

3.2 Port facilities

3.2.1 Brief History of the Wharves

1) Construction of the Wharves

The present wharves were constructed in two stages, that is, phase 1 and phase 2.

The first construction works began in 1953 and were completed in 1955. The works included wharves, a dredging channel, two warehouses, a fixed type 50 ton capacity crane, and a water supply system with two elevated tanks and a pump house, and were all constructed by an American company.

The second phase extension works were started in 1967, and finished in 1968. The works included wharves, a mobile crane on rails, two warehouses and so on.

2) Damages to the Wharves

About twenty years after the completion of the phase 1 works (and ten years after the completion of the phase 2 works), these structure and facilities were damaged by an earthquake. A survey on the damages to the structures and facilities was executed by a local consultant in 1978.

The damages to the structures and facilities found by the survey were caused not only by the earthquake, but also by superannuation and vessel collisions.

The consultant also proposed the method of repairing the wharves. The repair works were divided into five main categories.

- Additional pile driving work at the front of the wharves
- Reinforcing concrete works for slightly damaged piles and beams
- Reinforcing work for the abutment of the wharf to prevent the soil from leaking out
- Repair of pavement
- Renewal of the fender system.

3) Repair Works

The repair works were executed from 1981 through 1983. The drawings used in these works are available.

3.2.2 Present Condition of the Wharves

1) Undulation of the Wharf Platforms

A topographical survey was executed at certain points of the wharf platforms. Fig. 3.2.1 show the results of the measurements.

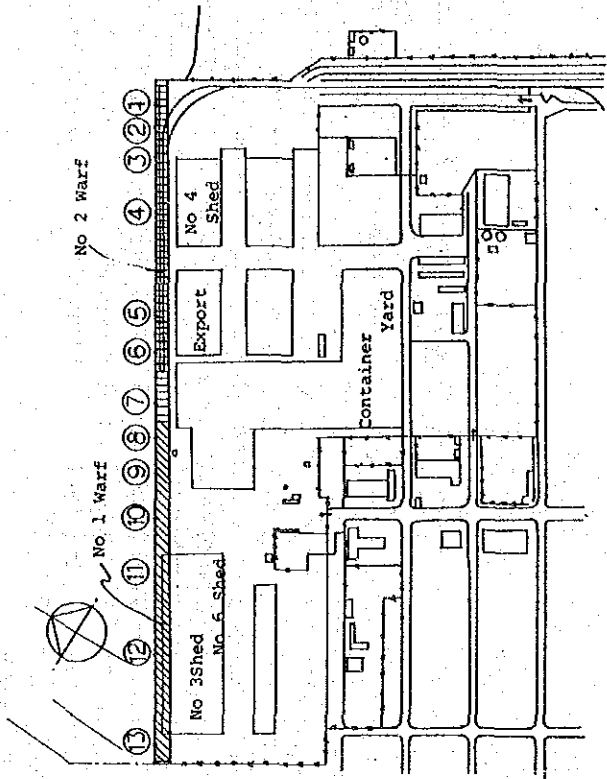
From this survey the surface of the platforms is rather smooth and shows no remarkable undulation.

2) Cracks in the Beams

Visual inspection was carried out underneath the wharf platforms. The phase 2 wharf structures such as beams, slabs and piles were repaired successfully and seem to have no crack damages. Although the phase 1 wharf structures were also repaired after the earthquake, there are a lot of new cracks in the beams connecting the pile heads. Especially some cracks which were repaired by means of chemical material injection are growing longer and wider. Fig.3.2.2 shows the location of cracks with triangular marks.

3) Strength of the Beams and Slabs

A Schmit Hammer test was carried out on the concrete beams and slabs which were built in 1955. The points of the test were selected as to avoid spots which were repaired before, because the purpose of the test was to find out the strength of the original concrete itself. Ten testing points were selected on the beams and eight on the slabs. The results are shown in Table 3.2.1 and 3.2.2 and the locations of the test are shown in Fig. 3.2.2.



Section	Distance	Section	Distance
0 - 1	13.5 m	7 - 8	48.2 m
1 - 2	36.9	8 - 9	49.4
2 - 3	35.4	9 - 10	62.1
3 - 4	75.9	10 - 11	75.0
4 - 5	143.4	11 - 12	112.4
5 - 6	48.7	12 - 13	123.7
6 - 7	71.0	13 - 14	19.2

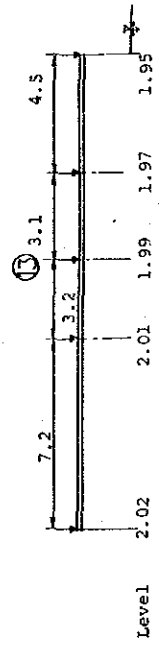
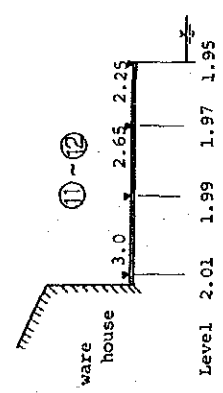
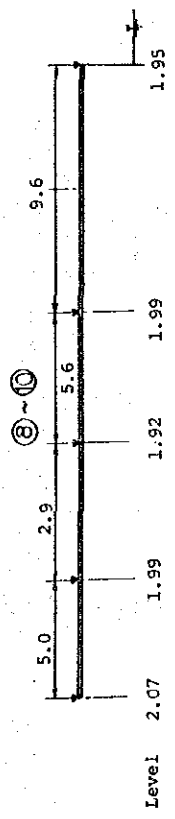
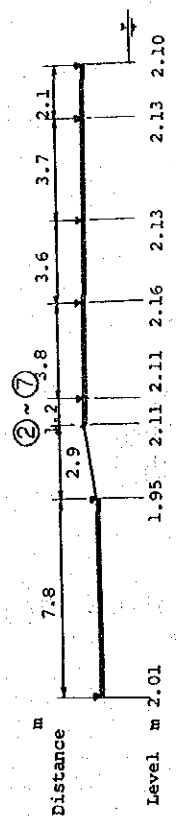
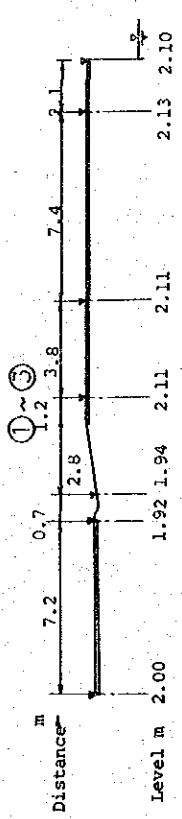


Fig. 3.2.1 Cross Section of the Wharf

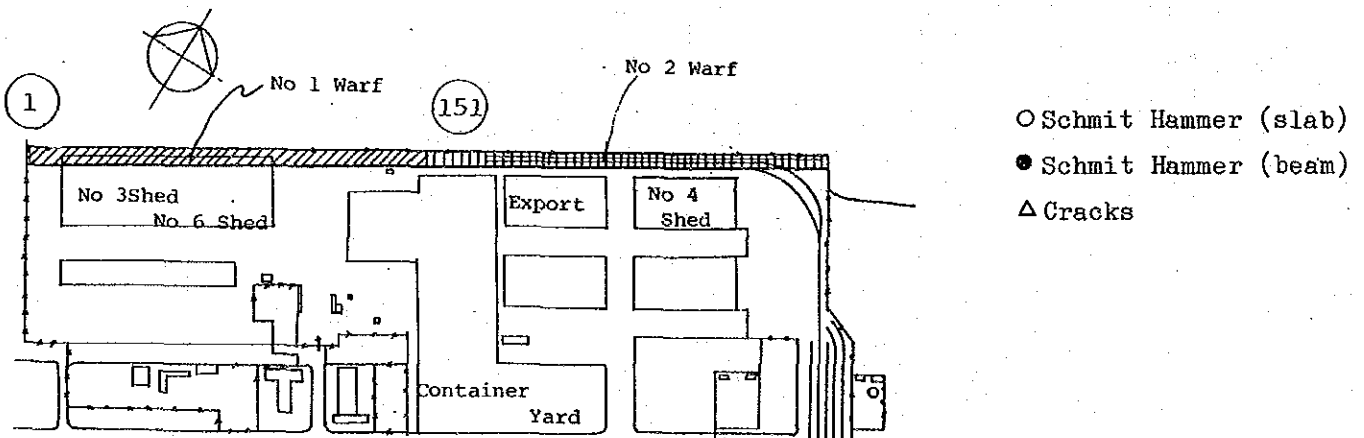
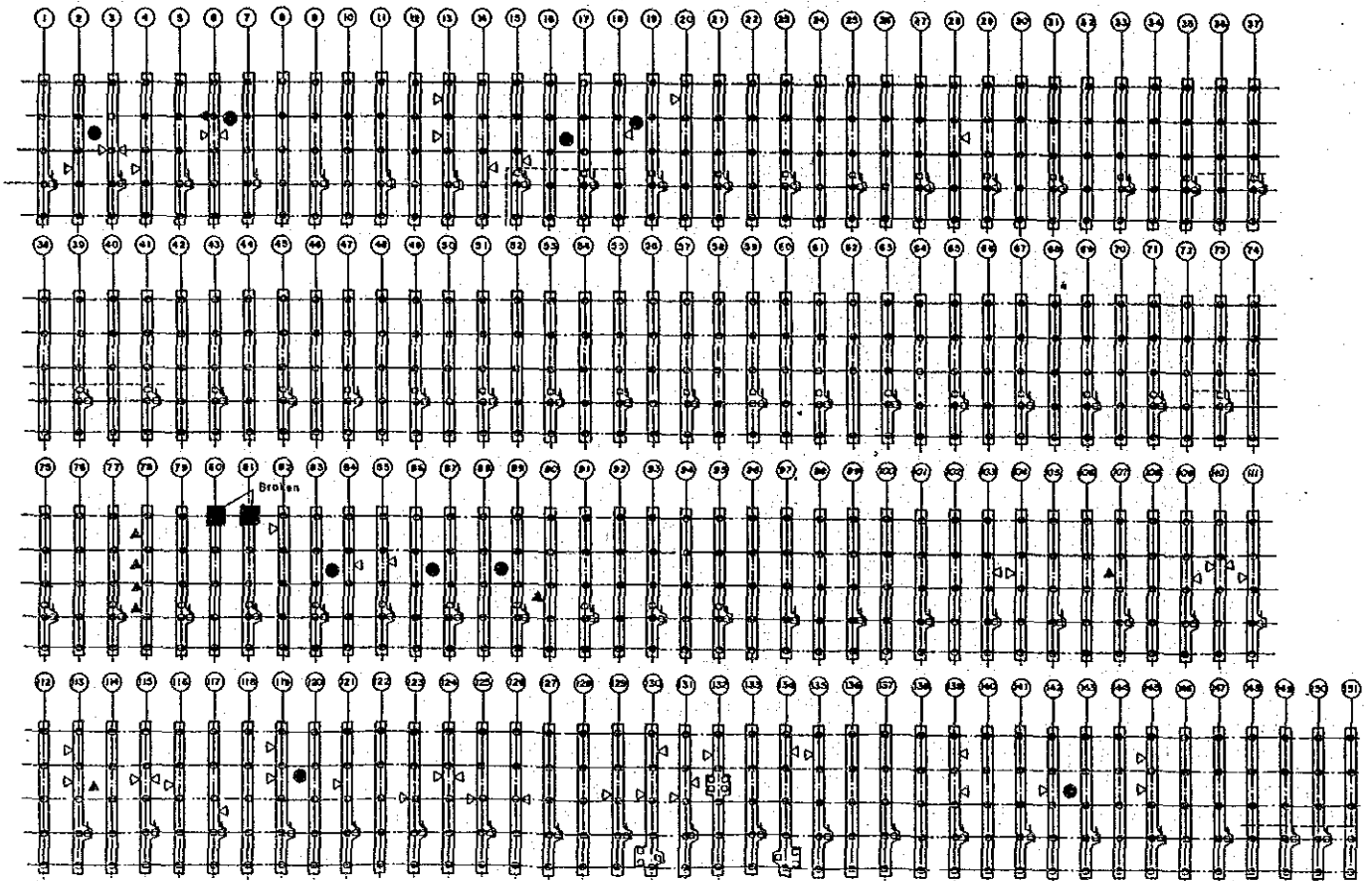


Fig. 3.2.3 The Location of the Test and Cracks

Table 3.2.1 Strength of Existing Concrete (Beam)

Beam No.	Hardness	Strength kg/cm ²	Note
78 - 1	45	330	Adjustment is not necessary.
78 - 2	44	325	
78 - 3	47	335	
78 - 6	44	325	
6	42	300	
90	48	340	
107	44	325	
114	43	320	
131 - 1	38	260	
131 - 2	41	280	

Table 3.2.2 Strength of Existing Concrete (Slab)

Slab No.	Hardness	Adjustment	Adjusted	Strength Kg/cm ²
18 - 19	46	-4	42	300
16 - 17	46	-4	42	300
6 - 7	42	-5	37	250
2 - 3	48	-4	44	325
83 - 84	50	-4	46	335
86 - 87	50	-4	46	335
119 - 120	54	-4	50	350
142 - 143	50	-4	46	350

Note: The hardness of the Schmit Hammer is adjusted according to the direction of the hammer; whenever the hammer is used horizontally the adjustment is zero and when the hammer is used at some angle to the horizontal, the hardness is adjusted.

The test results, beyond our presumption, are very good and the original concrete proved strong.

4) Chemical Analysis

Generally as concrete becomes weathered, its alkalinity is reduced. A chemical test was executed to check the alkalinity of the concrete. First, a concrete beam was chipped at a corner eighteen by eighteen centimeters as shown below;

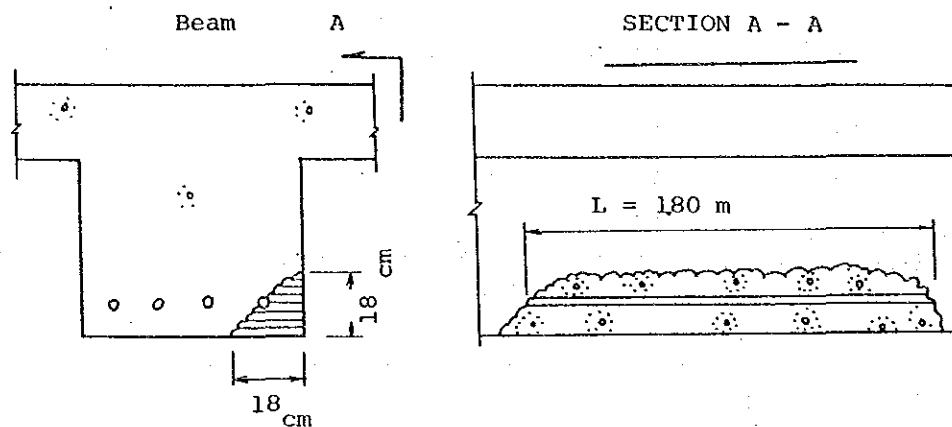


Fig. 3.2.3

A five percent chemical solution was sprayed on the surface of the chipped concrete. An alkaline reaction was seen very clearly. Thus the original concrete is still alkaline and is not excessively weathered.

5) Soundings of the Slopes under the Platforms

Soundings of the slopes were performed at 14 points, namely, beams No. 1, 5, 10, 20, 30, 37, 52, 65, 80, 91, 100, 120, 138 and 147, constructed during phase 1. Fig. 3.2.4 shows a typical cross section of the wharf (phase 1) and the results of the sounding. Originally, the slopes were designed as 1 to 1 and might have been constructed accordingly, but actually the slope has become moderate. Sounding of the slopes was also executed for phase 2 works, and the measured points were beams No. 10, 20, 30, 40, 50, 60, 70, 80 and 90. Fig. 3.2.5 shows the results.

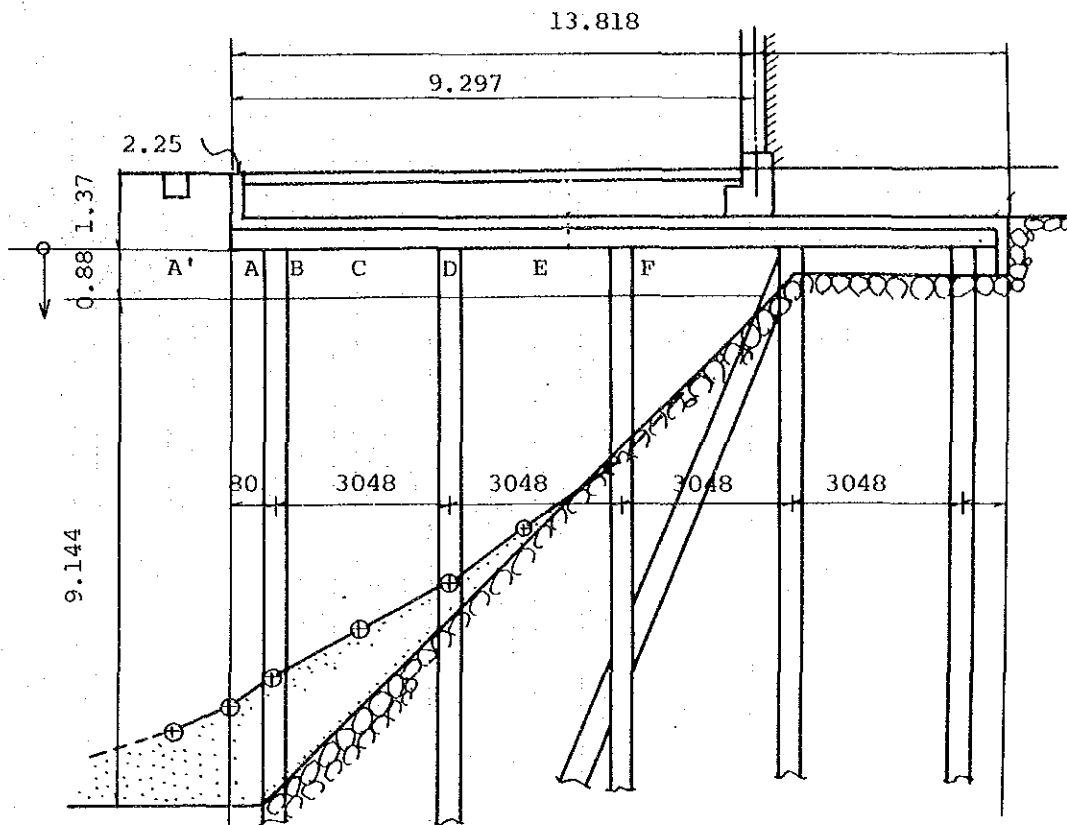


Fig. 3.2.4 Results of Sounding (Phase 1)

Table 3.2.3 Results of Sounding (Phase 1)

Beam No.	Points shown in the above figure (depth in meters)						
	A'	A	B	C	D	E	F
1	6.93	5.50	5.00	4.60	4.50	3.80	3.30
5	7.62	6.15	6.50	6.30	4.20	3.50	3.00
10	8.08	6.60	6.40	6.35	5.60	4.50	3.10
20	8.00	6.30	6.00	6.60	4.70	3.70	3.70
30	8.36	7.20	6.90	6.80	4.30	3.5	3.5
37	8.34	7.30	7.10	6.20	5.40	4.10	2.80
52	8.38	7.60	6.10	6.15	5.50	4.30	3.20
65	8.02	7.55	6.90	6.00	5.70	4.40	4.00
80	8.15	7.90	7.50	7.00	6.20	4.45	3.20
96	8.13	8.20	7.60	7.00	6.30	5.00	3.70
100	8.76	8.25	7.70	6.80	6.00	5.00	3.90
120	8.80	7.70	7.20	6.50	6.00	5.00	4.40
138	8.33	7.75	7.40	6.80	6.10	5.10	4.45
147	9.36	8.75	8.30	7.70	6.75	5.60	4.60

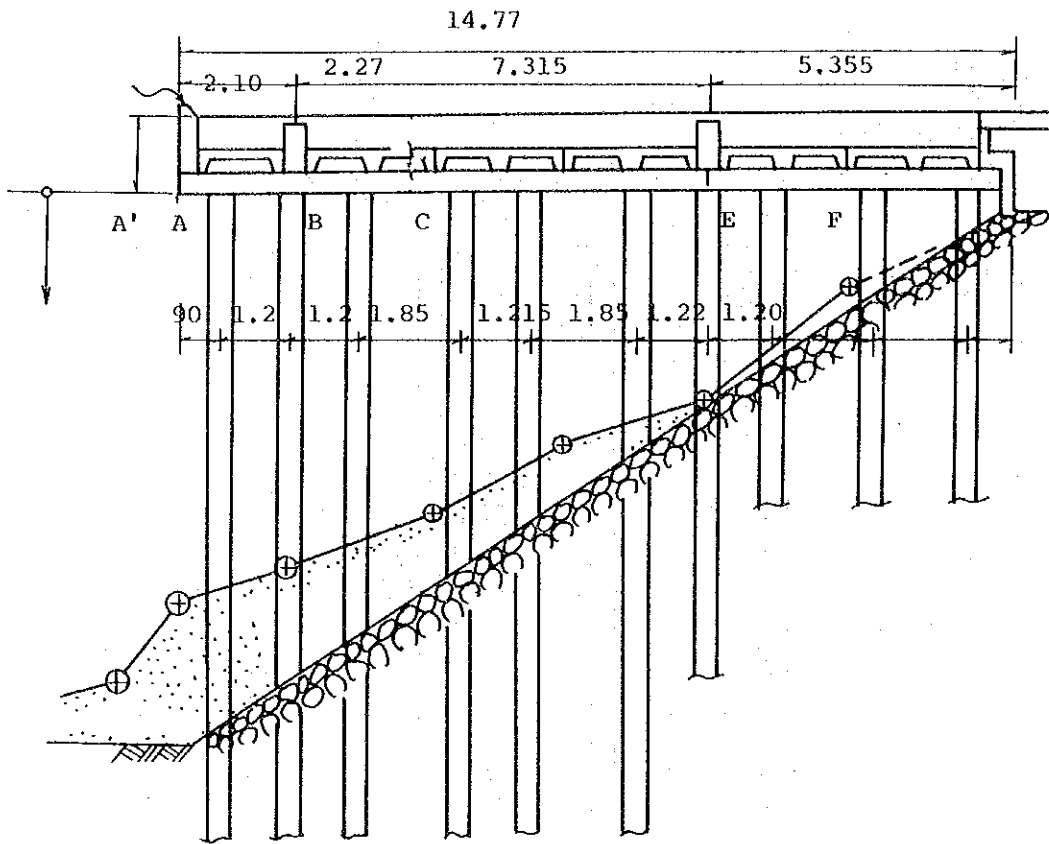


Fig. 3.2.5 Results of Sounding (Phase 2)

Table 3.2.4 Results of Sounding (Phase 2)

(depth in meters)

Beam No.	A'	A	B	C	D	E	F
10	8.49	8.00	7.35	5.56	5.25	3.80	1.71
20	8.20	7.65	6.92	6.80	5.40	3.36	1.57
30	7.88	7.50	6.78	5.85	5.00	3.80	1.78
40	8.20	7.60	6.87	5.95	5.15	3.67	1.80
50	8.58	7.45	6.55	5.20	4.18	3.00	1.68
60	8.16	7.20	6.60	5.60	4.70	3.30	1.75
70	7.22	7.35	7.20	5.90	4.70	3.50	1.80
80	8.21	8.20	7.40	5.95	4.62	3.60	1.60
90	7.45	7.60	7.50	5.90	4.70	3.50	1.85

3.2.3 Other Facilities

1) Warehouses No. 3 and No. 6

Warehouses No. 3 and No.6 which are joined together have a length of 245 meters and a width of 76.5 meters and were built in 1953.

Structurally, they are built with steel H shaped columns with angle trussed roofing and covered with waved slate. The warehouses are naturally ventilated. The surface of the steel structures is slightly rusted, but structurally there seems to be no problem. Seepage from rainfall is seen in certain areas, so drainage gutters and pipes under the floor concrete should be repaired.

The floor at the corner of the west end facing the sea has a lot of cracks, but this is not such a big problem. In the near future, the soil layer should be tamped and the pavement renewed.

In the daytime, the inside of the warehouses receives good natural light through the transparent roof sheets, but at night the existing lighting system is not sufficient for handling cargoes safely.

Design drawings of these warehouses are not available.

2) Warehouses at the Phase 2 Wharf

Four warehouses are located at the east side of the phase 2 wharf. Each house has a length of 114 m and a width of 61.5 m.

The houses are built with full web I-type steel columns and beams (the design drawings are available), and covered with wave slate. Generally, the structures are in good condition and look fine.

The feet of the columns supporting upper beams at the center of the spans are slightly damaged by cargo handling equipment, so these columns should be protected with concrete or guard rails to prevent damage.

3) Drainage System

Basically, the drainage system is established and arranged in order, but in some areas, for example around warehouses No. 3 and No. 4 and in the area for the future container yard, drainage pipes are missing. For the purpose of maintenance and management of the system, a drawing showing the position of manholes, underground pipes and ditches should be prepared.

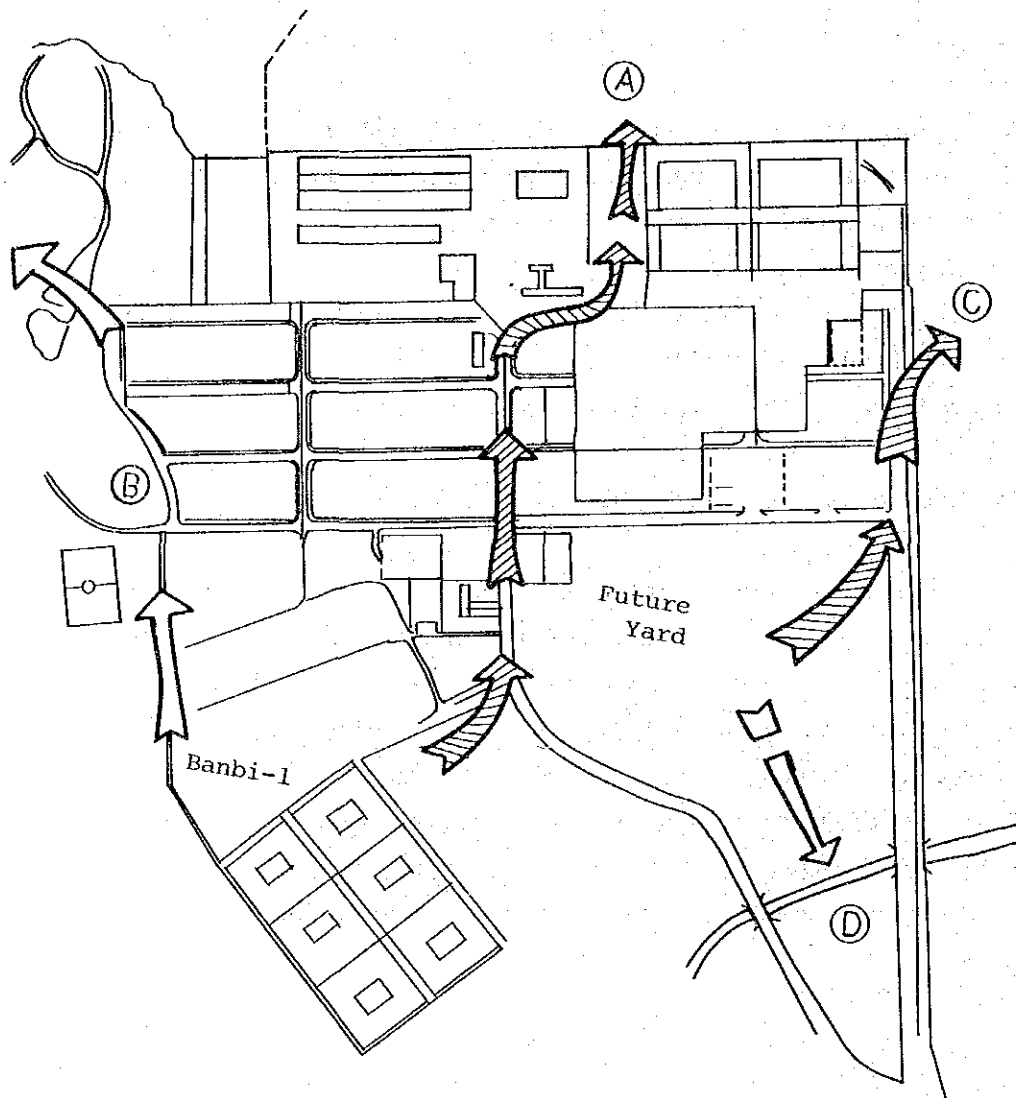


Fig. 3.2.6 Drainage System

Drain water from colonies "BANVI 1 and 2" and adjacent dwelling areas is flowing down the main street inside the port area and draining away to the sea as shown on Fig. 3.2.6.

Drain water from the future container yard is running down into the new port area.

Drainage routes A and C shown in Fig. 3.2.6 should be switched to routes B and D respectively.

4) Water Supply

The port area and adjacent colonies and villages are supplied from two elevated tanks located on a hill. The water source is an abundant fountain from the Agustin River.

The water tanks each have a 100,000 gallon capacity, and the water is pumped up from the pumphouse where two 30 H.P. and another two 40 H.P. vertical pumps are installed. Simple chlorination is performed.

The pumps and some of the water supply pipes are very old, so they should be replaced.

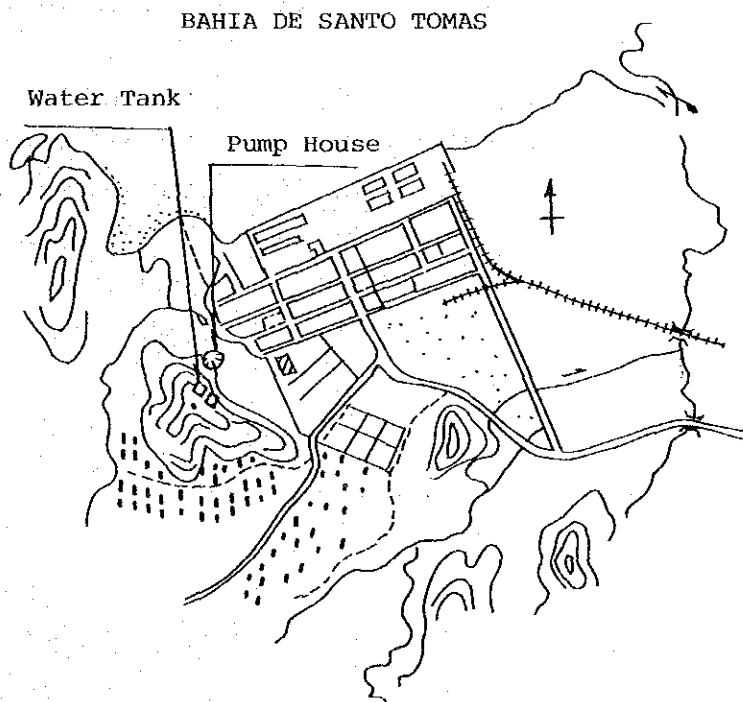


Fig. 3.2.7 Water Supply System

3.2.4 The Operation of Cargo-handling Machinery

(1) Actual Operation

The cargo-handling machinery and equipment of EMPORNAC is used for various services such as stevedoring, transferring commodities in the port and the marshalling, stuffing and unstuffing of containers.

According to Table 3.2.5, the cargo-handling machinery and equipment have been used for periods longer than the depreciation terms stipulated by EMPORNAC.

Thus, the cargo-handling machines are often in the EMPORNAC repair shop as shown in Table 3.2.6.

(2) Purchase Plan

A purchase plan of cargo-handling machinery in 1987 is shown as follows

Cargo-handling machine	Purchase plan		Purchase Schedule
	Capacity	Number	
Forklift	10,000 lb.	5	bid in August
Forklift	8,000 lb.	7	bid in August
Trailer		2	bid in August
Flatbed		2	bid in August
Straddle carrier		2	delivered in August
Straddle carrier		1	bid in August

Table 3.2.5 Number of Cargo-handling Machines (by Purchase Year)

CODE NAME	01 TRACT	02 FORK	03 M.CRA	04 M.CRA	05 CRANE	06 PAY L	07 FREI	08 T.TRA	09 FLAT	10 ATT	11 STRA	12 BULK	13 CHASS	TOTAL	RATE BY YEAR	SUM UP RATE
No cle	1				1		5						1	8	3.7	3.7
63														0	0.0	3.7
66					1									1	0.5	4.1
67														0	0.0	4.1
68								2	2					4	1.8	5.9
69	1			1			7			6				9	4.1	10.0
70														6	2.7	12.8
71				1										1	0.5	13.2
72		16	1			1	2					1		20	9.1	22.4
73														1	0.5	22.8
74		13								1				14	6.4	29.2
75		20					3							23	10.5	39.7
76														13	5.9	45.7
77	2		2								2			4	1.8	47.5
78	3	9					10	3						25	11.4	58.9
79										2				2	0.9	59.8
80	4	22					16	4	6	2				54	24.7	84.5
81														0	0.0	84.5
82						2								2	0.9	85.4
83														0	0.0	85.4
84	1	2						3						6	2.7	88.1
85	2	7					13		3					25	11.4	99.5
86														1	0.5	100.0
87														0	0.0	100.0
TOTAL	13	101	4	1	2	4	56	12	11	9	4	1	1	219	100.0	
** NUMBER	3	9	1	0	0	2	13	7	3	0	0	0	0	38		
*** RATE	23.1	8.9	25.0	0.0	0.0	50.0	23.2	58.3	27.3	0.0	0.0	0.0	0.0	17.4		
**** DEP MO	80	80	80	80	80	80	80	80	80	80	80	80	80			

Note :
 Code 1 : Tractor Code 2 : Forklift Code 3 : Mobile crane Code 4 : Mobile crane
 5 : Derrick crane 6 : Payloader 7 : Freight car 8 : Trailer
 9 : Flatbed 10 : Attachments 11 : Straddle carrier 12 : Equipment for bulk
 13 : Chassis & Trailer

The figures are computed by summing up the number of cargo-handling machines and equipment which were purchased before the pertinent year.

** Numbers of machines within depreciation term
 *** Rate of above
 **** Depreciation months stipulated by EMPORNAC

Table 3.2.6 Operational Condition of Cargo-handling Machinery

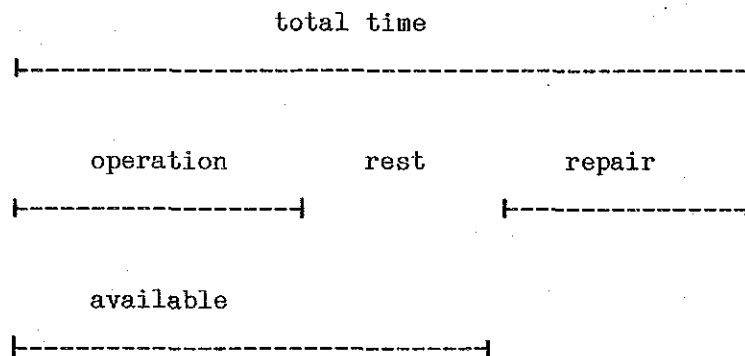
	Actual operation hours	Available hours *	Operation rate**	Repairing hours	Repairing rate ***
Tractor	38,364	102,430	37.5%	98,611	44.5%
Forklift	354,792	1,297,777	27.3	580,907	27.2
Mobile crane	11,179	43,470	25.7	22,777	30.4
Payloader	3,753	18,893	19.9	27,788	55.1
Trailer	78,689	188,392	41.8	53,376	19.1
Straddle carrier	12,210	26,753	45.6	29,145	47.6

Note: Summing up of the last 4 years

* Hours available for users

** Actual operation hours/available hours

*** hours within repair shop



(3) Overaged Cargo-handling Machinery and Equipment

The cargo-handling machines of EMPORNAC by type and purchase year are listed in Table 3.2.5.

The present condition of these machines judged by the Mobilization and the Inventory Dept. are shown in Tables 3.2.7 and 3.2.8. The conditions are classified into three categories, namely good, regular and bad according to the following criteria:

Table 3.2.7 Classification of Present condition
of Cargo-handling Equipment
(by Inventory Dept.)

	Year	Good	Regular	Bad	Total	G/T	R/T	B/T
Tractor	69		1		1		100.0	
(Tractor)	77		2		2		100.0	
	78		3		3		100.0	
	80		3	1	4		75.0	25.0
	84		1		1		100.0	
	85		2		2		100.0	
	Total		12	1	13		92.3	7.7
Montacaraga	72		10	6	16		62.5	37.5
(Forklift)	74		9	4	13		69.2	30.8
	75		18	2	20		90.0	10.0
	76		10	1	11		90.9	9.1
	78	1	8		9	11.1	88.9	
	80		19	3	22		86.4	13.6
	84		2		2		100.0	
	85		7		7		100.0	
	Total	1	83	16	100	1.0	83.0	16.0
Grua	69		1		1		100.0	
(Mobile Crane)	72		1		1		100.0	
	77		2		2		100.0	
	86		1		1		100.0	
	Total		5		5		100.0	
Grua Fija	63		1		1		100.0	
	Total		1		1		100.0	
Payloader	66		1		1		100.0	
	73		1		1		100.0	
	82		2		2		100.0	
	Total		4		4		100.0	
Vagoneta	69	7			7	100.0		
(Small Wagon)	75	3			3	100.0		
	78	19			19	100.0		
	80	15		1	16	93.8		6.3
	85	13			13	100.0		
	n.a.		2	3	5	0.0	40.0	60.0
	Total	57	2	4	63	90.5	3.2	6.3
Cabezal	68		2		2		100.0	
(Trailer)	78		3		3		100.0	
	80		4		4		100.0	
	85		3		3		100.0	
	Total		12		12		100.0	
Platforma	68		2		2		100.0	
(Flatcar)	80		6		6		100.0	
	85		3		3		100.0	
	Total		11		11		100.0	
Portacontenadore	76			2	2			100.0
(Straddle	80		2		2		100.0	
Carrier)	Total		2	2	4		50.0	50.0
Grand Total		58	132	23	213	27.2	62.0	10.8

Standard of Classification

Good : Working

Regular: Repair cost is low

Bad : Almost beyond repair

Table 3.2.8 Classification of Present condition
of Cargo-handling Equipment
(by Mobilization Dept.)

	Year	Good	Regular	Bad	Total	G/T	R/T	B/T
Tractor	69			1	1			100.0
(Tractor)	77			1	1			100.0
	78		2	1	3		66.7	33.3
	80		2	2	4		50.0	50.0
	Total		4	5	9		44.4	55.6
Montacaraga	72		8	2	10		80.0	20.0
(Forklift)	74		6	5	11		54.5	45.5
	75		13	5	18		72.2	27.8
	76		8	1	9		88.9	11.1
	78	1	5	1	7	14.3	71.4	14.3
	80		15	5	20		75.0	25.0
	84	2			2	100.0		
	85	7			7	100.0		
	Total	10	55	19	84	11.9	65.5	22.6
Grua	69		1		1		100.0	
(Mobile Crane)	72		1		1		100.0	
	77		2		2		100.0	
	Total		4		4		100.0	
Grua Fija	63		1		1		100.0	
	Total		1		1		100.0	
Payloader	66		1		1		100.0	
	73		1		1		100.0	
	Total		2		2		100.0	
Cabezal	68		2		2		100.0	
(Trailer)	78		3		3		100.0	
	80		4		4		100.0	
	84		3		3		100.0	
	Total		12		12		100.0	
Platforma	68		2		2		100.0	
(Flatcar)	80		6		6		100.0	
	85		3		3		100.0	
	Total		11		11		100.0	
Portacontenadore	76			2	2			100.0
(Straddle Carrier)								
Grand Total		10	89	26	125	8.0	71.2	20.8

Standard of Classification

Good : Working
Regular: Working and repairing
Bad : Almost cannot repair

Inventory Dept. : Expensed and frequency of repairs recorded through past depreciation period.

Mobilization Dept. : Recent operating conditions considering operation hours, available hours and repairing hours.

The relation between repairing hours, repair expenses and age of machines is shown in Fig. 3.2.8 to Fig. 3.2.20. According to Fig. 3.2.8, overaged machines require more repairing time.

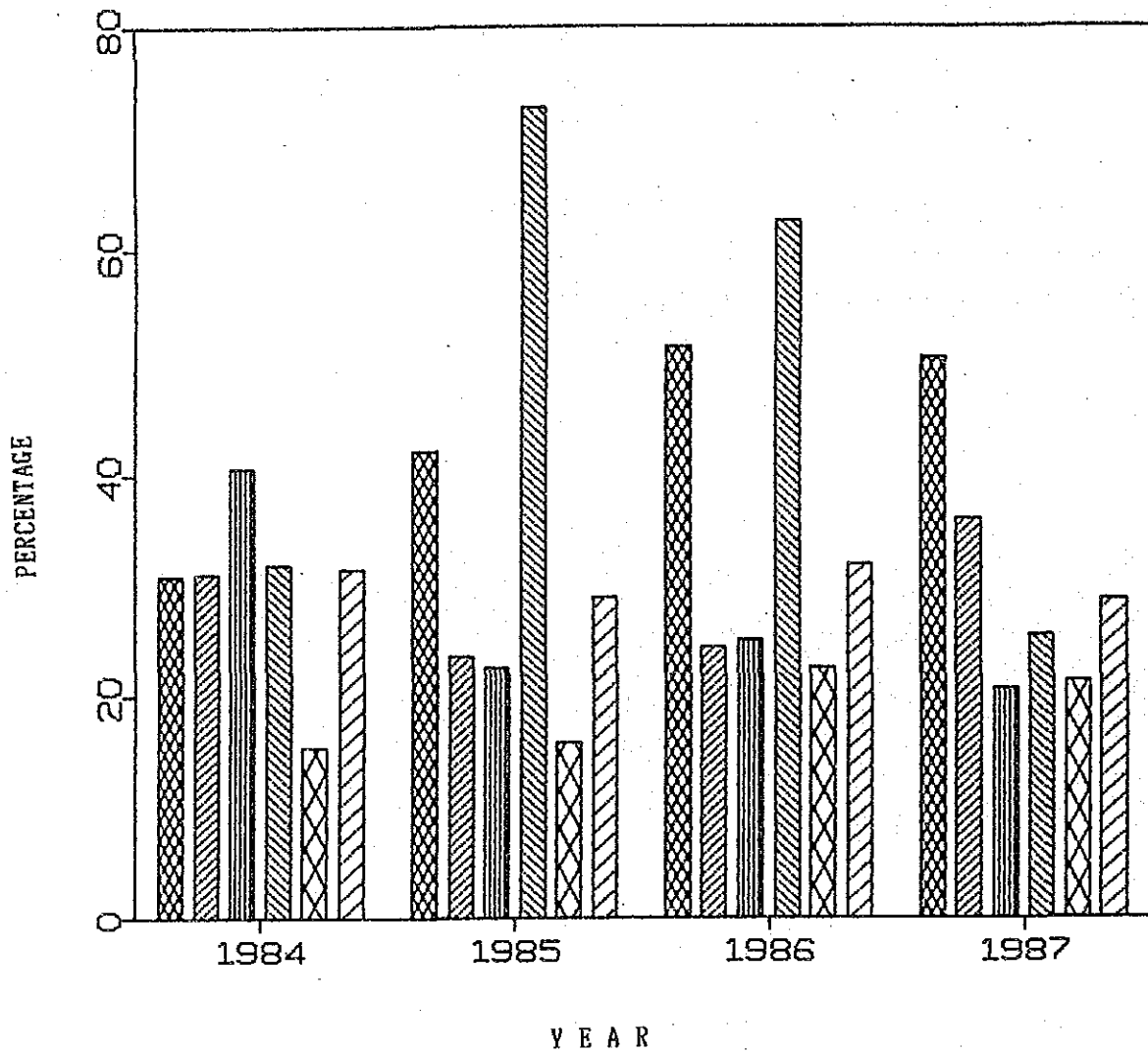
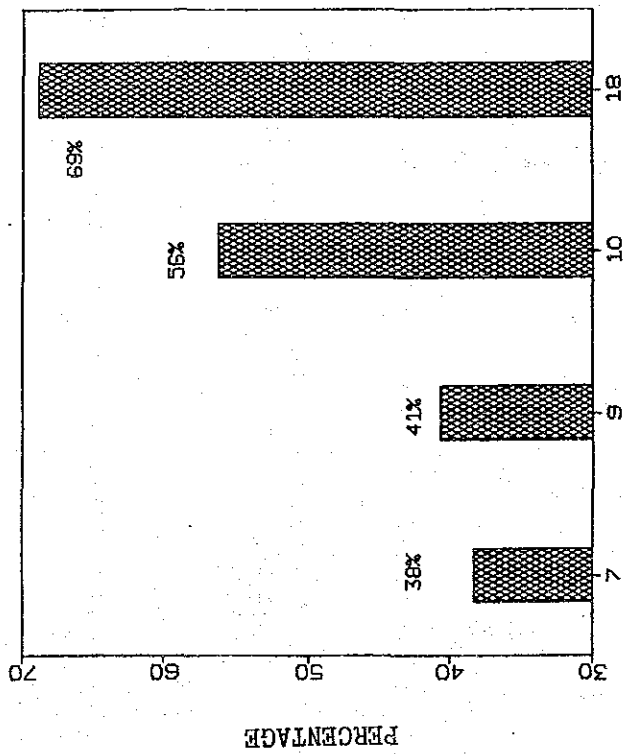


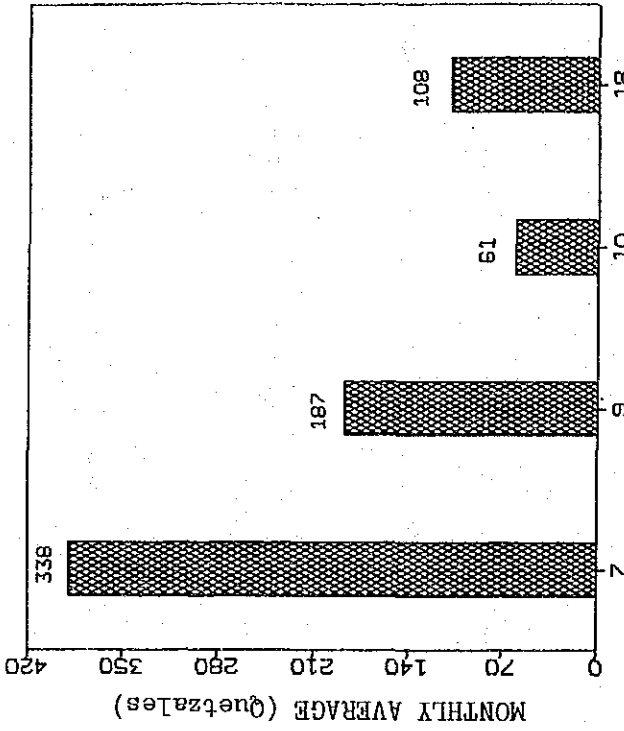
Fig. 3.2.8 Percentage of Repairing Time of Cargo-handling Machines



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the repairing time of tractors from 1983 to the present.

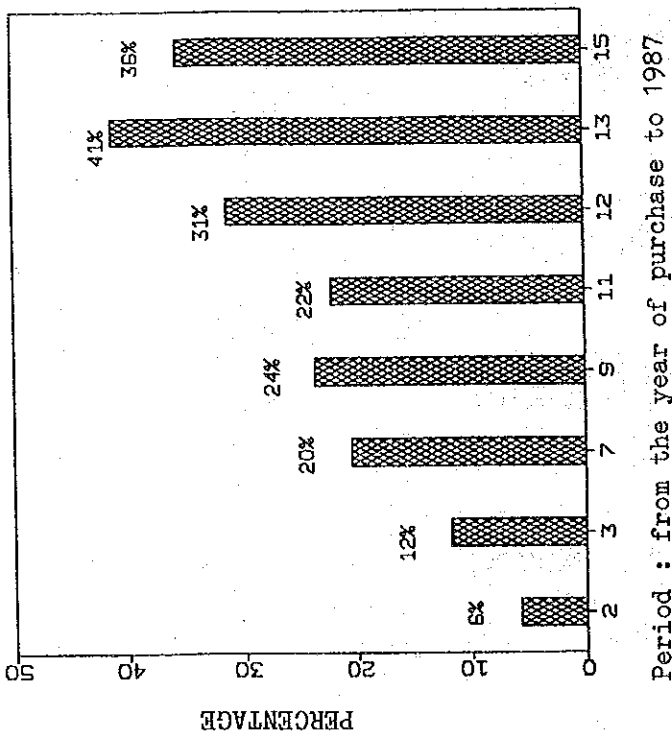
Fig. 3.2.9 Percentage of Repairing Time of Tractors



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the cost of tractor parts from 1983 to the present.

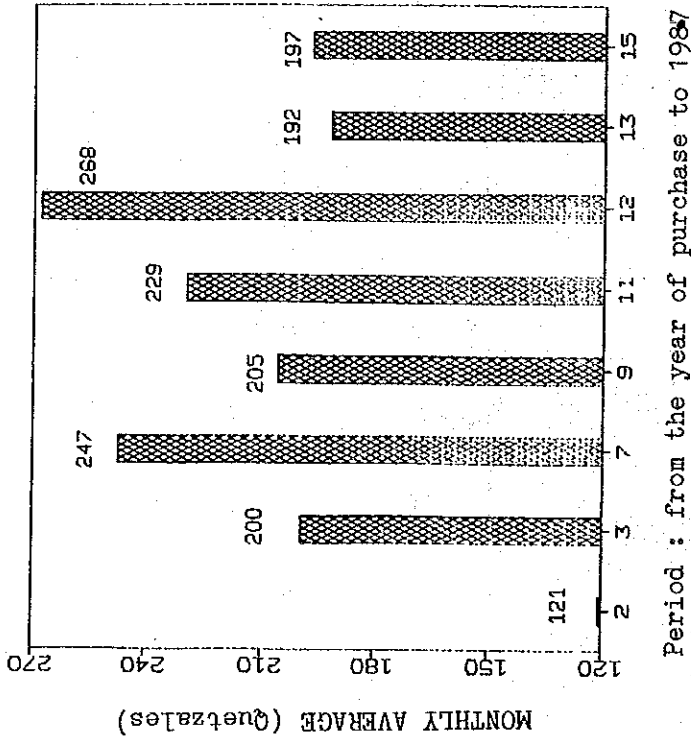
Fig. 3.2.10 Monthly Average Cost of Parts for Tractors



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the repairing time of forklifts from 1983 to the present.

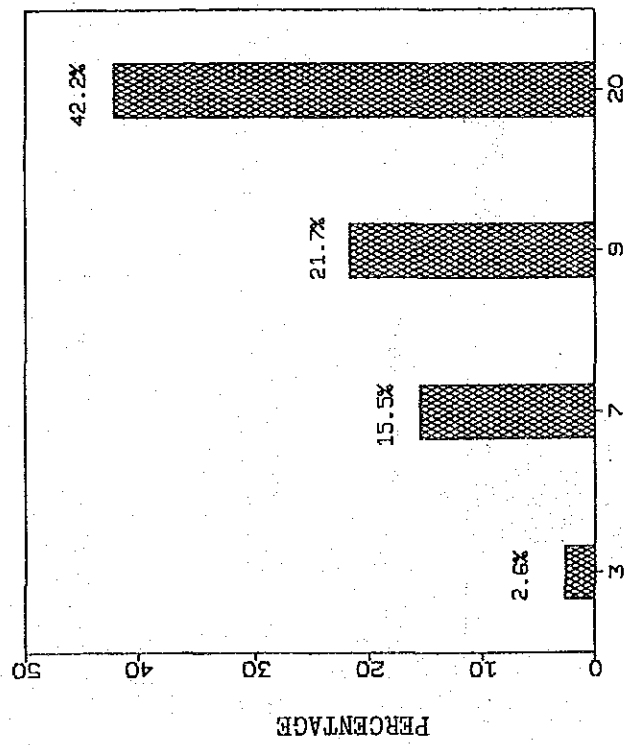
Fig. 3.2.11 Percentage of Repairing Time of Forklifts



Period : from the year of purchase to 1987

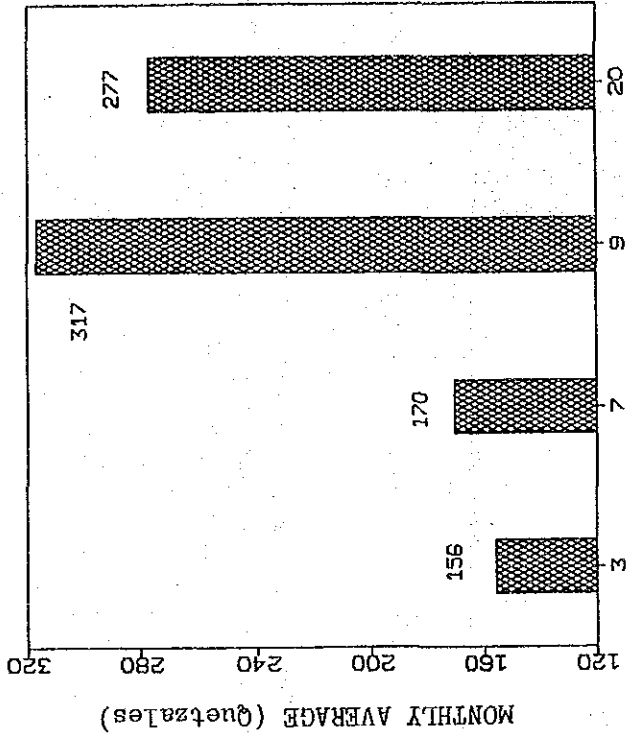
Note : The figures are computed by summing up the cost of tractor parts from 1983 to the present.

Fig. 3.2.12 Monthly Average Cost of Parts for Forklifts



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the repairing time of trailer from 1983 to the present.

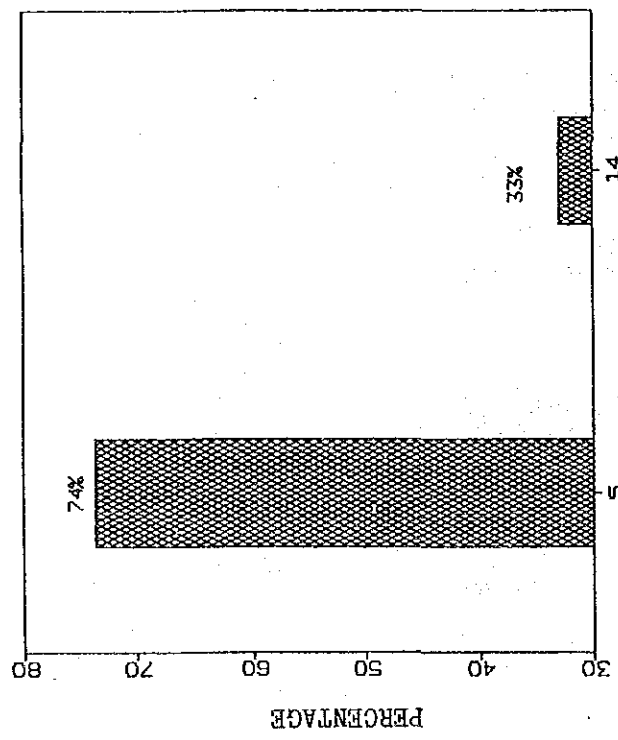


Period : from the year of purchase to 1987

Note : The figures are computed by summing up the cost of trailer parts from 1983 to the present.

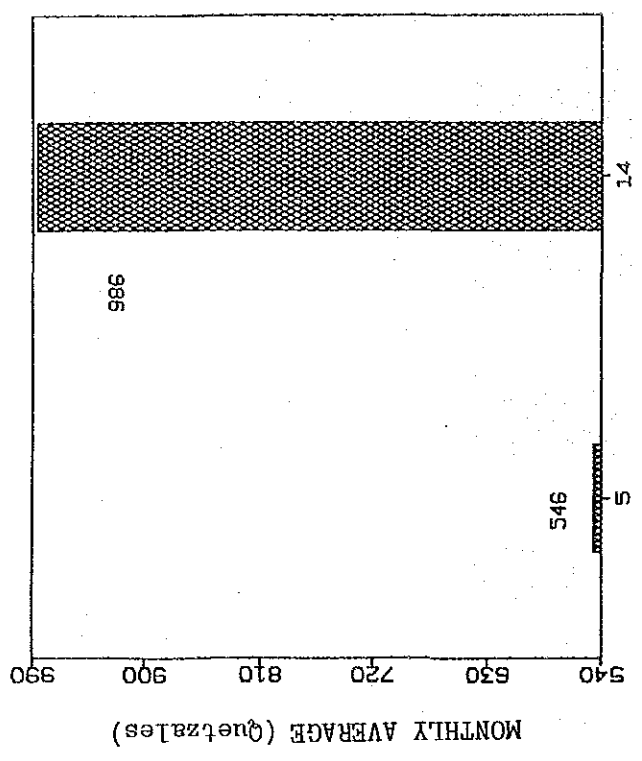
Fig. 3.2.13 Percentage of Repairing Time of Trailers

Fig. 3.2.14 Monthly Average Cost of Parts for Trailers



Period : from the year of purchase to 1987

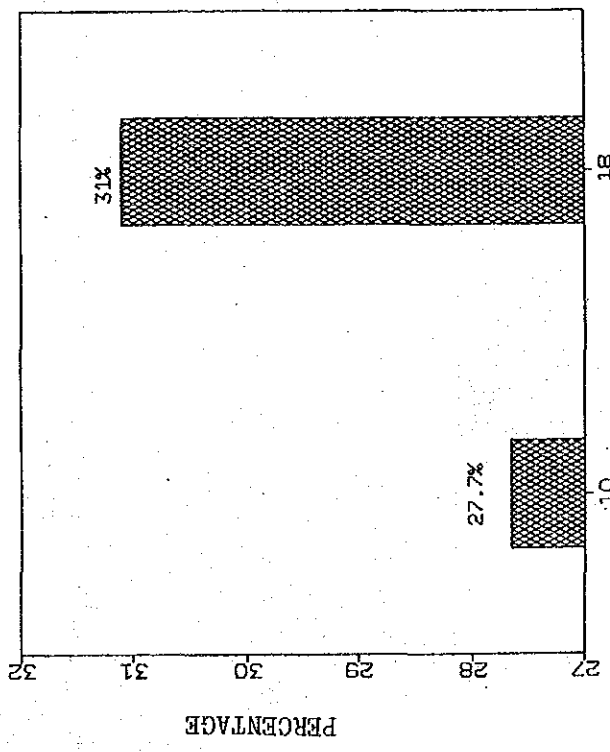
Note : The figures are computed by summing up the repairing time of payloaders from 1983 to the present.



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the cost of payloader parts from 1983 to the present.

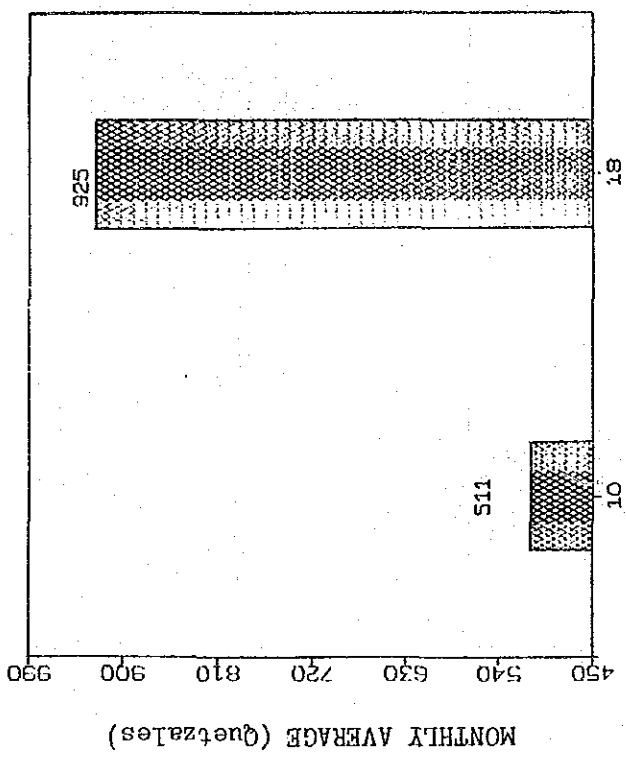
Fig. 3.2.15 Percentage of Repairing Time of Payloaders Fig. 3.2.16 Monthly Average Cost of Parts for Payloaders



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the repairing time of mobile cranes from 1983 to the present.

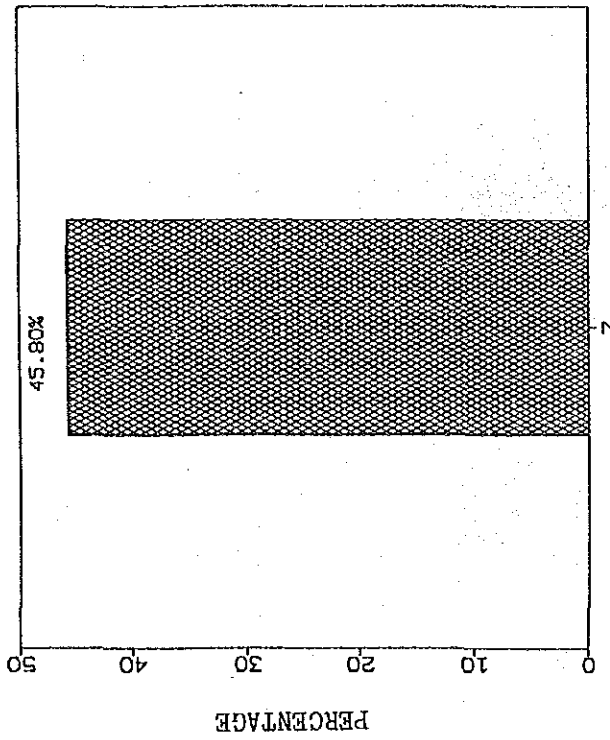
Fig. 3.2.17 Percentage of Repairing Time of Mobile Cranes



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the cost of mobile crane parts from 1983 to the present.

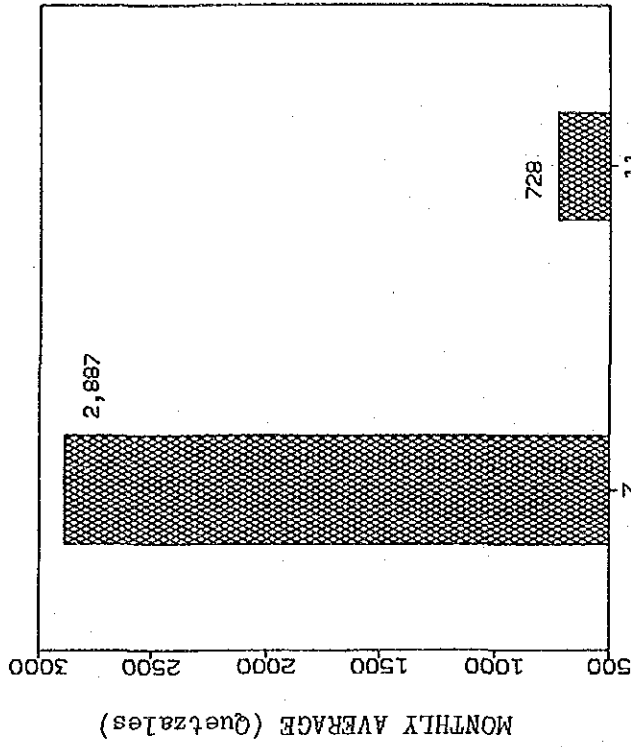
Fig. 3.2.18 Monthly Average Cost of Parts for Mobile Cranes



Period : from the year of purchase to 1987

Note : The figures are computed by summing up the repairing time of straddle carriers from 1983 to the present.

Fig. 3.2.19 Percentage of Repairing Time of Straddle Carriers



Period : from the year of purchase to, 1987

Note : The figures are computed by summing up the cost of straddle carrier parts from 1983 to the present.

Fig. 3.2.20 Monthly Average Cost of Parts for Straddle Carriers

CHAPTER 4 PORT ACTIVITY IN SANTO TOMAS DE CASTILLA

4.1 Cargo Handling in the Port

4.1.1 Cargo Handling Volume

(1) Cargo movement at the port

Since it was opened as the first modern port in Guatemala in 1955, the port of Santo Tomas de Castilla has been the most important port in Guatemala in terms of both foreign trade and total handling volume. The port of Santo Tomas de Castilla (hereinafter the Port), which is located at the edge of the Caribbean sea, is geographically advantageous for international trade with the United States, Europe and Caribbean countries and has played an important role as the key port for the Guatemalan economy. The cargo handling volume at the Port during the past 11 years is shown in the Table 4.1.1. The cargo handling volume at the Port has gradually increased throughout the period except for a few years, and 2,323 thousand tons of cargo with 1,092 thousand tons of exports and 1,231

Table 4.1.1 Cargo Handling Volume (tons)

Year	Export	Import	Total	G.R.(%)
1976	601,309	735,151	1,336,460	---
1977	482,639	819,809	1,302,448	- 2.5
1978	405,411	1,037,529	1,405,411	7.9
1979	482,129	961,215	1,443,344	2.7
1980	575,607	1,004,208	1,579,815	9.5
1981	492,244	1,157,879	1,650,123	4.4
1982	654,676	1,067,223	1,721,899	4.3
1983	795,185	956,273	1,751,458	1.7
1984	841,387	1,070,297	1,911,684	9.1
1985	876,894	1,176,773	2,053,667	7.4
1986	1,091,984	1,231,444	2,323,428	13.1

Source : Informe Estadistico (EMPORNAC)

Note : Including container boxes and trailers

thousand tons of imports were handled in 1986. The average annual growth rate of the handling volume in this period is 5.7%, and the growth rate in

the first 5 years and the second 5 years is 4.3% and 7.1%, respectively. Especially in the recent 3 years, the growth rate of the total handling volume has remarkably increased at an annual rate of 10%. The growth rates of the handling volume of exports and imports are 17.3% and 1.2% respectively in the second 5 years. The growth rate of the total cargo has been sustained by the export cargo, which consists of bananas, crude oil, coffee and other agricultural products. As for the import cargo the major commodities are fertilizer with a relatively high portion of the total, paper, petroleum products, chemical goods, propane gas and wheat. The economy of Guatemala has turned stagnant since 1980. However, the total handling volume at the Port has steadily increased despite the recession.

(2) Movement of Major Commodities

The major export and import commodities handled at the Port during the second 5 years are presented in Table 4.2 and Table 4.3, respectively. The major export commodities are bananas, coffee and crude oil, which account for 73.6% of total export cargo in 1986. Five years ago, however, sugar was also a leading export item. The major import commodities are fertilizer, diesel oil, chemical goods, petroleum products, propane gas and paper which together account for 60% of the total import volume.

a) Bananas

Bananas, which are a major export commodity at the Port, are mainly produced in Izabal. The production and exportation of bananas is conducted by BANDEGUA, and the bananas are transported by truck and railway from the production farm (Finca). The reason for the rapid increase of export volume since 1983 is that BANDEGUA has begun to change its export port from Puerto Barrios to the Port. Therefore, bananas produced by BANDEGUA are now exported from the port of Santo Tomas de Castilla to the United States and European countries.

b) Coffee

Coffee is the most important export earner of Guatemala, and accounts for 35% of the total exports. The handling volume at the Port represents

Table 4.1.2 Major Export Commodities

(Unit: Tons)

COMMODITY	1982	1983	1984	1985	1986
SESAME	10,704 (1.6%)	8,271 (1.0%)	14,436 (1.7%)	17,042 (1.9%)	17,037 (1.6%)
SUGAR	90,267 (13.8%)	14,828 (1.9%)	2,404 (0.3%)	400 (0.1%)	-----
COFFEE	156,881 (24.0%)	124,243 (15.6%)	151,316 (18.0%)	199,018 (22.7%)	177,962 (16.3%)
FRUIT	18,495 (2.8%)	18,968 (2.4%)	26,912 (3.2%)	34,902 (4.0%)	55,556 (5.1%)
CRUDE OIL	222,069 (33.9%)	309,905 (39.0%)	177,391 (21.1%)	64,964 (7.4%)	253,191 (23.2%)
BANANAS	6,329 (1.0)	177,487 (22.3%)	297,583 (35.4%)	356,913 (40.7%)	372,921 (34.1%)
OTHERS	149,931 (22.9%)	141,183 (12.8%)	171,346 (20.3%)	203,655 (23.2%)	215,317 (19.7%)
TOTAL	654,676 (100 %)	794,885 (100 %)	841,388 (100 %)	876,894 (100 %)	1,091,984 (100 %)

SOURCE: Informe Estadístico, EMPORNAC.

Table 4.1.3 Major Import Commodities (Unit: Tons)

COMMODITY	1982	1983	1984	1985	1986
FERTILIZER	172,502 (16.2%)	122,514 (12.8%)	189,906 (17.7%)	154,336 (13.1%)	214,832 (17.4%)
DIESEL AND FUEL	80,797 (7.6%)	66,369 (6.9%)	43,072 (4.0%)	130,051 (11.1%)	107,624 (8.7%)
GASOLINE	102,592 (9.6%)	76,455 (8.0%)	78,772 (7.4%)	84,008 (7.1%)	77,463 (6.3%)
OTHER PETROLEUM PRODUCTS	106,784 (10.0%)	137,930 (14.4%)	97,803 (9.1%)	43,089 (3.7%)	27,271 (2.2%)
OTHER CHEMICAL PRODUCTS	72,666 (6.8%)	61,120 (6.4%)	72,702 (6.8%)	78,767 (6.7%)	68,808 (5.6%)
PAPER	99,600 (9.3%)	104,977 (11.0%)	91,821 (8.6%)	111,684 (9.5%)	119,187 (9.7%)
LPG	-----	-----	53,892 (5.0%)	60,132 (5.1%)	71,710 (5.8%)
WHEAT	54,517 (5.1%)	54,850 (5.7%)	61,651 (5.8%)	74,587 (6.3%)	54,206 (4.4%)
OTHERS	377,768 (35.4%)	332,058 (34.8%)	380,678 (35.6%)	439,719 (37.4%)	490,344 (39.9%)
TOTAL	1,067,225 (100 %)	956,273 (100 %)	1,070,297 (100 %)	1,176,773 (100 %)	1,231,445 (100 %)

SOURCE: Informe Estadístico, EMPORNAC.

about 20% of exports. The average growth rate of coffee exports during the period is 2.7%. However, the export volume is greatly influenced by the volatile climate. Nevertheless, the share of coffee in total exports at the Port remains high because of the geographical advantages of the Port for export to the United States and the European Community.

c) Crude Oil

Crude oil produced in Alta Verapaz near the Mexican border is directly transported by pipeline. The production and exportation of crude oil is conducted by HISPANOIL, and the oil is exported to the United States. The export volume is influenced by the world market. The export volume increased at an annual growth rate of 2.8% over the past 4 years.

d) Fertilizer

Guatemala has increased the importation of fertilizer in order to improve the yield of agricultural products. Imports at the Port have increased at an annual rate of about 6% with some fluctuations.

e) Diesel & Other Fuel Oil and Gasoline

Diesel and other fuel oil are usually consumed by the industry and transport sectors so the consumption volume is sensitive to the economic condition. However, the import volume shows a relatively high annual growth rate of 7.4%. On the other hand, the volume of imported gasoline which is consumed for private use has remained constant due to the stagnation of private income and consumption.

f) Other Petroleum Products and Gas Propane (LPG)

Other petroleum products are also consumed by the industry and transport sectors which are sensitive to the economic climate. The import volume in 1984 showed a rapid decrease because of a new statistical procedure separating out LPG. Although the volume of LPG shows a steady increase in private consumption, the volume of other petroleum products has decreased almost 50% annually since 1984.

g) Paper and Printed Paper

The volume of imported paper and printed paper increased 4.5% annually. These products are used as private consumption goods in relation with the improving standard of living.

4.1.2 Cargo Flow at the Port

(1) Trade Partners

The import and export cargoes handled at the Port show clear trends. The cargo movement in the past 5 years by trade partner is presented in Table 4.1.4. The table shows that the major trade partners of the Port are the United States, Europe and the Antilles, which together account for more than 90% of the total cargo handling volume. This high share also indicates that the Port has geographical advantages and historical relations with these countries.

The share to and from the United States, in particular, has rapidly increased from 50% in 1982 to 73% in 1986. On the contrary, the shares of Europe and the Antilles have gradually decreased. However, there is no doubt that the leading trade partners of the Port are the United States and European countries.

As for the commodities shipped to and from the United States, the volume of each commodity and the share of each commodity shipped to the U.S. in 1986 are shown in Table 4.1.5. The three major export commodities of coffee, bananas and crude oil account for 73.3% of the total export volume to the United States, and the shares of these commodities sent to the U.S. are 70.0%, 66.3% and 100%, respectively. On the other hand, the shares of the major import commodities of fertilizer, diesel and other fuel oils, gasoline, paper, LPG and wheat imported from the U.S. account for 37.2%, 83.0%, 74.3%, 49.1%, 97.8%, and 100% respectively of the total import volumes of these commodities at the Port.

Table 4.1.4 Trade Partners of the Port

<Unit : tons>

Partner	1982	1983	1984	1985	1986
Central America	10,817 (0.7%)	8,808 (0.5%)	19,860 (1.0%)	6,742 (0.3%)	8,579 (0.4%)
Mexico	14,110 (0.8%)	14,369 (0.8%)	1,771 (0.1%)	679 (----)	4,733 (0.2%)
United States	855,287 (49.7%)	1,051,649 (60.0%)	1,122,273 (58.7%)	1,335,036 (65.1%)	1,704,629 (73.4%)
Canada	15,055 (0.9%)	14,892 (0.9%)	11,756 (0.6%)	8,407 (0.4%)	23,282 (1.0%)
South America	42,624 (2.5%)	50,162 (2.9%)	28,221 (1.5%)	48,517 (2.4%)	41,523 (1.8%)
Europe	407,614 (23.7%)	236,560 (13.5%)	334,215 (17.5%)	358,336 (17.5%)	393,237 (16.9%)
Japan	1,239 (0.1%)	126 (----)	2,496 (0.1%)	3,110 (0.2%)	4,364 (0.2%)
Africa	19,195 (1.1%)	843 (0.1%)	209 (----)	2,317 (0.1%)	5,820 (0.3%)
Asia	175 (----)	109 (----)	98 (----)	3,186 (0.2%)	512 (----)
Middle East	20,340 (1.2%)	17,600 (1.0%)	24,243 (1.3%)	42,451 (2.1%)	65,499 (2.8%)
Antilles	335,443 (19.5%)	356,340 (20.4%)	366,540 (19.2%)	244,844 (11.9%)	71,249 (3.1%)
Total	1,721,889 (100.0%)	1,751,458 (100.0%)	1,911,685 (100.0%)	2,053,667 (100.0%)	2,323,428 (100.0%)

Source: Informe Estadístico, EMPORNAC

Table 4.1.5 Cargo Volume to and from the United States in 1986

<Unit: thousand tons>

Export	to U.S.A.	Total	Share (%)
Coffee	124.3	178.0	70.0
Bananas	247.1	327.9	66.3
Crude oil	253.2	253.2	100.0
Others	227.6	287.9	79.1
Sub total	852.2	1,092.0	78.0
Import	from U.S.A.	Total	Share (%)
Fertilizer	79.9	214.8	37.2
Diesel & other fuel oils	89.3	107.6	83.0
Gasoline	57.6	77.5	74.3
Paper	58.5	119.2	49.1
LPG	70.1	71.7	97.8
Wheat	54.2	54.2	100.0
Others	442.8	586.4	75.5
Sub total	852.4	1,231.4	69.2
Total	1,704.6	2,323.4	73.4

Source: Informe Estadístico, EMPORNAC

(2) Hinterlands of Cargoes Handled at the Port

Bananas, coffee and crude oil are transported by truck and railway (FEGUA) from the producing farm (Finca). The bananas handled at the Port are produced in Izabal by BANDEGUA, and about 90% of the total production of the Republic is exported through the Port. And 100% of the crude oil produced in Alta Verapaz is directly transported from the oil field using the exclusive pipeline. Although the coffee farms (Finca) are located in the mountainous area near to the port of Quetzal facing the Pacific Ocean, the port of Santo Tomas de Castilla has geographical advantage for the export partners which are mainly the United States and the European Community. Therefore, 90% of the total coffee exports are handled at the Port.

As for the major imported commodities, almost all commodities except fertilizer are utilized for the industry and transport sectors and for private consumption. Therefore, these are distributed to the Department of Guatemala, which is the center of the economic and social activities of the nation and the center of the national demand.

4.1.3 Cargo Handling by Packing Type

(1) Containers

1) Number of Boxes

20', 35' and 40' containers are handled at the port at present. In 1986, the container cargo volume amounted to 68,492 TEU, showing an increase of 8% from the preceding year. Since container handling started in 1976, there has been a continuous increase in the cargo volume. The average increase rate over the seven years from 1980 to 1986 is 11.7%. A detailed breakdown by year is shown in Table 4.1.6.

2) Net Cargo Volume

In 1986, the net volume of container cargo excluding tare weight was 470,324 metric tons. The volumes of imports and exports are 186,073 tons and 284,251 tons, respectively. The historical trend of the volume is set forth in Table 4.1.7.

Table 4.1.7 Container Cargo Volume

Year	Unit: MT		
	Total	Import	Export
1976	14,375	6,494	7,906
1977	108,279	48,726	59,554
1978	224,284	100,928	123,356
1979	323,064	145,379	177,685
1980	253,714	113,704	140,010
1981	250,997	106,979	144,018
1982	254,183	104,151	150,032
1983	296,532	149,533	146,999
1984	340,392	177,170	163,222
1985	445,720	177,407	268,313
1986	470,324	186,073	284,251

Source: EMPORNAC

Table 4.1.6 Number of Containers Handled at the Port

YEAR	NO. OF BOXES		TEU EMPTY	STUFFED	TOTAL	STUFFED	TEU EMPTY	TOTAL	BOXES/TEU	
	STUFFED	EMPTY							STUFFED	EMPTY
1976	436	115	551	610.40	781.75	171.35	1.40	1.49	1.40	1.49
1977	5,383	124	5,507	7,536.20	7,720.96	184.76	1.40	1.49	1.40	1.49
1978	7,409	4,157	11,566	10,372.60	16,566.53	6,193.93	1.40	1.49	1.40	1.49
1979	9,807	5,842	15,649	13,729.80	22,434.38	8,704.58	1.40	1.49	1.40	1.49
1980	4,289	7,765	12,054	6,003.50	17,596.50	11,589.00	1.40	1.49	1.40	1.49
1981	4,614	7,755	12,369	6,021.75	16,996.50	10,974.75	1.31	1.42	1.31	1.42
1982	7,880	4,968	12,848	11,567.00	19,414.00	17,847.00	1.50	1.39	1.50	1.39
1983	8,561	4,264	12,825	11,826.50	19,702.00	6,876.00	1.54	1.44	1.54	1.44
1984	11,148	4,264	15,412	17,211.00	23,366.00	6,155.00	1.56	1.57	1.56	1.57
1985	11,923	8,457	20,380	18,599.00	31,884.00	13,285.00	1.56	1.57	1.56	1.57
1986	11,836	9,533	21,419	19,519.00	34,871.00	15,352.00	1.64	1.61	1.64	1.61
1976	628	46	674	942.00	1,007.32	65.32	1.50	1.42	1.50	1.42
1977	2,769	621	3,390	4,153.50	7,875.32	3,721.82	1.50	1.42	1.50	1.42
1978	8,566	3,266	11,832	12,849.00	17,486.72	4,637.72	1.50	1.42	1.50	1.42
1979	11,607	3,329	14,936	17,410.50	22,137.68	4,727.18	1.50	1.42	1.50	1.42
1980	3,433	8,759	12,192	5,160.00	17,639.00	12,479.00	1.36	1.35	1.36	1.35
1981	9,364	2,854	12,197	12,766.00	16,815.00	3,849.00	1.40	1.34	1.40	1.34
1982	9,448	2,749	12,197	13,190.00	16,878.00	3,688.00	1.46	1.42	1.46	1.42
1983	9,393	3,740	13,133	13,700.00	19,022.00	5,322.00	1.54	1.42	1.54	1.42
1984	11,273	4,110	15,383	17,353.00	23,201.00	5,848.00	1.54	1.42	1.54	1.42
1985	15,809	4,418	20,227	25,049.00	31,523.00	6,476.00	1.58	1.47	1.58	1.47
1986	16,646	4,078	20,724	27,407.00	33,621.00	6,214.00	1.65	1.52	1.65	1.52
1976	1,064	161	1,225	1,552.40	1,789.07	236.67	1.46	1.47	1.46	1.47
1977	8,152	2,745	10,897	11,689.70	15,596.28	3,906.58	1.43	1.42	1.43	1.42
1978	15,975	7,423	23,398	23,221.60	34,053.25	10,831.65	1.45	1.46	1.45	1.46
1979	21,414	9,171	30,585	31,140.30	44,572.06	13,431.76	1.45	1.46	1.45	1.46
1980	7,722	16,524	24,246	11,163.75	35,231.75	24,068.00	1.45	1.46	1.45	1.46
1981	13,978	10,609	24,587	18,788.50	35,311.25	14,823.25	1.45	1.46	1.45	1.46
1982	17,328	8,703	26,031	24,756.50	36,290.75	11,534.25	1.48	1.40	1.48	1.40
1983	17,954	8,703	26,657	26,526.25	38,723.75	12,197.50	1.48	1.40	1.48	1.40
1984	25,421	8,374	33,795	37,564.00	49,567.00	12,003.00	1.48	1.43	1.48	1.43
1985	27,732	12,875	40,607	43,647.50	63,409.00	19,761.50	1.57	1.48	1.57	1.48
1986	28,532	13,611	42,143	46,926.00	68,491.75	21,565.75	1.64	1.58	1.64	1.58

Source: EMPORNAC

3) Calling Vessels

Most of the containers handled at the Port are transported by full container ships. Some of the containers are carried by mixed type vessels comprising mainly Con-Ro ships and conventional vessels. A few of the containers are carried by Ro-Ro vessels. The numbers of the containers handled in 1986 by vessel type are indicated in Table 4.1.8.

Table 4.1.8 Number of Containers in TEU by Vessel Type

Vessel Type	Import		Export		Total		Share %	
	Stuffed	Empty	Stuffed	Empty	Stuffed	Empty		
Container	16,419	13,000	23,890	4,547	40,309	17,547	57,856	84.5
Mixed	1,055	2,035	2,420	416	3,475	2,451	5,926	8.7
Conventional	1,907	264	604	1,039	2,511	1,303	3,814	5.6
Ro-Ro	138	53	491	85	629	138	767	1.1
Dry Bulk			2	127	2	127	129	0.2
Total	19,519	15,352	27,407	6,214	46,926	21,566	68,492	100.0

Source: EMPORNAC

The container ships ply two main routes, the Europe route and the U.S.A. route. The former route has larger vessels. The sizes and principal dimensions of the typical container ships on the Europe route are shown in Table 4.1.9.

Table 4.1.9 Representative Container Ships on the Europe Route

No	Destination	Gross Tonnage	D.W.T.	L.O.A. (M)	Full Draft (M)
1	England	28,031	22,857	204	-
2	France	27,365	26,046	204	-
3	West Germany	27,939	23,051	204	-
4	West Germany	27,936	23,046	204	10
5	Netherlands	27,770	23,232	204	10

Source: EMPORNAC

The loading capacity of these vessels varies approximately from 1,300 TEU to 1,500 TEU. These vessels regularly call at ports in the Caribbean Islands and neighboring countries in Central America such as San Jose, Kingston, Cortes and Limon on the way to and from European Ports.

On the other hand, there are smaller vessels on the U.S.A. route. The sizes and principal dimensions of these vessels are presented in Table 4.1.10.

Table 4.1.10 Representative Container Ships on the U.S.A. Route

No	Destination	Gross Tonnage	D.W.T.	L.O.A. (M)	Full Draft (M)
1	U.S.A.	10,676	15,000	157	8.0
2	U.S.A.	8,635	12,000	137	8.0
3	U.S.A.	8,428	12,000	133	7.6
4	U.S.A.	5,645	8,945	133	6.6
5	U.S.A.	7,466	8,007	117	6.6

Source: EMPORNAC

There are actually two main U.S.A. routes as follows:

New Orleans - Everglades(Florida) - Cortes - Santo Tomas

New Orleans - Limon - Santo Tomas - Everglades

The numbers of container ships which called at Santo Tomas in 1986 by DWT are indicated in Table 4.1.11.

Table 4.1.11 Number of Container Ships in 1986

D.W.T.	No. of Container Ships
Under 1,000	18
1,001 -- 3,000	52
3,001 -- 5,000	27
5,001 -- 7,000	29
7,001 -- 10,000	21
10,001 -- 15,000	57
20,001 -- 30,000	33

Source: EMPORNAC

4) Ratio of Containerized Cargoes

The ratio of containerized cargoes is computed by dividing the net cargo volume of containers by the total volume of containerizable cargoes including those which are transported by container at present.

As for liquid bulk cargoes, crude petroleum, gasoline, kerosene, diesel and other fuel and propane gas except for other refined oils such as lubricants are transported by petroleum tanker. Most of the vegetable and animal oils and fats are also transported by tanker. As for dry bulk cargoes, wheat is transported by bulk carrier. A great portion of maize and fertilizer are carried by bulk carrier and a small portion of these cargoes are carried by conventional vessels. Therefore, it is assumed that these cargoes can not be containerized.

Thus, containerizable cargoes are selected, and the ratio of containerized cargoes is calculated. The ratio from 1976, the starting year of containerization at the Port, to the year 1987 is shown in Table 4.1.12.

Table 4.1.12 Historical Trend of Containerization

Year	Unit: MT, %					
	Total		Import		Export	
	Cargo Volume	%	Cargo Volume	%	Cargo Volume	%
1976	14,375	1.2	6,496	1.1	7,906	1.3
1977	108,279	9.9	48,726	7.9	59,554	12.5
1978	224,284	19.7	100,928	13.7	123,356	31.0
1979	323,064	28.9	145,379	22.7	177,685	37.0
1980	253,714	25.8	113,704	19.0	140,010	36.4
1981	250,997	26.0	106,979	16.3	144,018	47.0
1982	254,183	28.2	104,151	19.1	150,032	41.9
1983	296,532	31.2	149,533	28.1	146,999	35.3
1984	340,392	30.6	177,170	33.2	163,222	28.2
1985	445,720	35.9	177,407	33.4	268,313	37.7
1986	470,324	38.4	186,073	37.7	284,251	38.8

Source: EMPORNAC

5) Containerized Cargo Volume by Commodity

As mentioned above, around 85% of containers were transported by full container ships in 1986. In Table 4.13 and Table 4.14 the entire cargo volume handled at the port in 1986 and the volume transported by container ship are presented by commodity. According to these tables, bananas and coffee beans are the major export products, accounting for 54.7% and 26.1% of total exports. In this year, 69.9% of the coffee beans were transported by container ship. However, container ships transported only 11.3% of the bananas. Most of the bananas were transported by conventional vessels specialized for perishable agricultural products.

On the other hand, there were very few manufactured export products. Except for fertilizer and animal and vegetable oils and fats as bulk cargoes, 37.9% of imported manufactured products were transported by container ship and 49.4% of the products were carried by conventional vessels.

6) Drafts of Container Ships in Entrance and Departure

The draft distribution of container ships calling at the Port in 1986 is indicated in Table 4.1.15.

Table 4.1.13 (1/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(All Vessels) Unit: MT

Commodity	Import	Export	Total
Agricultural & Marine Products			
Bananas		372,922	372,922
Coffee Beans		177,981	177,981
Plantains		5,821	5,821
Cotton including Flocks	21	8,116	8,137
Cotton Seeds	0	93	93
Other Seeds	340	1,376	1,716
Wheat	54,206		54,206
Basic Grains	17,314	34	17,349
Fruits and Vegetables	481	55,545	56,026
Crude Tobacco		3,550	3,550
Honey		4,408	4,408
Sesame		17,037	17,037
Cardamom	44	8,913	8,957
Spices	10	355	365
Other Agricultural Products	32	60	92
Cassava		949	949
Rice	915		915
Kidney Beans	165	33	199
Maize	19,877		19,877
Meat	211	7,492	7,703
Fishes, Oysters & Clams		146	146
Shrimps & Lobsters	17	4,222	4,239
Unmanufactured jute	0		0
Forest Products	13	13,125	13,138
Sub Total	93,646	682,180	775,826
Minerals			
			0
Coal	164	102	226
Metallic Minerals	2	22	25
Other Minerals	67	22	90
Marble		1,130	1,130
Sub Total	234	1,277	1,510
Petroleum			
Crude Petroleum & Natural Gas		253,191	253,191
Gasoline	77,463		77,463
Kerosene	19,758		19,758
Diesel and Other Fuel Oils	107,624		107,624
Propane Gas	71,711		71,711
Other Refined Petroleum	27,277	21	27,298
Sub Total	303,832	253,212	557,044

Table 4.1.13 (2/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(All Vessels) Unit: MT

Commodity	Import	Export	Total
Manufactured Products			
Other Foods	39,254	3,986	43,240
Vegetable & Animal Oils & Fats	61,466	328	61,794
Malt	4,732		4,732
Alcoholic Beverages	1,134	473	1,607
Tobacco, Products	10	121	130
Textiles, Clothing & Leather	17,913	11,574	29,487
Sawed Timber	140	7,563	7,702
Wood Products except Furniture	5,538	2,113	7,651
Wooden Furniture	46	495	541
Paper & Paper Products	119,116	614	119,729
Fertilizer	214,832	2	214,834
Insecticide	7,298	2,432	9,730
Fibers, Resin & Plastic Material	48,889	602	49,491
Other Chemical Products	68,751	2,242	70,993
Pharmaceutical Products	1,742	606	2,348
Rubber Products	3,489	2,266	5,755
Plastic Products	7,840	901	8,741
Soil, Chinaware, Porcelain, Glass	10,681	7,860	18,541
Clay, Concrete & Others	6,837	42	6,880
Cement, Lime & Plaster	158	23	181
Products of Base Metals	34,495	988	35,484
Other Metallic Products	51,247	2,219	53,466
Products of Metallic Structures	3,355	97	3,452
Machinery and Equipment	12,944	1,619	14,563
Electric Machinery & Equip.	9,424	249	9,673
Transport Equipment	428	105	533
Automobiles	6,367	243	6,610
Spare Parts for Vehicles	2,589	79	2,668
Other Industrial Products	10,534	1,485	12,018
Sub Total	751,249	51,328	802,576
Tares of Stuffed Containers	36,240	53,444	89,685
Tares of Empty Containers	32,230	13,866	46,096
Tares of Stuffed Trailers	24,742	32,509	57,251
Tares of Empty Trailers	17,772	6,430	24,203
Tares of Flatbeds	211	83	293
Sub Total	111,195	106,333	217,528
Others	243	48	290
Grand Total	1,260,398	1,094,377	2,354,775

Table 4.1.14 (1/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(Container Vessels) Unit: MT, %

Commodity	Import Share		Export Share		Total Share	
Agricultural & Marine Products						
Bananas			42,116	11.3	42,116	11.3
Coffee Beans			124,326	69.9	124,326	69.9
Plantains			377	6.5	377	6.5
Cotton including Flocks	21	100.0	4,267	52.6	4,288	52.7
Cotton Seeds	0	100.0	54	58.0	54	58.1
Other Seeds	221	62.1	1,043	75.8	1,254	73.1
Wheat	491	0.9			491	0.9
Basic Grains	765	4.4	34	100.0	800	4.6
Fruits and Vegetables	245	50.9	14,420	26.0	14,665	26.2
Crude Tobacco			1,112	31.3	1,112	31.3
Honey			2,901	65.8	2,901	65.8
Sesame			11,373	66.8	11,373	66.8
Cardamom	44	100.0	6,395	71.7	6,439	71.9
Spices	9	90.0	231	65.0	240	65.7
Other Agricultural Products	32	100.0			32	34.8
Cassava			189	19.9	189	19.9
Rice						
Kidney Beans			19	56.4	19	9.5
Maize						
Meat	194	92.1	2,416	32.2	2,610	33.9
Fishes, Oysters & Clams			41	28.4	41	28.4
Shrimps & Lobsters			1,102	26.1	1,102	26.0
Unmanufactured jute						
Forest Products	1	10.9	12,191	92.9	12,193	92.8
Sub Total	2,014	2.2	224,606	32.9	226,620	29.2
Minerals						
Coal	61	37.1	102	100.0	163	61.2
Metallic Minerals	1	35.3			1	3.1
Other Minerals	67	100.0			67	75.2
Marble			352	31.2	352	31.2
Sub Total	129	55.2	454	35.6	583	38.6
Petroleum						
Crude Petroleum & Natural Gas						
Gasoline						
Kerosene						
Diesel and Other Fuel Oils	728	0.7			728	0.7
Propane Gas	0	0.0			0	0.0
Other Refined Petroleum	17,831	65.4	21	100.0	17,852	65.4
Sub Total	18,559	6.1	21	0.0	18,580	3.3

Table 4.1.14 (2/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(Container Vessels) Unit: MT, %

Commodity	Import Share		Export Share		Total Share	
Manufactured Products						
Other Foods	16,640	42.4	2,349	58.9	18,989	43.9
Vegetable & Animal Oils & Fats	523	0.9	292	89.0	815	1.3
Malt						
Alcoholic Beverages	742	65.5	222	46.9	964	60.0
Tobacco, Products	10	100.0	121	100.0	130	100.0
Textiles, Clothing & Leather	5,988	33.4	6,031	52.1	12,019	40.8
Sawed Timber	138	98.7	4,014	53.1	4,152	53.9
Wood Products except Furniture	867	15.6	1,933	91.5	2,800	36.6
Wooden Furniture	34	74.4	324	65.3	358	66.1
Paper & Paper Products	28,577	24.0	495	80.7	29,072	24.3
Fertilizer	96	0.0	2	100.0	98	0.0
Insecticide	3,270	44.8	575	23.7	3,845	39.5
Fibers, Resin & Plastic Material	40,035	81.9	561	93.2	40,596	82.0
Other Chemical Products	17,834	25.9	1,096	48.9	18,929	26.7
Pharmaceutical Products	818	47.0	475	78.3	1,293	55.1
Rubber Products	1,490	42.7	165	7.3	1,655	28.8
Plastic Products	5,890	75.1	388	43.1	6,278	71.8
Soil, Chinaware, Porcelain, Glass	2,846	26.6	6,734	85.7	9,580	51.7
Clay, Concrete & Others	3,971	58.1	40	94.3	4,011	58.3
Cement, Lime & Plaster	89	56.8	17	73.6	107	59.0
Products of Base Metals	3,515	10.2	956	96.7	4,471	12.6
Other Metallic Products	32,540	63.5	1,407	63.4	33,947	63.5
Products of Metallic Structures	835	24.9	73	75.4	908	26.3
Machinery and Equipment	4,981	38.5	516	31.9	5,497	37.7
Electric Machinery & Equip.	2,658	28.2	171	68.9	2,829	29.2
Transport Equipment	325	75.8	99	94.4	424	79.4
Automobiles	1,299	20.4	32	13.3	1,332	20.1
Spare Parts for Vehicles	783	30.3	64	81.2	848	31.8
Other Industrial Products	3,205	30.4	764	51.4	3,969	33.0
Sub Total	179,997	24.0	29,917	58.3	209,914	26.2
Tares of Stuffed Containers	30,482	84.1	46,586	87.2	77,068	85.9
Tares of Empty Containers	27,293	84.7	10,149	73.2	37,442	81.2
Tares of Stuffed Trailers			36	0.1	36	0.1
Tares of Empty Trailers						
Tares of Flatbeds	211	100.0	83	100.0	293	100.0
Sub Total	57,986	52.1	56,853	53.5	114,839	52.8
Others	189	78.1	47	98.9	237	81.5
Grand Total	258,874	20.5	311,899	28.5	570,773	24.2

Table 4.1.15 Draft Distribution of Container Ships in 1986

Draft Feet (Meters)	No. of Ships in Entrance	No. of Ships in Departure
Under 10.1(3.08)	35	36
10.1-12.0(3.08-3.66)	3	4
12.1-14.0(3.69-4.27)	27	30
14.1-16.0(4.30-4.88)	49	42
16.1-18.0(4.91-5.49)	35	28
18.1-20.0(5.52-6.10)	24	13
20.1-22.0(6.13-6.71)	24	29
22.1-24.0(6.74-7.32)	35	39
24.1-26.0(7.35-7.93)	4	16
26.1-28.0(7.96-8.54)	1	-
Total	237	237

Source: EMPORNAC

7) Cargo-handling System

At the Port, there is a container yard behind No.3 and No.4 Berths. The area is around 5.4 ha. including a yard for refrigerated containers of around 1.2 ha. (see Fig. 4.1.1). Since there are no gantry cranes for handling containers at the Port, only container ships equipped with cranes for loading and unloading containers call at the Port. In the case when containers are on board conventional vessels, containers are handled by ship cranes or by a rail-mounted shore crane with 35 tons lifting capacity owned by EMPORNAC. At the Port, though there is no designated berth for accommodating full container ships exclusively, No.3 and No.4 Berths are mainly used by such vessels. Additionally, although the apron of No.2 Berth has a width of only 8 meters, the berth is often used by container ships, as it is located near the container yard. The percentage of berth use by container ships in 1986 is as follows:

No1: 9.9% No2: 15.1% No3: 33.0% No4: 30.7% No5: 8.0% No6: 3.3%

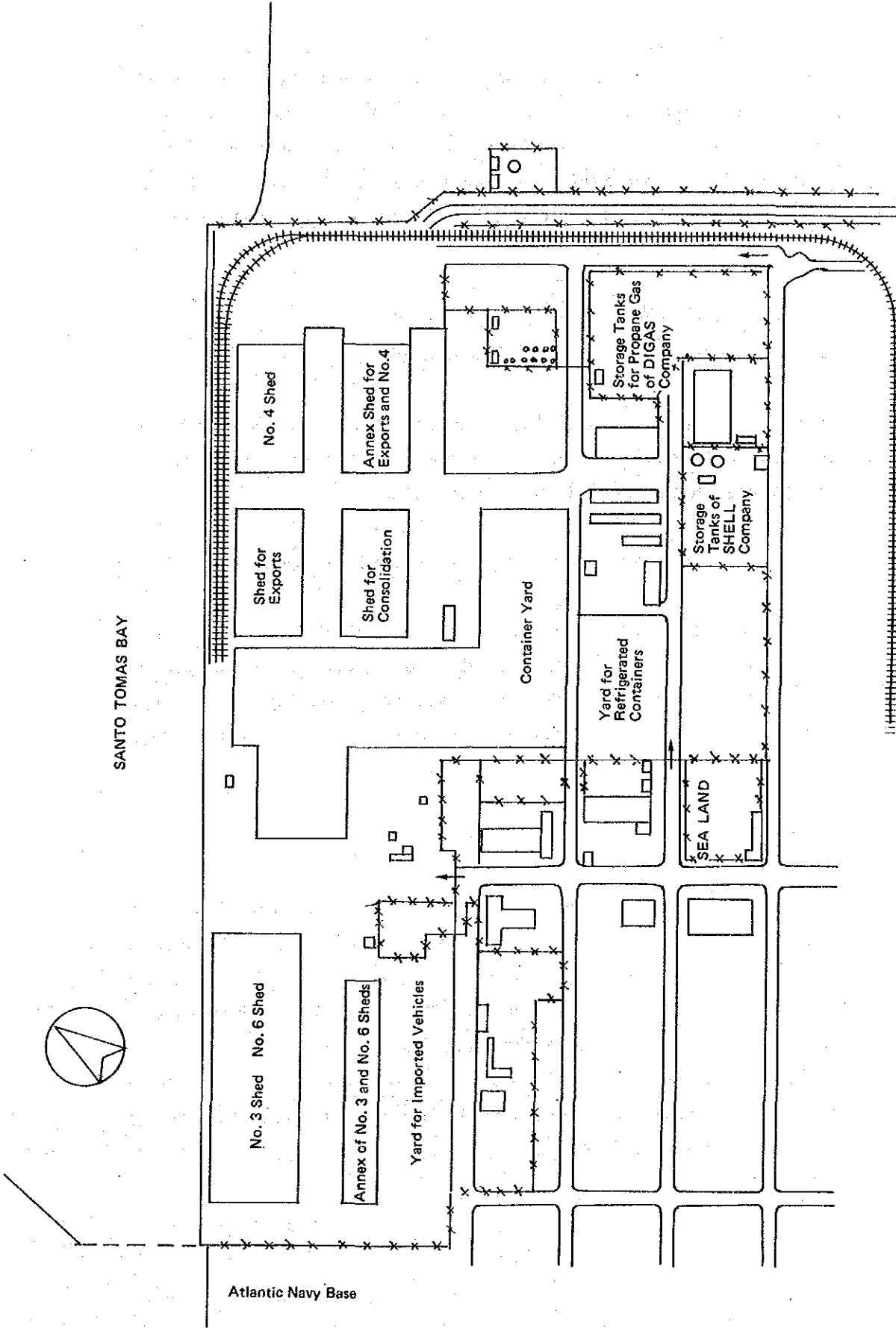
In the case of import containers, after being unloaded from the container ship they are transferred from the apron to the container yard by chassis and then piled up on the yard mainly by straddle carriers but sometimes by forklifts with a lifting capacity of 35 tons. The container yard is managed and operated directly by EMPORNAC without leasing it to any private company. Accordingly, EMPORNAC is responsible for the containers from the apron to the gate. In the case of export containers, the same procedure is applied in reverse.

8) Cargo-handling Productivity

The total berthing time of container vessels in 1986 is 9,382 hours, and the average berthing time per ship is 39.6 hours. The total net cargo volume is 570,773 metric tons, and the total number of containers in TEUs including empty vans is 57,856 TEU. Thus, cargo-handling productivity is computed as follows:

$570,773 \text{ tons} / 9,382 \text{ hours} = 60.8 \text{ tons} / \text{hour}$

$57,856 \text{ TEUs} / 9,382 \text{ hours} = 6.2 \text{ TEUs} / \text{hour}$



SANTO TOMAS BAY

SCALE 1:5000

Fig. 4.1.1 The Port of Santo Tomas de Castilla

9) F.C.L. and L.C.L. Cargoes

Almost 100% of exported coffee beans are L.C.L. cargo. They are stored in the transit shed for exports behind the No.5 Berth and then stuffed in container boxes in and around the container yard. On the contrary, almost 100% of export agricultural and marine products are F.C.L. cargo. As for imported manufactured products, the percentage of F.C.L. and L.C.L. cargoes are as follows:

The U.S.A. Route: F.C.L. : 63%, L.C.L.: 37%

The Europe Route: F.C.L. : 25%, L.C.L.: 75%

Devanning of the imported L.C.L. cargoes is carried out at the platform of the shed for consolidation behind the shed for exports, and the cargoes are then stored in the shed for consolidation.

The average times of storage in the container yard are as follows:

Exported Coffee in Containers: one day after being stored in the shed
for four days and stuffed in containers

Imported Manufactured Products: for destinations in Guatemala: 8 days
for El Salvador : 14 days

(2) Break Bulk

1) Calling Vessels

Break bulk cargoes are transported by conventional vessels. The volume of cargoes in 1986 is 610,170 metric tons. The volume of bananas accounts for 54.2% of the total and most of the rest is various manufactured products imported from abroad (see Table 4.1.16). Bananas are loaded into vessels specialized for banana transportation. In 1986, 414 conventional vessels called at the Port. Out of these, 174 vessels transported bananas exclusively. The numbers of conventional vessels by D.W.T. are indicated in Table 4.1.17.

Table 4.1.16 (1/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(Conventional Vessels) Unit: MT, %

Commodity	Import Share		Export Share		Total Share	
Agricultural & Marine Products						
Bananas			330,767	88.7	330,767	88.7
Coffee Beans			5,601	3.1	5,601	3.1
Plantains			3,822	65.7	3,822	65.7
Cotton including Flocks			30	0.4	30	0.4
Cotton Seeds						
Other Seeds	126	37.1	107	7.8	233	13.6
Wheat	91	0.2			91	0.2
Basic Grains	5,355	30.9			5,355	30.9
Fruits and Vegetables			435	0.8	435	0.8
Crude Tobacco			277	7.8	277	7.8
Honey			661	15.0	661	15.0
Sesame			3,252	19.1	3,252	19.1
Cardamom			124	1.4	124	1.4
Spices						
Other Agricultural Products						
Cassava						
Rice						
Kidney Beans						
Maize	4,943	24.9			4,943	24.9
Meat			234	3.1	234	3.0
Fishes, Oysters & Clams			20	13.8	20	13.8
Shrimps & Lobsters			176	4.2	176	4.2
Unmanufactured jute						
Forest Products			19	0.1	19	0.1
Sub Total	10,516	11.2	345,525	50.7	356,041	45.9
Minerals						
Coal	40	24.3			40	15.0
Metallic Minerals						
Other Minerals						
Marble			21	1.8	21	1.8
Sub Total	40	17.1	21	1.6	61	4.0
Petroleum						
Crude Petroleum & Natural Gas						
Gasoline						
Kerosene						
Diesel and Other Fuel Oils						
Propane Gas						
Other Refined Petroleum	4,305	15.8			4,305	15.8
Sub Total	4,305	1.4			4,305	0.8

Table 4.1.16 (2/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(Conventional Vessels) Unit: MT, %

Commodity	Import Share		Export Share		Total Share	
Manufactured Products						
Other Foods	14,253	36.3	50	1.3	14,303	33.1
Vegetable & Animal Oils & Fats	1,376	2.2	4	1.1	1,380	2.2
Malt	4,732	100.0			4,732	100.0
Alcoholic Beverages	166	14.6	76	16.1	242	15.1
Tobacco Products						
Textiles, Clothing & Leather	2,550	14.2	190	1.6	2,740	9.3
Sawed Timber			3,021	40.0	3,021	39.2
Wood Products except Furniture	4,320	78.0	42	2.0	4,362	57.0
Wooden Furniture	3	6.3	70	14.1	73	13.4
Paper & Paper Products	82,267	69.1	15	2.5	82,282	68.7
Fertilizer	41,273	19.2			41,273	19.2
Insecticide	2,756	37.8			2,756	28.3
Fibers, Resin & Plastic Material	5,908	12.1			5,908	11.9
Other Chemical Products	16,351	23.8	377	16.8	16,728	23.6
Pharmaceutical Products	578	33.2			578	24.6
Rubber Products	469	13.5	1,885	83.2	2,355	40.9
Plastic Products	713	9.1	0	0.0	713	8.2
Soil, Chinaware, Porcelain, Glass	3,612	33.8	318	4.0	3,930	21.2
Clay, Concrete & Others	2,241	32.8	0	0.7	2,241	32.6
Cement, Lime & Plaster	18	11.7			18	10.2
Products of Base Metals	28,708	83.2			28,708	80.9
Other Metallic Products	14,329	28.0	126	5.7	14,455	27.0
Products of Metallic Structures	2,401	71.6			2,401	69.6
Machinery and Equipment	2,505	19.4	1,016	62.8	3,521	24.2
Electric Machinery & Equip	608	6.4	22	8.7	629	6.5
Transport Equipment	25	5.7	6	5.6	30	5.7
Automobiles	1,255	19.7	35	14.2	1,289	19.5
Spare Parts for Vehicles	520	20.1	7	8.4	526	19.7
Other Industrial Products	882	8.4	88	5.9	970	8.1
Sub Total	234,818	31.3	7,347	14.3	242,165	30.2
Tares of Stuffed Containers	3,542	9.8	1,178	2.2	4,720	5.3
Tares of Empty Containers	555	1.7	2,317	16.7	2,872	6.2
Tares of Stuffed Trailers						
Tares of Empty Trailers						
Tares of Flatbeds						
Sub Total	4,097	3.7	3,495	3.3	7,592	3.5
Others	7	3.0			7	2.5
Grand Total	253,783	20.1	356,388	32.6	610,170	25.9

Table 4.1.17 The Number of Conventional Vessels in 1986

Dead Weight Tons	No. of Conventional Vessels
Under 1,001	53
1,001--3,000	31
3,001--5,000	54
5,001--7,000	114
7,001-10,000	76
10,001-15,000	63
15,001-20,000	22
20,000-30,000	1
Total	414

Source: EMPORNAC

The L.O.A. distribution of the conventional vessels which called at the Port in 1986 is indicated in Table 4.1.18.

Table 4.1.18 L.O.A. Distribution of Conventional Vessels in 1986

L.O.A. Feet (Meters)	No. of Vessels
No Data Available	35
51-100 (15.6--30.5)	1
101-150 (30.8--45.8)	7
151-200 (46.1--61.0)	30
201-250 (61.3--76.3)	8
251-300 (76.6--91.5)	43
301-350 (91.8-106.8)	17
351-400 (107.1-122.0)	47
401-450 (122.3-137.3)	72
451-500 (137.6-152.5)	115
501-550 (152.8-167.8)	34
551-600 (168.1-183.0)	5
Total	414

Source: EMPORNAC

2) Drafts of Conventional Vessels in Entrance and Departure

The draft distribution of conventional vessels which called at the Port in 1986 is shown by entrance and departure in Table 4.1.19.

Table 4.1.19 Draft Distribution of Conventional Vessels in 1986

Draft Feet (Meters)	No. of Ships in Entrance	No. of Ships in Departure
Under 10.1 (3.08)	56	69
10.1-12.0 (3.08-3.66)	32	27
12.1-14.0 (3.69-4.27)	27	25
14.1-16.0 (4.30-4.88)	72	34
16.1-18.0 (4.91-5.49)	77	70
18.1-20.0 (5.52-6.10)	81	72
20.1-22.0 (6.13-6.71)	28	69
22.1-24.0 (6.74-7.32)	23	34
24.1-26.0 (7.35-7.93)	9	13
26.1-28.0 (7.96-8.54)	7	1
28.1-30.0 (8.57-9.15)	1	-
30.1-32.0 (9.18-9.76)	1	-
Total	414	414

Source: EMPORNAC

3) Cargo-handling System

At the Port, palletized bananas are loaded by ship crane for the U.S.A. routes. For Europe and Saudi Arabia, bananas are loaded by a specialized loading machine for banana export with a belt conveyer. For palletized bananas, No.4 Transit Shed is mainly used. In this case, bananas are carried by trailers from banana plantations and then unloaded by small forklift on the platform of the shed. In the case when the specialized loading machines are used, bananas packed in cartons are directly loaded from the trailers or freight cars of FEGUA without passing through a transit shed. In this case, 60% of the bananas are transported by railway, and 40% of them by truck.

On the other hand, excluding bananas, most of the cargoes carried by conventional vessels are imported manufactured products. Except for fertilizer, most of them are once stored at No.3 and No.6 Transit Sheds for

imports or at the open storage yard behind the sheds. Automobiles, tractors, steel, oils in drums, etc. are stored in the open storage yard. The average storage time of these cargoes is 15 days.

4) Cargo-handling Productivity

The total berthing time of conventional vessels in 1986 is 16,588 hours, and the average berthing time per ship is 40.1 hours. The total cargo volume is 610,170 metric tons. Thus, cargo handling productivity is computed as follows:

All Conventional Vessels:	610,170 tons/16,588 hours = 36.7 tons/hour
Banana ships	: 305,955 tons/ 6,096 hours = 50.2 tons/hour
Other	: 304,215 tons/10,492 hours = 29.0 tons/hour

(3) Trailers

1) Calling Vessels

Trailers are transported by Ro-Ro vessels. A small amount of containers on chassis or containers directly laid on holds are also transported Ro-Ro ships. The net volume of cargoes carried by these vessels in 1986 is 154,651 metric tons. The volume of export agricultural and marine products accounts for 52.6% of the total. Most of the rest is imported and exported manufactured products. 73.0% of the total fruits and vegetables and 69.7% of shrimps and lobsters are transported by Ro-Ro vessels, taking advantage of the quick dispatch of these vessels (see Table 4.20). In 1986, 155 Ro-Ro vessels called at the Port. The numbers by D.W.T. are indicated in Table 4.1.21.

Table 4.1.20 (1/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(Ro-Ro Vessels) Unit: MT, %

Commodity	Import Share		Export Share		Total Share	
Agricultural & Marine Products						
Bananas			18	0.0	18	0.0
Coffee Beans			25,642	14.4	25,642	14.4
Plantains			1,623	27.9	1,623	27.9
Cotton including Flocks			224	2.8	224	2.8
Cotton Seeds			39	42.0	39	41.9
Other Seeds	2	0.7			2	0.1
Wheat						
Basic Grains	1,217	7.0			1,217	7.0
Fruits and Vegetables	236	49.1	40,536	73.0	40,772	72.8
Crude Tobacco			1,647	46.4	1,647	46.4
Honey			121	2.7	121	2.7
Sesame			1,231	7.2	1,231	7.2
Cardamom			709	8.0	709	7.9
Spices						
Other Agricultural Products						
Cassava			761	80.1	761	80.1
Rice	915	100.0			915	100.0
Kidney Beans	165	0.0	15	43.6	180	90.5
Maize						
Meat	17	7.9	4,833	64.5	4,849	63.0
Fishes, Oysters & Clams			84	57.8	84	57.8
Shrimps & Lobsters	17	0.0	2,944	69.7	2,961	69.9
Unmanufactured Jute	0	100.0			0	100.0
Forest Products	11	89.1	850	6.5	862	6.6
Sub Total	2,581	2.8	81,277	11.9	83,858	10.8
Minerals						
Coal	17	10.6			17	6.5
Metallic Minerals	1	64.7			1	5.7
Other Minerals			22	0.0	22	24.8
Marble			540	47.8	540	47.8
Sub Total	18.79	8.0	562.62	44.1	581.41	38.5
Petroleum						
Crude Petroleum & Natural Gas						
Gasoline						
Kerosene						
Diesel and Other Fuel Oils	63	0.1			63	0.1
Propane Gas						
Other Refined Petroleum	1,919	7.0			1,919	7.0
Sub Total	1,982	0.7			1,982	0.4

Table 4.1.20(2/2)

Cargo Volume Handled at the Port by Commodity and Vessel Type
(Ro-Ro Vessels) Unit: MT, %

Commodity	Import Share		Export Share		Total Share	
Manufactured Products						
Other Foods	7,282	18.6	1,148	28.8	8,430	19.5
Vegetable & Animal Oils & Fats	2,254	3.7	22	6.8	2,277	3.7
Malt						
Alcoholic Beverages	157	13.9	175	37.0	333	20.7
Tobacco, Products						
Textiles, Clothing & Leather	8,863	49.5	5,299	45.8	14,162	48.0
Sawed Timber	2	1.3			2	0.0
Wood Products except Furniture	318	5.7	97	4.6	415	5.4
Wooden Furniture	9	19.3	101	20.5	110	20.4
Paper & Paper Products	2,936	2.5	103	16.8	3,039	2.5
Fertilizer	24	0.0			24	0.0
Insecticide	877	12.0	205	8.4	1,082	11.1
Fibers, Resin & Plastic Material	2,624	5.4	20	3.3	2,644	5.3
Other Chemical Products	4,629	6.7	546	24.3	5,175	7.3
Pharmaceutical Products	273	15.7	131	21.7	404	17.2
Rubber Products	1,451	41.6	100	4.4	1,551	26.9
Plastic Products	1,114	14.2	512	56.8	1,626	18.6
Soil, Chinaware, Porcelain, Glass	2,495	23.4	809	10.3	3,304	17.8
Clay, Concrete & Others	267	3.9	2	5.1	269	3.9
Cement, Lime & Plaster	50	31.5	6	26.4	56	30.8
Products of Base Metals	753	2.2	32	3.3	786	2.2
Other Metallic Products	2,297	4.5	643	29.0	2,940	5.5
Products of Metallic Structures	65	1.9	18	18.1	83	2.4
Machinery and Equipment	4,767	36.8	42	2.6	4,809	33.0
Electric Machinery & Equip.	3,813	40.5	56	22.4	3,869	40.0
Transport Equipment	73	17.0			73	13.6
Automobiles	2,650	41.6	144	59.1	2,794	42.3
Spare Parts for Vehicles	1,146	44.3	8	10.4	1,154	43.3
Other Industrial Products	6,201	58.9	579	39.0	6,780	56.4
Sub Total	57,390	7.6	10,801	21.0	68,191	8.5
Tares of Stuffed Containers	256	0.7	958	1.8	1,215	1.4
Tares of Empty Containers	111	0.3	190	1.4	301	0.7
Tares of Stuffed Trailers	24,742	100.0	32,473	99.9	57,216	99.9
Tares of Empty Trailers	17,772	100.0	6,430	100.0	24,203	100.0
Tares of Flatbeds						
Sub Total	42,882	38.6	40,052	37.7	82,934	38.1
Others	39	16.1	1	1.1	40	13.7
Grand Total	104,893	8.3	132,693	12.1	237,585	10.1

Table 4.1.21 Number of Ro-Ro Vessels in 1986

Dead Weight Tons	No. of Conventional Vessels
Under 1,001	2
1,001--3,000	14
3,001--5,000	52
5,001--7,000	14
7,001-10,000	61
10,001-15,000	12
Total	155

Source: EMPORNAC

These Ro-Ro vessels call at ports in the U.S.A. such as Miami, Houston, New Orleans and Jacksonville, and ports in Central America such as Cortes and Limon.

2) Drafts of Ro-Ro Vessels in Entrance and Departure

The draft distribution of Ro-Ro vessels which called at the Port in 1986 is shown in Table 4.1.22.

Table 4.1.22 Draft Distribution of Ro-Ro Vessels in 1986

Draft Feet (Meters)	No. of Ships in Entrance	No. of Ships in Departure
Under 10.1 (3.08)	19	15
10.1-12.0 (3.08-3.66)	13	9
12.1-14.0 (3.69-4.27)	29	34
14.1-16.0 (4.30-4.88)	37	31
16.1-18.0 (4.91-5.49)	17	26
18.1-20.0 (5.52-6.10)	33	35
20.1-22.0 (6.13-6.71)	6	5
22.1-24.0 (6.74-7.32)	1	-
Total	155	155

Source: EMPORNAC

3) Cargo-handling System

At the Port, No.1, No.3, No.4 and No.6 Berths accommodate Ro-Ro vessels. Open yards are located behind these berths and they are used as

marshalling yards for trailers carried by Ro-Ro vessels.

4) Cargo-handling Productivity

The total berthing time of Ro-Ro vessels in 1986 is 1,752 hours, and the average berthing time per ship is 11.3 hours. The total net cargo volume is 154,651 metric tons. Thus, cargo-handling productivity is calculated as follows:

$$154,651 \text{ tons} / 1,752 \text{ hours} = 88.3 \text{ tons} / \text{hour}$$

(4) Solid Bulk

1) Calling Vessels

Solid bulk cargoes such as fertilizer, wheat and maize are mainly transported by bulk carriers. The volume of cargoes transported by bulk carriers in 1986 is 252,515 metric tons. Almost all the cargoes are imports, and fertilizer accounts for 68.7% of the total. Wheat and maize account for 21.2% and 5.9% of the total, respectively. 80.7% of fertilizer, 98.9% of wheat and 75.1% of maize were transported by bulk carrier in 1986. The remainder of these cargoes were carried by conventional vessels. In 1986, 30 bulk carriers called at the Port. The numbers of the bulk carriers by D.W.T. are shown in Table 4.1.23.

Table 4.1.23 Number of Bulk Carriers in 1986

Dead Weight Tons	No. of Bulk Carriers
1,001--3,000	1
3,001--5,000	2
5,001--7,000	7
7,001-10,000	9
10,001-15,000	2
15,001-20,000	5
20,001-30,000	4
Total	30

Source: EMPORNAC

The L.O.A. distribution of the bulk carriers which called at the Port in 1986 is indicated in Table 4.1.24.

Table 4.1.24 L.O.A. Distribution of Bulk Carriers in 1986

L.O.A. Feet (Meters)	No. of Vessels
Under 101 (30.8)	3
101-150 (30.8--45.8)	2
251-300 (76.6--91.5)	1
301-350 (91.8-106.8)	8
351-400 (107.1-122.0)	2
401-450 (122.3-137.3)	5
451-500 (137.6-152.5)	2
501-550 (152.8-167.8)	4
551-600 (168.1-183.0)	3
Total	30

Source: EMPORNAC

2) Drafts of Bulk Carriers in Entrance and Departure

The distribution of bulk carriers which called at the Port in 1986 is shown by entrance and departure in Table 4.1.25.

Table 4.1.25 Draft Distribution of Bulk Carriers in 1986

Draft Feet (Meters)	No. of Ships in Entrance	No. of Ships in Departure
Under 10.1 (3.08)	3	8
10.1-12.0 (3.08-3.66)	-	3
12.1-14.0 (3.69-4.27)	-	7
14.1-16.0 (4.30-4.88)	-	5
16.1-18.0 (4.91-5.49)	4	2
18.1-20.0 (5.52-6.10)	2	1
20.1-22.0 (6.13-6.71)	3	2
22.1-24.0 (6.74-7.32)	8	1
24.1-26.0 (7.35-7.93)	4	-
26.1-28.0 (7.96-8.54)	2	1
28.1-30.0 (8.57-9.15)	3	-
30.1-32.0 (9.18-9.76)	1	-
Total	30	30

Source: EMPORNAC

3) Cargo-handling System

At the Port, fertilizer is unloaded by clamshell bucket type ship crane or by EMPORNAC's truck crane of the same type. Then the fertilizer is loaded into trailers or freight cars and transported outside of the Port directly. Wheat and maize are also unloaded by the same type of crane. Pneumatic unloaders are also used for discharging these grains. Wheat and maize are brought out from the Port by trailer or freight car directly.

4) Cargo-handling Productivity

The total berthing time of bulk carriers in 1986 is 5,685 hours, and the average berthing time per ship is 189.5 hours. The total cargo volume is 252,515 metric tons. Thus, cargo handling productivity is calculated as follows:

$$252,515 \text{ tons} / 5,685 \text{ hours} = 44.4 \text{ tons} / \text{hour}$$

(5) Liquid Bulk

1) Calling Vessels

Liquid bulk is carried by petroleum and chemical tankers. The volume of cargoes loaded and discharged from those tankers at the Port in 1986 is 618,147 metric tons. The volume of exported crude petroleum accounts for 37.1% of the total. The volume of imported refined petroleum fuels comprising gasoline, kerosene and diesel fuel accounts for 33.0% of the total. Propane gas and vegetable and animal oils and fats account for 11.6% and 9.3%, respectively. The remainder is chemical products. In 1986, 94 petroleum and chemical tankers called at the Port. The number of those tankers by D.W.T. is shown in Table 4.1.26.

Table 4.1.26 Number of Tankers in 1986

Dead Weight Tons	No. of Vessels
Under 1,001	3
1,001--3,000	7
3,001--5,000	5
5,001--7,000	45
7,001-10,000	16
15,001-20,000	1
20,001-30,000	3
30,001-40,000	6
60,001-70,000	6
70,001-70,100	2
Total	94

Source: EMPORNAC

The L.O.A. distribution of the tankers which called at the Port in 1986 is shown in Table 4.1.27.

Table 4.1.27 L.O.A. Distribution of Tankers in 1986

L.O.A. Feet (Meters)	No. of Vessels
Under 101 (30.8)	32
101-150 (30.8--45.8)	1
151-200 (46.1--61.0)	3
201-250 (61.3--76.3)	7
251-300 (76.6--91.5)	1
301-350 (91.8-106.8)	6
351-400 (107.1-122.0)	40
501-550 (152.8-167.8)	2
601-650 (183.3-198.3)	2
Total	94

Source: EMPORNAC

2) Drafts of Tankers in Entrance and Departure

The draft distribution of the tankers which called at the Port in 1986 is shown by entrance and departure in Table 4.1.28.

Table 4.1.28 Draft Distribution of Tankers in 1986

Draft Feet (Meters)	No. of Ships in Entrance	No. of Ships in Departure
Under 10.1 (3.08)	11	14
10.1-12.0 (3.08-3.66)	1	5
12.1-14.0 (3.69-4.27)	5	5
14.1-16.0 (4.30-4.88)	4	15
16.1-18.0 (4.91-5.49)	18	20
18.1-20.0 (5.52-6.10)	23	12
20.1-22.0 (6.13-6.71)	9	10
22.1-24.0 (6.74-7.32)	14	6
24.1-26.0 (7.35-7.93)	4	4
26.1-28.0 (7.96-8.54)	-	2
28.1-30.0 (8.57-9.15)	5	1
Total	94	94

Source: EMPORNAC

3) Cargo-handling System

At the Port, liquid bulk such as crude petroleum, gasoline, kerosene, diesel fuel, propane gas and vegetable and animal oils and fats is handled at No.6 Berth. From inland deposits of those liquids to the berth, pipelines are installed along the east end of the existing port. The liquids are loaded or discharged into or from tankers using flexible hoses connecting tankers and the pipelines.

4) Cargo-handling Productivity

The total berthing time of tankers in 1986 is 3,769 hours, and the average berthing time per tanker is 40.1 hours. The total cargo volume is 618,148 metric tons. Cargo-handling productivity is calculated as follows:

$$618,148 \text{ tons} / 3,769 \text{ hours} = 164.0 \text{ tons} / \text{hour}$$

4.2 Land Use

4.2.1 Present Land Use

The land in and around the port area is mainly possessed by EMPORNAC, and is being used for port, residential, commercial and industrial activities. The area of the land possessed by EMPORNAC is approximately 2,000 ha., and the port area is located facing Santo Tomas Bay. The area consists of the EMPORNAC wharf, truck terminal, and the office zone related to port activities including both public and private sector groups. Around the port area, there are residential and industrial areas. As for the residential area, EMPORNAC houses for its employees are located near the port area, and private houses are sparsely scattered.

On the other hand, most of manufacturers operate in the industrial and commercial free zone (ZOLIC) near the port area. There are depots for various products which function as a distribution center in ZOLIC. Enterprises in ZOLIC are exempt from import and export taxes. The land of ZOLIC was taken over by EMPORNAC. Petroleum depots are also located in and around the port. Propane and asphalt depots are located in the port area. The gasoline, kerosene and diesel fuel depot is located close to the bounds of EMPORNAC's land. On the other hand, the crude petroleum depot is located just outside of EMPORNAC's land.

As for recreation, a park is located west of the Port and the sports complex (COMPLEJO DEPORTIVO) is next to ZOLIC.

Thus, the land in and around the Port serves various purposes. However, a great part of EMPORNAC's territory is still unused. This may be due to the vastness of the land, which has a great potential for development in the future.

There are three principal roads from EMPORNAC's territory to Guatemala City, Puerto Barrios and Las Escobas, respectively. The road to Guatemala City is called CA-9, and small villages and FINCA are located along this road. Along the road to Puerto Barrios, urbanized areas are found. On the contrary, the road to Las Escobas runs through sparsely populated mountainous areas.

The railway of FEGUA also connects the Port and Guatemala City.

4.2.2 Existing Land Use Plan

In 1979, an urban plan for EMPORNAC's land called PLAN URBANO DE SANTO TOMAS DE CASTILLA was compiled by EMPORNAC together with the General Direction of Public Works (La Direccion General de Obras Publicas) in cooperation with various institutions.

In 1985, a zoning plan of EMPORNAC's land (ZONIFICACION AREAS TERRENOS EMPORNAC) was proposed by the Engineering Department. Though there is no decisive difference between the former and the latter plans, some of the zoning was revised. According to the latest plan, the area to the east of the existing port is zoned as an area for future expansion of the Port. A commercial area is planned near the existing port along the highway connecting the Port with Puerto Barrios and Guatemala City. The eastern areas of EMPORNAC's land are reserved for industrial development in the future. On the other hand, the western areas, most of which are still left in fields, are reserved for residential use in the future.

4.3 Other Principal Ports

There are five principal ports in Guatemala. The Ports of Champerico, Quetzal and San Jose are located on the Pacific coast side. These ports function as terminals connecting Guatemala and foreign countries as the country's trading partners are mainly located along the Pacific. Among these ports, the Port of Quetzal which started operation in 1983 is the only modern port. The water depth along the main wharf located west of the port area is 11 meters below Low Water Level, and therefore, the port can receive vessels of around 20,000 Dead Weight Tons in size under full draft. The main facilities are as follows:

West Wharf : Length : 802 meters
Water Depth : -11 meters

Access Channel : Water Depth : -12 meters
Minimum Width : 200 meters

Turning Basin : Water Depth : -12 meters

The total volume handled at the port in 1986 is 628 thousand metric tons. The exports account for 59% of the total volume in that year. Sugar is the major export commodity. Fertilizer is the major import commodity accounting for 80% of the imports.

The Port of San Jose is located near the Port of Quetzal. However, the scale of the port is very small compared with the Port of Quetzal. Molasses is exported through the port. The port is also used as a fishing port.

The Port of Champerico is located west of the Port of Quetzal. The distance between the Port of Champerico and the Port of Quetzal is 76 nautical miles. This port was established in the year 1871 as a modern port at that time. The water depth at the pier is around 5.5 meters below Low Water Level. At the roadstead off the pier, cargoes are loaded or unloaded to and from large vessels of around 35,000 Dead Weight Tons using small barges. Trucks cannot approach the pier directly and trolleys are used between the pier and the transit sheds. The major export cargo is cotton.

On the other hand, the Port of Santo Tomas de Castilla and Puerto

Barrios are located on the Atlantic coast side. These ports serve the international trade between Guatemala and foreign ports mainly located along the Atlantic.

The Port of Puerto Barrios was established in the 19th century. The port was the only port for international trade on the Atlantic coast side until the start of operations at the Port of Santo Tomas de Castilla in 1955. Originally, Puerto Barrios had a pier of approximately 500 meters in length. However, half of the pier is submerged due to an earthquake which occurred in 1976. The rest of the pier is usable. The water depths along the pier vary from 5.5 meters to 7.6 meters. The total length of the front line of the pier is around 500 meters. Major import cargoes are wheat, paper, steel and lubricants. The major export cargo is sugar. On average, only five vessels per month call at the port. The size of these vessels is around 6,000 Dead Weight Tons. Trucks cannot approach the pier directly, and the port facilities are obsolete, and were damaged in the earthquake in 1976.

CHAPTER 5 ACTUAL CONDITION OF MANAGEMENT AND OPERATION OF THE PORT

In Guatemala, many port facilities were constructed at same time as the railway system, over 100 years ago. These include the ports of San Jose, Champerico and Puerto Barrios, at present under the control of FEGUA.

In the year 1955, the Port of Santo Tomas de Castilla was constructed as a communication port, and EMPORNAC was established under the jurisdiction of the Ministry of Finance.

And in 1983, the Port of Quetzal commenced operation under the jurisdiction of the Ministry of Communication, Transport and Public Works.

As Guatemalan ports have a varied historical background, the port administration system in Guatemala has become quite complicated.

5.1 EMPORNAC's Organization and Duties of Each Section

5.1.1 The Organizations Responsible for The Ports

In Guatemala, the following governmental organizations are responsible for port administration within their respective jurisdictions.

<u>Port Administratives Affairs</u>	<u>Responsible Government Organization</u>
Basic Affairs	
Establishment of Port Management Bodies	Ministry of Finance (Mnt. Finanzas)
Designation of Jurisdiction of Port Management Bodies	National Port Commission (C.L.P.N) Mnt. Finanzas
Port Development	
Investigation/Survey on Development	Ministry of Communication, Transport and Public Works (Mnt. C.T,OP) Economic Planning Agency (SEGEPLAN)
Port Planning	SEGEPLAN Mnt. C.T.OP
Investment in Port Facilities	
(Water Facilities)	Mnt. C.T.OP
(Mooring Facilities)	Mnt. C.T.OP

A new organization solely responsible for port administration is to be established in the near future so as to centralize all the port administrative affairs which are under the control of various government organizations at present.

5.1.2 Organization of EMPORNAC

EMPORNAC is a public organization which was established under the jurisdiction of the Ministry of Finance. On the other hand, the private sector assists EMPORNAC with part of the cargo-handling work due to the lack of cargo-handling machinery. EMPORNAC is the sole body responsible for the management and operation of the Port.

(1) Principal Purposes of EMPORNAC

The following services are provided for port related activities:

- Assistance to ships
- Pilotage and Tug boat service
- Coastal trading service
- Cargo loading and unloading

EMPORNAC administers the Port under various laws and regulations including the law establishing EMPORNAC and the working rules.

(2) Functions

In order to fulfill the above-mentioned purposes, EMPORNAC has four major functions:

- To carry out necessary port operational functions
- To execute indispensable maritime operations for the ships which call at the port
- To carry out basic financial operations
- To carry out all the administrative actions and to support the other activities of EMPORNAC.

To execute the above mentioned functions, EMPORNAC is organized as shown in Fig. 5.1.1.

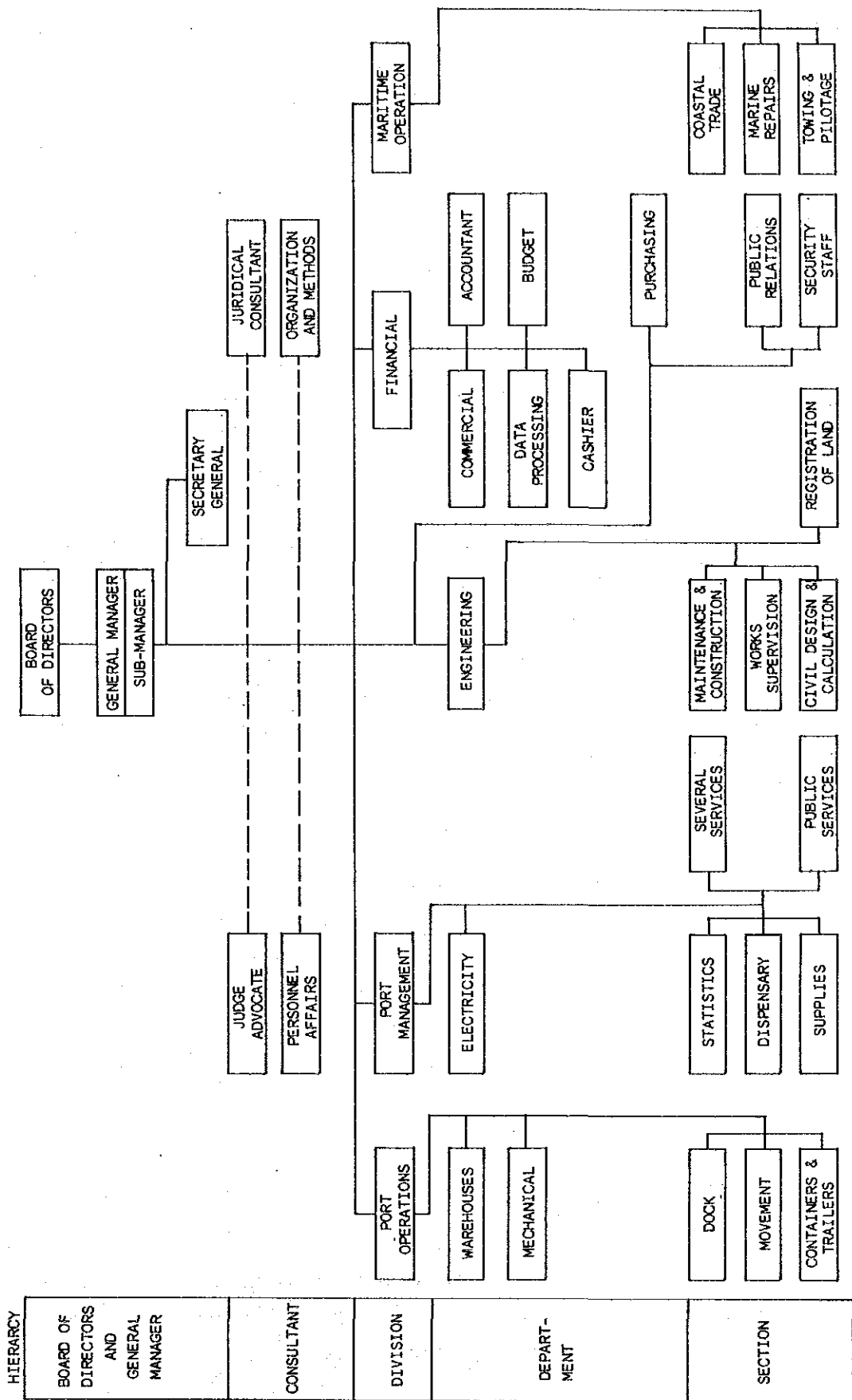


Fig. 5.1.1.1 Organization of Empresa Portuaria Nacional Snato Tomas de Castilla

5.1.3 Duties of Each Section

The duties of each section of EMPORNAC are as follows:

(1) Board of Directors

The Board of Directors is the managing organization. The duties of the Board are as follows.

To approve business of major importance to EMPORNAC.

To approve interior rules and standards of EMPORNAC.

To dictate the general policy for the administrations of EMPORNAC.

(2) General Manager's Office

This is the managing organization for the daily operation of EMPORNAC.

The duties of this office are as follows.

To project, direct and control the work of the divisions of EMPORNAC.

To execute the general direction of EMPORNAC workers.

To legally represent EMPORNAC to exterior organizations.

(3) Interior Auditor

The duties of this office are as follows.

To check if the operation and activities of the institution correspond to the laws and rules.

To examine the accounts and the accounting system and to propose changes as necessary.

To inspect monthly the financial condition of EMPORNAC and to confirm the accuracy of accounting reports.

To check at least each 3 months the portfolio of EMPORNAC, in order to ensure proper liquidity and settlement.

To participate in quotation and bidding.

To revise monthly the budget execution.

To confirm that payments to EMPORNAC are executed.

To present annual information of its work concerning the economic and financial situation to the Manager's office.

(4) Division of Port Operation

The duties of this division are as follows.

To provide necessary information about port activities and operations to the Manager's office.

To present suggestions and projects to improve port service to the Manager's office.

To provide the superior authorities with technical elements in order to formulate, execute, control and evaluate programs.

To participate in the periodic evaluation of the progress of the different programs or projects which the Division executes.

To execute studies with the collaboration of the consultant's office of EMPORNAC.

(5) Division of Administrative Service

The duties of this division are as follows.

To provide various operative services.

To plan, control and evaluate the different operative services.

To outline the general policy of the administrative service of EMPORNAC.

(6) Financial Division

The duties of the financial division are as follows.

To provide the Manager's office with the technical elements for the formulation, execution, control and evaluation of the financial plans of EMPORNAC.

To orient, coordinate and evaluate the financial activities together with the administrative unit.

To participate in the periodic evaluation of the progress of various programs.

To execute financial studies with the collaboration of the other consultant offices.

To plan, direct and control the financial activities of EMPORNAC.

(7) Division of Maritime Operation

The duties of this division are as follows.

To provide pilotage service at the Atlantic Ports and Rio Dulce.

To assist the ships which approach the ports of Santo Tomas de Castilla and Barrios with tug boat service,

To execute coastal trading service along the Atlantic coast and in inland waterways.

To rent barges.

To provide communication facilities for communications between ship-ship, ship-land, ship-maritime agency, and ship-institution concerned.

To collaborate with the development of the villages of Amatique Bay through the transport service.

To provide transport and crew service to anchored ships in the Port of Santo Tomas and Amatique Bay.

To provide transport service for official visits to the ships anchored in or approaching Santo Tomas.

(8) Engineering Department

The duties of this department are as follows.

To execute the urban development study of Santo Tomas.

To develop the infrastructure works required for the Port.

To supervise the works executed by contract.

To elaborate maps, drawings and specifications of various projects.

To prepare public bids in order to realize the various projects.

(9) Department of Maintenance

The duties of this department are as follows.

To establish a preventative course of maintenance for the various buildings, machines and electric facilities of EMPORNAC.

To provide maintenance and repair service.

To construct the works which do not require the use of sophisticated or highly-technical equipment.

To maintain the port area in a clean and hygienic condition.

To maintain traffic signals.

5.2 Port Tariff

In Guatemala, there are five ports: Santo Tomas de Castilla, Quetzal, San Jose, Champerico and Puerto Barrios, and each port management body has its own port tariff table.

The present tariff has been applied from April 1984.

EMPORNAC will revise the tariff table with the approval of the Ministry of Finance.

5.2.1 Present Port Tariff

The port tariff of EMPORNAC can be divided into three basic charges: ship service, cargo service and other services.

The main charges are as follows:

(1) Ship Service

1) Commission of Registration

by registered net tonnage (R.N.T.) per vessel

up to	50 R.N.T.	Q. 7.80
from 51	up to 100 R.N.T.	Q. 13.00
from 101	up to 200 R.N.T.	Q. 26.00
over 201	R.N.T.	Q. 65.00

2) Charge for Use of Navigation Aids

up to 200 registered gross tons (R.G.T.)

over 200 R.G.T. Q. 13.00

3) Pilotage

less than 10 feet of draft Q. 4.55

over 10 feet of draft Q. 45.50

4) Tug Boat	
For Ro-Ro vessels	
for the first hour	Q.260.00
for each additional hour	Q.227.50
For other vessels	
up to 3,000 R.G.T.	
ordinary day work	Q.195.00
extraordinary day work	Q.292.50
over 3,000 R.G.T.	
ordinary day work	Q.325.00
extraordinary day work	Q.406.25
For loss time of tug boats	
for the first hour	Q.260.00
for each additional hour	Q.227.00

5) Staying	
By R.G.T. for each 24 hours or fraction there of	
	Q.0.0325

6) Water Supply	
By metric tonnage	Q.1.30

(2) Cargo Service

1) Labour

The labour charge is charged according to the tariff of EMPORNAC, and the additional surcharge is 86% of the worker's salary for social assistance for the employees of EMPORNAC.

2) Rent of Cargo-handling Equipment

(each hour or fraction thereof)

Straddle carrier	Q.109.20
Truck crane	Q. 26.00
Forklift (20,000 lbs)	Q. 6.83
Forklift (8,000 lbs)	Q. 5.53
Tractor	Q. 5.53
Trailer (without flatbed, ordinary hour)	Q. 32.50

Trailer (without flatbed, extraordinary hour)	Q. 37.38
Trailer (without flatbed, holiday & midnight)	Q. 39.00
Trailer (with flatbed, ordinary hour)	Q. 42.90
Trailer (with flatbed, extraordinary hour)	Q. 47.78
Trailer (with flatbed, holiday & midnight)	Q. 49.40
Derrick crane	Q. 52.00
Shore crane	Q. 52.00
Rent of scales export storage ordinary hour	Q. 3.90
Rent of scales export storage extraordinary hour	Q. 5.20
Rent of scales import and export movement	Q. 0.65
Rent of maintenance truck	Q. 13.00
Payloader	Q. 13.00

Crane service

(mobile and fixed cranes)

up to 5,000 K.G.	Q. 11.46
from 5,001 to 8,000 K.G.	Q. 17.19
from 8,001 to 10,000 K.G.	Q. 28.65
from 10,001 to 12,000 K.G.	Q. 39.67
from 12,001 to 14,000 K.G.	Q. 57.30
from 14,001 to 16,000 K.G.	Q. 71.63
up to 16,001	Q. 104.00

3) Import Wharfage (by M.T.)

Diesel oil in barrels or tanks	Q. 4.30
Corn flour, bean flour, wheat flour, etc.	Q. 4.30
Linseed oil	Q. 4.30
Cotton impressing package	Q. 4.30
Rice	Q. 4.30
Other Items	Q. 5.37
Aluminum sulphate bought by municipalities	Q. 4.30
Animal food	Q. 4.30
Beans	Q. 4.30
Fertilizer for agriculture	Q. 4.30
Gasoline in barrels	Q. 4.30
Pesticide	Q. 4.30
Animal and vegetable grease	Q. 4.30

Pig iron and steel, rolling wire, shapes	Q. 4.30
Kerosene in barrels	Q. 4.30
Lubricants in barrels	Q. 4.30
Wood	Q. 4.30
Corn	Q. 2.87
Potatoes	Q. 4.30
Newspaper, draft paper	Q. 4.58
Paraffin	Q. 4.30
Crude oil	Q. 4.30
Semolina	Q. 4.30
Wheat	Q. 2.87
Insecticides and their derivatives	Q. 4.30
Asphalt in barrels	Q. 4.30
Grease in bulk (granule grease)	Q. 0.96
Minimum rate	Q. 1.30
 Living Animals	
Goats, Pigs, Sheep, Dogs	Q. 1.63
Cows	Q. 2.60
Horses, Mules, Donkeys	Q. 3.25
Other domestic animals	Q. 1.30
Other large animals	Q. 3.90
 4) Export Wharfage (by M.T.)	
Sesame seed	Q. 2.87
Cotton in pressing package	Q. 4.30
Other Items	Q. 4.30
Sugar	Q. 2.87
Bananas	Q. 3.58
Bales of cotton	Q. 2.87
Special seed coffee or seed coffee	Q. 2.87
Wood	Q. 2.87
Marble	Q. 2.87
Honey	Q. 2.87
Special honey	Q. 1.43
Crude minerals	Q. 2.87
Pasturage in pressing packages	Q. 3.58

Cotton Seeds for forage	Q.	2.87
Other cotton seeds	Q.	2.87
Yucca	Q.	3.58
Tobacco	Q.	2.87
Minimum rate	Q.	1.30

Living animals

Goats, Pigs, Sheep, Dogs	Q.	1.63
Cows, Horses, Mules, Donkeys	Q.	2.60
Other small domestic animals	Q.	1.30
Other large animals	Q.	3.90

5) Import and Export Service

Commodities in transit

Commodities in transit are charged import and export fees, wharfage, handling and dispatching, storage and voluminous or heavy commodity fees.

6) Transfer of Commodities

by 100 K.G.	Q.	0.14
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7) Handling of Heavy or Voluminous Commodities

1,000 to 1,500 K.G. or 1.00 to 1.50 m ³	Q.	3.90
1,501 to 2,000	Q.	5.20
2,001 to 2,500	Q.	6.50
2,501 to 3,000	Q.	7.50
3,001 to 3,500	Q.	9.10
3,501 to 4,500	Q.	13.00
4,501 to 5,500	Q.	15.60
5,501 to 6,500	Q.	18.20
6,501 to 7,500	Q.	20.80
7,501 to 8,500	Q.	23.40
8,501 to 9,500	Q.	26.00
9,501 to 10,500	Q.	28.60
10,501 to 11,500	Q.	31.20
11,501 to 12,500	Q.	33.80
12,501 to 13,500	Q.	36.40

13,501 to 14,500	13.51 to 14.50	Q. 39.00
14,501 to 15,500	14.51 to 15.50	Q. 41.60
15,501 to 16,500	15.51 to 16.50	Q. 44.20
16,501 to 17,500	16.51 to 17.50	Q. 46.80
17,501 to 18,500	17.51 to 18.50	Q. 49.40
18,501 over	18.51 over	Q. 52.00

8) Handling and Dispatching

by each 1,000 K.G. Q. 0.65

9) Storage Charge

Import commodities can remain in the warehouse of EMPORNAC up to 10 days without charge.

After 10 days the charge is Q. 0.29 for each 1,000 kg or fraction thereof. Export commodities can also remain in the warehouse of EMPORNAC up to 10 day free of charge.

(3) Other Services

1) Passenger Service

Punta Gorda (one way)	Q. 5.00
(round trip)	Q. 10.00
Livingston (one way)	Q. 0.75

2) Ship Rental

to los Cayos de Belice (daily)	Q.1,000.00
Puerto Cortes (daily)	Q.1,500.00
Livingston (daily)	Q. 550.00
Punta Gorda (daily)	Q. 650.00
Castillo San Felipe (daily)	Q. 650.00
Belice	Q.1,500.00

3) Containers

The tariff by operation hour is calculated on a time basis.

each hour or fraction thereof Q. 109.00

The staying or storage fees of containers are charged from the first day of landing, according to the storage charge tariff.

by each 1,000 K.G.

Q. 0.29

4) Loading and Unloading of Containers

by operation each box

Empty

Q. 60.00

Full

Q. 100.00

Note:

Classification of Working time

	7:00 to 17:00	18:00 to 24:00	0:00 to 6:00
Weekday	ordinary	extraordinary	midnight
Saturday, Sunday	extraordinary	extraordinary	midnight
Legal holiday	holiday	holiday	midnight

When workers' salaries are increased, the tariff is revised.

A sample calculation of the above-mentioned tariffs by vessel type is shown in Table 5.2.1 to Table 5.2.4.

Table 5.2.1 (1/2) Sample Calculation of Port Charges (Container Ship)

Name: CARIPIA EXPRESS
 Mooring Day: 16-04
 Departure day: 19-04
 Tons-IMP: 14493.62

Ship Type: Container ship
 Mooring Hour : 7:00
 Departure Hour: 6:05
 Tons-EXP: 1,768.87
 Tons-Total: 3,262.49

Services	Description	Tariff	Value
Wharf Mooring Service	3 days	65.0000	195.00
Commission of Registration		52.0000	52.00
Lighthouse Service		13.0000	13.00
Water service	100 tons drinking water	1.3000	130.00
Port Commission	1.156.920 KLS import	.0500	57.85
	1.629.283 KLS export	.0500	81.46
Maritime Service	Pilotage service		257.40
	Tagboat service		650.00
	Boat service		23.40
Rent of Operation Machines	18 hours forklift import	5.5300	99.54
	21 hours ordinary coast trading with flatbed	42.9000	900.00
	18 hours extraordinary coast trading with flatbed	47.7800	860.04
	15 hours holiday or midnight coast tractor with flatbed	49.4000	741.00
	16 hours straddle carrier import.	109.2000	1,747.20
	2 hours no port equipment	32.7600	65.52
	28 hours forklift export	5.5300	154.84
	27 hours ordinary coast tractor with flatbed	42.9000	1,158.30
	36 hours extraordinary coast trading with flatbed	47.7800	1,720.08
	18 hours holiday or midnight coast trading with flatbed	49.4000	889.20
	26 hours straddle carrier export	109.2000	2,839.20
Service to Ship	Hand labour for wharf mooring		11.55
	Hand labour for ship moving between berths		11.55
	Hand labour for wharf departure		9.00
	Hand labour for water supply		44.08
Day Work Importation	Hand labour for unloading containers		1,156.14
	Hand labour for dispatching containers		24.75
Day Work Exportation	Hand labour for loading containers		4.31
	Hand labour for receiving containers		1,830.99
	86% labour service		190.41
	Emergency Allowance		2,823.19
	Sub total		225.50
			18,967.40
	Water service		130.00
	Port commission		139.31
	Sub-total		18,698.09
	7% I.V.A.		1,308.87
	Total		20,276.27

Table 5.2.1 (2/2) Sample Calculation of Port Charges (Container Ship)

Services	Description	Tariff	Value
Electrical Service	Hand labour for electrical service		81.84
	86% labour service		70.38
	Emergency allowance		6.05
Reconsolidation of Commodity	Hand labour for commodity		19.41
	Reconsolidation		16.70
	Emergency allowance		1.98
Remarking of Commodity	500 Remarkd Commodity	.0630	31.50
	3 hours forklift export	5.5300	16.59
	Hand labour for remarking commodity		50.09
	86% labour service		43.08
	Emergency allowance		6.16
Commodity Transferring	16 hours forklift import	5.5300	88.48
	Hand labour for commodity transferring		903.99
	86% labour service		777.43
	Emergency allowance		66.38
Container Washings	28 tons drinking water	1.3000	36.40
	Hand labour for container washing		74.90
	86% labour service		64.41
	Emergency allowance		9.24
Spread Container	14 hours straddle carrier export	109.2000	1,528.80
	Hand labour for spread containers		210.72
	86% labour service		181.22
	Emergency allowance		11.00
Container Stuffing	78 hours forklift export	5.5300	431.34
	26 hours tractor export	5.5300	143.78
	Hand labour for container stuffing		501.96
	86% labour service		431.69
	Emergency allowance		44.99
Container unstuffing	143 hours forklift import	5.5300	801.85
	48 hours tractor import	5.5300	265.44
	Hand labour for container unstuffing		832.97
	86% labour service		716.36
	Emergency allowance		99.66
	Sub-Total		8,567.29
	Water Service		36.40
	Port Commission		8,530.89
	Sub-Total		597.16
	7% I.V.A.		9,164.45
	Total		14,138.89
Other Charges			
Grand Total			43,579.70

Table 5.2.2 Sample Calculation of Port Charges (Semicontainer Ship)

Name: SCHACKENBORG
 Mooring Day: 12-01
 Departure day: 16-01
 Tons IMP: 1,335.79

Ship Type: Semicontainer
 Mooring Hour : 14:45
 Departure Hour: 17:25
 Tons-EXP: 1,701.91
 Tons-Total: 3,037.70

Services	Description	Tariff	Value
Wharf Mooring Service	5 days	65.0000	325.00
Commission of Registration		52.0000	52.00
Lighthouse Service		13.0000	13.00
Port Commission	811,580 KLS. IMP	.0500	40.58
Maritime Service	1,560,722 KLS. EXP	.0500	75.34
	Pilotage service		336.70
	Tugboat service		1,218.75
	Boat service		23.40
	132 hours forklift IMP	5.5300	729.96
	25 hours tugboat IMP	5.5300	138.25
Rent of Operation Machines	37 hours ordinary coast trading with flatbed	42.9000	1,587.30
	48 hours extraordinary coast trading with flatbed	47.7800	2,293.44
	32 hours hours holiday or midnight coast trading with flatbed	49.4000	1,580.80
	6 hours straddle carrier IMP	109.2000	655.20
	39 hours forklift EXP	5.5300	215.67
	5 hours tugboat EXP	5.5300	27.65
	52 hours ordinary coast trading with flatbed	42.9000	2,230.80
	24 hours hours holiday or midnight coast trading with flatbed	49.4000	1,185.60
	2 hours straddle carrier EXP	109.2000	218.40
Day Work Importation	Hand labour for mooring		11.55
	Hand labour for unloading containers		2,046.19
	Hand labour for unloading general commodities		754.35
	Hand labour for dispatching containers		22.00
	86% labour service		2,437.32
	Emergency allowance		213.40
Day Work Exportation	Hand labour for receiving containers		212.85
	Hand labour for loading general commodities		42.85
	Hand labour for loading containers		1,967.96
	Hand labour for wharf departure		9.00
	86% Labour service		1,920.09
	Emergency Allowance		170.06
	7% I.V.A.		1,584.77
	Total		24,340.23
Other Charges			2,289.55
Grand Total			26,629.78

Table 5.2.3 Sample Calculation of Port Charges (Conventional Ship)

Name: EAST WIND
 Mooring Day: 23-01
 Departure day: 25-01
 Tons IMP: 83.04

Ship Type: Conventional
 Mooring Hour : 15:40
 Dearture Hour : 16:10
 Tons-EXP: 1,858.89 Tons-Total: 1,858.89
 Main Commodity: Bananas

Services	Description	Tariff	Value
Wharf Mooring Service	3 days	65.0000	195.00
Commission of Registration		52.0000	52.00
Lighthouse Service		13.0000	13.00
Port Commission		.0500	4.15
Maritime Service	83,082 KLS. import	.0500	88.79
	1,775,859 KLS. export		261.95
	Pilotage service		1,462.50
	Tugboat service		23.40
	Boat service		199.08
Rent of Operation Machines	36 hours forklift import	5.5300	199.08
	97 hours forklift export	5.5300	536.41
Day Work Importation	Hand labour for approaching wharf		5.09
	Hand labour for unloading general commodity		199.64
	Hand labour for dispatching commodity		194.24
	Hand labour for ship cleaning		194.03
	86% labour service		509.98
	Emergency allowance		43.89
Day Work Exportation	Hand labour for moving material		34.63
	Hand labour for moving pallets		371.90
	Hand labour for wharf departure		45.01
	86% Labour service		388.32
	Emergency Allowance		30.25
	7% I.V.A.		333.22
	Total		5,186.48
Other Charges			3,555.03
Grand Total			8,741.51

Table 5.2.4 Sample Calculation of Port Charges (Roll-on Roll-off Ship)

Name: STENA	Ship Type: Roll-on Roll-off Ship
Approaching Day: 5-01	Approaching Hour: 18:50
Clearing Day: 6-01	Clearing Hour: 19:10
Tons-Imp: 853.64	Tons-Exp: 1,511.70 Tons-Total: 2,365.34

Services	Description	Tariff	Value
Wharf Mooring Service	1 day	65.0000	65.00
Comission of Registration		52.0000	52.00
Lighthouse Service		13.0000	13.00
Port Commission	476,203 KLS. Import	.0500	23.81
	1,185,970 KLS. Export	.0500	59.30
Maritime Service	Pilotage service		247.00
	Tugboat service		812.50
	Boat service		23.40
Rent of Operation Machine	5 hours forklift Import	6.8300	34.15
	5 hours forklift Export	6.8300	34.15
Day Work Importation	Hand labour for wharf approaching		23.10
	Hand labour for unloading Ro-Ro with flatbed		31.53
	Hand labour for unloading general commodity		67.53
	Hand labour for dispatching Ro-Ro with flatbed		187.79
	86% labour service		266.56
	Emergency allowance		21.01
Day Work Exportation	Hand labour loading Ro-Ro with flatbed		830.61
	Hand labour for reception Ro-Ro with flatbed		154.02
	Hand labour for wharf departure		114.03
	86% labour service		514.85
	Emergency allowance		34.87
	Sub Total		3,110.21
	Water Service		
	Port Commission		83.11
	Sub Total		3,027.10
	7% I.V.A.		211.90
	Total		3,322.11
Other Charges			6,659.58
Grand Total			9,981.69

5.2.2 Port Tariff Revision

EMPORNAC is planning to revise its port tariff in January 1988. In this revision, standard cargo-handling efficiency as a basis of the tariff will be changed. The following revision will be applied, after obtaining the approval of the Ministry of Finance.

(1) Ships Service

- | | |
|--|-----------------|
| 1) Port dues
by registered gross tonnage (R.G.T.) | 0.11US\$/R.G.T. |
| 2) Pilotage | 0.06US\$/R.G.T. |
| 3) Tug boat | 0.18US\$/R.G.T. |
| 4) Mooring-unmooring | 0.02US\$/R.G.T. |
| 5) Berthage
by each 12 hours | 0.07US\$/R.G.T. |

Special service

- | | |
|--|-----------------|
| 6) Anchorage
by day each 5,000 R.G.T. or fraction thereof | 4.00US\$ |
| 7) Special pilotage | 0.04US\$/R.G.T. |
| 8) Special tug boat service
(by hour or fraction thereof) | 500.00US\$ |

Assistant service

- | | |
|---|------------|
| 9) Potable water service (by M.T.) | 2.00US\$ |
| 10) Rent of tractor for potable water supply
(by hour or fraction thereof) | 250.00US\$ |

- 11) Maintenance, small repairs, cleaning of shiphold and wharf
 Labour force cost by hour, rent of equipment cost by hour,
 material and other supply cost (additional 30% of total cost)

Rent of boat

- 12) Pilot (LA GRACIOA, RIO ESCONDIDI) by trip 15.00US\$
- 13) Coast trading (LAS PUNTAS) by trip 31.00US\$
- 14) Fuel, lubricant and electricity
 Supply cost dollars plus additional 30% of total cost

The ship service shall be paid in dollars or quetzales at the exchange rate of the day fixed by the Bank of Guatemala.

(2) Cargo Service

- 1) Labour force----- Present tariff

- 2) Rent of Cargo-handling machinery and equipment
 (by hour or fraction there of)

Straddle carrier	Q.309.66	(109.20)
Truck crane (35 tons)	Q. 92.36	
Truck crane (17.5 tons)	Q. 30.47	
Truck crane		(Q. 26.00)
Forklift (20,000 lbs)	Q. 54.06	(6.83)
Forklift (10,000 lbs)	Q. 37.22	
Forklift (8,000 lbs)	Q. 26.99	(5.53)
Forklift (6,000 lbs)	Q. 24.57	
Tractor	Q. 20.95	(5.53)
Wheel platform car	Q. 6.12	
Trailer with flatbed	Q. 62.44	
Trailer without flatbed	Q. 55.92	
Flatbed	Q. 6.92	
Trailer (without flatbed, ordinary hour)		(Q. 32.50)
Trailer (with flatbed, ordinary hour)		(Q. 42.90)

Derrick crane	Q.103.60 (52.00)
Shore crane	Q.207.52 (52.00)
Rent of maintenance truck	Q. 33.60 (13.00)
Pay loader	Q. 61.06 (13.00)

- 3) Import Wharfage----- Present tariff
- 4) Export Wharfage----- Present tariff
- 5) Import and Export Service----- Present tariff
- 6) Transfer of Commodities----- Present tariff
- 7) Handling of Heavy or Voluminous Commodities----- Present tariff
- 8) Handling and Dispatching----- Present tariff
- 9) Storage Charge----- Present tariff

(3) Other Service

1) Passenger service

Punta Gorda (one way)	Q. 7.50 (5.00)
(round trip)	Q. 15.00 (10.00)
Livingston (one way)	Q. 1.00 (0.75)

2) Rent of Ship

to los Cayos de Belice (daily)	Q.1,800.00 (1,000.00)
Puerto Cortes (daily)	Q.2,100.00 (1,500.00)
Livingston (daily)	Q. 600.00 (550.00)
Punta Gorda (daily)	Q.1,200.00 (650.00)
Castillo San Felipe (daily)	Q. 900.00 (650.00)
Belice	Q.2,400.00 (1,500.00)

3) Containers

The tariff by operation hour is calculated.

by hour or fraction thereof	Q. 309.66 (109.20)
-----------------------------	---------------------

The staying or storage of containers will be charged from the first day of landing, according to the tariff.

by each 1,000 K.G. Q. 0.29 (0.29)

4) Loading and Unloading of Containers----- Present tariff.

Note: () Present Charge

5.3 Present Financial Condition

According to the financial statement shown in Table 5.3.1, there was a surplus in the year 1969 immediately after the completion of the construction of the second stage project. After that, profits have been accumulated along with the increases of the cargo volume handled at the Port.

The profits of EMPORNAC are distributed as follows:

Central government	15%
Local government	15%
EMPORNAC's employees	15%
EMPORNAC	50%
Legal Reserve	5%

Judging from the small long-term liability, the financial condition of EMPORNAC seems to be sound (see Table 5.3.3).

Table 5.3.1 Financial Statement (Summary)

(unit: Quetzales)

Year	Income	Expense	Net Income
1967	2,524,460.82	1,950,317.17	574,143.65
1968	3,333,712.52	2,449,762.10	883,950.42
1969	2,595,749.37	2,192,012.19	403,737.18
1970	3,033,799.97	2,807,467.85	226,332.12
1971	3,057,006.88	2,609,561.20	447,445.68
1972	3,620,515.42	2,903,664.17	716,851.25
1973	4,884,911.65	3,637,631.94	1,247,279.71
1974	6,567,583.21	4,786,178.64	1,781,404.57
1975	6,324,881.10	5,011,996.98	1,312,884.12
1976	8,911,740.42	5,810,537.36	3,101,203.06
1977	11,304,117.20	7,628,513.91	3,675,603.29
1978	12,761,181.55	8,721,381.56	4,039,799.99
1979	14,930,076.22	9,834,419.94	5,095,656.28
1980	16,258,752.14	11,214,171.37	5,044,580.77
1981	18,310,020.80	12,893,724.28	5,416,296.52
1982	16,481,791.81	13,983,629.76	2,498,162.05
1983	13,372,550.63	12,482,277.68	890,272.95
1984	17,578,184.48	13,289,743.18	4,288,441.30
1985	21,638,262.18	15,914,659.90	5,723,602.28
1986	30,586,793.39	24,002,145.02	6,584,648.37

Note: Expense detail is shown Table 5.3.2

Table 5.3.2 Breakdown of Expenses (1983 - 1986)

(Unit: Quetzales)

	1983		1984		1985		1986	
	Expense	Share	Expense	Share	Expense	Share	Expense	Share
Personnel expenditure	6,770,626	54.2	7,112,768	53.5	8,468,020	53.2	11,277,720	47.0
Salary of fixed posts	1,995,775	16.0	2,212,127	16.6	2,330,213	14.6	2,635,569	11.0
Salary of provisional personnel	62,935	0.5	75,922	0.6	76,733	0.5	74,709	0.3
Bonus	270,825	2.2	334,350	2.5	381,379	2.4	524,203	2.2
Wage	4,397,788	35.2	4,456,820	33.5	5,632,687	35.4	7,940,704	33.1
Allowance							30,425	0.1
Allowance of Representation	17,321	0.1	16,950	0.1	37,408	0.2	18,552	0.1
Technical and Professional Service	25,982	0.2	16,599	0.1	9,600	0.1	53,558	0.2
General and Administrative Expenditure	1,327,012	10.6	1,636,659	12.3	2,070,724	13.0	3,402,691	14.2
Quota of Employer	371,563	3.0	398,397	3.0	582,940	3.7	1,446,689	6.0
Allowance, Vacation Indemnification	650,235	5.2	938,705	7.1	1,018,861	6.4	1,360,710	5.7
Rent	119,431	1.0	118,154	0.9	184,908	1.2	238,657	1.0
Insurance	145,971	1.2	135,560	1.0	232,333	1.5	290,345	1.2
Public Service	25,905	0.2	35,356	0.3	34,709	0.2	40,781	0.2
Other	13,907	0.1	10,487	0.1	16,973	0.1	25,509	0.1
Operation and Maintenance	3,032,773	24.3	3,262,692	24.6	3,767,885	23.7	7,230,718	30.1
Repairs and Maintenance	1,043,436	8.4	1,125,040	8.5	1,593,305	10.0	2,883,270	12.0
Public Service	394,260	3.2	473,872	3.6	473,300	3.0	757,245	3.2
Combustibles and Lubricants	676,277	5.4	695,760	5.2	726,872	4.6	1,186,721	4.9
Materials and Supply	767,211	6.1	837,545	6.3	846,936	5.3	1,910,114	8.0
Other Various Useful Products	151,639	1.2	130,475	1.0	125,472	0.8	493,368	2.1
Interest on Loans	10,316	0.1						
Eximbank	10,316	0.1						
Depreciation	1,341,551	10.7	1,277,624	9.6	1,608,031	10.1	2,091,016	8.7
Cargo Handling Equipment	323,447	2.6	377,320	2.8	387,836	2.4	429,487	1.8
Transport Machines	269,651	2.2	226,993	1.7	323,224	2.0	357,440	1.5
Buildings	226,249	1.8	226,249	1.7	190,105	1.2	190,105	0.8
Installations	40,112	0.3	41,101	0.3	48,081	0.3	50,607	0.2
Public Use Goods	219,584	1.8	219,584	1.7	469,617	3.0	845,353	3.5
Urbanization Works	46,612	0.4	46,612	0.4	39,955	0.3	39,955	0.2
Other Assets	215,896	1.7	139,765	1.1	149,213	0.9	178,069	0.7
Total	12,482,278	100.0	13,289,743	100.0	15,914,660	100.0	24,002,145	100.0

Table 5.3.3 Balance Sheet (Summary)

(Unit: Quetzales)

	1983	1984	1985	1986
Assets				
Current Assets	8,894,200.33	11,820,273.29	24,764,476.36	26,190,187.98
Deferred Assets	4,478,176.41	4,248,956.85	40,715.87	247,528.32
Permanent Assets	19,374,410.93	21,590,039.27	23,982,570.35	28,243,690.90
Accumulated Depreciation	5,750,435.63	6,377,832.51	7,201,071.84	8,270,700.17
Other Reserve Funds				934,688.43
Other Deposits	13,623,975.30	15,212,206.76	16,781,498.50	19,038,302.30
Fixed Assets	19,932,420.56	19,923,708.61	27,096,176.01	27,096,176.01
Accumulated depreciation	5,468,256.21	5,921,976.32	8,752,787.97	9,878,808.30
Total Assets	41,460,527.39	45,283,169.19	59,930,078.77	62,693,386.31
Liabilities, Capital, Reserve & Surplus				
Current Liabilities	6,248,248.53	9,220,614.46	11,175,306.81	14,331,572.58
Deferred Liabilities	901,531.29	605,115.88	2,574,373.33	3,620,856.69
Long-term Liabilities	2,871,762.00	2,871,762.00	2,586,833.00	2,871,762.00
Capital, Reserves & Surplus	31,438,985.57	32,585,676.85	43,593,565.63	41,869,195.04
Total Liabilities & Capital	41,460,527.39	45,283,169.19	59,930,078.77	62,693,386.31

5.4 Actual Management and Operations

5.4.1 Existing Port Facilities

The main facilities of the port are as follows:

1) Apron of wharf area		13,509m ²
2) Sheds		
a) 3rd and 6th sheds	76m. x 245m.	18,620m ²
b) Annex 3rd and 6th sheds	23m. x 20m.	4,600m ²
c) 4th shed	61.5m. x 114.3m.	7,029m ²
d) Consolidation shed	61.5m. x 114.3m.	7,029m ²
e) Export shed	61.5m. x 114.3m.	7,029m ²
f) Annex shed of export and 4th sheds	61.5m. x 114.3m.	7,029m ²
Total shed capacity		51,337m ²
g) Open shed (to bidding 1988)		7,053m ²
3) 5th storage yard		21,250m ²
4) Container yard		
a) Rear shed of consolidation and exportation		
	70m. x 120m.	8,400m ²
b) Refrigerated container yard	80m. x 149.2m.	11,936m ²
c) Front of container office	80.4m. x 121.4m.	9,760m ²
d) Front of control tower		12,616m ²
e) Between 4th and 3rd street behind refrigerated container (to construct 1988)	75m. x 177.3m.	(13,293m ²)
f) Between 1st and 2nd street, corner street "D" in the side of storage (to bidding 1988)	75m. x 150m.	(11,250m ²)
g) East side of time office		8,800m ²
Total container yard capacity		51,512m ²
5) Service area		
a) Open shed for operation machine (mobilization)		2,312m ²
b) Mechanic workshop		1,250m ²
c) Warehouse of materials and supplies		660m ²
d) Building occupied by repairing and civil works construction		220m ²
e) Building occupied by chain and trap, etc.		224m ²
f) Maritime workshop		220m ²
Total area		4,846m ²

6) Circulation way	46,015m ²
7) Area occupied by tanks of SHELL Company	6,826m ²
8) Free area (parking, place for iron, office and gas station)	57,381m ²
Total port area	284,275m ²
Length of Wharf (water depth -9.0m)	914m.

5.4.2 Cargo Handling Activity

(1) Stevedoring

As for stevedoring, 1, 2 or 3 gangs of EMPORNAC workers are provided at the request of shipping as users.

1) Composition of Stevedore Gangs

<u>Function</u>	<u>Number</u>
Time Measurement	1 person
General chief	1
Chief of storage	1
Wincher	3
Stevedore	14
(12 on boat, 2 at platform of wharf)	
Checker	1
Forklift Operator	1
Mark checker	1

2) Number of Gangs Employed

Number of gangs usually used by ship type:

Container ship	1 gang and 4 to 5 trailers with flatbeds
Conventional ship	2 to 3 gangs and 2 platform cars with tractors
Ro-Ro ship	1 gang and trailer tractor

(2) Service Time

The service time of EMPORNAC is as follows:

Ordinary hours	7:00 to 12:00
	14:00 to 17:00
Extraordinary hours (additional charge 50%)	18:00 to 24:00
Midnight hours (additional charge 100%)	0:00 to 6:00

In fact, cargo-handling works are usually performed at midnight EMPORNAC is able to offer the midnight service in accordance with the request of users by providing 1 shift of workers.

(3) Cargo Handling Contract

Cargo handling contracts are divided into the following categories:

Ordinary work	Personnel expense and rental charge of cargo-handling equipment is paid by number of hours used.
Piece work.	Cargo-handling charge is paid by handling volume.

Generally, these contracts are combined according to the request of the user.

5.4.3 Labour

(1) Number of EMPORNAC's Employees

The number of EMPORNAC's employees by year is as follows:

Table 5.4.1 Number of EMPORNAC's Employees (1982-1986)

	Year	1982	1983	1984	1985	1986
Personnel of Guatemala City office		31	25	36	35	46
Personnel of Santo Tomas		560	588	602	579	636
Personnel by contract (office)		5	4	8	4	5
Personnel by contract (wharf)		23	6	4	7	
Maintenance		377	371	396	423	485
Maintenance		337	337	396	423	485
Mechanic workshop		40	34			
Maritime repairs		33	37	33	35	37
Maritime operations		71	76	79	73	80
Stevedore		1,179	1,115	1,070	1,025	1,110
Personnel of Livingston		4				
Total		2,283	2,222	2,228	2,181	2,399

There has been a continuous decrease in the number of employees from 1982 to 1985. However in the year 1986, EMPORNAC newly employed around 200 employees.

(2) Labour Union

Almost all EMPORNAC workers belong to the Port Labourers Association (ASTRAPORT).

5.4.4 Existing Computer System

(1) System

In order to manage the administrative information and operational control, EMPORNAC employs a computer system with the following specifications:

Central Processing Unit model IBM S/36
516 k bytes of memory and 400 M bytes of stock

1 System printer (650 lines per minute)
4 Dot printers (200 characters per second), (136 characters per second)

15 terminals with 1,920 character screens located in the following departments:

- 5 units in the Data Processing Dept.
- 2 units in the Commercial Dept.
- 2 units in the Cashier Dept.
- 1 unit in Personal Affairs Dept.
- 1 unit in Budget Dept.
- 1 unit in Finance Dept.
- 1 unit in Statistics Dept.
- 1 unit in Time Measurement Dept.

(2) Utilization

The computer system is mainly used to produce the following documents:

- User invoices
- Financial statements
- Statistics
- The cashing of hand labour
- The control of fixed assets
- The check of salaries and bonuses
- Profit and various complements
- The control of personnel
- Portfolio
- Cash flow
- Budget and others

The time for processing the above data accounts for 75% of the total c.p.u. time. The rest is used for computer system development, programming, etc.

CHAPTER 6 PRESENT SITUATION OF ACCESS CHANNEL

6.1 Access Channel

6.1.1 Charts

The charts available at the Port are as follows:

- (1) Puerto Santo Tomas Castilla y Puerto Barrios
No. GUA 03-28165 S: 1/15,000
- (2) Approaches to Puerto Barrios and Santo Tomas de Castilla
No. 28164 S: 1/50,000
- (3) Puerto Barrios and Santo Tomas de Castilla
No. 2988 S: 1/25,000
- (4) Approaches to Puerto Barrios and Santo Tomas de Castilla
No. 2988 S: 1/65,000

6.1.2 Entrance Channel and Approach Channel

The outline of the entrance channel is as follows:

- Length between "Boya de Mar" and quaywall: about 12.4 km.
- Width of channel: 90 m
- Depth: 9.0 m
- Type: Straight Channel
- Channel Line: 10°-190° (T.N) and almost from North to South.

It can be said that the Entrance Channel at the Port is adequate considering the figure of the Bay, the topography of the sea bottom, wind, tide, current, etc. However, as the vessels are becoming larger both in size and number, several measures for safe and easy navigation through channels will be studied carefully.

6.1.3 Access Channel Outside the Port

The following channel is being used:

Off shore of Cabo Tres Puntas, 15°-39'-00"N., 88°-37'-24" W., the course is toward 42°-222°, and at Bajo de Ox Tongue 2 kilometers westward, 15°-53'-36" N., 88°-42'-30" W., it turns by 90°, then finally the channel is

connected with Boya de Mar offshore of the entrance channel 316o-136o (Fig 6.1.1).

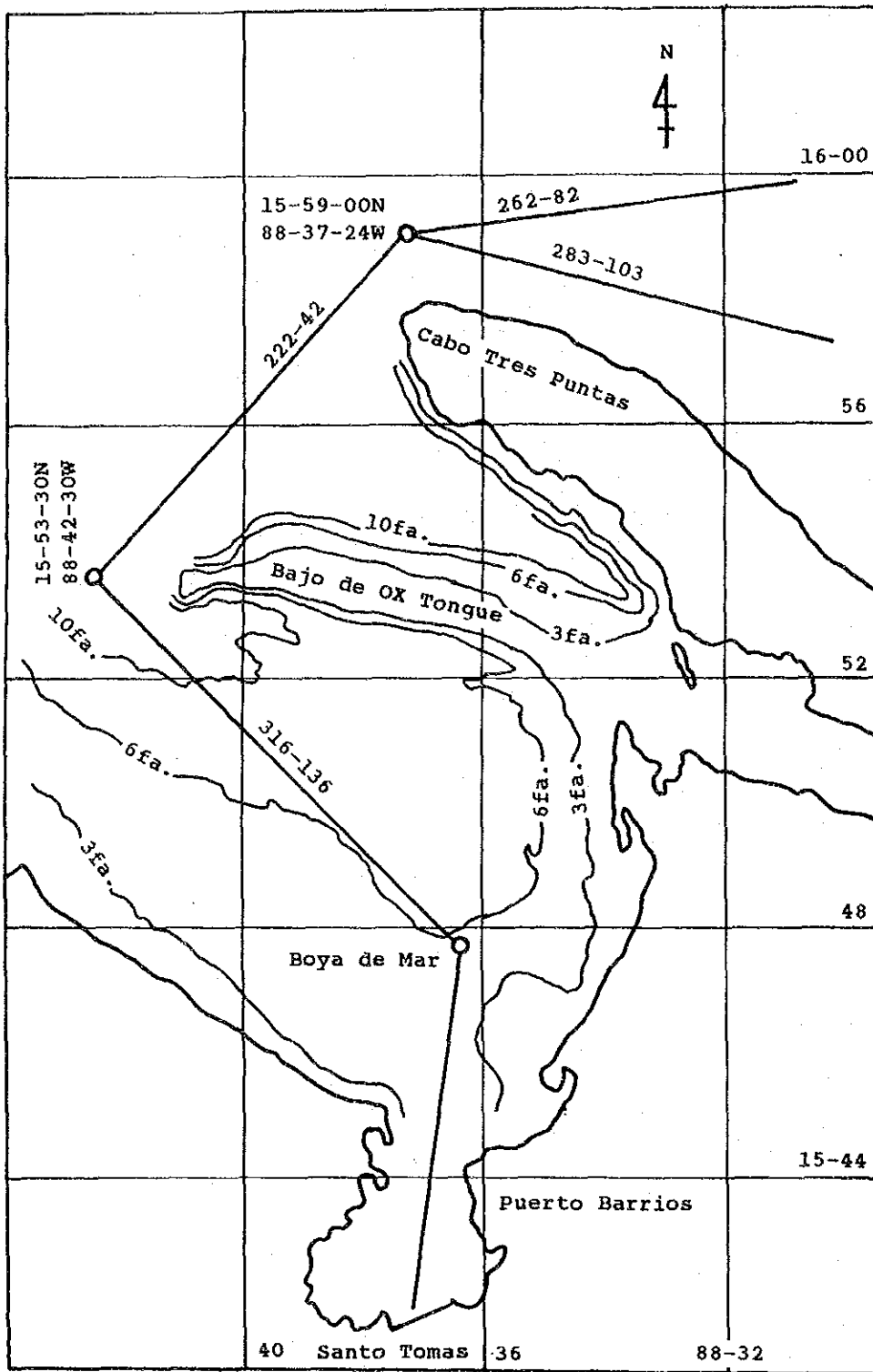


Fig. 6.1.1 Access Channel

6.1.4 Entrance Quaywall

When a vessel enters the harbor, a port pilot will usually get on board and handle the vessel in place of the pilot of the vessel. Ordinary vessels (except Ro-Ro vessels) move up to the quaywall by the course A,B,C in Fig. 6.1.2. At No. 7,8 Buoys, the engine is cut and the vessel is pulled up to the quaywall by two tug boats. Generally, the approach on the left side of the vessel is easy, however in some cases, the approach will be made on the right side.

The angle between the channel and the quaywall is about 55° . A is used in case of No.1- No.3 berths, and B is used in case of No.4- No.6 berths.

It is estimated that Ro-Ro vessels arrive every two days in average. The distance between moored vessels should usually be around 100 m. Ro-Ro vessels approach the quaywall at a velocity of 10 cm/s. (Fig. 6.1.3).

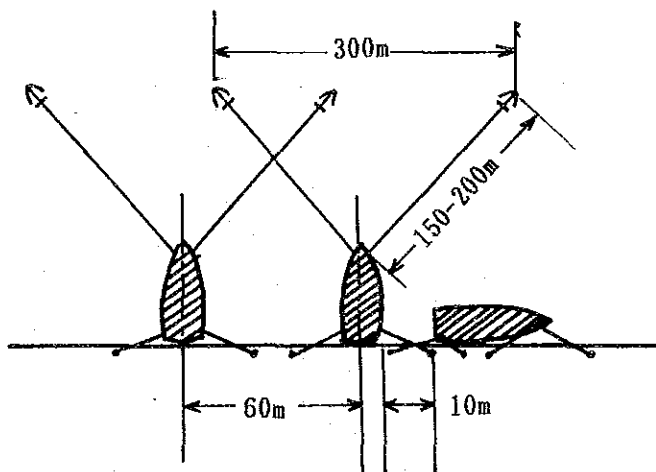


Fig. 6.1.3 Mooring of Ro-Ro Vessels

6.1.5 Leaving the Port

When leaving the Port, a vessel is usually pulled out by the tug boats. Generally it is difficult to navigate because the west side of the quaywall is very shallow in depth. However, the west side has a larger turning basin (Fig 6.1.4).

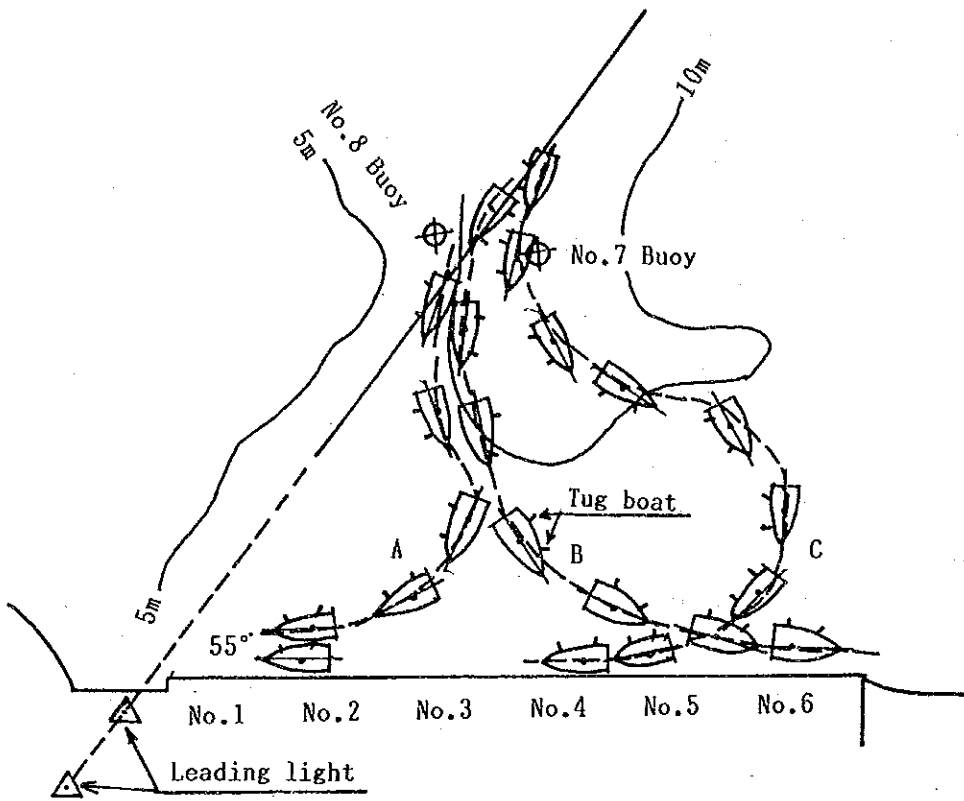


Fig. 6.1.2 Approach to the Quaywall

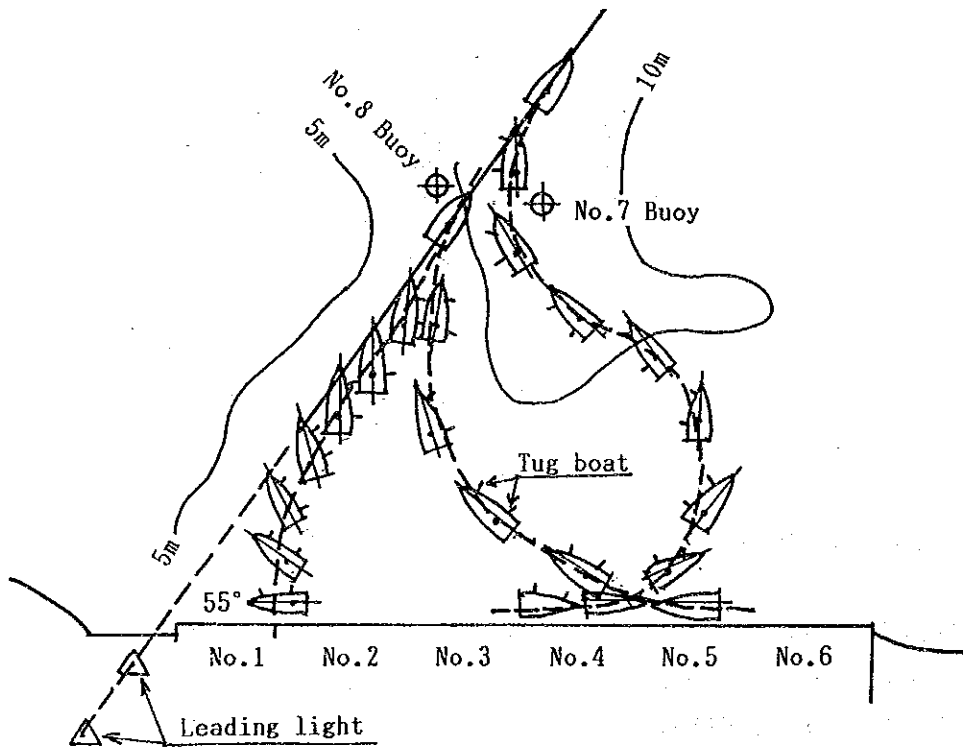


Fig. 6.1.4 Departure from the Quaywall

6.2 Navigation Aids

Guatemala belongs to the Maritime Buoyage System of the International Association of Lighthouse Authorities (IALA), and all light buoys were changed based on the new system in January 1984. The Port management has a strong desire to install radio beacons at Punta del Cabo, Punta Coco, Punta de Palma and Livingston in order to realize easy and safe entrance to and exit from the port (Fig. 6.2.1).

6.2.1 Safe Water Marks

The safe water marks are clear, but dangerous areas are not clearly marked. Safe water marks have an appearance quite different from danger marking buoys. They are spherical, or alternatively pillar-shaped or square with a single red spherical topmark. They are the only type of mark to have vertical stripes (red and white). Their lights, if any, are white using isophase, occulting, one long flash or Morse "A" rhythms.

Safe water marks are installed along the entrance channel.

6.2.2 Lateral Marks

Lateral marks in Region A utilize red and green colors by day and night to denote the port and starboard sides of channels respectively. However, in Region B these colors are reversed with red to starboard and green to port.

A modified lateral mark may be used at the point where a channel divides to distinguish the preferred channel, that is to say the primary route or channel.

Lateral marks, used in conjunction with a "Conventional Direction of Buoyage," are used for well defined channels, with 4 buoys on each the port and the starboard sides of the channel (Table 6.2.1, Fig. 6.2.2, 6.2.3).

6.2.3 Isolated Danger Marks

Isolated danger marks are placed at small, dangerous areas which are surrounded by navigable water. Distinctive double black spherical topmarks and group flashing of (2) white lights, serve to identify isolated danger marks.

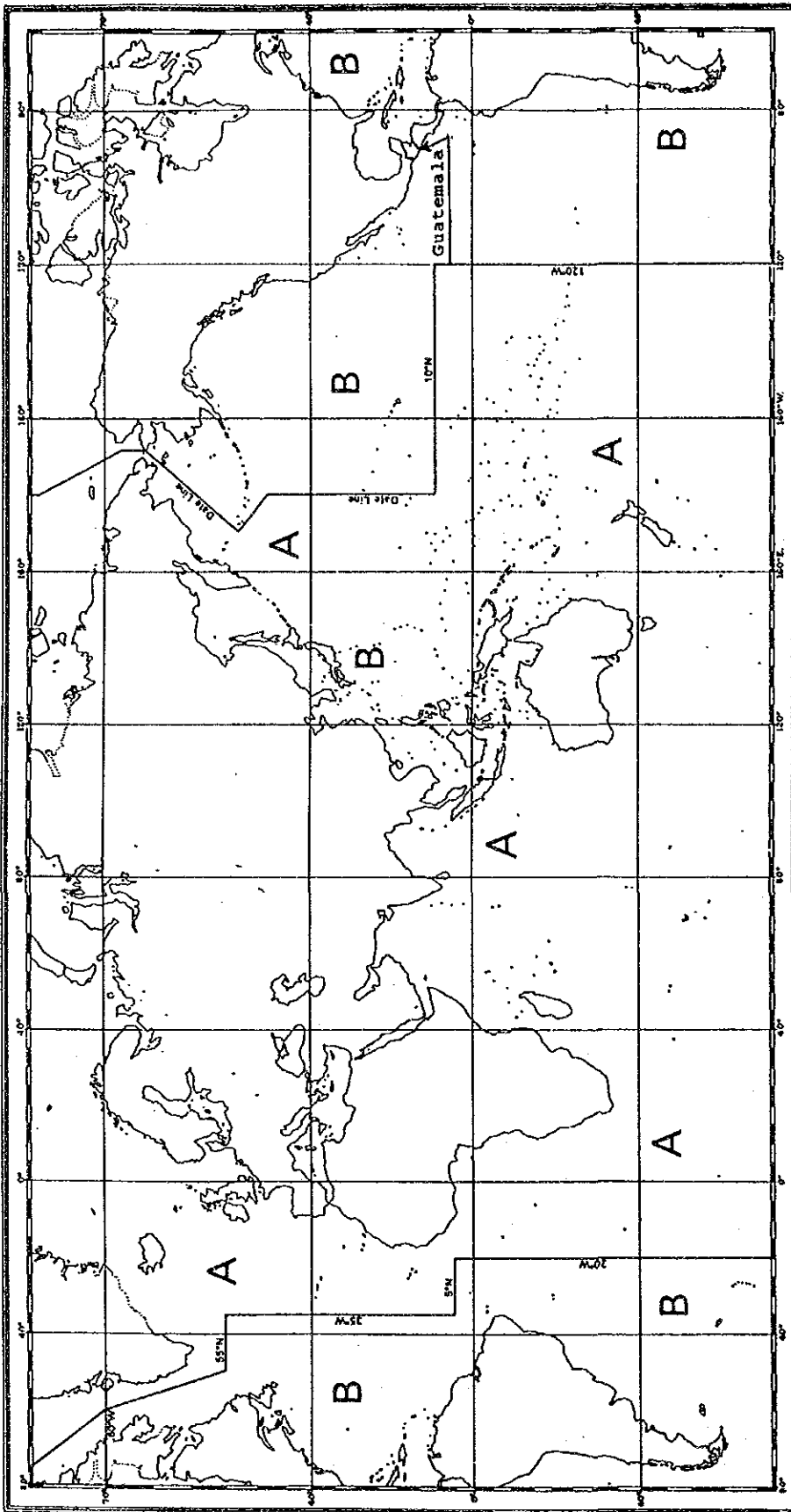


Fig. 6.2.1 IALA MARITIME BUOYAGE SYSTEM
Buoyage Regions A and B, November 1980

Table 6.1.1 Aids to Navigation

AID DESCRIPTION	Light		Daymark Color	Position	Moorings		Sinkers (LBS)	Battery CAP.	Service
	LAMP	VR at T			Rythm	Chain			
Buoy No.1	155 MM Green	5.9 km	Green	15-47-19.3 N 88-36-15.1 W	3/4	2,000	12 V	Solar Panel	
Buoy No.2	155 MM Red	5.7	Red	15-47-20.9 N 88-36-26.3 W	-ditto-	-ditto-	-ditto-	-ditto-	
Buoy No.3	155 MM Green	6.1	Green	15-44-46.1 N 88-36-22.1 W	-ditto-	-ditto-	-ditto-	-ditto-	
Buoy No.4	155 MM Red	6.1	Red	15-45-23.0 N 88-36-43.0 W	-ditto-	-ditto-	-ditto-	-ditto-	
Buoy No.5	155 MM Green	6.5	Green	15-43-40.4 N 88-36-37.8 W	-ditto-	-ditto-	-ditto-	-ditto-	
Buoy No.6	155 MM Red	6.1	Red	15-43-40.4 N 88-36-58.5 W	-ditto-	-ditto-	-ditto-	-ditto-	
Buoy No.7	155 MM Green	6.1	Green	15-42-11.6 N 88-37-03.3 W	-ditto-	-ditto-	-ditto-	-ditto-	
Buoy No.8	155 MM Red	6.1	Red	15-42-10.9 N 88-37-09.8 W	-ditto-	-ditto-	-ditto-	-ditto-	
Sea Buoy	203 A Clear	13.7	Morse letter and white	15-48-25.8 N 88-36-11.9 W	1-1/8	5,000	-ditto-	-ditto-	

Note: 1) All buoy lanterns must show through zenith
 2) All lanterns equipped with 4 or 6 place lampchangers
 3) Geographic range based upon observers height of eye
 of 15 ft
 4) Numerals and/or letters are white retroreflective
 5) All retroreflective markings are wide-angle, flat-top films

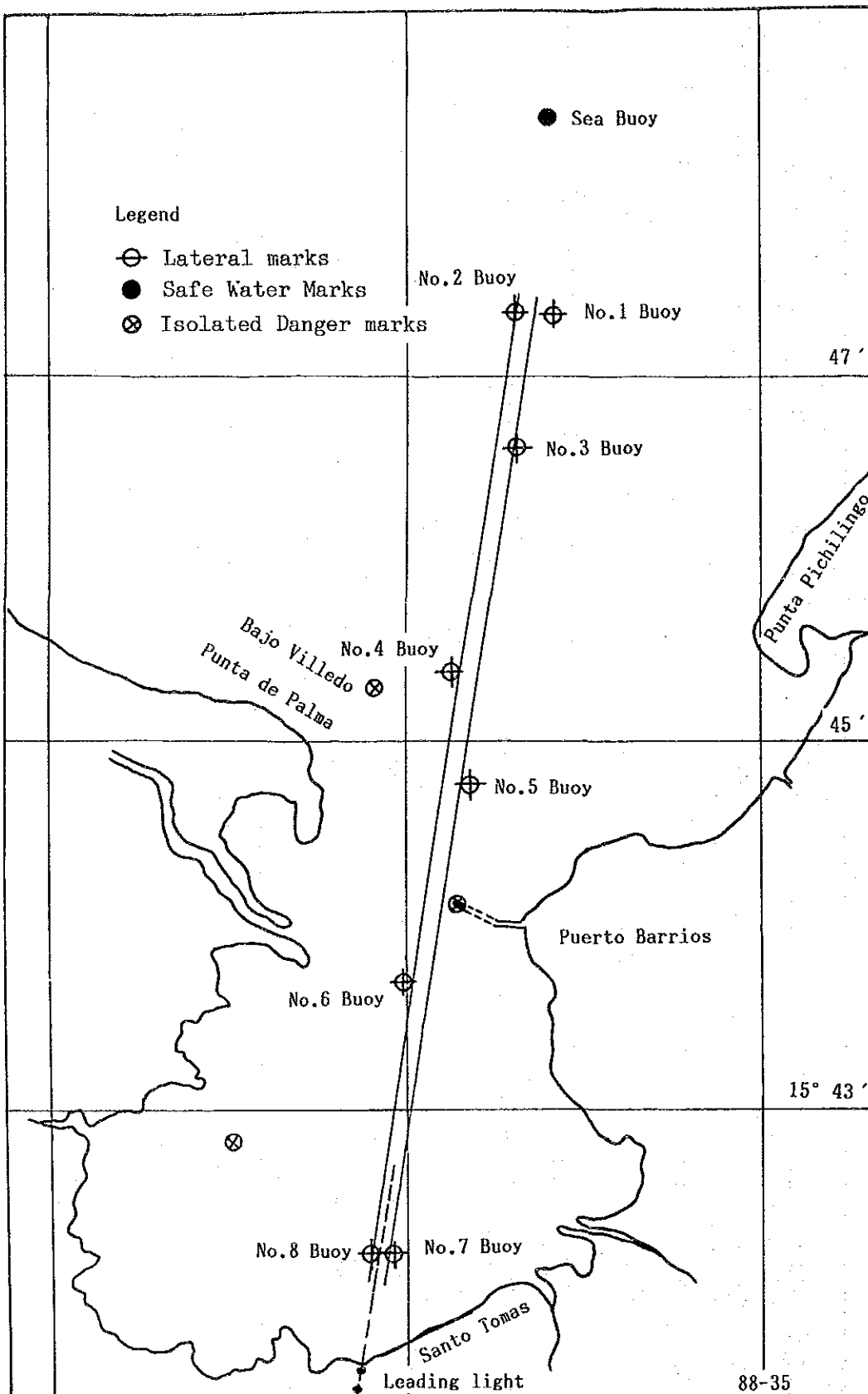
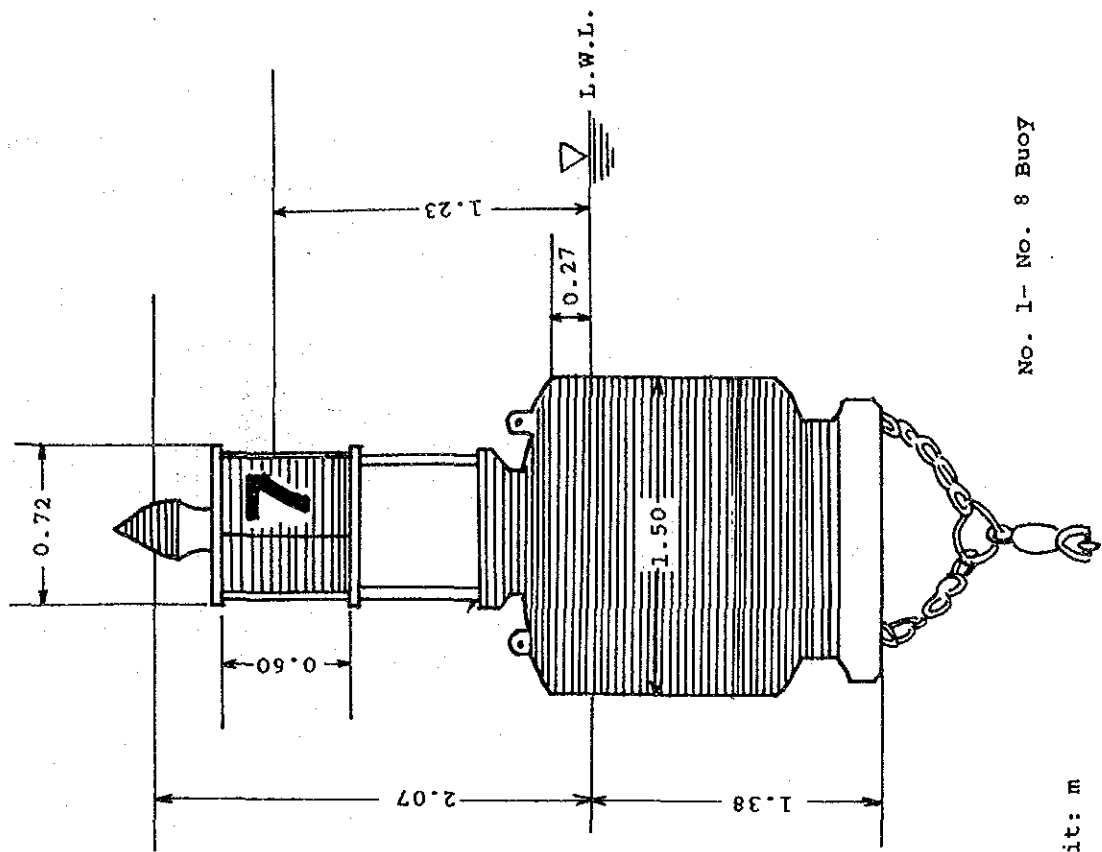


Fig. 6.2.2 Location of Light Buoys



No. 1- No. 8 Buoy

unit: m

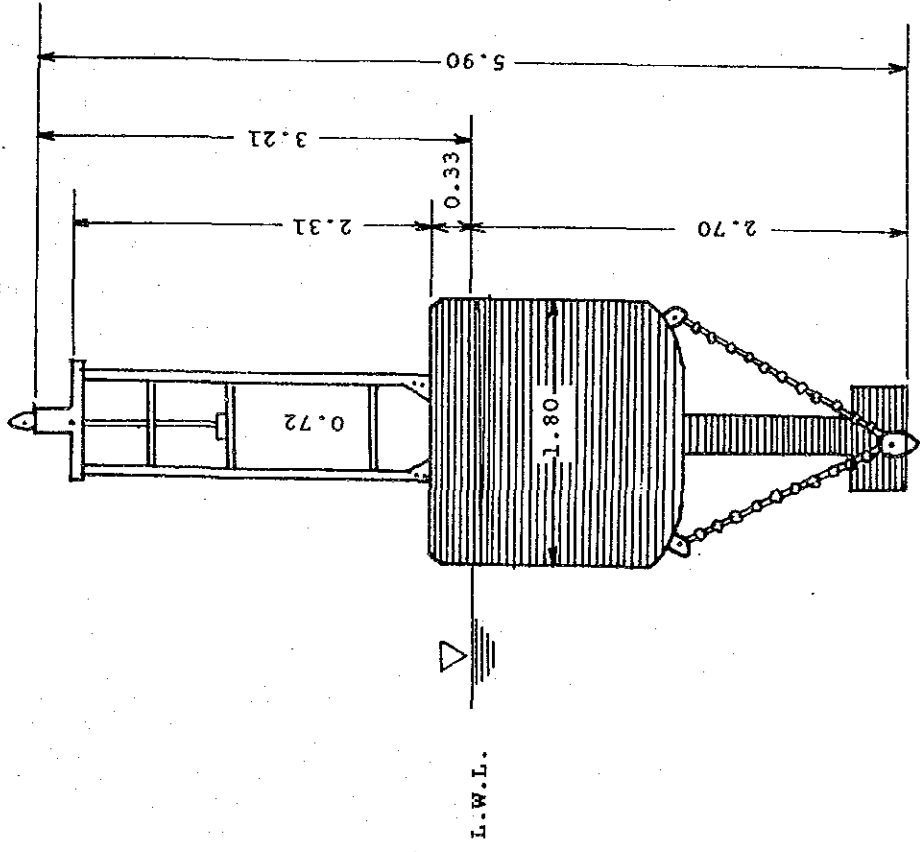


Fig. 6.2.3 Configuration of sea Buoys

6.2.4 Leading Lights

One set of leading lights is installed on the land along the visible line of the channel as shown below. The details are shown in Fig. 6.2.4.

This leading light was constructed in January 1984.

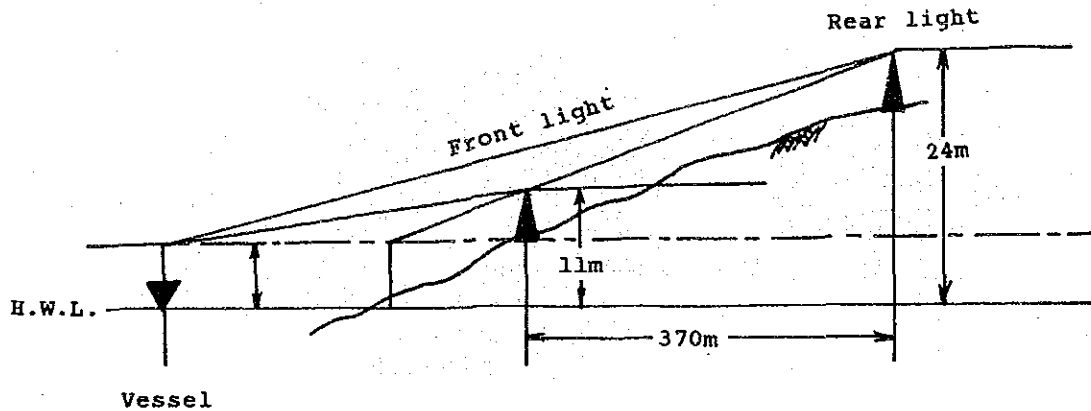


Fig. 6.2.4. Leading Light

6.2.5 Tug Boats

There are currently 3 tug boats (Table 6.2.2) used at the Port. The "Victoria" is used for Carrying Pilots to and from the vessels. The other two tug boats are actually used as tug boats. The tug boats two vessels within the turning basin inside the approach channel, i.e., inside No. 7 and No. 8 Buoys. The operation time of "30 de Junio" and "20 de Octubre" is very long. The port also has 2 sets of launches for carrying pilots to and from the vessels. However, these launches are now out of order and are not being used (Table 6.2.3).

Table 6.2.2 Launches

NAME OF LAUNCH	TONNAGE	DIMENSIONS			POWER	R.P.M	PERSONS	CONSTRUCTION
		LENGTH	WIDTH	DRAFT				
RIO ESCONDIDO	9.51t	10.2m	3.6m	2.7m	210hp	2,850	16	1979
GRACIOSA	9.51	10.2	3.6	2.7	210	3,050	16	1979

Table 6.2.3 Tug Boats

NAME OF BOAT	TONNAGE	LENGTH	WIDTH	DRAFT	POWER	R.P.M	YEAR CONSTRUCTED
30 DE JUNIO	160t	22.8m	7.5m	2.4m	750 x 2 1,500 hp	1,900	1986
20 DE OCTUBER	78	22.8	7.8	2.1	675	1,800	1980
VICTORIA	60	19.5	3.3	1.5	350	1,800	1941

NOTE 1: OPERACIONES MARITIMAS

NOTE 2: CONSTRUCTION

1) Stamford Connecticut. U.S.A.

2) Depend -A- Graf. U.S.A.

3) Slowing. GUATEMALA

6.3 Change of the Water Depth at Channel and Turning Basin

6.3.1 A Comparative Study of Sounding Results

A comparative study was made between the results of the present sounding survey and past survey data to determine the change of the water depth at channel and turning basin. Sounding surveys made in the past are for the following:

- a) Around Puerto Barrios pier January 1984
(including access channel in the port)
- b) Santo Tomas de Castilla basin February 1984

The present sounding survey covers the entire area of the turning basing. As a result of the comparison of data, No major changes in water depth nor deposition of bed materials has been found. Slight changes in water depth are presumed to be due to differences in the base line of sounding, sounding pitch, ship position measurement method, etc.

6.3.2 Transport of Bed Materials by Waves

Drift sand may be divided largely into two types according to the mode of transport. One type is a lively movement of bed materials along the seabed and the other is a movement in a suspended state in the water. The former is called "traction drift sand", while the latter is called "suspended load". These phenomena are caused by waves, of which breakers, in particular, tend to transport bed materials causing the change of water depth.

For this reason, the waves of Tropical Storm LAURA of 1971 were used to calculate the maximum wave height in the basin with 20-year a return period. As a result, wave direction of N, wave height $1/3$ of 1.04m and wave period of 3.74 sec were obtained. The water depth as this wave transports the bed materials is as follows:

- | | |
|--|-------|
| (a) Travelling critical depth | 7.8 m |
| (b) Wearing course travelling critical depth | 4.5 m |
| (c) Perfect travelling critical depth | 2.5 m |

In this case, the boundary layer has a smooth surface and a turbulent flow. Since the change of water depth becomes apparent only at the perfect travelling critical depth, transport of bed materials by waves cannot be conceived in the present channel and turning basin which maintain a water depth of 9.0m or more.

1) Change of Water depth in Bajo de Ox Tongue

Bajo de Ox Tongue has a small water depth and is subject to westerly high waves during inclement weather and also to the frequent N and NNW waves. Since the water depth of this shoal is about 4 m on the average, the wave height of 0.9m causes the wearing course travelling of bed materials.

2) Breakers

Breakers that cause active sand drift along the coast generate at a water depth of 1.7m outside the Bahia de Amatique and have a breaking wave height of 1.2m. In the shore area of the bay, breakers generate at a depth of 1.6m and have a height of 1.1m. Even waves of a relatively small height break. However, these are spilling breakers due to short wave period and large H/L ratio, which do not directly induce the transport of bed materials.

3) Suspended Drift Sand

The amount of suspended load caused by turbulence of breakers or the amount of sediments discharged from rivers such as Rio Cacao and Rio Quebrada Seca is difficult to estimate due to lack of necessary data.

6.3.3 Tidal Current

The speed of tidal current in the duration of rise and fall is 0.30 to 0.50m/sec. outside the bay and less than 0.30m/sec. inside the bay. This speed of tidal current can not be considered to cause transport of bed materials.

As discussed so far, there will be no particular tendency of deposits owing to such elements as waves and tidal current even when the channel and turning basing are increased in depth. However, as the channel is to be increased in width as well as in depth, there is the possibility of still seawater being trapped in the dredged section, which together with surface water of low salinity may cause two water layers, thereby generating a density current.

6.3.4 Recommendations

At present, there is only a small amount of deposit in the channel and turning basin by sediment load due to waves, tidal current and river discharges, and no major changes in water depth are foreseen within the next 10 years or so under this condition.

Under the port expansion and improvement project, however, the channel is to be increased in depth and width and the eastern part of the turning basin is to be dredged. As a result, the turning basin will come closer to Rio Quebrada Seca and Rio Cacao. It is necessary, therefore, to carry out a periodic sounding survey of the channel and turning basin to observe the change of water depth by establishing a standard line in the channel and turning basin and sounding twice a year, once at the beginning of the wet season and once at the beginning of the dry season.

CHAPTER 7 DEMAND FORECAST

7.1 General

7.1.1 Hypothesis and Port Functions

The intermediate national development plan (1987-1991) aims to promote recovery from the stagnation of exports of traditional agricultural products supporting the Guatemalan economy and to promote the export of new agricultural products. In order to achieve the recovery of the Guatemalan economy, government policy aims to improve the private investment climate and increase private consumption. The government aims to stabilize and sustain the economy in 1991 through emphasizing the effective use of private fixed assets, increasing government investment and arranging prices and wages. Through the implementation of these policies, foreign transactions such as the export of agricultural products and the import of investment and consumption goods will increase. Therefore port facilities which can handle increased cargo volume with appropriate capacity shall be needed to contribute to the economic development.

The government has not yet formulated any long-term development plan after the year 1991. Therefore, based on the macroeconomic indices in the intermediate national development plan, this report assumes that the development of the economy of Guatemala shall progress satisfactorily considering the past economic growth in Guatemala and the world economic situation.

At present, there are five Guatemalan ports handling export and import cargoes. The port of Santo Tomas de Castilla, which carries trade with North America, Western Europe, Central America and Caribbean countries and handles 2.11 million tons (about 60% of the total international trade) per year, is the most important port in the nation. Therefore, the importance of the development of this port shall increase still further in the future considering the close relations between Guatemala and North America, Western Europe, Central America and Caribbean countries.

Judging from the historical data, the cargo handled at the port has

the following characteristics, and the functions of the Port for handling cargo are assumed not likely to greatly change in the future.

- a) Bananas, which had been exported from Puerto Barrios, are exported from the Port at present, and almost all of them are transported by banana ships. Therefore virtually all Guatemalan export bananas seem likely to be handled at the Port in the future.
- b) The port of Puerto Barrios can handle all its projected cargo through the period of this development project using existing facilities.
- c) The cargo handled at the Port includes cargo transported to/from El Salvador, and it is assumed that this transport route shall be managed in the same manner in the future.
- d) The current trade pattern of crude oil, such as exporting from Santo Tomas de Castilla and importing at San Jose, is also assumed not to change through the project period.

7.1.2 Method of Traffic Forecast

(1) Methodology

There are two methods usually used to forecast the cargo volume. The first one is a macro forecast. Based on the assumption that the cargo volume handled at the port reflects the economic activity in the port's hinterland, the total cargo volume is estimated using the historical relation between cargo volume and macroeconomic indices such as GDP. The second method is a micro forecast, which estimates each commodity group individually based on related indices and the forecast demand and supply situation.

However, as mentioned in Chapter 4, there is no obvious relation between the historical cargo volume at the Port and GDP as a whole.

Therefore, the cargo volume to be handled at the Port in this study is estimated by using the micro forecast method.

(2) Major Commodity Groups

The port of Santo Tomas de Castilla handles many commodities. However, the following commodity groups are selected for the forecast in the study. Although sugar has been a major export commodity at the Port, the export volume from the Port has decreased since the port of Quetzal started operation in 1983. Therefore, sugar is assumed not to be handled at the Port from now on.

Export commodities : Bananas, Coffee, Fresh Fruit and Vegetables, Sesame and Cardamom, Maize, Other Agricultural Products, Crude Oil, Minerals, Manufactured Products

Import commodities : Wheat, Basic Grain, Other Agricultural Products, Gasoline, Diesel and Fuel Oil, LPG, Kerosene, Other Petroleum Products, Fertilizer, Paper and Printing Paper, Machinery and Equipment, Fiber Resin and Plastic Materials, Chemical Products, Metal Products, Vegetable and Animal Oil, Textile and Leather Products, Other Foods, Other Manufactured Products

The historical volume of these major commodity groups handled at the Port is shown in Table 7.1.1.

(3) Cargo Forecast by Packing Type

The packing type of cargo handled at the Port can be classified into five types (Loose cargo, Container cargo, Furgon cargo^{*1}, Solid Bulk cargo and Liquid Bulk cargo). The future cargo volume by packing type is estimated considering the historical transition. When estimating the cargo packing type, especially for container cargo, the containerizable rate is assumed considering the characteristics of each commodity.

Note *1 : Furgon means an over-the-road trailer

Table 7.1.1 Historical Major Commodity Groups

COMMODITY	(unit : tons)											
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	
<<<< IMPORT >>>												
Wheat	0	0	173	432	16080	26613	54517	54850	61651	74537	54206	
Basic Grains	1251	26714	33401	774	11612	21015	6205	4000	7726	6437	17314	
Maize	0	0	0	0	0	0	0	0	0	0	19876	
Other Agricultural Products	4260	1693	2227	765	2401	2164	750	463	338	647	1854	
Minerals	17025	12199	9790	6836	10913	12204	184	15	1441	354	69	
Diesel and Other Fuel Oil	6011	45543	124390	82492	140417	88268	80797	66369	43072	130451	107623	
LPG	0	0	0	0	0	0	0	0	53892	60132	71711	
Gasoline	87117	111489	146787	199585	131945	102615	102592	76455	78772	84008	77463	
Kerosene	0	0	0	0	0	0	0	0	17934	21404	19758	
Other Petroleum Products	168939	121087	106338	50676	67951	100209	106809	137965	97803	43089	27272	
Fertilizer	24528	34135	15279	26325	19631	185516	172502	122514	189906	154336	214832	
Paper and Printing Paper	59259	83409	102226	97141	113187	107020	99600	104977	91821	111684	119187	
Machinery and Equipment	60125	52436	59699	50474	37006	30983	24452	11683	17473	14544	16035	
Fiber, Resin and Plastic Materials	21130	31848	31346	42833	37136	34194	37105	43299	39910	45373	48890	
Chemical Products	45546	70657	111781	95719	96461	88908	87731	69364	80843	97763	85881	
Metal Products	83988	84916	94527	81196	83227	130599	82949	68149	60760	76313	59899	
Vegetable and Animal Oil	26630	8035	13212	12719	16534	18184	40942	33769	38465	41778	61466	
Textiles and Leather Products	11878	8237	13213	12524	17470	19646	18186	14738	15807	20069	17913	
Other Foods	15620	29877	47134	41066	54713	47031	37684	43024	43962	40016	39254	
Other Manufactured Products	98644	97531	125946	159598	65799	61744	41919	34180	45060	53072	59515	
Others	0	0	0	12	458	548	466	340	317	259	220	
Sub Total	735151	819806	1037529	961167	922941	1077511	995390	886154	986953	1076366	1120238	
Tares	n.a.	n.a.	n.a.	n.a.	81334	80420	71835	70119	83337	100407	111203	
Total	735151	819806	1037529	961167	1004275	1157931	1067225	956273	1070290	1176773	1231441	
<<<< EXPORT >>>												
Bananas	n.a.	98971	22025	19915	22975	11178	6329	177487	297582	356913	372922	
Coffee	n.a.	115472	127232	215268	112464	128386	156881	124243	151316	199018	177962	
Fruits and Vegetables	n.a.	3721	6205	9223	11051	13310	18495	18968	26913	34901	55556	
Sesame and Cardamom	n.a.	0	0	0	0	18789	17375	15822	19700	23649	25950	
Other Agricultural Products	n.a.	35541	43929	34848	38019	37786	34123	29957	36419	37842	32417	
Sugar	n.a.	144457	37350	48563	119629	38287	90267	14828	2404	400	0	
Minerals	n.a.	1368	2910	6074	13763	9502	1165	1118	21	1360	1174	
Crude Oil	n.a.	0	0	1	111179	104019	222069	309905	177391	64964	253191	
Other Petroleum Products	n.a.	4	163	5	40	1478	37	1	4	0	21	
Manufactured Products	n.a.	83105	114809	147754	68239	49275	34952	34952	44474	57361	66080	
Others	n.a.	0	0	100	0	48	190	180	387	724	380	
Sub Total	n.a.	482639	404623	481751	497359	412038	581498	727461	756611	777132	985653	
Tares	n.a.	n.a.	n.a.	n.a.	78248	79566	72865	67724	84772	99757	106323	
Total	482639	482639	404623	481751	575607	491604	654363	795185	841383	876889	1091976	
Grand Total	1217790	1302445	1442152	1442918	1579882	1649935	1721588	1751458	1911673	2053662	2323417	

Source : Informe Estadístico, EMPORNAC
n.a. : not available

7.2 Socioeconomic Framework

7.2.1 Economy and Demography

As noted above, the Guatemalan government has not published any long-term development plan. However, the intermediate national plan (1987-1991) sets a target annual economic growth rate of 3.5% in 1991. On the other hand, "Lineamientos Basicos de Politica Energetica (LBPE)" conducted by Secretaria General del Planificacion Economica (SEGEPLAN), Ministerio de Energia y Minas (MEM) and UNDP in 1987 estimates the long-term economic growth up to the year of 2000. According to this report, the GDP growth rate in 1990 is estimated to be 4.2 % per year and after that 3.1 % per year is estimated up to the year 2000.

This study assumes that the Guatemalan economy achieves the target growth rate of 3.5 % under the intermediate national plan, and that growth continues at the same rate up to the year 1995. Thereafter, the growth rate up to the year 2005 is assumed to be 3.0 % considering the LBPE.

As for the population increase in Guatemala, population projections up to the year 2025 were published by "Direccion General de Estadistica (DGE)" and "Centro Latinoamericano de Demografia (CELADE)" in 1985. This report considers three alternative cases, but the intermediate scenario is adopted for the study. Based on the above assumptions, GDP and population up to the year 2005 are estimated as shown in Table 7.2.1.

Table 7.2.1 GDP and Population

Year	GDP (million Q)	Population (thousand)	p.c. GDP (Quetzal)
1985	2,925	7,963	367
1990	3,474	9,197	378
1995	4,126	10,621	388
2000	4,783	12,222	391
2005	5,545	13,971	397

Source : Study team estimates

Note : Values in constant 1958 prices

7.2.2 Sectoral GDP

In order to estimate the future sectoral GDP, the past trend of sectoral GDP and the expenditures on GDP are shown in Tables 7.2.2 and 7.2.3. The sectoral GDP over the past 15 years does not show remarkable changes. However, the following items are observed. The share of the agricultural sector showed a decrease from 28% in the first half of the 1970's to 25% in the second half of the 1970's. And the GDP share of agriculture still remains at 25%. The share of the construction sector showed a rapid increase after the damage caused by the earthquake in 1976 in order to reconstruct houses and infrastructures. However, the share then decreased to the level of the first half of the 1970's. The GDP share of the commercial sector remained at about 28% in the 1970's. However, the share then gradually decreased to 25% in 1985 in accordance with the decrease of private investment for fixed capital. The share of the transport & communications sector has steadily increased from 5% to 7% during the period. The industrial sector sustained a share of 16% through this period despite the recession. The others sector maintained a share of 20% in the 1970's. However, since 1980 the GDP share of others has increased, especially housing and government administration.

The future sectoral GDP is estimated as shown in Table 7.2.4 considering the historical trend and the intermediate national development plan.

Table 7.2.2 Sectoral GDP

(unit : million Quetzles)

Sectors	1971	1975	1980	1985
Agriculture	524(27.7)	660(28.0)	772(24.8)	750(25.6)
Industry	302(16.0)	356(15.1)	517(16.6)	467(16.0)
Commercial	542(28.6)	649(27.6)	839(27.0)	745(25.5)
Construction	28(1.5)	44(1.9)	98(3.2)	49(1.7)
Transport & Communications	106(5.6)	151(6.4)	216(7.0)	209(7.1)
Others	391(20.6)	493(21.0)	665(21.4)	705(24.1)
GDP	1,893	2,353	3,107	2,925

Source : Boletín Estadístico, Banco de Guatemala

Note : Values in constant 1958 prices

: Figures in parentheses are in percent (%)

Table 7.2.3 Expenditures on GDP

(unit : million Quetzales)

Sectors	1971	1975	1980	1985
Private consump. expend.	1,480	1,778	2,319	2,257
Government consump. expend.	116	149	224	229
Fixed capital formation	228	270	373	222
Private	179	210	224	160
Government	49	60	149	62
Increase in stocks	20	10	-17	12
Exports of goods & services	360	498	651	454
Less:Imports of goods & serv.	312	352	441	249
GDP	1,893	2,353	3,107	2,925

Source : Boletin Estadistico, Banco de Guatemala

Note : Values in constant 1958 prices

Table 7.2.4 Future Sectoral GDP

(unit : million Q)

Sectors	1985	1990	1995	2000	2005
Agriculture	750	869	1,011	1,148	1,303
Industry	467	556	681	813	970
Commercial	745	869	1,052	1,244	1,431
Construction	49	87	103	120	139
Transport & Comm.	209	243	297	359	416
Others	705	850	982	1,099	1,286
GDP	2,925	3,474	4,126	4,783	5,545

Source : Study team estimates

Note : Values in constant 1958 prices

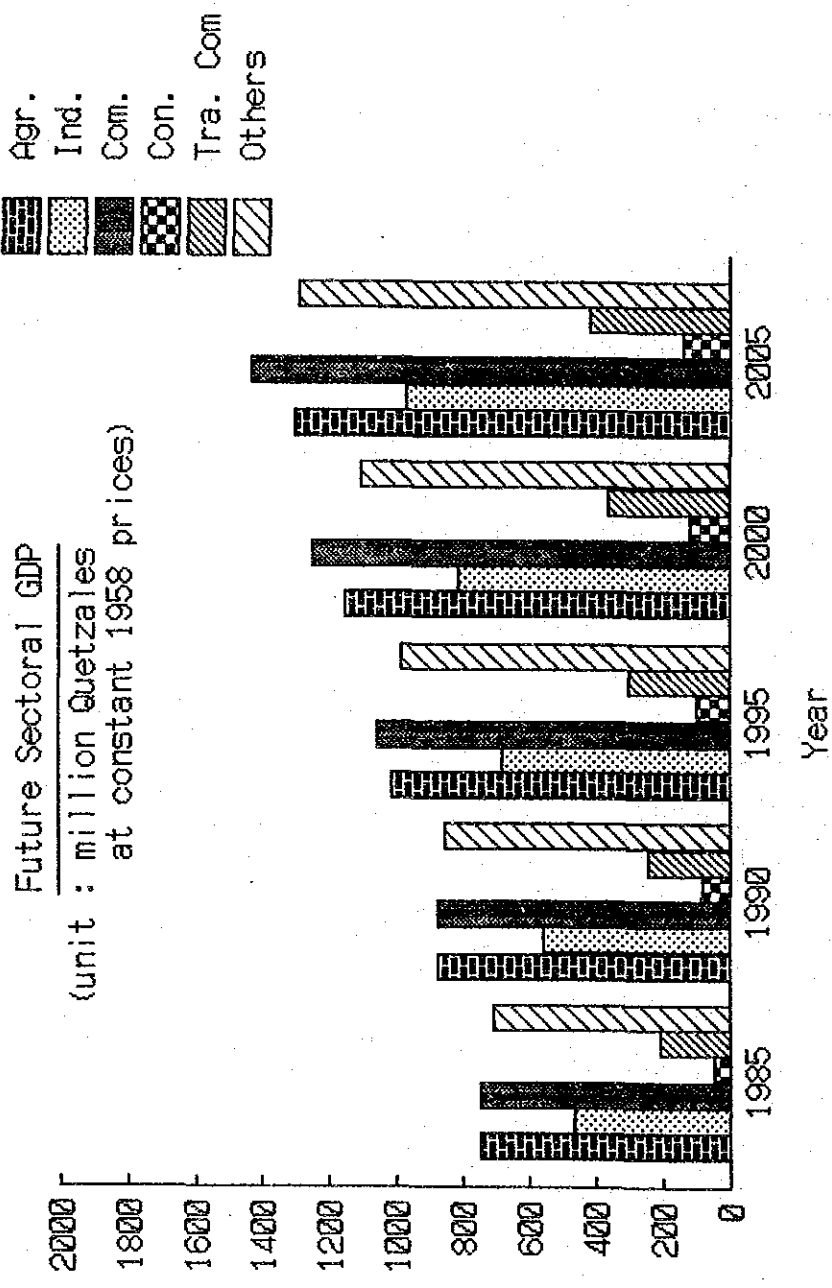


Fig. 7.2.1 Estimated Sectoral GDP

7.3 Cargo Forecast

7.3.1 Export Commodity Groups

(1) Bananas

About 35 % of the total export cargo handled at the Port is bananas, and 70 % of the bananas are exported to the United States. The major production area of bananas is located in the Department of Izabal where the Port is also located, and the production and export of bananas is conducted by BANDEGUA. The export volume of bananas is estimated considering the results of the interview with BANDEGUA. The production and export statistics are shown in Table 7.3.1.

Table 7.3.1 Production and Export of Bananas

Year	Area (['] 000 ha)	Produc. (['] 000 t)	Yield (t /ha)	Export (['] 000 t)	Export (['] 000 t)	Export (['] 000 t)
	*1	*1	*1	*1	*2	*3
1976	5.033	312.2	62.0	302.8	n.a.	n.a.
1977	5.662	321.5	56.8	286.1	n.a.	99.0
1978	5.732	321.8	56.1	285.8	n.a.	22.0
1979	5.033	292.7	58.2	265.4	237.7	19.9
1980	7.409	407.1	54.9	397.4	365.0	23.0
1981	7.340	386.4	50.2	354.1	373.8	11.2
1982	7.409	414.0	55.9	463.3	430.3	6.3
1983	7.619	268.1	35.2	268.1	290.7	177.5
1984	7.689	374.2	48.7	266.3	n.a.	297.6
1985	7.689	429.5	55.9	324.9	n.a.	356.9

Source : *1 Banco de Guatemala

*2 Comercio Exterior

*3 EMPORNAC

(a) Production

The production of bananas showed remarkable changes during the period from 1976 to 1985, however the average annual growth rate is 3.6%. Compared with the increase of the crop area, however, the increase of the yield per unit area is low. More than 90 % of the total production of bananas is exported to the United States and European countries, and the domestic consumption is very low and very limited. Therefore, the production volume is not only influenced by the climate but also constrained by the strategy of competitors having the same export market. However, considering the abundant fertile land in Guatemala, the growth of banana production is likely to continue at almost the same growth rate.

(b) Export

The average growth rate of banana exports showed a low level of 0.8 % during the period. However, the rate was 7.0 % in 1976-80 and -1.7 % in 1980-85. Other export competitors in Central America have showed almost the same tendency. According to the interview with the main exporter BANDEGUA, the company intends to produce and export bananas taking the production behavior of competitors into consideration. The growth rate of banana exports, thus, is not expected to achieve the high rate of the 1970's. Therefore the growth rate is assumed to be same as the projected growth rate of agricultural GDP which is 3.1 % up to 1995 and 2.6 % up to 2005. The export volume of bananas handled at the Port is estimated as shown in Table 7.3.2.

Table 7.3.2 Estimated Export Volume (1)
(Bananas)

Year	Export ('000 t)	Growth (%)
1990	414	
1995	482	3.1
2000	547	
2005	621	2.6

Source : Study team estimates

(2) Coffee

Coffee is the most important export commodity in Guatemala, and is the major export commodity next to bananas at the Port in terms of volume. The major production area of coffee is located in the mountainous area close to the Pacific ocean. The major export ports are the port of Quetzal and the Port. However more than 90% of the total coffee exports is handled at the Port because of the geographical advantages of the Port for export to the United States and European countries. The production and export statistics are shown in Table 7.3.3.

Table 7.3.3 Production and Export of Coffee

Year	Area (^{'000} ha) *1	Produc. (^{'000} t) *1	Yield (kg/ha) *1	Export (^{'000} t) *1	Export (^{'000} t) *2	Export (^{'000} t) *3	Export (^{'000} t) *4
1976	258.2	158.6	614	119.1	n.a.	n.a.	n.a.
1977	258.2	168.2	651	132.7	n.a.	n.a.	115.5
1978	255.0	169.6	665	132.3	n.a.	n.a.	127.3
1979	255.5	172.9	677	142.6	143.3	n.a.	215.3
1980	257.9	171.6	665	128.7	128.7	n.a.	112.5
1981	257.9	167.0	648	109.9	100.4	115.3	128.4
1982	257.9	167.9	651	141.5	140.2	153.7	156.9
1983	257.2	168.0	653	118.9	142.5	120.5	124.2
1984	257.2	180.0	700	130.7	n.a.	118.8	151.3
1985	257.2	179.4	698	185.9	n.a.	187.0	199.0

Source : *1 Banco de Guatemala

*2 Comercio Exterior

*3 ANACAFE

*4 EMPORNAC

(a) Production

The average annual growth rate of production during 1976-1985 is 1.4 %. This increase of production is due to the increase of the yield rate per unit area because the crop area has not increased. World coffee production has increased at a 2% annual growth rate as a whole, but the increase in the area of North America, Caribbean and Central American countries is about 1.2 %. Therefore, the growth rate of production in

the future in Guatemala is assumed to be 1.0-2.0 %.

(b) Export

In order to stabilize the price of coffee on the world market, the International Coffee Association (ICA) was established by major coffee producing countries in Latin America in 1957. Under ICA agreements, coffee exporting countries have quotas for export volume based on discussions between the exporting and importing countries. The export share of Guatemala for the traditional market in the world is about 3.4 % (110 thousand tons). And the average export volume for the new market during the past five years is about 30 thousand tons. According to an interview with the Asociacion Nacional del Cafe (ANACAFE), Guatemala has a potential to export more to both new and traditional markets. However, a large increase of the export share in the world market can not be expected. Annual growth rates of 2.0 % for the traditional market and 5.0 % for the new market are assumed. Based on the assumptions, the coffee export volume is estimated as 181 thousand tons in 1995 and 243 thousand tons in 2005. According to the statistics of ANACAFE, the export volume at the Port is about 90 % of the total national export volume, and the Port also exports the coffee produced in El Salvador. There is no available data on coffee transported from El Salvador. Therefore, the coffee from El Salvador is considered as the difference in volume (about 60 thousand tons) between the statistics of ANACAFE and the Port. Assuming a constant volume from El Salvador, the total export coffee volume at the Port is estimated as shown in Table 7.3.4.

Table 7.3.4 Estimated Export Volume (2)
(Coffee)

Year	Guatemala ('000 t)	at the Port ('000 t)		
		Domestic	El Salvador	Total
1990	170	153	60	213
1995	181	163	60	223
2000	210	189	60	249
2005	243	219	60	279

Source : Study team estimates

(3) Fresh Fruits and Vegetables

The export volume of Fresh Fruits and Vegetables excluding bananas has rapidly increased at the Port because of the increase in the export share of the Port in total exports. In 1985, more than 90 % of the total export volume of fruits and vegetables was handled at the Port, and almost all of the exports of fresh fruits and vegetables are expected to be handled at the Port in the future. The exports of these commodities increased at an average rate of 9% in the 1970's supported by high prices. However, this high growth rate is not expected to continue in the future. Therefore the growth rate of exports is assumed to be 4-5 % exceeding the growth rate of GDP of the agricultural sector considering the export promotion policy for agricultural products. The export volume of fresh fruits and vegetable is estimated as shown in Table 7.3.5.

Table 7.3.5 Estimated Export Volume (3)
(Fresh Fruits and Vegetables)

Year	Export ('000 t)	Growth (%)
1990	45	5
1995	57	5
2000	69	4
2005	84	4

Source : Study team estimates

(4) Sesame and Cardamom

In accordance with the emphasis on diversification away from traditional agricultural products, the production and export volume of Sesame and Cardamom has shown a remarkable increase. The export price of these products, especially cardamom, is very high and the total export value is almost the same as bananas. The export volume handled at the Port increased at an annual growth rate of 6% during 1981-1986. Therefore, considering the move away from cotton suffering from inactive exports, the annual growth rate of export of these commodities is assumed to continue at 5-6%. The export volume at the Port is estimated as shown in Table 7.3.6.

Table 7.3.6 Estimated Export Volume (4)
(Sesame and Cardamom)

Year	Export ('000 t)	Growth (%)
1990	32	6
1995	42	6
2000	54	5
2005	69	5

Source : Study team estimates

(5) Maize

Maize is the staple crop of Guatemala, and therefore it is necessary to produce enough to satisfy increasing domestic consumption. The production is almost equal to the national consumption at present. The production and trade statistics are shown in Table 7.3.7.

Table 7.3.7 Production and Consumption of Maize

Year	Area ('000 ha) *1	Produc. ('000 t) *1	Yield (kg/ha) *1	Import ('000 t) *1	Export ('000 t) *1	Consum ('000 t) *1	Consum (kg/per) *1
1976	514.5	562.5	1093	6.5	0.0	562.5	91.9
1977	499.2	580.6	1163	0.0	0.0	580.0	91.2
1978	591.1	863.5	1461	84.9	0.0	948.4	145.
1979	608.2	1043.0	1715	56.4	0.0	1099.4	163.
1980	657.8	902.4	1372	82.2	16.2	968.4	140.
1981	680.5	997.5	1466	65.6	0.0	1063.1	149.
1982	667.7	1099.8	1647	3.2	20.0	1083.0	148.
1983	568.8	988.2	1737	3.8	2.7	989.3	131.
1984	690.3	1198.0	1735	5.2	0.0	1203.2	155.
1985	658.7	1088.4	1652	14.9	10.0	1093.3	137.

Source : *1 Banco de Guatemala

(a) Production

The production of maize rapidly increased in the 1970's and remained relatively stable in the 1980's. However, the average annual growth rate over the past 10 years was 4%. The increase pattern in the 1970's and

1980's shows a different path. In the 1970's the increase of production was mostly caused by an increase of the crop area. However, the improvement of yield per unit area contributed to the increase of total production in the 1980's. As a whole, the crop area increased 2% per year and the yield per unit area increased at an average rate of 4% (6% in the 1970's and 2% in the 1980's) during the period. The growth rate of total production in the future is assumed considering the need for self-sufficiency in staple crops.

Table 7.3.8 Estimated Growth Rate of Production

Increase (%)	1995	2005
Crop area	1.5	2.0
Yield per unit area	3.0	2.5
Total production	4.55	4.55

Source : Study team estimates

(b) Consumption

The average gross consumption volume in the past five years in Guatemala is 145 kg/year/person. Considering that the consumption per capita is more than 200kg in Mexico which uses maize as a staple crop, the consumption per capita in Guatemala is expected to increase in the future. The consumption per capita is assumed to increase to 160kg in 1995 and 180kg in 2005.

(c) Export

Based on the above assumptions, the demand and supply volumes are estimated as shown in Table 7.3.9. According to the estimation, imports of maize will gradually cease and a surplus will appear after the year 2000. The surplus is assumed to be exported and half of it to be handled at the Port.

Table 7.3.9 Estimated Export Volume (5)
(Maize)

Year	Production (^{'000} t)	Consumption		Export (^{'000} t)	
		Per capita	Total	Total	The Port
1990	1,359	150	1,380	-21	-
1995	1,698	160	1,699	-1	-
2000	2,121	170	2,078	43	22
2005	2,648	180	2,515	133	66

Source : Study team estimates

(6) Other Agricultural Products

The average volume of other agricultural products handled at the Port during 1977-85 is about 36 thousand tons annually, and the past movement of handling volume does not show any clear characteristics. When considering the export promotion policy for agriculture products, however, the future handling volume at the Port is expected to increase in accordance with the growth of the GDP of the agricultural sector. Therefore, the future handling volume at the Port is estimated as shown in Table 7.3.10.

Table 7.3.10 Estimated Export Volume (6)
(Other Agricultural Products)

Year	Export (^{'000} t)	Growth (%)
1990	44	
1995	51	3.1
2000	58	
2005	66	2.6

Source : Study team estimates

(7) Crude Oil

Since starting production of crude oil in 1980, crude oil is exported from the Port to the United States by HISPANOIL. Crude oil has been partly consumed as fuel for power stations and factories. However, almost all the crude oil is exported from the Port at present. There was a plan to produce petroleum products by refining this crude oil domestically, but

it has not been implemented because of high prices of local petroleum products in comparison with the imported products. As there is no abrupt tendency to push up the prices of the imported petroleum products, all local crude oil is expected to be exported to be exported without any domestic consumption.

(a) Export

It is very difficult to estimate the volume of production and export of crude oil, because there are many factors involved such as the export policy and the worldwide demand-supply situation which are difficult to forecast. According to an estimation conducted by MEM, the production will reach 6.2 million bbl in 1991, which is more than three times the actual production in 1986. This estimation shows an average annual growth rate of 28%. LBPE conducted by MEM, SEGEPLAN and UNDP in 1987 also estimates a high increase of the production. This report estimates an abrupt increase of production to 7.5 million bbl in 1995 and then a decrease to 5.6 million bbl in 2000. Therefore, assuming that the production volume in 2005 will gradually decrease to 50% of the production in 1995, the export volume handled at the Port is estimated as shown in Table 7.3.11.

Table 7.3.11 Estimated Export Volume (7)
(Crude Oil)

Year	Production (million bbl)	Export *1 ('000 t)
1990	4,634	663
1995	7,500	1,073
2000	5,625	805
2005	3,750	537

Note : *1 Specific gravity is assumed to be 0.90 t/m³

(8) Minerals

Major minerals exported from Guatemala include nickel, zinc and lead. The export volume handled at the Port rapidly increased in the 1970's, however the export volume abruptly decreased after exporting 14 thousand tons in 1980. The export volume is assumed to recover to the level of the 1970's in accordance with the improvement of the investment climate. The export volume at the Port is estimated as shown in Table 7.3.12.

Table 7.3.12 Estimated Export Volume (8)
(Minerals)

Year	Export ('000 t)
1990	5
1995	10
2000	15
2005	20

Source : Study team

(9) Manufactured Goods

The total volume of manufactured goods exported from the Port is less than 10% of the agricultural products exports. This means that export industry is still underdeveloped in Guatemala. The historical trend of manufactured goods handled at the Port shows that major commodities such as agro-based goods, wooden products and textiles led the increase in the 1970's, and after 1980 the export volume abruptly decreased and then started increasing again. The average growth rate was 33 % in the 1970's and 18 % in the 1980's. In the future, these high growth rates are not expected to continue. However, growth rates of 10% in 1995 and 5% in 2005 are assumed considering the promotion of the introduction of private capital into the free industrial zone (ZOLIC) and the improvement of the investment climate. The estimated export volume is shown in Table 7.3.13.