

6.2.2 Facility Design

(1) Facility Design of ICD

1) Container Freight Station (CFS)

(a) Space Requirements

9. The space requirement of the CFS is calculated in Chapter 2 as 4,800 sq m. The CFS length is divided into spans of 7.5 m so that two containers would be able to berth within a span. Then, the width of the CFS would be 40 m. Therefore, the CFS has a size of 120 m (7.5 m x 16 spans) long by 40 m wide.

10. In addition, an apron and a customs inspection area would be provided at both sides of the CFS 2.5 m and 5 m in width, respectively.

(b) Structure

11. The CFS comprises two kinds of structures, steel structures and reinforced concrete structures. The former are for roofs while the latter are for columns.

12. A pitched roof truss with cantilever shed expansion would be adopted for the roof structure. The cantilever shed 6 m wide protrudes beyond the CFS limit, installing a roll-up shutter.

13. Reinforced concrete columns are supported by H-shape precast concrete piles and 25 m long underground through footings.

(c) Roadway Space

14. The combined width of the berthing and service road is the required roadway space.

(d) Other dimensions

15. The CFS floor is raised to the floor level of the vehicles. In the case of container trailers, the height is 1.3 m and for trucks the height is 1.0 m.

16. The inner height of the beams of roof frames above the floor would be about 6 m, which is enough to load three or four layers of palletized cargo.

17. A general view of the CFS is shown in Fig. III.6.1.

2) Office Building

18. The office building is located to combine the CFS with the covering area and further to attach the container gate with the pedestrian bridge. The adopted building design is 10 m wide by 25 m deep and has four stories.

19. The space for this building is broadly divided into four blocks as below:

- . Resting space for drivers, workers, etc. on the ground floor
- . Space for the business section on the first floor
- . Space for the administration section on the second floor
- . Space for the operation section and the maintenance section on the third floor.

The space requirements for each section are calculated as follows:

(a) Operation Section

20. The operation section must occupy the top floor so that workers can look over the whole area to control movement. The required space is calculated assuming twelve persons will be required for the operation section except for checkers and drivers, etc. Assuming a space requirement of 10 sq m per person for twelve persons, then the required area is 10 sq m

x 12 persons = 120 sq m.

(b) Business Section

21. Two units are provided for the business section. One is for making documentation and the other is a rest area for clerks, etc. Assuming a space requirement of 6 sq m per person for ten office workers, then the required area is 6 sq m x 10 persons = 60 sq m. Further assuming a space requirement of 2.5 sq m per persons for seventeen workers, then the additional required area is 2.5 sq m x 17 persons = 43 sq m.

(c) Administration Section

22. Assuming a space requirement of 6 sq m per persons for twenty-two workers except for seven security persons and a manager, then the required area is 6 sq m x 22 persons = 132 sq m.

(d) Maintenance Section

23. The required space is calculated assuming five office workers for the maintenance section. Assuming a space requirement of 6 sq m per person for five persons, then the required area is 6 sq m x 5 persons = 30 sq m. Space for twelve mechanical workers is provided at the maintenance and repair shop.

(e) Customs Office

24. Assuming a space requirement of 2.5 sq m per person is required for twenty workers, then the required area is 2.5 sq m x 20 persons = 50 sq m.

(f) Worker and Driver's Room

25. Assuming a space requirement of 1.5 sq m per person for the sixty-eight drivers, etc. required for the operations section, then the required area is 1.5 sq m x 68 persons = 102 sq m.

(g) Canteen

26. Assuming a space requirement of 1.5 sq m per persons for 70% of all employees is necessary and that the turnover is three times per hour, the required area is $1.5 \text{ sq m} \times 156 \text{ persons} \times 0.7/3 = 50 \text{ sq m}$.

(h) Others

27. Besides the abovementioned rooms, space for the following rooms is also provided.

- . Entrance lobby
- . General manager's room
- . Shipping company/agent's room
- . Conference room
- . Toilet
- . Pantry

28. A general view of the office building is shown in Fig. III.6.2.

3) Container Gate

29. The adopted design of the container gate which will be covered by a 20 m x 20 m roof comprises three lanes 4 m wide, two checking booths 2 m x 3.5 m and one checking bridge of GL. + 4.8 m height. The gate is designed to provide one lane for inbound container traffic and one lane for outbound traffic. Weighbridges are installed in the respective lanes.

30. In addition, one more lane is provided which will be used by trailers without containers, personal cars, and passenger cars.

31. A general view of the container gate is shown in Fig. III.6.2.

4) Maintenance and Repair Shop

32. The maintenance and repair shop 20 m wide by 32 m long comprises two kinds of structures; steel structures for the roof and reinforced concrete

structures for columns. This building broadly comprises a container repair shop, storage area, office, etc.

(a) Container Repair Shop

33. The repair shop with a hoist of 3 ton capacity is designed to provide only light repairs since heavy damages will be repaired at the Laem Chabang Port Workshop. The required floor area is 480 sq m (20 m wide by 24 m long). Four 40' container boxes can be simultaneously repaired. The pavement of this space should resist oil dripping and acetylene and oxygen gas, and a grease trap should be installed.

(b) Other spaces

34. It is assumed that approximately 50% of the floor area of the container repair shop would be for other purposes such as tool storage, spare storage and a battery room on the ground floor, and further office space and a worker's lounge on the upper floor.

(c) Repair Yard

35. An open space 20 m wide by 32 m long is provided in front of the repair shop for container and equipment repair. The pavement of the open space must resist oil drippings, etc. and a grease trap must also be installed in this yard.

36. A general view of the maintenance and repair shop is shown in Fig. III.6.3.

5) Fuel Station

37. The fuel station is provided for the cargo handling vehicles moving in the ICD. The pavement of the fuel station area must resist oil and a grease trap must also be installed for this area.

38. An estimation of the diesel fuel consumption is shown in Table III.6.6.

Table III.6.6 Estimation of Diesel Fuel Consumption

Type	(tons)	Number of Units	Working Hours	Consumption	
				liters/h/unit	liters/day
Forklift	(2)	10	6	3.5	210
	(3)	11	6	4.0	265
	(6)	2	3	5.0	30
Top Lifter	(35)	1	6	16.5	48
	(10)	3	6	8.0	297
Yard Tractor	(25)	4	6	12.0	288
Mobile Crane	(20)	1	3	16.5	50
Truck	(2)	1	3	6.0	18
Total					1,206

39. Assuming a safety factor of 1.5, the consumption of diesel fuel per day is approximately 1.8 kl. Further assuming that the fuel station has sufficient stock for 5 days, then the required tank capacity is approximately 10 kl.

6) Container Yard

40. For the pavement of the 100 m by 230 m container yard, asphaltic concrete is proposed.

41. Twenty plugs for the reefer containers would be installed at one side of the yard.

(2) Facility Design of Administration Zone

1) Main Office Building

42. The adopted building design has a size of 14 m wide by 54 m long comprising two floors. The building is broadly divided into four sections as below:

- . Customs section
- . Port section
- . Railway section
- . Operator section

The space requirements for each block are calculated below:

(a) Customs Section

43. Three rooms are prepared for the customs section: registration office, general affairs, and documentation. Assuming a space requirement of 6 sq m a person for 75% of all customs staff, then the required floor area is $6 \text{ sq m} \times 50 \text{ persons} \times 0.75 = 225 \text{ sq m}$. Further assuming the required space for applicants is as large as the abovementioned space, the required floor area for the registration office is $225 \text{ sq m} \times 2 = 450 \text{ sq m}$.

44. In addition, assuming a space requirement of 6 sq m person for 25% of all custom staff, that is the required area for general affairs, the additional required area is $6 \text{ sq m} \times 50 \text{ persons} \times 0.25 = 75 \text{ sq m}$.

(b) Port Section

45. Assuming a space requirement of 6 sq m per person for five persons, the required area is $6 \text{ sq m} \times 5 \text{ persons} = 30 \text{ sq m}$.

(c) Railway Section

46. Assuming a space requirement of 6 sq m per person for five persons, then the required area is $6 \text{ sq m} \times 5 \text{ persons} = 30 \text{ sq m}$.

(d) Operator Section

47. Assuming a space requirement of 4 sq m per person for nine persons, the required area is $4 \text{ sq m} \times 9 \text{ persons} = 36 \text{ sq m}$.

(e) Others

48. Besides the abovementioned rooms, space for the following rooms is also required:

- . Canteen
- . Entrance lobby

- . Police room
- . Medical treatment room
- . Conference room
- . Pantry
- . Toilet
- . Computer room

49. A general view of the main office building is shown in Fig. III.6.4.

2) Overtime Cargo Warehouse

50. The space requirement is established in Chapter 2 as 2,100 sq m. The adopted building design is 25 m wide by 84 m long (6 m x 14 spans). This building comprises steel structures for the roof and reinforced concrete structures for columns. The reinforced concrete columns are supported by H-shape precast concrete piles and a 25 m long underground through footing.

51. In addition to the above-mentioned items, the major engineering factors required are as follows:

- . The warehouse length would be divided into spans 6 m long.
- . Rigid concrete would be adopted for the finishing of the floor with a 1% slope.
- . A pitched truss roof would be adopted for the roof structure.
- . A rolling shutter 4 m high would be installed at the four sections of building frontage.

52. A general view of the overtime cargo warehouse is shown in Fig. III.6.5.

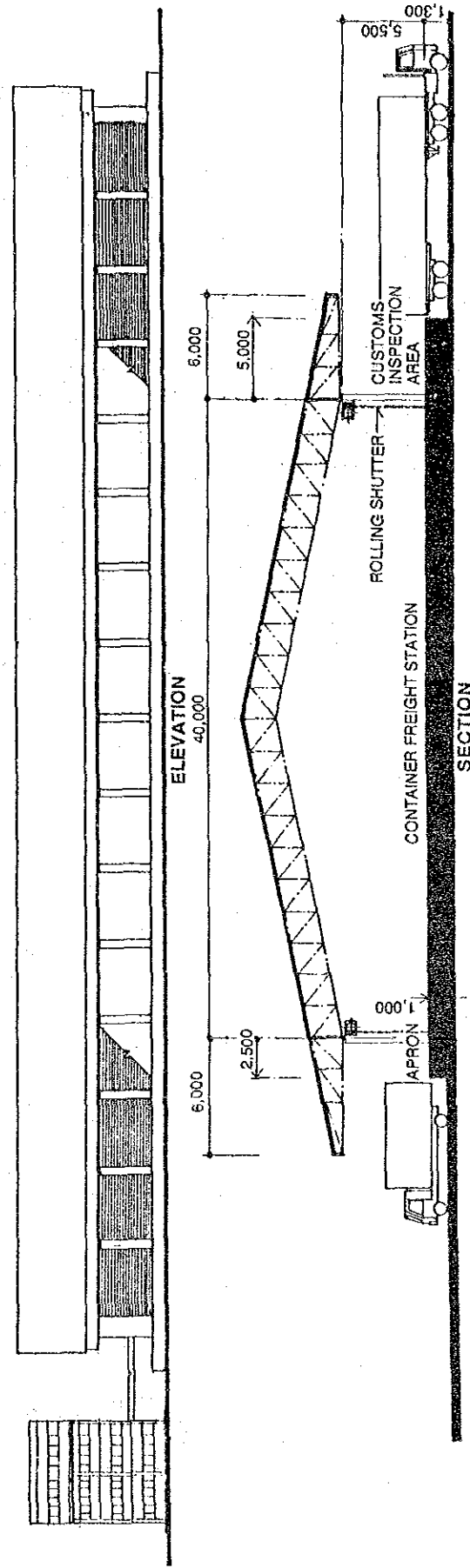
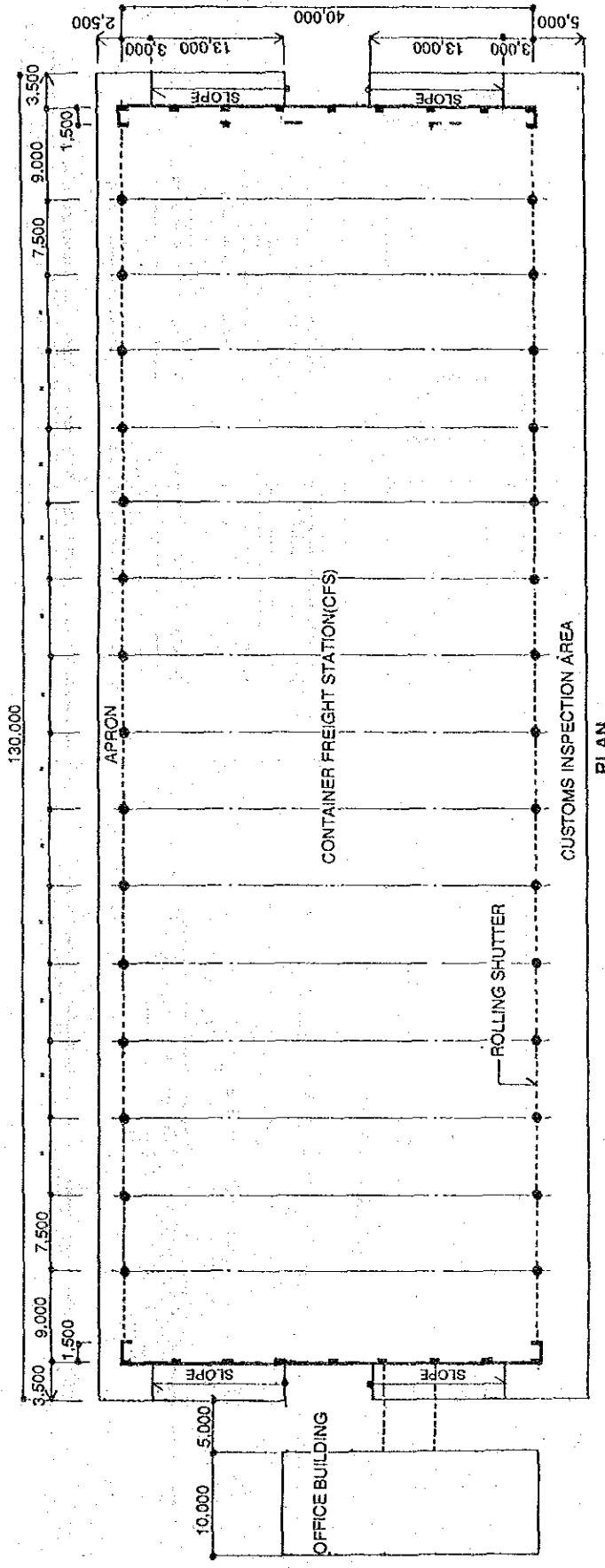


Fig. III.6.1 General View of CFS

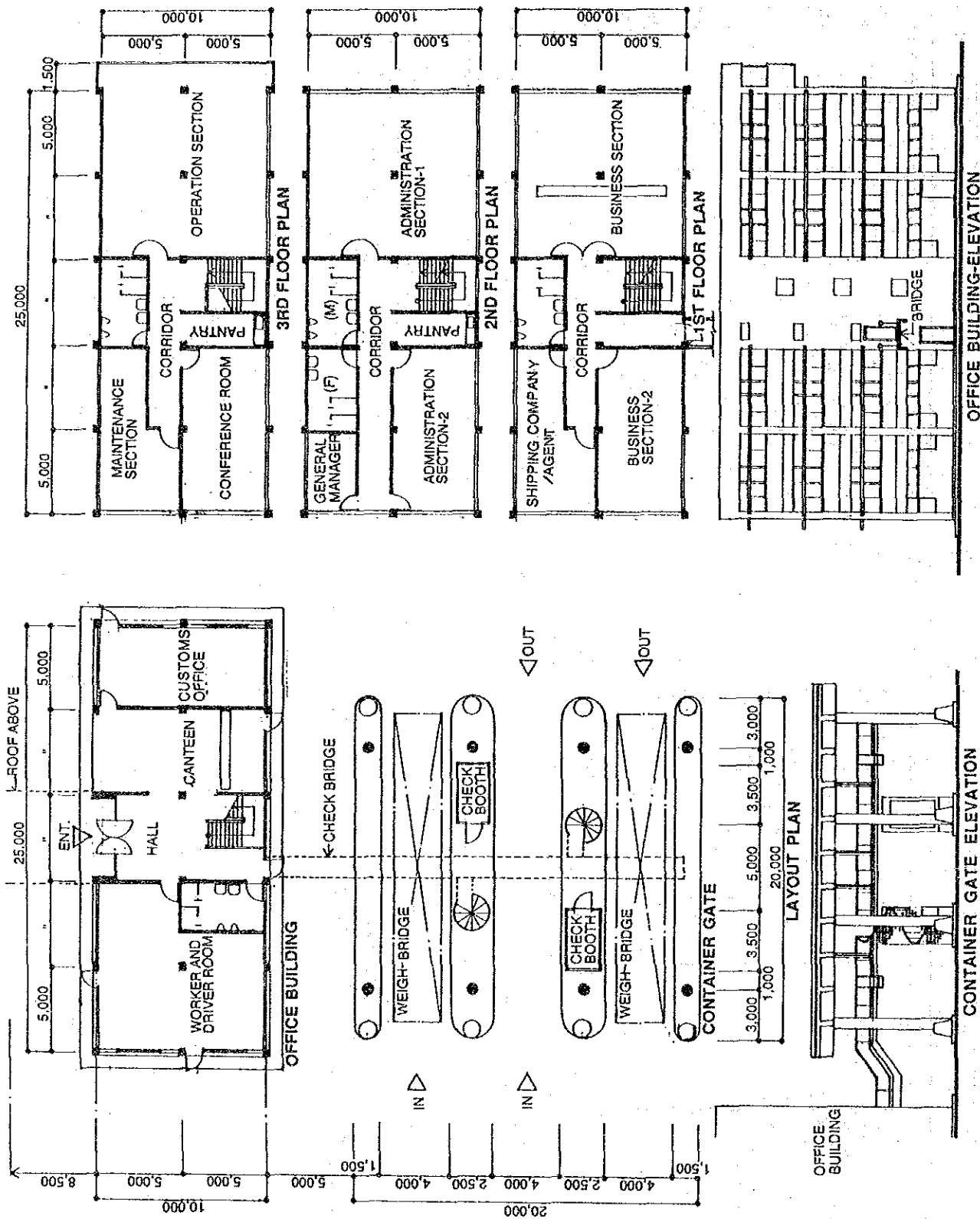


Fig. III.6.2 General View of Office Building and Container Gate

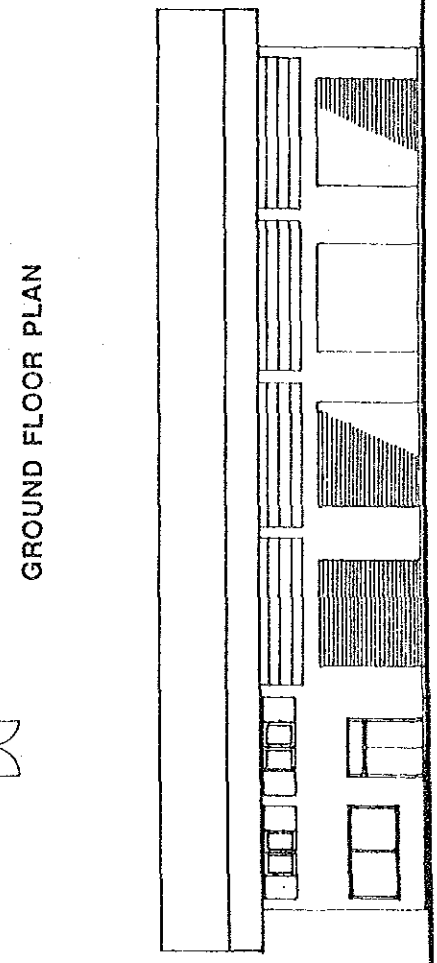
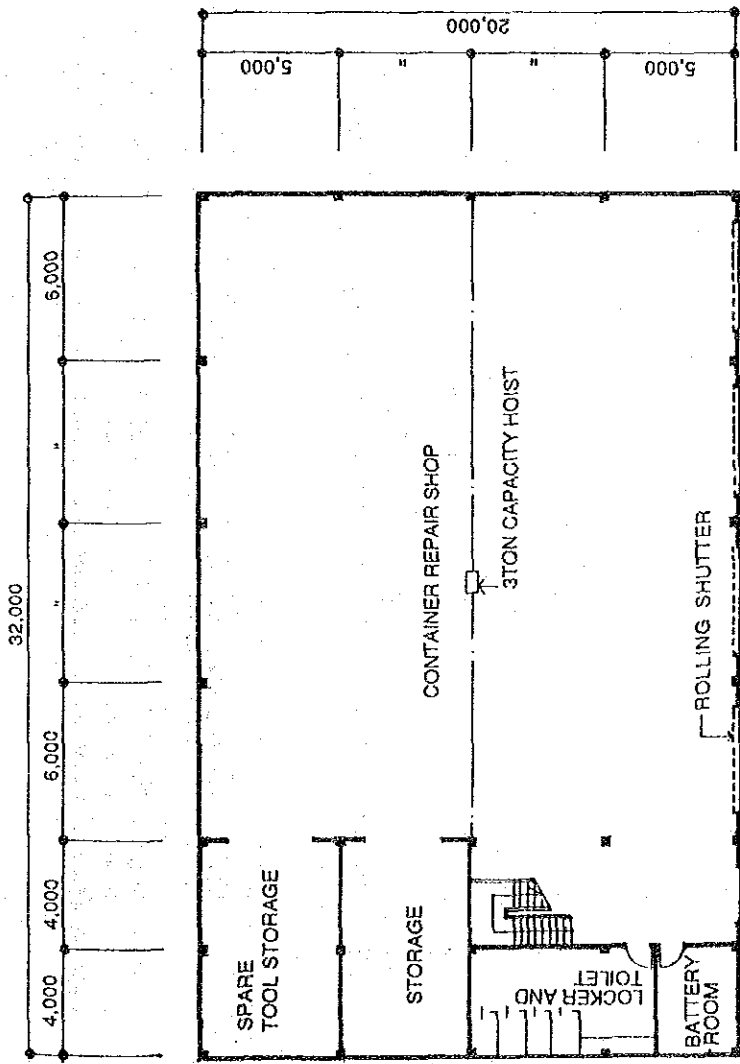
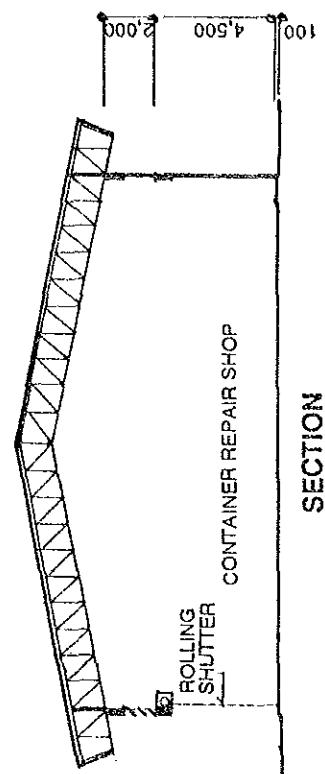
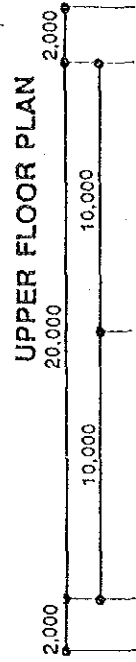
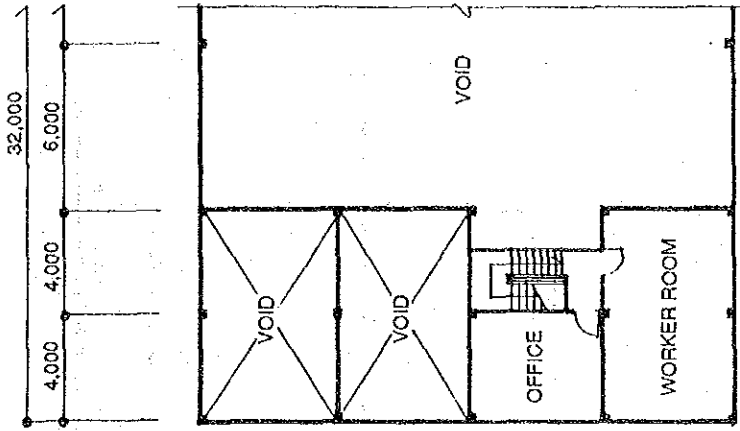
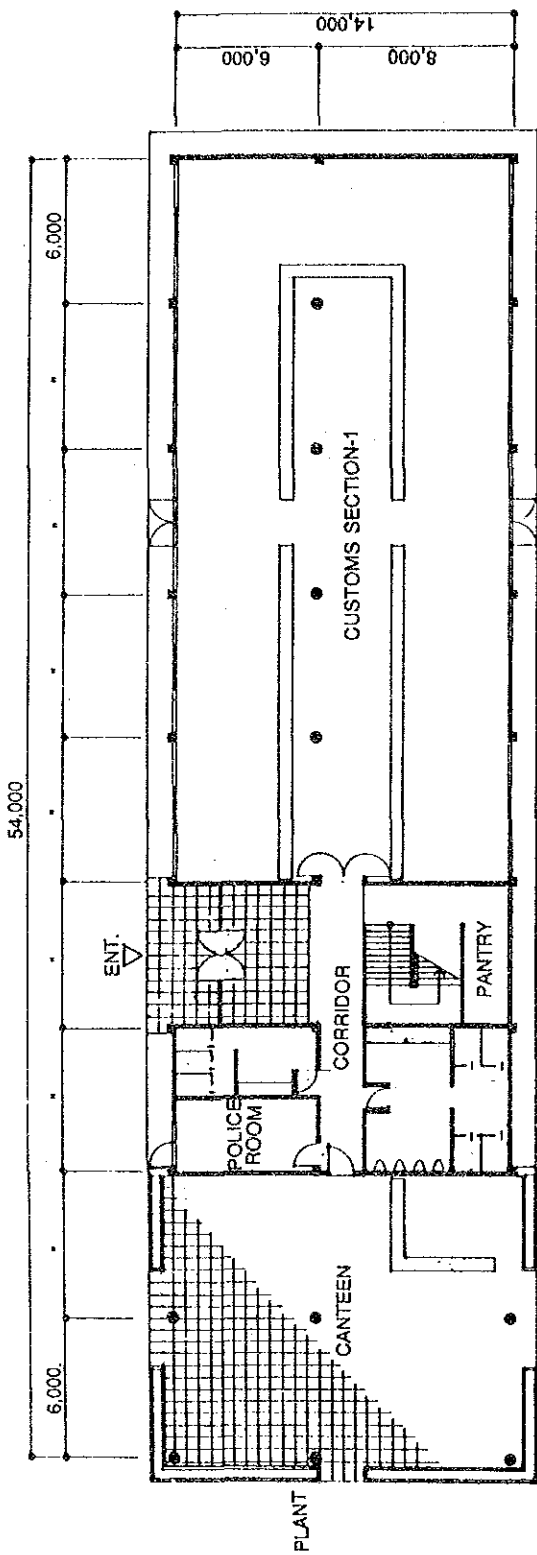
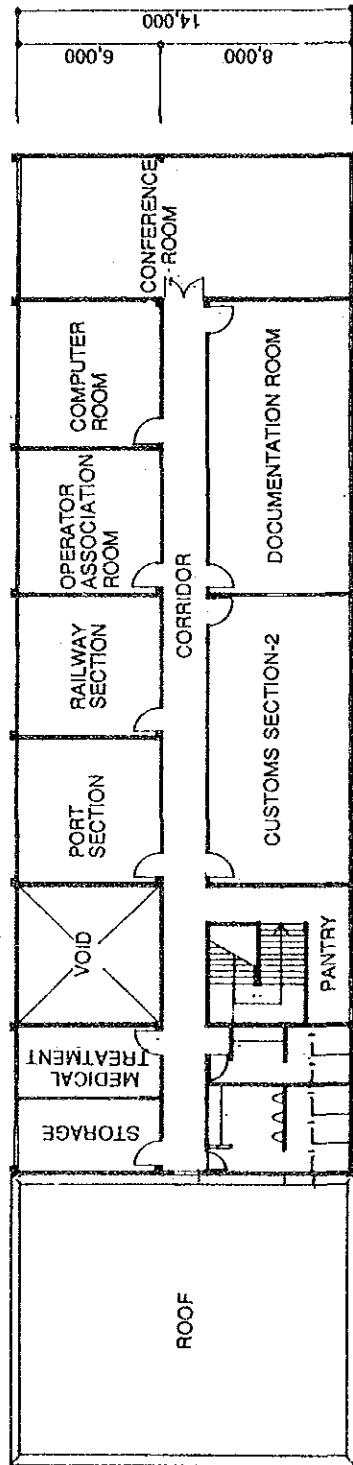


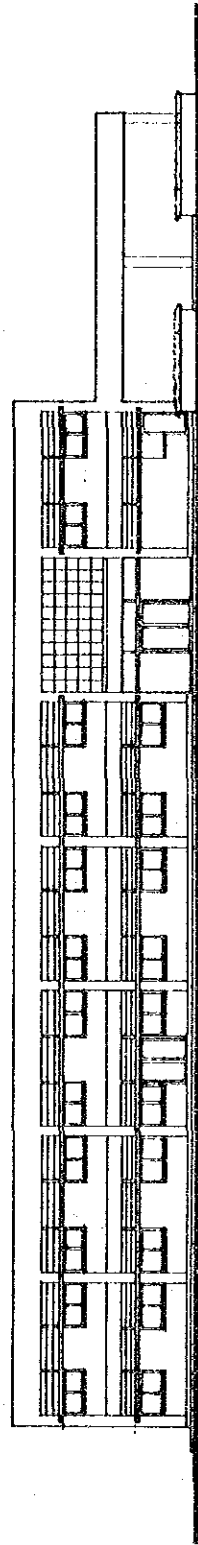
Fig. III.6.3 General View of Maintenance and Repair Shop



GROUND FLOOR PLAN



FIRST FLOOR PLAN



FRONT ELEVATION

Fig. III.6.4 General View of Main Office Building

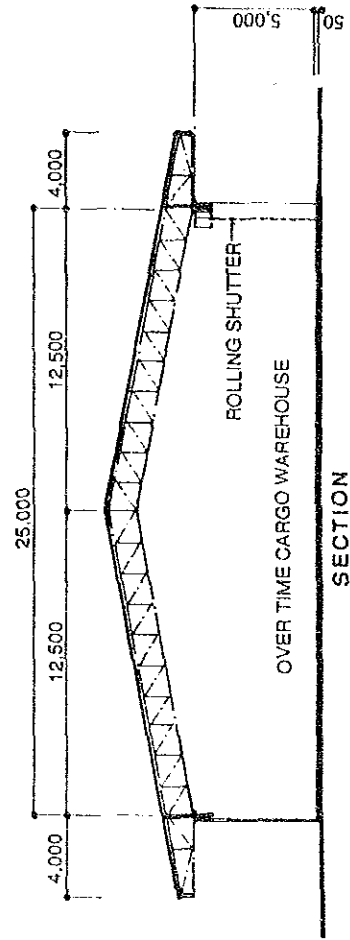
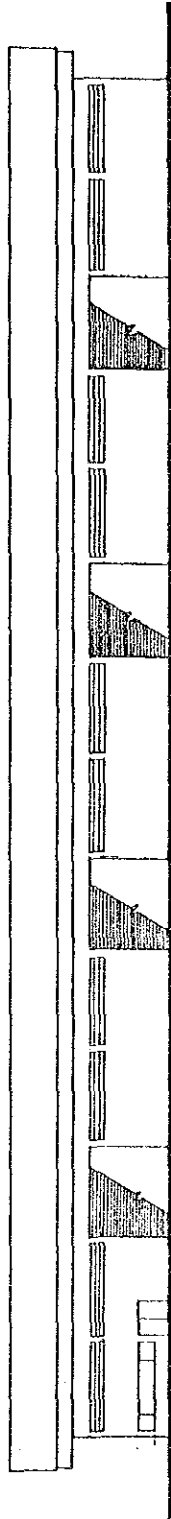
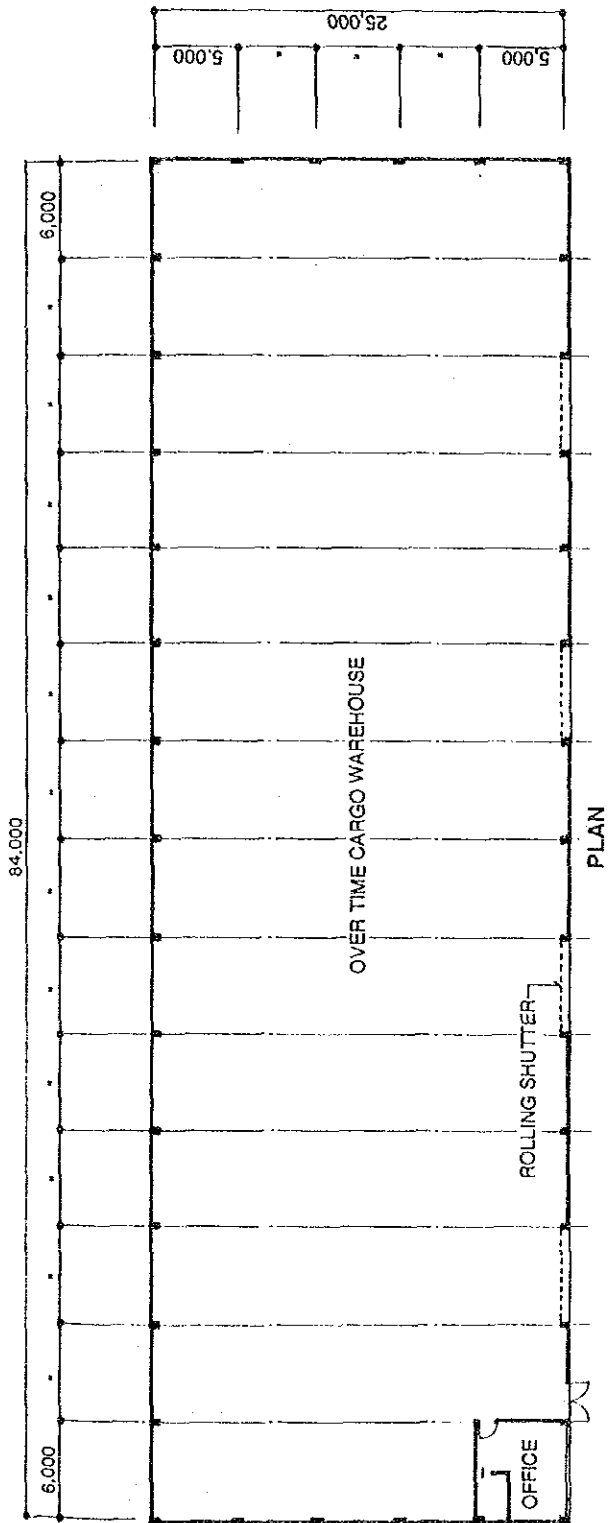


Fig. III.6.5 General View of Overtime Cargo Warehouse

6.2.3 Utility Planning

(1) Pumping Work

1) Water Supply System

53. The nearest klong which has a water supplying capacity would be proposed as a water source for the ICD. The raw water derived from the klong will be purified in a water treatment plant and stored in an elevated water tank (GL. + 20 m) from where water will be supplied to each ICD. The quality of supplied water should meet the Thai standard for drinking water which has been established by the Thai Industrial Standards Institute, Ministry of Industry.

54. A cross-section of the water supply system is shown in Fig. III.6.6. The estimated water consumption is shown in Table III.6.7.

2) Soil and Waste-water Drainage System

55. Soil and waste water produced by each building will go into separate drainage systems leading to a septic tank. After being treated in the septic tank, waste water will be discharged into the nearest klong.

56. The estimated sewage treatment requirement is assumed to be 90% of the water supply volume.

$$260 \text{ m}^3/\text{day} \times 0.9 = 234 \text{ m}^3/\text{day}$$

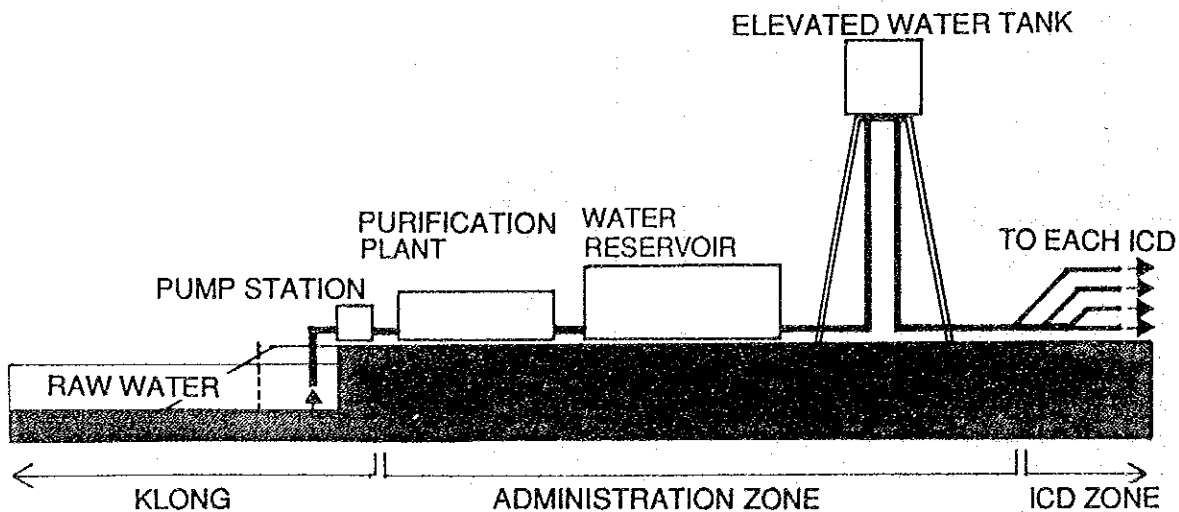


Fig. III.6.6 Cross-section of Water Supply System

Table III.6.7 Estimation of Water Consumption

First Stage			
Staff: Terminal	176 persons x 4 x 100 l/person/day	=	70,400 lit.
Main Office	80 persons x 100 l/person/day	=	8,000 lit.
Washing Containers	5 vehicles x 4 x 100 l/vehicle	=	20,000 lit.
Others (visitors, truck drivers, canteen, etc.)	approx		78,000 lit.
Total		approx.	170 m ³ /day

Final Stage			
Staff: Terminal	176 persons x 6 x 100 l/person/day	=	105,600 lit.
Main Office	110 persons x 100 l/person/day	=	11,000 lit.
Washing Containers	5 vehicles x 6 x 1,000 l/vehicle	=	30,000 lit.
Others (visitors, canteen, etc.)			116,000 lit.
Total		approx.	260 m ³ /day

3) Storm Water Drainage system

57. The drainage system for storm water consisting of U-ditches and concrete culvert pipes to collect water from the site is run off into a drainage located along the boundary of each terminal. This drainage drains into the nearby klong.

58. The design discharge or the drainage system is calculated using the following equation:

$$Q = R \times \frac{C}{360} \times A \text{ (cu m/sec)}$$

Where:

- Q = Peak Discharge (cu m/sec)
- C = Run-off coefficient
- R = Intensity of Rainfall (mm/hr)
- A = Area for drainage (ha)

(a) Coefficient of Discharge

59. A major portion of the terminal site will be built-up with structure or paved. Therefore, the ratio of run-off coefficient is taken as 0.9.

(b) Intensity of Rainfall

60. Based on the meteorological data for the Bangkok Metropolis, the intensity of rainfall for a duration of less than 15 minutes with a return period of five years is taken to be 140 mm/hour.

(2) Electric Power Supply

1) Power Supply System

61. A power supply sub-station will be installed on the site tapping off from the nearest 24 kV high tension transmission line. The primary supply is thus on 24 kV high tension voltage while the secondary supply to the terminal is a low voltage of 400/230 V.

62. Lighting requirements in each separate building will be supplied from individual distribution boards. A diesel generator will also be installed as a back-up system for electric failure.

63. In addition, other installations necessary for the terminal are the computer system, telecommunications system and lighting rod system.

64. The illumination of the lighting system is shown in Table III.6.8.

Table III.6.8 Illumination of Facilities

Facility	Illumination (lx)
CFS	100
Office building	400
Main office building	400
Overtime cargo warehouse	50
Maintenance and repair shop	300
Container yard	20
Truck scale	300
Access road	20

2) Electric Demand

65. The electric capacity requirement of the ICD is calculated as shown in Table III.6.9.

3) Total Power Demand

66. The capacity of electric supply to the ICD for the First Stage and the Final Stage are 2,500 kVA and 3,660 kVA respectively. It is assumed that the power demand hours for buildings are 12 hours per day while the demand for outdoor lighting is also 12 hours per day. Therefore, assuming the ratio of demand factor is 0.8, the daily electric power demand is calculated as below:

$$\text{First stage} = 2,500 \text{ kVA} \times 0.85 \times 12 \text{ hours} \times 0.8 = 20,400 \text{ kWh}$$

$$\text{Final stage} = 3,660 \text{ kVA} \times 0.85 \times 12 \text{ hours} \times 0.8 = 29,865 \text{ kWh}$$

67. Therefore, the daily electric power consumption is 20,000 kWh in the first stage and 30,000 kWh in the second stage.

Table III.6.9 Estimation of Electric Demand

Facility	Quantity (sq m)	Electric Capacity Demand	
		(kVA/sq m)	(kVA)
ICD			
CFS	4,000	0.02	96
Office Building	1,000	0.10	100
Maintenance and Repair Shop	120	0.016	43
Reefer	20	7/point	140
Outdoor Lighting	51,810	0.002/sq m	104
Total			483
Common Facilities			
Main Office	1,176	0.10	120
Water House	2,100	0.02	42
Outdoor Lighting	16,524	0.001	17
Sewage Treatment	1 unit	19/unit	19
Water Purification	1 unit	12.5/unit	12.5
Access Road Lighting	1,680 m (First)	0.7/30 m	39
	3,220 m (Final)	0.7/30 m	75
Total		First stage	250
		Final stage	286
First Stage			
ICD Zone (Four ICDs)		483 kVA x 4	= 1,932 kVA
Common Facilities zone			= 250 kVA
Total			2,182 kVA
Final Stage			
ICD Zone (Six ICDs)		483 kVA x 6	= 2,898 kVA
Common Facilities			286 kVA
Total			3,184 kVA

Assuming a safety factor of 1.15, then the required electrical supply for the First and the Final Stages is:

First stage = $2,182 \times 1.15$ = approximately 2,500 kVA

Final stage = $3,184 \times 1.15$ = approximately 3,660 kVA

6.2.4 Related Civil Works

(1) Road and Pavement

68. Flexible pavement, asphaltic concrete pavement, rigid pavement and reinforced concrete pavement would be prepared as the pavement structure for the ICD. Flexible pavement will be adopted for the yards and access roads where vehicles travel while reinforced pavement will be provided for the berthing space attached to the CFS, washing area and repair yard.

69. The sections of the respective pavements are shown in Fig. III.6.7.

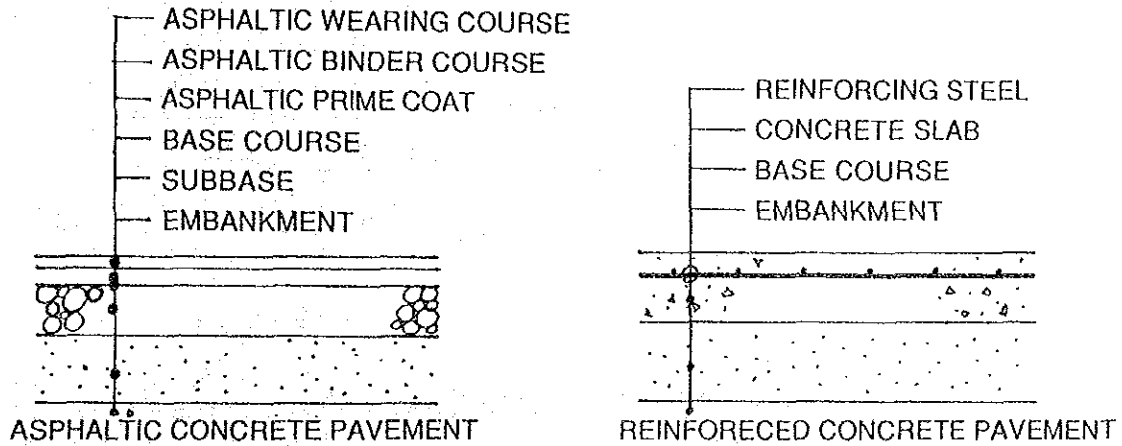


Fig. III.6.7 Section of Pavement

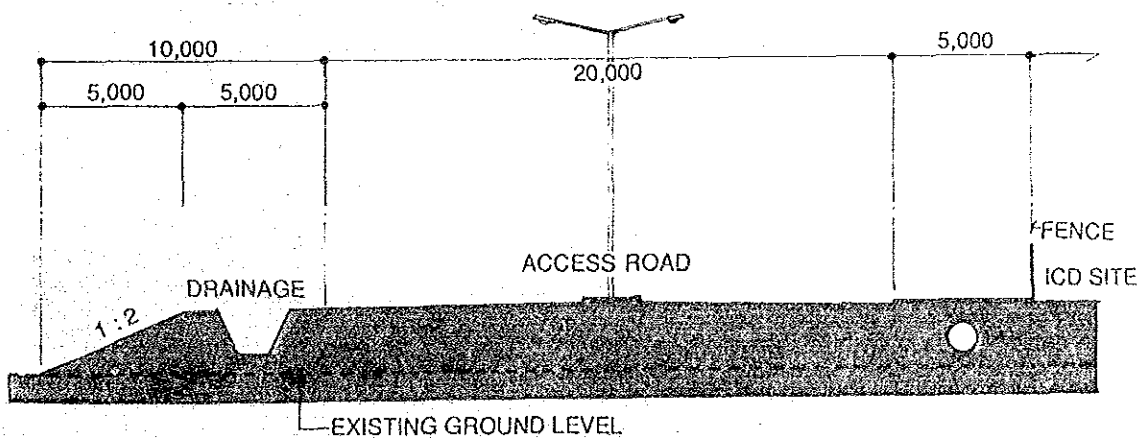


Fig. III.6.8 Cross-section of Access Roads

(2) Railway

70. The design criteria and standard used for the railway in the ICD would be based on the design standard of the State Railway of Thailand (SRT). Further the train operation, signalling and communication system would be studied at the Detailed Design Stage.

71. Three tracks are provided in the ICD site, two are for loaded wagons and one for turning around locomotives. The distance between the two tracks is 4 m from centre to centre, with enough space for connecting/disconnecting wagons.

72. The cross-sections of the tracks in the ICD and of the track leading to the ICD are shown in Fig. III.6.9.

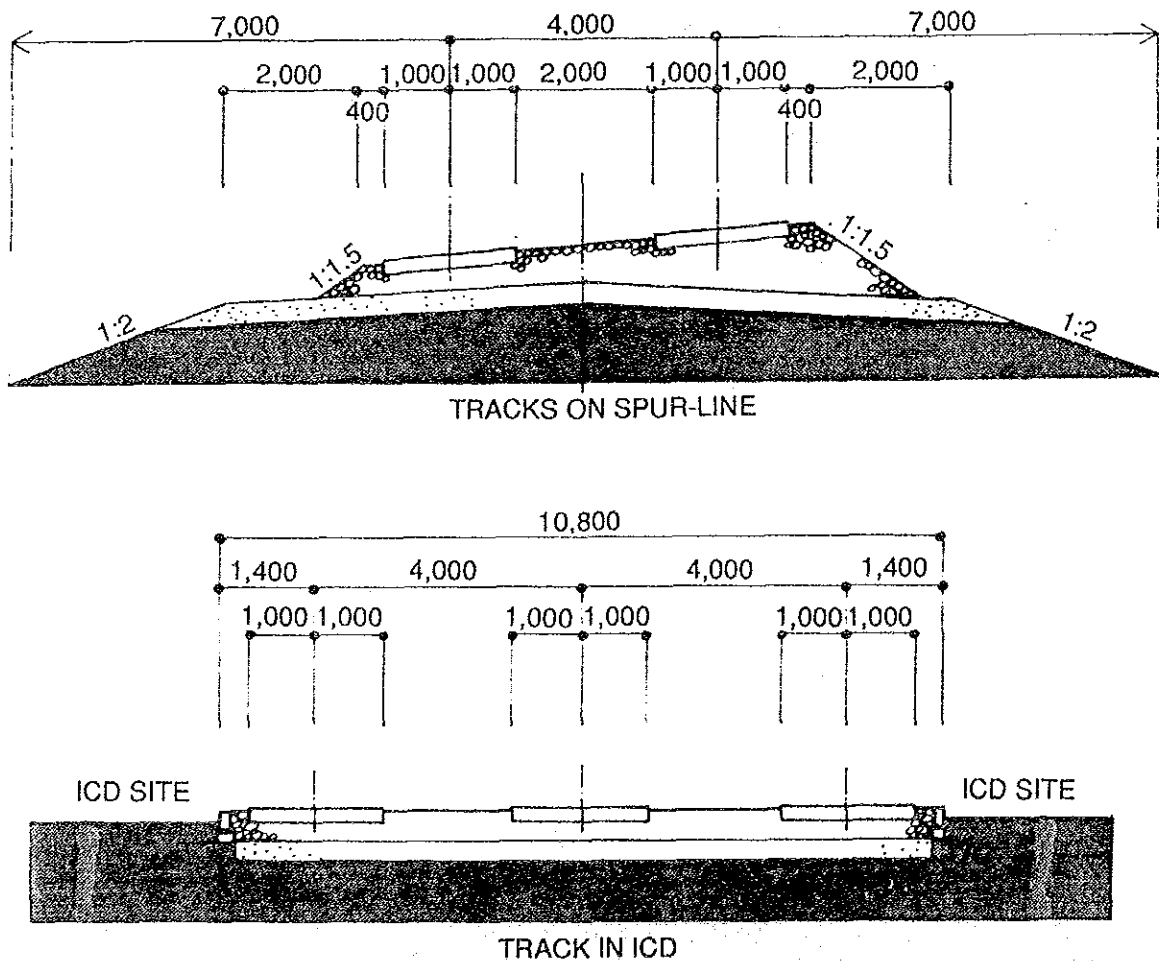


Fig. III.6.9 Cross-sections of Tracks

CHAPTER 7 COST ESTIMATES AND IMPLEMENTATION PLAN

7.1 Cost Estimates

7.1.1 Assumptions

1. The cost estimation is based on the following assumptions.
 - 1) Unit prices are divided into foreign currency and local currency, and both are indicated in baht. The foreign currency portion includes the following:
 - Equipment, materials, and supplies which depend entirely on imports
 - Materials which are locally available but are entirely imports
 - Wages and salaries for expatriate workers
 - Cost, expenses and profits by foreign companies

The local currency portion includes the following:

- Equipment, materials and supplies which are locally available
 - Wages and salaries for local workers
 - Costs, expenses and profits by local companies
 - Taxes
- 2) Unit prices are determined on the basis of "Construction Material Prices in Central Region: Ministry of Commerce (Feb.-July 1988)," "Laem Chabang Industrial Complex Project (July 1988)," and "Laem Chabang Port Development Project (Sept. 1987)."
 - 3) These unit prices are adjusted for inflation based on "Consumer Price Index & Producer Price Index: Ministry of Commerce (Aug. 1988)."
 - 4) Land acquisition cost is estimated on the basis of data obtained from the Official Land Price authorized by Land Department, Bangkok Metropolitan Administration. However according to our survey, the actual price is about two times higher than the official figures. We estimate that the actual land price is one million baht per rai.

- 5) The unit prices include overhead costs.
- 6) A physical contingency of 10% of direct construction cost, design/engineering cost and supervision cost is allowed.
- 7) Detailed engineering design cost and supervision cost are estimated at 7% of the direct construction cost.

7.1.2 Unit Prices

(1) Major Materials

2. Unit prices for both imported and locally available materials are based on market prices in Bangkok, as shown in Table III.7.1.

Table III.7.1 Unit Prices for Major Materials

Major Material	Unit	Cost (Baht)
Fuel (Gasoline)	Lit	8.9
Fuel (Diesel)	Lit	6.3
Earth Fill Material (Imported)	Cu.m	110
Coarse Aggregate	Cu.m	230
Fine Aggregate	Cu.m	190
Asphalt	Lit	30
Cement	Ton	1,620
Ready-Mixed Concrete	Cu.m	1,130
Reinf. Deformed Bar (SD 30)	Ton	9,770
Structural Steel	Ton	14,850
Hollow Concrete Block (100x200x400)	Each	7
PC Pile (I-shaped 300x300x21000)	Each	4,960
Galv. Corr. Iron Sheet	Sq.m	78
Corr. Asbestos Cem. Sheet 1020mm x 1500mm	Sheet	150
Hardwood 1" x 6" x 6' (Second-class Teak)	Sq.ft	680
Concrete Pipe (200mm x 3m)	Piece	250
Galv. Iron Pipe (4" x 6m)	Piece	800
P.V.C. Pipe (100mm x 4m)	Piece	1,060
Woven Wire Net	Sq.m	60
Plywood External Type 15mm x 1200mm x 2400mm	Sheet	790

(2) Labor Cost

3. Unit prices for wages and salaries based on data available in Thailand are shown in Table III.7.2.

Table III.7.2 Unit Price for Labor

(Unit : Baht/Hour)

Type of Worker	Cost
Supervisor	80
General Foreman	65
Skilled Laborer	45
Unskilled Laborer	15
Carpenter	25
Electrician	35
Mechanic	35
Welder	45
Truck Driver	22
Heavy Equip't Operator	28
Surveyor	40
Watchman	26

(3) Equipment and Machinery

4. Unit prices for equipment and machinery are estimated for hourly lease charges on the basis of data obtained from Laem Chabang Industrial Complex Project and Laem Chabang Port Project. Depreciation for major equipment and machinery are listed Table III.7.3.

Table III.7.3 Depreciation for Equipment and Machinery

(Unit: Baht/Hour)

Equipment/Machinery	Cost
Dump Truck (7 ton)	275
Flat Bed Truck (7 ton)	200
Bulldozer (D8)	1,250
Wheel Loader (1.5-2.5 cu.m cap.)	650
Excavator (1.5-2.5 cu.m cap.)	1,350
Mobile Crane (50 ton cap.)	1,930
Pick-up Truck (1 ton)	60
Motor-grader (100 HP)	670
Air Compressor (17 cu.m/min.)	450
Mobile Generator (125 KVA)	440
3-Wheel Steel Roller (12 Ton)	450
Tyre Roller (12 Ton)	400

(4) Taxes

5. Present rates of taxation in Thailand are shown in Table III.7.4.

Table III.7.4 Taxation in Thailand

Description	Rate
Company Profit Tax	35% of Profit
Business and Municipal Taxes	3.3% of Contract Value
Average Personal Income Tax	
Local Workers	10% of Income
Foreign Workers	30% of Income
Duty on Imported Materials and Equipment (average)	15% of CIF price

(5) Official Land Acquisition Cost

6. The official land acquisition cost around the project area is shown in Table III.7.5.

Table III.7.5 Official Land Acquisition Cost

Type of Land	Unit Price (Baht/Sq.m)
Area from roadside 0-80m	375
Area from soi 0-40m	250
Other Area	150

(1 rai = 1,600 sq.m)

7.1.3 Unit Prices of Work Items

7. Based on material, labor and equipment costs estimated in the foregoing sections, standard unit prices for work items in Bangkok are estimated as shown in Table III.7.6.

Table III.7.6 Unit Prices by Work Item

(Unit : Baht)

Work Item	Unit	Unit Price
Land Fill	Cu.m	200
Piling Work	L.m	480
Concrete Work	Cu.m	1,500
Structural Steel Work	Ton	26,600
Re-Bar Work	Ton	13,840
Masonry Work	Sq.m	200
Roofing Work (Asbestos Cement Sheet)	Sq.m	132
Plastering Work	Sq.m	95
Painting Work	Sq.m	62
Asphalt Pavement (Light Duty)	Sq.m	240
Asphalt Pavement (Middle Duty)	Sq.m	320
Asphalt Pavement (Heavy Duty)	Sq.m	490
Concrete Pavement	Sq.m	600
Railway Track Laying	L.m	7,500

7.1.4. Construction Cost Estimate

8. Construction cost estimates are made for each section based on the quantities estimated in the preliminary design and on the unit prices for each work item. The result of cost estimation are shown in Tables III.7.7 ~ III.7.11.

Table III.7.7 Construction Cost (Stage 1)

Item	Unit	Unit Price (Baht)	Quantity	Amount (1,000 Baht)
Preparatory Work	Sq.m	3	320,000	<u>960</u>
Common Civil Work				
Land Fill	Cu.m	200	672,000	134,400
Pavement (Concrete)	Sq.m	600	100	60
Pavement (Asphalt, Middle Duty)	Sq.m	320	44,600	14,272
Railway	L.m	7,500	2,880	21,600
Boundary Fence	L.m	1,800	3,920	7,056
Landscaping	Sq.m	30	7,800	234
			<u>sub total</u>	<u>177,622</u>
ICD (per 1 ICD)				
CFS	Sq.m	4,712	6,400	30,157
Container Gate	Sq.m	3,675	400	1,470
Office Building	Sq.m	7,469	1,000	7,469
Repair Shop	Sq.m	4,562	640	2,920
Weighbridge	Ea	1,180,000	2	2,360
Pavement (Concrete)	Sq.m	600	6,050	3,630
Pavement (Asphalt, Heavy Duty)	Sq.m	490	27,120	13,289
Pavement (Asphalt, Light Duty)	Sq.m	240	15,800	3,792
Area Lighting	L.S.			1,450
Area Drainage	Sq.m	130	48,970	6,366
Guard Hut	Ea	16,000	1	16
			<u>sub total(per 1 ICD)</u>	<u>72,919</u>
			<u>sub total(4 ICDs)</u>	<u>291,676</u>
Common Facilities				
Main Building	Sq.m	7,469	1,344	10,038
Water Purification Plant	L.S.			5,500
Sewage Treatment Plant	L.S.			4,320
Electric Station	L.S.			4,800
Overtime Cargo Warehouse	Sq.m	3,600	2,100	7,560
Area Drainage	Sq.m	130	44,700	5,811
Area Lighting	L.S.			1,997
			<u>sub total</u>	<u>40,026</u>
			<u>TOTAL</u>	<u>510,284</u>
Mobilization (5%)				25,514
GRAND TOTAL				535,798

Table III.7.8 Summary of Construction Cost (Stage 1)

(1,000 Baht)

Item	Cost
Construction Cost	535,798
Land Acquisition and Compensation	200,000
Detailed Engineering Design and Supervision	37,506
Physical Contingencies	57,330
TOTAL	830,634
Local Cost	574,260
Foreign Cost	256,374

Table III.7.9 Summary of Construction Cost (Stage 2)

Item	Unit	Unit Price (Baht)	Quantity	Amount (1,000 Baht)
Preparatory Work	Sq.m	3	154,000	<u>462</u>
Common Civil Work				
Land Fill	Cu.m	200	323,400	64,680
Pavement (Concrete)	Sq.m	Void		
Pavement (Asphalt, Meddle Duty)	Sq.m	320	22,600	7,232
Railway	L.m	7,500	690	5,175
Boundary Fence	L.m	1,800	960	1,728
Landscaping	Sq.m	30	3,900	117
		<u>sub total</u>		<u>78,932</u>
ICD (per 1 ICD)				
CFS	Sq.m	4,712	6,400	30,157
Container Gate	Sq.m	3,675	400	1,470
Office Building	Sq.m	7,469	1,000	7,469
Repair Shop	Sq.m	4,562	640	2,920
Weighbridge	Ea	1,180,000	2	2,360
Pavement (Concrete)	Sq.m	600	6,050	3,630
Pavement (Asphalt, Heavy Duty)	Sq.m	490	27,120	13,289
Pavement (Asphalt, Light Duty)	Sq.m	240	15,800	3,792
Area Lighting	L.S.			1,450
Area Drainage	Sq.m	130	48,970	6,366
Guard Hut	Ea	16,000	1	16
		<u>sub total(per 1 ICD)</u>		<u>72,919</u>
		<u>sub total(2 ICDs)</u>		<u>145,838</u>
Common Facilities				
Main Building	Sq.m	Void		
Water Purification Plant	L.S.	Void		
Sewage Treatment Plant	L.S.	Void		
Electric Station	L.S.	Void		
Overtime Cargo Warehouse	Sq.m	3,600	1,100	3,960
Area Drainage	Sq.m	130	22,600	2,938
Area Lighting	L.S.			666
		<u>sub total</u>		<u>7,564</u>
		<u>TOTAL</u>		<u>232,796</u>
Mobilization (5%)				11,640
GRAND TOTAL				244,436

Table III.7.10 Summary of Construction Cost (Stage 2)

(1,000 Baht)

Item	Cost
Construction Cost	244,436
Land Acquisition and Compensation	96,250
Detailed Engineering Design and Supervision	17,110
Physical Contingencies	26,150
TOTAL	383,946
Local Cost	265,739
Foreign Cost	118,207

Table III.7.11 Summary of Project Cost (Stage 1 and 2)

(1,000 Baht)

Item	Cost
Construction Cost	780,234
Land Acquisition and Compensation	296,250
Detailed Engineering Design and Supervision	54,616
Physical Contingencies	83,480
TOTAL	1,214,580
Local Cost	839,999
Foreign Cost	374,581

7.2 Implementation Plan

9. The implementation schedule is prepared on the condition that the entire construction of the ICDs would be completed by the end of August 1991 (Stage 1) and the end of 1996 (Stage 2) in consideration of effective investment.

10. Before beginning the construction of the ICDs, it is necessary to carry out such pre-construction work as topographical survey, soil investigation, detailed engineering design, land acquisition and procurement of finances.

7.2.1 Implementation Schedule

(1) Detailed Engineering Design

11. The detailed design of the ICDs will be completed in 8 months not only for Stage 1 construction but also for Stage 2. If there are changes in the socio-economic conditions, policies of urban port planning and transportation, etc., a review of the feasibility study should be commenced at an early stage of the detailed engineering design.

(2) Tendering Process

12. It is recommended that the tendering be separated into two processes: one for land fill work, and the other for construction work.

13. Tendering for land fill work will start after the completion of the detailed engineering design for earth work and of the financial arrangements. It will require 2 months.

14. Tendering for construction work will start after the completion of the entire detailed engineering design. A minimum of 6 months will be required. The pre-qualification of contractors will also be required.

(3) Land Acquisition and Compensation

15. As the project site will be located near the Greater Bangkok Area, serious problems concerning land acquisition and compensation may occur. It is necessary that the land acquisition programme be started as early as possible.

(4) Construction

16. As the construction site is located near the Greater Bangkok Area, it will be possible to use high quality standard construction methods and skilled laborers. However, it will take 13 months for the land fill work for Stage 1 because of the high volume of filling material. The period of construction work is estimated as 9 months for Stage 1.

7.2.2 Staged Implementation Program

17. To obtain the maximum economic benefit, it is desirable to consider a stage implementation instead of completing the final scheme from the initial stage.

(1) Stage 1 Implementation

18. The construction of four ICDs and related facilities are scheduled in Stage 1. This construction will be carried out in consideration of the traffic demand, efficiency of terminal operation, construction costs, difficulty of land acquisition, future expansion program of Laem Chabang Port, planning of a new highway and traffic congestion on the existing roads.

19. The construction of Stage 1 will be completed by the end of August 1991 in time for the opening of Laem Chabang Port.

(2) Stage 2 Implementation

20. The construction of two additional ICDs will be carried out as Stage 2 work. It will be completed by the end of 1996.



	1989	1990	1991	1992	1993	1994	1995	1996	1997
Stage 1 Construction									
Stage 2 Construction									

Fig. III.7.1 Implementation Schedule for Staged Construction








	4	8	12	16	20	24	28	32	36 (month)
Land Acquisition	 (7 months)								
Loan Negotiation	 (8 months) (Based on International Loan)								
Detailed Design	 (8 months)								
Tendering for Earth Fill Work	 (2 months)								
Earth Fill Work	 (13 months)								
Tendering for Construction	 (6 months)								
Construction Work	 (9 months)								

Fig. III.7.2 Implementation Schedule (Stage 1 Construction)

CHAPTER 8 ECONOMIC ANALYSIS

8.1 Purpose of the Economic Analysis

1. The purpose of the economic analysis is to appraise the economic feasibility of the First Stage Plan of the ICD from the viewpoint of the national economy. Therefore, the analysis investigates the economic benefits as well as the economic costs which will arise from the Project, and evaluates whether the net benefits exceed those which could be derived from other investment opportunities (the opportunity cost of capital) in the Kingdom of Thailand.

8.2 Methodology of the Economic Analysis

8.2.1 General

2. The economic internal rate of return (EIRR) based on cost-benefit analysis is used in order to appraise the feasibility of the project. In estimating the costs and benefits of the Project, "economic pricing" is applied. Economic pricing here means the appraisal of costs and benefits in terms of international prices (border prices).

3. The EIRR is a discount ratio which makes the costs and benefits of a project during the project life equal, and it is calculated using the following formula:

$$\sum_{i=1}^n \frac{B_i - C_i}{(1+r)^{i-1}} = 0$$

n : Period of economic calculation

B_i: Benefit in i-th year

C_i: Cost in i-th year

r : Discount rate

Fig. III.8.1 shows the flow chart of the economic analysis procedure.

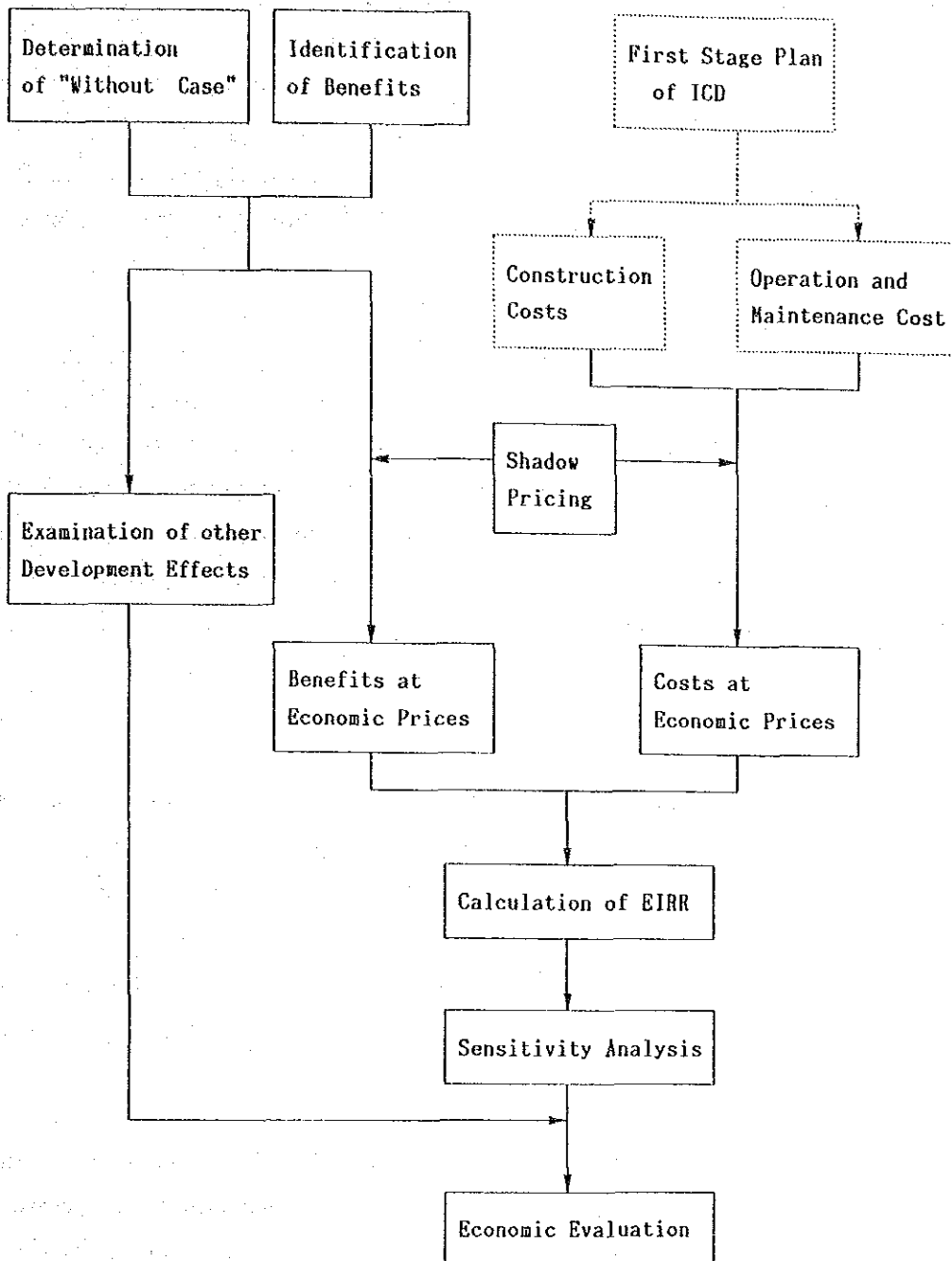


Fig. III.8.1 Flow Chart of the Economic Analysis

8.2.2 Prerequisites to the Economic Analysis

(1) Base Year

4. For the estimation, all costs and benefits analyzed quantitatively here are indicated by prices as of August 1988 when the price survey was conducted.

(2) Project Life

5. The depreciation period of the main facilities such as the CFS and other buildings is 28 years, and the construction period including the detailed design is 3 years. Therefore, the period of economic calculation (project life) is assumed as 31 years from the beginning of the construction (i.e. from 1989).

(3) Foreign Currency Exchange Rate

6. The exchange rate adopted for this study is the following rate as of August 1988.

1 Baht = 5.20 Yen
(1 US\$ = 25.6 Baht = 133 Yen)

(4) "Without" Case

7. A cost-benefit analysis is conducted on the difference between the "with" and "without" investment cases. In other words, incremental benefits and costs arising from the proposed investment are compared, and it is examined whether or not the net benefits generated by the project exceed the opportunity cost of capital in the Kingdom of Thailand. Therefore, determining the "without" case is one of the key points of the economic analysis.

8. In this study, the following conditions are adopted as the "without" case after various possibilities are discussed.

- ① All of the cargoes which use the ICD under the "with" case are transported directly from/to the Laem Chabang marine terminal. In that case, the transportation cost between the marine terminal and the hinterland is covered by the shipper/consignee.
- ② All customs clearance procedures are carried out at the Laem Chabang marine terminal. In that case, some customs brokers stay there permanently.
- ③ Compared with the "with" case, larger scale facilities such as the CY and CFS and additional operation costs are necessary at the Laem Chabang marine terminal.

(5) Cargo Volume

9. The handling volume at the ICD and at the Laem Chabang marine terminal is calculated based on the result of the demand forecast in this study.

1) Cargo Volume under the "With" Case

10. The annual cargo volume during the project life is calculated by interpolating the container volumes in 1991, 1996 and 2001 which are estimated in the demand forecast. However, the cargo volume used for the economic analysis assumed to arise from 1992 and any cargo volume beyond the cargo handling capacity of the ICD under the First Stage Plan is disregarded.

2) Cargo Volume under the "Without" Case

11. The total container cargo volume at Laem Chabang Port is assumed to be the same as under the "with" case, because the container cargo volume handled at Laem Chabang Port is calculated by deducting the capacity of Bangkok Port from the total container volume of Bangkok Zone.

8.2.3 Economic Pricing

(1) Methodology

12. Most of the data used to calculate the benefits and costs are

expressed in market prices. The labour cost at market prices is often influenced by a minimum wage system. The local currency portion of the goods and materials at market prices often include customs duties. Therefore, market prices often do not express the true costs from the economic point of view.

13. There are several ways of applying the concept of economic pricing, but in this study, the prices of domestic goods and services are revised to border prices in an effort to determine a more rational valuation. In general, these border prices are intended to represent the international market value, or world prices, of these goods and services.

14. The market prices are changed to border prices using various conversion factors such as "Standard Conversion Factor", "Conversion Factor for Consumption" and "Conversion Factor for Skilled/Unskilled Labour" as mentioned below.

(2) Exclusion of Transfer Items

15. Import duties and other taxes should not be included in the calculation of the economic costs or the economic benefits of development. The tax on materials, for example, is a financial cost to those who pay the tax, but it does not necessarily reflect any economic cost to the country as a whole, for an increase in the tax does not mean that more economic resources are required to produce a given volume of material.

(3) Method of Applying Conversion Factors

16. Generally, all benefits and costs are divided into labour, traded goods and non-traded goods. Labour is further divided into skilled labour and unskilled labour.

17. The economic cost of skilled labour is obtained by multiplying its market price by the conversion factor for consumption (CFC) and the economic cost of unskilled labour is calculated by multiplying its market price by a ratio of the shadow wage rate and the CFC.

18. Traded goods are expressed by the CIF value for imports and by the FOB value for exports. As international prices can not be directly applied in the case of non-traded goods, a second level analysis is made of the items required for the production of non-traded goods. These items are, in turn, divided into the categories of labour, traded goods and non-traded goods. The standard conversion factor (SCF) is then applied to the remaining value of non-traded goods.

(4) Calculation of the Conversion Factors

1) Standard Conversion Factor (SCF)

19. Import duties and subsidies create a price differential between the domestic market and the international market. For the purpose of analysing benefits and costs within the domestic market, the standard conversion factor is applied in order to convert domestic prices to international market prices.

20. The SCF is obtained using the following formula:

$$SCF = \frac{I + E}{I + Di + E - De}$$

where, I : Total amount of imports
E : Total amount of exports
Di : Total amount of import duties
De : Total amount of export duties

21. The SCFs for the four years from 1984 to 1987 are listed in Table III.8.1. In this study, the mean value for the four year period is used. Thus, the SCF has a value of 0.94.

Table III.8.1 Standard Conversion Factors (SCFs)

Unit: Million Baht

Item	1984	1985	1986	1987	1984-1987
Imports (CIF)	245,155	251,169	241,358	334,340	1,072,022
Exports (FOB)	175,237	193,366	233,383	299,853	901,839
Import Duties	29,692	30,742	31,106	40,002	131,542
Export Duties	1,862	1,079	806	1,301	5,048
SCF	0.938	0.937	0.940	0.942	0.940

Source: Bank of Thailand, Monthly Bulletin March, 1988

2) Conversion Factor for Consumption (CFC)

22. This factor is used for converting the prices of consumer goods from domestic to international prices. This is particularly required to convert domestic labour prices to the corresponding international prices. The CFC is usually calculated in the same manner as the SCF, replacing total imports and total exports by imports and exports of consumer goods only.

23. The value of foreign trade for the main consumer goods and the value of their duties in 1987 are shown in Table III.8.2. According to these figures, the CFC comes to 0.94.

Table III.8.2 Conversion Factor for Consumption (CFC)

Unit: Million Baht

Total Import Value of Consumer Goods	90,542
Total Export Value of Consumer Goods	149,452
Total Value of Import Duties for Consumer Goods	15,815
Total Value of Export Duties for Consumer Goods	2
CFC	0.94

Source: Calculated based on data from the Customs Department

3) Shadow Wage Rate

24. For economic analysis, labour costs are usually measured in terms of their opportunity costs, that is, the value of lost marginal production for other purposes arising from the employment of labourers for a given project.

(a) Conversion Factor for Skilled Labour

25. The cost of skilled labour is calculated based on actual market wages, assuming that the market mechanism is functioning properly. However, as these are domestic costs, they are converted to border prices by multiplying the local wage by the conversion factor for consumption (CFC).

$$\boxed{\text{Conversion Factor for Skilled Labour}} = \boxed{\text{Nominal Wage Rate}} \times \boxed{\text{CFC}} = 1 \times 0.94 = 0.94$$

(b) Conversion Factor for Unskilled Labour

26. Generally, as the wages paid to unskilled labourers by a project are usually far above the opportunity cost, these market wages should not be used for calculating the economic value of the unskilled labourers. So, in this study, the economic cost of unskilled labour is estimated based on a simplified measure of the opportunity cost considering the productivity of the agricultural sector.

27. The total GDP of the agricultural sector and the total number of agricultural workers are shown in Table III.8.3. Assuming that the number of working days for agricultural workers is 200 days per annum, the opportunity cost is estimated as 20 Baht/day (at 1972 prices). On the other hand, the wage which is paid to unskilled labour in this project is 32 Baht/day (at 1972 prices).

28. Therefore, the conversion factor for unskilled labour is calculated as follows:

$$\begin{aligned}
 \text{Conversion Factor for Unskilled Labour} &= \frac{\text{Opportunity Cost}}{\text{Nominal Wage}} \times \text{CFC} \\
 &= \frac{20 \text{ Baht/day}}{32 \text{ Baht/day}} \times 0.94 = \underline{\underline{0.59}}
 \end{aligned}$$

Table III.8.3 Opportunity Cost of Agricultural Workers

Item	Unit	1984	1985	1986	1987
① Total GDP of Agricultural Sector (at 1972 prices)	Mil. Baht	67,115	70,456	70,181	68,521
② Total Number of Agricultural Workers	Mil. persons	17.51	17.91	17.06	17.42
③ Opportunity Cost (at 1972 prices) $\left(\frac{\text{①}}{\text{②} \times 200} \right)$	Baht/day	19.2	19.7	20.6	19.7

Average 20 Baht/day

8.3 Costs

8.3.1 Construction Costs

29. The construction costs include the land acquisition cost under the "with" case which is estimated at market prices in Chapter 7 of Part III and has to be converted to economic prices for the economic analysis using the Standard Conversion Factor and the Shadow Wage Rate estimated above.

30. On the other hand, under the "without" case, larger scale facilities such as the CY and CFS are necessary at the Laem Chabang marine terminal. Therefore, the incremental construction costs from the First Stage Plan are calculated by deducting the additional construction cost at the marine terminal from the construction cost for the ICD. This additional construction cost under the "without" case must also be converted to economic prices.

31. Construction costs under the "with" and "without" cases at economic prices are shown in Table III.8.4. Under the "with" case, the reconstruction costs of the weighbridges are included because their service lives are only 11 years.

Table III.8.4 Construction Costs (Economic Prices)

Unit: Mil.Baht

Year	"With" Case	"Without" Case	"With" - "Without"
1989	4.7	15.8	- 11.1
1990	306.2	4.0	302.2
1991	425.9	170.7	255.2
2002	8.0		8.0
2013	8.0		8.0
2019	- 3.6 (Residual Value)		- 3.6
Total	749.2	190.5	558.7

8.3.2 Maintenance and Repair Costs

32. The maintenance and repair costs per year for the facilities are assumed to be a fixed proportion (2% for structures, 5% for machines, 3% for pavement and railways and 1% for other civil works) of the original construction costs. These prices must also be converted to economic prices for the economic analysis. Table III.8.5 shows the maintenance and repair costs of the facilities under the "with" and "without" cases.

Table III.8.5 Maintenance and Repair Costs (Economic Prices)

Unit: Mil.Baht

Year	"With" Case	"Without" Case	"With" - "Without"
1992	9.6	3.8	5.8
⋮			
⋮			
⋮			
⋮			
⋮			
2019			
Total	268.8	106.4	162.4

8.3.3 Administration and Operation Costs

33. Under the "without" case, additional administration and operation costs are necessary at the Laem Chabang marine terminal as compared with the "with" case. Therefore, the incremental administration and operation costs from the First Stage Plan are calculated by deducting the additional administration and operation costs at the marine terminal under the "without" case from the administration and operation costs under the "with" case. Table III.8.6 shows the administration and operation costs at economic prices from 1992 to 2019.

Table III.8.6 Administration and Operation Costs (Economic Prices)

Unit: Mil.Baht

Year	"With" Case	"Without" Case	"With" - "Without"
1992	96.1	83.6	12.5
1993	96.1	83.6	12.5
1994	147.9	117.8	30.1
2019			
Total	4,037.6	3,230.0	807.6

8.4 Benefits

8.4.1 Benefit Items

34. Considering the "with" and "without" situations mentioned above, the following items are identified as benefits of the First Stage Plan.

- ① Savings in land transportation costs
- ② Savings in customs clearance costs
- ③ Reduction of traffic congestion between the ICD and Laem Chabang Port
- ④ Promotion of the national economic development through the formulation of an efficient container transportation system
- ⑤ Increase in employment opportunities
- ⑥ Multiplier effect from the investment of the First Stage Plan

35. It is impossible to evaluate all the benefits in monetary terms, but here the following items are considered tangible and the monetary benefits of these items are calculated.

- ① Savings in land transportation costs
- ② Savings in customs clearance costs

36. The other benefits are intangible or difficult to quantify, so only a qualitative analysis is undertaken.

8.4.2 Benefits from Savings in Land Transportation Costs

37. As mentioned above, under the "without" case all of the cargoes which use the ICD under the "with" case are transported directly from/to the Laem Chabang marine terminal. Therefore the difference of the land transportation cost between the "without" and "with" cases is one of the main benefits of the development project. The figure is calculated as follows:

$$\begin{aligned}
& \boxed{\text{Savings in Land Transportation Costs}} \\
& = \boxed{\text{Cost under the "Without" Case}} - \boxed{\text{Cost under the "With" Case}} \\
& = \boxed{\text{Transportation Cost between O/D and LCB}} - \left(\boxed{\text{Transportation Cost between O/D and ICD}} + \boxed{\text{Transportation Cost between ICD and LCB}} \right)
\end{aligned}$$

Note: LCB --- Laem Chabang, BKK --- Bangkok

(1) Transportation Costs (Unit Cost)

38. The transportation costs by each mode are shown in Table III.8.7. The transportation costs of trucks and trailers are estimated from two categories, one is the cost in proportion to the driving distance and the other is the cost in proportion to the driving time.

Table III.8.7 Transportation Costs by Mode (Economic Prices)

Mode	Transportation Cost	ICD - Laem Chabang (One-Way)
6 Wheel Truck (5ton)	2.06 Baht/Km + 162.9 Baht/hr	-
10 Wheel Truck (10ton)	2.29 Baht/Km + 234.2 Baht/hr	-
Trailer (40' Container)	2.72 Baht/Km + 414.4 Baht/hr	790 Baht/TEU
Railway (Container)	-	520 Baht/TEU

(2) Transportation Distances and Travelling Times

39. Transportation distances and travelling times are estimated as shown in Table III.8.8.

Table III.8.8 Transportation Distances and Travelling Times

Route	Mode	Distances	Travelling Times
O/D - LCB	6 wheel truck (LCL)	215km # ⁻¹	4.5 hrs # ⁻¹
	10 wheel truck (FCL)	120km # ⁻¹	2.4 hrs # ⁻¹
O/D - ICD	6 wheel truck (LCL)	125km # ⁻¹	2.8 hrs # ⁻¹
	10 wheel truck (FCL)	33km # ⁻¹	0.7 hrs # ⁻¹
ICD - LCB	Trailer	100km	2.0 hrs
	Railway	120km	-

Note-1 #⁻¹ are average weighted distances and travelling times by traffic volume

Note-2 O/D --- Origin and Destination, LCB --- Laem Chabang,

(3) Traffic Volume

40. LCL cargoes would be transported by 6 wheel trucks (carrying load is 5 tons) and FCL cargoes would be transported by 10 wheel trucks (carrying loads is 10 tons). Containerized cargoes would be transported by trailers or railways. The traffic volume is estimated as shown in Table III.8.9.

(4) Savings accruing to the Kingdom of Thailand

41. Under the "without" case, shippers/consignees have to carry their cargoes to and from the Laem Chabang marine terminal and pay for this inland transportation. Under the "with" case, the transportation between the ICD and the Laem Chabang marine terminal would be conducted by shipping companies at their own expense.

42. Virtually all of the shippers/consignees are Thai corporations. On

the other hand, 95% of the cargoes are carried by foreign shipping companies. Assuming that this share will remain constant in the future, only 5% of the inland transportation cost will be paid by Thai shipping companies under the "with" case. The difference between the "without" case, where virtually all of the inland transportation costs will be paid by Thai shippers/consignees, and the "with" case, where only 5% of the inland transportation costs between the ICD and Laem Chabang Port will be paid by Thai shipping companies, represents a significant economic benefit to the Thai economy.

(5) Calculation Results

43. Table III.8.10 shows the benefits from savings in land transportation costs.

Table III.8.9 Traffic Volume

Year	"Without" Case		"With" Case			
	O/D - LCB		O/D - ICD		ICD - LCB	
	6 wheel truck # ⁻¹ (vehicles)	10 wheel truck # ⁻¹ (vehicles)	6 wheel truck # ⁻¹ (vehicles)	10 wheel truck # ⁻¹ (vehicles)	Trailer (TEU)	Railway (TEU)
1992	63,200	68,100	63,200	68,100	37,600	12,200
1993	81,500	87,700	81,500	87,700	48,400	15,800
1994	99,700	107,200	99,700	107,200	58,900	19,600
1995	118,000	126,800	118,000	126,800	69,700	23,200
1996	136,200	146,400	136,200	146,400	80,500	26,800
1997	145,700	156,600	145,700	156,600	85,900	28,800
1998	↓	↓	↓	↓	↓	↓
1999	↓	↓	↓	↓	↓	↓
2000	↓	↓	↓	↓	↓	↓
⋮	↓	↓	↓	↓	↓	↓
⋮	↓	↓	↓	↓	↓	↓
⋮	↓	↓	↓	↓	↓	↓
2019	↓	↓	↓	↓	↓	↓

#-1 Ratio of loaded vehicles is 0.6.

Table III.8.10 Savings in Transportation Cost

Unit: Mil. Baht

Year	"Without"	"With" Case				"Without" - "With"
	O/D-LCB	O/D-ICD	ICD-LCB		Total	
			Trailer	Railway		
1992	131.8	61.2	1.5	0.3	63.0	68.8
1993	170.0	79.0	1.9	0.4	81.3	88.7
1994	208.1	96.8	2.3	0.5	99.6	108.5
1995	246.3	114.6	2.8	0.6	118.0	128.3
1996	284.5	132.4	3.2	0.7	136.3	148.2
1997	304.1	141.6	3.4	0.7	145.7	158.4
1998	↓	↓	↓	↓	↓	↓
1999	↓	↓	↓	↓	↓	↓
2000	↓	↓	↓	↓	↓	↓
2001	↓	↓	↓	↓	↓	↓
2019	↓	↓	↓	↓	↓	↓
Total	8,035.0	3,740.8	89.9	18.6	3,849.3	4,185.7

8.4.3 Benefits from Savings in Customs Clearance Costs

44. As mentioned above, under the "without" case all customs clearances are carried out at the Laem Chabang marine terminal. In that case, some customs brokers would stay there permanently.

(1) Number of Entries

45. The number of entries each year is shown in Table III.8.11. These numbers are calculated using the average weights per entry based on the actual data from the Customs Department, which are 10 tons/entry for export and 8 tons/entry for import.

Table III.8.11 Number of Entries

Unit: entries/year

Year	Export	Import	Total
1992	20,900	48,700	69,600
1996	46,100	103,300	149,400
1997-2019	49,300	110,400	159,700

(2) Customs Clearance Costs

1) "With" Case

46. Under the "with" case, customs brokers go to the ICD and conduct the customs clearance there. Costs per entry under the "with" case are estimated as follows:

Labour Costs for Customs Brokers	59 Baht/entry
Transportation Cost between Office and ICD	27 Baht/entry
Total	86 Baht/entry

1) "Without" Case

47. Under the "without" case, some customs brokers stay permanently at the Laem Chabang site and messenger service is used between Bangkok and Laem Chabang. Costs per entry under the "without" case are estimated as follows:

Labour Costs for Customs Brokers (permanent stay)	76 Baht/entry
Rent for the Office	10 Baht/entry
Cost for the Messengers Service	(5.7 Mil.Baht/year)
Total	86 Baht/entry + 5.7 mil.Baht/year

(3) Calculation Results

48. Table III.8.12 shows the benefits from savings in customs clearance costs.

Table III.8.12 Savings in Customs Clearance Costs

Unit: Mil. Baht

Year	"Without" Case	"With" Case	"Without" - "With"
1992	11.7	6.0	5.7
1993	13.4	7.7	5.7
1994	15.1	9.4	5.7
1995	16.8	11.1	5.7
1996	18.5	12.8	5.7
1997	19.4	13.7	5.7
⋮	↓	↓	↓
2019			
Total	521.7	362.1	159.6

8.5 Evaluation

8.5.1 Economic Profitability

49. As mentioned in section 8.2 of this Chapter, the economic profitability of the project is evaluated based on the EIRR. Using the above estimated benefits and costs, the EIRR of the Project is 17.0% as shown in Table III.8.13.

50. A project is generally regarded as feasible if the EIRR exceeds the local opportunity cost of capital. In the case of this project, it is considered that the Project is economically feasible if the EIRR is more than 12%. In this case, only taking into consideration the two items which are easily quantified, the EIRR of the project is 17.0%. Therefore, the Project is considered to be feasible.

Table III.8.13 EIRR Calculation

EIRR = 17.0%

Unit: Mil. Baht

Year	Benefits			Costs				Benefits - Costs
	Savings in Transportation Cost	Savings in Customs Clearance Cost	Total	Construction Cost	Maintenance Cost	Admi. & Operation Cost	Total	
1989	-	-	-	-11.1	-	-	-11.1	11.1
1990	-	-	-	302.2	-	-	302.2	-302.2
1991	-	-	-	255.2	-	-	255.2	-255.2
1992	68.8	5.7	74.5	-	5.8	12.5	18.3	56.2
1993	88.7	5.7	94.4	-	5.8	12.5	18.3	76.1
1994	108.5	5.7	114.2	-	5.8	30.1	35.9	78.3
1995	128.3	5.7	134.0	-	5.8	30.1	35.9	98.1
1996	148.2	5.7	153.9	-	5.8	30.1	35.9	118.0
1997	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
1998	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
1999	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2000	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2001	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2002	158.4	5.7	164.1	8.0	5.8	30.1	43.9	120.2
2003	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2004	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2005	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2006	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2007	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2008	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2009	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2010	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2011	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2012	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2013	158.4	5.7	164.1	8.0	5.8	30.1	43.9	120.2
2014	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2015	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2016	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2017	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2018	158.4	5.7	164.1	-	5.8	30.1	35.9	128.2
2019	158.4	5.7	164.1	-3.6	5.8	30.1	32.3	131.8
Total	4,185.7	159.6	4,345.3	558.7	162.4	807.6	1,528.7	2,816.6

8.5.2 Sensitivity Analysis

(1) Assumption of Cases

51. Sensitivity analysis is made for three cases as follows:

Case A --- The costs increase by 10%.

Case B --- The benefits decrease by 10%.

Case C --- The costs increase by 10% and the benefits decrease by 10% simultaneously.

(2) Results of the Sensitivity Analysis

52. The results of the sensitivity tests are shown in Table III.8.14. Each EIRR exceeds 12%. The results of the sensitivity analysis thus prove that each case would be feasible.

Table III.8.14 Sensitivity Analysis for EIRR

Case	EIRR (%)
Case A (Increase in Costs by 10%)	15.2
Case B (Decrease in Benefits by 10%)	15.0
Case C (Increase in Costs by 10% and Decrease in Benefits by 10%)	13.4

8.5.3 Conclusion

53. The First Stage Plan is judged to be more than feasible based on the EIRR of the project as well as on the intangible benefits arising from the project.

CHAPTER 9 FINANCIAL ANALYSIS

9.1 Purpose and Procedure of the Analysis

1. The purpose of the study in this Chapter is to determine the port charges of the P.M.B. and expected terminal operators and to analyze their projected financial situations. The purpose of the financial analysis is to examine the viability of the project and to examine the financial soundness of the P.M.B. and the terminal operators. The viability of the project is analyzed based on the Financial Internal Rate of Return (FIRR) using the Discount Cash Flow Method. The financial soundness of the P.M.B. and the terminal operators are analyzed based on their projected financial statements.

2. The procedure of the study is shown in Fig. III.9.1.

9.2 Objects of the Financial Analysis

3. The financial analysis in this study is carried out for the First Stage Plan of the ICD. The objects of the financial analysis are the P.M.B. which will implement the project and manage the facilities after completion, and the terminal operators which will rent the facilities and handle the container cargo.

4. As proposed previously, the P.M.B. should manage the ICD and the marine terminal as one body and the terminal operators should rent both facilities as one lump package and handle the container cargo. Then, each financial unit in this study covers both the ICD and the marine terminal, but is limited to container cargo handling and related business. Accordingly, the objective facilities of the financial analysis are the entire Lat Krabang ICD, 4 container berths and other port facilities related to container transport through Laem Chabang Port.

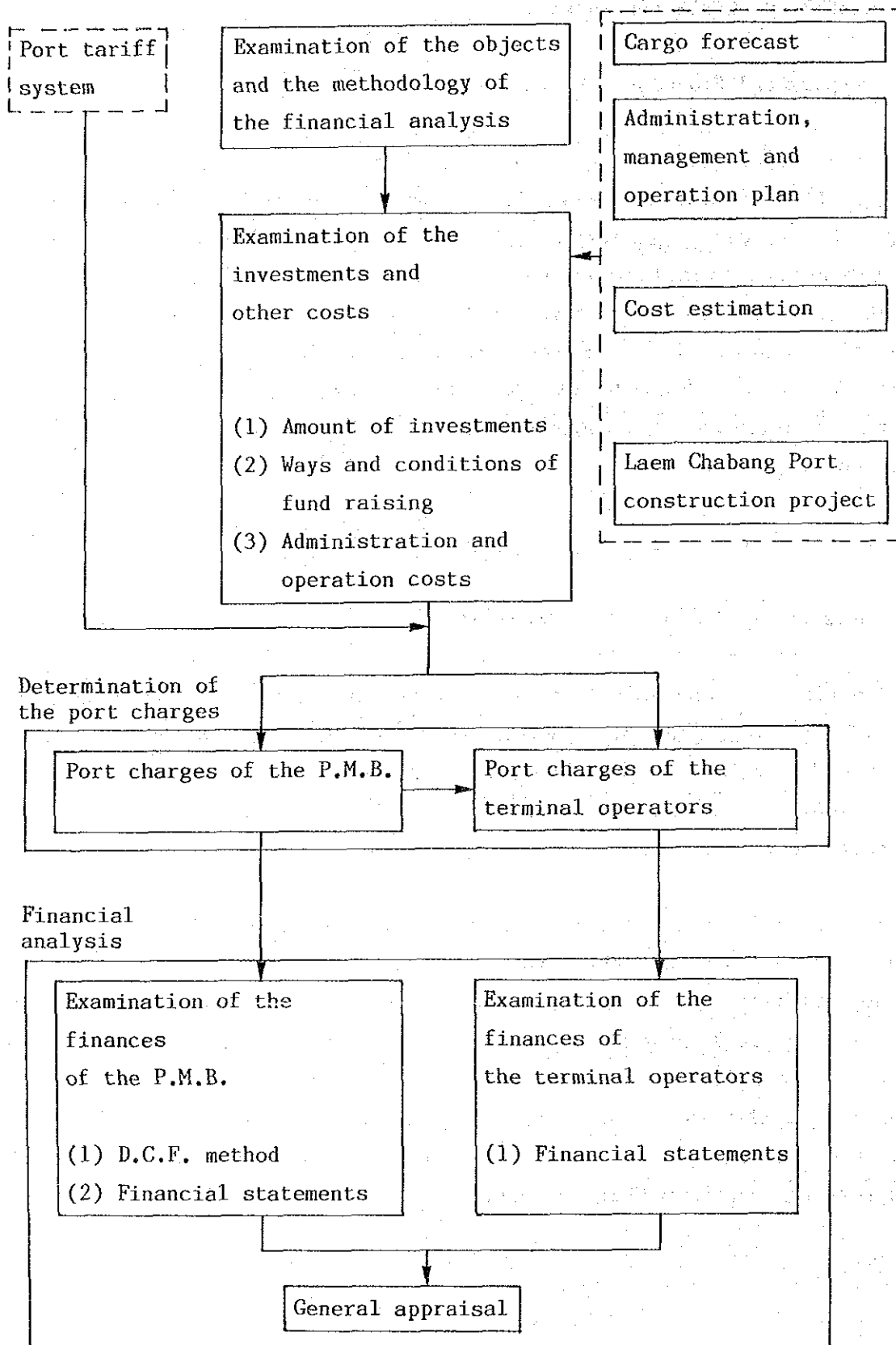


Fig. III.9.1 The Procedure of the Study

9.3 General Prerequisites of the Financial Analysis

9.3.1 Project Life

5. Based on the same reasons as for the economic analysis, the project life for the financial analysis is determined as 31 years including 3 years of detailed design and construction and 28 years of operation.

9.3.2 Base Year

6. For the estimation, all costs, expenditures and revenues analyzed quantitatively here are indicated in prices as of August 1988 when the price survey was conducted. Neither inflation of prices nor the increase of nominal wages are considered during the project life.

9.3.3 Cargo Handling Volume

7. Based on the cargo volume forecast and estimated cargo handling capacity, the annual cargo handling volume of the facilities in the ICD and the marine terminal are determined as shown in Appendix 7.

9.4 Methodology of the Financial Analysis

9.4.1 Viability of the Project and Financial Soundness of the P.M.B.

(1) Prerequisites

1) Costs and Expenditures

(a) Initial Investments

8. The initial investments of the P.M.B. are as follows:

(a) The investment for the Lat Krabang ICD project (1989 - 1991)

(b) The investment for the Laem Chabang Port project (1985 - 1991)

9. The investment for the ICD project is estimated in Chapter 7 of Part III.

10. The investment for the Laem Chabang Port project includes the detailed design which has been finished already, the construction works and related engineering services which are under implementation, and the procurement of cargo handling equipment (gantry cranes), harbor craft and the marine control system which will be contracted in the near future. Among these investments, the financial analysis in this study is limited to those items related to the container transport, i.e. the construction of the container berths including the reclamation, the procurement of container handling equipment and the portion of the common use facilities necessary for general port activities which the container transport should share. Four new container berths will be needed in Laem Chabang Port in 1996, and the additional investment for these berths is estimated based on the present contract prices.

11. The proportion of the costs of the common use facilities which the container transport should share is 60% for the facilities in the water area, that is, the proportion of the total NRT (Net Registered Tonnage) of container vessels to the total NRT of all merchant ships expected to call at Laem Chabang Port during the project life, and 70% for the facilities in the land area, that is, the proportion of the total volume of container cargo to the total volume of all the cargo expected to be handled at the port during the project life. The investments for the detailed design and the engineering services for the construction work are also shared by the same rates after being divided into the investments for the facilities in the water area and for those in the land area.

12. The common use facilities in the water area include the basin, the channel, the breakwater, the navigation aids and the marine control system, and the common use facilities in the land area include the service boat terminal, the roads, the railway, the warehouses for bonded cargo and overtime cargo, the facilities for port administration and the land for these facilities.

(b) Re-investments

13. The facilities and the equipment will be renewed based on their service lives. The expenditures for renewal are considered as re-

investments. The service lives of each facility and equipment are shown in Appendix 7.

(c) Maintenance and Repair Costs

14. The annual maintenance and repair costs for the facilities and the equipment are calculated based on fixed proportions of the original construction or procurement costs. The fixed proportions are also shown in Appendix 7.

(d) Personnel and Administration Costs

15. The personnel cost is estimated based on the required number of staff members of the P.M.B. proposed in Chapter 1 of Part II. The wages are set by rank considering the current standard of PAT and bonuses are also considered. The administration cost is estimated as 50% of the total personnel cost. 70% of the operation cost of the marine terminal and 100% of the operation cost of the ICD are regarded as being related to the container transport and used for the calculation.

(e) Operation Costs

16. The operation costs of the P.M.B. are the cost for the computer system and the fuel cost of the vehicles and the harbor craft necessary for the port administration and the charges for water supply and electricity necessary for the operation of the common use facilities. 70% of these costs is regarded as being related to the container transport and used for the calculation.

(f) Depreciation Costs

17. The annual depreciation costs of the facilities and equipment are calculated by the straight line method based on their service lives shown in Appendix 7. Residual values after depreciation are neglected.

(g) Repayments of Loans and Interest on Loans

18. The repayments of long-term and short-term loans and the interest on these loans are calculated based on the fund raising plan presented in 3).

(h) Taxes and the Payment to the Government

19. The P.M.B. should be a public agency and thus it should not pay any tax. No other payment to the Government is considered in this study.

2) Revenues

20. The operating revenue of the P.M.B. includes the terminal rents collected from the terminal operators and the port dues collected from the calling container vessels. The non-operating revenue of the P.M.B. is the interest on the cash surplus deposited in banks, as well as the interest on the deposits from the terminal operators.

3) Fund Raising

21. The funds necessary for the implementation of the project are raised as follows:

- 1) The initial investment for the Laem Chabang Port project including the detailed design, construction works and related engineering service

OECF loans have already been introduced for the foreign currency portion and some of the local currency portion. The funds for the rest of the local currency portion are assumed to be raised as follows.

Source : Loans from local banks
Interest rate : 11.5% per annum
Repayment term: 10 years with no grace period

- 2) The initial investment for the ICD project, the remaining initial

investments for the Laem Chabang Port project including the procurement of the gantry cranes, the harbor craft and the marine control system and the re-investments for the procurement of major equipment including the gantry cranes, the weighbridges and the harbor craft

The funds for the foreign currency portion are assumed to be raised as follows:

Source : Loans from abroad
Interest rate : 2.9% per annum
Repayment term: 30 years including a grace period of 10 years

The funds for the local currency portion are assumed to be raised as follows.

Source : Loans from local banks
Interest rate : 11.5% per annum
Repayment term: 10 years with no grace period

Any cash shortage should be covered by short-term loans with an interest rate of 11.5% per annum.

22. The financial situation of the P.M.B. would be considerably improved introducing the government funds for the local currency portion of the project cost and the recovery of cash shortage, but loans from the local banks are adopted for the analysis assuming the severer condition.

(2) Port Charges Collected by the P.M.B.

23. Port charges are set based on the port tariff system proposed in Chapter 1 of Part II.

24. Among the costs and expenditures of the P.M.B. enumerated in (1), the following items should be covered by the port charges collected by the P.M.B.

Initial investments and re-investments
Interest on long-term loans
Maintenance and repair costs
Personnel and administration costs
Operation costs

Among these items, the items for the common use facilities in the water area, that is, the items for the breakwater, the basin, the channel, the navigation aids and the marine control system, are covered by the port dues. The other items are covered by the terminal rents.

25. Here, land is considered as a non-depreciable asset which will maintain its value even after the end of the project life. Then it is not appropriate to recover the investment cost for the land acquisition by the port charges. Accordingly, the land acquisition cost is not included in the calculation of the port charges, but land rent is added on the calculated annual charges. The annual land rent is set as 11.5% of the land acquisition cost. This rate is the same as the annual interest rate on loans from local banks.

26. In this study, the port charges are set to recover all the other items within the project life and to maintain the financial soundness of the P.M.B.

27. The port dues are charged to every merchant ship calling at the port except vessels less than 500 NRT, and are collected by NRT. The terminal rents for the ICD and the marine terminal are collected annually in a package from every terminal operator. The terminal rents are set as a fixed flat rate in this study.

(3) Viability of the Project

28. The viability of the project is analyzed using the Discount Cash Flow Method and appraised by the FIRR. The FIRR is a discount rate which makes the costs and the revenues during the project life equal, and it is calculated using the following formula:

$$\sum_{i=1}^n \frac{B_i - C_i}{(1+r)^{i-1}} = 0$$

- n : Project life
 B_i : Revenue in the i-th year
 C_i : Cost in the i-th year
 r : Discount rate

Here, the revenue and the cost are the difference between those under the "with" case and the "without" case. In this study, the "without" case is set as explained in Chapter 8 of Part III. The revenue and the cost in this analysis cover the following items.

- Revenue: Operating revenue of the P.M.B.
 Cost : Investments, maintenance and repair costs, personnel and administration costs and operation cost of the P.M.B. (residual values of the gantry cranes, the weighbridges, the harbor craft and the vehicles at the end of the project life are deducted)

As mentioned in (2), the investment cost for the land acquisition is not recovered by the revenue. Accordingly, this cost is not included in the calculation of the FIRR.

29. When the calculated FIRR exceeds the weighted average interest rate of the total funds for the investments of the project, the project is regarded as feasible.

(4) Financial Soundness of the P.M.B. and the Terminal Operators

30. The financial soundness of the P.M.B. is appraised based on its projected financial statements (profit and loss statement, cash flow statement and balance sheet). The ICD project will start in 1989, but the financial statements are presented from 1985 considering the construction of Laem Chabang Port. The appraisal is made from the viewpoints of profitability, loan repayment capacity and operational efficiency.

1) Profitability

Rate of Return on Net Fixed Assets

$$\frac{\text{Net Operating Income}}{\text{Total Fixed Assets}} \times 100 (\%)$$

31. This indicator shows the profitability of the investment which is presented as the net total fixed assets. It is necessary to keep the rate above the average interest rate of the total funds for the investment.

2) Loan Repayment Capacity

(Debt Service Coverage Ratio)

$$\frac{\text{Net Operating Income before Depreciation}}{\text{Repayment of and Interest on Long-term Loans}}$$

32. This indicator shows whether the operating income can cover the repayment of and the interest on long term loans and must be more than 1.

3) Operational Efficiency

(Operating Ratio)

$$\frac{\text{Operating Expenses}}{\text{Operating Revenues}} \times 100 (\%)$$

(Working Ratio)

$$\frac{\text{Operating Expenses} - \text{Depreciation Cost}}{\text{Operating Revenues}} \times 100 (\%)$$

33. The operating ratio shows the operational efficiency of the P.M.B. as an enterprise and the working ratio shows the efficiency of the routine operation of the port.

9.4.2 Financial Soundness of the Terminal Operators

(1) Prerequisites

1) Costs and Expenditures

(a) Initial Investments

34. The initial investments of the terminal operators are the procurement of cargo handling equipment for both the ICD and the marine terminal.

(b) Re-investments

35. The facilities and equipment will be renewed based on their service lives. The expenditures for renewal are considered as re-investments. The service lives of each facility and equipment are shown in Appendix 7.

(c) Maintenance and Repair Costs

36. The annual maintenance and repair costs for the facilities and the equipment are calculated based on fixed proportions of the original construction or procurement costs. The fixed proportions are also shown in Appendix 7.

(d) Personnel and Administration Costs

37. The personnel cost is estimated based on the number of staff members proposed in Chapter 4 of Part III. The wages are set based on the current wages in Bangkok Port. The administration cost is estimated as 50% of the total personnel cost.

(e) Operation Costs

38. The operation costs of the terminal operators are the cost for the computer system, the fuel cost of the cargo handling equipment and the charges for water supply and electricity.

(f) Depreciation Costs

39. The annual depreciation costs of the facilities and equipment are calculated by the straight line method based on their service lives as shown in Appendix 7. Residual values after depreciation are neglected.

(g) Repayments of Loans and Interest on Loans

40. The repayments of long term and short term loans and the interest on these loans are calculated based on the fund raising plan presented in 3).

(h) Terminal Rents

41. The terminal rents explained in 9.4.1 (2) are also costs of the terminal operators. The terminal operators have to deposit 3/12 of the annual terminal rent with the P.M.B. prior to the commencement of terminal operation, and this deposit is also included in the costs for the cash flow analysis.

(i) Taxes and Payment to the Government

42. Corporate income tax is set at 35% of annual net profit, taking the case of a Thai company not registered with the Securities Exchange of Thailand. As the entire business of the terminal operators is deemed as "Inland Transport Business," the gross receipts from the business shall be exempted from business tax and municipal tax according to R.D. No.54.

2) Revenues

43. The operating revenue of the terminal operators includes the container handling charges and CFS charges collected from terminal users, and the non-operating revenue is the interest on the cash surplus deposited in banks.

44. The land transport charge between the ICD and the marine terminal might be collected by the terminal operators on behalf of the transporters because of the ease of the collection, but this charge is to be transferred to the transporters and is not regarded as the revenue of the terminal operators.

3) Fund Raising

45. The funds for the initial investments for the cargo handling equipment (1992, 1994) are raised as follows:

Source : Loans from local banks
Interest rate : 11.5% per annum
Repayment term: 5 years with no grace period

Any cash shortage should be covered by short-term loans with an interest rate of 11.5% per annum.

(2) Port Charges Collected by the Terminal Operators

46. Among the costs and expenditures of the terminal operators enumerated in (1), the following items should be covered by the port charges collected by the terminal operators.

Initial investments and re-investments
(Residual values of the equipment at the end of the project life are deducted)
Interest on long-term loans
Maintenance and repair costs
Personnel and administration costs
Operation costs
Terminal rents

Among these items, the items for the CFS facilities and cargo handling in the CFS are covered by the CFS charges and the other items are covered by the container handling charges. In this study, the port charges are set to recover all these items within the project life and to maintain the financial soundness of the terminal operators.

47. The CFS charge is charged on the cargo stuffed or unstuffed in the CFS by tonnage, and the container handling charge is charged on the containers handled in the CY. The container handling charge is simplified as the throughput rate. In this study, the throughput rate for a 40' container is

set as 150% of the rate for a 20' container, and the same rates are charged whether containers are loaded or empty. Both the CFS charge and the container handling charge are collected from the terminal users. The charges are set for the ICD and the marine terminal separately.

(3) Financial Soundness of the Terminal Operators

48. The financial soundness of the terminal operators is appraised based on the projected financial statements (profit and loss statement, cash flow statement and balance sheet). The financial statements are presented for the first lease period without the optional extension (from 1992 to 2001). The appraisal is made from the viewpoints of the profitability, loan repayment capacity and operational efficiency of the operators.

9.5 Evaluation

9.5.1 Port Charges

49. The port charges are proposed as follows:

(1) Port Charges Collected by the P.M.B.

Total terminal rent	120 million baht per annum
(ICD	20 million baht/ICD per annum)
(Marine terminal	100 million baht/berth per annum)

Port dues 5.0 baht/NRT

(2) Port Charges Collected by the Terminal Operators

Container handling charge (throughput rate)

ICD	20'	1,000 baht/box
	40'	1,500 baht/box
Marine terminal	20'	1,700 baht/box
	40'	2,600 baht/box

CFS charge

ICD	80 baht/ton
Marine terminal	80 baht/ton

These charges do not include the land transport charge between the ICD and the marine terminal. Compared with the current charges for container cargo handling in Klong Toei, the charges proposed here are reasonable and competitive.

9.5.2 Viability of the Project

50. The FIRR of this project is 6.5% and exceeds the weighted average interest rate of funds during the project life (5.7%).

9.5.3 Financial Soundness of the P.M.B. and the Terminal Operators

(1) Financial Soundness of the P.M.B.

51. The projected financial statements and financial indicators are shown in Table III.9.1.

1) Profitability

52. The rate of return on net fixed assets will increase exceeding the average interest rate of the total funds (5.7%) from 1994, the 3rd year of the terminal operation, and will then maintain a high level throughout the project life. The annual net income will go into the black in 1998, the 7th year of the terminal operation, and the cumulative net income will go into the black in 2011, the 20th year.

2) Loan Repayment Capacity

53. The debt service coverage ratio will exceed 1.0 from the first year of the terminal operation and will maintain a high level after 2002, when the repayment of local loans for the initial investment will be completed. Accordingly, there will be no problem for the repayment of the long-term loans using the annual operating revenues from the first year of the terminal operation. But, it will be necessary to take short-term loans to cover the loan repayments and interest during the construction term, and the cumulative amount of the short-term loans in 1991, the year before the

commencement of the terminal operation, will be about 600 million baht. The cumulative short-term loans will continue to increase even after the commencement of the terminal operation and will reach about 870 million baht in 2001, but will then decrease year by year and there will be cash excess in 2014.

3) Operational Efficiency

54. Both the operating ratio and the working ratio will constantly keep favorable levels. The operating ratio will be around 60%, and the working ratio will be around 30%, which is quite low.

(2) Financial Soundness of the Terminal Operators

55. The projected financial statements and financial indicators are shown in Table III.9.2.

1) Profitability

56. The rate of return on net fixed assets will be at a low level for the first three years of the terminal operation because the annual net operating income will not be sufficient due to the small cargo handling volume, but the rate will exceed the average interest rate of the funds (11.5%) in the fourth year and will maintain quite a high level thereafter. The annual net income will go into the black in 1996, the 5th year of the terminal operation, and the cumulative net income will go into the black in 1999, the 8th year.

2) Loan Repayment Capacity

57. The debt service coverage ratios will be less than 1.0 for the first four years of the terminal operation and there will be a cash shortage because of the insufficient annual net operating income, but the ratio will be rapidly improved from the 5th year and the repayment of the long-term loans will be completed in 1999. Short-term loans will be necessary in order to cover the cash shortage at the initial stage, but the financial situation will improve year by year and there will be a cash excess of 10

million baht in 2001, the last year of the terminal lease contract.

3) Operational Efficiency

58. The operational efficiency at the initial stage will be so bad that the operating expenses will exceed the operating revenues, but both the operating ratio and the working ratio will constantly maintain good levels after 1996, the 5th year of the terminal operation.

9.5.4 Sensitivity Analysis

59. Sensitivity analysis is made for the following 2 cases.

Case 1: The ICD project cost increases by 10%.

Case 2: The cargo volume decreases by 10%.

In Case 1, the impact on the port charges is analyzed. In Case 2, the impact on the financial situation of the terminal operators is analyzed.

(1) Case 1

60. In this study, the port charges of the P.M.B. are set to recover the total project cost within the project life. Accordingly, when the total project cost changes, the port charges are also changed by the same rate in order to maintain the financial situation of the P.M.B. at the same level. When the total project cost of the ICD increases by 10%, the port charge for the ICD also increases by 10% and the total terminal rent is set as follows:

Total terminal rent	122 million baht per annum
(ICD	22 million baht/ICD per annum)
(Marine terminal	100 million baht/berth per annum)

The share of the ICD rent in the total costs of the ICD operation is 35%. Then, a 10% increase of the ICD rent increases the ICD operation costs by 3.5%. But this cost increase causes only a 1% increase in the total operation costs including the marine terminal operation costs, and this rate of increase can be regarded as negligible.

(2) Case 2

61. In this analysis, it is assumed that the annual cargo handling volume at the marine terminal will decrease by 10%, from 160,000 TEU to 144,000 TEU, the cargo handling volume at the ICD will also decrease by 10%, but the operating expenses will not change. The projected financial statements and financial indicators are shown in Table III.9.3.

62. The operating revenues will decrease by 10% following the 10% decrease of the cargo handling volume. Accordingly, the rate of return on net fixed assets will not exceed 1.0 until the 4th year of the terminal operation and the debt service coverage ratio will not exceed 11.5% until the 5th year. Then, there will be a serious cash shortage and it will be necessary to introduce substantial short-term loans to cover it throughout the terminal lease period.

63. The net income will go into the black in 1997, the 6th year of the terminal operation, but it will be too small to recover the cumulative net loss within the terminal lease period.

9.5.5 Conclusion

64. Judging from the above analysis, this project is financially feasible for the P.M.B., with the port charges at a reasonable level. Moreover, the terminal operators will be able to realize a net profit and get some cash excess during the 10 year terminal lease period. Then the project is also feasible for the terminal operators. However, the management of the terminal operators is sensitively influenced by the fluctuation of cargo volume. Thus, efforts for securing a sufficient cargo volume will be very important as well as efforts for the improvement of cargo handling efficiency and the reduction of the operating expenses.

Table III.9.1 Financial Statements and Financial Indicators of the P.M.B.

(Unit: Million Baht)

Profit and Loss Statement (P.M.B.)		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Operating Revenues		0	0	0	0	0	0	0	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480
Terminal Rents		0	0	0	0	0	0	0	17	21	24	28	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Port Dues		0	0	0	0	0	0	0	497	501	504	508	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	
Total Operating Revenues		0	0	0	0	0	0	0	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	480	
Operating Expenses		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cash Expenses		0	0	0	0	0	0	0	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	
Personnel Cost		0	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Administration Cost		0	0	0	0	0	0	0	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
Maintenance/Repair Cost		0	0	0	0	0	0	0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Operation Cost		0	0	0	0	0	0	0	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	
Land Rent		0	0	0	0	0	0	0	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	
Total Cash Expenses		0	0	0	0	0	0	0	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155
Non-Cash Charges		0	0	0	0	0	0	0	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
Depreciation Expenses		0	0	0	0	0	0	0	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
Total Non-Cash Expenses		0	0	0	0	0	0	0	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153
Total Operating Expenses		0	0	0	0	0	0	0	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308	308
Net Operating Income (NOI)		0	0	0	0	0	0	0	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
NOI before Depreciation		0	0	0	0	0	0	0	342	346	349	353	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357	357
Other Income and Expenses		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Food Management Income		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Interest on Loans		0	2	15	53	61	77	103	204	180	175	160	145	128	112	100	86	73	62	58	54	50	45	116	109	100	92	83	74	65	58	49	41	33	30	27		
Interest on Short Term Loans		0	0	0	3	14	27	45	60	63	68	72	76	84	89	90	96	99	100	93	84	75	63	59	48	45	41	35	27	18	6	0	0	0	0	0		
Total Interest on Loans		0	2	15	56	74	104	148	274	253	243	232	221	212	201	190	182	172	162	151	139	124	108	168	157	145	133	118	101	83	64	49	41	33	30	27		
Net Income		0	-2	-15	-56	-74	-104	-148	-84	-69	-46	-32	-17	-7	4	15	23	32	42	54	66	80	95	37	47	59	72	87	103	122	140	150	176	192	208	223		
Cash Flow Statement (P.M.B.)		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019		
Cash Replanning		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Cash Inflow		0	0	0	0	0	0	0	497	501	504	508	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512	512
Operating Revenues		45	187	516	295	348	536	1,970	6	0	0	0	0	2	10	0	0	0	0	0	0	0	1,419	0	0	12	0	0	0	0	0	0	0	0	0	0	0	
Long Term Loans		0	0	0	0	0	0	0	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Deposits from the Lessees		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Fund Management Income		45	187	516	295	348	536	1,970	607	501	504	508	512	514	522	512	512	512	514	512	512	514	1,931	512	512	524	512	512	544	512	518	525	533	545	558	558	558	
Total Cash Inflow		45	187	516	295	348	536	1,970	607	501	504	508	512	514	522	512	512	512	514	512	512	514	1,931	512	512	524	512	512	544	512	518	525	533	545	558	558	558	
Cash Outflow		45	187	516	295	348	536	1,970	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0	1,419	0	0	12	0	0	0	0	0	0	0	0	0	0	
Investment		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Loan Repayments		0	0	19	37	40	51	67	126	129	146	158	198	189	166	218	207	191	133	133	133	133	133	174	174	174	175	175	175	171	156	143	154	112	107	53		
Long Term Loans		0	0	0	0	0	0	0	155	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	153	
Short Term Loans		0	0	2	27	129	234	389	604	551	588	627	665	727	770	780	831	863	870	807	734	648	548	432	417	391	353	304	239	158	55	0	0	0	0	0		
Total Loan Repayments		0	0	11	64	160	285	456	729	680	733	785	863	915	936	998	1,039	1,054	1,002	940	866	781	680	565	591	505	470	414	320	211	143	154	112	107	53			
Interest on Loans		0	2	15	53	61	77	103	204	180	175	160	145	128	112	100	86	73	62	58	54	50	45	116	109	100	92	83	74	65	58	49	41	33	30	27		
Long Term Loans		0	0	0	3	14	27	45	69	63	68	72	76	84	89	90	96	99	100	93	84	75	63	59	48	45	41	35	27	18	6	0	0	0	0	0		
Short Term Loans		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Interest on Loans		0	2	15	56	74	104	148	274	253	243	232	221	212	201	190	182	172	162	151	139	124	108	168	157	145	133	118	101	83	64	49	41	33	30	27		
Cash Expenses		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Cash Outflow		45	187	516	295	348	536	1,970	0	0	0	0	0																									

Table III.9.2 Financial Statements and Financial Indicators of the Terminal Operator

Profit and Loss Statement (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Operating Revenues										
Revenues from ICD										
CY Service	10,675	13,757	16,825	19,907	23,000	24,582	24,582	24,582	24,582	24,582
CFS Service	11,908	15,408	18,856	22,304	25,744	27,520	27,520	27,520	27,520	27,520
Subtotal	22,643	29,165	35,681	42,211	48,744	52,102	52,102	52,102	52,102	52,102
Revenues from MT										
CY Service	125,850	153,000	179,925	207,075	234,325	235,500	235,500	235,500	235,500	235,500
CFS Service	14,968	17,168	19,368	21,568	23,768	23,768	23,768	23,768	23,768	23,768
Subtotal	140,818	170,168	199,293	228,643	258,093	259,268	259,268	259,268	259,268	259,268
Total Operating Revenues	163,461	199,333	234,974	270,854	306,837	311,362	311,362	311,362	311,362	311,362
Operating Expenses										
Cash Expenses										
Terminal Rent	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Personnel Cost	21,492	21,492	21,492	21,492	21,492	21,492	21,492	21,492	21,492	21,492
Administration Cost	10,746	10,746	10,746	10,746	10,746	10,746	10,746	10,746	10,746	10,746
Maintenance/Repair Cost	10,622	10,622	15,184	15,184	15,184	15,184	15,184	15,184	15,184	15,184
Operation Cost	16,050	16,050	23,550	23,550	23,550	23,550	23,550	23,550	23,550	23,550
Total Cash Expenses	178,910	178,910	203,284	203,284	203,284	203,284	203,284	203,284	203,284	203,284
Non-cash Expenses										
Depreciation Cost	19,065	19,065	27,904	27,904	27,904	27,904	27,904	27,904	27,904	27,904
Total Non-cash Expenses	19,065	19,065	27,904	27,904	27,904	27,904	27,904	27,904	27,904	27,904
Total Operating Expenses	197,975	197,975	231,188	231,188	231,188	231,188	231,188	231,188	231,188	231,188
Net Operating Income (NOI)	-34,514	1,358	3,786	39,658	75,641	80,174	80,174	80,174	80,174	80,174
NOI before Depreciation	-15,449	20,423	31,650	67,562	103,545	108,078	108,078	108,078	108,078	108,078
Other Income and Expenses										
Fund Management Income	0	0	0	0	0	0	0	0	0	0
Interest on Loans	0	24,431	19,545	25,151	18,167	11,182	4,197	2,099	0	0
Interest on Long Term Loans	0	5,227	11,175	15,949	19,691	20,858	21,035	16,457	10,741	2,609
Interest on Short Term Loans	0	19,204	8,370	9,202	-1,524	-9,676	-16,838	-14,358	-10,000	-2,609
Total Interest on Loans	0	24,431	19,545	25,151	18,167	11,182	4,197	2,099	0	0
Net Income	-34,514	-28,300	-26,934	-1,443	24,429	31,287	35,712	40,952	45,131	50,417
Income Tax	0	0	0	0	13,154	16,847	19,229	21,566	24,301	27,148
Net Income after Tax	-34,514	-28,300	-26,934	-1,443	24,429	31,287	35,712	40,952	45,131	50,417

Cash Flow Statement (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cash Beginning	0	0	0	0	0	0	0	0	0	0
Cash Inflow										
Operating Revenues	163,461	199,333	234,974	270,846	306,829	311,362	311,362	311,362	311,362	311,362
Long Term Loans	212,443	0	91,241	0	0	0	0	0	0	0
Fund Management Income	0	0	0	0	0	0	0	0	0	0
Return of the Deposit	0	0	0	0	0	0	0	0	0	0
Total Cash Inflow	375,904	199,333	326,215	270,846	306,829	311,362	311,362	311,362	311,362	311,362
Cash Outflow										
Investment	212,443	0	91,241	0	0	0	5,560	0	2,317	45,368
Deposit to the Lessor	39,000	0	0	0	0	0	0	0	0	0
Loan Repayments										
Long Term Loans	0	42,489	42,489	60,737	60,737	60,737	18,248	18,248	0	0
Short Term Loans	0	45,449	97,172	138,691	172,967	181,370	182,916	143,108	93,401	22,683
Total Loan Repayments	0	87,938	139,661	199,428	233,703	242,107	201,164	161,356	93,401	22,683
Interest on Loans										
Interest on Long Term Loans	0	24,431	19,545	25,151	18,167	11,182	4,197	2,099	0	0
Interest on Short Term Loans	0	5,227	11,175	15,949	19,691	20,858	21,035	16,457	10,741	2,609
Total Interest on Loans	0	29,658	30,720	41,101	37,858	32,039	25,232	18,556	10,741	2,609
Income Tax	0	0	0	0	13,154	16,847	19,229	21,566	24,301	27,148
Cash Expenses	178,910	178,910	203,284	203,284	203,284	203,284	203,284	203,284	203,284	203,284
Total Cash Outflow	421,353	296,565	464,905	443,813	488,199	494,278	454,470	404,763	334,045	301,083
Cash Inflow - Cash Outflow	-45,449	-97,172	-138,691	-172,967	-181,370	-182,916	-143,108	-93,401	-22,683	10,279
Cash Ending	-45,449	-97,172	-138,691	-172,967	-181,370	-182,916	-143,108	-93,401	-22,683	10,279
Cash Excess	0	0	0	0	0	0	0	0	0	10,279
Short Term Loans	45,449	97,172	138,691	172,967	181,370	182,916	143,108	93,401	22,683	0

Balance Sheet (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ASSETS										
Current Assets										
Cash & Deposit	0	0	0	0	0	0	0	0	0	10,279
Total Current Assets	0	0	0	0	0	0	0	0	0	10,279
Fixed Assets										
Depreciable Assets										
Depreciable Assets	212,443	212,443	303,684	303,684	303,684	303,684	309,244	309,244	311,561	356,921
Accumulated Depreciation	19,065	35,130	66,034	93,938	121,842	149,746	177,650	205,554	233,458	261,362
Net Depreciable Assets	193,378	177,313	237,650	209,746	181,842	153,938	131,594	103,690	78,103	95,559
Non-Depreciable Assets										
Deposit to the Lessor	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000
Total Non-Depreciable Assets	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000	39,000
Total Fixed Assets	223,378	204,313	267,650	239,746	211,842	183,938	161,594	133,690	108,103	125,559
Total Assets	223,378	204,313	267,650	239,746	211,842	183,938	161,594	133,690	108,103	135,838
LIABILITIES & NET WORTH										
Liabilities										
Current Liabilities										
Short Term Loans	45,449	97,172	138,691	172,967	181,370	182,916	143,108	93,401	22,683	0
Long Term Liabilities										
Long Term Loans	212,443	169,954	218,707	157,970	97,233	36,497	16,245	0	0	0
Total Liabilities	257,892	267,127	357,398	330,937	278,603	219,412	161,356	93,401	22,683	0
Net Worth										
Equity Capital	0	0	0	0	0	0	0	0	0	0
Retained Earnings	0	-34,514	-62,814	-89,748	-91,191	-65,762	-35,474	238	40,289	85,420
Net Income After Tax	-34,514	-28,300	-26,934	-1,443	24,429	31,287	35,712	40,952	45,131	50,417
Total Net Worth	-34,514	-62,814	-89,748	-91,191	-66,762	-35,474	238	48,289	85,420	135,838
Total Liabilities & Net Worth	223,378	204,313	267,650	239,746	211,842	183,938	161,594	133,690	108,103	135,838

Financial Indicators (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rate of Return on Net Fixed Assets (%)	-15.45	0.66	1.41	16.54	35.71	43.59	49.61	59.97	74.16	63.85
Debt Service Coverage Ratio	-	0.91	0.51	0.79	1.31	1.56	4.82	5.31	-	-
Operating Ratio (%)	121.1	99.3	98.4	85.4	75.3	74.3	74.3	74.3	74.3	74.3
Working Ratio (%)	109.5	89.8	86.5	75.1	66.3	65.3	65.3	65.3	65.3	65.3

Table III.9.3 Financial Statements and Financial Indicators of the Terminal Operator (Sensitivity Analysis Case 2)

(Unit: 1,000 Baht)

Profit and Loss Statement (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Operating Revenues										
Revenues from ICD										
CY Service	9,608	12,381	15,143	17,916	20,700	22,124	22,124	22,124	22,124	22,124
CFS Service	10,771	13,857	16,970	20,074	23,170	24,768	24,768	24,768	24,768	24,768
Subtotal	20,379	26,249	32,113	37,990	43,870	46,892	46,892	46,892	46,892	46,892
Revenues from MT										
CY Service	113,265	137,700	161,939	186,368	210,893	211,950	211,950	211,950	211,950	211,950
CFS Service	13,471	15,451	17,431	19,404	21,384	21,384	21,384	21,384	21,384	21,384
Subtotal	126,736	153,151	179,369	205,772	232,277	233,334	233,334	233,334	233,334	233,334
Total Operating Revenues	147,115	179,400	211,477	243,761	276,146	280,226	280,226	280,226	280,226	280,226
Operating Expenses										
Cash Expenses										
Terminal Rent	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
Personnel Cost	21,492	21,492	29,700	29,700	29,700	29,700	29,700	29,700	29,700	29,700
Administration Cost	10,746	10,746	14,850	14,850	14,850	14,850	14,850	14,850	14,850	14,850
Maintenance/Repair Cost	10,822	10,822	15,184	15,184	15,184	15,184	15,184	15,184	15,184	15,184
Operation Cost	16,050	16,050	23,550	23,550	23,550	23,550	23,550	23,550	23,550	23,550
Total Cash Expenses	178,910	178,910	203,284	203,284	203,284	203,284	203,284	203,284	203,284	203,284
Non-cash Expenses										
Depreciation Cost	19,065	19,065	27,904	27,904	27,904	27,904	27,904	27,904	27,904	27,904
Total Non-cash Expenses	19,065	19,065	27,904	27,904	27,904	27,904	27,904	27,904	27,904	27,904
Total Operating Expenses	197,975	197,975	231,188	231,188	231,188	231,188	231,188	231,188	231,188	231,188
Net Operating Income (NOI)	-50,860	-18,575	-19,712	12,573	44,958	49,038	49,038	49,038	49,038	49,038
NOI before Depreciation	-31,795	490	8,192	40,477	72,862	76,942	76,942	76,942	76,942	76,942
Other Income and Expenses										
Fund Management Income	0	0	0	0	0	0	0	0	0	0
Interest on Loans	0	24,431	19,545	25,151	18,167	11,182	4,197	2,099	0	0
Interest on Long Term Loans	0	7,106	15,583	23,545	31,474	35,789	39,410	38,533	36,794	32,937
Interest on Short Term Loans	0	17,325	3,962	1,606	-15,307	-24,607	-35,219	-36,437	-37,940	-39,937
Total Interest on Loans	0	21,527	19,545	26,757	15,862	10,575	4,972	2,662	0	0
Income Tax	-50,860	-50,113	-54,819	-36,123	-4,683	1,343	3,530	5,464	7,958	10,466
Income Tax	0	0	0	0	0	723	1,901	2,942	4,285	5,635
Net Income After Tax	-50,860	-50,113	-54,819	-36,123	-4,683	1,343	3,530	5,464	7,958	10,466

Cash Flow Statement (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cash Beginning	0	0	0	0	0	0	0	0	0	0
Cash Inflow										
Operating Revenues	147,115	179,400	211,477	243,761	276,146	280,226	280,226	280,226	280,226	280,226
Long Term Loans	212,443	0	31,241	0	0	0	0	0	0	0
Fund Management Income	0	0	0	0	0	0	0	0	0	0
Return of the Deposit	0	0	0	0	0	0	0	0	0	0
Total Cash Inflow	359,558	179,400	302,718	243,761	276,146	280,226	280,226	280,226	280,226	280,226
Cash Outflow										
Investment	212,443	0	91,241	0	0	0	5,560	0	2,317	45,360
Deposit to the Lessor	30,000	0	0	0	0	0	0	0	0	0
Loan Repayments	0	42,489	42,489	60,737	60,737	60,737	18,248	18,248	0	0
Long Term Loans	0	61,795	135,332	204,736	273,691	311,207	342,697	335,071	319,951	286,407
Short Term Loans	0	0	0	0	0	0	0	0	0	0
Total Loan Repayments	0	61,795	135,332	204,736	273,691	311,207	342,697	335,071	319,951	286,407
Interest on Loans	0	24,431	19,545	25,151	18,167	11,182	4,197	2,099	0	0
Interest on Long Term Loans	0	7,106	15,583	23,545	31,474	35,789	39,410	38,533	36,794	32,937
Interest on Short Term Loans	0	17,325	3,962	1,606	-15,307	-24,607	-35,219	-36,437	-37,940	-39,937
Total Interest on Loans	0	21,527	19,545	26,757	15,862	10,575	4,972	2,662	0	0
Income Tax	0	0	0	0	0	723	1,901	2,942	4,285	5,635
Cash Expenses	178,910	178,910	203,284	203,284	203,284	203,284	203,284	203,284	203,284	203,284
Total Cash Outflow	421,353	314,731	507,454	517,453	587,353	622,922	615,297	609,177	566,632	573,623
Cash Inflow - Cash Outflow	-61,795	-135,332	-204,736	-273,691	-311,207	-342,697	-335,071	-319,951	-286,407	-293,397
Cash Ending	-61,795	-135,332	-204,736	-273,691	-311,207	-342,697	-335,071	-319,951	-286,407	-293,397
Cash Excess	0	0	0	0	0	0	0	0	0	0
Short Term Loans	61,795	135,332	204,736	273,691	311,207	342,697	335,071	319,951	286,407	293,397

Balance Sheet (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
ASSETS										
Current Assets										
Cash & Deposits	0	0	0	0	0	0	0	0	0	0
Total Current Assets	0	0	0	0	0	0	0	0	0	0
Fixed Assets										
Depreciable Assets										
Depreciable Assets	212,443	212,443	303,684	303,684	303,684	303,684	309,244	309,244	311,261	356,921
Accumulated Depreciation	19,065	38,130	66,034	93,938	121,842	149,746	177,650	205,554	233,458	261,362
Net Depreciable Assets	193,378	174,313	237,650	209,746	181,842	153,938	131,594	103,690	77,803	95,559
Non-Depreciable Assets										
Deposit to the Lessor	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
Total Non-Depreciable Assets	223,378	204,313	267,650	239,746	211,842	183,938	161,594	133,690	107,803	125,559
Total Assets	223,378	204,313	267,650	239,746	211,842	183,938	161,594	133,690	107,803	125,559
LIABILITIES & NET WORTH										
Liabilities										
Current Liabilities										
Short Term Loans	61,795	135,332	204,736	273,691	311,207	342,697	335,071	319,951	286,407	293,397
Long Term Loans	212,443	169,954	218,707	157,970	97,233	36,497	18,248	0	0	0
Total Liabilities	274,238	305,286	423,443	431,661	408,441	379,193	353,319	319,951	286,407	293,397
Net Worth										
Equity Capital	0	0	0	0	0	0	0	0	0	0
Retained Earnings	0	-50,860	-100,973	-155,793	-191,915	-196,598	-195,255	-191,725	-186,261	-178,303
Net Income After Tax	-50,860	-50,113	-54,819	-36,123	-4,683	1,343	3,530	5,464	7,958	10,466
Total Net Worth	-50,860	-100,973	-155,793	-191,915	-196,598	-195,255	-191,725	-186,261	-178,303	-167,838
Total Liabilities & Net Worth	223,378	204,313	267,650	239,746	211,842	183,938	161,594	133,690	107,803	125,559

Financial Indicators (Terminal Operator)										
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Rate of Return on Net Fixed Assets (%)	-22.77	-9.09	-7.36	5.24	21.22	26.66	30.35	36.68	45.36	39.06
Debt Service Coverage Ratio		0.01	6.13	0.47	0.92	1.07	3.43	3.78		
Operating Ratio (%)	134.6	110.4	109.3	94.8	83.7	82.5	82.5	82.5	82.5	82.5
Working Ratio (%)	121.6	99.7	96.1	83.4	73.6	72.5	72.5	72.5	72.5	72.5

APPENDICES

Appendix I The Tendency of International Liner Shipping

(1) Cargo Movement in the Late 1980s

Thai exports by FOB value in 1986 are shown in Tables A.1.1 and A.1.2. The top 10 countries cover about 70% of the total export value, and the top 30 countries account for more than 90%. The main commodities to the top 10 countries are cereal to neighboring countries in the Far East; electrical machinery, textiles and vegetables to the U.S.A. and Europe; and rubber, fish and meat to Japan.

Table A.1.1 Exports FOB Value by Top 30 Countries, (JAN.- DEC. 1986)

Country		FOB Value (Million Baht)	Country		FOB Value (Million Baht)
1	U.S.A.	41,367	18	Switzerland	2,491
2	Japan	32,377	19	Belgium	2,336
3	Singapore	20,369	20	Bangladesh	2,247
4	Netherlands	16,775	21	U.S.S.R.	1,894
5	W. Germany	10,609	22	Indonesia	1,482
6	Hong Kong	9,156	23	Brazil	1,393
7	Malaysia	9,021	24	India	1,354
8	U. Kingdom	7,407	25	Kuwait	1,249
9	China	7,241	26	Denmark	1,209
10	Korea	6,288	27	Sri Lanka	1,065
11	Saudi Arabia	5,397	28	Iran	1,063
12	France	5,234	29	Sweden	1,060
13	Australia	4,161	30	Spain	904
14	U.A. Emirates	3,905	Sub Total		209,505
15	Italy	3,828	Others		20,432
16	Taiwan	3,445	Grand Total		229,937
17	Canada	3,178			

(Source: Customs Dept.)

Remarks: 1) Exports of the Produce and Manufactured Goods of Thailand

2) Excluding;

a) Personal Effects

b) Transshipment Cargo

c) Parcel Post not Cleared by Customs Officials

d) Military Goods

3) The Figures Include all Exports by Sea, Land, Air and Parcel Post

Table A.1.2 Top Five Commodities by Top 10 Countries (Jan.- Dec. 1986)

No. Country Commodity	FOB Value M. Baht	Ratio %	No. Country Commodity	FOB Value M. Baht	Ratio %
1 U.S.A.			6 Hong Kong		
Electrical Machinery	5,480	13.2	Cereal	1,704	18.6
Preparation of Meat, Fish	4,941	11.9	Precious Stone & Metal	1,409	15.4
Precious Stone & Metal	4,895	11.8	Artificial Resin & Plastic	427	4.7
Apparel & Clothing Acc.	2,868	6.9	Edible Fruits & Nuts	427	4.7
Prep. of Veg, Fruits, Plants	2,426	5.9	Iron & Steel	409	4.5
G. Total	41,367	100.0	G. Total	9,156	100.0
2 Japan			7 Malaysia		
Rubber & Synthetic	7,443	23.0	Cereal	3,466	38.4
Fish, Crustaceans, Mollusks	6,881	21.3	Electrical Machinery	1,768	19.6
Meat & Edible Meat Offal	3,269	10.1	Fish, Crustaceans, Mollusks	728	8.1
Precious Stone & Metal	2,236	6.9	Sugar & Confectionery	573	6.4
Sugar & Confectionery	1,571	4.9	Rubber & Synthetic	458	5.1
G. Total	32,377	100.0	G. Total	9,021	100.0
3 Singapore			8 U. Kingdom		
Electrical Machinery	7,835	38.5	Prep. of Meat, Fish	1,291	17.4
Cereal	2,223	10.9	Apparel & Clothing Acc	741	10.0
Tin	1,201	5.9	Electrical machinery	642	8.7
Coffee, Tea, Spices	1,066	5.2	Knit & Crocheted Goods	566	7.6
Rubber, Synthetic	923	4.5	Fish, Crustaceans, Mollusks	491	6.6
G. Total	20,367	100.0	G. Total	7,407	100.0
4 Netherlands			9 China (PRC)		
Edible Vegetables	12,948	77.2	Cereal	2,594	35.8
Tin	569	3.4	Rubber & Sythetic	1,411	19.5
Cereal	456	2.7	Sugar & Confectionery	992	13.7
Apparel & Clathing Acc	367	2.2	Iron & Steel	457	6.3
Prep. of Meat, Fish	305	1.8	Man-Made Fibre	384	5.3
G. Total	16,775	100.0	G. Total	7,241	100.0
5 W. Germany			10 Korea		
Apparel & Clothing Acc	1,452	13.7	Cereal	2,404	38.2
Edible Vegetables	1,287	12.1	Sugar, Confectionery	1,650	26.2
Knit & Crocheted Goods	1,158	10.9	Rubber & Sythetic	655	10.4
Prep. of Meat, Fish	898	8.5	Edible Vegetables	553	8.8
Rubber & Synthetic	703	6.6	Mineral Fuel Oil, Wax	164	2.6
G. Total	10,609	100.0	G. Total	6,288	100.0

(Source: Customs Dept.)

(2) The Trend of Main Liner Service

The two main trunk container service routes are Far East/U.S.A. & Canada and Far East/Europe & Mediterranean Sea, served by a total container capacity of 400,000 TEUs and 300,000 TEUs, respectively. These two routes account for about 50% of total world trade in terms of container carrying capacity.

The fundamental principle of operating container mother vessels is to pursue volume scale merit by mass transport and to minimize the transit time of one voyage by limiting the number of calling ports. The intention is to minimize a vessel's operating cost by deploying larger vessels and to decrease time in port resulting in increasing the total number of voyages in a year and earning greater freight revenue.

Fixed day weekly service (FDWS) by container mother vessels contributes to customer service from savings of working capital and inventory control of goods. Cargoes originated from ports where mother vessels do not directly call are transferred to a transshipment port by feeder service by land or sea, and transshipped onto mother vessels.

In order to remain competitive, major container vessel operating companies have commenced to replace their fleets with 3,000 - 3,500 TEU so-called 3rd generation type vessels. By the early 1990s, each major shipping company will complete its arrangement of a new fleet. Furthermore, a few shipping companies are starting to utilize over 4,000 TEU, post-Panamax size container vessels. It is generally understood that these new vessels could be used on main trunk routes in about 10 years, so each major shipping company is forced to fight against cutthroat competition toward the 21st century.

The shipping companies operate their fleets at a high speed of 21 - 24 knots in order to keep FDWS at every calling port. For this purpose, even their feeder service modes by land and sea are forced to maintain FDWS. FDWS is definitely a minimum condition for customer service under stiff competition.

The Far East/U.S.A. trade service is being conducted on a schedule of 35 turn-around days with 5 vessels or 42 days with 6 vessels subject to navigation mileage per voyage. On the Far East Europe trade, service patterns are from 63 turn-around days with 9 vessels to 77 days with 11 vessels.

(3) Sailing Schedule Patterns of Mother Vessels

Typical calling port patterns for the Far East/U.S.A. trade are described in the following table.

Table A.1.3 Typical Calling Port Patterns for the Far East/U.S.A.

Region Service	Far East	Japan	U.S.A. & Canada	T/R days per voyage
PSW	2-3 Ports among Busan, Hong Kong, Keelung, Kaohsiung (plus Singapore) (by one line)	2-4 Ports among Hakata, Moji, Kobe, Osaka, Nagoya, Shimizu, Yokohama, Tokyo	1-2 Ports among Los Angeles, Long Beach, San Francisco, Oakland	35-42 days
PNW	Same as above	Same as above	2-3 ports among Vancouver, Seattle, Portland, Tacoma	35-42 days
ATLANTIC	Same as above	Same as above	3-5 ports among Miami, Savannah, Jacksonville, Norfolk, Philadelphia, Baltimore, New York, Boston, St. John, Halifax	60-63 days

Typical calling port patterns for the Far East/Europe trade are the same as for the Far East/U.S.A. trade. The calling ports in Europe are 5 - 6 ports among Antwerp, Rotterdam, Bremerhaven, Hamburg, Felixstowe, Southampton and Le Havre. Every vessel calls at Singapore as a very important port for this trade.

(4) Operating Patterns of Feeder Vessels

Cargoes originated from some ports where mother vessels do not directly call are transferred by feeder vessels and transshipped onto mother vessels at appropriate mother calling ports. For this purpose, major shipping companies prepare feeder service networks.

There might be two reasons why mother vessels do not directly call at those ports. One is that the feeder port is not appropriate for the mother vessel due to the physical inadequacy of port facilities such as draft, turning basin, wharf, cargo handling equipment, etc. Another is the viewpoint of economy, namely it may be impossible for freight revenue from the port to cover the total expenses of the mother vessel's cost, port charges, bunkering cost, cargo handling cost, etc.

Feeder service vessels in the Far East territory used by major shipping companies are generally 200 - 500 TEU. There are three main service procedures of feeder vessels. One is to use a common feeder on a commercial basis, another is a co-operating feeder by a consortium of major shipping companies and the third is an independent exclusive feeder service by a major shipping company or its affiliated company.

The three ports of Hong Kong, Kaohsiung and Singapore are very important hub centers where almost all mother vessels call directly. At the same time these three ports are active transshipment ports where feeder containers from neighboring ports are connected to mother vessels. Feeder cargo ports connected to these three ports are as follows:

Hong Kong; Bangkok, Shanghai, other PRC ports.

Kaohsiung; Bangkok, Manila, Cebu.

Singapore; Penang, Port Kelang, Bangkok, Jakarta, Surabaya,
Karachi, Bombay, Cochin, Madras, Calcutta, Colombo.

As a sample of feeder networks by some major shipping companies, Fig. A.1.1 is attached. More than 10 major shipping companies have almost the same networks in Asia.

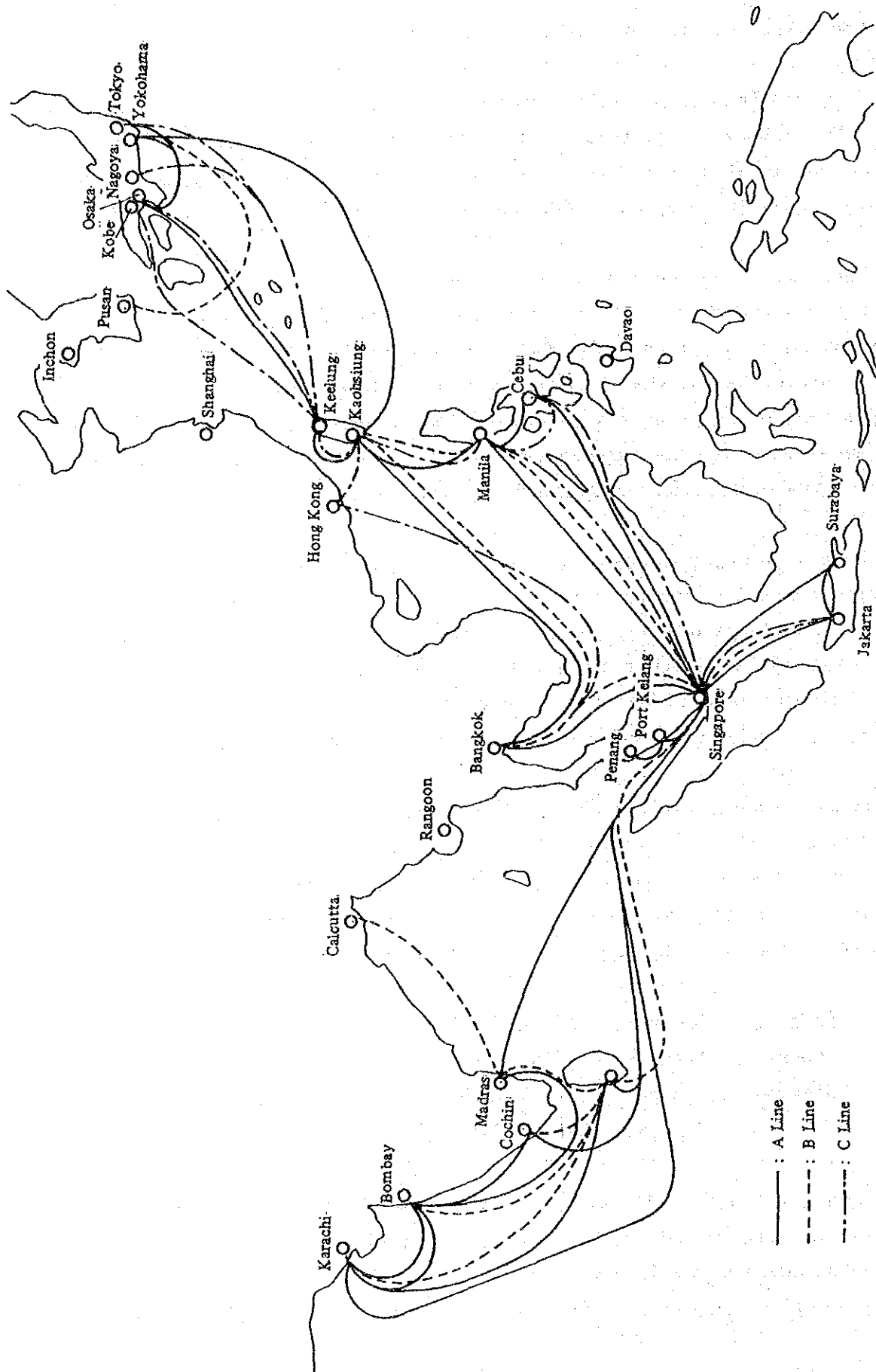


Fig. A.1.1 Sample Feeder Networks, 1987

(5) The Location of Laem Chabang Port in the Far East

As per Fig. A.1.2, the sea mileages between Laem Chabang Port and each of the three hub port are as follows:

Laem Chabang/Hong Kong = $316 + 311 + 797 = 1,424$ miles

Laem Chabang/Kaohsiung = $316 + 311 + 963 = 1,590$ miles

Laem Chabang/Singapore = $675 + 75 = 750$ miles

If a mother vessel for U.S. trade were to call at Laem Chabang Port from Hong Kong or Kaohsiung, the additional time would be 6.15 days via Hong Kong and 6.77 days via Kaohsiung based on a 22 knot sailing speed and 18 hours port stay at Laem Chabang. If a mother vessel for U.S. trade or Europe trade from Singapore to Hong Kong or Kaohsiung or in reverse order were to call at Laem Chabang Port, it would take 3.52 extra days under the same conditions.

Therefore, if a major shipping company were to make an additional call at Laem Chabang Port maintaining FDWS in the trade, the company would have to deploy an additional mother into its service pattern or skip another port of call in its existing service or speed up to the utmost extent. In any case, it would not be a good policy for the shipping company if there were not some strategic consideration as the shipping company would have to pay tremendous extra expenses.

(6) The possibility of direct calling at Laem Chabang Port

Whether or not a mother vessel comes to Laem Chabang Port depends upon each shipping company's management policy.

Generally speaking, when a shipping company makes a decision to make a vessel call at a new port, the following points are deeply considered.

1. Total cargo prospects in the future.
2. Balance of in/out cargo movement; calculation on positioning costs of empty containers in case of unbalanced movement.
3. Ocean freight rate level of main commodities; gross revenue per

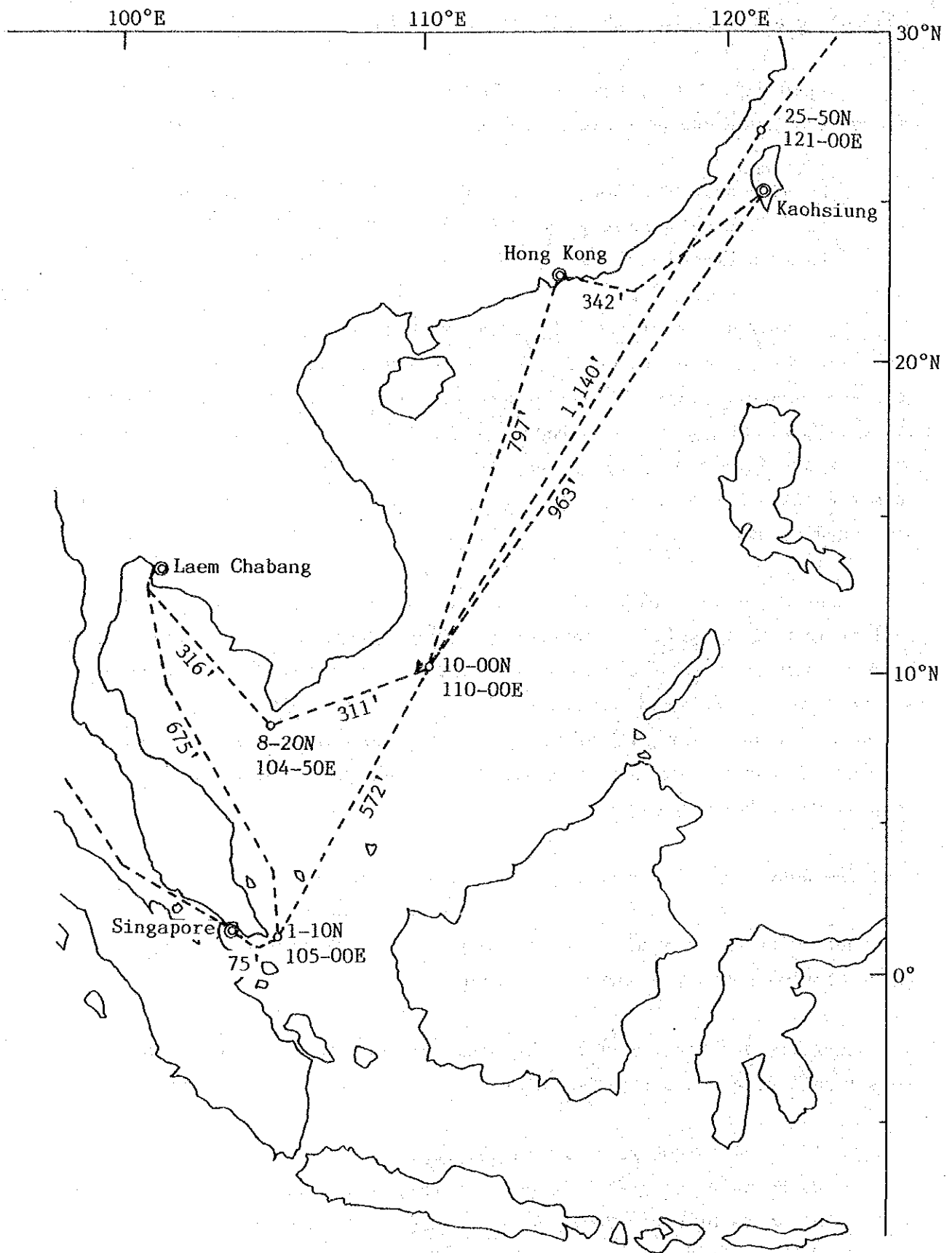


Fig. A.1.2 Sea Mileages Between Laem Chabang Port and Each of the Three Hub Ports

- call; Possibility to increase its share among competitors.
4. Geographical location of the port; To be a main regular calling port on the way or by deviation.
 5. Port and terminal facility and service level so that a vessel can call punctually and safely.
 6. Berth priority; exclusive, preferential, or "first comes, first served" on a common basis, in order to keep FDWS.
 7. Systematic flow of operation in the terminal; From a ship's operation to CY, CFS, gates and vice versa with perfect information being confirmed by documentation using a computer if possible.
 8. Calculation of profit/loss on all earnings and payments including vessel cost, port and terminal charges, agent's fees, etc.

Unless there were some big changes in the cargo forecast including neighboring ports, any shipping company which is considering direct calling of a mother vessel at Laem Chabang Port would use the above criteria.

As the Far East/U.S.A. trade is operated by single shipping companies or very few consortium groups, there might be some possibility to study variations of trade service patterns, for example a Laem Chabang - Hong Kong or Kaohsiung - U.S.A. port schedule might be an idea.

The Far East/Europe trade is being operated by big consortium groups. This means that changing of service trade patterns is not so easy as compared with the U.S.A. trade.

Anyway, the final decision by shipping companies would be based on the key points of cargo volume, gross revenue and service level by port and terminal operator.

Appendix 2 Container Transportation and Documentation

(1) Present System at Bangkok Port

1) Container Cargo Handling

The flow of the container cargo handling is examined as follows:

(a) Import

- i) Stevedoring involves discharging containers from the ship onto the quay by ship gear or mobile cranes. This is carried out by private stevedoring companies.
- ii) However, mobile cranes on the quay are operated as a monopoly by a private company under contract to PAT.
- iii) Hauling loaded containers from quay to shed or CFS for customs inspection, and delivery from shed or CFS to inland transporters are, in principle, carried out by PAT. But actually these are carried out mainly by private companies. Imported empty containers are hauled to the CY after customs inspection on the apron.
- iv) Land transportation of containers out of Klong Toei Wharves is monopolized by ETO. Due to a lack of trailers and chassis, however, equipment owned by private transporters is being chartered by ETO.
- v) Rail transportation is carried out by SRT.
- vi) Unstuffing of loaded containers is carried out by PAT.
- vii) Tallying is conducted at the time when containers are discharged onto the quay from the ship, when they are unstuffed and when containers or unstuffed cargo are delivered to land transporters by both PAT and private companies which are mostly shipping agents.

(b) Export

The flow of the work is almost the same as for imports, but the following points are different:

- i) Land transportation into Klong Toei Wharves is not monopolized by ETO.

- ii) Although stuffing work is under the control of PAT, private stevedoring companies actually conduct this business.

(c) Present Situation

PAT's actual tasks are limited to all the unstuffing works and a limited part of haulage and lifting-on/lifting-off of containers. This is caused by the shortage of larger equipment which is utilized for container loading, unloading and haulage, and also by the delay of transferring laborers, drivers and clerks from the declining conventional sector to the growing container sector. Other tasks which PAT does not actually take charge of are conducted by stevedoring companies.

Such facilities as the container yard, container freight station, empty container depot, marshalling yard and maintenance shop normally collectively function as a container terminal. There are, however, only container yards and import container freight stations at present at Klong Toei Wharves. Container yards are allocated to around 50 shipping companies and shipping agents. As various kinds of tasks are conducted in each small yard, the yard becomes congested and does not work efficiently. The physical defect of poor pavement condition which limits the stacking capacity to a level of one or two tiers also increases the congestion.

There are two CFS at East Quay and two new CFS at the east end of West Quay being used exclusively for import containers. Transit sheds and supplementary sheds, which are located at West Quay, are also frequently used as import CFS when the existing CFS cannot provide sufficient space. In this case containers are unstuffed around sheds, causing a serious traffic jam.

In 1987, about 70 % of the total import container cargo and about 90 % of the total export container cargo were unstuffed or stuffed within the port area, while about 85 % of imports and about 90 % of exports are estimated as potentially full container load (FCL) cargo.

It seems that there are many reasons for the high percentage of stuffing/unstuffing of FCL containers at the port area. For one, the customers' sites are not sufficient to accept containers as there are physically narrow roads which do not allow container passage between the customers' sites and Klong Toei Wharves. There is also a limitation both for trailers and tractors in Bangkok Metropolitan Area according to the

Land Traffic Act, B.E. 2522 (1979). The fee rates of ETO, which holds a monopoly for the transportation of cargoes out of Klong Toei Wharves, may be another reason. For some exporters, the ETO rate for carrying empty containers from the port area to their sites is not attractive compared with private trucking company rates. And for some importers, ETO's trailer and chassis rates are higher than their truck rates which make unstuffing of the imported containers in the port area less costly than draying the containers on trailer chassis. In addition, the bonded transportation system has not yet become popular due to the necessity of whole cargo inspection for preventing smuggling. By stuffing/unstuffing FCL containers in the port area the original packing cost of goods becomes comparatively higher, cargo damage or pilferage may occur, and the merits of door to door transportation are lost.

Due to the insufficient site space of customers, the fact that bonded transportation is not popular, and the distortion of the tariff structure with transport rates for trailers and chassis higher than truck rates, some exporters bring laborers together with export cargo for stuffing goods in the containers by themselves. This work is conducted at container yards allocated to shipping companies or shipping agents and they as well as PAT allow this activity. This makes the congestion in the port area still more severe.

2) Flow of Container Cargoes and Documents

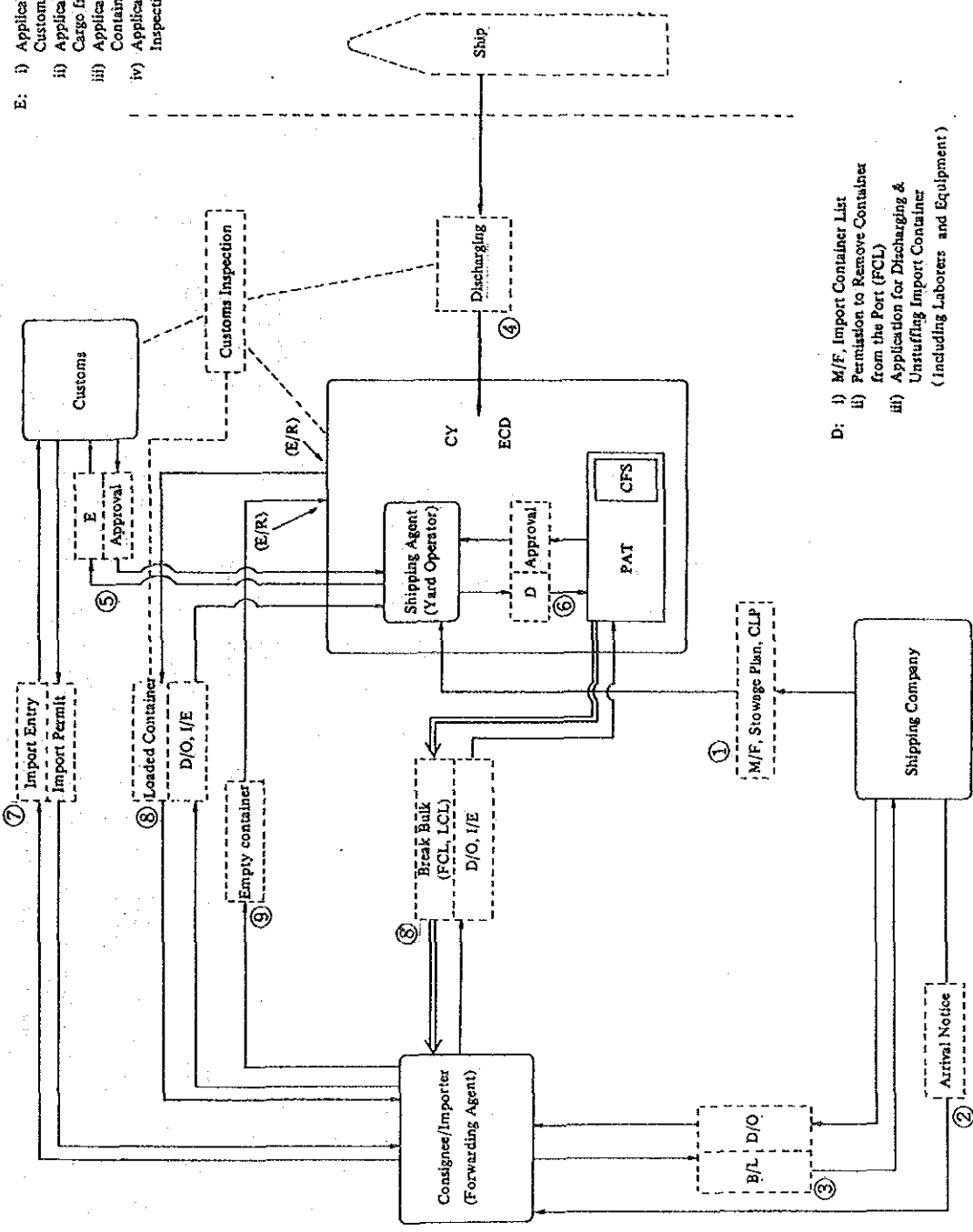
Fig. A.2.1 and A.2.2 show the present flow of container cargoes and documents. The outline is as follows.

(a) Import

The shipping company sends the Manifest (M/F), the Stowage Plan, etc. to the port office of the shipping agent and sends voluntarily the Arrival Notice (A/N) to the consignee or importer.

The consignee (importer) should be in possession of the original Bill of Lading (B/L) before the arrival of the incoming vessel to allow for preparations for receiving his goods. The consignee (importer) must endorse the B/L and surrender it to the shipping company and pay any outstanding freight or other charges. On surrender of the B/L and payment

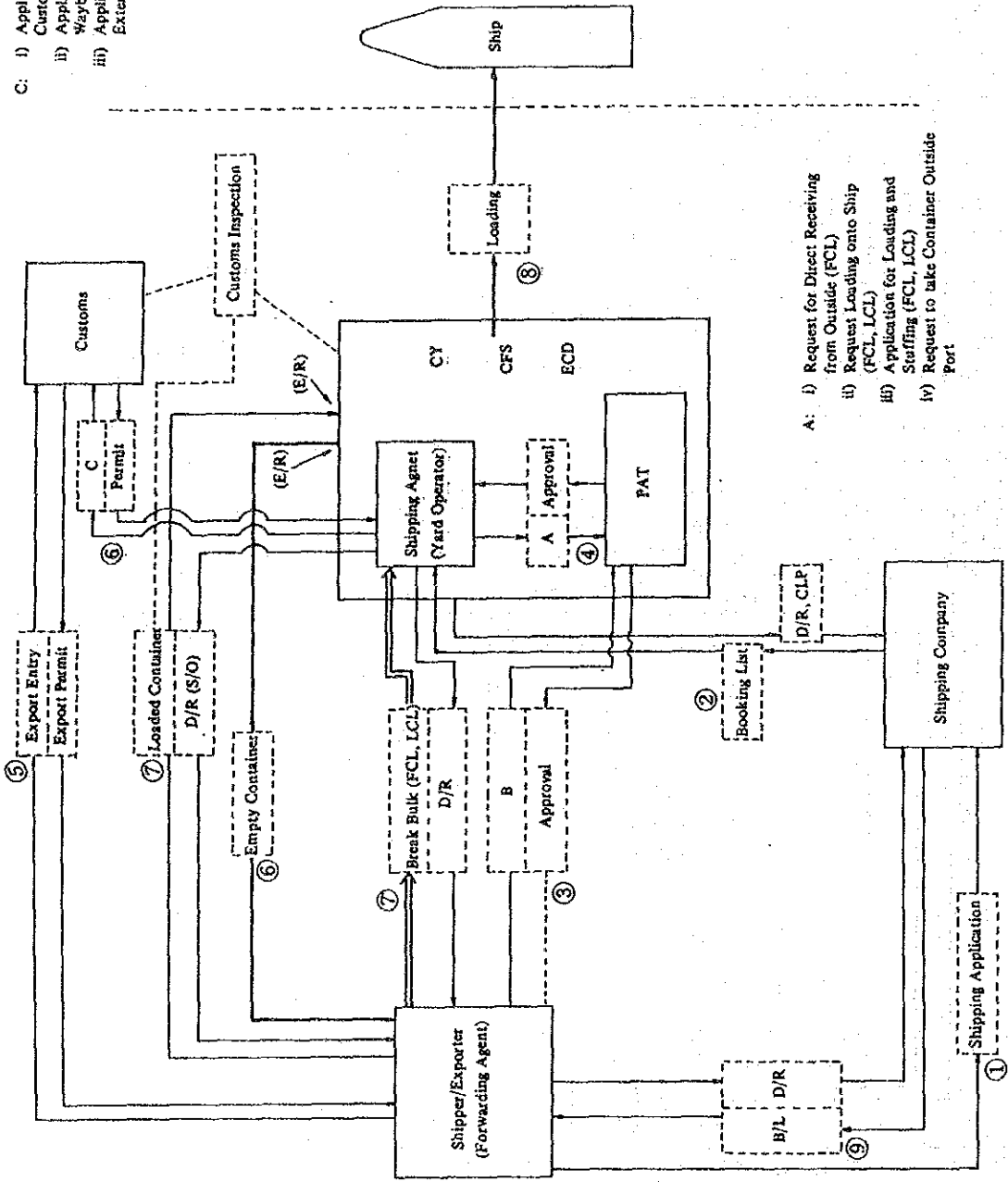
- E: i) Application for special Customs Import Entry
 ii) Application for Unstuffing Cargo from Container
 iii) Application for Releasing Container to Outside PAT
 iv) Application for External Inspection



- D: i) M/F, Import Container List
 ii) Permission to Remove Container from the Port (FCL)
 iii) Application for Discharging & Unstuffing Import Container (Including Laborers and Equipment)

Fig. A.2.1 Present Flow of Container Cargoes and Documents (Import)

- C: i) Application for Special Customs Export Entry
- ii) Application for Waybill of Cargo Stuffing
- iii) Application for External Inspection



- A: i) Request for Direct Receiving from Outside (FCL)
- ii) Request Loading onto Ship (FCL, LCL)
- iii) Application for Loading and Stuffing (FCL, LCL)
- iv) Request to take Container Outside Port

- B: i) Request for Permission to bring Export Cargo into PAT for Export Stuffing (FCL, LCL)
- ii) Packing List
- iii) The List of Weight and Measurement of Export Cargo Packing

Fig. A.2.2 Present Flow of Container Cargoes and Documents (Export)

of freight charges, the consignee (importer) will be issued a Delivery Order (D/O) by the shipping company. Sometimes the D/O is stamped upon the back of the B/L itself. This form then becomes the document of title containing the particulars relating to the goods, and instructs the PAT shed office to deliver them to the person named on the D/O.

Where import containers (FCL) are to be unstuffed outside the PAT area, an Application for Releasing Container to Outside the Port and an Application for External Inspection have to be submitted to Customs. A Request for Permission to Remove Container from the Port is also required by PAT. The consignee (importer) presents the D/O and Import Permit in exchange for his container.

When import containers (FCL or LCL) are to be unstuffed inside the PAT area, the shipping agent must apply to PAT for equipment, laborers and tally service. A PAT tally officer compiles a list of the contents as they are taken out of the container for removal to the import CFS or the transit shed. A similar counter tally sheet is also compiled by a tally man employed by the shipping agent.

The Import Permit which involves Customs release and the D/O are presented to the PAT shed office, where in return for the receipt of necessary payment from the consignee (importer) such as landing charges, handling charges and storage rent charges if any, the Wharf Receipt is issued in exchange for the D/O.

The Wharf Receipt must be signed by the consignee (importer) in order to release PAT from liability for picking up his cargo from the shed.

All imported goods are subject to examination by the customs inspector stationed at the PAT shed in the presence for the consignee (importer)/forwarding agent. When the goods are released from Customs, the Customs Clearance Pass is issued as exit clearance to pass through the customs check post at the PAT gate post.

(b) Export

The shipper (exporter)/forwarding agent initiates the process of outward shipment of his goods by booking ship space with a shipping company first by telephone, and then followed by a written application to confirm the verbal booking agreement. Among other details, the Shipping Application (S/A) contains:

- i) The name of the vessel booked, or to be booked, the port of loading and of discharging
- ii) Marks, numbers and description of the consignment
- iii) Gross and net weights and measurements of the packages
- iv) Names and addresses of the relevant parties

For containerized shipment, the shipper (exporter)/ forwarding agent provides the shipping company with information concerning:

- i) When the goods (LCL or FCL) are dispatched to the port area
- ii) When the goods (LCL) are to be stuffed into containers at the port area

The shipping company notifies the port office of the shipping agent of the booking and other information in order to enable the port office to apply to PAT for permission for stuffing at the port area and to arrange for equipment, laborers and tally service.

The shipper/forwarding agent produces a completed Shipping Order (S/O) set in the form designated by the shipping company, in which accurate particulars of the goods are furnished. The S/O is invalid if it is not endorsed by the shipping company as a confirmation of the cargo booking. The S/O is sent to the port office of the agent.

Where an export container (FCL) is to be stuffed outside the PAT area, a Request to Take Empty Container Outside Port has to be submitted to PAT. This must be accompanied by a validated customs approval. After stuffing, a Request for Permission to Bring Container into PAT must be submitted. The external inspection is carried out and a customs seal as well as the shipping company's seal must be attached to the Container.

The shipper (exporter)/forwarding agent must submit to PAT a Request for Permission to Bring Export Cargo into PAT for Export Stuffing (LCL, FCL) and a packing list to determine PAT charges for export cargoes.

The shipper (exporter) dispatches the goods to the PAT port area to meet the pre-arranged time for stuffing cargoes into the container. During stuffing, the tally man employed by the shipping agent is in attendance and prepares the tally sheets.

Checking the tally sheets against the S/O, the port office of the

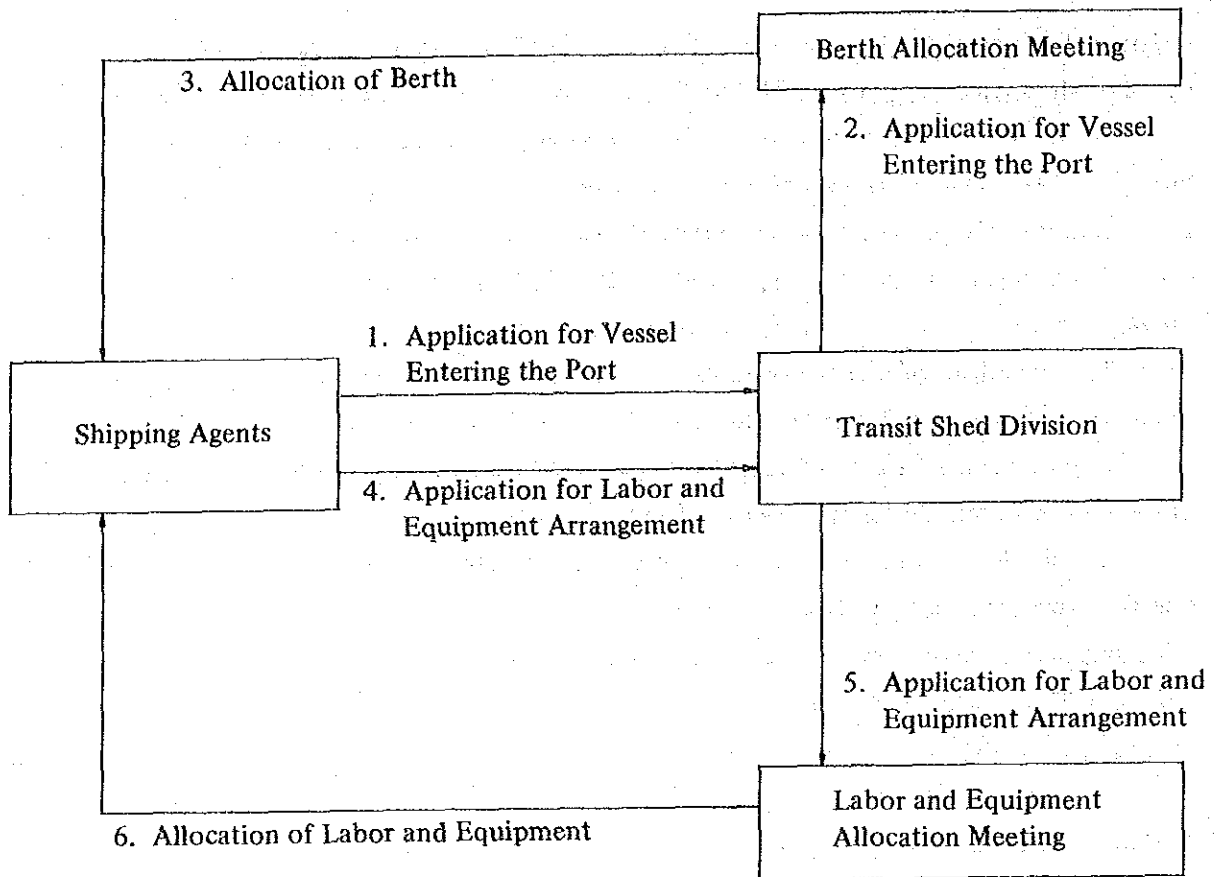
shipping agent issues the Dock Receipt (D/R), which is an official receipt by the shipping company. The D/R is produced as a part of the S/O set.

In exchange for the D/R, the shipping company issues the B/L to the shipper (exporter) as a receipt for the goods consigned. It is handed to the shipper (exporter) upon payment of freight or upon agreement of the method of payment to be employed. The B/L is signed in sets, usually of three copies.

The signed B/L conveys the title to the goods and must reach the consignee (importer) before he can collect his consignment.

Fig. A.2.3 (1) to (9) show the documents interchanged especially between PAT and shipping agents (yard operators).

These documents are characteristic of the present PAT system and are complicated for the related users.



Note: Shipping Agents are members of Berth Allocation Committee and Labor and Equipment Allocation Meeting

Fig. A.2.3 (1) Documents between PAT and Shipping Agents (Export, Import)
 - Before Vessel Entry into the Port -

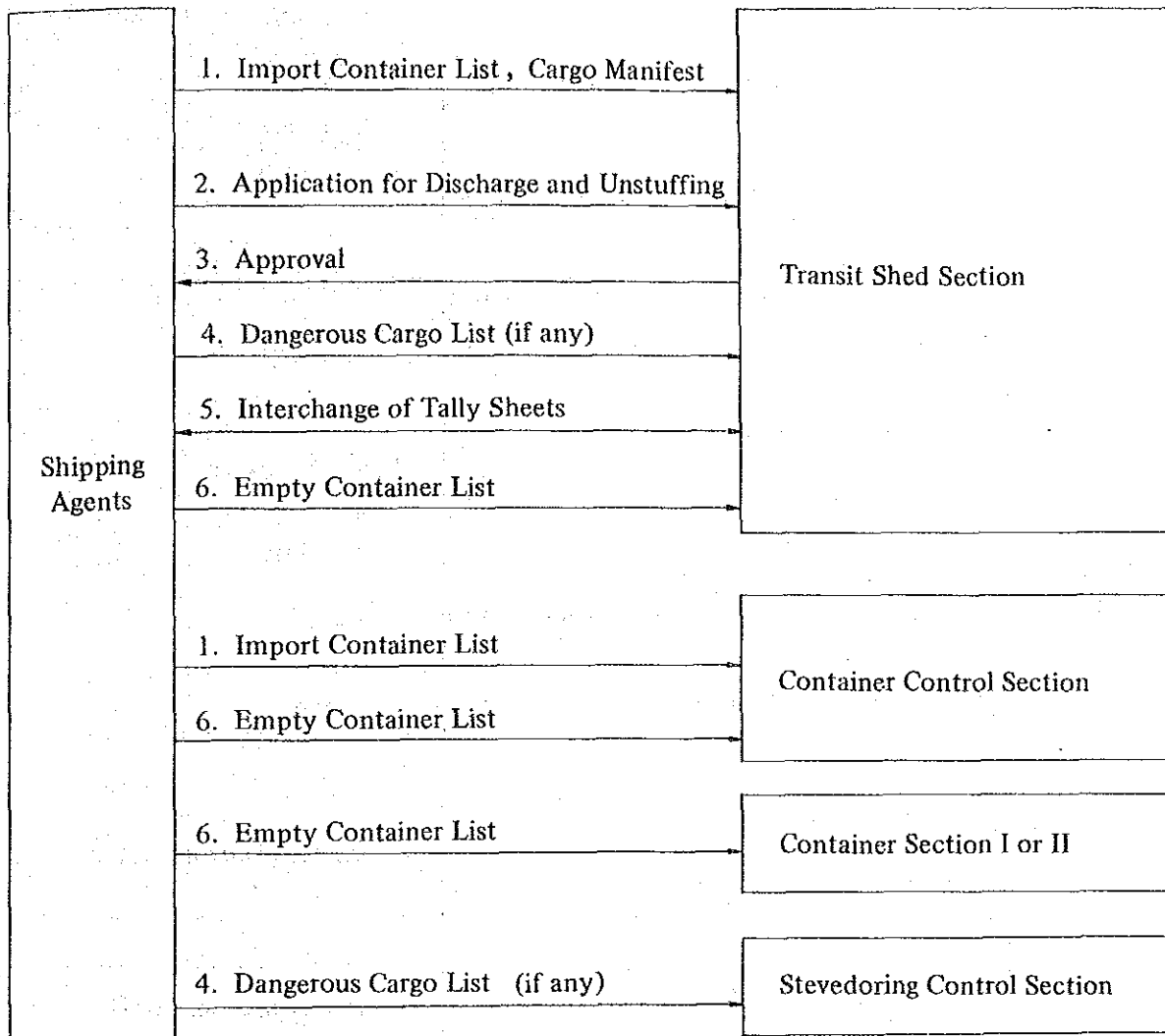


Fig. A.2.3 (2) Documents between PAT and Shipping Agents (Import, FCL)
 - Discharge -

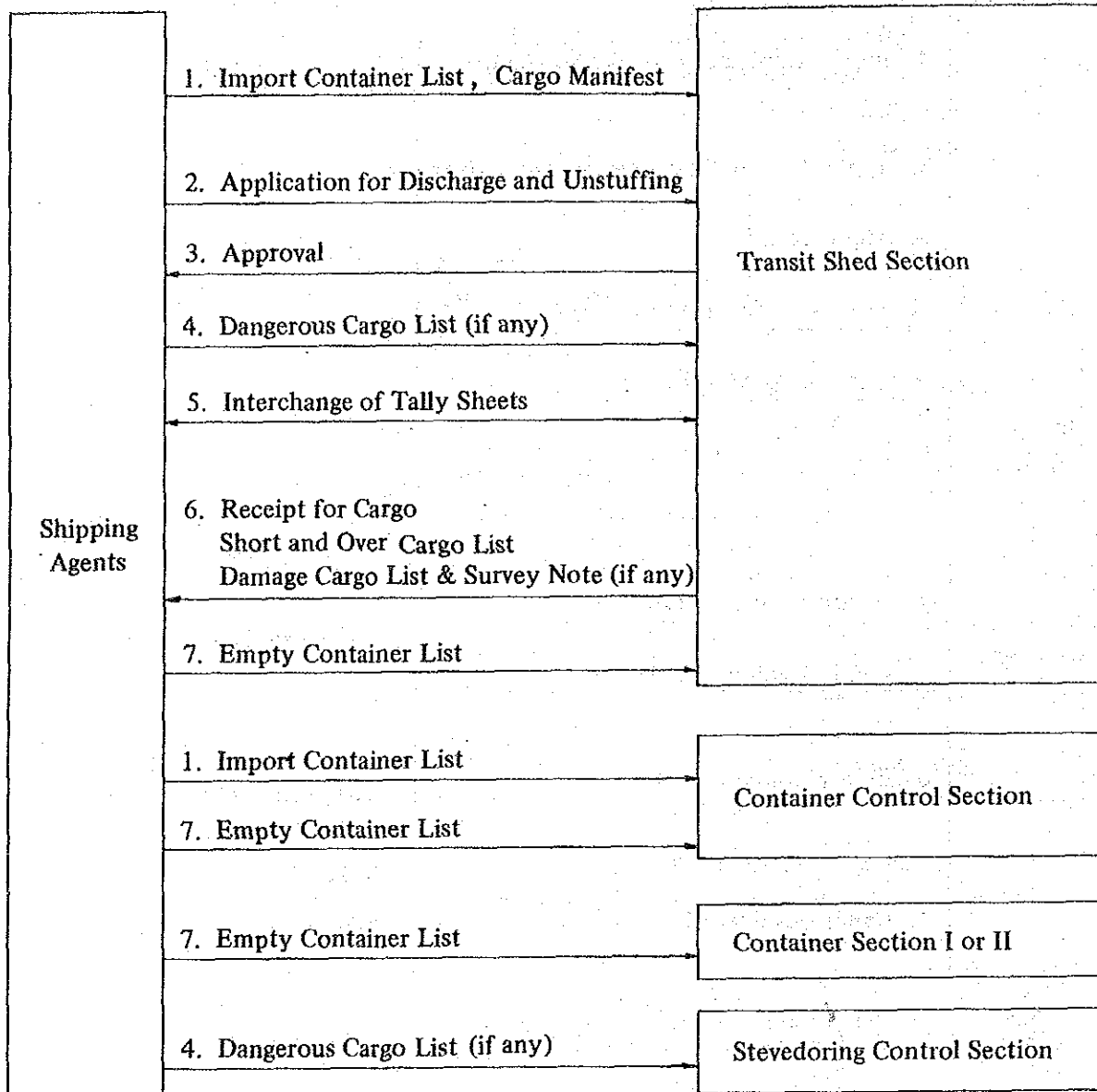
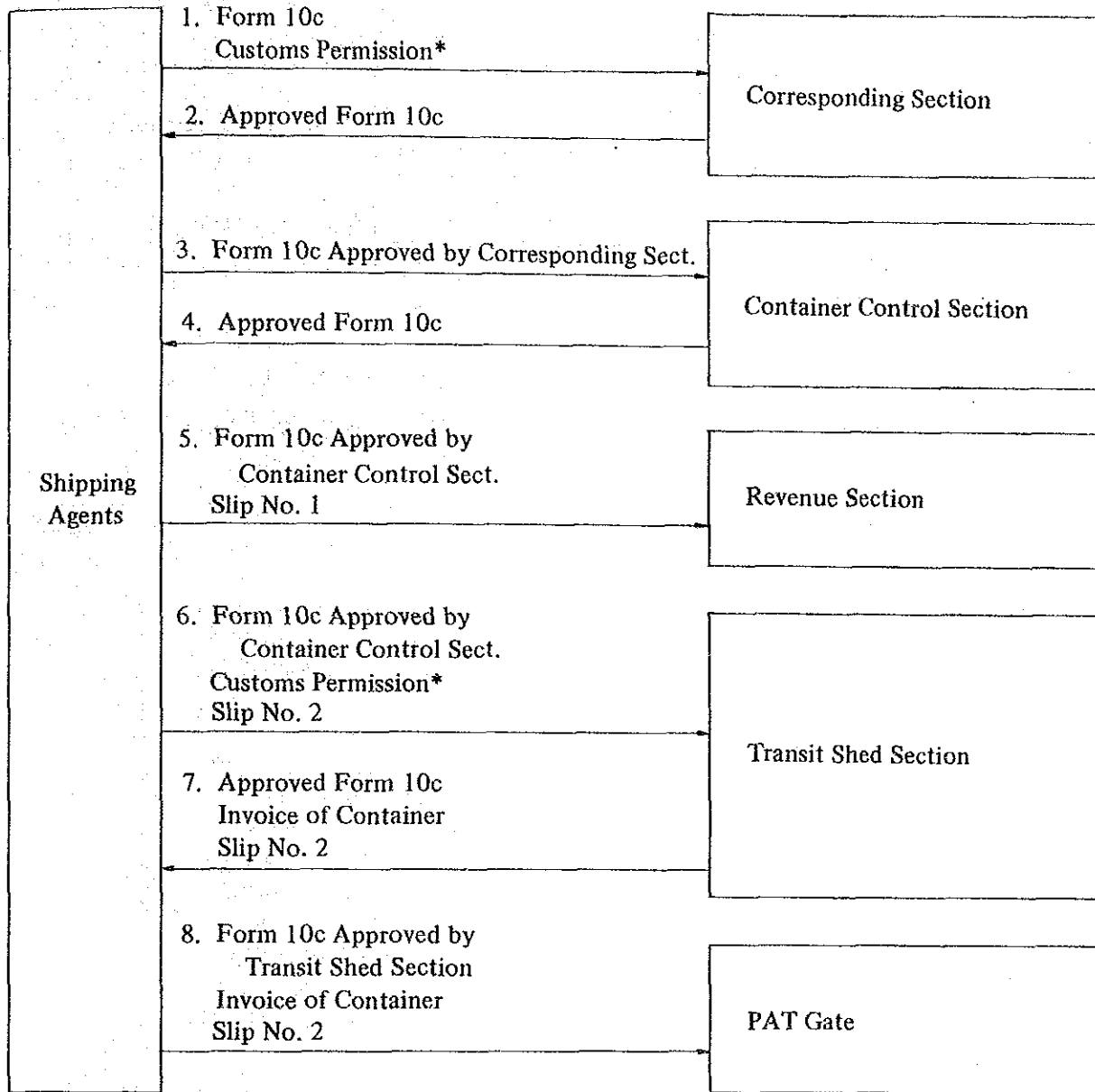


Fig. A.2.3 (3) Documents between PAT and Shipping Agents (Import, LCL)
- Discharge, Unstuffing -



Form 10c : Request for Permission to Take Container out of PAT Area

*Customs Permission : Customs permission for taking container out of the customs fence

Fig. A.2.3 (4) Documents between PAT and Shipping Agents (Import, FCL)

- Taking Containers out of PAT Area -

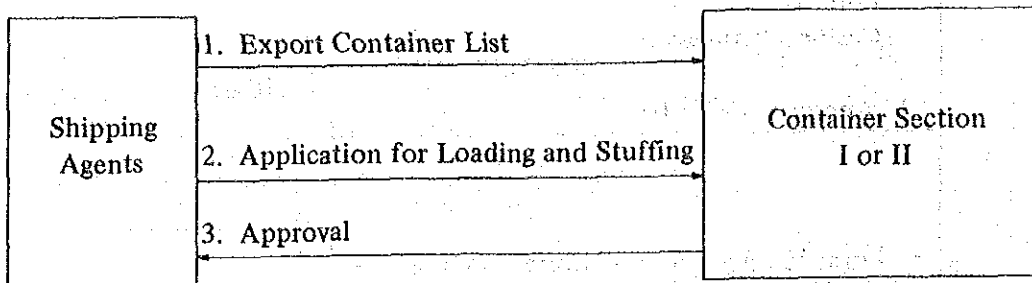
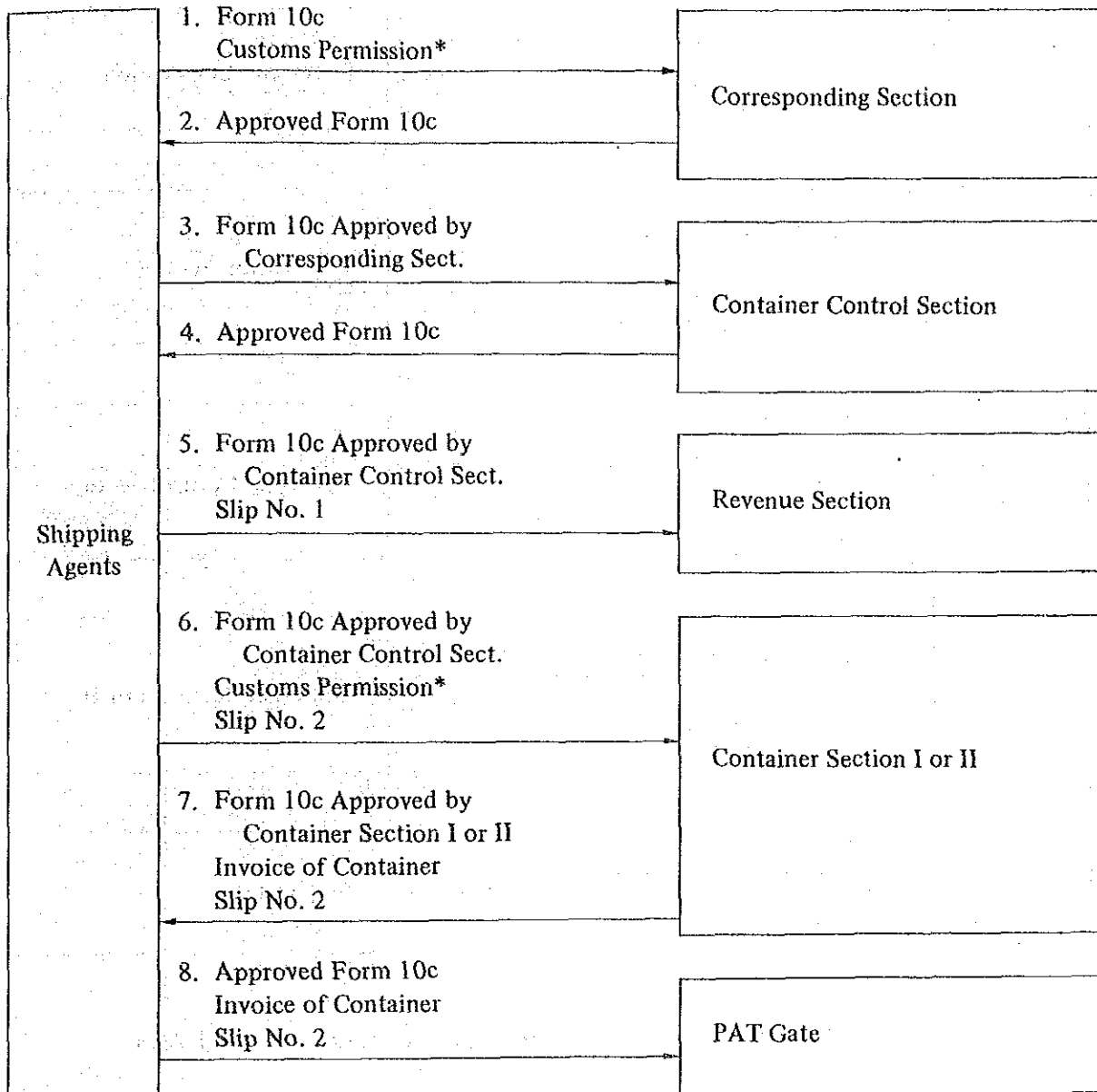


Fig. A.2.3 (5) Documents between PAT and Shipping Agents (Export)
- Before Taking Empty Containers out of PAT Area (FCL) -
- Before Stuffing (LCL) -

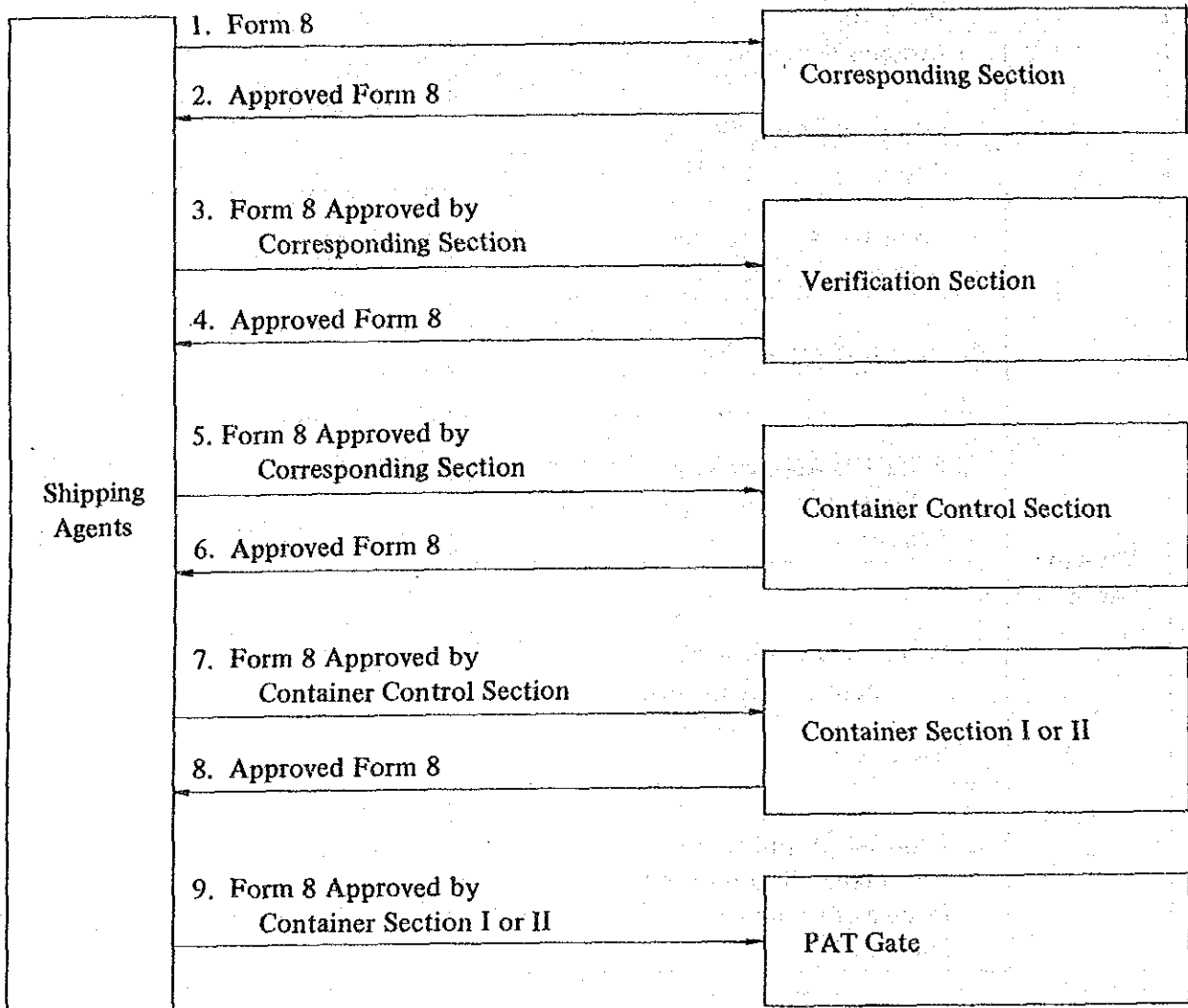


Form 10c : Request for Permission to Take Container out of PAT Area

*Customs Permission : Customs permission for taking container out of the customs fence

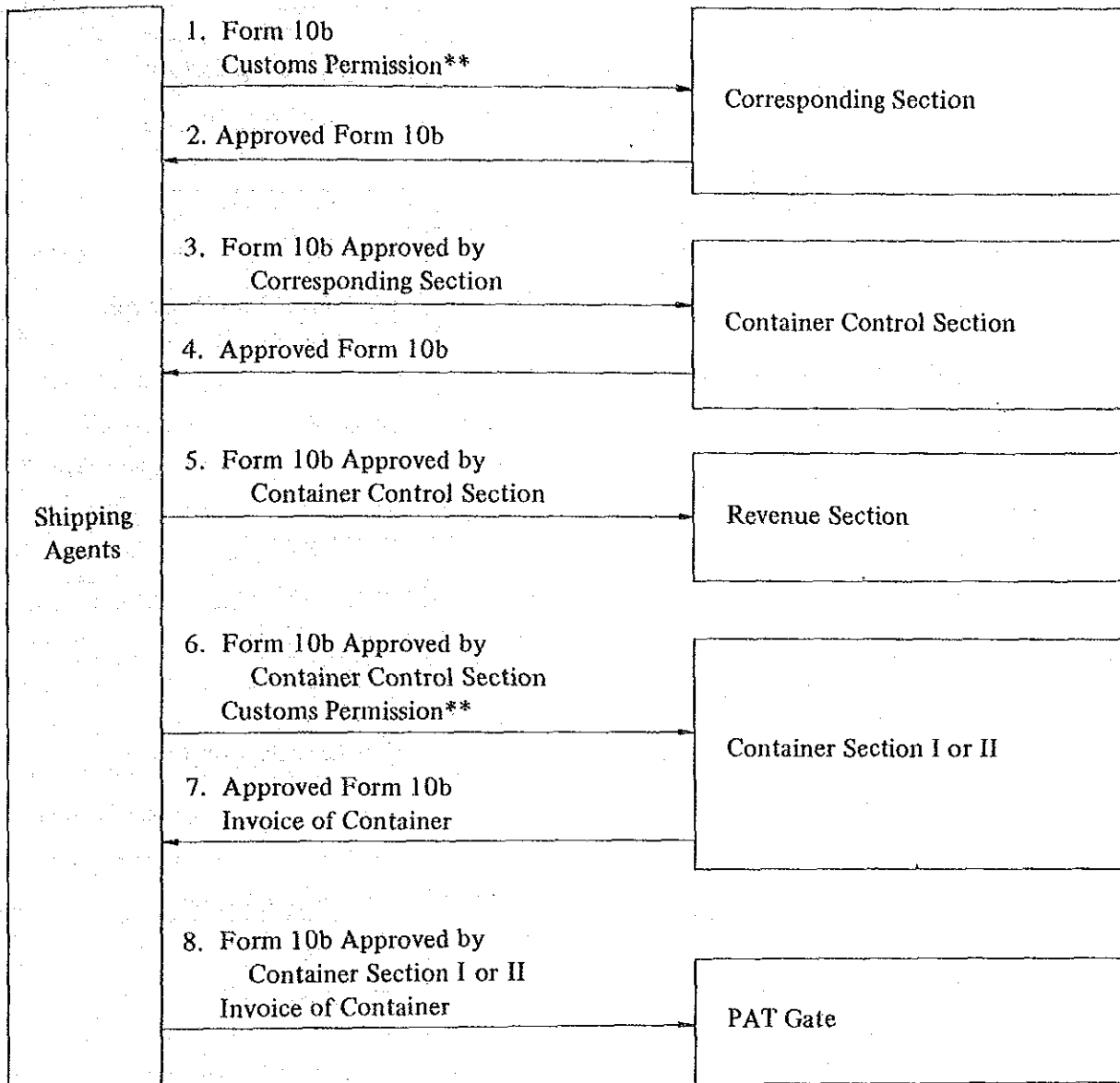
Fig. A.2.3 (6) Documents between PAT and Shipping Agents (Export, FCL)

- Taking Containers out of PAT Area -



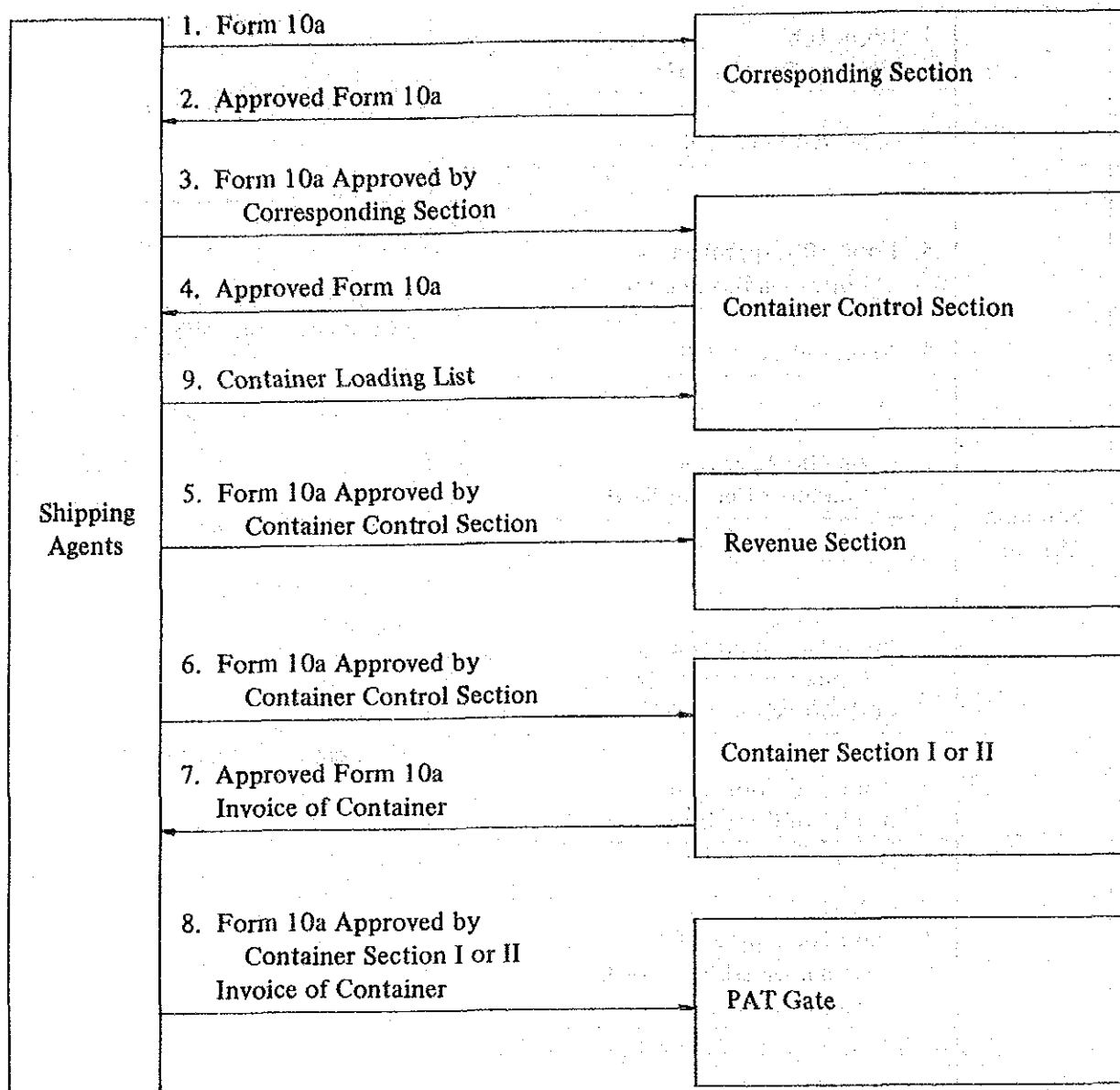
Form 8 : Request for Permission to Bring Container into PAT Area

Fig. A.2.3 (7) Documents between PAT and Shipping Agents (Export, FCL)
 - Bringing Loaded Containers into PAT Area from Outside -



Form 10b : Request for Direct Receiving Container from Outside
 **Customs Permission: Customs permission for bringing container from outside

Fig. A.2.3 (8) Documents between PAT and Shipping Agents (Export, FCL)
 - Directly Receiving Loaded Containers into PAT Area
 from Outside -



Form 10a : Request for Loading onto Ship

Fig. A.2.3 (9) Documents between PAT and Shipping Agents (Export, FCL, LCL)
 - Loading onto Ship -

3) Customs Procedures in Thailand

(a) Customs Brokers

The Shipping Association of Thailand is an association of the companies and individuals engaged in the business of customs brokering, with approximately 600 members. The customs brokers, on behalf of their clients, prepare and lodge customs documents and attend to customs formalities in compliance with the Customs Law. The customs documents have to be signed by qualified persons who are approved by the Customs Department as such, and who hold licenses issued by the Customs Department.

This licensing requirement was only imposed in May 1986 by Notification (No. 33/2529) of the Customs Department. Further requirements are expected to be imposed in the future. Under Notification (No. 33/2529), customs brokers are required to apply using a prescribed form for Customs Formalities Certificates to conduct official matters with the Customs Department. The certificates are issued within 15 days from the date of application, and the applicants must meet the following requirements:

- i) They have never obtained any such certificates and have never committed any offense concerning the Customs Law and have never done anything likely to cause damage to the Customs Department.
- ii) They have a bachelor's degree or the equivalent or they have technical training certificates issued by the Customs Training Centre, the Shipping Association of Thailand or by any of the shipping educational institutes acceptable to the Customs Department.
- iii) They hold a letter of authorization to Act as a customs agent issued by their principals.

To transact business at the Customs House, a licensed person is required to produce:

- i) A letter of authorization from the exporter or importer, authorizing the company, of which he is an employee, to act on behalf of the client

- ii) A letter of authorization from the president of the company, authorizing him to represent the company
- iii) A registration card for the signature of the president of the company to identify the signature in item ii), above.

Most shipping agents and forwarding agents employ licensed persons and offer their services to shippers and consignees.

(b) Customs Formalities for Import

A flow chart is shown in Fig. A.2.4.

The clearance process is similar whether the imports arrive by sea, air or land. Generally, the practice resembles that found in most other countries for items arriving by sea. However, under the advanced entry system, the import entry and supporting documents may be filed and processed at any time prior to the arrival of the goods.

When a shipment of imported goods arrives at a port or a customs station whether by sea, land, air, or mail, the master of the ship or ship's agent or operator of whatever means of transportation must submit the cargo manifest and other necessary documents such as passenger list, lists of weapons, provisions, and so on to the competent officer within 24 hours after the arrival. At the port or customs station, the goods may be removed from the ship and stored in a landing godown or a warehouse for later inspection.

Meanwhile, the importer must prepare to file an import entry with the competent officer in order to obtain the release of such goods. An entry form with all necessary information concerning the shipment of imported goods such as name of vessel, date of arrival, port of embarkation, name of importer and address, marks, numbers and description of goods, quantities, weights, country of origin, country of purchase and value of the goods, is to be accompanied by appropriate documents, such as:

- i) Bill of Landing
- ii) Invoice
- iii) Packing List
- iv) Import Entry
- v) Exchange Control Form (E.C. Form 21 issued under the Exchange

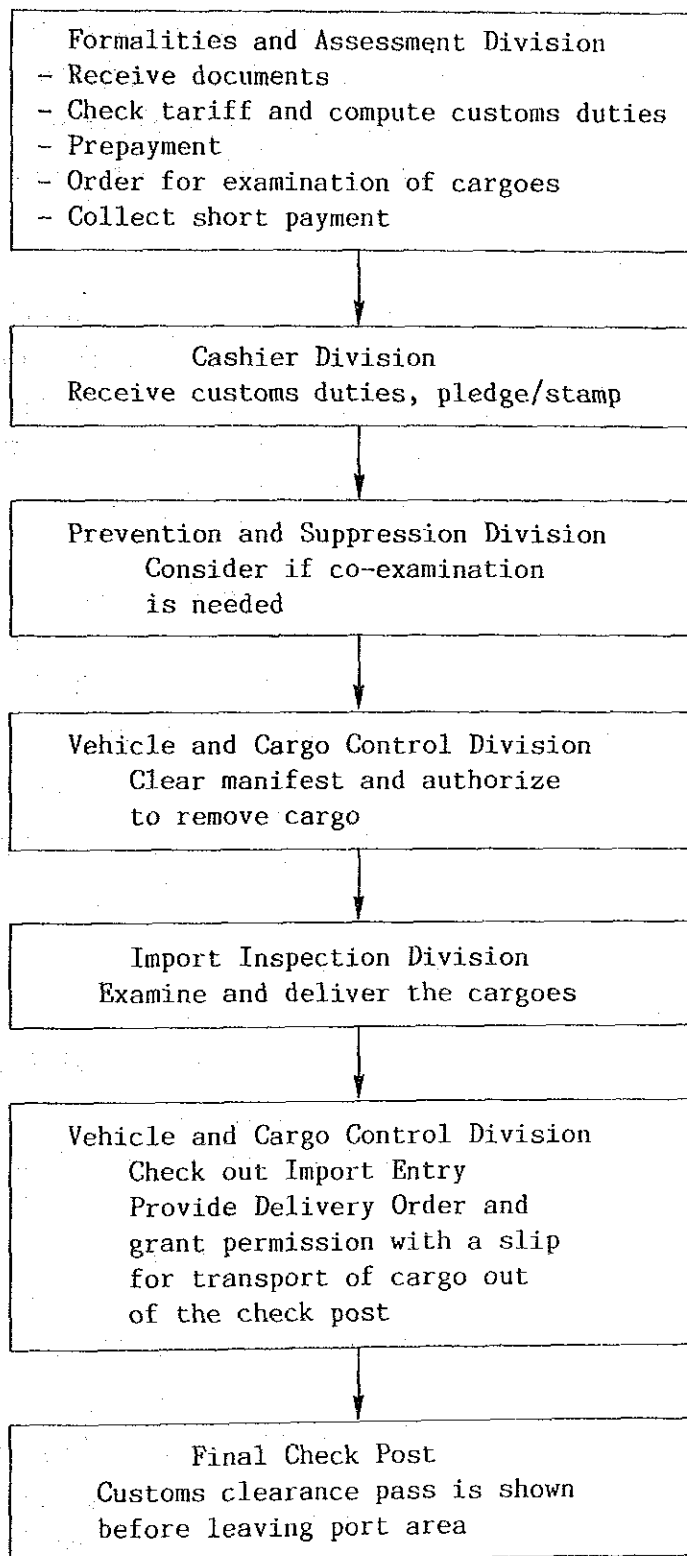


Fig. A.2.4 Flow Chart of General Customs Formalities - Import

Control Act)

- vi) Permission for Restricted goods
- vii) Other documents that may be required such as insurance policy certificates. If the goods are subject to the business tax, the importer is required to have a business tax registration number. In the case of certain goods, an import license is also required.

After processing these papers and after the arrival of the vessel within the port limits, the importer must pay the duties and business tax. In those cases in which total duties have not been determined, or where urgent clearance is warranted, a deposit may be paid. Payment can be made by cheque only if it is a bank cheque, or if certain other conditions have been met. Otherwise, payment must be made in cash. Upon payment, documents are rechecked and stamped.

These documents are then taken to the warehouse where they are presented to the Inspector, who will order the goods prepared for customs examination. On the average, one-tenth of the packages are opened for examination, although the ratio may be higher or lower depending on relevant circumstances. A report of the examination is entered on the entry form and if any discrepancy appears, the goods will be retained until additional duty is paid or placed on deposit or a fine is paid, as the case may require.

PAT then collects its landing, handling and storage rent charges which are based on the measurement or gross weight of packages. After paying these charges, the importer submits his receipts, release order or delivery order and receives a Wharf Receipt. With this receipt he can claim the imported goods. A Customs Clearance Pass is issued to the Check Post Officer for final checking at the exit gate of the Customs fence.

When the goods are of a type which do not permit inspection at the docks, appropriate arrangements can be made with the Customs Department to have the goods delivered directly to the importer's premises where they can be inspected after having been unpacked or installed.

If goods are not cleared within two months they are liable to forfeiture upon 15 days notice. Forfeiture can often be avoided by paying either a deposit or a sum equal to highest duty chargeable on the goods. This procedure may also be adopted where clearance is delayed owing to a dispute as to the correct duty payable or for any reason. Moreover, the

Director General may accept guarantees from MOF or from a bank subject to such conditions as he deems necessary. Interest may be charged on any duty which is assessed but unpaid within the prescribed period.

To compute time for customs purposes, goods are deemed to have been imported when the ship carrying the cargo actually comes within the limits of the port of discharge or consignment.

o Advance Entry System

An advance entry system is in force in Thailand. The entry form, documents and a copy of the bill of landing can be submitted at any time prior to the arrival of the goods. The customs officers check the entry form against the bill of landing instead of the ship's manifest. The amount of the duty to be paid can be approved if the customs officers are satisfied with the documentation. If there are problems, a deposit equal to the amount of duty as determined by the customs officers may be required. The duty is paid or a deposit is made only after the arrival of the vessel. If a deposit is paid or there are other problems, settlement will be made by specialists in the Customs Department after clearance of the goods. The advance entry system has proved very successful and allows time to settle most problems prior to the arrival of the goods.

(c) Customs Formalities for Export

A flow chart is shown in Fig. A.2.5.

For the most part, customs formalities for export are similar to those for import. Apart from the seven groups of commodities mentioned earlier and goods listed under governmental prohibitions and restrictions, all other exported goods are exempt from export duty. However, some may be subject to non-export tariffs such as business and local taxes and special surcharges.

In brief, the customs procedures for exports are:

- i) To check to see whether export is under prohibition or restriction. If under restriction, prior permission must be sought from the appropriate authority before the goods can be exported.
- ii) To obtain the exchange control form -E.C. Form 61 - endorsed by an authorized commercial bank where the exporter will receive the

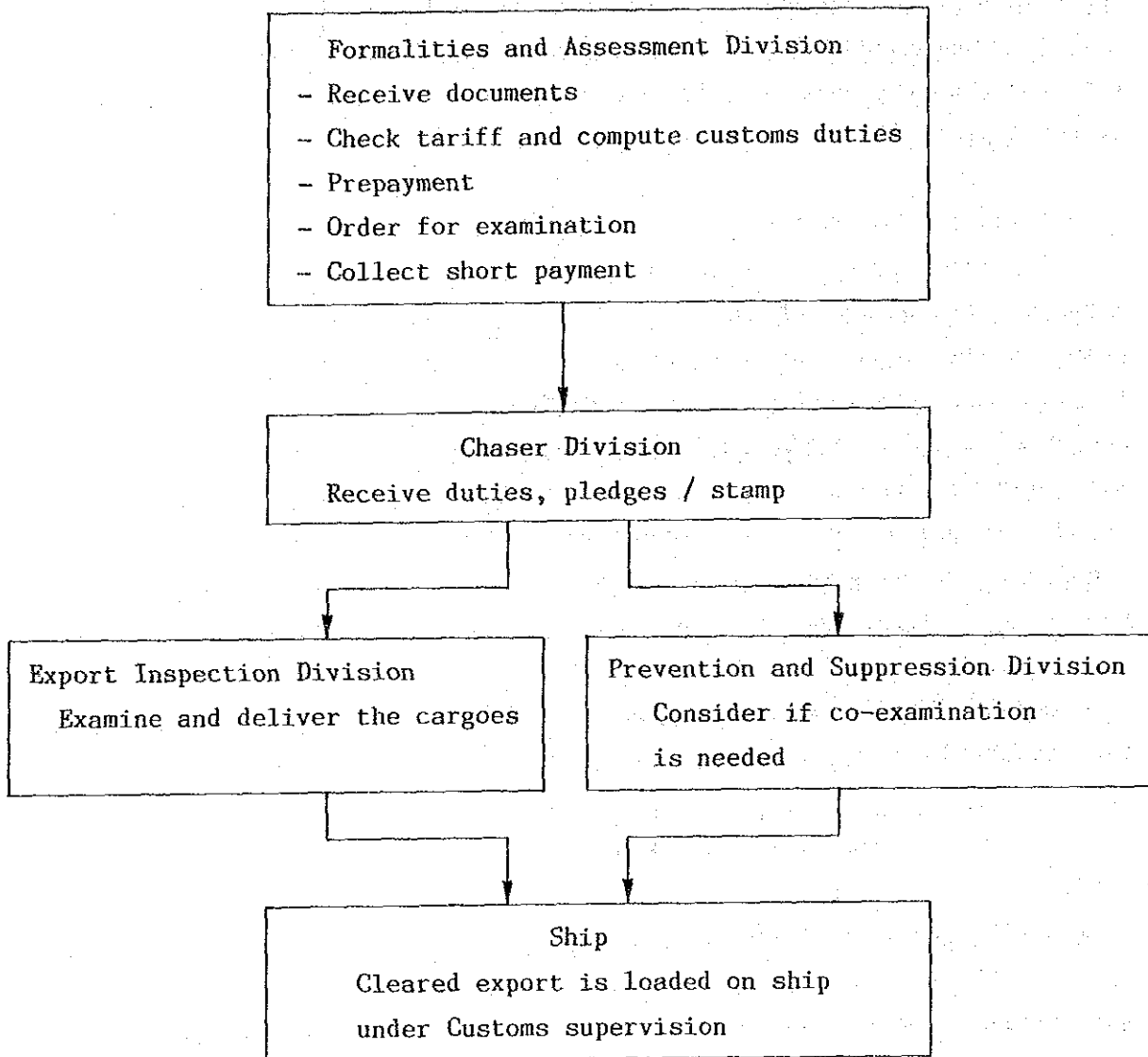


Fig. A.2.5 Flow Chart of General Customs Formalities - Export

payment for the goods when they have been exported.

- iii) To file an export entry with the customs officer together with necessary supporting documents such as an export permit and the export control form mentioned above, and to pay export duty as well as business and local taxes, if any, or make the necessary security cash deposit.
- iv) When the export entry is approved, the exporter can proceed to load his goods on board a ship.

(d) Bonded Warehouse

By virtue of NEC Announcement No. 359 of 13th December B.E. 2515 (1972), the Director General of the Customs Department is empowered to approve the establishment of two other types of bonded warehouses. These are duty-free shops where goods are stored and sold for the purpose of exportation, and manufacturing warehouses where imported goods are stored and used in the process of producing, mixing with or assembling into other goods mainly for export.

The following are the major products in the bonded manufacturing warehouse:

- i) Electronic products, including integrated circuits and semiconductors
- ii) Jewelry
- iii) Garments
- iv) Threads and elastic yarns
- v) Veneer
- vi) Furniture, parquets and pallets
- vii) Processed wood
- viii) Optical lenses
- ix) Photographic processing equipment
- x) Watches and watch components
- xi) Automobile air-conditioners and radios
- xii) Home air-conditioning systems
- xiii) Computer components
- xiv) Wind-gliding equipment
- xv) Canned goods

- xvi) Consumer goods including tissue paper
- xvii) Footware
- xviii) Synthetic leather
- ixx) Steel pipes
- xx) Electric wire sets for automobiles

(2) Popular Container Transportation in the World

1) Standard System of Container Transportation

(a) Container Flow

Fig. A.2.6 shows import and export container flow.

i) Import containers

All import containers are discharged from a ship and then transferred to the container stacking yard for stacking. FCL containers (door to door service containers) are basically delivered from the container stacking yard directly to consignees through the gate office. Containers with consolidated cargoes (LCL cargoes) are moved to the designated shed (CFS). Cargoes are unstuffed from the containers in the CFS, sorted, and then delivered. The empty containers are then stored at the stacking yard or transferred to the shipping companies' empty container depots. If space is available in the container terminal, empty containers are stacked in the stacking yard.

ii) Export containers

Prior to a ship's arrival, export FCL containers are received at the gate office and stacked in the stacking yard. Export LCL cargoes are brought into the CFS by shippers, and then stuffed into the containers by the operator. All export (full and empty) containers are loaded onto a ship in accordance with the loading sequence plan.

(b) Documentation Flow

The flow of documents for the container transportation is not

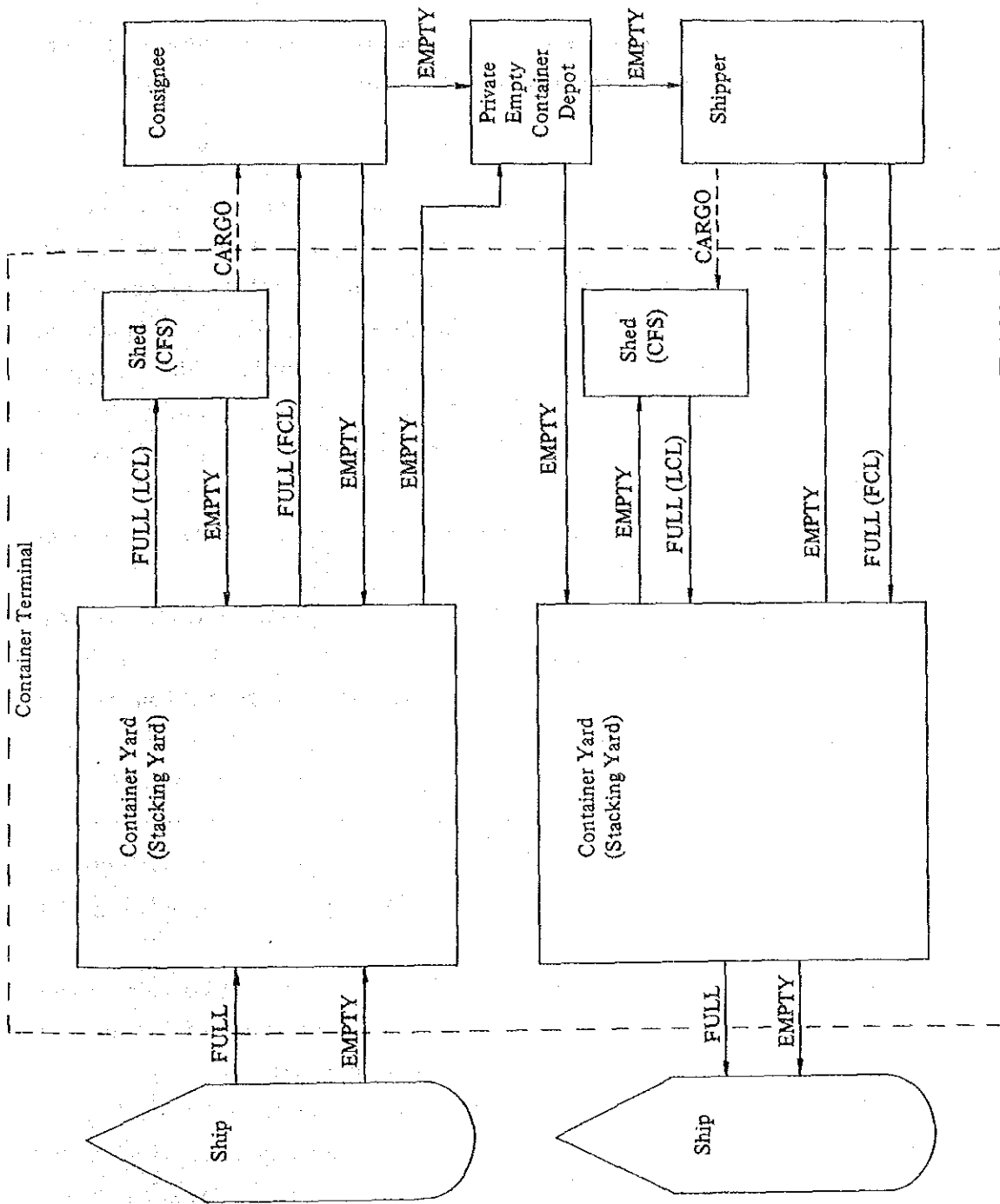


Fig. A.2.6 Container Flow

substantially different from that for conventional cargo transportation. However, due to the characteristics of the container transportation -- all cargoes are contained in containers, the speed of container vessels the cargo handling time is much shorter than that of conventional cargo and so on -- some new kinds of documents have been used since the beginning of containerization.

The flow of container cargoes and documents which center on the container terminal is shown in Figs A.2.7 and A.2.8.

<Import>

- i) The shipping company sends import container documents such as the Manifest (M/F), the Storage Plan, the Container Load Plan (CLP), the Special Container List, the Reefer List, the Dangerous Cargo List, etc., which are sent from the loading port by airmail or telex or other method, to the container terminal. The shipping company sends the M/F and the CLP to the Container Freight Station (CFS) not later than 3-7 days before the container ship's scheduled arrival.
- ii) The shipping company sends the Arrival Notice (A/N) to the consignee (importer).
- iii) The consignee (importer) shows the Bill of Lading (B/L) to the shipping company office, and exchanges it for the Delivery Order (D/O). Then the shipping company relays this information to the container terminal and the CFS.
- iv) After the arrival of the container ships, discharged containers are transferred to the Container Yard (CY). The container terminal makes the Boat Note (B/N) in which container number and weight are listed, and it is signed by the ship's master acknowledging the receipt of containers.
- v) The container terminal submits the M/F, the collective Container List and the B/N to Customs, which procedure confirms the completion of discharge and bringing in of containers.
- vi) The consignee (importer)/forwarding agent completes the Import/Declaration (I/D) and, if necessary, goes through the procedures for animal/plant quarantine inspection via the Animal/Plant Quarantine Office.
- vii) After giving the delivery schedule of his container to the

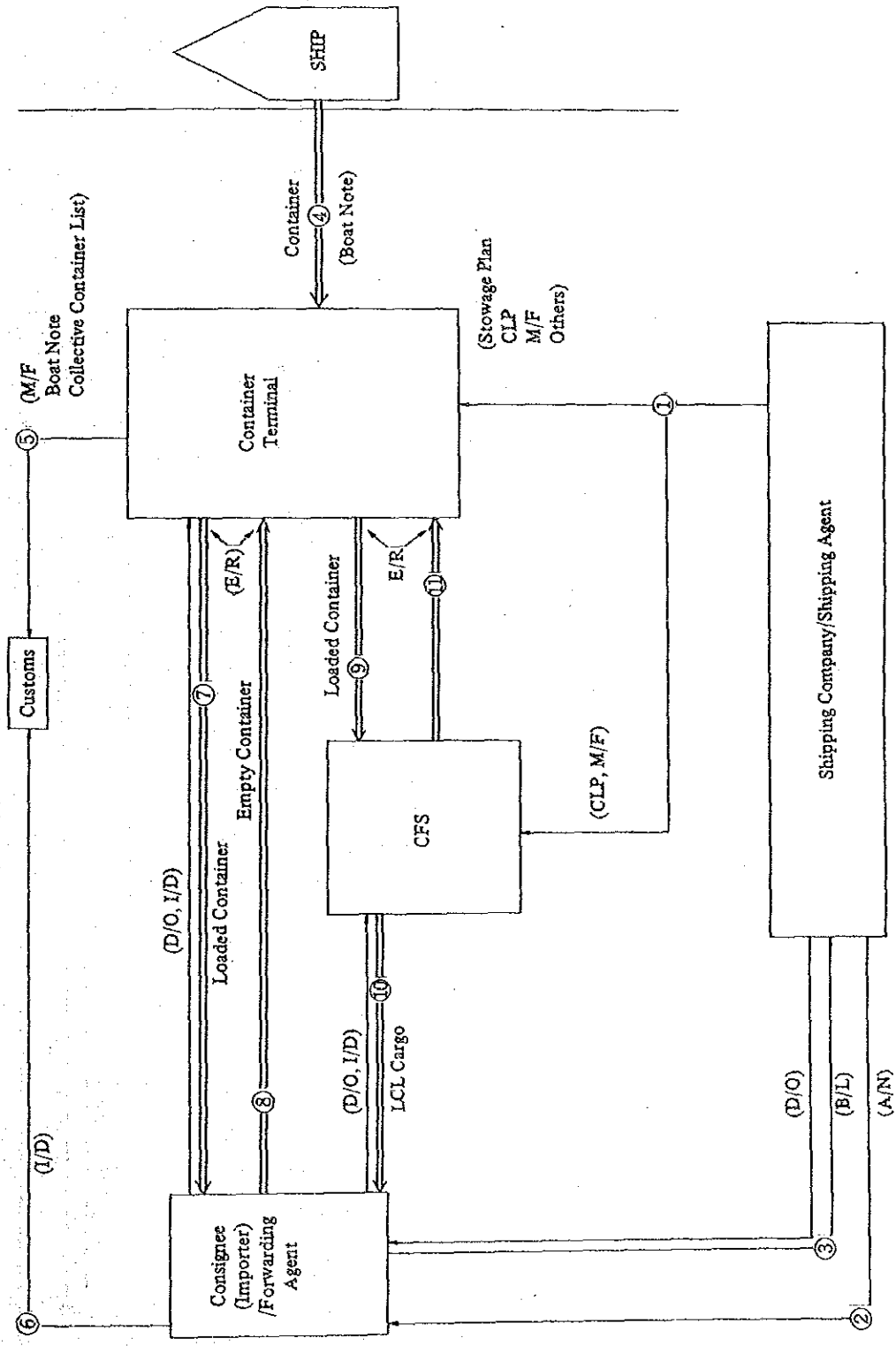


Fig. A.2.7 Flow of Container Cargoes and Documents (Import)

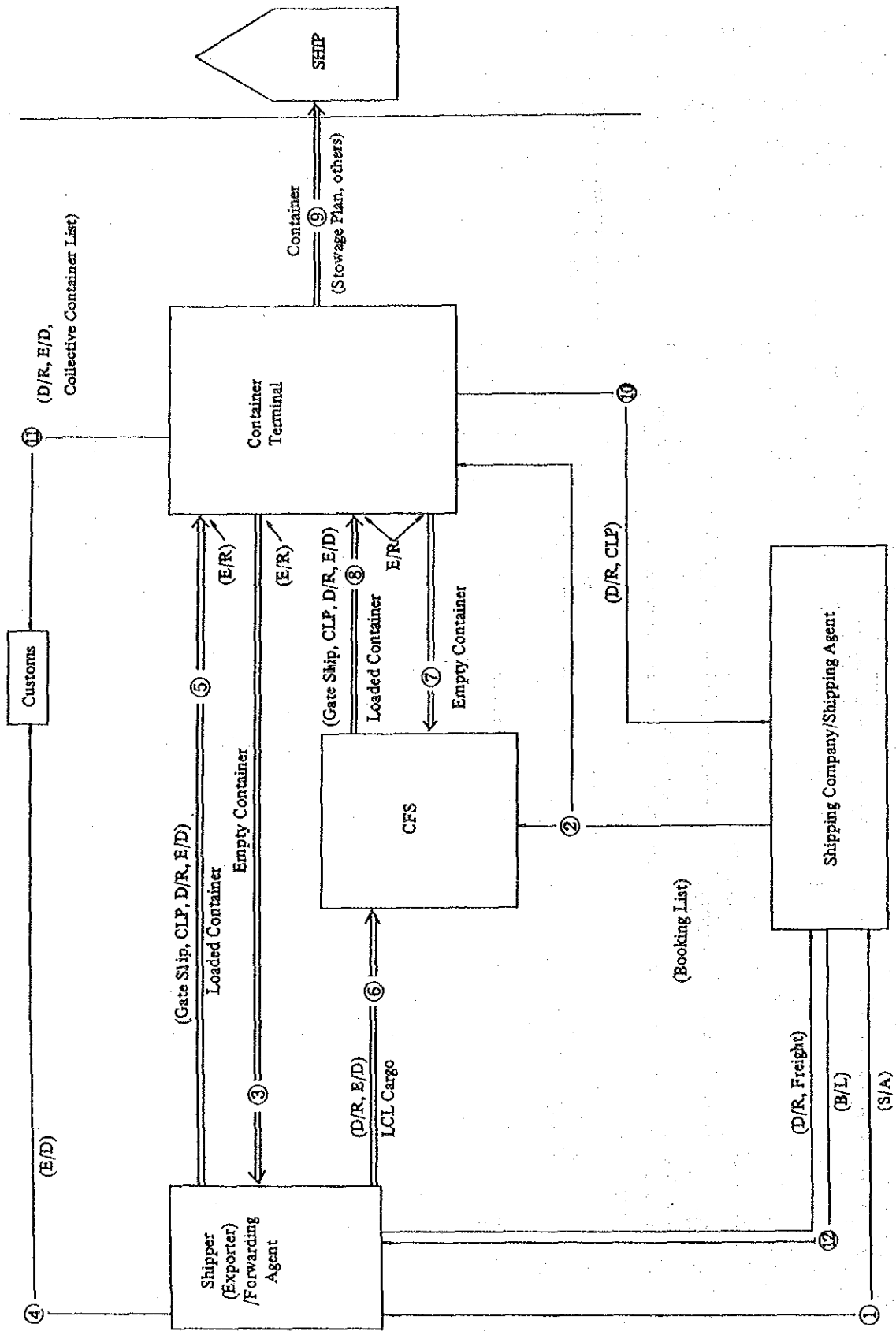


Fig. A.2.8 Flow of Container Cargoes and Documents (Export)

- container terminal, the consignee (importer)/forwarding agent presents the D/O and the I/D to the container terminal. When delivering the container at the gate office, the Equipment Receipt (E/R) is signed by both the gate clerk and the trailer driver.
- viii) The consignee (importer) unstuffs the container, and then this empty container is returned to the gate office of the container terminal, where the E/R is signed.
 - ix) The Less than Container Load (LCL) container cargo is delivered from the container terminal to the CFS after the signing of the E/R.
 - x) Cargoes unstuffed at the CFS are taken out by the consignees' trucks in exchange for the D/O and I/D.
 - xi) The empty containers, after being unstuffed at the CFS, are returned to the container terminal where the E/R is signed.

<Export>

- i) The shipper (exporter) sends the Shipping Application (S/A) to the shipping company in order to book ship space.
- ii) The shipping company sends the booking list which summarizes each S/A to the container terminal and the CFS.
- iii) The container terminal hands over the necessary empty containers to the shipper (exporter) in accordance with the shipping company's instructions and the booking list. At that time, the container terminal prepares the E/R and which is signed by both the gate clerk and the trailer driver.
- iv) The shipper (exporter)/forwarding agent completes the Export Declaration (E/D).
- v) The shipper (exporter)/forwarding agent stuffs the container with cargoes which have received permission for export and attaches the seal of the shipping company, and then delivers this container into the container terminal. At that time, the trailer driver presents the Gate-in-Slip which notes the container number, the name of the shipping company, the ship's name, discharging port, size, weight, kind of cargo, situation of customs procedure, etc. The CLP, D/R and E/D are delivered together by the forwarding agent.

The container is checked at the gate office of the container terminal for several items such as seal, outside condition, weight,

temperature of reefer container, etc. The E/R is counter-signed by both the gate clerk and the trailer driver.

- vi) As for LCL cargoes, the shipper (exporter)/forwarding agent completes Customs export clearance, delivering these cargoes with the D/R and E/D to the CFS.
- vii) The container terminal hands over the necessary empty container to the CFS with the counter-signed E/R.
- viii) The stuffed container is delivered from the CFS to the container terminal together with the Gate-in-Slip, CLP, D/R and E/D. The E/R is counter-signed by both the gate clerk and the trailer driver.
- ix) The container is loaded onto the container ship.
- x) The D/R and CLP are sent from the container terminal to the shipping company.
- xi) The container terminal submits the D/R, CLP, E/D and the collective Container List to Customs, which procedure confirms the completion of loading the container.
- xii) The shipping company issues the B/L in exchange for the original D/R and prepaid freight.

2) Customs Procedures

(a) Containerization and Customs Procedures

o Customs Formalities for Containers Themselves

The Customs Convention on Containers, 1956 was adopted at the Economic Commission for Europe of the United Nation (ECE) in 1956 and this convention came into effect in 1959. In 1972, it was amended to supplement its inadequacies. The purpose of the convention is, as stated in the preamble, "to promote utilization of containers and to simplify container usage in international transportation". Considering the concrete background in those days in Europe, where containers had been utilized for international transportation of cargo, it was necessary for every country to permit the temporary importation of containers themselves with no customs duties in order to promote more smooth international transportation.

The number of countries which associated with this convention was 17

Table A.2.1 Member Countries Associated with Customs Convention
on Containers, 1956 and 1972

(May 1987)

Country	1956	1972	Country	1956	1972
Algeria	○	○	Norway	○	
Australia	○	○	Poland	○	○
Austria	○	○	Portugal	○	
Belgium	○		Romania	○	○
Bulgaria	○	○	Sierra Leone	○	○
Kampuchea	○		Solomons	○	
Cameroon	○		Spain	○	○
Canada	○		Sweden	○	
Cuba	○	○	Switzerland	○	○
Czechoslovakia	○	○	Turkey		sign
Denmark	○	○	Trinidad and Tobago	○	
Finland	○		U.S.S.R		○
France	○		U.K.	○	
West Germany	○		U.S.A.	○	○
East Germany		○	Yugoslavia	○	
Greece	○	sign	China		○
Hungary	○	○	New Zealand		○
Ireland	○		Ukraine		○
Israel	○		White Russia		○
Italy	○		South Korea		○
Jamaica	○				
Japan	○		S. Total	38	21
Luxemburg	○				sign 2
Malawai	○				
Mauritius	○				
Netherlands	○		Total		46

at first and increased to 46 by 1987 as shown in Table A.2.1.

The gist of the content of this convention is as follows:

- i) To recommend to permit the temporary importation of containers with customs duties unpaid on the condition that the containers will be re-exported within three months.
- ii) To recommend to abolish the procedures whereby container documents and declarations of the temporary importation or the re-exportation with customs duties unpaid are to be submitted, although this is to be entrusted to the laws and regulations of individual countries, and to recommend not to hold a mortgage in this case.
- iii) To recommend to permit conditional use of containers, which are temporarily imported with customs duties unpaid, in domestic transportation. The countries which ratified this convention have enacted their own laws and regulations.

o Types and Functions of Bonded Areas

In any bonded area, the loading or unloading, conveyance, storage, manufacture or exhibition of foreign goods may be conducted in bond. To assure the collection of customs duties and enforce legitimate control, the foreign goods and others stored in bonded areas are placed under the supervision of the Customs. There are, in general, five types of bonded areas, which are designated bonded areas, bonded sheds, bonded warehouses, bonded manufacturing warehouses and bonded display areas. The purposes and functions of each type of bonded area are as follows:

- i) The designated bonded area is a place where foreign goods may be loaded, unloaded, conveyed or stored temporarily in bond to obtain simplified and prompt customs clearance in any open port or customs airport. The goods stored in the designated bonded area may be inspected, repacked or sorted and displayed as samples and processed simply. The same operations may also be authorized in bonded sheds and warehouses.
- ii) The bonded shed is permitted as a place where foreign goods may be loaded or unloaded, conveyed or stored temporarily in bond. It is a place, similar to the designated bonded area, used for the

handling of goods for customs clearance, but unlike the designated area, the bonded shed is established by exporters, importers or warehousing companies as a place convenient to them in accomplishing the customs clearance of the goods stored.

- iii) The bonded warehouse is permitted as a place where foreign goods may be stored in bond over a long span of time without going through the formalities on import clearance or reshipment.
- iv) The bonded manufacturing warehouse is a factory to which permission is given as a place where the processing or manufacturing of any foreign goods by using foreign materials may be conducted in bond. In addition to the above mentioned operations, inspection, repacking, sorting or any other similar handling of foreign goods may be carried out. The period in which foreign goods may be stored for the purposes of processing or manufacturing here is generally long. However, at the request of the person concerned, and for reasons considered valid by the Customs, this period may be extended by the Customs.
- v) The bonded display area is permitted as a place where foreign goods may be displayed in bond for international exhibitions, international fairs or any other similar exhibitions. The foreign goods which may be brought into a bonded display area are those used for construction, maintenance or removal of facilities for an exhibition or for the operation of exhibitions.

o Bonded Transportation

Fig. A.2.9 is a sample of Application of Bonded Foreign Cargo Transportation form.

(3) Comparison between Bangkok Port System and Standard System

Table A.2.2 shows the comparison between Bangkok Port System and Standard System.

Customs Office to be applied _____ Purpose _____ Application Date _____
 Place of Delivery _____ Transport Method _____ Entry Number _____
 Delivery Date _____ Place of Destination _____
 First Receiving Date _____ Name of Ship or Aircraft _____ Transport From _____
 Origin of Goods _____ Arrival Date _____ Period To _____
 Year Month Day

Mark and Numbers	Commodity	Number of Packages	Quantity	Declared Value
Remark of Despatch Place		Remark of Destination Place		
Seal Condition				
Confirmative Sign Despatch Place	Putting Seal	Confirmative Sign of Arrival Place	Arrival Date	
	Customs (points) Authorized Body (points)		Permitted by Customs Officer	
Customs Note Approval of Despatch Approval of Arrival				
Remarks		Address and Name of Applicant <div style="text-align: right;"> <input type="checkbox"/> Own <input type="checkbox"/> Charter </div>		

Fig. A.2.9 A Sample of Application of Bonded Foreign Cargo Transportation

Table A.2.2. Comparison between Bangkok Port System and Standard System

System Item	Bangkok Port System	Standard System
<p>1. Container Terminal (1) Facilities and Equipment 1) Cranes</p> <p>2) CFS Facilities</p> <p>3) Container Inspection Area</p>	<p>The loading and discharging operation is carried out using ship gear or mobile cranes. The container handling efficiency is not so high. In particular, the manipulation of mobile cranes is comparatively difficult for the operators and the cranes occupy a large space on the shipside aprons.</p> <p>There is no export CFS provided in the PAT port area, and the stuffing work of containers is conducted at each shipping agent's yard and even on roads where shippers' trucks frequently enter and exit. Furthermore, the containers themselves are usually used for storing LCL cargo instead of a warehouse.</p> <p>Since there are no facilities for customs inspection and animal/plant quarantine inspection, export containers are inspected in each shipping agent's yard and import containers are inspected beside the import CFS and transit sheds.</p>	<p>Gantry cranes which can supply quick and stable handling are widely used throughout the world. The container handling efficiency is generally 25 - 30 boxes per crane per hour.</p> <p>Both export and import cargoes are handled at CFS facilities, which include storage sheds for cargo. Working spaces for container trailers and trucks are provided in front and in back of the CFS.</p> <p>Even inspection procedures are simplified, a container inspection area is specially prepared where container requiring inspection are shifted so as not to disturb the handling operations in the container yard.</p>

Item	System	Bangkok Port System	Standard System
<p>4) Maintenance Shop and Cleaning Area</p> <p>5) Equipment</p> <p>6) Control Tower and Office</p>	<p>The maintenance shop located in the PAT port area can only be used for repairing cargo handling equipment. As for container repair, each shipping agent repairs containers individually within his own yard, and there is no specific cleaning area.</p> <p>Transtainers, top lifters, forklifts, mobile cranes, tractors, trailers and chassis are mainly used in the PAT port area. Although the downtime ratio of the machines is not so high, there are not enough machines. Also, the machines are not always used in accordance with their intended purpose.</p> <p>No control tower is provided at East Quay in the PAT port area. At present six transtainers are in operation just behind the apron without any unified supervision or control.</p>	<p>A maintenance shop and a cleaning area are provided for both container and cargo handling equipment. The cleaning area requires a drainage ditch to collect polluted water, and an oil separator and sink are necessary.</p> <p>The main handling equipment is determined considering the container handling system such as all-chassis system, straddle carrier system, transtainer system and forklift system. It is understood that each system has both advantages and disadvantages. The optimum system and necessary equipment are selected, taking into account the geographical condition of the container terminal, the assignment pattern of ships, the ratio of FCL and LCL cargoes and the ratio of empty containers.</p> <p>The function of the control tower is to oversee terminal operations such as handling containers, loading and discharging to and from ships, and generally controlling yard operations. The control tower is located in a high place providing</p>	

System Item	Bangkok Port System	Standard System
<p>7) Marshalling Yard</p> <p>(2) Operation in general</p>	<p>There is no marshalling yard at East Quay in the PAT port area. When a ship commences loading, export containers are chaotically transferred from various stacking yards. Serious traffic congestion occurs, and trailers and chassis are not able to move in a smooth way. The congestion seriously reduces the loading efficiency.</p> <p>The container yard allocated to each shipping agent is independently utilized by means of individual handling systems, while PAT is the nominal terminal operator. No problems occur when the container volume is small. However, serious problems occur when the volume gets larger, as the operations of individual agents interfere with each other. PAT has not yet established an integrated operational section to supervise and control the overall operation.</p>	<p>a good view of the entire terminal, and includes office space necessary for operation staff, shipping agents, etc.</p> <p>A marshalling yard is generally provided in the container yard. The marshalling yard is a place where export containers are, in advance, stacked in accordance with a loading sequence which is planned considering the destination, size and weight of containers to be loaded. On the other hand, it is possible to stack import containers temporarily in part of the marshalling yard to expedite the quick departure of ships.</p> <p>There are two typical operation systems. One is that all operations in the container terminal are consistently carried out by the owner of the facilities, that is the port management body, such as the Port of Singapore Authority. The other is that a private sector entity which leases out the facilities and equipment carries out all the operations in the container terminal. In both cases, the operation of the container terminal is performed by a</p>