ

ທ່ານ ໄຊ ພະກະຊຸນ

ຫົວໜ້າພະແນກ ຄຊກ.

ທ່ານ ສຳຫລັດ ຊາຍາວິງສາ

ຮອງ ຫົວໜ້າພະແນກ

ທ່ານ ພິມມາ ສິມຍະມິນ

ວິຊາການຂົວທາງ

ກ/ຊ ຄຊປກ.

ທ່ານ ບຸນທິງ ປະເສີດສັກ

ວິຊາການຂົວທາງ ກົມຄົມມະນາຄົມ.

ຝ່າຍຍຸບັມ

ຄະນະສຳຮວດ

ທ່ານ ຈິບາ ຄິມິໂອ, ຫົວໜ້າ ຄະນະ

ທ່ານ ສາຮາ ຊາດາໂອ

ທ່ານ ລາອິຮາ ໂມບູຣິຊາ

ທ່ານ ຊຸຊຸກິ ໂມບູງກິ

ຄະນະພັບກຊາ

ທ່ານ ມາມບູ ຕາກາອາກິ, ປະທານຂອງຄະນະ

ທ່ານ ໂອກດາ ມິຈິງ

ທ່ານ ອິນາງິ ອິໂຣອິສາ

ໃຈກັງ

ທ່ານ ໂມຣິ ຊິນອິຈິ

ຫ້ອງໄປ

ການປະຊຸມມີຂຶ້ນໃນວັນທີ 17 ແລະ 18 ຂອງເດືອນ ທັນວາ ທີ່ຫ້ອງປະຊຸມ ຂອງພະແນກຄົມມະນາຄົມຂົນສົ່ງແລະກໍ່ສ້າງ (DCTC) ກຳແພງມະຄອມວຽງຈັນ ໂດຍການເປັນປະທານ ທ່ານ ໄຊ. ຄະນະສຳຮວດໄດ້ຂໍພິບາຍ ສ້າງສະລຸບລາຍງານຂັ້ນສູດທ້າຍ ແລະ ຫ້ອງໄປໃດຮັບຮູ້ໂດຍ

ໃນທີ່ປະຊຸມ, ທຸກຝ່າຍໄດ້ປຶກສາຫາລືກັນເປັນລື້ນ ຄະນະສຳຮວດ ຄະນະຝ່າຍລາວ ມີຄວາມ
ເຫັນນຳກັນກຽດກັບມູນຄ່າການກໍ່ສ້າງ ແລະຄວາມຄິດຂັ້ນໄຫງງວດກັບການໃຊ້ທາງ ທີ່ມີແລ້ວມາ
ເປັນທາງເຂົ້າຫາຂົວ, ລາຍລະອຽດຂອງການປະຊຸມມີດັ່ງນີ້.

ຂ. ມູນຄ່າກໍ່ສ້າງ.

(DCTC) ຕົກລົງເຫັນດີມູນຄ່າຂອງໂຄງການກໍ່ສ້າງທີ່ລະບຸໄວ້ໃນ (DFR) ທາງ DCTC
ດາວນວ່າໃນມູນຄ່າມີໄດ້ຄິດໄລ່ການໃຊ້ຈ່າຍຕ່າງໆຂອງພະນັກງານ (DCTC) ເຂົ້າໃນໂຄງ
ການ ຄະນະ ໃດ້ຕອບວ່າຕ້ອງມີການປຶກສາກັນໃນຂັ້ນຕອນຕໍ່ໄປ (DCTC) ໃດ້ເຂົ້າໃຈຕາມ
ຄຳອະທິບາຍ.

ຄ. ຄວາມຄິດເຫັນກຽດກັບການໃຊ້ຖິ່ນທີ່ມີແລ້ວເຂົ້າໄປຫາຂົວ.

ທາງຄະນະ ໃດ້ອະທິບາຍວ່າມາຈາກທີ່ມີຖິ່ນທີ່ມີແລ້ວ ມີຄວາມຕ້ອງການ ເນື້ອທີ່ດິນ ແລະ
ຄ່າຊົດເຊີຍຫລາຍກວ່າການລ່ອຍກເອົາຖິ່ນໃນ (DFR) (DCTC) ໃດ້ສະເໜີໃຫ້ເອົາ
ການອະທິບາຍເຂົ້າໃນການອະທິບາຍ ປັບບົດລາຍງານຫົວໄຫຍ່.
ທາງຄະນະໄດ້ຕອບວ່າຄວາມຄິດເຫັນໃນການໃຊ້ຖິ່ນທີ່ມີແລ້ວ ອາດຈະເປັນໄປບໍ່ໄດ້ເພາະ
ນັ້ນເປັນພຽງແຕ່ຖິ່ນສຳຮອງໃນການວາງນາດຕະຖານເຂົ້າໃນໂຄງການແລະເຖິງຢ່າງໃດກໍ່ດີການ
ສຶກສາຢຽບຢາງບໍ່ຄວນຈະອ້າງເຖິງ ໃບຊອ້ມພ່າຍຕິດມາ (DCTC) ຕົກລົງເຫັນດີກັບຂັ້ນ.

ງ. ການແບ່ງ ທາງລົດ ແລະ ທາງຮ່າງ

(DCTC) ຂໍອ້າງໃຫ້ຄະນະຕິດຕັ້ງຮ່າວ, ລະຫວ່າງ ທາງລົດ ແລະ ທາງຮ່າງ ສຳລັບຄວາມ
ປອດໄພແກ່ຄົນເດີນໄປມາ, ຄະນະຕອບວ່າການແບ່ງນັ້ນແມ່ນການຄິດທາງຮ່າງໃຫ້ສູງຂຶ້ນ ແລະ
ກໍ່ມີຄວາມປອດໄພແກ່ຄົນຮ່າງໃຊ້ໃນປະຈຸບັນ, ໃນອາມາຄິດຈະມີການພິຈາລະນາກັນດີມີອີກ.
ທັງສອງຝ່າຍເຫັນດີນຳກັນ ກັບທາງຄະນະ ຈະໄດ້ຄິດໄລ່ລະອຽດມາພິຈາລະນາເພີ່ມເຕີມ ແລະ ດຽມບອນ
ທີ່ຈຳເປັນ ເພື່ອການຕິດຕັ້ງ ຮ່າວ ແລະ ລາງ ໃນອາມາຄິດຂັ້ນຕໍ່ໜ້າ.

ຈ. ຄວາມເຫັນດີ (DFR) ຂອງ (DCTC)

(DCTC) ຮ້ອງຄວາມເຫັນອັນລະອຽດທັງໝົດ (DFR) ມັນຈະສະເໜີເຖິງ (JICA)
ໂດຍຕົວນສະຖານພູມດິນຟູງຈັ້ນ ກອນວັນທີ 15 ເດືອນ ມັງກອນ 1991.

ສ. ລົງຄວາມເຫັນສຸດທ້າຍ.

ທ້າຍສຸດ, (DCTC) ສະແດງຄວາມຂອບໃຈຕໍ່ອົງການ (JICA) ແລະ ຄະນະພອ້ມ
ທັງສະແດງຄວາມຊົມເຊີຍໃນການຮ່ວມມືຂອງ (DCTC) ທີ່ໄດ້ສຶກສາລວມກັນຕລອດມາ.
ໃນວັນທີ 19 / 12 / 1990 ທາງຄະນະແລະ (DCTC) ໄດ້ລົງລາຍຊື່ນແລະແລກ
ປຽນບົດບັນທຶກຂອງການປະຊຸມ.

JICA