7. IMPLEMENTATION PROGRAM

7.1 Implementation Principles

The environment of Phatthaya has been so seriously degraded that if no effective countermeasures are taken, tourism in the area would severely affected and the welfare of the residents would also be deteriorated. The proposed Integrated Development Plan for Phatthaya, priority projects as given in Chapters 4 and 6 in particular, should, therefore, be urgently carried out.

In order to bring the priority projects into reality, however, institutional and financial arrangements should firstly be made that are best fit to the implementation of the projects. To work out the implementation plan, special attention are paid to the followings:

i) Implementation organization

- ° Implementation capacity of the public organizations
- ° Importance of coordination and cooperation between the public and private sectors and Central and Local Governments as well as among the various departments and authorities concerned with the development.

ii) Adaptability to the legal framework

iii) Fund raising

- ° Budget allocation
- ° Financial capacity of the Phatthaya City
- ° Utilizing the private sector fund

Considering the urgency of project implementation, the implementation plans are worked out so that the existing administrative framework and financial facilities in hands are utilized as much as possible. Namely, the establishment of new organizations and the measures which necessitate the enactment of new laws that require substantial time period are not sought.

With a view to the efficient and effective implementation of the projects which should serve for the common objective of upgrading the urban environment of Phatthaya and are interdependent each other, the projects should be promoted

as a package of projects and the implementation thereof should be effectively coordinated.

In this chapter, the implementation plan for the package of priority projects will first be proposed in Section 7.3.1. That of the Waterfront Project, which is the first large-scale reclamation project in the country will be explained further in detail in Section 7.3.2, for which various alternatives are envisaged and examined including private participation. That of the Phatthaya Beach Restoration is given in Section 7.3.3.

7.2 Implementation Schedule and Cost Estimation

7.2.1 Implementation Schedule

The implementation schedule of priority projects is planned as shown in Table 7.2.1 based on the following basic principles:

- Projects should be completed as soon as possible before the end of 1996.
- Adequate periods of time for engineering services, financial arrangements and contract approval should be considered before the commencement of construction.
- New projects should be proceeded in parallel with the projects already committed by PWD, PWA, TAT and other agencies.

Basic considerations of the implementation schedule are described hereunder.

① Tourist port

Subsequent to the first phase project already committed by TAT and scheduled to be implemented by the middle of 1993, second phase developments which compose of a excursion boat pier, a terminal building, a jetfoil pier and the boat yard should be commenced for construction from the beginning of 1995 and implemented by the middle of 1996.

② Reclaimed land in South Phatthaya

Engineering services should be started now as soon as possible. The reclamation work could be finished during 1992 and 1993 and the

infrastructure and building works could be carried out during 1993 - 1995. Stagewise development should be carried out in the reclamation work so that the infrastructure work and building construction can follow on the party completed reclamation land.

③ Ta Van pier

Ta Van pier in Ko Lan should be completed by the middle of 1993 when the implementation of the tourist pier in South Phatthaya will be completed.

④ Phatthaya Beach restoration

Beach restoration could be accomplished in the same period of the South Phatthaya reclamation work.

⑤ Sewerage project

Na Klua sewerage and Jomtien sewerage projects are already committed by PWD and expected to be implemented during 1992 and 1993.

Further expansion of the sewerage systems for the Phatthaya town area should be commenced as soon as possible and be implemented until the same year of above projects in order to acquire the efficient improvement of sea water contamination in Phatthaya Beach.

⑥ Rainwater drainage projects

Phatthaya town box culvert project, Phatthaya canal improvement and Jomtien area box culvert should started from the year of 1990 and completed by the year of 1994. Puk Plub canal improvement would take more years because of the land acquisition problems.

⑦ Water supply projects

In order to follow the construction of four reservoirs and a transmission pipeline which are already committed by PWA and expected to be implemented by the end of 1992, the new distribution pipeline should be constructed in the Study Area. Its completion will be around the end of 1994.

In addition to the above projects, the construction of transmission pipeline from the existing Nong-Kho reservoir scheduled to be connected with Nong Pla Lai reservoir in the year of 1994 should be commenced as a new water resources for Phatthaya. Its construction and pumping station as well as distribution pipelines will be finished by the end of 1996.

⑧ Solid waste projects

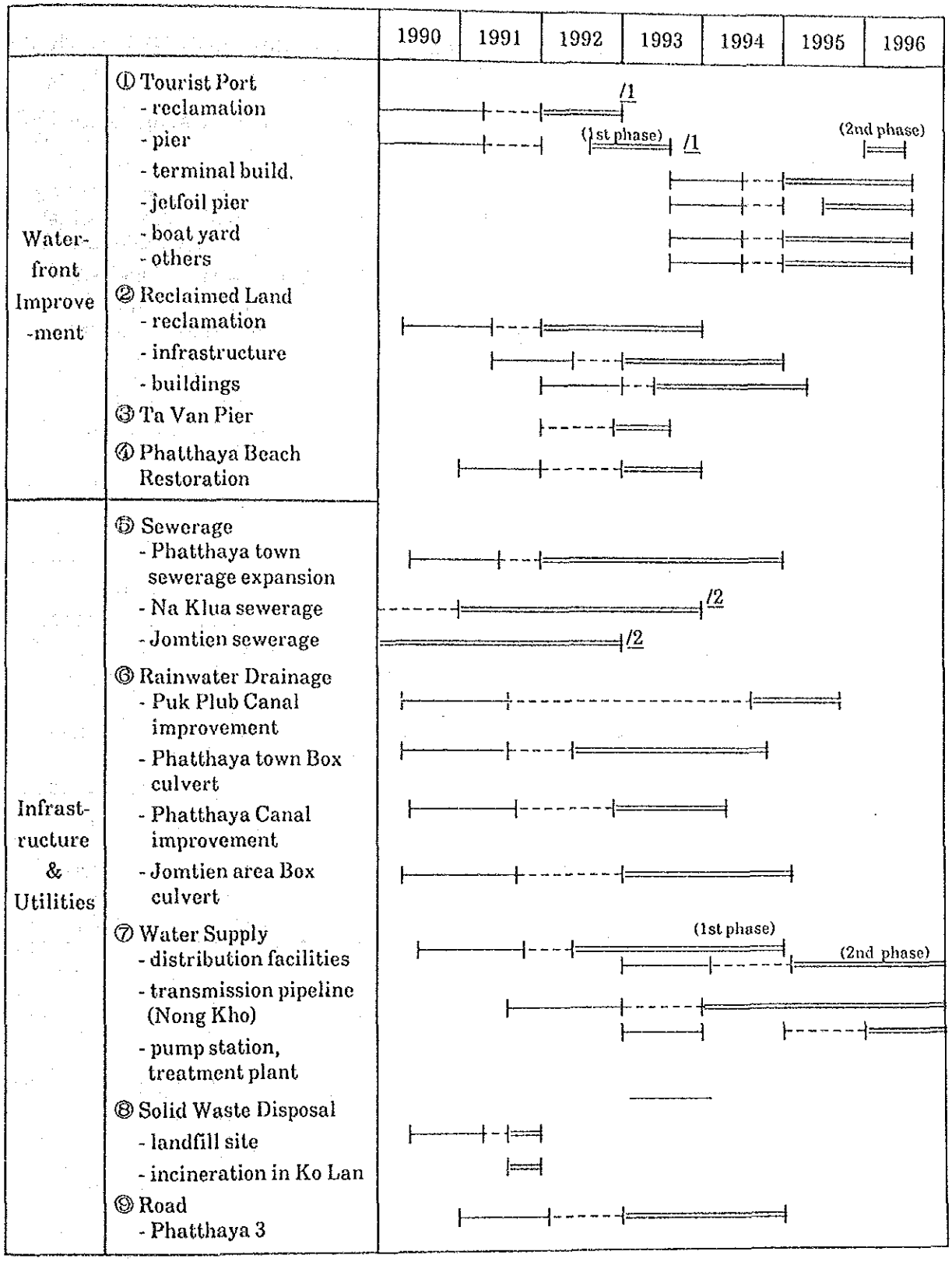
A new sanitary landfill site should be ready by the begging of 1992 in which existing site is foreseen to be filled up.

A incinerator should be installed in Ko Lan immediately.

⑨ Road projects

Construction of Phatthaya 2 road, improvement of Jomtien beach road and Sukhumvit road are already committed by DOH and Phatthaya City. The other roads are expected to be commenced following the above projects and should be completed by the year of 1994.

Table 7.2.1 IMPLEMENTATION SCHEDULE OF SHORT-LIST PROJECTS



Remarks: /1 Project committed by TAT.
/2 Project committed by PWD

Legend: ——— Engineering Design, Environmental Impact Acessment, etc.
- - - - - - - Approval, contract
═══ Construction

7.2.2 Cost Estimation

Total costs of the priority projects amount to 3,548 million Bahts in which 3,369 Bahts is expended on the construction cost and 169 Bahts is on the land acquisition expense. The cost estimation is summarized in following table and detail cost by each project is shown in Table 7.2.2 ~ 7.2.10.

COST ESTIMATION (unit: Million Bahts)

	Project	Total	Construction Cost	Land Acquisition Cost
Waterfront Improvement	1. Tourist Port (Port, Jetfoil berth, Boat yard)	265	265	-
	2. Reclaimed Land (hinter land)	767	767	-
	3. Ta Van Pier	26	26	-
	4. Phatthaya Beach Restoration	120	120	-
	Sub total	1,178	1,178	-
Infrast-ructure & Utilities	5. Sewerage	651	651	-
	6. Rainwater Drainage	250	246	4
	7. Water Supply	1,021	1,021	-
	8. Solid Waste Disposal	135	62	73
	9. Road	303	211	92
	Sub total	2,360	2,191	169
	Total	3,538	3,369	169

Table 7.2.2 CONSTRUCTION COST OF RECLAIMED LAND AND TOURIST PORT (1/2)

(A: Tourist Port) (Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Construction cost	-	-	-	-	-	179,210	82,480	96,730
1. Tourist port	-	-	-	-	-	149,530	67,330	82,200
1) Port facility	-	-	-	-	-	93,970	56,690	37,280
① Reclamation dyke	m	580	27,500	14,700	12,800	15,900	8,500	9,400
② Land fill	m^2	33,000	740	460	280	24,400	15,200	9,200
③ Beach nourishment	m^3	30,000	120	80	40	3,600	2,400	1,200
④ Boat piers	m	390	93,000	58,200	34,800	36,270	22,700	13,570
⑤ Operation build.	m^2	800	6,000	1,800	4,200	4,800	1,440	3,360
⑥ Nav. aids	LS	-	-	-	-	9,000	6,450	2,550
2) Road	-	-	-	-	-	8,100	3,180	4,920
① Access road	m	70	7,800	3,430	4,370	550	240	310
② Sub road	m	470	5,000	1,650	3,350	2,350	780	1,570
③ Pedestrian way	m	400	3,000	990	2,010	1,200	400	800
④ Car parking	m^2	16,000	250	110	140	4,000	1,760	2,240
3) Sewerage (Sewer)	m	240	3,000	5120	2,490	720	120	600
4) Water supply pipe	m	370	2,000	1,200	800	740	440	300
5) Terminal Build.	m^2	9,200	5,000	750	4,250	46,000	6,900	39,100
2. Jetfoil/Hydrofoil berth	-	-	-	-	-	19,800	11,930	7,870
1) Approach trestle	m	160	45,000	24,300	20,700	7,200	3,890	3,310
2) Berthing head	m^2	400	31,500	20,100	11,400	12,600	8,040	4,560
3. Boat Yard	-	-	-	-	-	9,880	3,220	6,660
1) Ramps	m^2	1,800	1,600	720	880	2,880	1,300	1,580
2) Boat yard pavement	m^2	12,000	250	110	140	3,000	1,320	1,680
3) Boat house	m^2	1,000	4,000	600	3,400	4,000	600	3,400
II. Miscellaneous (I × 10%)	-	-	-	-	-	17,920	8,2350	9,670
III. Administration expense (I to II) × 2%	-	-	-	-	-	3,940	1,810	2,130
IV. Engineering service (I to II) × 10%	-	-	-	-	-	19,710	9,070	10,640
V. Physical Contingency (I to IV) × 20%	-	-	-	-	-	44,160	20,320	23,840
Total	-	-	-	-	-	264,940	121,940	143,000

Remarks: /1 Administration buildings such as TAT office, tourist police, etc. are exclusive.

Table 7.2.3 CONSTRUCTION COST OF RECLAIMED LAND AND TOURIST PORT (2/2)

(B: Hinterland Facilities)

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Construction cost	-	-	-	-	-	518,760	168,180	350,580
1. Reclaimed Land	-	-	-	-	-	154,700	92,800	61,900
1) Reclaimed dyke	m	1,800	22,500	12,000	10,500	40,500	21,600	18,900
2) Land fill	m^2	182,000	590	365	225	107,000	66,400	40,600
3) Beach nourishment	m^3	60,000	120	80	40	7,200	4,800	2,400
2. Infrastructure	-	-	-	-	-	48,860	17,600	31,260
1) Road	-	-	-	-	-	26,650	10,030	16,602
① Access main in hinterland	m	170	7,800	3,430	4,370	1,330	580	750
② Access main to 2nd beach road	m	720	7,800	3,430	4,370	5,620	2,470	3,150
③ Sub road	m	2,060	5,000	1,650	3,350	10,300	3,400	6,900
④ Pedestrian way (W = 10m)	m	1,800	3,000	990	2,010	5,400	1,780	3,620
⑤ Bridge	m^2	400	10,000	4,500	5,500	4,000	1,800	2,200
2)Water supply pipe (φ300)	m	2,510	2,000	1,200	800	5,020	3,010	2,010
3) Sewerage (Sewer)	m	1,610	3,000	510	2,490	4,830	820	4,010
4) River improvement (reclaimed land)	m	290	8,000	2,000	6,000	2,320	580	1,760
5) Car parking	m^2	8,900	250	110	140	2,230	980	1,250
6) Park	m^2	32,400	200	56	144	6,480	1,810	4,670
7) Event square	m^2	13,300	100	28	72	1,330	370	960
3. Buildings	-	-	-	-	-	315,200	57,780	257,420
1) Children house (400m^2×1F)	m^2	400	3,000	450	2,550	1,200	180	1,020
2) Library (1,000m^2×2F)	m^2	2,000	5,000	750	4,250	10,000	1,500	8,500
3) Concert hall, Theater (2,000m^2×2F)	m^2	4,000	5,000	1,500	3,500	20,000	6,000	14,000
4) Event hall (2,500m^2 ×4F, Site area = 5,000m^2)	m^2	10,000	5,000	1,500	3,500	50,000	15,000	35,000
5) Art Center (2,500m2 ×4F, Site area = 6,500m^2)	m^2	10,000	5,000	750	4,250	50,000	7,500	42,500
6) Commercial Build. (9,500m^2 ×4F)	m^2	38,000	4,000	600	3,400	152,000	22,800	129,200
7) Restaurant (4,000m^2 ×2F)	m^2	8,000	4,000	600	3,400	32,000	4,800	27,200
II. Miscellaneous (I × 10%)	-	-	-	-	-	51,870	16,820	35,050
III. Administration expense (I to II) × 2%	-	-	-	-	-	11,410	3,700	7,710
IV.Engineering service (I to II) × 10%	-	-	-	-	-	57,060	18,500	38,560
V. Physical Contingency (I to III) × 20%	-	-	-	-	-	127,820	41,440	86,380
Total	-	-	-	-	-	766,930	248,640	518,290

Table 7.2.4 CONSTRUCTION COST OF TA VAN PIER

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Construction cost	-	-	-	-	-	17,870	9,780	8,090
1. Approach	m	300	9,500	5,100	4,400	2,850	1,530	1,320
2. Rock Causeway	m	85	72,000	38,520	33,480	6,120	3,270	2,850
3. Piled pier	m	207	43,000	24,080	18,920	8,900	4,980	3,920
II. Miscellaneous (I × 10%)	-	-	-	-	-	1,790	980	810
III. Administration expense (I to II) × 2%	-	-	-	-	-	390	220	170
IV. Engineering Service (I to II) × 10%	-	-	-	-	-	1,970	1,080	890
V. Physical Contingency (I to IV) × 20%	-	-	-	-	-	4,400	2,410	1,990
Total	-	-	-	-	-	26,420	14,460	11,960

Table 7.2.5 CONSTRUCTION COST OF PHATTHAYA BEACH RESTORATION

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Construction cost	-	-	-	-	-	81,400	53,740	27,660
1. Beach nourishment	m^3	560,000	140	94	46	78,400	52,640	25,760
2. Pavement of pedestrian way	m	2,000	1,000	330	670	2,000	660	1,340
3. Car parking lot (beachside lot)	m^2	4,000	250	110	140	1,000	440	560
II. Miscellaneous (II × 10%)	-	-	-	-	-	8,140	5,390	2,770
IV. Administration expense (I to III) × 10%	-	-	-	-	-	1,790	1,180	610
V. Engineering Service (I to III) × 10%	-	-	-	-	-	8,950	5,910	3,040
VI. Physical Contingency (I to V) to 20%	-	-	-	-	-	20,060	13,240	6,820
Total	-	-	-	-	-	120,340	79,450	40,890

Table 7.2.6 CONSTRUCTION COST OF SEWERAGE AND SEWAGE TREATMENT PROJECT

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Phatthaya Town Sewerage and Sewage Treatment /1								
1. Land Acquisition	m^2	-	-	-	-	-	-	-
2. Construction Costs								
2.1 Land Reclamation	m^2	-	-	-	-	-	-	-
2.2 Sewerage		1				96,885	58,131	38,754
2.3 Sewage Treatment Works		1				100,203	60,120	40,083
Sub Total						197,088	118,251	78,837
3. Engineering & Administration Cost. (2× 12%)						23,650	14,190	9,460
4. Physical Contingency (2+3)× 20%						44,148	26,488	17,660
5. Total						264,886	158,929	105,957
II. Na Klua Sewerage and Sewage Treatment								
1. Land Acquisition	m^2	-	-	-	-	-	-	-
2. Construction Costs								
2.1 Land Reclamation	m^2	30,000	1,275	765	510	38,250	22,950	15,300
2.2 Sewerage		1				58,000	34,800	23,200
2.3 Sewage Treatment Works		1				45,000	33,750	11,250
2.4 Effluent Disposal		1				500	300	200
Sub Total						141,750	91,800	49,950
3. Engineering & Administration Cost. (2×12%)						17,010	11,020	5,990
4. Physical Contingency (2+3) ×20%						31,750	20,560	11,190
5. Total						190,510	123,380	67,130
III. Jomtien Sewerage and Sewage Treatment								
1. Land Acquisition	m^2	-	-	-	-	-	-	-
2. Construction Costs								
2.1 Sewerage	LS	1				91,770	55,060	36,710
2.2 Sewage Treatment Works	LS	1				36,000	27,000	9,000
2.3 Effluent Disposal	LS	1				18,000	13,500	4,500
Sub Total						145,770	95,560	50,210
3. Engineering & Administration Cost. (2 ×12)						17,490	11,460	6,030
4. Physical Contingency (2+3) ×20%						32,650	21,400	11,250
5. Total						195,910	128,420	67,490
Grand Total						651,306	410,729	240,577

Remarks: /1 Assumes Reclaimed Land with South Phatthaya Reclamation Project.

Table 7.2.7 CONSTRUCTION COST OF RAINWATER DRAINAGE PROJECTS

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Land Acquisition (Puk Plub River)	m²	1,300	8,000	-	8,000	3,900	-	3,900
II. Construction Cost	-	-	-	-	-	166,800	100,080	66,720
1. Puk Plub Canal Improvement	-	-	-	-	-	4,950	2,970	1,980
1) Open channel	m	400	8,000	4,800	3,200	3,200	1,920	1,280
2) Box culvert	m	50	35,000	21,000	14,000	1,750	1,050	700
2. Phatthaya Town Box Culvert	m	3,150	40,000	24,000	16,000	126,000	75,600	50,400
3. Phatthaya Canal Improvement (open channel)	m	1,000	8,500	5,100	3,400	8,500	5,100	3,400
4. Jomtien Area								
Box Culvert	-	-	-	-	-	27,350	16,410	10,940
1) Box Culvert-A	m	400	17,000	10,200	6,800	6,800	4,080	2,720
2) Box Culvert-B	m	500	17,000	10,200	6,800	8,500	5,100	3,400
3) Box Culvert-C	m	500	15,000	9,000	6,000	7,500	4,500	3,000
4) Box Culvert-D	m	350	13,000	7,800	5,200	4,550	2,730	1,820
III. Miscellaneous (II × 10%)	-	-	-	-	-	16,680	10,010	6,670
IV. Administration expense (I to III) × 2%	-	-	-	-	-	3,750	2,200	1,550
V. Engineering Service (II + III) × 10%	-	-	-	-	-	18,350	11,010	7,340
VI. Physical Contingency (II to V) to 20%	-	-	-	-	-	41,120	24,660	16,460
Total	-	-	-	-	-	250,600	147,960	102,640

Table 7.2.8 CONSTRUCTION COST OF WATER SUPPLY PROJECTS

(1st phase)

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Construction Cost						690,410	436,000	254,410
1. Pipeline	-	-	-	-	-	268,010	155,530	112,480
1) 100 mm	m	137,230	345	-	-	47,340	27,510	19,830
2) 150 mm	m	28,600	474	-	-	13,560	7,870	5,690
3) 200 mm	m	12,000	804	-	-	9,650	5,600	4,050
4) 250 mm	m	1,800	1,034	-	-	1,860	1,080	780
5) 300 mm	m	25,100	1,391	-	-	34,910	20,250	14,660
6) 400 mm	m	22,100	2,204	-	-	48,710	28,250	20,460
7) 500 mm	m	6,200	3,026	-	-	18,770	10,890	7,880
8) 600 mm	m	6,800	3,941	-	-	26,800	15,550	11,250
9) 700 mm	m	5,900	7,125	-	-	42,040	24,390	17,650
10) Pipe bridge & road crossing	LS	-	-	-	-	24,370	14,140	10,230
2. Facilities for high land	-	-	-	-	-	10,500	6,860	3,640
1) Booster pump	unit	1	3,600,000	2,660,000	940,000	3,600	2,660	940
2) Reservoir (3,300 cu m)	unit	1	6,900,000	4,200,000	2,700,000	6,900	4,200	2,700
3. Raw water transmission pipeline		-	-	-	-	328,800	220,300	108,500
1) 900 mm	m	22,100	10,772	-	-	238,061	-	-
2) 600 mm	m	6,400	5,740	-	-	36,736	-	-
3) 5700 mm	m	5,200	4,653	-	-	24,196	-	-
4) Pipe bridge & road crossing	LS	-	-	-	-	29,807	-	-
4. Pump station	-	-	-	-	-	23,700	15,360	8,340
1) Pump station	-	-	-	-	-	13,200	8,960	4,240
- Large pump 1 unit	unit	1	4,600,000	-	-	4,600	3,400	1,200
- Small pump 1 unit	unit	1	2,600,000	-	-	2,600	1,900	700
- Pump house	sq m	300	20,000	-	-	6,000	3,660	2,340
2) Reservoir	LS	-	-	-	-	10,500	6,400	4,100
5. Treatment plant	-	-	-	-	-	59,400	37,950	21,450
1) Civil works	unit	1	33,300,000	-	-	33,300	-	-
2) Building & other house	unit	1	3,970,000	-	-	3,970	-	-
3) Elevated tank	unit	1	2,020,000	-	-	2,020	-	-
4) Reservoir (4000 cu m)	unit	2	8,400,000		-	16,800	-	-
5) Installation	LS		-	-	-	3,690	-	-
II. Miscellaneous (I × 10%)	-	-	-	-	-	69,040	43,600	25,440
III. Administration expense (I + II) × 2%	-	-	-	-	-	15,190	9,590	5,600
IV. Engineering Service (I + II) × 10%	-	-	-	-	-	75,940	47,960	27,980
V. Physical Contingency (I to IV) × 20%	-	-	-	-	-	170,110	107,430	62,680
Total	-	-	-	-	-	1,020,690	644,580	376,110

Table 7.2.9 CONSTRUCTION COST OF SOLID WASTE DISPOSAL PROJECTS

(Initial Cost of Sanitary Landfill Phase-1) (Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Land Acquisition (Site)	rai	135	500,000	0	500,000	67,500	0	67,500
(Access)	rai	5	1,000,000	0	1,000,000	5,000	0	5,000
II. Construction cost	-	-	-	-	-	28,637	7,846	20,791
Site clearance	m^2	140	1,600	160	1,440	224	22	202
Excavation	cu m	290,000	30	15	15	8,700	4,350	4,350
Clay liner	cu m	67,600	80	16	64	5,408	1,082	4,326
Leachate piping & gravel	m	1,300	250	0	250	325	0	325
Leachate pond	NO.	3	1,000,000	200,000	1800,000	3,000	600	2,400
Leachate manhole	NO.	3	30,000	0	30,000	90	0	90
Pump	NO.	1	500,000	400,000	100,000	500	400	100
Gas vent	LS	1	400,000	360,000	40,000	400	40	360
Site Drainage	m	2,000	800	0	800	1,600	0	1,600
Access Road	m^2	8,000	240	48	192	1,920	384	1,536
In-site Road, parking	m^2	4,000	240	48	192	960	192	768
Fende & gate	m^2	2,000	900	0	900	1,800	0	1,800
Site office	m^2	100	5,000	0	5,000	500	0	500
Weigh bridge (with house)	LS	1	1,200,000	0	1,200,000	1,200	0	1,200
Maintenance house	m^2	200	4,000	0	4,000	800	0	800
Monitoring well	NO.	4	30,000	0	30,000	120	0	120
Utilities	LS	1	400,000	200,000	200,000	400	200	200
Planting	LS	1	50,000	0	50,000	50	0	50
Personal computer	NO.	2	120,000	108,000	12,000	240	216	24
Software	LS	1	400,000	360,000	40,000	400	360	40
III. Equipment	-	-	-	-	-	22,900	22,900	-
Bulldozer (140 HP)	NO.	2	4,500,000	4,500,000	0	9,000	9,000	0
Compactor (140 HP)	NO.	1	5,400,000	5,400,000	0	5,400	5,400	0
Wheel loader (140 HP)	NO.	1	4,500,000	4,500,000	0	4,500	4,500	0
Dump truck (20 TON)	NO.	2	2,000,000	2,000,000	0	4,000	4,000	0
IV. Engineering & Administration Cost (II) × 10% + (III) × 2%						3,322	1,243	2,079
V. Physical contingency ((II) + (III) + (IV)) × 20%						10,970	6,400	4,570
Total						133,329	38,389	94,940

(Incinerator for Ko Lan) (Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Construction cost Incinerator	LS	1	1,000,000	900,000	100,000	1,000	900	100
II. Miscellaneous (I × 2%)						100	90	10
III. Administration expense (I + II) × 2%						22	20	2
IV. Physical contingency (I to III) × 20%						224	202	22
Total						1,346	1,212	134
Grand Total						134,675	39,601	95,074

Table 7.2.10 CONSTRUCTION COST OF ROAD PROJECTS

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Unit Price (Baht)			Amount (1,000 Baht)		
			Total	F/C	L/C	Total	F/C	L/C
I. Land Acquisition	-		-	-	-	211,000	-	211,000
1. Phatthaya 3								
1) North-Central Phatthaya	m	1,900	-	-	-	78,960	-	78,960
2) Central-South Phatthaya	m	1,750	-	-	-	36,000	-	36,000
3) South Phatthaya-Mountain	Rd.m	1,500	-	-	-	47,590	-	47,590
4) Mountain Rd.- Reclamation	m	800	-	-	-	-	-	
5) Phatthaya Soi 17	m	1,400	-	-	-	48,450	-	48,450
II. Construction Cost	-	-	-	-	-	53,510	23,550	29,960
1. Phatthaya 3								
1) North-Central Phatthaya	m	1,900	7,720	3,400	4,320	14,670	6,460	8,210
2) Central-South Phatthaya	m	1,750	6,750	2,970	3,780	11,810	5,200	6,610
3) South Phatthaya-Mountain	Rd.m	1,500	7,910	3,480	4,430	11,870	5,220	6,650
4) Mountain Rd.- Reclamation	m	800	7,130	3,140	3,990	5,700	2,510	3,190
5) Phatthaya Soi 17	m	1,400	6,760	2,970	3,790	9,460	4,160	5,300
III. Compensaton Phatthaya 3 (Central - South Phatthaya)	LS	-	-	-	-	5,600	-	5,600
IV. Miscellaneous (II × 10%)	-	-	-	-	-	5,350	2,350	3,000
V. Administration expense (I to IV) × 2%	-	-	-	-	-	5,510	520	4,990
VI. Engineering service (II + IV) × 10%	-	-	-	-	-	6,450	2,590	3,860
VII. Physical contingency (II to VI) × 20%	-	-	-	-	-	15,280	5,800	9,480
Total	-	-	-	-	-	302,700	34,810	267,890

7.3 Implementation Program

7.3.1 Overall Program

1) General

The situation in Phatthaya has already reach critical stage. To revive Phatthaya as a resort for the people of Thailand as well as foreigners and to add the significant role of ESB regional center, all the proposed projects should be implemented as presented in this chapter. It is strongly advised that every effort should be made to even accelerate the proposed implementation schedule, in particular emergency projects including sewerage, solid waste disposal and waterfront projects.

(1) Enhancement of Working Group for Phatthaya under ESB Sub-Committee

Established Working Group for Phatthaya

Considering the serious environmental condition of the Phatthaya City area today, Minister of the Ministry of Interior instructed the appointment of a working group to control/remedy the pollution problem of the water bodies within Phatthaya City communities in March, 1990 under the Sub-Committee for Administering the Development of the Communities, Social and the Environmental Aspects within the Eastern Seaboard under ESB Development Committee. According to the instruction, its scope and function are as follows:

"The Working Group for controlling/remedying the pollution problem of the water bodies of Phatthaya City communities, shall have the power and duties to propose a policy, guideline, work plan, budgetary plan and various measures relevant to the control/remedy of the pollution problem of the water bodies of Phatthaya City communities including the supervision of the implementation, as well as the coordination of the work in remedying the pollution problem of the water bodies of Phatthaya City communities, to correspond with one another in a systematic way, capable of achieving the target set, including the appointment of a Specific Working Group to assist in the performance as deemed necessary, and the outcome of the implementation shall be reported to the Sub-Committee for Administering the Development of the Community, Social and the

Environmental Aspects within the Eastern Seaboard, periodically, according to suitability".

According to the instruction, the Working Group shall comprise:

1. The Under-Secretary of the Ministry of Interior	as Chairman of the Working Group
2. The Secretary-General of the Department of Local Administration	as Vice-Chairman of the Working Group
3. The Secretary-General of the Public Works Department	as Vice-Chairman of the Working Group
4. The Director-General of the Land Department	as Working Group Member
5. The Director of the Departmnet of Town and Country Planning	as Working Group Member
6. Director, Policy and Planning Department, Ministry of Interior	as Working Group Member
7. Governor, Regional Water Works Authority	as Working Group Member
8. Representative of the National Economic & Social Development Board	as Working Group Member
9. Representative of the National Environment Board	as Working Group Member
10. Representative of the Ministry of Public Health	as Working Group Member
11. Representative of the Budgetary Office	as Working Group Member
12. Representative of the Harbour Department	as Working Group Member
13. Representative of the Fishery Department	as Working Group Member
14. Representative of the Tourism Authority of Thailand	as Working Group Member
15. Governor, Chonburi Province	as Working Group Member
16. Director, Local Government Division	as Working Group Member
17. Under-Secretary of Phatthaya City	as Working Group Member
18. Deputy Director-General Deapartment of Local Administration & Secretary	as Working Group Member & Secretary

(2) Working Group for Upgrading the Environment of Phatthaya

As stated in the previous section, a appropriate working group has already been set up within ESB Development Committee for coping with the water pollution problem in the Phatthaya City. To eradicate the various problems with water pollution as one component prevailing in the Phatthaya City and its neighboring areas, it is proposed that the Working Group should be enhanced as follows:

Objective Area

Considering that the development has been spreading out of the Phatthaya to the adjacent area, particularly to the south and degradation of environment threatens, the objective area for the Working Group should be enlarged to encompass the neighboring area up to Bang Sare to the south.

Scope and function

Considering the varied nature of the environmental degradation in Phatthaya, scope and function of the working group should be widened to cover the followings:

- Rainwater drainage and flood prevention
- Water supply
- Solid waste disposal
- Road development
- Port and jetty development
- Waterfront development

The following scope should be included:

- Coordination among the central departments and state authorities, among Central, Provincial and Phatthaya City Governments for the efficient execution of the projects.

- Working out the plans to secure private sector involvement including investment and promotion thereof.

- Explanation of the necessity and impacts of the projects, hearing of the opinions and needs of the local community and the people concerned

with the Phatthaya development and reflecting them on the implementation of the projects.

- Demarcation of the responsibilities and power of the organizations concerned with regard to the implementation of the projects.

- Confirmation of funding sources including budgets for the projects and coordination among the organizations as well as promotion of additional financial facilities.

Members

Working Group should be augmented corresponding to the widened scope and function with DOH as one additional member. To ensure stronger coordination with the private sector, participation of the representatives of the private sector as observers in the meetings whenever appropriate is recommended.

2) Responsibilities for Execution and Management of the Projects

Considering the urgency of the implementation of the priority projects, it is proposed that the present implementation mechanism should fully be utilized in order to expedite their implementation without altering the current work division among the Central Government departments, State Authorities and PCG. Responsibilities for the project implementation should be assumed by respective organizations shown in Table 7.3.1.

It is recommended that the augmented Working Group (Working Group for Upgrading the Environment of Phatthaya) should prepare an authorized implementation plan for the development and upgrading the environment of Phatthaya, based on the proposals and recommendations made in the "Master Plan Study for the Development of Phatthaya Area, JICA".

The Plan should be approved by the Sub-Committee and ESB Committee and financial arrangements should be made by relevant ministries, departments and authorities. Action should also be taken by the private sector in coordination of the public sector.

3) Financial Arrangement

As given in Section 7.2, total costs of the priority projects, which should be disbursed with the coming 7 years: 1990 - 1996, amount to 1,179 million bahts, comprising 465 million bahts of foreign currency component and 714 million bahts of local currency component which is summarized:

(Unit: Million Bahts)

Project	FC	LC	Total
Waterfront Improvement/1 Infrastructure & Utilities	464.6	713.9	1,178.5
Total			

Remarks; /1: Including Ta Van Pier and Phatthaya Beach Restoration.

The annual fund requirement of the priority projects are given in Table 7.3.2. The annual average fund requirement during 1990 - 1996 or until the mid target year of the Study is estimated at 505 million bahts which far exceed these in the last decade. The existing financial facilities in hand should, therefore, be enhanced substantially and fully utilized for funding the projects as well as establishing new measures for fund raising.

More specifically, the following measures are proposed to be taken:

i) Major infrastructure development in Phatthaya has been undertaken by the Central Government departments and State Authorities using their budgets. In order to accelerate the development which is badly needed to revive Phatthaya as the second biggest tourist resort in the country as well as to serve as the business center of ESB region, it is proposed that their budget allocation to Phatthaya should substantially be increased to meet the requiremnt.

ii) The special grant from the Central Government which shall be used to cover development expenses of the Phatthaya City is proposed to be augmented sharply from the present level of 30 to 40 million bahts per annum. This should be used to cover the costs of the sanitary landfill site and incineration projects and Phatthaya 3 road construction.

iii) As recommended in Chapter 5, Environment Conservation tax is proposed to be introduced, revenue of which would supplement the

priority project costs. This tax should be a locally-levied tax, revenue by which become an income of the Phatthaya City.

iv) In case any surplus arises from the Waterfront Improvement Project, i.e., Tourist Port and Reclaimed Land., it should be used for supplementing the fund for the priority projects.

Except the Waterfront Project, the development costs and operation and maintenance costs should be financed mainly through the Central Government budget and partly by the Phatthaya City as shown in Table 7.3.3, according to the division of responsibility proposed in the previous section. As shown in the table, Central Government budget required for financing the construction of the priority projects is estimated at 1,949 million bahts, while that of Phatthaya City is estimated at 437.2 million bahts. Namely, about 82% of the total fund requirement of the priority projects excluding the Waterfront Project, should be met by the Central Government and the rest of 18% by the Phatthaya City.

Table 7.3.1 RESPONSIBLE ORGANIZATIONS FOR PRIORITY PROJECTS

Priority Project	Planning	Design	Construction	O&M and Management
Water Supply:				
° Water transmission facilities	PWD	PWD	PWD	PWD
° Distribution facilities	PWA	PWA	PWA	PWA
Sewerage	PWD/	PWD/	PWD/	PCG
° Sewers	PCG	PCG	PCG	
° Treatment plants				
Drainage	PWD/	PWD/	PWD/	PCG
° River improvements	PCG	PCG	PCG	
° Box culverts				
Solid Waste	PCG	PCG	PCG	PCG
° Sanitary landfill site				
° Ko Lan incinerator				
Roads	DOH/	DOH/	DOH/	DOH/
° Phatthaya 3	PCG	PCG	PCG	PCG
Waterfront Improvement /1	PCG/ PWD/2	PCG/ PWD/2	PCG/ PWD/2/ PRV	PCG/ PRV
Phatthaya Beach Restoration	PCG (TAT)/ PWD/2	PCG (TAT)/ PWD/2	PCG (TAT)/ PWD/2	PCG
Ta Van Pier	TAT/ HD	TAT	TAT/ PWD/2	PCG

Remarks; /1 For adopted case
/2 Technical assistance

Table 7.3.2 CASHFLOW OF INVESTMENT COSTS OF OVERALL PRIORITY PROJECTS

(million Bahts)

		1990	1991	1992	1993	1994	1995	1996	FC	LC	Total
Water-front Improve-ment	① Tourist Port										
	- reclamation - pier	5.6	2.8	71.8	17.0	0.5	16.3	24.9	83.8	55.1	138.9
	- terminal build. - jetfoil pier - boat yard - others	-	-	-	5.2	5.1	72.7	43.0	438.1	87.9	126.0
	② Reclaimed Land										
	- reclamation	8.5	8.5	105.8	105.9	-	-	-	137.2	91.5	228.7
	- infrastructure	-	3.6	1.8	33.4	33.4	-	-	26.0	46.2	72.2
	- buildings	-	-	34.7	107.8	215.6	107.9	-	85.6	380.4	466.0
	③ Ta Van Pier	-	-	-	26.4	-	-	-	14.5	11.9	26.4
	④ Phatthaya Beach Restoration	-	9.0	-	111.3	-	-	-	79.4	40.9	120.3
	Sub-Total	14.1	23.9	214.1	407.0	254.6	196.9	67.9	464.6	713.9	1,178.5
Infrast-ructure & Utilities	⑤ Sewerage										
	- Phatthaya town sewerage expansion	3.5	8.8	80.5	89.5	82.6	-	-	168.9	106.0	264.9
	- Na Klua sewerage	-	50.7	76.0	63.8	-	-	-	123.4	67.1	190.5
	- Jomtien sewerage	27.5	71.4	71.4	25.6	-	-	-	128.4	67.5	195.9
	⑥ Rainwater Drainage										
	- Puk Plub Canal improvement	0.3	0.2	-	-	7.3	3.4	-	4.4	6.8	11.2
	- Phatthaya town box culvert	6.9	7.0	43.1	86.2	43.1	-	-	111.8	74.5	186.3
	- Phatthaya Canal improvement	0.5	0.5	-	11.6	-	-	-	7.6	5.0	12.6
	- Jomtien box culvert	1.5	1.5	-	9.3	28.1	-	-	24.2	16.2	40.4
	⑦ Water Supply										
	- distribution facilities	8.8	13.3	55.2	110.4	118.8	52.6	52.6	240.0	171.7	411.7
	- transmission pipeline (Nong Kho)	-	12.1	24.0	-	150.0	150.0	150.0	325.7	160.4	486.1
	- pump station, treatment plant	-	-	-	9.1	-		113.8	78.8	44.1	122.9
	⑧ Solid Waste Disposal						-				
	- landfill site	1.3	131.9	-	-	-		-	38.4	94.8	133.2
	- incineration in Ko Lan	-	1.3	-	-	-	-	-	1.2	0.1	1.3
	⑨ Road										
	- Phatthaya 3	-	3.2	-	149.8	149.7	-	-	34.8	267.9	302.7
	Sub Total	50.3	301.9	350.2	555.3	579.6	206.0	316.4	1,277.6	1,082.1	2,359.7
Total		64.4	325.8	564.3	962.3	834.2	402.9	384.3	1,742.2	1,796.0	3,538.2

Table 7.3.3

DISTRIBUTION OF CONSTRUCTION COSTS OF PRIORITY PROJECTS EXCEPT WATERFRONT IMPROVEMENT AMONG PUBLIC ORGANIZATIONS

PROJECT	Construction Cost (Million Bahts)	Organizations to Bear the Cost	
Water Supply	1,020.7	PWA/PWD	
° Water transmission facilities			
° Treatment plant			
° Distribution facilities			
Sewerage	651.3	PWD	
° Sewers			
° Treatment plants			
Drainage	250.6	PWD	
° River improvements			
° Box culverts			
Solid Waste Disposal	134.5	PCG	
° Sanitary landfill site			
° Incinerator in Ko Lan			
Road	302.7	PCG	
° Phatthaya 3			
Ta Van Pier	26.4	TAT	
Total	2,386.2	Central Gov.	1,949.0
		PCG	437.2

Table 7.3.4 DISTRIBUTION OF CONSTRUCTION COSTS FOR WATERFRONT IMPROVEMENT PROJECT AMONG PRIVATE ENTERPRISE AND PUBLIC BODIES (1/4)

(A: Tourist Port) (Dec. 1989 Constant price)

Item	Unit	Q'ty	Total (1,000 Bahts)	Organization to Bear Cost
1. Tourist port	-	-		
1) Port facility	-	-	138,926	TAT
① Reclamation dyke	m	580	(23,507)	
② Land fill	m^2	33,000	(36,073)	
③ Beach nourishment	m^3	30,000	(5,322)	
④ Boat piers	m	390	(53,622)	
⑤ Operation build.	m^2	800	(7,096)	
⑥ Nav. aids	LS	-	(13,306)	
2) Road	-	-	11,975	PCG
① Access road	m	70	(813)	
② Sub road	m	470	(3,474)	
③ Pedestrian way	m	400	(1,774)	
④ Car parking	m^2	16,000	(5,914)	
3) Sewerage	m	240	1,064	PWD
(Sewer)				
4) Water supply pipe	m	370	1,094	PWA
5) Terminal Build.	m^2	9,200	68,006	PRV

Remarks ; PRV signifies private investor.

Table 7.3.5 DISTRIBUTION OF CONSTRUCTION COSTS FOR WATERFRONT IMPROVEMENT PROJECT AMONG PRIVATE ENTERPRISE AND PUBLIC BODIES (2/4)

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Total (1,000 Bahts)	Organization to Bear Cost
2. Jetfoil/Hydrofoil berth	-	-	29,272	PRV
1) Approach trestle	m	160	(10,644)	
2) Berthing head	m^2	400	(18,628)	
3. Boat Yard	-	-	14,607	PRV
1) Ramps	m^2	1,800	(4,258)	
2) Boat yard pavement	m^2	12,000	(4,435)	
3) Boat house	m^2	1,000	(5,914)	

Remarks; PRV signifies private investor.

/1 Administration buildings such as TAT office, tourist police, etc. are excluded.

Table 7.3.6 DISTRIBUTION OF CONSTRUCTION COSTS FOR WATERFRONT IMPROVEMENT PROJECT AMONG PRIVATE ENTERPRISE AND PUBLIC BODIES (3/4)

(B: Hinterland Facilities) (Dec. 1989 Constant price)

Item	Unit	Q'ty	Total (1,000 Bahts)	Organization to Bear Cost
4. Reclaimed Land	-	-	228,708	PCG
1) Reclaimed dyke	m	1,800	(59,875)	
2) Land fill	m^2	182,000	(158,189)	
3) Beach nourishment	m^3	60,000	(10,644)	
5. Infrastructure	-	-	57,393	
1) Road	-	-	39,400	PCG
① Access main in hinterland	m	170	(1,966)	
② Access main to 2nd beach road	m	720	(8,309)	
③ Sub road	m	2,060	(15,228)	
④ Pedestrian way (W = 10m)	m	1,800	(7,983)	
⑤ Bridge	m^2	400	(5,914)	
2) Water supply pipe (ø300)	m	2,510	7,422	PWA
3) Sewerage (Sewer)	m	1,610	7,141	PWD
4) River improvement (reclaimed land)	m	290	3,430	PWD
6. Car parking	m^2	8,900	3,297	PRV
7. Park	m^2	32,400	9,580	PCG
8. Event square	m^2	13,300	1,966	PRV

Table 7.3.7 DISTRIBUTION OF CONSTRUCTION COSTS FOR WATERFRONT IMPROVEMENT PROJECT AMONG PRIVATE ENTERPRISE AND PUBLIC BODIES (4/4)

(Dec. 1989 Constant price)

Item	Unit	Q'ty	Total (1,000 Bahts)	Organization to Bear Cost
9. Buildings	-	-	465,992	
1) Children house (400m^2 x 1F)	m^2	400	1,774	PCG
2) Library (1,000m^2 x 2F)	m^2	2,000	14,784	PCG
3) Concert hall, Theater (2,000m^2 x 2F)	m^2	4,000	29,568	PRV
4) Event hall (2,500m^2 x 4F, Site area = 5,000m^2)	m^2	10,000	73,920	PRV
5) Art Center (2,500m^2 x 4F, Site area = 6,500m^2)	m^2	10,000	73,920	PRV
6) Commercial build. (9,500m^2 x 4F)	m^2	38,000	224,717	PRV
7) Restaurant (4,000m^2 x 2F)	m^2	8,000	47,309	PRV

7.3.2 Waterfront Improvement Project

1) General

The Waterfront Improvement Project (the Project) is the first large-scale reclamation project ever carried out in Thailand and there exists some ambiguity in the legal proceedings required for its implementation. Before the implementation of the Project, detailed study should be carried out for the appropriate legal proceedings as well as the in-depth study on the technical and financial viability of the Project. In this Master Plan Study, preliminary study is conducted to work out possible alternatives together with the study on the legal proceedings and institutional and financial arrangements.

The alternative implementation plans are compared from legal, institutional and financial viewpoints as well as from social and political points of view.

It should be noted that the alternatives presented in this Study are by no means exhaustive but should be considered a few possible cases for possible implementation.

At present, TAT is carrying out a feasibility study on the Phatthaya Tourist Jetty for which TAT budget has already been secured for implementation. The feasibility study is scheduled to be completed around May 1990 which is after the submission of the Draft Final Report of this Master Plan Study. This Master Plan, therefore, has prepared a project plan : Waterfront Improvement Project, which encompassed a tourist jetty as one component based on the preliminary discussion and exchange of views with TAT. It should be noted that the project plan is a master plan drawn without detailed technical investigation and in-depth financial and institutional studies. After the completion of the feasibility study, therefore, the waterfront improvement plan should be modified accordingly.

2) Legal, Institutional and Financial Arrangements

(1) Legal proceedings

i) Filling by private investment

There are two principal types of legal options governed by the nature of the investment on filling works.

Navigation in Thai Waters Act, B.E. 2456 and amended by Announcement of the Revolutionary Party No. 50 dated January 19, 18.E. 2515 gives a power to use the sea area to the Director-General of Harbour Department (HD), Ministry of Communication, who is the "Harbour Master". Relevant sections of the Act for the waterfront project are referred to as below:

Section 117 - Any construction projecting over, in and under the water of river, canal, swamp, reservoir or lake where people use as common path, or where people commonly use, or the sea in Thai waters is prohibited, except an approval of the Harbour Master.

Section 119 - Depositing rock, gravel, sand, soil, mud, or any dirt including oil, and chemicals to river, canal, swamp, reservoir or lake where people use as common path, or where people commonly use, or the sea in Thai waters, which cause them shallowed or being sedimentary or dirty and polluted is prohibited, except an approval of the Harbour Master.

Section 120 - The Habour Master is responsible to protect and digging water channel, shipping line, river, canal and the sea in Thai water. Digging, improving, changing them are prohibited, except and approval of the Harbour Master.

Accordingly, an application shall be made to HD for approval of filling the sea at South Phatthaya.

The application shall provide sufficient information including:

- Scale/area
- Planned land use
- Environmental impact
- Filling cost
- Feasibility/Profitability

Environmental Impact Assessment report shall be attached to the application. HD will refer to NEB and NEB will review it. If the assessment is perfect, review will be completed within 90 days. Otherwise supplemental information and data would be requested by NEB.

When application become complete and review of EIA report is finished by NEB, the investor will be allowed to start filling the sea.

After the reclamation works are completed, Director General of Land Department will be given a power to protect this reclaimed land by Section 8 of the Act of Promulgating Land Code, B.E. 2497. The status of the land will be "state-owned public land". In order to use the land for private purpose together with public purpose as envisaged in the Waterfront Improvement Project, a Royal Decree must be issued by King, through Cabinet and Parliament with the initiation by Land Department, MOI as prescribed in the Act:

"If lands of the public domain used in common by the public and no longer so used or if the state provides substitute land for use in common by the public, such lands may be withdrawn from their status as public domain by Royal Decree which shall include a map showing the area to be affected".

The private investor, through PCG, shall make a request to the Land Department to draft the said Royal Decree.

After the public domain status is withdrawn, the land may be given to a public body for management by issuing a Ministerial Regulation of MOI as stipulated in Section 11 of the Act that;

"In arranging for the utilization of state land according to the provisions of the previous section, the Minister may assign to another public body arrangements for utilization for the state or local development in accordance with the rules and procedures prescribed in Ministerial Regulations."

The land may be conceded or leased by person with given Ministerial Regulation, as said in Section 12 of the Act that:

"State land over which no one has possessory rights may be given by concession, granted or made available for use for a limited time by the Minister in accordance with the rules and procedures prescribed in Ministerial Regulations."

For example, after the public domain status is withdrawn, PCG can be given the power for the management of the land by a Ministerial

Regulation of MOI. PCG may then concede the right of use of or lease the land to the private investor who carried out the filling.

It is not clear whether or not it is legally allowed that the private investor may be given the ownership of the reclaimed land on which they invested under the existing legal framework. Enactment of a new law may be necessary.

During the initial stage of the legal proceedings, it may be desirable or even required that Waterfront Development project should be prepared by the committee comprising representatives of Phatthaya City, and relevant agencies, such as National Environment Board, Public Work Department, Tourism Authority of Thailand, Harbour Department, Ministry of Interior. Then the Phatthaya City submits the project to Interior Minister through Chonburi Provincial Government for being initially approved with the consent of the *Minister of Communication and the National Environment Board.*

After the initial approval, the interior Minister should submit the project to be approved by the Cabinet. If approved, the project is ready to be implemented.

ii) Filling by governments budget

In case that the filling is carried out by means of the budget of any government, Central Government or PCG, the status of the reclaimed land shall be "state property" under the Ministry of Finance. The power of management may be given to the public body or private sector by the State Property Committee under Section 6 of the State Property Act, B.E.2518 that:

"The State Property Committee shall have the duty to lay down policies, principles and methods of safe-guarding, maintaining, using and obtaining benefit form the use of state property."

Delegation of a power to manage or even granting ownership can be done by issuing a Ministerial Regulation of MOF, by Section 6 and Section 8 of the State Property Act B.E. 2518 stipulating that:

"The principles and methods prescribed by the State Property Committee shall be announced as Ministerial Regulations," and

"Transfer of ownership of state property, only in sofar as it concerns state-owned public property for the executive use of state shall be affected through an act, the transfer of other state properties shall be in accordance with the principles and methods prescribed in the Ministerial Regulations ..., "respectively.

(2) Institutional and Management Arrangements

i) Project preparation and filling the sea

For the effective implementation of the Project, it is recommendable or required any case that Project Preparation Committee should be established which comprises the departments and authorities concerned including:

- MOI
- HD
- NEB
- PWD
- TAT
- Chonburi Provincial Government
- PCG

Filling the sea or land reclamation can be done either by private sector or public sector. Phatthaya City may set up a juristic company by APCA on the condition that the City holds shares in excess of 50% of the registered capital of the company and the Minister for Interior as well as the City Council approve it.

In the case of public investment, possibilities are:

- Central Government
- PCG
- Central Government/PCG joint venture

In addition, "Union" may be established by a Royal Decree, in which Phatthaya City may participate jointly with government units, State agencies, State enterprises or local government units for the intensive benefit of the City. The Union is a juristic person

having an executive committee consisting of the representatives of the said organizations.

ii) Development and management of the reclaimed land

In case of the private investment for land reclamation, PCG would be the management body of the land. The land use of the reclaimed land should be specified by the Ministerial Regulation, MOI. PCG will concede the right of the use of the land or lease it to the private investor designated by the Ministerial Regulation. The private investor will develop the land in compliance with the land use plan stipulated in the Regulation by constructing upper structures including commercial buildings, restaurants and public buildings and facilities other than infrastructures and utilities which should be constructed by the Central Government departments and state authorities. TAT should construct the tourist jetty. Jetfoil/hydrofoil berth may be constructed by the private investor or by TAT, whichever deemed appropriate.

The public facilities other than infrastructures and utilities should be transferred to the Phatthaya City for management and maintenance. The tourist jetty may be transferred to the City for management and maintenance. The infrastructures and utilities should be operated and maintained by the Central departments, state authorities and PCG according to the current practice.

The commercial buildings and restaurants could either be operated and managed by the private investor or could be leased or concession right of which could be given to another private investor for recovering the investment costs and profit making.

In case that government budget is used for filling, the power of management of the reclaimed land can be given to either public body or private investor. If deemed appropriate by State Property Committee, ownership of the land may also be granted. In the actual case, it is likely that the power of management of the land is given to the Phatthaya City. The City then would either develop the land and construct the buildings and facilities by herself or give the concession right of the use of land to private investor or lease it for development. In either case, the infrastructure and utilities

and the tourist jetty should be constructed and managed in the same manner as stated in the case of the land reclamation by private.

(3) Financial Arrangement

i) For filling the sea

Other than private investment and financing by the Central Government budget, one alternative is to finance the filling by the budget of the Phatthaya City. In this case, the following fund sources are conceivable:

- Special grant from the Central Government
- Provident Fund (grant)
- Loan extended by the Central Government
- Loan from the Municipality Trust Fund
- Issuance of public bond
- Borrowing from the private sector
- Revenue from Environment Conservation Tax

Considering the size of the required investment, it might be necessary to use some of the above financial facilities jointly.

The cost should be recovered by the revenue obtained by giving the concession right of or leasing the land to the private investor.

ii) For constructing upper structures

In case PCG construct the upper structures, the available fund sources are the same as for filling.

Budget for the tourist jetty(first stage) has already been committed by TAT. If so decided by TAT, the second phase should also be financed by TAT's budget. The construction costs of the infrastructures and utilities should be borne by the Central government departments, State authorities and PCG according to the current practice.

3) Alternative Implementation Plans

(1) General

There may exist various alternatives for implementing the Waterfront Improvement Project. In this section, 3 possible alternative plans are worked out and presented considering the possibility and practicability for implementation from the viewpoints of legal proceeding, institutional setting and financial arrangement. It should be noted that these alternatives are by no means exhaustive. In-depth study should be carried out on legal, institutional and financial feasibility as well as engineering issues.

(2) Alternative A

i) Legal proceedings and institutional framework

Waterfront Development Project will be prepared by the committee comprising representatives of Phatthaya City and relevant agencies, such as National Environment Board. Public Works Department, Tourism Authority of Thailand, Harbour Department, Ministry of Interior. Then the Phatthaya City submits the project to Interior Minister through Chonburi Provincial Government for being initially approved with the consent of the Minister of Communication and the National Environment Board. After the initial approval, the Interior Minister will submit the project to be approved by the Cabinet. After the Cabinet approval, application will be submitted by PCG for filing the sea to the Director-General of Harbour Department. After the approval, reclamation works will be started with a private investment through specific agreement with PCG.

After the completion of the reclamation, PCG will make a request to the Land Department to draft a Royal Decree for withdrawing the public domain status of the reclaimed land. The draft of the Royal Decree will be submitted to be issued by the King through MOI, Cabinet and Parliament, respectively.

After the issuance of the Royal Decree, the Phatthaya City will request the Land Department to draft the Ministerial Regulation for transferring the responsibility and power to use and acquire

benefit of the reclaimed land to the Phatthaya City. The Ministerial Regulation will then be issued by the Interior Minister. A concession right for the use of the land will be given to the private investor who made the investment on the reclamation.

Construction works will be executed for the reclaimed land along the principles specified in the Ministerial Regulation. TAT will construct the tourist jetty using her budget. Infrastructures and utilities will be constructed by the Central government departments, State authorities and PCG by means of their budgets. The rest of the building and facilities will be constructed by the private investor.

Legal proceedings are shown in Fig. 7.3.1 together with the authorities and organization to be involved.

ii) Financial arrangement

The costs for filling will be financed by the private investor. After the "public domain status" of the reclaimed land is withdrawn by a Royal Decree and transferring the responsibility to use and acquire the benefit to the Phatthaya City, concession right for the use of the land will be given to the private investor gratuitously.

Construction of the buildings including commercial buildings, restaurant and terminal as well as car parking and event square will be financed by the private investor. The costs for park and children house as well as library which should serve for the interests of the public will be borne by the City. Infrastructure and utilities comprising roads, sewerage, water supply and river improvement will be implemented by the budgets of respective public bodies according to the current practice. Tourist jetty and the relevant facilities will be financed by TAT. Jetfoil/hydrofoil berth and the boat yard will either be financed by the private investor or through TAT budget.

The commercial buildings, restaurants, terminal building for the tourist port and the art center accommodating the souvenir shops and a duty-free shop will be the major profit making facilities for the private investor. After the completion of the upper structures

of the reclaimed land, they will either be managed by the private investor or leased to other private enterprises. The investment cost for filling and construction works on the land made by the private investor will be recovered with some fair return on the investment. Other facilities including car parking, event square, event hall and concert hall could be managed to make profits and will be run by the private investor or leased.

Fees for water supply and sewerage as well as for solid waste collection services will be collected by the relevant public bodies and will be used for supplementing the costs.

(3) Alternative B

i) Legal proceedings and institutional framework

A project preparation committee will be formed for the effective implementation of the Waterfront Project. After the approval of the Cabinet, application will be submitted by PCG for filling the sea to the Director-General of Harbour Department. Up to this stage, the proceedings are the same as these of Alternative A.

After the approval by Harbour Department, reclamation works will be commenced using the budget of PCG allocated for the Project.

After the completion of the reclamation, the Phatthaya City will make a request to the Land Department to draft a Ministerial Regulation for transferring the power and responsibility to use and acquire benefit of the reclaimed land to the Phatthaya City. The Ministerial Regulation will then be issued by the Finance Minister which also prescribes the rules and procedures for giving concession, grant or making available for use as well as the principles for the use of the land. In compliance with the rules and procedures, Phatthaya City will call tender and award a concession right to the private investor, plan of which for the land development is best fit for the purpose of local development of Phatthaya.

Construction of the buildings, tourist jetty, infrastructures and utilities and other facilities will be carried out in the same manner as for Alternative A.

Legal proceedings are shown in Fig. 7.3.2 together with the authorities and organizations to be involved.

ii) Financial arrangement

The costs for filling will be financed by means of PCG's budget to be allocated for the Project. Considering the practicability of the available financial facilities, the allocation will be financed by:

- Specific grant from the Central Government
- Loan from the Central Government
- Borrowing from the private sector

The private investor given the concession right to use the land will pay the sum for the right, equivalent to the filling cost plus interest of loans during construction paid by the City and the expenses of the City directly incurred for the preparation and execution of the filling.

The construction costs will be borne by the respective organizations in the same manner as of Alternative A. The investment cost born by the private investor together with the payment made for acquiring the concession right will be recovered by the profit to be accrued from the commercial buildings and other profitable facilities with some fair return on investment.

(4) Alternative C

i) Legal proceedings and institutional framework

Legal proceedings and institutional arrangement are the same as of Alternative B until the power and responsibility to use and acquire benefit of the reclaimed land are transferred to the Phatthaya City. Instead of giving a concession right of using the land to a private investment, the Phatthaya City will construct all the buildings and facilities except the tourist jetty and pertinent

facilities to be executed by TAT and the infrastructures and utilities to be executed by the respective public organizations.

Legal proceedings are shown in Fig. 7.3.3 together with the authorities and organizations to be involved.

ii) Financial arrangement

The costs of filling will be financed by means of PCG's budget to be allocated for the Project as in Alternative B. The construction costs for buildings and facilities except the tourist jetty and infrastructure and utilities will also be financed by the PCG's budget. Funding sources will be the same as for filling but major portion is from borrowing from the private sector. The total investment costs of the Phatthaya City will be recovered by leasing the profitable buildings and facilities to the private sector.

4) Comparison of the Alternatives

(1) Assessment criteria

The alternative implementation plan are examined and compared from the practicability of implementation comprising the following viewpoints:

i) Certainty and time required for clearing the legal proceedings

ii) Certainty for fund raising

iii) Securing the coordination and cooperation of the organization and parties concerned and people affected by the Project

iv) Institutional capacity for the execution and management of the Project

Each alternative is assessed as follows:

E: Excellent
F: Fair
D: Some difficulty

(2) Assessment and Comparison

i) Alternative A

Certainty for clearing legal proceedings

° Under this alternative, filling the sea will be made by private investment and a Royal Decree shall be issued to withdraw the status of "public domain" of the reclaimed land. Only after the issuance of the Decree, a Ministerial Regulation can be issued in which principles and procedures to manage the reclaimed land shall be written.

° There exists some uncertainty whether or not the required Royal Decree is issued and the private investor is not guaranteed for the recovery and return on this investment at the time when they make the investment for filling the sea. Even if issued, it may take time.

° Demerit associated with the issuance of the Royal Decree, however, may be alleviated by supporting the implementation of the Project by the Cabinet after the initial approval.

Certainty for fund raising

° If proved profitable which is very likely, the present investment environment of the country is very favorable for this investment. Financing the Project including the reclamation by the private sector would not at all be difficult.

Securing coordination and cooperation

° Execution of the reclamation would involve various public bodies and close coordination would be required between the private investor and these organizations.

° There are various parties concerned as well as people and enterprises who might adversely be affected by the implementation of the project whose cooperation or understanding for the project would be prerequisite to its success.

° Private investor would be at a disadvantage to secure coordination and cooperation of the people, parties and organizations for implementing the project than public body.

Institutional capacity

° Private enterprises are more experienced and have accumulated know-how for implementing and managing this kind of commercial undertaking than public bodies.

ii) Alternative B

Certainty for clearing legal proceedings

° PCG being a local government, the land reclaimed by the investment shall be a sate property. Issuance of Royal Decree will not be necessitated. Transferring the responsibility and power for managing the land to the Phatthaya City would be made by issuing a Ministerial Regulation by Minister for Finance.

Certainty for fund raising

° Among the three proposed fund sources, the amount of the specific grant is at present limited to 30~40 millions bahts per annum although it may be increased considerably in the near future.

° Central Government loan should be justified to be extend for the land reclamation, considering that it would improve the environment as well as sea transport at the South Phatthaya and thereby enhance the contribution of Phatthaya to the national economy by upgrading tourism.

Securing coordination and cooperation

° PCG, being a public body and responsible for the development of Phatthaya, is at the best position to coordinate among the public bodies concerned and securing proper apprehension of the local community of the necessity of the Project and cooperation thereof.

° During the stage of the construction of the buildings and facilities on the reclaimed land which will be carried out by the private sector, it will be required that the Phatthaya City extend full support for the coordination and cooperation with the organizaitons and people concerned.

Institutional capacity

° The Waterfront Project encompasses the first big-scale reclamation project ever carried out in the country as well as the development thereof. Even with the technical assistance of PWD both for reclamation and construction of upper structures, enhancing of PCG personnel, both technical and managerial as well as financial expertise, would be essential.

iii) Alternative C

Certainty for clearing legal proceedings

° Same as Alternative B for the reclamation stage.

° For the construction stage, an ordinance shall be enacted for a commercial undertaking of the Phatthaya City.

Certainty for fund raising

° Same as Alternative B with regard to the fund raising fort the land reclamation.

° Financial arrangement for the construction works of the buildings and facilities will be mainly through borrowing from the private sector. If the feasibility study on the Project guarantees high return on the investment which is very likely, the private sector would be ready for financing under the present economic environment of the country.

Securing coordination and cooperation

° Under this alternative, PCG will execute all the project works from filling the sea up to the construction of the buildings and facilities. Coordination and cooperation of the organizations,

parties and people concerned and affected would best be assured under this alternative.

Institutional capacity

- With regard to the reclamation stage of the Project, situation is identical with Alternative B.
- During the construction stage, the construction of the various buildings and facilities will be carried out by PCG. PCG will directly manage and maintain certain facilities including park. PCG will further conduct commercial undertaking either by running the profitable buildings and facilities or by leasing them to the private sector. PCG may also be obliged to seek the cost recovery of the Project.
- Huge volume of works will be generated for tendering and contracting of civil and architectural works during the construction stage as well as the reclamation stage. Running the business will require personnel well experienced in managerial and accounting works for commercial undertakings. Phatthaya City administration must be, therefore, substantially reinforced.

iv) Comparison and adoption of an alternative for case study

The assessment of the alternatives are shown in the following Table. Alternative B is assessed the best among the three conceived ones with one "excellent" without "some difficulty" and adopted for the case study described in the next section.

ASSESSMENT OF THE PRACTICABILITY OF ALTERNATIVE IMPLEMENTATION PLANS

Practicability \ Alternative	Alternative A	AlternativeB	Alternative C
Legal Proceedings	D	E	F
Fund Raising	E	F	F
Coordination & Cooperation	D	F	E
Institutioanl Capacity	E	F	D
Overall Rating	2	1	2

Remarks: E: Excellent, F: Fair, D: Some difficulty

5) Case Study for the Adopted Alternative

(1) Strengthening of PCG

Among the divisions of PCG, "Public Works Division" and "Finance Division" are most concerned with the implementation of the Waterfront Project, which are staffed with 41 officials and 143 employees and 30 officials and 15 employees, respectively as of June 1989. It is proposed that staff should substantially be augmented and enhanced, taking into account other requirements for the implementation of the integrated development of Phatthaya.

Alternatively, a section or unit may be proposed to be set up of preparation and the implementation of the Project, transferring some staff from the relevant divisions as well as recruiting from outside including the private sector.

In order to support planning s well as technical study as well as tendering and contracting, assistance of PWD must be secured.

(2) Preliminary Financial Analysis

i) General

In this section, two cases are analyzed, i.e., to implement the Waterfront Improvement Project only and to implement the Waterfront Improvement together with the Phatthaya Beach Restoration as an integrated project.

In conducting the analysis, the following assumptions are made:

① The reclamation works are executed by the allocation of PCG's budget which is financed by borrowing from the private sector. Loan condition is assumed at:

- interest of 15% per annum
- repayment period of 4 years.

② Concession right to use and acquire benefit of the land will be given to a Private Enterprise by PCG. The amount for compensation will be equal to the cost of reclamation added with the interest during the reclamation.

③ The construction costs of the buildings and facilities including the tourist jetty and the infrastructures and utilities will be borne as follows:

	Unit:MillionBahts
Private Enterprise	566,582
PCG	306,221
TAT	138,926
PWD & PWA	20,151

Details are shown in Table 7.3.4.

④ Government offices to be constructed on the reclaimed land will be executed and financed by respective governments and departments, and their costs will not appear in the analysis.

⑤ Only the following buildings are profitable:

- Port terminal building
- Commercial buildings

- Restaurant building
- Art center with duty free and souvenir shops

They will be leased to other private enterprises and the revenue for the Private Enterprise will comprise down payments for leasing and monthly rental fees which is equivalent to the maintenance costs of the buildings.

⑥ OMR (operation, maintenance and replacement) costs of other buildings and facilities are either provided by the government budget or by their revenues without surplus.

⑦ All the costs and revenues are at December 1989 level. If inflation is applied uniformly to the costs and revenues, financial viability would be upgraded.

⑧ Revenues of the buildings are based on these of the buildings which are situated in the seaboard of the south Phatthaya, having the locational advantages equivalent to the buildings proposed in the reclaimed land.

ii) Investment costs

Investment costs required for the Waterfront Project is estimated at 1,032 million bahts in December 1989 price. The cashflow during the initial investment period, 1990-1996, is shown in Table 7.3.2.

iii) Monthly rental fee which is assumed as equal to the maintenance cost is:

180 B/m2 year × 62,900 m2 = 11.3 million Bahts/year
(15 B/m2 month) (total rentable floor area)

iv) Revenues

The revenue of the Private Enterprise to be derived from the profitable buildings in the form of the down payment of the lease are shown below:

Unit: Million Bahts

Year	1993	1994	1995	1996	Total
① Port terminal Building (3/4 of floor area) 6,900 m^2 × 18,750 B/m^2 = 129 mB	-	-	26	103	129
② Commercial Build. 38,000 m^2 × 18,750 B/m^2 = 712 mB	142	285	285	-	712
③ Restaurant 8,000 m^2 × 18,750 B/m^2 = 150 mB	30	60	60	-	150
④ Art center 10,000 m^2 × 18,750 B/m^2 = 188 mB	38	75	75	-	188
Total	210	420	446	103	1,179

v) Fund requirement for the Private Enterprise

The fund requirement for the Private Enterprise, i.e., investment costs less down payments is shown below for without and with Phatthaya Beach Restoration Project cases:

Without Phatthaya Beach Restoration

Unit: Million Bahts

Year	1991	1992	1993	1994	1995	1996	Total
Investment by Private Enterprise /1	0.2	33.6	111.1	214.9	168.6	38.2	566.6
Payment for Concession Right	-	-	289.5	-	-	-	289.5
Gross Fund Requirement	0.2	33.6	400.6	214.9	168.6	38.2	856.1
Downpayment for Lease	-	-	210.0	420.0	446.0	103.0	1,179.0
Net Fund Requirement	0.2	33.6	190.6	-205.1	-227.4	-64.8	-322.9

Remarks; /1 Comprising terminal building, commercial buildings, restaurant, art center, concert hall, event hall, car parking, event square, jetfoil/hydrofoil berth and boat yard.

With Phatthaya Beach Restoration

Unit: Million Bahts

Year	1990	1991	1992	1993	1994	1995	1996	Total
Investemnt by Private Enterprise	-	9.2	33.6	222.4	214.9	168.6	38.2	686.9
Payment for Concession Right	-	-	-	289.5	-	-	-	289.5
Gross Fund Requirement	-	9.2	33.6	511.9	214.9	168.6	38.2	976.4
Downpayment for Lease	-	-	-	210.0	420.0	446.0	103.0	1,179.0
Net Fund Requirement	-	9.2	33.6	301.9	-205.1	-277.4	-64.8	-202.6

vi) Financial viability

vi-1) Without Phatthaya beach restoration

The net surplus of the Project of the Private Enterprise will be 322.9 million bahts after the initial investment period of 6 years or 37.7% return on the investment. which can be considered as favorable return.

vi-2) With Phatthaya beach restoration

In case the Phatthaya beach restoration should be an integral part of the Project and it is assumed that its costs should also be born by the Private Enterprise, the net surplus of the Project would be reduced 202.6 million bahts and return on the investment would be 20.7%, which may still be considered as adequate for private investment.

7.3.3 Phatthaya Beach Restoration Project

1) Legal Proceedings and Institutional Arrangement

The beach in the country is usually recognized as "land" as the Land Code under the Act Promulgating the Land Code, B.E. 2497 states that:

"land means the land surface everywhere and includes mountains, hills, streams, ponds, canals, swamps marshes, waterways, lakes, islands, and sea coast", where beach is included in "sea coast".

The Act stipulates that:

"All the land which is either public domain or state property, if there is no law otherwise provided, the Director-General shall be responsible for it care and take measures to protect it as appropriate to the case. Such responsibility may be delegated by the Minister to other public body."

On the other hand, Section 122 of the Local Administration Act, B.E. 2457 states that:

"the District Government is responsible to inspect and prevent the public land where people use as common field of husbandry, path, or road and other land where people commonly use from personal possession."

By these, we may interpret that the Local Administration Act provides the power of taking care of and protection of the beach to the District Government. Restoration of the beach should, then, be started from getting approval from the District Government.

It is proposed that either the Phatthaya City or TAT should make a request to the District Government for approval of the restoration of the Phatthaya beach which should be authorized by the Minister for Interior through the Chonburi Provincial Government. The Environmental Impact Assessment report will be required to be submitted by NEB.

The Phatthaya beach restoration will not change the function of the beach to serve for the benefits of the public. The benefits would rather be enhanced. Furthermore the tourism resource will be upgraded and environmental condition will be improved by filling up the polluted mud on the sealed adjacent to the existing beach.

Difficulty is, therefore, not foreseen legally for the implementation of the Project.

2) Financial Arrangement

The construction cost of the beach restoration is proposed to be financed by either TAT's budget on City revenue from the special grant. Loan from the

Central Government and borrowing from the private sector may be not recommendable, considering that the Project would not generate any direct revenue. If introduced in time, the revenue form the Environmental Tax should also be used for financing the Project.

Alternatively, it is proposed that this project should be included in the Waterfront Project as a component on the condition that the Waterfront Project still can prove profitable including the additional cost of the restoration of the Phatthaya beach.

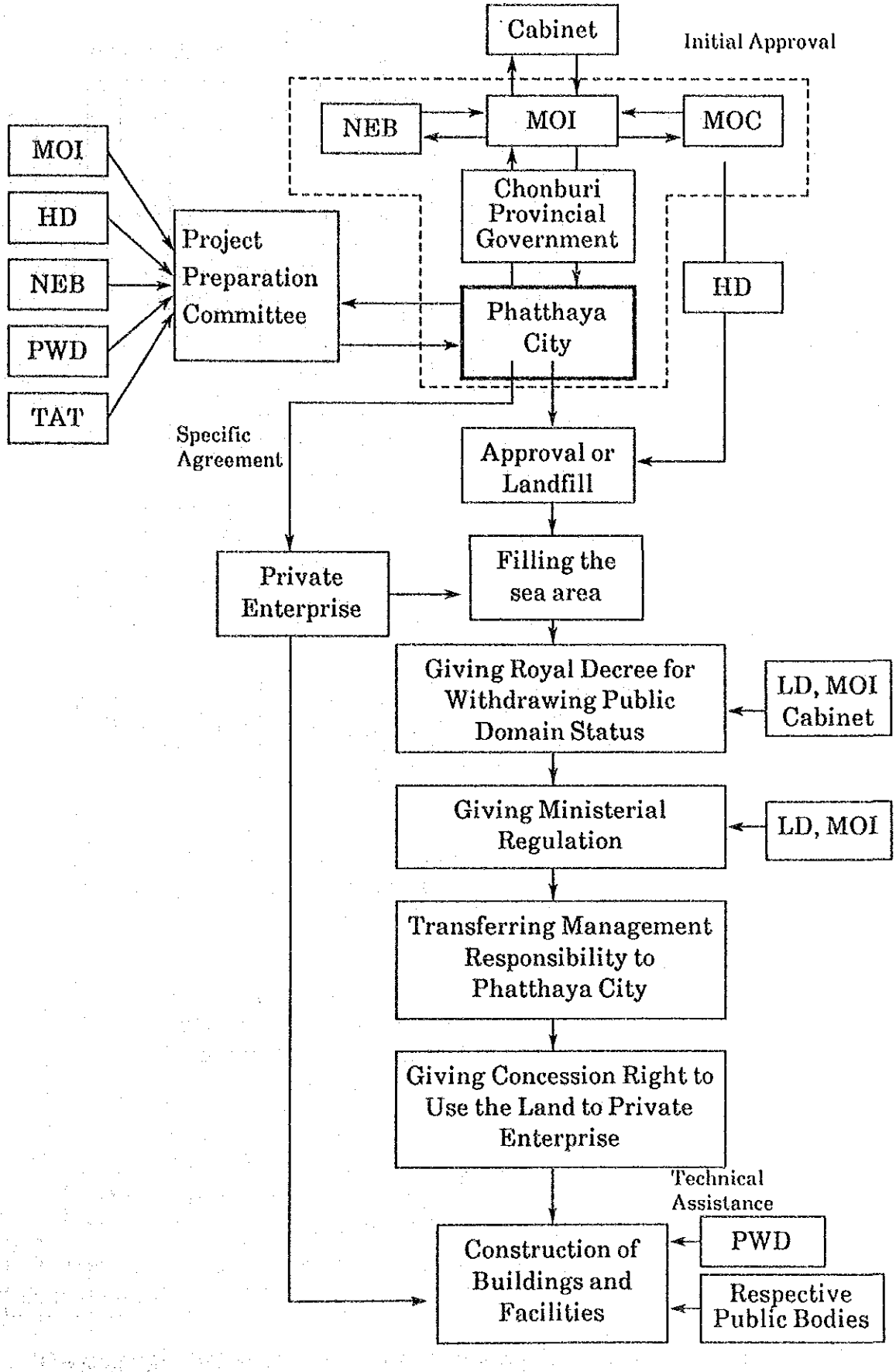


Fig.7.3.1 Legal Proceedings and Institutional Framework for Alternative A

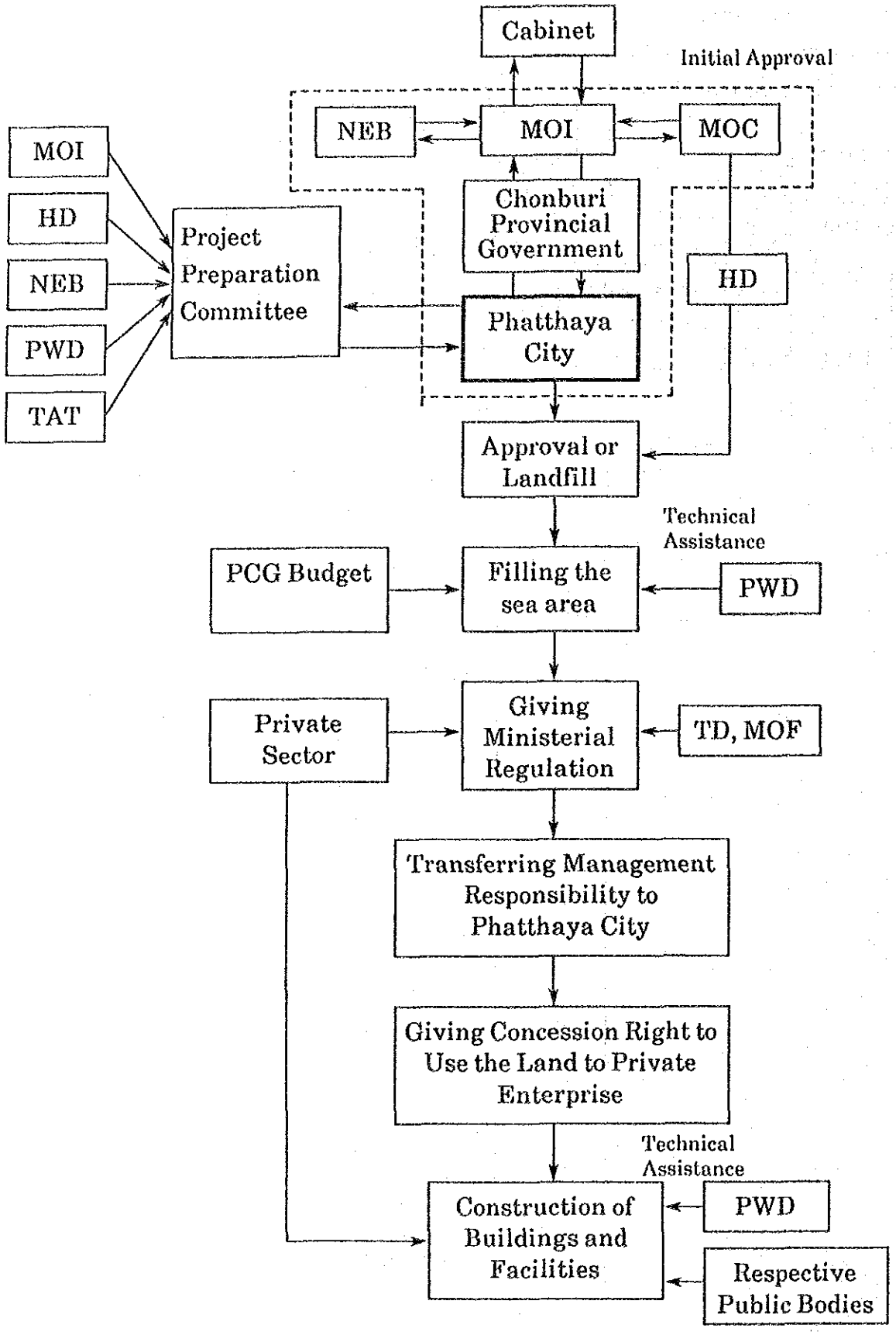


Fig. 7.3.2 Legal Proceedings and Institutional Framework for Alternative B

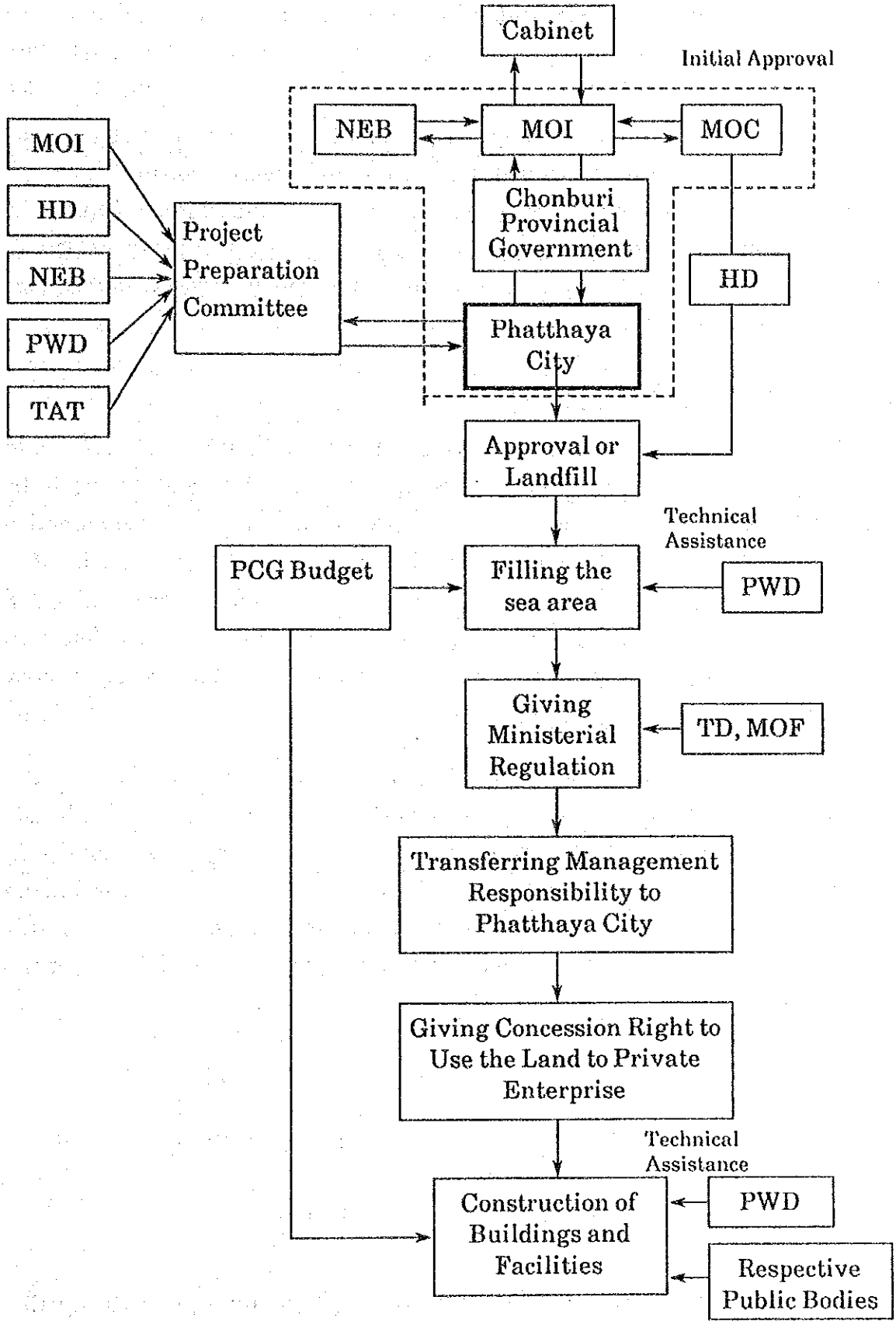


Fig. 7.3.3 Legal Proceedings and Institutional Framework for Alternative C

7.3.4 Immediate Actions Required

1) General

Feasibility Study and Detailed design should be carried out at early as possible for each priority project for which no specific actions are yet committed. Terms of References for feasibility study and engineering works which may be referred to when actions are taken by the Government of Thailand are given in Section 7.4. Among all, the following actions are recommended to be taken in particular.

2) F/S and D/D for Sewerage Project

Currently PWD is conducting a F/S for Phatthaya including Na Klua and Jomtein. The study is scheduled to be completed around July 1990 and to be followed by D/D for Na Klua and Jomiten. Once completed, it is recommended that the results for the study should be reviewed referring to these of this JICA Study particularly in such aspects as projects population by area, estimated water demands and capacity of the facilities required. In case gap is found in the required capacity, it should be carefully examined and necessary actions should be taken.

It should be noted that the south part of the Phatthaya City or the Phatthaya town area for which expansion works of the existing plant is already completed and a new treatment station is under construction, is not included in the scope of the F/S. According to this JICA Study, however, the following capacity of treatment plant and pertinent facilities will be required for this area beyond the accumulated capacity of the area after the completion of the above projects.

	(Unit: 1,000 m3/day)
1996	17.0
2006	26.0

It is recommended that the facilities development plan proposed by this Study should carefully be reviewed by PWD together with the estimated sewage volume to be generated. If deemed appropriate by PWD, F/S should be carried out to meet the additional requirement in this area to be followed by

engineering works, land acquisition and construction of the facilities. Referring to the plan proposed in this Study, F/S may be completed in a short period of time.

3) F/S, D/D and Land Acquisition for The Sanitary Landfill Site Project

The present site where open dumping is currently being conducted will be filled up within the coming 2 years. It is urgently required to conduct a F/S to select the optimum site for sanitary landfill. In this study, emphasis should be placed on the comparative cost of the alternative sites, considering the land acquisition cost and transportation cost. After the selection, action should immediately taken for acquiring the land, taking into account the sharply increasing land price.

4) Modification of Waterfront Improvement Plan and Conducting a F/S

Currently a F/S is being conducted by TAT for the Tourist Jetty Project, which will be completed around May 1990. The TAT project envisages the construction of a tourist jetty to serve for the excursion boats playing between Phatthaya and Ko Lan while waterfront improvement plan proposed in this Study is a more comprehensive one including large-scale reclamation with various structures and building s well as tourist piers with the same objective as TAT jetty. As soon as TAT's its is completed, the waterfront improvement project should be reexamined to coordinate with the tourist jetty project proposed by TAT and should be modified accordingly.

A F/S should be carried out quickly, paying due consideration for the TAT's Jetty plan with emphases on:

i) Required legal proceedings;
ii) Organizational structure for project implementation;
iii) Financial viability and practicability of private sector involvement;
iv) Availability of proper fill materials.

7.4 Terms of Reference for Subsequent Study

Considering the present environment of Phatthaya which is seriously degraded, the implementation of the proposed Integrated Development Plan for Phatthaya, particularly the priority projects, are urgently required. Bearing this in mind, the following Terms of References are prepared and presented as reference material for the departments and authorities of Thai Government concerned with the execution of the projects.

1) TOR For Phatthaya Bay Waterfront Development

(1) Background of the Project

Background and Necessity

Phatthaya is the second largest tourist center of Thailand and its most important beach resort. Conveniently located relative to Bangkok and Don Muang international airport, its beaches and other natural resources attract many visitors both from within Thailand and abroad. Phatthaya also has a developing role as the potential residential, commercial and institutional centre for the Eastern Seaboard Development programme which aims at creating major industrial complexes near the new seaports of Laem Chabang and Map Ta Phut.

In recent years there has been a sharp acceleration in the rate of growth of the number of Thai and overseas visitors to Phatthaya, resulting from the impressive growth of Thailand's economy and the success of the Government of Thailand's tourist promotion campaign abroad. From 1985 to 1987 the total number of visitors to Phatthaya almost doubled from 796,000 to 1,417,000. International tourists comprised about 70% of this total, and Phatthaya is a major contributor to Thailand's substantial earnings from tourism.

Privately financed hotel, condominium and commercial development in Phatthaya City and the surrounding areas has been extremely rapid to accommodate increasing numbers of visitors but public infrastructure has lagged behind. This unexpectedly swift commercially-driven growth, coupled with the lack of appropriate land and coastal use development planning and ineffective regulation and control, have led to many problems in Phatthaya. These include uncontrolled land use and encroachment on public land, inadequate

water supply and sewerage, traffic congestion, environmental pollution, coastal erosion, congestion in coastal waters and navigational hazard.

In view of current problems and the likelihood of continuing growth in Phatthaya, the government of Thailand concluded that a Master Plan for the future development of Phatthaya was urgently needed. A request to the Government of Japan led to agreement in December 1988 that a Master Plan Study would be undertaken by JICA (Japan International Cooperation Agency) on the basis of a 15 year planning period : years 1991 to 2006. The study area was to include Phatthaya City, Na Klua and the coastline south of Phatthaya extending through Jomtien to Bang Sare. The master plan study commenced in June 1989 and the draft Final Report was submitted in March 1990.

The study concluded that a number of priority projects were required, which it recommended should be completed by 1996. One such project is an integrated waterfront development along Phatthaya bay.

The waterfront of Phatthaya bay is the core of Phatthaya's growth as a recreational and tourist centre. The small fishing village from which Phatthaya originated has grown to a highly developed coastal strip comprising a narrow beach, a coastal promenade and a busy beach road with hotels, restaurants, shops, bars etc. on the landward side. The downtown entertainment complex in the southern part of the bay is built out over the sea, supported by piling. Liquid and solid waste from these buildings is discharged directly to the water, causing pollution in the bay. The waterfront lacks marine facilities for the many boats in the bay and basic amenities for beach users ; there is an acute shortage of land for improvements. Loss of sand from the beach and coastal erosion caused by structures which encroach beyond the natural shoreline is a serious and growing problem. In view of these many problems, a comprehensive scheme to improve the waterfront is needed urgently.

Current Socio-Economic Characteristics

Phatthaya is situated on the eastern coast of the Upper Gulf of Thailand, about 50 km south of Chonburi, principal city of Chonburi Province. The administrative boundary of Phatthaya City includes

Na Klua, Jomtien beach and Ko Lan island. Annexe-1 shows the geographical location of Phatthaya and adjoining areas. The registered population of Phatthaya City, including Na Klua and Jomtien, was 53,454 in 1989 but it was estimated that the actual population exceeded 100,000. The estimate of actual population was derived from the total for persons in employment, estimated as 50,000. Tourism dominates the local economy of Phatthaya and 56% of all employees work in the service sector. The revenue generated in Phatthaya from tourism was estimated as Baht 16,500 million in 1987, of which over 90% was provided by international tourists.

A survey conducted in 1987 by the Department of Town and Country Planning indicated that commercial and service establishments numbered 2249, of which a total of 1160 were food and beverage shops, hotels, clothes shops, bars, beer gardens and beauty parlors. Many of these are located on the Phatthaya bay waterfront and play a major part both in its commercial success and its problems.

The JICA Master Plan Study concluded that the total population of Phatthaya City was likely to grow to 200,000 in year 2006 and the number of visitors to 3.24 million/year.

Phatthaya Waterfront and Existing Facilities

The Phatthaya waterfront is the 5 km long spirally shaped shoreline of a bay which lies between a small north headland and the more prominent south headland of Laem Phatthaya. The north and central parts of the bay have a narrow beach which extends some 3000 m from the north headland to the edge of the entertainment complex, which occupies a further 750m of the shoreline. Beyond this, there is a small beach near the mouth of Khlong Phatthaya which flows into the south corner of the bay. The final section of coastline is a rocky foreshore at the foot of the steep slope of Phatthaya hill.

The seabed beyond the beach and foreshore falls at a very gentle slope and the bay is shallow : up to 4 m water depth at low water near the south headland and less elsewhere. The tidal range is approximately 2.2m. The bay and shore are used for many recreational activities - swimming, sun-bathing, water-skiing, parasailing, riding water scooters, etc. About 200 excursion boats of length ranging from 5 to 40

m and passenger capacity 15 to 200, provide day-trips to nearby islands for tourists. There are no regular services by sea to Bangkok or other destination at present.

The existing amenities along the main beach include a promenade with two concrete block paved footpaths, separated by flowerbeds, trees and shrubs. Thatched sunshades and deck chairs are available for rental on the narrow sandy beach. Although the bay is extensively used by excursion vessels and small boats for water-sport, there are very few permanent marine facilities. These consist of a few concrete ramps for launching small boats and isolated timber piers extending out from the entertainment area. There are no changing rooms, showers or other amenities for swimmers on the promenade.

A number of sewers and surface water drains discharge direct into the bay and create visible pollution and odor near the beaches.

Committed Development Plans

A project for the construction of a tourist port at Phatthaya is currently being implemented, at a budget cost of Baht 104 million which will be funded by an OECF loan. The overall implementation period is 45 months and the feasibility study, which commenced in January 1990, will be followed immediately by detailed design and construction. the scope of this project is restricted to port facilities only. Other waterfront development in Phatthaya is not included.

Executing Agency

The executing agency for the feasibility study will be the Office of the Eastern Seaboard, Thailand.

The Government of Thailand, through the OESB, will provide office accommodation, counterpart staff and logistical support for the satisfactory completion of the study. Liaison and coordination with other Government offices and agencies will also be arranged by the OESB.

Previous Studies

The following studies have been undertaken previously or are in progress, relating to development at Phatthaya :

- Phatthaya City Development Plan, 1987~1991, Phatthaya City Administration
- Phatthaya Tourism Development Study, 1977, JICA
- Phatthaya Infrastructure Development Study, 1978, JICA
- Master Plan Study for the Development of Phatthaya Areas, 1990, JICA
- Feasibility Study on Tourist Port : in progress

(2) Study Area and Planning Horizon

Feasibility Study Area

The principal study area shall include :

- the north and south headlands of Phatthaya bay and the entire length of shoreline and beach in between
- the sea area within Phatthaya bay
- the developed coastal strip along the shoreline including the beach road and building and structures along it
- roads leading to the waterfront and navigation routes from Phatthaya bay.

The wider study area, which shall be considered to the extent that it influences waterfront development in Phatthaya bay, shall be the study area of the JICA Master Plan Study (1990).

Planning Horizon

The study planning horizon shall be the year 2006.

(3) Objective and Scope of Works

① Objective

The objective of the study is to formulate a development plan for the Phatthaya bay waterfront, to investigate the technical legal financial economic and institutional feasibility of the project, to assess its environmental effects and propose the optimum scheme for its successful implementation.

② Project Outline and Approach to the Feasibility Study

The waterfront development project as proposed in the 1990 JICA Master Plan Study included the following main elements : beach restoration and widening to provide an improved recreational beach; refurbishment of the coastal promenade; construction of port facilities for excursion vessels and for high speed sea services to Bangkok and other destinations; 20 hectares of reclamation in the south part of Phatthaya bay to provide additional waterfront land for essential public facilities and for commercial use. The conceptual waterfront development plan proposed by the Master Plan Study is included as Annex-2.

The elements of the proposed development include basic infrastructure or essential remedial work (port facilities, coastal protection) of high capital cost, for which full recovery by direct charging of users is impractical, together with reclamation of commercially valuable land which should yield substantial rents. It is expected that the effective utilization of the commercial potential of the reclaimed land will be a critical factor for the financial feasibility of the overall project. Private sector participation is envisaged, possibly by a joint venture agreement or other form of cooperation between the Phatthaya City Administration and private interests.

The feasibility study shall explore all viable alternatives for waterfront development in Phatthaya bay, and shall not be restricted to the types of facility, their locations, or the implementation methods proposed by the JICA Master Plan Study.

③ Scope of Works

The scope of works for the feasibility study shall include, but not be limited to, the items of work listed hereunder. The Consultants shall:

General Requirements

i) Obtain and review all available data, materials and previous studies relating to the study area.

ii) Perform all technical, environmental, economic, financial, legal and institutional studies and analyses consistent with the objectives of the feasibility study.

Data Collection and Review, Survey and Site Investigations

i) Collect and review all relevant data on natural conditions, including physical and environmental data on winds, waves, tides, currents, water characteristics, littoral drift, soil condition on the seabed and coastal stability.

ii) Undertake topographic and bathymetric surveys covering the study area both on land and water and their approaches, and hydraulic surveys and investigations as required to measure waves, currents, tides and sand movement.

iii) Initiate and supervise geotechnical investigations within the study area including boring, sampling, field and laboratory testing and analysis to determine design criteria relating to load bearing, settlements, stability of foundations, erosion, siltation and coastal stability.

iv) Undertake surveys to determine location, extent, ownership and costs of suitable onshore and offshore sources of naturally occurring construction materials e.g., rock fill, rock armour, gravel and sand for reclamation fill; in selecting borrow areas for these materials due consideration shall be given to minimizing environmental degradation.

v) Undertake road traffic and marine traffic surveys to determine motor vehicle and boat characteristics and ownership, daily

and seasonal traffic variations, average and peak traffic requirements.

vi) Collect data on local population, current land use and ownership, type of building or structure, including conducting interviews and site surveys as necessary.

vii) Collect and review data on existing infrastructure including roads, marine facilities, surface water drainage, sewerage, water supply, electrical power supply, telecommunications and other city utilities.

viii) Undertake any environmental surveys which are required to assess the environmental effect of the development.

ix) Collect and review, in terms of its effect on project feasibility and implementation methods, data relating to legal and financial status including duties and authorities, institutional framework, departmental organization and administrative procedures of the country and the Phatthaya City.

Feasibility Study and Preliminary Design, Development Plan and Implementation Programme

i) Study the existing coastal region utilizing relevant coastal engineering data from previous studies and new investigations, and assess the effects of proposed developments on the stability of the coastline.

ii) Analyse data, review trends and prepare demand forecasts for land and marine facilities in the study area.

iii) Prepare preliminary land use plan as well as engineering and architectural designs and landscaping proposals for land and marine facilities and structures, buildings, promenades, parks, roads, services, utilities and other amenities.

iv) Formulate an optimum development plan for the study area including recommendations for development in stages, if appropriate.

v) Prepare cost estimates for the proposed development, separating foreign and local currency cost components, direct and indirect costs, taxes and duties.

vi) Study the legal and institutional implications of the proposed development including the existing legal and administrative structure of Phatthaya City, laws relating to ownership of land reclaimed from the sea, practicality and constraints of Phatthaya City/private sector joint ventures and related issues and to confirm the appropriate legal procedure required.

vii) Carry out an investment appraisal which includes preparation of fund requirement, financial arrangement, revenue estimation, financial and economic analysis, determination of financial and economic internal rates of return and sensitivity testing.

viii) Assess the impact of the development on the natural ecology and environment of the study area and surrounding region including land use and transport; the environmental impact assessment shall be carried out to comply with the procedures and requirements of the National Environment Board.

ix) Prepare an implementation programme and schedule of investment.

x) Recommend a suitable organization and management structure for implementation of the overall development and for efficient operation and maintenance of both public and private facilities therein.

④ Study Schedule and Reports

The period of the feasibility study shall be nine (9) months.

The following reports shall be prepared and submitted during the course of the study :

- Inception report : within one month of commencement of the study

- Progress reports : at the end of the third and sixth months of the study
- Draft feasibility study report : within eight months of commencement of the study
- Final feasibility study report : within nine months of commencement of the study

⑤ Required Expertise

The professional staff engaged on the feasibility study shall have expertise in the following aspects :

- port planning / port engineering
- coastal hydraulics / coastal processes
- engineering geology / geotechnics
- land use and urban planning
- architecture / landscape architecture
- environmental impact assessment
- roads / traffic engineering
- drainage, sewerage and utilities
- construction planning
- quantity surveying / cost estimating
- economic and financial analysis
- legal and institutional affairs.

2) TOR for Accelerated Sewerage Programme

(1) Introduction

The Phatthaya Area is the most important tourist destination in Eastern Seaboard region. Easily accessible from Bangkok, its climate, beaches and natural resources attract both international and domestic tourists generating considerable earnings and income for both the city and the country as a whole.

As a result of the Government's successful efforts to promote the international tourist industry and the general increase in domestic disposable incomes, arising from Thailand's recent rapid economic expansion, Phatthaya and its tourist industry which were already growing at a considerable pace have expanded at a phenomenal rate over the past four to five years. This growth in development, which initially centered on Phatthaya beach, has in recent years spilled over into adjacent areas, particularly the Jomtien beach area to the south where hotel and condominium projects are competing for beach front property but also into Na Klua to the north. The development on Jomtien beach now also extends considerably to the south of Phatthaya City boundary into Amphoe Sattahip close to the fishing village of Bang Sare.

This rapid and continuing growth has by far exceeded all earlier development planning expectations and has created problems with land use control, city planning, encroachment on public land, etc. Growth has also by far out-paced infrastructural development, both in Phatthaya City and the areas to the south, and as a consequence shortfalls in basic services such as water supply, sewerage/sewage disposal, drainage and solid waste disposal have emerged. These shortfalls are evidenced by a growing pollution problem, particularly in the Phatthaya beach area and waters, which is beginning to seriously threaten the prosperity of the tourist industry in Phatthaya and, by association, in Thailand generally. Other problems with transportation and navigational control, etc. are also emerging.

Recognizing these problems and the fact that, due to its location in the center of the Eastern Seaboard Development, Phatthaya City is expected to further develop its role as a residential,

business/commercial and institutional center serving the Eastern Seaboard Development, the Government sought to prepare a Phatthaya Area Development Master Plan.

The Japanese International Co-operation Agency (JICA) undertook this Development Master Plan Study with a planning horizon of year 2006. The study addressed all planning issues including infrastructural development and environmental aspects for the whole of the Phatthaya City area, and the area to the south including the fishing village of Bang Sare and the island of Ko Lan to the west of the city. (See accompanying map).

The office of the Eastern Seaboard Development Committee acted as the executing and co-ordinating agency for the study which was conducted under the overall guidance of an Inter-Ministerial/Departmental Steering Committee.

(2) Background to Wastewater Pollution Problems

The emergence of serious environmental pollution problems in the Phatthaya Area, particularly Phatthaya City and along Phatthaya Beach and its waters is well documented. Investigations conducted by the National Environmental Board (NEB), Public Works Department (PWD) and others have confirmed that human wastes have been contributing significantly to this pollution for some time and are posing consequent health risks to beach users and bathers etc.

In response to this problem the Government of Thailand constructed a first stage foul sewerage and sewage treatment facility in 1985/86. This first stage works, implemented by the Public Works Development (PWD), was designed to serve the existing and then planned developments fronting onto Phatthaya beach and the completed works were commissioned and handed over to Phatthaya City for operation in January 1986.

Despite these efforts and investments the pollution problem continued to grow and the PWD therefore prepared designs and contracts for a second stage sewerage and sewage treatment disposal project for Phatthaya town. These works are currently being implemented and on completion in November 1990 the combined capacity of the stage

one and stage two sewerage and sewage treatment works shall be approximately 13,000 cu m/day average flow. These works will intercept the majority of the raw sewage flows that are currently being discharged either directly or indirectly, via natural or man made drainage, to the beach/sea in the Phatthaya town area, and convey them to treatment prior to disposal.

Recognizing that serious wastewater pollution problems also exist in Na Klua to the north of Phatthaya town and that the rapid development of the Jomtien Beach are to the south will very shortly precipitate similar problems the Government of Thailand initiated a feasibility study/detailed design agreement for sewerage/sewage treatment provisions for these two areas. This study also includes consideration of some sewerage/drainage expansion in Phatthaya town, a review of the performance of private sewage treatment facilities at hotels, etc., and consideration of possible cost-recovery mechanisms and tariff systems. This study and detailed design agreement, commenced in November 1989, is being undertaken by the Thai Institute of Scientific and Technological Research (TISTR) with completion scheduled for June 1991. The programme includes for the commencement of works in the Jomtien area in November 1990.

(3) The Need for Further Sewerage and Sewage Treatment Provisions

The expansion of the sewerage network and sewage treatment facilities currently being implemented in the Phatthaya town area is expected to result in a considerable improvement in the short term. However, the Phatthaya Development Master Plan Study has identified that the continued rapid development of Phatthaya town can be expected to place considerable strain on the expanded sewerage system and particularly the sewage treatment works within a year or two and that unless further major expansion of the facilities is initiated in the immediate future, the improvements being made now will be shortlived.

To enable the Phatthaya Area to continue to flourish as an international and domestic tourist destination and to emerge as a residential and commercial centre within the Eastern Seaboard Development it is therefore essential that long term measures, to

complement the urgent provision currently being made and ensure continued protective against wastewater pollution, are initiated now. These terms of reference are therefore prepared with the aim of initiating a feasibility study/detailed design agreement for the sewerage and sewage treatment facilities necessary to secure this long term protection against wastewater pollution, through a phased sewerage implementation programme.

(4) Feasibility Study Area and Planning Horizon

① The feasibility study area shall be the Phatthaya City Area including Phatthaya Town, Na Klua and Jomtien and extending south of the Jomtien southern boundary approximately 1.25 km. to the spur road to Siam Beach Hotel.

② The planning horizon for the study shall be the year 1996 and 2006.

(5) Objective of the Feasibility Study

The primary objectives of the feasibility study shall be to define a comprehensive long term sewerage strategy for the Phatthaya Area and determine a phased implementation programme aimed at securing continuing protection against wastewater pollution problems. This shall require:

° Examination and assessment of the presently existing and being implemented sewerage and sewage treatment/disposal systems.

° Examination of feasibility and detailed implementation proposals currently being formulated by PWD/TISTR against the long term planning expectations and the identification of any proposal enhancement or reinforcement required for the Na Klua and Jomtien areas.

° Examination of PWD/TISTR feasibility study findings for the Phatthaya Town area and consideration of these findings against long terms planning expectations.

° Identification and confirmation of a site for a new sewage treatment works to serve the Phatthaya Town area (this site may be inland or on re-claimed land in South Phatthaya).

- Determination of a phased implementation strategy for trunk sewerage and sewage treatment works provision that provides the basis for continuing protection against wastewater pollution but maximizes the return on existing facility investment.

- Determination of parameters and final scope for detailed design for the initially required phase of sewerage and sewage treatment/disposal provision for Phatthaya town area.

- Examination of existing institutional and operations, maintenance and management arrangements and determination of organizational and procedural changes and strengthening required to effect efficient implementation and operation.

- Determination of capital and operational cost estimates.

(6) Scope of Feasibility Study and Detailed Design Works

The study and detailed design shall be completed in twelve months in two phases and shall include but shall not be limited to:-

Phase I Feasibility study

a) Collect and assess relevant data and reports including those previously and currently prepared either by the Government or by any consulting engineers appointed by the Government.

b) Assemble, and through investigations on site verify essentials of, existing record drawings for sewerage facilities including existing foul sewers, pumping stations, treatment facilities and disposal outfalls. Also assemble all documents and performance specifications prepared for sewerage and sewage treatment expansion projects. (Phatthaya town area).

c) Collect and review all operational and maintenance data available for the existing sewerage and sewage treatment works, including flow data, works performance data, maintenance problems and solutions and operation and maintenance budgets and costs. (Phatthaya town area).

d) Investigate and assess the fabric adequacy, structural integrity and mechanical and electrical efficiency and suitability of existing pipelines, structures and equipment. (Phatthaya town area).

e) Assess the hydraulic capacity of the existing and planned sewerage systems, including pumping stations, to cater for total existing and future flows up to year 2006 within their existing and proposed catchment areas. Identify areas of insufficient capacity or where maintenance problems arise or can be expected to arise due to accumulations of grit and solids/rubbish etc. (Phatthaya town area).

f) Evaluate the existing hydraulic and process performance and performance potential of the existing and proposed sewage treatment facilities. Consider particularly the proposal to adapt the sewerage network from a separate system to a combined/partially combined system and the hydraulic, process and grit accumulation problems that might arise. (Phatthaya town area).

g) Investigate and assess the extent and level of expedient and illegal connections to and pollution loads in the storm drainage systems and the environmental implications thereof.

h) Investigate and assess the extent and level of pollution problems caused by unsewered populations. For Phatthaya town consider existing unsewered population and unsewered population after the second stage sewerage development for existing and planned population up to year 1996 and 2006.

i) Identify and evaluate any immediate measures which could achieve significant environmental improvement or correct or eliminate sewerage or sewage treatment deficiencies or bottlenecks. Any such measures should be developed and carried forward to the detailed design phase.

j) Identify and initially evaluate long-term solution options and make recommendations on the most appropriate and cost-effective methods of eliminating human waste pollution problems particularly in the beach/sea, watercourses and storm drains.

Recommended solutions shall take account of practicalities, urgency of problems, land availability and costs, environmental benefits, time scales, construction costs and operation and the maintenance resources, capability and costs involved in the provision of sewerage and sewage treatment/disposal facilities.

k) Identify and confirm a site, either inland or on reclaimed land in South Phatthaya for a new sewage treatment works to serve the Phatthaya town area.

l) Identify define and prepare cost estimates and budgets for the Phase I project works, required to establish and provide on-going environmental protection consistent with the touristic nature of the town and the anticipated planned development, that shall be carried forward to the detailed design phase. The works shall include both new sewerage, sewage treatment/disposal facilities and any upgrading improvement/or replacement of existing facilities identified as being required.

m) Examine the institutional, organizational and regulatory environment and consider and recommend institutional, organizational, procedural and regulatory changes and reinforcements necessary or desirable to facilitate efficient implementation of the programme, improved operation and maintenance control of the systems to be developed and enhanced enforcement of statutory instruments.

n) Identify and carry out any investigation, confirmatory topographical and hydrographic survey work, flow measurement, sampling testing and analyses, and soils investigations required to supplement gathered data in preparation for the detailed design phase.

To include preparation of tender documents, performance specifications, conditions of contract etc for any specialist services required, preparation of work programmes, provision of overall supervision and including assessment of specialist consultant findings.

Phase II Detailed Design

The detailed design phase shall be commenced on receipt of approval to the feasibility study project synopsis and proposed design parameters and shall comprise:

a) Additional detailed survey work that is essential to detailed design including

- topographic survey
- site investigations/borings etc.
- building surveys as required
- treatment works site survey and establishment of works site boundaries

b) Detailed design of all sewers, connections, overflows, manholes pumping stations etc. required to make effective the sewerage system.

c) Detailed design of the sewage treatment works and effluent disposal facilities required to provide the agreed treatment capacity and designed for future expansion to meet the ultimate capacity required.

d) Preparation of tender documents including

- conditions of contract
- bills of quantities
- materials and workmanship specifications
- performance specifications
- construction/tender drawings
- etc.

All in accordance with regulations and standards prevailing in Thailand or to other internationally acceptable and appropriate standards and practices where a Thai standard has not been established.

e) Preparation of guidelines for sewerage and sewage treatment works operation and maintenance as a basis for the preparation of

full operation and maintenance manuals on completion and commissioning of the works.

(7) Implementation and Reporting

The feasibility study and detailed design is expected to be completed in a period of twelve months and shall comprise two Phases:

Phase I Feasibility Study
Phase II Detailed Design

Phase I shall be essentially completed within a four months period and finally completed within six months.

Phase II shall be commenced as soon as practically possible after approval of project synopsis and parameters prepared during first four months of Phase I. Phase II shall be completed within 12 months of commencement of the Study.

An Inception Report shall be submitted within 1 month of commencement of the Study. This Report shall set out the details and findings of initial review of available reports, data and conditions, identify possible problems which may obstruct work and provide updated work schedules etc.

An Interim Feasibility Report shall be submitted four months after commencement and shall provide a detailed synopsis of, and parameters for, the sewerage and sewage treatment/disposal strategy recommended to ensure the continuing and long term protection against wastewater pollution required. The proposals in this study shall be fully coordinated with the studies and works currently being undertaken by the PWD/TISTR. The Report shall include a detailed implementation programme together with a detailed scope of works for the first stage of development proposed for detailed design under Phase II. The Report shall include estimated capital and operation and maintenance costs. Draft documentation for all specialist studies/services eg soils investigation, land survey etc. shall also be provided.

The Feasibility Study Final Report shall be submitted six months after commencement and shall comprise a finalized sewerage strategy

for the Phatthaya Area incorporating feed back from and approved by the Thai Government. This Report shall also detail recommendations for institutional, organizational and management enhancement and strengthening required to ensure the best return on the capital investments proposed.

Detailed design documentation comprising design statements for each proposed contract package shall be submitted as they are completed.

Tender documentation including, conditions of contract, bills of quantities, specifications and tender drawings shall be submitted by proposed contract package as they are completed. Each package shall be accompanied by a detailed cost estimate. All tender documentation and estimates shall be completed and submitted within 12 months of commencement of the Study. The operation and maintenance guidelines shall be completed and submitted together with the final submission of tender documents.

3) TOR for Water Supply Project

(1) Background

Phatthaya area has been suffered chronic water shortage in a last few years due to lagged public investment. Because of the rapid growth in Phatthaya area with inadequate provision of infrastructures, the public utilities are not able to catch up with the pase of the private sector.

The water supply, especially in 1989, facing serious raw water shortage, and exceeding the capacity of the water production, urgently needs improvement and expansion program to meet increasing demand. Therefore, elaborate studies and long term plans shall be efficiently carried out in order to preserve the socio - economic resources and to eliminate an obstruction against approaching development goal of the ESB project.

(2) Outline of the project

As described in previous subsection, present Phatthaya water supply mostly serves for the highly populated and developed area, and, however, has the problems of;

- Insufficient production rate of existing raw water source and it is insufficient to meet the future demand increase
- Large demand over the production capacity of treatment plant
- Large demand is anticipated in the adjacent area of Phatthaya city which has no public water supply system.

The following projects are proposed after due consideration of present problems and ongoing development plans.

① Water supply for Phatthaya and Na Klua town area, and Jomtien beach area

- Upgrading and additional pipeline to existing distribution facilities.

- Construction of extension pipeline and replacement of absolute pipelines as required.

- Approximate max. day demand is estimated to be additionally 34,400 cu m/d.

② Water supply for Tha Farang beach, Bang Sare and Phatthaya inland area.

- Construction of new distribution network to serve the most densely populated and developed zone among these area with the approximate max. day demand of 55,100 cu m/d.

③ Water supply for whole project areas to meet the long term needs

- Upgrading and additional pipeline to the distribution network
- Construction of expansion pipeline to cope with the progress of development
- Construction of treatment plant with an additional treatment capacity of approximately 66,700 cu m/d
- Construction of raw water transmission pipeline from proposed water source to the treatment plant with the capacity of 17.3 MCM/y in average day demand
- Construction of raw water pumping station as required

The aims of the project No. 1 and 2 is to provide the distribution facilities corresponding to the ongoing development plan which are classified into first phase works. The No. 3 projects are to cope with the long term water demand up to year 2006 which depends on the other water basin or on new source other than secured five reservoirs. It is classified into second phase work.

(3) Study area and planning horizon

The area of this feasibility study covers all of the area of Phatthaya city and following neighboring areas ;

- Southern coastal area extends from south boundary of the city down to Bang Sare.
- A part of Nong Preo Sanitary District extends to east of the city and Ban Rong Po extends to north of the city which are partially

included in existing PWA's system. Study area has an whole area of approximately 67 sq km.

Among these areas, the service by PWA's piped system covers the are of;

- Populated seaside area, and its surrounding area in Phatthaya city.
- A part of Nong Preo Sanitary District and Ban Rong Po

The water supply of remaining parts of the study are, those are, inland of the city, southern area (Tha Farang Beach and Bang Sare) and Ko Lan depend on the private ground water facilities, rivulet water, truck loading water or stored rain water.

(4) Objectives and scope of works

① Objectives

The feasibility study for water supply system of the study area shall perform to create the guiding principles and strategy for development of water supply system up to the year of 1996 and 2006. The specific objectives of the study are ;

- To formulate an optimum development plan for the water supply system in Phatthaya area
- To study the engineering, economic, financial and legal feasibility of the development project
- To study and recommend suitable organization and management structures for implementation of the development program and for operation and maintenance of the water supply system.
- To prepare managing time schedule and TORs of next stage of implementation.

Most cost - effective and feasible system shall be recommended to meet the demand up to the year 2006. The available water source shall also be identified for the development. Water demand shall be forecasted so that the amount of water supply can be planned accordingly.

② Scope of works

The study comprise of ;

- Survey, collection and data analysis.
- Preliminary design of major components of the project.

- Cost estimation of construction in the stage of feasibility study.
- Feasibility study of economics and finance.
- Study for legal aspects, organization and management for implement.
- Preparation of implementation program of the project
- Preparation of TORs for detailed design and tender documents work, bid evaluation, field survey, soil investigation, construction supervision and other related engineering services.

The study shall cover the following works

i. Survey, collection and data analysis

Necessary surveys, investigations, collection, evaluation and analysis of all available datas shall be conducted about physical, socio - economic, engineering and legal aspects. The data shall be concerned to following items ;

a. Present situation, technical data and drawings of the existing waterworks facilities

- Intake facilities
  Number, capacity, water source, intake amount, river discharge, durable years, quality of raw water, type of pump, etc.

- Water transmission distribution and service installations
  Material of pipes, diameter, pipe length, period of pipe laying, capacity of clear water reservoir, analysis of water leakage and unaccounted - for water, construction method, valves and hydrants. etc.

- Purification facilities
  Number, capacity, process of purification, chemicals, chemical injection facilities, ability level of personnel, etc.

- Maintenance of facilities
  System of operation, inspection, repair, etc.

- Present development plan by PWA.

b. Past and present data of water supply condition

- Statistics of population, water served population, tourist, water production and sales, number of connection, efficiency of supply, served area and population served ratio, etc.
- Use of chemicals and electricity
- Daily average water consumption per capita
- Unit water consumption by usage (eg. domestic, public, tourism, commercial and industrial)
- Type of water supply source
- Record of water quality analysis

  - Present water source and treated water
  - Wells
  - Nong Kho, Nong Pla Lai, Dok Krai and another related reservoirs

c. Water rate system
Metering, collection, water rate, installation condition and functional condition of meters

d. Previous studies of water resource development and water supply development around Phatthaya area

e. Direct information for present water uses by the inhabitant to grasp the trend of future water demand.

f. Design standard or criteria

- Present design standard for general and for existing facilities
- Water quality standard

g. Natural conditions and features

- Data of topography and soil properties
- Meteorological data of Phatthaya area
- Hydrological data of supposed water source rivers

h. Water rights of supposed water source rivers

i. References for management and organization of waterworks

- Laws and regulations
  - Laws and regulations concerning to waterworks business
  - Water supply regulations and rules
  - Laws and regulations concerning to construction
- Organizations and roles
  - Organizations, working staff members and their roles of major waterworks offices and of headquarters
  - National and regional administrative organization
- Management situation
  - Statement of budgets and accounts, management reports, etc.
  - Process of decision making for budget and policy
- PWA's purpose of activity and outline of PWA's undertaking
- Future plan or target of PWA

j. Outline of the city

- Type of the city
- Movement of population, economics (income and expenditure, etc)
  - Laws and regulations
  - Financial status
  - Management organization and roles
  - Present situations of the city utilities

k. Underground embedded facilities

- Embedded condition of existing drainage, gas, electricity, communication, and other city utilities

l. Land utilization

- Existing condition and future plan
- Designation of utilization zone

- Restricted items by local regulations and related laws

m. Related improvement plans

- Upper level development plan and their relationship to the project
- City development plan
- Water supply development plan
- Road and street improvement plan
- Land improvement plan
- Drainage, gas, electricity, communication and other city utilities

n. Investigation of construction circumstances

- Construction unit cost of waterworks facilities
- Availability and origine of construction material, machinery, waterworks equipment and labor
- Composition of whole project cost
- Cost allocation of foreign and local currency portion

o. Existing problems about ;

- Management of waterworks organization
- Water supply planning
- Design and management of waterworks facilities
- Operation and maintenance of waterworks facilities
- Execution and management of construction
- Control of water quality and leakage

p. Administrative organizations between other related agencies

q. Others necessary for the study

ii Analysis and study

The study shall be carried out over reviewing previous master plan and development plan of water resources and waterworks.

a. Make hydrological study and evaluate supply capability of existing and expected water sources for long term water

resources, including ground water resources from the viewpoint of quantity and quality.

b. Study and assess the future population, number of tourist, water demand and land use from the projection of socio - economic, industrial and commercial growth over the study period. Water demand shall be studied not only in total trend but also by various types of users.

c. Investigate the water resource development plan or potentials in neighboring water basin and study possibility of water diversion from these water basin.

d. Evaluate present waterworks and its development plans concerning ;

- Service area and population
- Supply system, quantity and quality
- Facilities
- Water leakage and unaccounted - for water
- Operation and maintenance
- Management system
- Financial situation

and grasp the problems, capability and necessity of improvement.

e. Delineate the service areas for two specified period (1996 and 2006) after due consideration of future population, land use, commercial and tourism development

f. Based on the analysis and projection, recommend the proposed water supply system and development plans for water source, transmission, treatment and distribution for each period. Most promising proposal shall be selected from various alternatives after studying on the viewpoint of possibility of land acquisition, engineering rationality, capital cost and methodology for construction, operation and maintenance, and conformity of legal restriction.
Treatment process shall also be recommended based on the raw water quality of proposed source.

g. Rehabilitation of obsolete facilities shall be recommended if necessary.

h. Recommend the basic policy to secure the long term water source including interbasin water diversion plan.

i. Study the engineering characteristics of the water supply which relate to the design and construction. Prepare the criteria for design and guide for construction, operation and maintenance.

j. Preliminary design shall be made for the waterworks and related facilities. The design shall include ;

- Accurate indication of the location, arrangement, treatment process and principal features of the project
- Preliminary engineering design of the necessary components and facilities.
- Preparation of design criteria, outline drawings, basis of cost estimates as well as all details to define the project.

The preliminary design shall be used to derive preliminary cost estimates which shall be further used for economic and financial analysis.

k. Study the construction materials, machineries and labour force.

l. Study the construction method and procurement of material/equipment.

m. Prepare the cost estimates for the following items ;

- Construction cost including land acquisition
- Engineering service cost such as detail design, soil investigation, field survey and supervision
- Government administrative cost
- Cost for operation and maintenance of proposed facilities

Each of the cost items shall be defined in local and foreign currency portions.

n. Prepare economic analysis of the project and its implications to the water users with regards to health and income as well as determine willingness of the community and ability to pay in terms of water tariff.

o. Prepare a financial plan based on the required investment plan of the recommended project. Carry out a detailed analysis of the existing and projected financial operation including yearly estimate of revenue, operating expenditure, etc., and its effects of expected price escalation and water rate increase.

p. Make economic evaluation of the net benefits and costs. Costs shall be converted to economic cost to reflect alternative uses of resources by the nation. Benefits shall include effects of the project on the water users and national interest.

q, Study the legal aspects of the project in detail and recommend suitable measures to solve the major problems, constraints and operating organization to the project implementation.

r. The appropriate organization and management structures for the operation, maintenance and fulfillment of necessary functions of the waterworks shall be recommended.

s. Recommend the proper system to reduce a water leakage and unaccounted - for water in the future.

t. Prepare the proposals concerning further stage of the development activities, that is, organization and management structures for the operation of development program and terms of reference for the engineering services such as ;

- Field survey and soil investigation
- Detailed design works and preparation of tender documents for construction.

- Construction supervision and related engineering services.

u. Prepare the implementation program for the completion of the project, including the schedule of disbursement and proceeding of the project. The period and stage of implementing operation shall also be studied.

iii Transfer of Knowledge

Throughout the course of the study, transfer of knowledge and training shall be pursued to the government personnels or counterparts by the study team expertise in the following fields ;

- Water resources.
- Hydrological study and analysis.
- Planning and investigation of waterworks.
- Hydraulic, structural, mechanical and electrical design of waterworks facilities.
- Machinery and materials of waterworks.
- Construction and its management of waterworks facilities.
- Operation and maintenance of facilities including water quality control.
- waterworks administration, finance and legal aspects.
- Economic evaluation
- Operation for improvement and development activities.

The above transfer of knowledge will be carried out at the stage of field investigation, in the office study and expertise's home office.

(5) Study schedule and reports

The period of study shall be twenty seven (27) months in total, however, the results of first phase work shall be accomplished within nine (9) months from commencement of the study. In the course of the study, the following reports shall be prepared ;

- Inception report

This report shall review the work plan proposed in the consultant's technical proposal, propose a new work plan if necessary and summarized work progress and future work plan.

- Interim report
  It shall comprise work progress, summary of findings, problems encountered, selection of best alternative solution of the water supply system and criteria/concept/and guidelines for project development.
- Draft final report
  It shall present in detail all findings and results of the works stipulated in the TOR. This report will be reviewed and commented on by the specially appointed committee.
- Final report
  The final report is the revised version of the draft final report to accommodate reasonable comments of the specially appointed committee.
- Progress report
  During the period of the study, the progress report shall be prepared indicating progress of the work, problems encountered suggestion for solution and work plan for next stage of the work.

Submitting terms of each reports are summarized below ;

Reports	Terms to be submitted from the commencement of the study
- Inception report	1 month
- Interim report for first phase	4.5 months
- Draft final report for first phase	8 months
- Final report for first phase	9 months
- Interim report for second phase	18 months
- Draft final report for second phase	24 months
- Final report for second phase	27 months
- Progress report	Quarterly throughout the study (4 issues)

All reports shall be prepared in English language, however, executive summaries shall be attached both in Thai and English for interim, draft final and final report. Theses summary reports shall be prepared containing adequate details, important figures and maps for use of related local agencies as well.

(6) Required expertise

Highly qualified professionals who have much experience in the field of water supply are required in the following, but not limited to, specified fields

- Overall coordination (team leader) and waterworks planning
- Urban planning and land use planning
- Water resource
- Hydrology engineering
- Hydrogeology
- River engineering
- Water quality survey
- Topographic survey
- Geotechnical engineering
- Waterworks engineering
- Electrical engineering
- Hydro - mechanical engineering
- Architecture
- Quantity survey
- Construction planning and cost estimation
- Socio - economics
- Financial and economic analysis
- Legal and institutional affairs

4) TOR for Rainwater Drainage Project

(1) Background of the Project

Phatthaya City developing as an international resort area is located in the east-southern part of Thailand. Development in this city had been made mainly in Phatthaya beach area which extends behind the developed seaside area. This development process in lower area is presumed to continue in future.

From drainage point of view, this lower area has a function of retarding in rainy season by pounding rainwater once protecting downstream developed area from flood damage. Reclamation of this area by development without drainage aspect results decrement of retarding function and may cause new inundation in the vicinity frequently.

On account of insufficient rainwater drainage facilities, Phatthaya City had serious problems on comfortability and convenience of the city in 1988, when rainwater from upstream area overflowed on the main roads for several days.

Taking into account the above conditions, urgent construction of rainwater drainage facilitates will be required in order to keep development possibilities in the Phatthaya City in future and to create a safe international resort area.

(2) Outline of the Project

In order to protect Phatthaya City from flood damage, three rainwater drainage projects should be carried out urgently. Outline of each project is summarized as follows:

① Puk Plub River Improvement Project

Project area is located in south Na Klua area. In this project improvement of Puk Plub river which is the main channel in this area will be carried out. Effect of this project is expected to protect the developed area which is located downstream of this river mostly from flood damages and to create safety zone in the lower area which extends behind the developed area so that development should be possible.

② Phatthaya Town Box Culvert Construction Project

The Project Area is located in main part of Phatthaya Town. In the Project Area, many functions in the city and faciliates of resort area concentrate. Construction of box culvert as a main drainage should be carried out in order to protect main part of Phatthaya City from flood and to raise possibility of development in the lower are which extends behind the developed seashore area.

③ Phatthaya River Improvement Project

The Project Area is located southern part of Phatthaya town. High density amusement center in Phatthaya City so called South Phatthaya is included in this area. Improvement of Phatthaya river which is the main channel in this project area will be carried out. Effect of this project can be expected to protect the developed area which is located downstream of this river, from flood damages and to create safety zone in the lower area which extends behind the developed area so that development possible.

④ Jomtien Area Box Culvert Construction Project

The Project Area is located in the southern part of Phatthaya Municipality. Many condominiums and hotels are under construction in the beach side of this area. Construction of box culverts should be carried out in order to protect Jomtien beach area from flood and to raise possibility of development in the lower area which extends behind this beach area.

(3) Study Area and Planning Horizon

The Study Area is located in South Na Klua Phatthaya Town, South Phatthaya area and Jomtien area.

(4) Objectives and Scope of Works

① Objectives

Objectives of this projects are to carry out feasibility study in South Na Klua area, Phatthaya Town area and South Phatthaya, taking into account following matters:

- Practicability and emergency of the project
- Remarkable developing conditions and difficulty of land acquisition in the project area
- Coordination with sewerage plan, coastal utility plan and other plans
- Aethetic aspect on river

② Scope of Works

i) Scope of the Study

In order to attain the objectives mentioned above, the study shall include following items:

[Phase-I]
- Date collection
- Reconnaissance survey
- Review of existing plans

[Phase-II]
- Preparation of drainage project plan
- Recommendation on implementation

[Phase-I]

a. Data collection

Collection of existing data relevant to the study.
- Topographic and geological maps
- Soil test data
- Meteorology and hydrology
- Present land use and future land use plan
- Previous flood and damages
- Existing facilities related to drainage control
- Construction cost and construction materials
- Administrative and socio-economic conditions
- Others

b. Reconnaissance survey

The following reconnaissance surveys shall be carried out to obtain supplementary data useful for study.

- Topographic survey along proposed alignment
- Longitudinal and cross-sectional survey
- Geological survey and soil test
- Survey on present land use and flood control system
- Others

c. Review of existing plans

In order to study the drainage facilities plan, the existing plans such as PWD's and Phatthaya City Hall's will be carefully reviewed, considering the present field conditions.

Review of proceeding plans, studies, documents and other materials relevant to the study will be carried out.

[Phase-II]

Formulation of rainwater drainage facilities plan

On the basis of the results of above study, the rainwater drainage facilities plan in South Na Klua, Phatthaya town and Phatthaya river area will be planned.

- Setting up a basic plan for rainwater drainage facilities
- Basic layout of rainwater drainage facilities
- Preliminary design of rainwater drainage facilities
- Construction plan
- Estimation of cost for construction, operation and maintenance
- Estimation of benefit and evaluation of project feasibility
- Economical and financial analysis
- Program and organization for operation and maintenance
- Social and environmental aspect
- Recommendation on implementation

ii) Transfer of Knowledge

The transfer of technology on servers, planning and design will be presented to counterparts, other engineers and technicians through on-the-job training.

(5) Study Schedule and Reports

The period of the study will be eighteen (18) months in total and be divided into two (2) stages.

Phase-I : Pre-feasibility study : (8 months)
Phase -II : Feasibility study : (10 months)

In the course of the study, the following reports in English will be prepared:

- Inception report : within 2 months from commencement of the study
- Interim report including a comprehensive field survey report : within 8 months from commencement of the study
- Draft feasibility report : within 16 months from commencement of the study
- Final feasibility report : within 18 months from commencement of the study
- Progress report : twice throughout the study (2 issues)

(6) Required Expertise

For executing the study, the following expertise but not limited to will be required for the study.

(1) Team leader
(2) Hydrologist
(3) Drainage engineer
(4) Soil engineer
(5) Economist
(6) Structural engineer

(7) Construction engineer
(8) Topographic survey expert

5) TOR for Solid Waste Disposal Project

(1) Background

Sanitary and clean city is essential for an international resort, which solid waste management should secure. The quantity of solid waste is increasing rapidly from increase of both number of population and tourists and unit discharge amount. The present disposal site will be filled up within a few years, Phatthaya city ought to cope with this problem. Considering the preparation period, provision of a new disposal site would be urgently required. The delay would cause serious environmental problems. As the present disposal site has polluted surface and underground water, the new site should be planned with environmental consideration.

(2) Outline of the Project

The Solid Waste Disposal Project will prepare a new final disposal system constructing sanitary landfill site with necessary equipment and facilities including a transfer station if necessary.

(3) Study Area and Planning Horizon

The study area and the target year of the project is as follows:

- Study area : Phatthaya City including Koh Lan and the surrounding area
- Service area : Phatthaya City
- Target year : 1996 and 2006

(4) Objective and Scope of Works

① Objective

The objective of the study on the Phatthaya Solid Waste Disposal Project will be to investigate the sites, to collect and analysis the data to select an optimum site, to formulate an optimum disposal plan of solid waste from Phatthaya area including Koh Lan, to make

an implementation plan and to investigate the economic and technical feasibility of the project.

the study will be divided into two phases ; Phase-1 : Pre-feasibility study and Phase-2 : Feasibility Study. Main objectives of each phase are as follows:

Phase-1 : Data collection, review of previous studies field investigation on topography, geology, hydrology, soil, land use, quantity and quality of solid waste etc., investigation of socio-economic aspects, formulation of a preliminary plan and site selection.

Phase-2 : Formulation of an optimum plan for solid waste management with a physical plan of sanitary landfill and a physical plan of transfer station if necessary, and investigation of technical and economical feasibility including its environmental assessment.

The special condition of this project is importance of availability of land. Because approval of the land-owners and the community is necessary, their opinions will affect the schedule of the study. In spite of that, in order to implement the schedule in time, such factors should be solved in an adequate period.

In addition, location of the site will relate to necessity of a transfer station. In case the site is located in a remote area, a transfer station and relevant equipment should be prepared.
The study area includes Koh Lan, where sanitary landfill is considered not adequate.
Thus the study is not limited to final disposal but to collection, haulage and intermediate treatment. Total plan for solid waste management including improvement of collection should be considered. However, the main objective of the study is final disposal plan.

② Scope of Works

i. Phase-1 : Pre-feasibility

As the disposal site has not been decided yet, three or four sites should be selected for comparison and through technical and economical evaluation with relevant field investigation and preliminary study, a optimum site will be recommended in cooperation with Phatthaya City.

a) To review previous studies and existing data and materials relevant to the study

b) To investigate the regional socio-economic aspects relevant to quantity and quality of solid waste

c) To conduct topographic survey on the candidate sites

d) To conduct geological and geotechnical investigations

e) To conduct hydrological and underground hydrological investigations

f) To conduct investigations on land use, existing community, land price, conditions of roads, land ownership etc.

g) To study cooperation with Laem Chabang Complex

h) To study quality and quantity of solid waste

i) To make a preliminary plan of sanitary landfill and a transfer station

j) To evaluate the candidate sites with or without a transfer station considering technical and economical feasibility, availability of land and environmental impact etc.

k) To study feasibility of privatisation

e) To study a preliminary implementation plan

ii. Phase-2 : Feasibility Study

The Phase-2 study will follow the Phase-1 Study and include the following:

a) To collect and review supplemental data

b) To prepare a preliminary design of sanitary landfill and transfer station if necessary, which will include the following:

- Structure of landfill (excavation, embankment, soil cover, lining etc.)
- Drainage
- Leachate collection and treatment
- Gas venting
- Facilities (Weigh bridge, office, maintenance house, monitoring well etc.)

c) To make operation plan including :

- Equipment
- Procedure
- Personnel
- Phasing

d) To estimate initial and operation costs

e) To study fee collection and revenue

f) To access impacts of the project to the natural and social environment

g) To clarify technical and economical feasibility of the project

h) To recommend an optimum plan for solid waste management from improvement of collection to final disposal including preparation of an implementation program

i) To conduct detailed topographic and geotechnical survey required for the following detailed design.

(5) Study Schedule and Reports

i. Study Period and Schedule

The period of the study will be nine (9) months in total and be divided into two (2) stages:

Phase-1 : 6 months
Phase-2 : 3 months
Total : 9 month

ii Reporting

In the course of the study, the following reports will be prepared from the commencement of the study:

- Inception report : 1 month
- Interim report : 4 months
  including field survey report
- Pre-feasibility report : 6 months
- Draft feasibility report : 7.5 months
- Final feasibility report : 9 months
  with supplemental survey report

(6) Required Expertise

The following expertise will be required:

- Team leader
- Planner for solid waste management
- Sanitary landfill engineer
- Civil engineer (road, earthwork, etc.)
- Geologist
- Surveyor
- Environmental engineer
- Building engineer
- Economist
- Landscape architect

6) TOR for Phatthaya Road Improvement Project

(1) Background of the Project

Phatthaya's growth in recent years has been phenomenal. The older Phattaya town area is now fully developed along the beach and Phattaya 2 road and the newer Jomtien area is being filled with mashrooming condominiums and other establishments. The growth of traffic in Phatthaya City has been even more dramatic and traffic congestion and associated problems such as air pollution and accidents have become increasingly serious, threatening the very livelihood of Phatthaya.

The Department of Town and Country Planning has prepared an area-wide land use plan including road plans (called Phatthaya General Plan) and it was officially approved in 1987. the General Plan is subject to revision every five years. Road plans specified in the current General Plan were found generally adequate or more than adequate to accommodate the anticipated increase in traffic in the short to medium term by a study carried out by the Japan International Cooperation Agency (JICA) in 1989. the Master Plan Study for the Development of Phatthaya Area (hereinafter called the JICA Study). The JICA Study recommended that a series of road network improvement work be carried out as urgent projects. This study review and design project is to follow up the recommendations of the JICA study.

(2) Outline of the Project

The Project is to review the results of the JICA Study, to make appropriate revisions taking into account changes occurred since, to do detailed designs of finally selected road network improvement projects, and to prepare a ground for the immediate implementation of the selected projects.

The road network improvement projects recommended by the JICA Study for immediate implementation are:

Construction of Phatthaya 3 Road

- North-central Phatthaya
- Central-South Phatthaya
- South Phatthaya-Mountain Road

- Mountain road - Reclamation Area
- Soi 17

(3) Study Area and Planning Horizon

Projects subject to physical design shall be within the boundary of Phatthaya City and Amphoe Bang Sare. However, the subject area for the estimation of traffic may not be limited by the above. The target year for the planning purposes shall be 2006.

(4) Objective and Scope of Works

① Objective

- To provide a plan of road improvements for the Phatthaya area that will satisfy the medium term requirements for accommodating a healthy growth of Phatthaya.

- To provide designs and cost estimates for the projects included in the above plan that can be implemented immediately.

② Scope of Work

The study shall review the JICA Study, make appropriate revisions, carry out an economic evaluation, and prepare an implementation plan. Work shall contain but not necessarily limited to the following:

- collection of data needed to update the analysis presented in the JICA Study
- collection of any other relevant data
- review of the JICA Study
- traffic forecasts
- preliminary soils and materials investigation
- route alignment study
- preliminary engineering design
- preliminary cost estimates
- environmental study
- economic evaluation
- selection of projects included in the implementation plan
- preparation of an implementation plan

- recommendations to ensure efficient implementation including organizational, financial and legal matters.

(5) Project Duration and Reports

① Duration

Project duration shall be six months.

② Reporting

Inception report - 20 copies within 1 month of the starting day.

Draft Feasibility Study Report - 20 copies within 6 months.

Final Feasibility Study Report - 30 copies within 1 month of the day of receiving comments from the Government.

(6) Required Expertise

The following experts are expected to be required to carry out this project.

Project Manager
Highway Engineer
Soil and Materials Engineer
Structural Engineer
Traffic Engineer
Transportation Planner
Economist
Surveyor
Environmental Specialist
Hydrologist/Drainage Engineer
Cost Estimator

ANNEX : STUDY TEAM

1. JICA'S STUDY TEAM

1)	Project manager	:	Mr. T. Yoshimatsu
2)	Regional Development/Land Use	:	Mr. A. Asahi
3)	Financial/Implementation Planner	:	Mr. M. Akagawa
4)	Port-Coast Use Planner	:	Mr. I. Mirchandani
5)	Tourism Development Planner	:	Mr. K. Hosino
6)	Tourism Facilities Planner	:	Mr. I. Asakura
7)	Demand Forecast Expert	:	Mr. H. Yamane
8)	Economist	:	Mr. Y. Kamiya
9)	Environmental Expert	:	Mr. P. Puthipiroj
10)	Transportation Planner	:	Mr. Y. Motomura
11)	Sewerage Planner	:	Mr. M. Wishart
12)	Water Supply Planner	:	Mr. K. Nagayoshi
13)	Rainwater Drainage Planner	:	Mr. M. Hayashi
14)	Public Facilities Planner	:	Mr. N. Minami

2. JAPANESE ADVISARY COMMITTEE

1)	Chairman	:	Prof. Dr. H. Morisugi
2)	Member	:	Mr. T. Nagai
3)	Member	:	Mr. H. Kondo
4)	Member	:	Mr. S. Naruse
5)	Member	:	Mr. S. Miyama

3. EMBASSY OF JAPAN

1)	First Secretary	:	Mr. H. Matsuda
2)	Second Secretary	:	Mr. M. Ito

4. JICA STAFF

1)	JICA Headquarters	:	Mr. Y. Sasaoka
2)	JICA Headquarters	:	Miss R. Inada
3)	JICA Bangkok Office	:	Miss C. Hara

5. STEERING COMMITTEE

Dr. Savit Bhotiwihok	:	Director OESB
Mr. Mana Chotikapanich	:	PWD
Mr. Phaitoon Boonwatana	:	DOLA
Mrs. Jutamas Siriwan	:	TAT
Mr. Sakda Tonguthaisri	:	DTCP
Mr. Wattana Karnbunjop	:	DTCP
Mr. Apai Chantanachulaka	:	Chonburi Province
Mr. Suchai Ruayrin	:	Phatthaya City
Mr. Saksidh Tridech	:	NEB
Mr. Sidhiporn Kachornnetiyudh	:	NEB
Mr. Buncha Vatanasinthu	:	DOH
Mr. Viched Rochanathamkul	:	HD
Mr. Sunsern Vongcha-um	:	NESDB
Dr. Utis Kaothien	:	NESDB
Prof. Kamropluk Suraswadi	:	OESB
Mr. Somchet Taeracoop	:	OESB
Mr. Phatai Metharom	:	OESB

6. WORKING CROUP

Mr. Somchet Taeracoop	:	OESB
Mr. Pathai Metharom	:	OESB
Mr. Voranit Chayavivattanavong	:	PWD
Mr. Leunyos Leelachati	:	DOLA
Mr. Paradech Phayukhavichien	:	TAT
Mr. Anukul Khunavongse	:	Chonburi Province
Mr. Theerapol Noprumpa	:	Phatthaya City
Lt. Col. Vichit Emsawat	:	Phatthaya City
Miss Kannika Boontanonte	:	HD
Mr. Thaneerat Liripachana	:	OESB
Mr. Kriangkrai Boonyayothin	:	OESB
Mr. Termsap Taclakul	:	OESB