

Figure 5-4-1 Layout of the port of Cristobal

Differently designed warehouses with an area of 1.4 ha each are located on each pier. The width of apron in front of the warehouse is not sufficient to handle containers. Widening works for the apron on Pier No.7 was completed by demolishing a part of the warehouse.

There is a plan to construct a new navigation control facility at the end of the mole behind the piers with an access road along the north side of the mole by the PCC.

(4) Container Terminal

The most important area of the port is this container terminal which is the only full scale container terminal in Panama corresponding to Panamax type container ships.

This terminal consists of two piers (No.9 and No.10), a container yard, a container freight station, cargo handling equipment and other supporting facilities.

Pier No.9 is a marginal wharf which measures 12 m in depth and 317 m in length equipped with two 40 ft Gantry Cranes. This pier is located parallel to the other finger type piers.

Pier No.10 is also a marginal type of wharf measuring 12 m in depth and 122 m in length. This pier is not equipped with container crane and shares the same container yard with Pier No.9.

The container yard with 7.5 ha width has a distorted shape due to the buildings on the land side and PCC facilities on the coastal side. It seems to be one of the main reasons for the inefficient container cargo handling in this terminal. A small scale expansion of this yard is planned by demolishing some old buildings in the land side as shown in Figure 5-4-2, which is, however, far from a radical reform.

In the south-east side of the yard, there is open space with 13.37 ha, but this area has already been conceded to private companies. It is impossible to further expand the yard in this direction.

At the south-east end of the yard, there is a container freight station (CFS) measuring 6,279 square meters in width equipped with a track terminal in the north side. A surface railroad track is provided in the south side of the station.

The gate of the terminal is located at the center of the north side with a building of a container terminal operation center to the side.

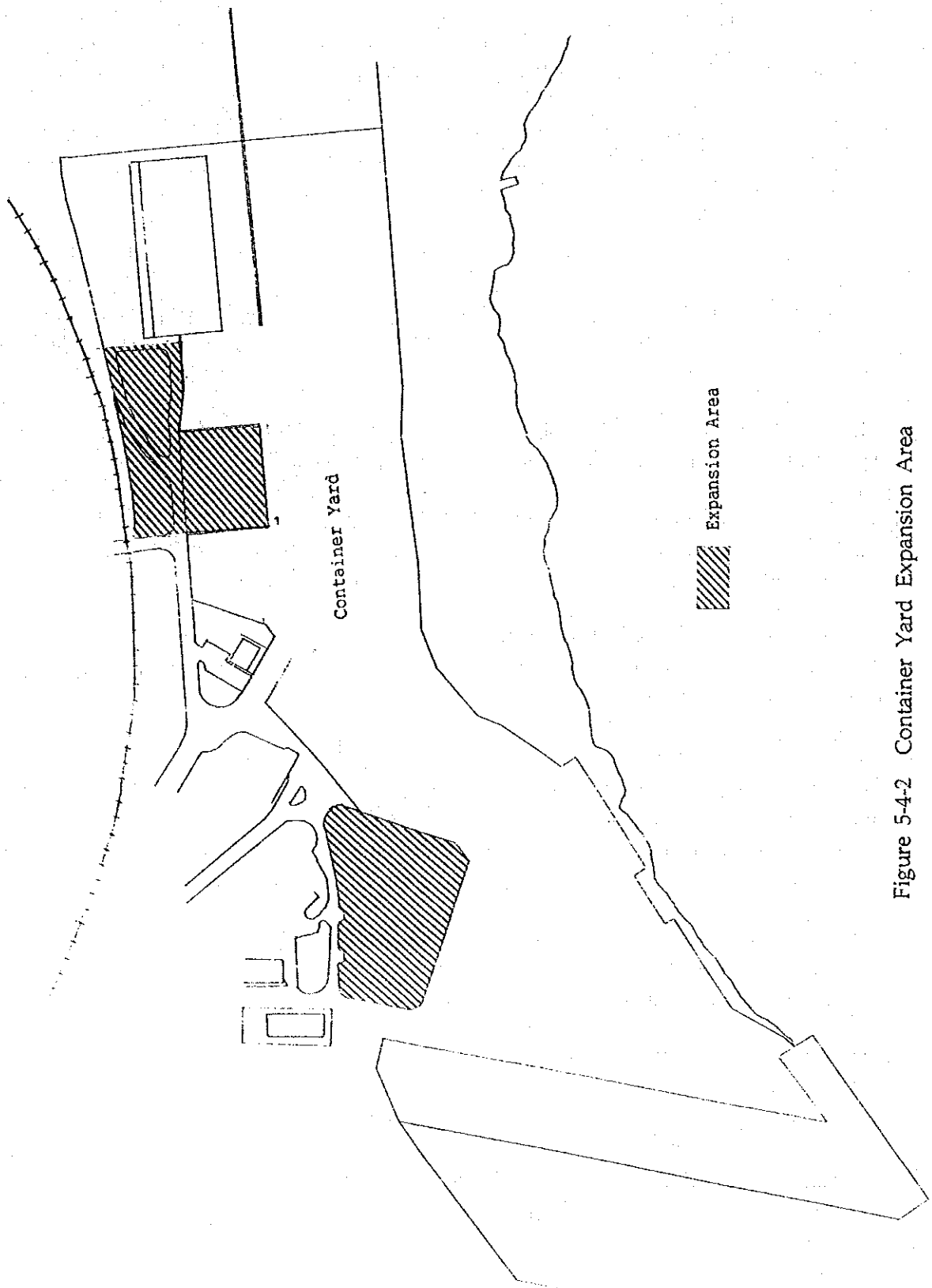


Figure 5-4-2 Container Yard Expansion Area

(5) Bunkering Facilities

Bunkering service is one of the major functions of the port of Cristobal. Pier 16 measuring 347 m long by 137 m wide was constructed in 1914 for the supply of coal and fuel oil to the vessels which transit the Panama canal.

A coal pond was originally equipped inside the pier and used as a dumping area for dredging spoils afterward. Three berths are located alongside the pier with a depth between 8.7 m to 12.6 m.

Supply of water and fuel is available at all the piers in the port by pipe line network connecting each berth with the fuel oil storage tanks and an water filtration plant located at the Mount Hope area. A pump station is deployed in Mount Hope Area equipped with 7 pump systems, and it moves oil from storage tanks to loading points at each berth or other storage tanks.

Unloading oil from tankers up to storage tanks is limited to Pier No.16 because of the capacity of pipe lines and for safety reasons. The tankers pump oils up to the storage tanks by their own pumps and the pump station assists when it is necessary (See Figure 5-4-3).

(6) Ship Repair Facilities

The PCC owns a repair shop complex inside the French Canal area. Almost all kinds of repair work for vessels and machinery related to the Canal operation is available with various facilities deployed within the area of 102.0 ha (See Figure 5-4-4).

The major facilities of this complex are a dry dock and a Synchrolift. In front of the dry dock, there is an approach basin of 1.4 ha width and 12 m depth equipped with two wharves on both side, Pier No.14 and No.15 respectively. Pier No.14 located on the north side of the basin is 139 m long and 8.8 m deep, and Pier No.15 located on the other side is 273 m long and 10.6 m deep.

The Synchrolift, which was put into service in 1984, supports a tug and miter gate repair facility together with a 21 by 122 m concrete ground-level working platform and other subsidiary equipment. This facility can accommodate all of the PCC's towboats and Panama Canal Lock's miter gates.

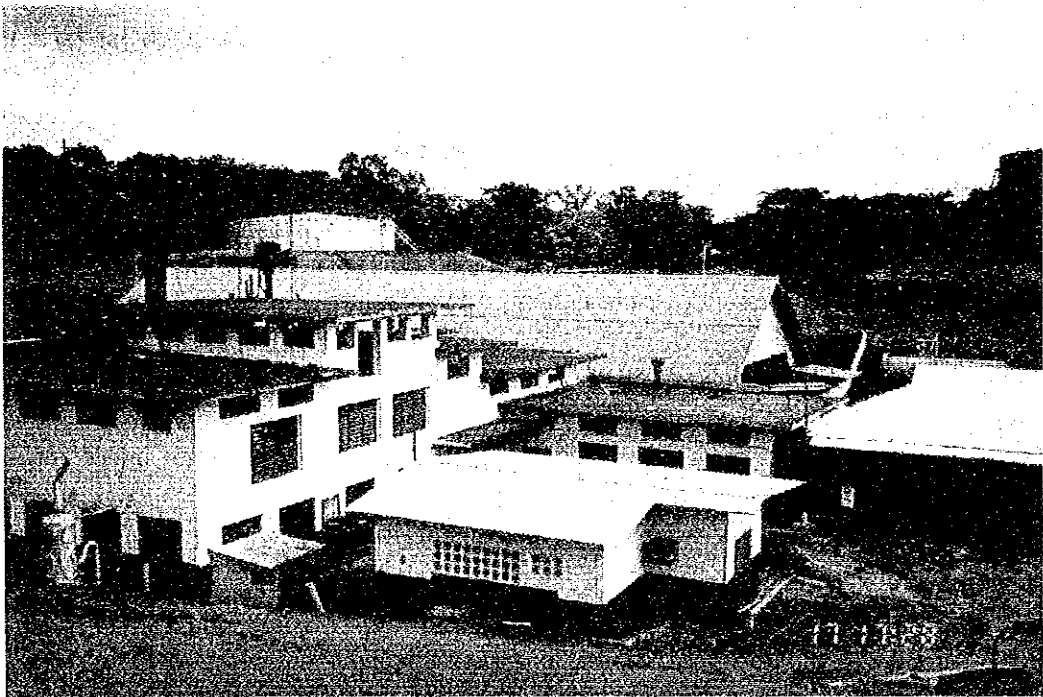
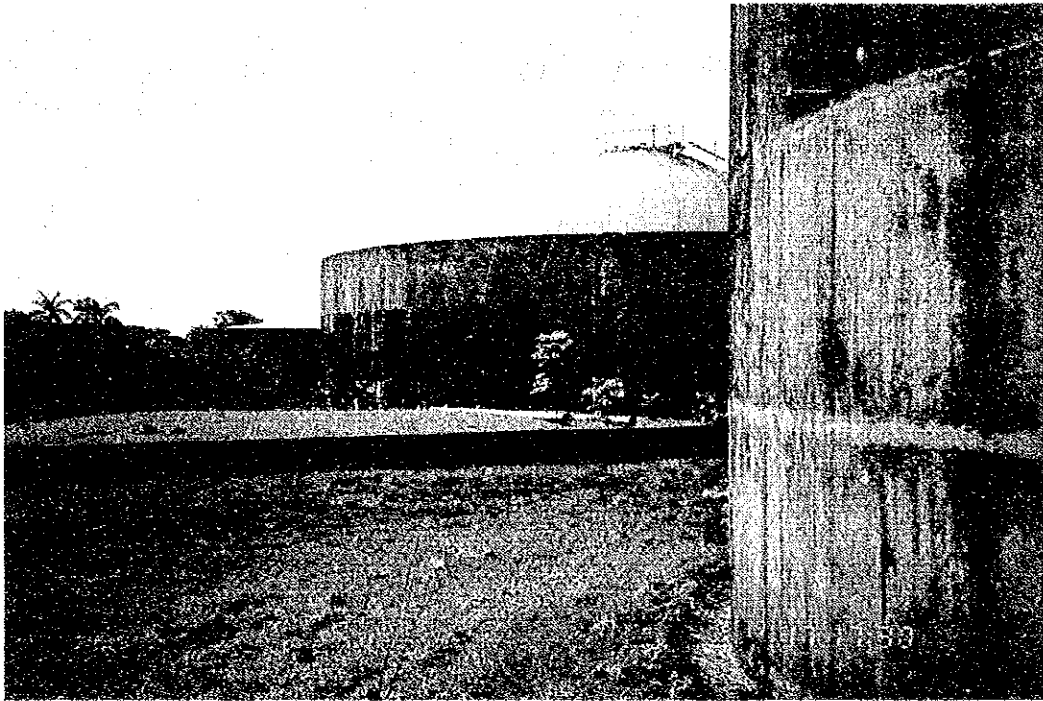


Figure 5-4-3 Oil Storage Tanks and Pump Station

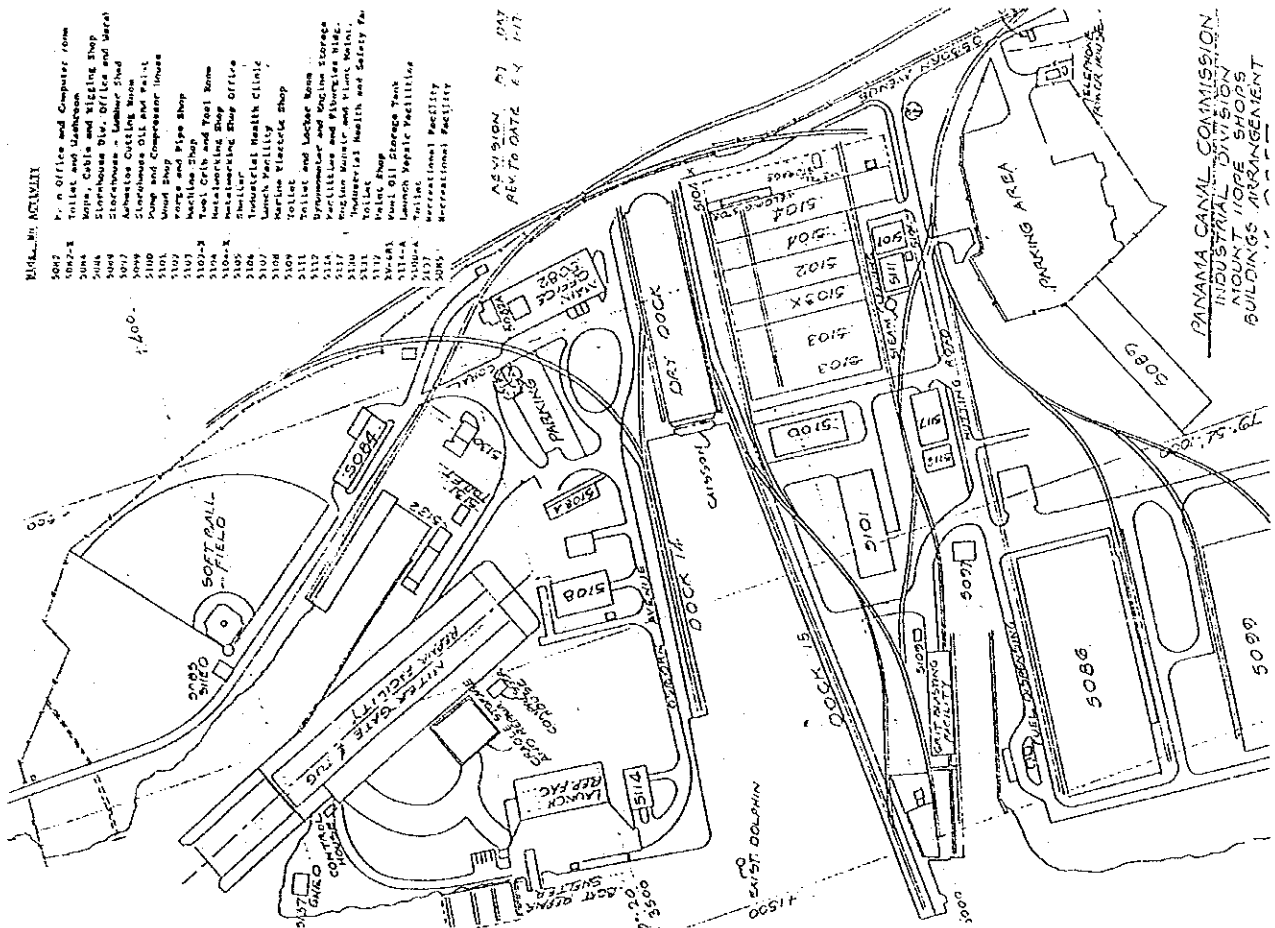


Figure 5-4-4 Ship Repair Facilities

The dry dock put in service in 1981 is mainly used for the repair of large floating equipment such as dredgers, crane barge, crane boat and other equipment which the Synchrolift is unable to lift. It measures 135 m in length, 20 m in width and 7.6 m in depth, and is closed at the entrance with a box type floating caisson.

At the south side of the dry dock, there are a group of factories for mechanical works. While this complex can repair only the facilities owned by PCC according to the Canal Treaty, it may have the ability to repair other vessels on a commercial basis.

5.4.2 The Port of Coco Solo Norte

(1) General

The port of Coco Solo Norte has 4 piers divided into 9 berths having a total length of 2,034 meters of berthing space. Piers identified as No.2 and No.3 are finger piers; 1 and 4 are marginal (See Figure 5-4-5).

Since the port is located in the calm Manzanillo Bay, there are no breakwaters. The depth of the entrance area of the port is maintained at more than 8 meters.

(2) Piers

The major facility of this port is Pier No.1. There are two berths with 7 meters depth or more and 570 meters length in total at the south side of this pier. At the north side, one more berth with 3 meters depth is located, but it is not in use anymore.

There is a warehouse of 8,000 square meters and a container yard with an area of 4,140 square meters on this pier. The container yard is conceded and exclusively used by Sealand Co.. Since no container cranes are equipped on these berths, containers are handled by ship gears or mobile cranes.

5.4.3 The Port of Bahia Las Minas

This port enjoys excellent shelter for safe navigation thanks to its location within a natural bay protected from wind and waves. There is only one marginal wharf for general cargo handling with the usable extension of 90 meters and depth of 7 meters. The navigation channel in the bay is maintained deeper than 11 meters from the entrance of the bay to the petro-terminal which is located next to this wharf (See Figure 5-4-6).

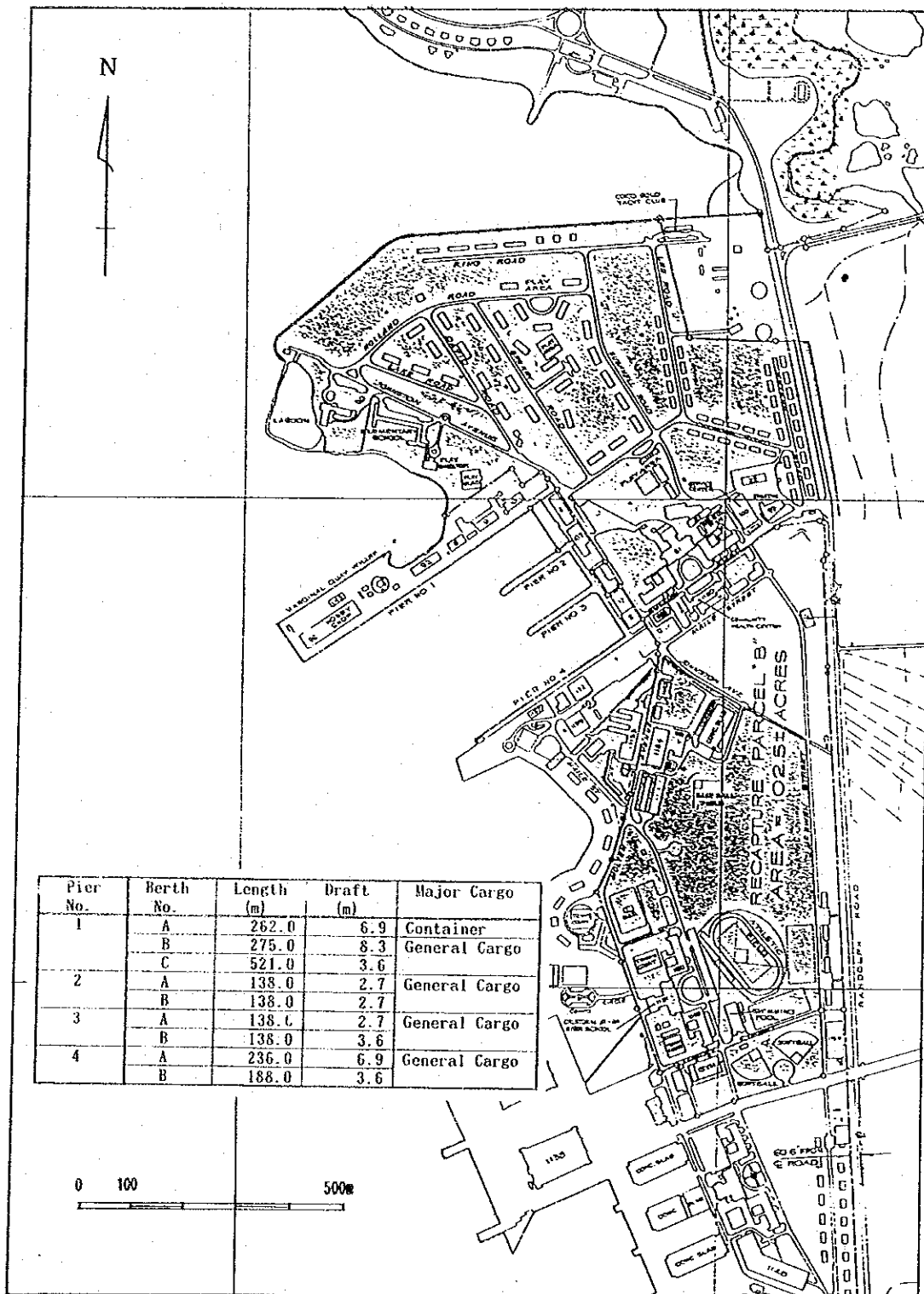


Figure 5-4-5 Layout of the Port of Coco Solo Norte

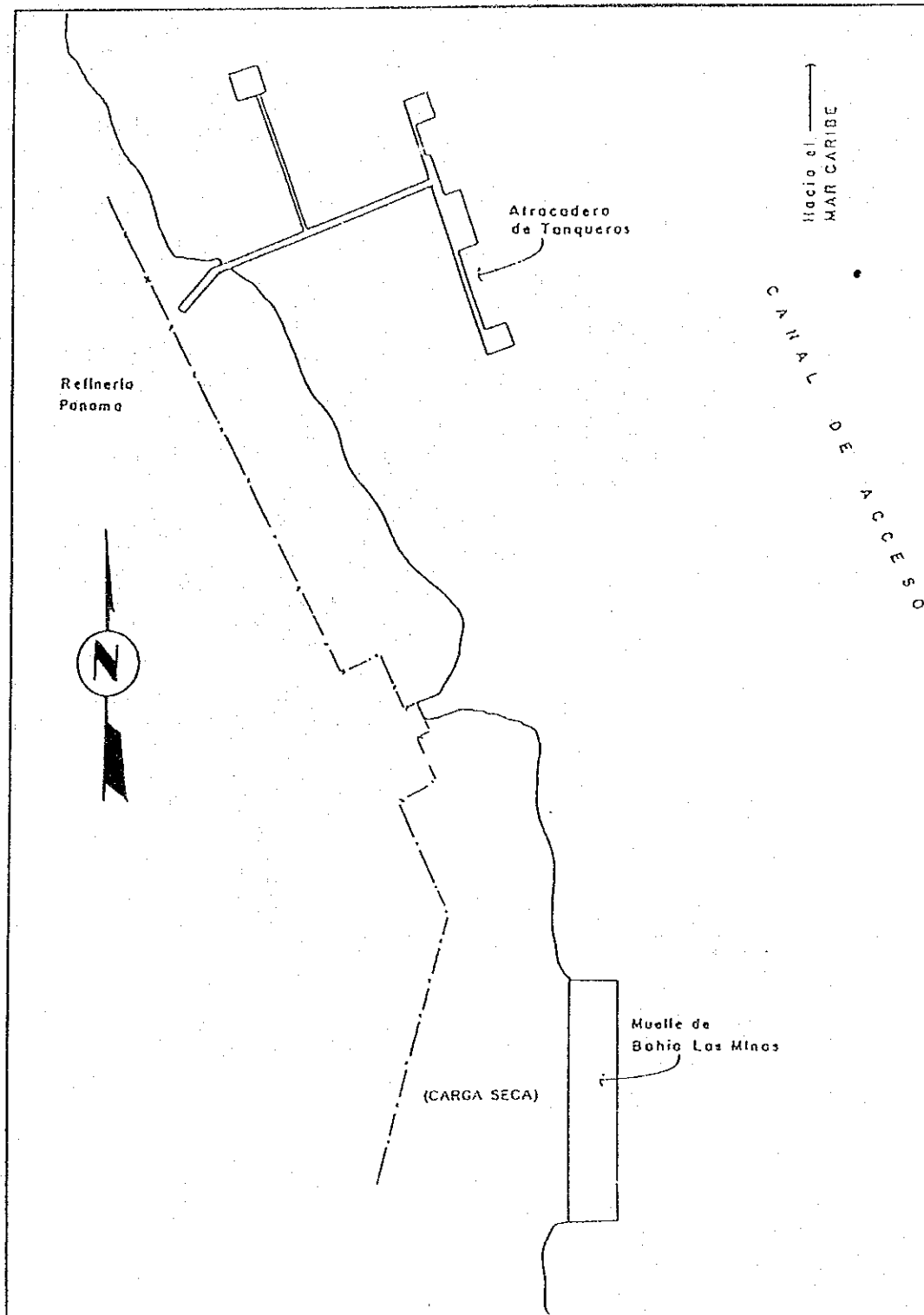


Figure 5-4-6 Layout of the Port of Bahia Las Minas

Because of its very narrow space, there is no room for stacking cargo around the wharf. There is no cargo handling equipment on the wharf.

In spite of the poor condition of port facilities, this port handles a large amount of container cargo by rapid Ro-Ro operation.

5.4.4 The Port of Balboa

(1) General

The port of Balboa, constructed in the inlet at the Pacific entrance of the Panama Canal without breakwaters, has 10 wharves divided into 20 berths having a total length of 2,640 m and a dry dock complex consisting of three different size dry docks which is considered to be the only such facility in Latin America (See Figure 5-4-7).

(2) Wharves

The wharves identified as No.14, 15 and 16 form a continuous marginal wharf having a combined length of 800 m. These wharves are of prime importance to the operation of this port as they are used extensively for bunkering and for working container ships and bulk carriers. A 30 tonnage type Gantry Crane is equipped on Pier No.15.

The wharves identified as No.4, 6 and 7 are also continuous berths with open wharf type structure. Wharf No.18 is a finger type pier and the only facility in this port with a cargo shed. The cargo shed is 305 m by 49 m or total floor area of 15,000 square meters. This wharf is used by the largest number of general cargo vessels and fishing boats working at Balboa and for bunkering purposes.

(3) Dry Dock Complex

The principal dry dock is the largest at 318 m in length and 33.5 m in width. Constructed on basaltic rock, it offers 10.7 m total depth and is equipped to service and re-launch vessels of up to 60,000 DWT (See Figure 5-4-8). There are also two other small docks. Dock No.2 is 134 m long, 25.6 m wide and 7.9 m deep. Dock No.3 is 77.6 m long, 14.6 m wide and 5.5 m deep.

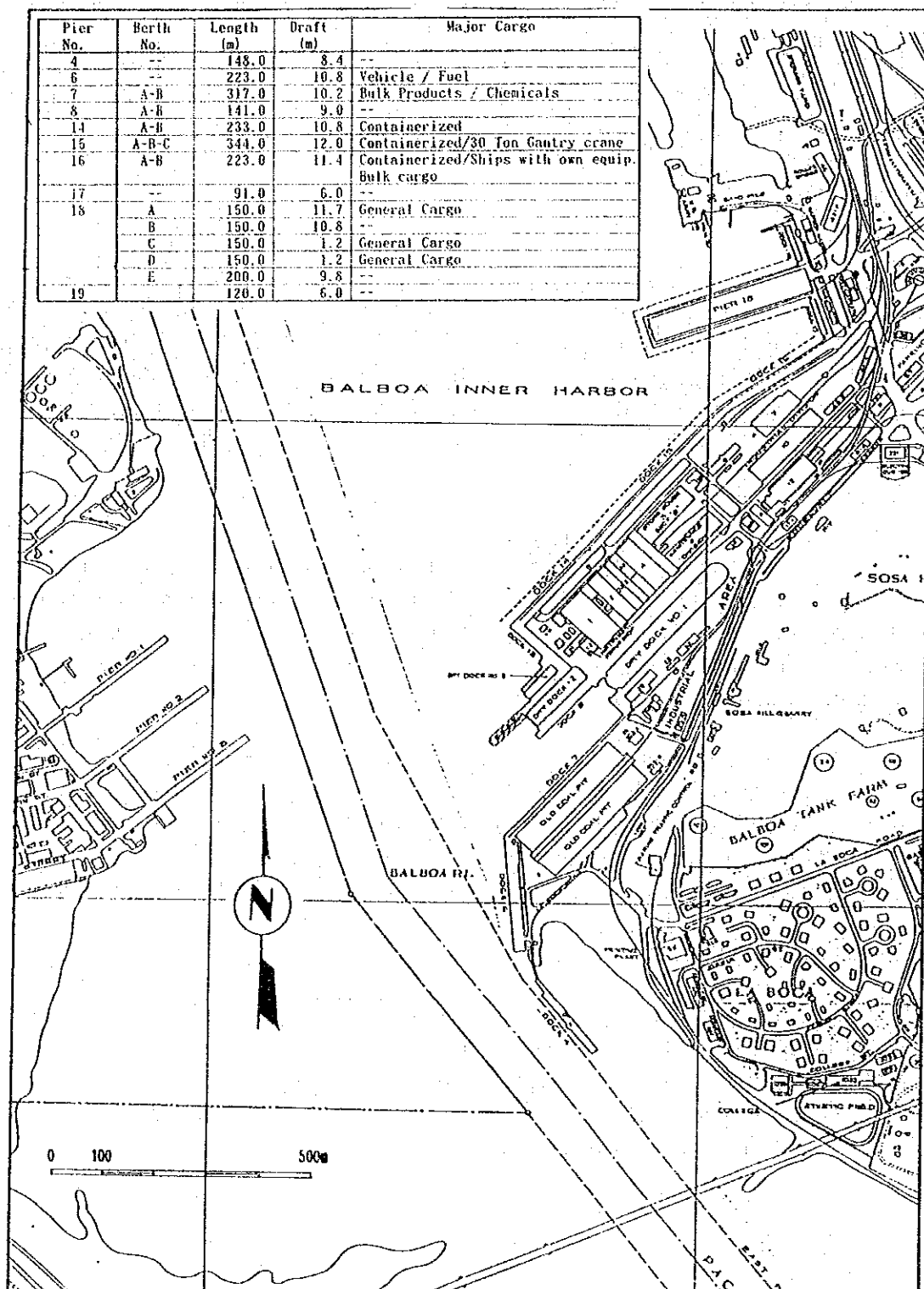


Figure 5-4-7 Layout of the Port of Balboa

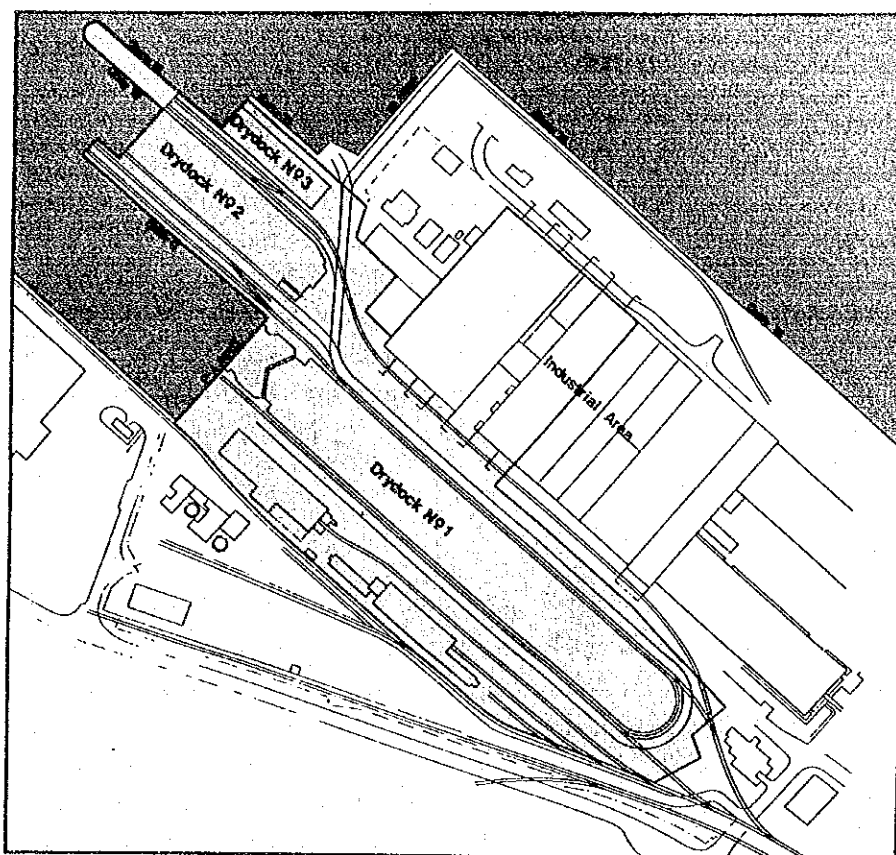


Figure 5-4-8 Dry Dock Complex in Balboa

5.5 Land and Water Area Use Around the Ports

In this section, the present situation and the future prospect of the utilization of land and water area around the Cristobal Port Area including Cristobal, Coco Solo and Telfers Island, are described.

For the Port of Balboa, the same items are illustrated for the purpose of estimating the possible future development of the port. On this subject, it is inevitable to think about the relation between PCC and the US Armed Forces.

There are many areas under the administration of PCC or the US Armed Forces around the ports which had been under the US administration for a long time.

These areas have been gradually transferred to the Government of Panama to be completed by the year 2,000 according to the Panama Canal Treaty.

These reverted land areas are basically taken charge of by the Canal Asset Department of the Ministry of Treasure. A new organization named "The Authority of the Interoceanic Region" will be in charge of promotion and administration of the reverted areas.

5.5.1 The Port of Cristobal

The present situation of land and water area use of the port of Cristobal is very complicated. The port of Cristobal has close relation with the area use of Limon Bay. At the center of Limon bay, there is an approaching channel leading to the gatun lock. Around the channel a series of anchorage area is specified, Anchorage "A" to Anchorage "B", which occupies about 90% of wet basin MWL - 10m. There is a spoil dumping area leeward the West breakwater. It is reported that this area is not currently utilized by PCC. APN port area occupies about one ha in west basin which is only 3% of total bay areas. Refer to Figure 5-5-1.

The port area consists of land area and water area as shown in Figure 5-5-2. It covers a series of finger piers No.6, No.7 and No.8, mole, marginal wharves No.9 and No.10 with their back-up area, and a narrow access to the Mount Hope Tank Farm. Total area including net basin and land is approximately 214 ha, among this the land area shares about 30%. In addition to these area, Pier No.16 and its vicinity are practically under the jurisdiction of APN. The land in the port area is owned by the APN in principle, however, there exist some areas under the administration of the PCC within the port area.

Inside the area so called "the Port of Cristobal", there are ten pieces of land classified as the Canal Operation Area. Their locations are as follows;

1. A square space on the deck of Pier No.6 (Approx. 100 sq.m)
2. Water basin at the head of Pier No.6 (Approx. 1,100 sq.m)

3. Water basin at the head of Pier No.7 (Approx. 1,100 sq.m)
4. Launch house between Piers No.7/No.8 (Approx. 1,500 sq.m)
5. Launch house between Piers No.7/No.8 (Approx. 600 sq.m)
6. Administration Building and Police Station area
(Building 1106, Approx. 5,000 sq.m)
7. Building 1907 (Approx. 350 sq.m)
8. Maintenance Division along the French canal (Approx. 16,000 sq.m)
9. Building 9339 along the French Canal (Approx. 3,000 sq.m)
10. Water Tank and Mt. Hope Filtration Plant (Approx. 40,000 sq.m)

Total area of above described is about 70,000 sq.m.

Close to the port area, there is the Colon City Area in the east, and a pond and transportation facility owned by the PCC in the south. Along the coast line facing the French Canal, there are some facilities related to the Panama Canal operation. It is impossible to expand this port area beyond its current boundary without agreement of PCC.

The APN owns a land area of approximately 71 ha including the piers 6 to 10 and the container yard. Besides this area, APN owns the Mount Hope oil storage tank area of approximately 60 ha wide including the site for railroad siding which connects the port and Mount Hope area. The land area that APN owns amounts to 131 ha in total. The land area covering Pier 16, the ship repair complex facing the French Canal and Telfers Island is under administration of PCC.

Telfers Island is used as a dumping site for dredged spoils and disposal of domestic waste from Colon City and other residential areas.

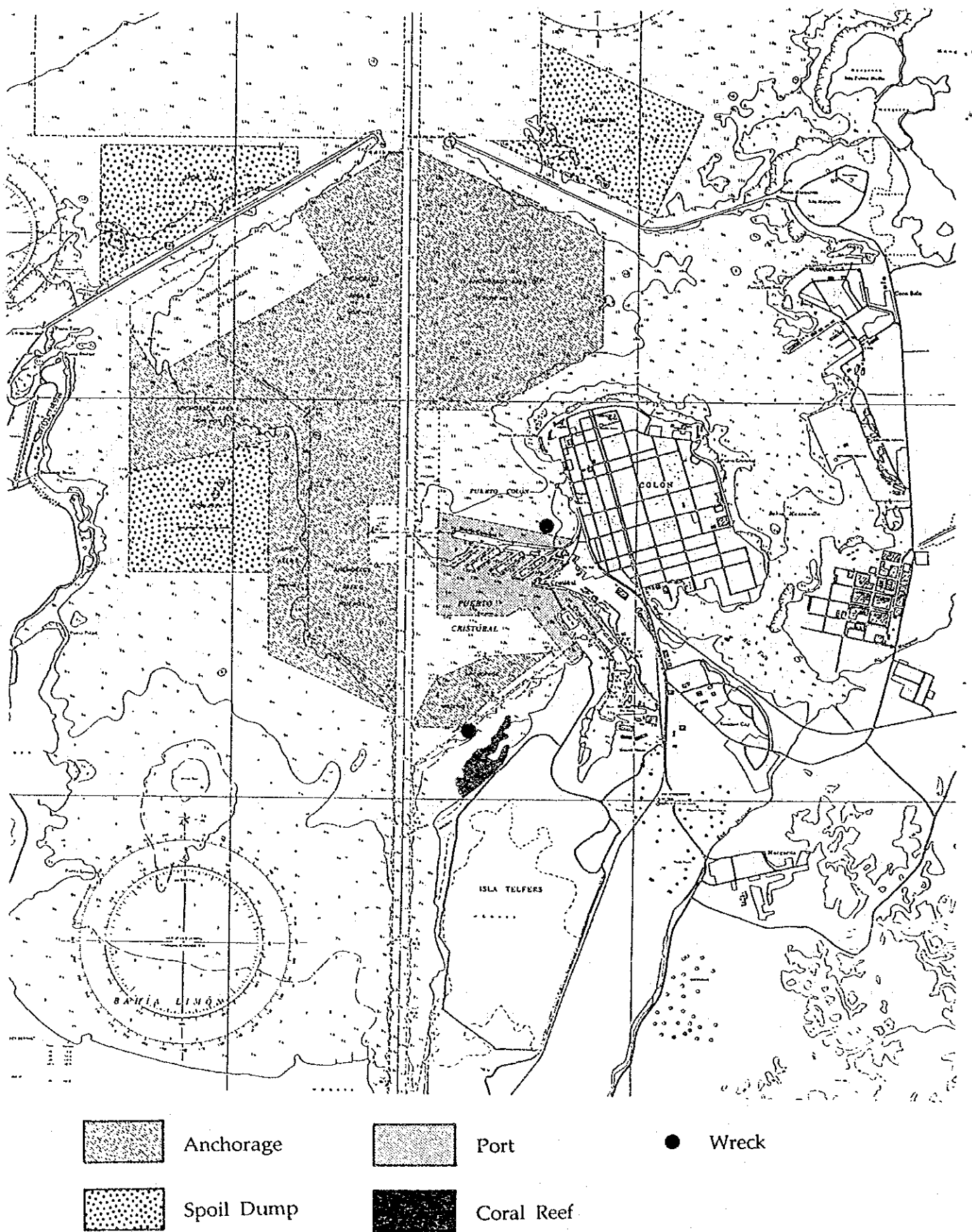


Figure 5-5-1 Area Use of Limon Bay

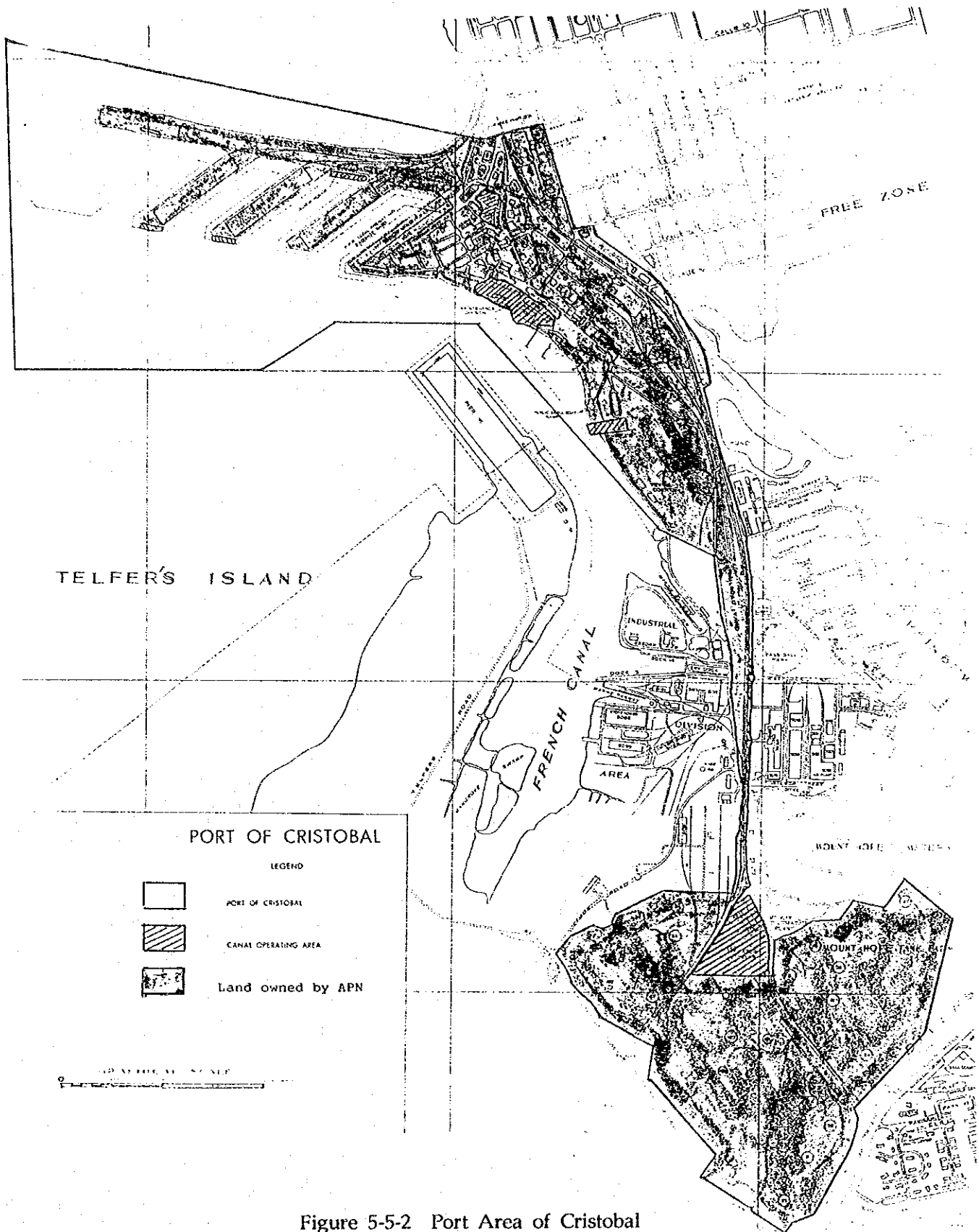


Figure 5-5-2 Port Area of Cristobal

The coastal area on the west of Colon City is not owned by a public sector other than APN. There live many squatters in this area.

The water area under administration of APN is limited to the area around piers No.6 to No.10. The surrounding water area of Pier 16 is included in the Canal Operating Area under administration of PCC, but it is virtually administrated by the APN in concert with the PCC as mentioned before.

Just in front of Telfers Island, there is an anchorage area named "Area F" for the small ships and yachts which transit the Panama Canal (See Figure 5-5-1).

Since this area can provide ships with a good anchorage condition protected by the mole in the port from hazardous north winds, approximately 1,000 small crafts anchor annually.

Its location, close to the town and the marina in the port, seems to be another advantage. There is no other water area that has such good conditions within Limon Bay.

5.5.2 The Port of Coco Solo Norte

The port area owned by APN contiguous to the piers is limited by a depth of less than 100 meters (See Figure 5-5-3).

Since it is surrounded by residences or some public facilities which have no relation to port activities, it is not easy to expand the port area.

Besides this area, APN owns two other land areas of around 33.5 ha in total. Since these areas are not contiguous to the port facilities, they cannot be utilized as expansion areas and they are conceded to the private companies as stockyards for containers or imported cars.

There is no privately owned land area. The areas owned by the PCC, the US Armed Forces and Panamanian Government exist intermingled.

Since this port is around 1.5 km off the anchorage area of the Canal, the entire water area surrounding the port is under administration of the Government of Panama.

5.5.3 The Port of Balboa

The present situation of land use in and around the port of Balboa is more complicated than that of the port of Cristobal because of the scattered facilities and wharves belonging to PCC and US Armed Forces. On the other hand, the utilization of the

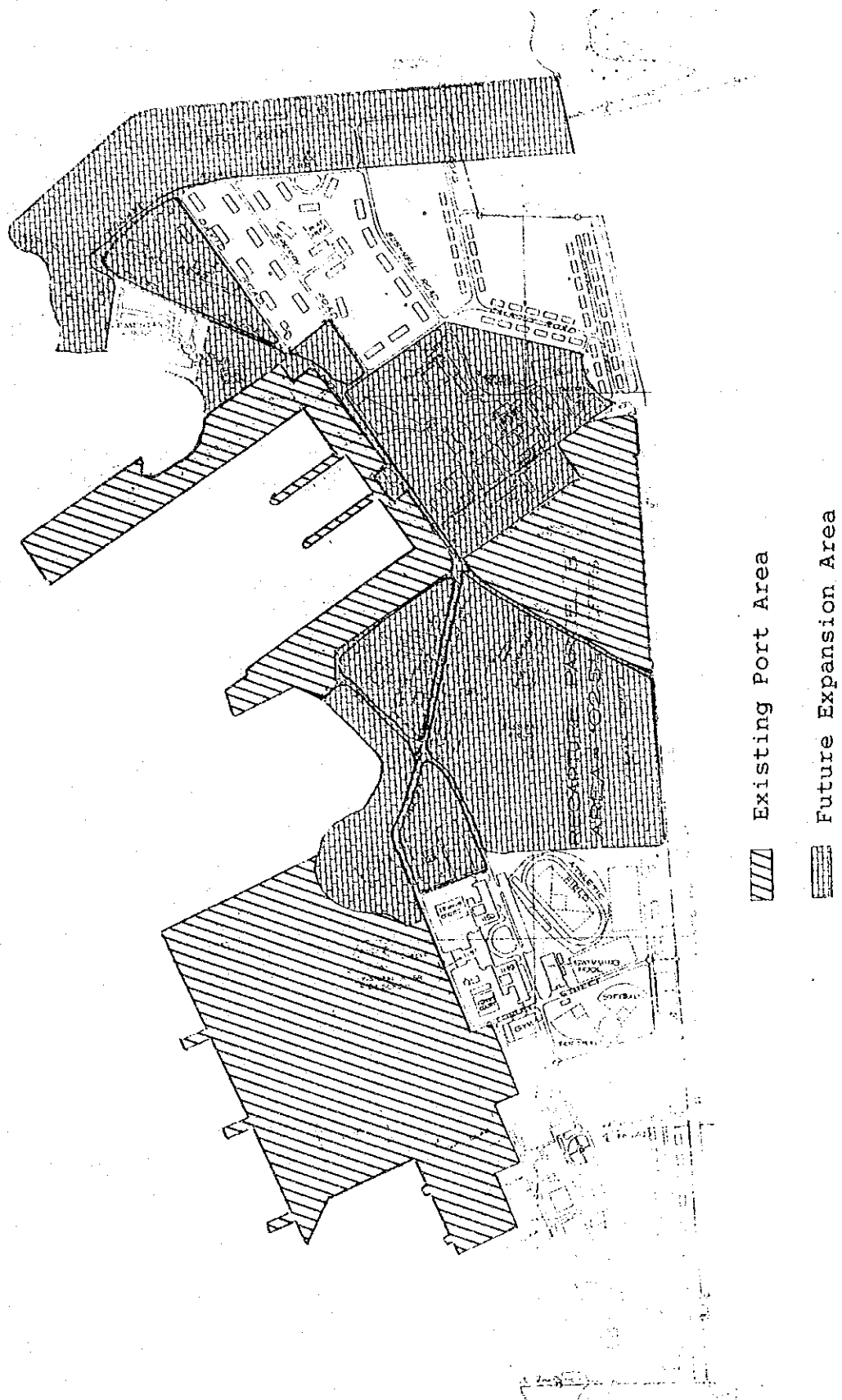


Figure 5-5-3 Future Land Expansion Plan of Coco Solo Norte

water area is rather simple, because the entire water area surrounding the wharves is now under the administration of APN (See Figure 5-5-4).

The existing land area around wharves owned by APN is approximately 75 ha wide including PCC facilities and other facilities such as playgrounds. This area is totally limited in the south side by Sosa Hill presently under administration of PCC and other military facilities. On the north side it is also limited by the Diablo Heights Residential Area.

It is difficult to expand the port area in other direction. On the east side, it faces the old Albrook Air Force Base. Since the base area is gradually being reverted to Panama, it seems appropriate to expand the port area to the East.

Besides this area, APN owns a part of Corozal Area of approximately 38 ha width north of Diablo Heights and two separate Balboa tank farm areas of approximately 32 ha in total south of Sosa Hill.

APN has made a master plan for the land use of the vicinity area around the port of Balboa including the existing territory and the area owned by PCC or US Armed Force which will be reverted by the year 2000 according to the Canal Treaty. This master plan is now under negotiation among the organizations concerned of the Government of Panama.

The master plan proposes four different zones corresponding to their major functions within the various port activities (See Figure 5-5-5).

(1) Port Operation Zone

This area is approximately 234 ha including a water area specialized for port operation activities. It includes the wharves and their related land areas, the ship repair facilities, passenger terminal and railroad facilities. This area is almost the same as the existing port area around the wharves.

(2) Cargo Stacking Zone

This area of approximately 133 ha will be exclusively used for stacking the cargo handled in the port. It includes warehouses, hangers, container stockyards, motor pools and oil storage tank farms.

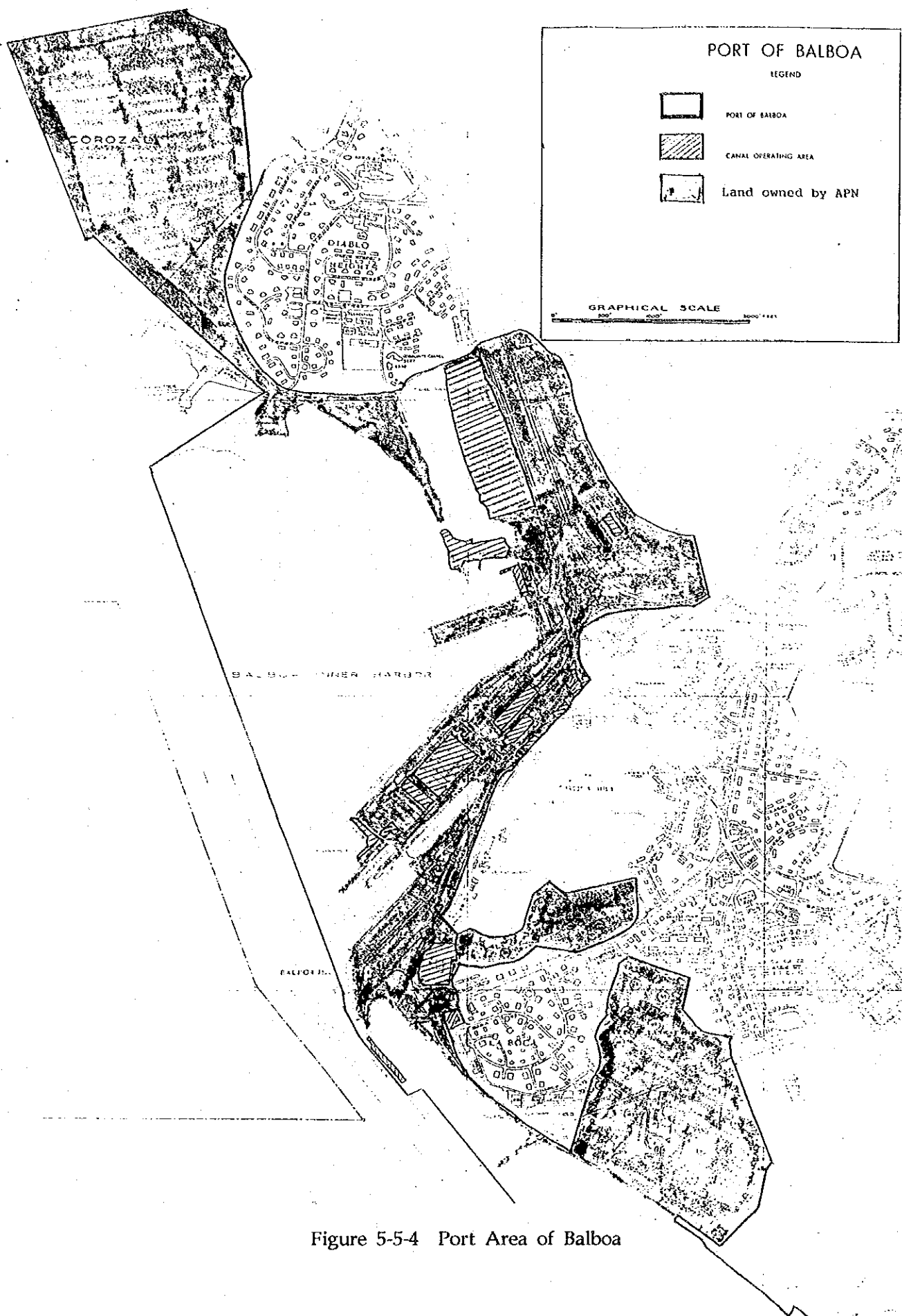


Figure 5-5-4 Port Area of Balboa

It covers 19.9 ha of the Albrook area on the east side of the port operation zone and the existing two tank farms. This area will be conceded to private companies.

(3) Port Administration Zone

The headquarter of APN and the administration office of Balboa Port will be moved to this area. It requires approximately 44 ha and two alternative sites are proposed for this area; the site of the Panama Canal College and the site of Balboa High School. The offices related to the port activities such as shipping agents, banks, insurance company, law offices and agents for foreign enterprises will be located in this area.

(4) Industrial Area

This area with approximately 168 ha is designated for the manufacturing industries which are necessary to be located close to the port. It covers almost all of the Corozal Area.

(5) Port Related Area

This is an expansion area for companies related to port activities with approximately 181 ha. This area might not necessarily belong to the port area, but will be in close relation to the utilization of the area. This area includes existing Diablo Residential Area.

In this master plan, APN points out that the access from the port to the Panama Railroad and the Transisthmian Highway is the most vital factor for securing maximum utilization of those areas.

Considering that the port has a tremendous property value and great potential as an economic booster, it is quite reasonable to use the surrounding area of the port so that the port can give full play to its ability.

It seems desirable to develop the Sosa Hill as a park or tourist point, because it provides a splendid view point for visitors of the port and the Panama Canal.

5.6 Land Transportation Facilities Around the Ports of Cristobal

The road and railroad are the major and only facilities which connect the Cristobal Port Area with its hinterland or other ports. In this section, the present situation and the problems of these facilities are described on the bases of site investigation and review of the existing data and information.

The routes of the road and railroad between Colon and Panama City are shown in Figure 5-6-1.

5.6.1 Panama Railroad

This trans-isthmian railroad was constructed by the U.S. and opened for service in 1855 as the first transcontinental railroad in the Americas. It was transferred to the Government of Panama in 1979 according to the Panama Canal Treaties.

The Panama Railroad, the management body of this railroad, was established in 1980 as an affiliated organization of APN. It became virtually independent from APN by a decree in 1991.

(1) Major Facilities

1) Track

The railroad is an un electrified single lane and runs 78.5 kilometers, parallel to the Panama Canal and connects the two main cities in Panama, Colon and Panama City.

Track gauge is 1.5 meters, which is different from the international standard. Most of the track traverses dry land, however, a considerable portion in the middle section runs on piles over areas flooded by the construction of the Panama Canal.

Panama Railroad recognizes that the track is fairly superannuated and most of the cross-ties have rotted due to the ill condition of ballast which is almost mixed with bed soil. On the other hand, tunnels and bridges are in fairly sound condition.

2) Terminal

There is only one cargo handling yard managed and operated by the railroad in Curundu in Panama City.

It has a container yard and a freight station for general cargo. The container yard with a width of 8,830 square meters handles approximately 30 containers per day on average. The maximum capacity of the yard is 342 boxes of 20 ft-containers and 132 boxes of 40 ft-containers. There are eight forklifts and one container crane deployed in this terminal.

In the port of Cristobal, there are sidetracks on Pier No.8 and at the back side of CFS in the port container terminal.

One container crane and three forklifts are deployed in Cristobal.

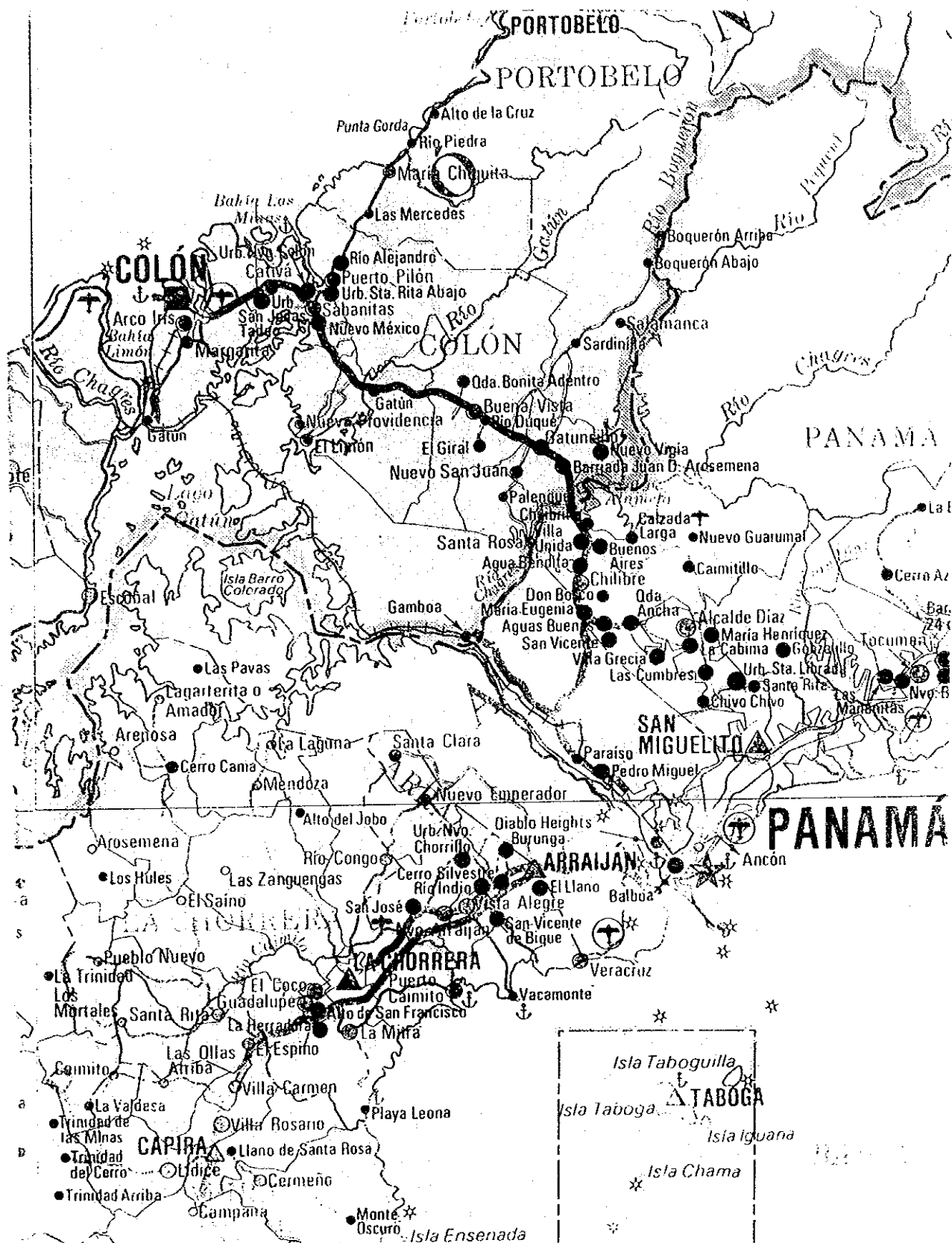


Figure 5-6-1 Routes of Road and Railroad

There is one more cargo handling point in Balboa accessing the port facilities, however it is not equipped with major facilities. The repair facilities for the locomotives and freight cars is deployed in Balboa.

3) Rolling Stock

The railroad has four locomotives, eighty three freight cars and three coaches. Three GM600 type locomotives with 1200 HP are 30 years old and one ALCO900 type locomotive with 1600 HP is 40 years old.

(2) Operation

All of the general and container cargoes are transported between two of the three cargo handling points. There is no fixed timetable and a diagram is not used. The number of trips is decided on a daily basis (minimum of six) according to the demand. One train has ten cars in maximum. It takes two hours and 15 minutes to run between Colon and Panama on average.

The freight rate on containers is fixed for each size and pair of terminals, and a little bit lower than that of automobile transport.

Passenger transportation service was terminated in 1989 due to the decrease of demand, but it re-opened as a tourist train in December 1992.

(3) Cargo Volume

The railroad transported 2,871 TEUs of containers and 28,145,800 t of general cargo in 1991. The container cargo volume has been gradually decreasing since 1986. The volume of general cargo has been decreasing for a long time. The major cargo is imported goods transported from Colon to Panama City.

(4) Future Development Plan

The Panama Railroad has a long term rehabilitation plan with an investment of B/.25,000,000 for ten years. The objective of this project is to recover the main route of Panama Railroad without making large scale modification to the present alignment and to make it possible to run passenger trains at a speed of 80 km/h and cargo trains at 60km/h respectively.

It includes complete rehabilitation of a 30 km section and procurement of new equipment for maintenance and cargo handling. A series of rails which show serious signs of fatigue between Mount Hope and Gatun will be replaced. In this section, the cross-ties will also be entirely replaced.

Preliminary rehabilitation works on a 20 km long track is planned to be completed by the end of 1993.

5.6.2 Transisthmian Highway

The Transisthmian Highway was built by the U.S. Army Corps of Engineers during World War II to facilitate the transportation of material and soldiers between defense sites located at the entrances to the Panama Canal. Since then, it has been the sole option for automobile transport between the City of Colon and Panama City and the rest of the country. As such it is an important link between Panama's most important Atlantic and Pacific ports, industrial and trading zones.

(1) Facility

The highway is approximately 70.5 kilometers long. Although it has four lanes in some sections adjacent to Panama City and Colon, for the most part it is comprised of two lanes.

During its fifty years of existence, it has suffered marked wear and tear, and on occasion serious damage that has interrupted traffic, such as landslides and partial collapses during the rainy season.

Prior to the Panama Canal Treaties of 1977, the U.S. Army was responsible for maintenance, and in 1973-75, the Corps of Engineers carried out a total rehabilitation of the pavement and other construction works in preparation for turning its responsibility over to the Government of Panama.

Since that time, the road has deteriorated at an accelerated pace due to greatly increased use and an almost total lack of maintenance.

(2) Traffic

The traffic between Colon and Panama City is generally congested, especially in the morning and evening hours. The traffic in the vicinity of Colon and Panama City is considerably heavy. The majority of the vehicles are passenger cars and buses for commuters. It takes almost two hours from Panama City to Colon in congested conditions.

Traffic volume survey of the highway has been conducted several times. The data of the survey is shown in Table 5-6-1. The traffic volume and its growth rate between Panama and San Miguelito is the largest. It may be due to the continuous increase of the commuter traffic caused by the concentration of population in the Panama Metropolitan area. The traffic in the proximity of Colon also has a large volume and relatively high growth rate.

Since the traffic jams occur almost in the same places, the traffic condition could be fairly alleviated by improving the facilities in these areas.

5.6.3 The Road Network Around the Ports

The ports of Cristobal, Coco Solo Norte and Bahia Las Minas are connected with each other by local road network as shown in Figure 5-6-2.

The Transisthmian Highway which terminates at Colon branches out to Route 36 toward Bahia Las Minas at Barriada San Pedro 8 km east to Colon.

Route 32, named Randolph Road, branches off from the highway northward to Coco Solo 2.5 km off Colon. This road has another branch from the same intersection to Cristobal and it is used as a bypass of the highway. Route 6, named Bolivar Highway, runs from Colon southward to Gatun.

Each of these roads was constructed before 1950, without any major reconstruction since then. These roads, in general, have only two lanes and are not necessarily well maintained.

The overall capacity seems to fall short of the demand and the road condition is poor for the container cargo transportation related to the ports and the Free Zone activities.

The physical and traffic conditions of major routes are described below:

(1) The Transisthmian Highway

It is approximately seven meters wide with one lane for each direction accompanied with paved side ways. Many trailers run with other cars on this road. The pavement between Colon and the intersection with Randolph Road is in rather good condition, but damaged on the west side of the intersection. The traffic volume exceeds 5,000 vehicles per day.

(2) Randolph Road (north branch)

It is approximately eight meters wide with one lane for each direction. It is used by cars and trailers related to the port and Free Zone, and traffic volume is less than 1,000 vehicles per day.

Perhaps because it was constructed on a swamp area, its foundation seems to be damaged in some places.

The section in front of the Free Zone with a heavily damaged pavement is flooded when it rains heavily.

Table 5-6-1 Traffic Volume of Transisthmian Highway

Section	Traffic Volume (Vehicle/day)				Growth Rate	
	1972	1975	1984	1989	72~84	84~89
1.Panama - San Miguelito	15,000	18,371	31,489	48,235	6.4%	8.9%
2.San Miguelito - Centera Los Andes	11,300	14,150	30,710	35,570	8.7%	3.0%
3.Centera Los - Lucha Franco	6,965	9,472	15,204	18,061	6.8%	3.5%
4.Lucha Franco - Alcade Diaz	3,800	—	11,439	15,367	9.6%	6.1%
5.Alcade Diaz - Carretera Maden	3,600	5,523	4,693	4,873	2.2%	0.8%
6.Carretera Maden - Puente Don Busco	4,370	4,506	6,567	8,110	3.5%	4.3%
7.Puente Don Busco - Buenos Aires	3,800	4,618	6,638	7,958	4.8%	3.7%
8.Buenos Aires - Buena Vista	3,800	—	6,314	7,510	4.3%	3.5%
9.Buena Vista - Sabanita Sur	4,018	4,846	6,988	8,588	4.5%	2.9%
10.Sabanita Sur - Sabanita Norte	6,237	6,516	9,238	10,681	3.3%	4.2%
11.Sabanita Norte - Cativa	7,289	8,059	11,009	13,900	3.5%	4.7%
12.Cativa - Coron	6,800	—	15,382	17,125	7.0%	2.2%

(Source : JICA)



Figure 5-6-2 Local Road Network

(3) Randolph Road (south branch)

It is approximately ten meters wide with one lane toward Colon and two lanes for the opposite direction. The majority of the traffic consists of cars and buses, and not many trailers run on this road. The pavement is rather damaged.

(4) Boliver Highway

It is approximately eight meters wide with one lane for each direction. There is a small amount of traffic generated by cars and buses on this road. The pavement condition is fairly good.

(5) Route 36

It is approximately six meters wide with one lane for each direction. The traffic volume consisting mainly of container trailers is less than 1,000 vehicles per day. The condition of the pavement is fairly good except for the port area section which is not paved at all.

5.6.4 Container Stockyards Outside the Ports

Since none of the three ports, Cristobal, Coco Solo Bahia Las Minas has enough space for increasing container handling, many privately owned container stockyards are operated and compensate the lack of capacity of this port. Many of these private yards mainly store and transport empty containers, but storage and transportation of laden containers and repair of broken containers are also their business.

At present the yards play important roles in supporting the container cargo movement in this area. The scale and facilities of these yards vary from each other, and many of them rent their land space from public organizations like Free Zone or APN.

Since the business circumstances of these yards can easily change responding to the fluctuation in demand, it is hard to grasp the situation in detail.

The location and the names of these container yards are shown in Fig 5-6-3 and Table 5-6-2 respectively.

There is no significant container stockyard outside the port area around the Port of Cristobal due to the lack of available open space.

In the southern part of the port area, five private companies have just started or are about to start operating a container stockyard for empty containers conceded by APN.

Along the north branch of Randolph Road in the France Field Area, there are two stockyards close to the Free Zone by obtained in a concession from the Free Zone.

On the east side of the port area of Coco Solo Norte, six private companies have been starting container stockyard operation in a concession from the APN.

There are three other container stockyards which handle a large amount of laden and empty containers along Route 36 which runs to Bahia Las Minas. Since this port has no space to handle the container cargo at all, these stock yards are virtually the most important part of the facilities.

These container stockyards are not necessarily operated in good condition, and some of them are nearly flooded by heavy rain.

The total area of these container stockyards exceeds 40 ha, which is more than five times the existing container yard in the port of Cristobal. It is indispensable to take the role of these yards into consideration in order to elaborate a future development plan of container terminals.

Table 5-6-2 List of Private Container Stockyards

Location No.	Name	Area and Capacity	No. of container handled	Remarks
1 & 2	Muelles, S.A.	Area: 6 ha Capacity: 710 Unit (40ft. 1 layer)	2,000 Units (40ft) / Mon. (Laden) 20% (Empty) 80%	Land: Concession from APN (5 ha) and from Private (1ha) Operating from 1971 On Chassis only
3	Maggil, S.A.	Area: 4.2 ha Capacity: 3,000 TEUs (3 layer)	(Laden) 100-300 TEUs/Year (Empty) 20,000 TEUs/Year	Land: Company owned Operating from 1977 Repair of containers
4	Ground Container Service, S.A.	Area: appx. 10ha* Capacity: 1,000 - 2,200 TEUs (3 layer)	-----	Land: Concession from Free Zone (* including other company)
5	Contenedores Maritimas, S.A.	Area: 1.7 ha Capacity: 1,000 - 1,200 Unit (3 layer)	(Empty) 1,000 Units/Mon.	Land: Concession from Free Zone
6	American Line, S.A.	Area: 0.5 ha	NA	Land: Concession from APN
	Naviera Mitchell S.A.	Area: 0.24 ha	NA	Land: Concession from APN
	Promociones E Inv. Raz., S.A.	Area: 0.6 ha	NA	Land: Concession from APN
	Rhasanna Co. Inv., S.A.	Area: 0.5 ha	NA	Land: Concession from APN
	Sea Cargo, S.A.	Area: 1.8 ha	NA	Land: Concession from APN
	Port Int. Container, S.A.	Area: 1.2 ha	NA	Land: Concession from APN Affiliated with Sealand
7	Administradora Portuaria, S.A.	Area: 4 ha	NA	Land: Concession from APN
	Almacendora De Contenedo., S.A.	Area: 2.4 ha	NA	Land: Concession from APN
	Maritime Conta. Storage, S.A.	Area: 2.4 ha	NA	Land: Concession from APN
	Contenedores Maritimos, S.A.	Area: 2.4 ha	NA	Land: Concession from APN
	Contenedores Del Istmo, S.A.	Area: 2.4 ha	NA	Land: Concession from APN

CHAPTER 6 PORT ACTIVITIES OF MAJOR PORTS

This chapter indicates ports activities in four major ports; the ports of Cristobal, Coco Solo Norte, Bahia Las Minas (carga seca) and Balboa, focusing on cargo and passenger movement through the ports.

6.1 Cargo Volume Handled and Passenger Movement

6.1.1 Cargo Volume Handled

The share of cargo volume handled in four major ports to the total volume of all ports under APN has been increasing from 40% to 50% during the last 10 years and it was 58% in 1991. The share will be more than 60% in 1992 according to the records as of August 1992. The total cargo volume of four ports was increasing at a annual growth rate of 10% or so, excluding the years 1984 and 1988. The annual growth rate of 26% was recorded in 1991. The cargo volume in the ports of Cristobal, Coco Solo Norte and Balboa contributed to this high rate. However, the cargo volume at the port of Bahia Las Minas in 1991 decreased by 8% of the previous year.

Table 6-1-1 and Figure 6-1-1 show the past records of the cargo volume of each port.

Table 6-1-1 Past Records of Cargo Volume
in Four Major Ports

(Unit: Metric Tons)						
Name of Port	1981	1982	1983	1984	1985	1986
Cristobal	431,529	341,506	343,663	416,021	482,645	626,026
Coco Solo Norte	28,951	41,009	31,672	24,745	35,451	65,318
Bahia Las Minas (carga seca)	158,042	165,290	136,354	137,194	198,706	197,804
Balboa	419,311	437,190	474,916	404,268	460,622	449,329
Total	1,037,833	984,995	986,605	982,228	1,177,424	1,338,477

Name of Port	1987	1988	1989	1990	1991	1992
Cristobal	704,890	477,709	616,095	672,026	945,103	1,050,170
Coco Solo Norte	63,911	69,781	66,323	87,390	126,275	296,524
Bahia Las Minas (carga seca)	248,846	226,423	254,403	293,368	269,319	277,858
Balboa	338,590	264,678	285,945	328,400	398,331	502,686
Total	1,356,237	1,038,591	1,222,766	1,381,184	1,739,028	2,127,238

Source: Autoridad Portuaria Nacional (APN)

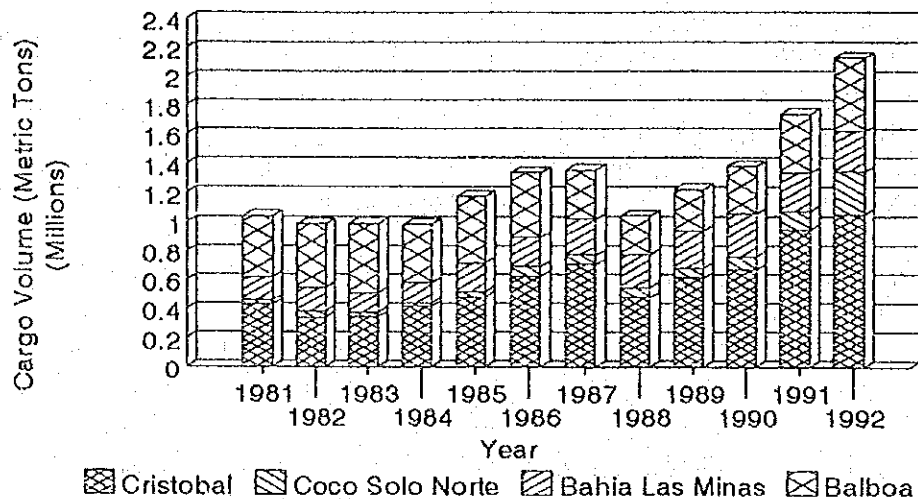


Figure 6-1-1 Cargo Volume Handled in Four Major Ports
(Source: Autoridad Portuaria Nacional)

(1) Port of Cristobal

1) Cargo Handled

All cargo handled in the port of Cristobal is for overseas trade incoming from/outgoing abroad and no domestic trade cargo is handled. Annual growth rates were near the 20% level, excluding 1983 and 1988, annual growth rate of 42% was recorded in 1991 (according to the records as of August 1992, this high growth rate will not be sustained). The average growth rate per annum between 1982 and 1991 was recorded at 12%. The cargo volume share of this port has been kept near the 20% level since 1986 and it became 31.6% in 1991. This means that the port of Cristobal plays a very important role in Panama.

Regarding cargo movement by import (unloading) and export (loading), 80% of the volume was imported in 1991. By packing types, shares were 75% for container cargo and 16% for general cargo in 1991. Bulk cargo (both liquid and solid) was handled with a share of less than 10% in 1991. Figure 6-1-2 shows the transition of cargo volume by unloading and loading operations, Figure 6-1-3 shows the transition of cargo volume by packing types.

Bulk cargo has been handled from 1989 continuously. Solid bulk cargo was handled from 1990 and the volume rapidly increased in 1991 (12,514 metric tons in 1990, 89,721 metric tons in 1991) because bulk cargo such as coal and gypsum which had originally been handled in the port of Bahia Las Minas, was transferred to the port of Cristobal.

General cargo consists agricultural products (fruit and its products), iron and steel materials, construction materials etc. and most of them are imported. Exports are agricultural products such as coffee (coffee is handled by both general and in container).

Vehicles are handled mainly in Pier No.16 of this port. Vehicles of 35,973 units (25,347 imported and 10,626 re-exported), 47,817 metric tons were handled in 1991. Major type was the passenger car. The past records of vehicles handled are shown in Table 6-1-2.

Transshipment cargo has been handled at a share of 5% to 6% of the total. It can be said that there is an increasing tendency for handling transshipment cargo in these years.

2) Container Cargo

The share of container cargo volume is approx. 70% to 80% of the total (82% in 1990, 75% in 1991). 704,630 metric tons, 162,446 TEUs were handled in 1991 and the annual growth rate was 28.6% in weight and 31.8% in TEU (547,991 metric tons, 123,264 TEUs in 1990). Major commodities in container are food, textiles, wood and papers, chemical products, household appliances etc. and most are imported.

Ratio of laden containers (total 100,486 TEUs) to the total was 62%, of which 91% (75,921 TEUs) in case of unloading and 31% (24,565 TEUs) in case of loading in 1991. Average weight of a laden container was approx. 7 metric tons/TEU. Summary of container cargo is shown in Table 6-1-3. Figure 6-1-4 illustrates the past records of container cargo by unloading and loading operations. Since imports were in excess of exports, 70% of loaded containers were empty.

95% of laden containers (in TEU) were FCL (full container load) containers in 1991. This FCL ratio has been increasing in these years. Table 6-1-4 shows the past records of FCL and LCL (less than container load) ratios for container cargo.

Refrigerated cargo was handled in 1991 at 2% of the total volume. The major commodities are fresh fruit, fresh fish and meat, dairy products, etc.

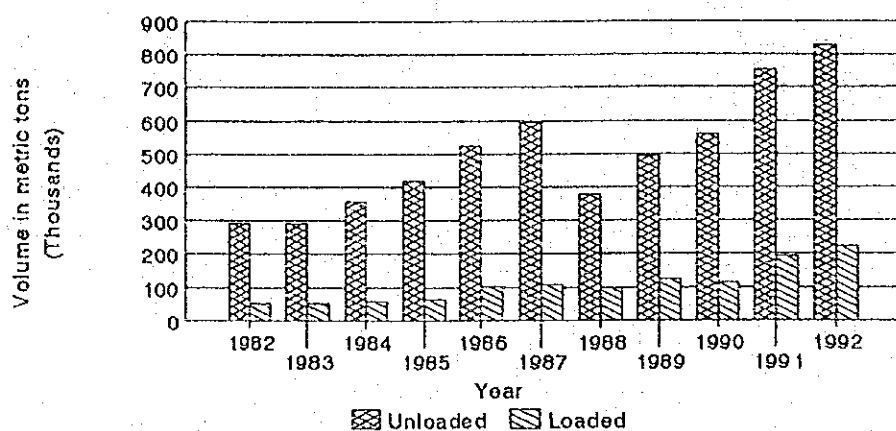


Figure 6-1-2 Past Records of Cargo Volume Handled by Unloading and Loading Operations
Port of Cristobal

(Source: Autoridad Portuaria Nacional)

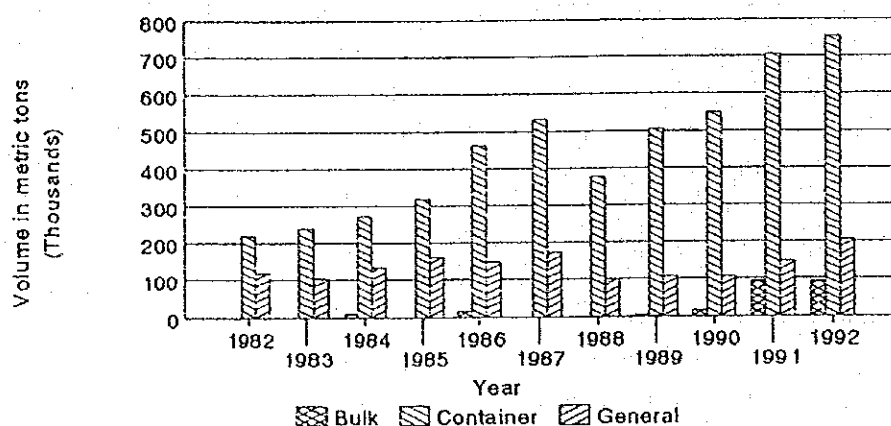


Figure 6-1-3 Past Records of Cargo Volume Handled by Packing Types: Port of Cristobal

(Source: Autoridad Portuaria Nacional)

Table 6-1-2 Past Records of Number of Vehicles
Port of Cristobal

Port of Cristobal		1983	1984	1985	1986	1987	1988	1989	1990	1991
Number of Vehicles	Year									
	Unload	4,025	10,002	9,184	6,719	10,010	9,156	16,446	11,246	25,347
	Load	2,241	6,119	6,572	3,969	1,638	4,063	5,620	6,032	10,626
Weight (m.tons)	Total	6,266	16,121	15,756	10,688	11,648	13,219	22,066	17,278	35,973
	Unload	5,124	11,036	15,039	9,238	13,123	11,353	18,345	17,122	31,643
	Load	2,479	6,565	7,787	5,823	3,123	4,767	6,013	7,182	16,174
	Total	7,603	17,601	22,826	15,061	16,246	16,120	24,358	24,304	47,817

Source: Autoridad Portuaria Nacional (APN)

Table 6-1-3 Past Records of Container Cargo Handled
Port of Cristobal

(Source: Autoridad Portuaria Nacional)

		1987	1988	1989	1990	1991
Cargo Volume In Containers (Ton)	Unload	430,822	290,226	395,657	447,011	538,823
	Load	100,888	88,073	109,364	100,980	165,807
	Total	531,710	378,299	505,021	547,991	704,630
Total Number of Containers (TEU)	Unload	63,507	42,139	53,110	61,156	83,267
	Load	65,075	40,309	49,593	62,108	79,179
	Total	128,582	82,448	102,703	123,264	162,446
Number of Laden Containers (TEU)	Unload	60,276	39,142	51,453	59,092	75,921
	Load	14,931	12,175	14,047	14,577	24,565
	Total	75,207	51,317	65,500	73,669	100,486
Average volume per Container (Ton/TEU)	Unload	7.1	7.4	7.7	7.6	7.1
	Load	6.8	7.2	7.8	6.9	6.7
	Total	7.1	7.4	7.7	7.4	7.0
Ratio of Laden Containers (%)	Unload	94.9%	92.9%	96.9%	96.6%	91.2%
	Load	22.9%	30.2%	28.3%	23.5%	31.0%
	Total	58.5%	62.2%	63.8%	59.8%	61.9%

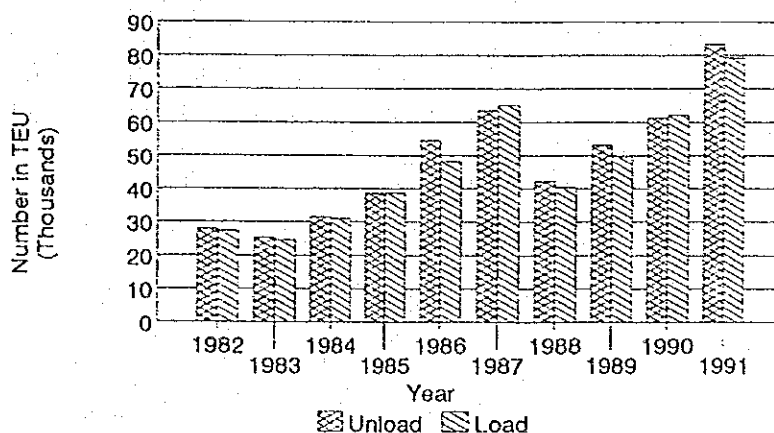


Figure 6-1-4 Past Records of Container Cargo
by Unloading/loading Operations: Port of Cristobal

(Source: Autoridad Portuaria Nacional)

Table 6-1-4 Past Records of FCL/LCL Ratio
of Containers: Port of Cristobal

Port of Cristobal									(TEU's)
Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
FCL	25,813 82.1%	31,502 84.0%	39,261 87.5%	59,188 89.9%	69,638 92.6%	47,959 93.5%	61,774 94.3%	69,324 94.1%	95,362 94.9%
LCL	5,638 17.9%	5,982 16.0%	5,609 12.5%	6,680 10.1%	5,569 7.4%	3,358 6.5%	3,726 5.7%	4,345 5.9%	5,124 5.1%
Total	31,451	37,484	44,870	65,868	75,207	51,317	65,500	73,669	100,486

Source: Autoridad Portuaria Nacional (APN)

(2) Port of Coco Solo Norte

1) Cargo Handled

The port of Coco Solo Norte is the only port handling domestic cargo among the four major ports described in this Chapter. However, foreign trade cargo has been increasing in these years since there is a transit center of foreign trade in its hinterlands the same as the port of Cristobal. Cargo volume for domestic trade has been constant in these five years. On the other hand, cargo volume for foreign trade has been increasing dramatically since 1990 and the highest volume handled of 116,141 metric tons was recorded in 1991. Further, the cargo volume handled largely exceeds the volume of the year 1991 (180,091 metric tons) based on the records as of August 1992. Therefore, the port activities of this port will concentrate on foreign trade in the future. One of the reasons for this phenomenon is that the Sea-Land Service Inc. began its weekly container shipping services from Miami in October 1991. The share of cargo volume in APN's ports had been around 2% to 3% until 1990 and became 4.2% in 1991, and radically expanded to 8.5% as of August 1992.

As for unloading and loading operations, 30% of the total cargo was unloaded in 1991. However, 59% of the total cargo was unloaded as of August 1992.

By packing types, more than 90% of the volume was general cargo until 1990 due to the lack of container handling equipment. After Sea-Land began services, general cargo of 71% and container cargo of 28% were handled in 1991 and container cargo of 63% was handled as of August 1992. Figures 6-1-5 and 6-1-6 show the transitions of cargo volume by unloading/loading operations and by packing types respectively. Bulk cargo has been handled since 1990.

Food, clothes, wood, vehicles etc. are handled as general cargo. As for vehicles, the volume has been increasing since 1986 and 3,243 vehicles (2,258 unloaded, 985 loaded), total 11,035 metric tons were handled in 1991. Heavy vehicles have been handled since 1990. The past records of vehicles handled are shown in Table 6-1-5.

A small volume of transshipment cargo was handled; only 30 metric tons were loaded in 1991.

2) Container Cargo

As described above, volume of container cargo handled has increased since 1990 and containers of 35,705 metric tons, 13,220 TEUs were handled in 1991 at annual growth rates of 365% (7,686 metric tons in 1990) in weight and 254% (3,734 TEUs in 1990) in TEU respectively. As of August 1992, the volume handled was almost the same as that of the port of Bahia Las Minas. The

major commodities in containers are food, clothes, electric appliances etc. as mentioned in the previous section for the port of Cristobal.

Ratio of laden containers (total 7,529 TEUs) was 57% of the total cargo, of which 66% (4,960 TEUs) in case of unloading and 45% (2,569 TEUs) in case of loading in 1991. Average weight of a laden container was approx. 5 metric tons/TEU. This value was smaller than that of Cristobal. As of August 1992, however, the average weight became 6.7 metric tons/TEU. Summary of container cargo is shown in Table 6-1-6. Figure 6-1-7 shows the past records of container cargo by unloading and loading operations.

All containers are FCL types. No refrigerated cargo has been recorded. No facility for reefer containers exists in the port.

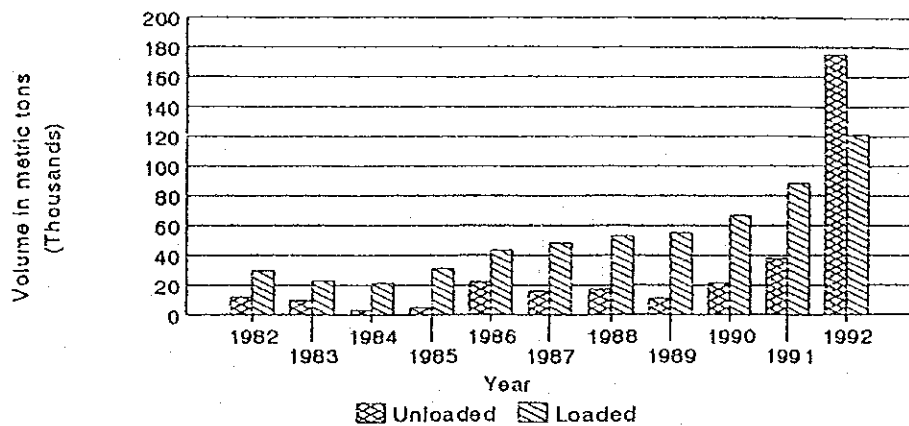


Figure 6-1-5 Past Records of Cargo Volume Handled
by Unloading and Loading Operations
Port of Coco Solo Norte
(Source: Autoridad Portuaria Nacional)

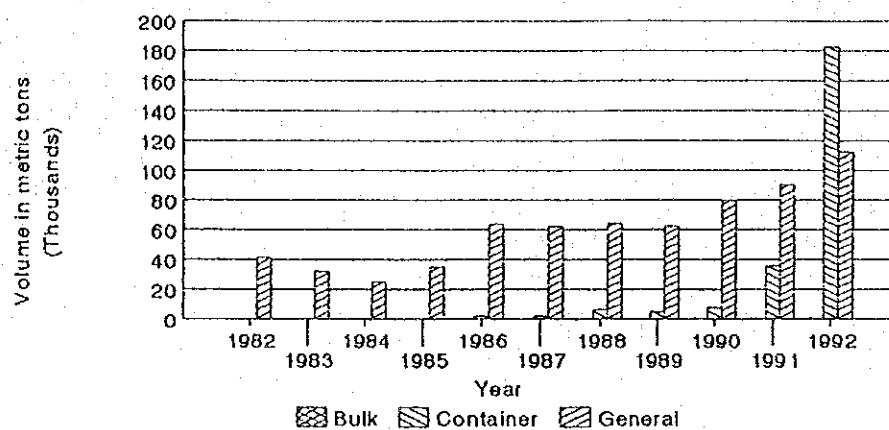


Figure 6-1-6 Past Records of Cargo Volume Handled by Packing Types: Port of Coco Solo Norte
(Source: Autoridad Portuaria Nacional)

Table 6-1-5 Past Records of Number of Vehicles Port of Coco Solo Norte

Port of Coco Solo Norte		1983	1984	1985	1986	1987	1988	1989	1990	1991
Number of Vehicles	Unload	361	5	1	421	984	26	189	324	2,258
	Load	1,950	274	15	3,510	5,645	6,342	4,578	1,918	985
Total		2,311	279	16	3,931	6,629	6,368	4,767	2,242	3,243
Weight (m.tons)	Unload	367	10	6	425	1,016	41	191	3,745	5,541
	Load	2,070	274	14	3,626	5,953	6,776	4,685	3,508	5,494
Total		2,437	284	20	4,051	6,969	6,817	4,876	7,253	11,035

Source: Autoridad Portuaria Nacional (APN)

Table 6-1-6 Past Records of Container Cargo Handled
Port of Coco Solo Norte

(Source: Autoridad Portuaria Nacional)

		1987	1988	1989	1990	1991
Cargo Volume in Containers (Ton)	Unload	31	24	86	395	26,853
	Load	2,053	5,981	4,372	7,291	8,852
	Total	2,084	6,005	4,458	7,686	35,705
Total Number of Containers (TEU)	Unload	697	1,407	768	2,249	7,470
	Load	436	1,052	1,105	1,485	5,750
	Total	1,133	2,459	1,873	3,734	13,220
Number of Laden Containers (TEU)	Unload	2	3	4	48	4,960
	Load	415	1,045	864	1,460	2,569
	Total	417	1,048	868	1,508	7,529
Average volume per Container (Ton/TEU)	Unload	15.5	8.0	21.5	8.2	5.4
	Load	4.9	5.7	5.1	5.0	3.4
	Total	5.0	5.7	5.1	5.1	4.7
Ratio of Laden Containers (%)	Unload	0.3%	0.2%	0.5%	2.1%	66.4%
	Load	95.2%	99.3%	78.2%	98.3%	44.7%
	Total	36.8%	42.6%	46.3%	40.4%	57.0%

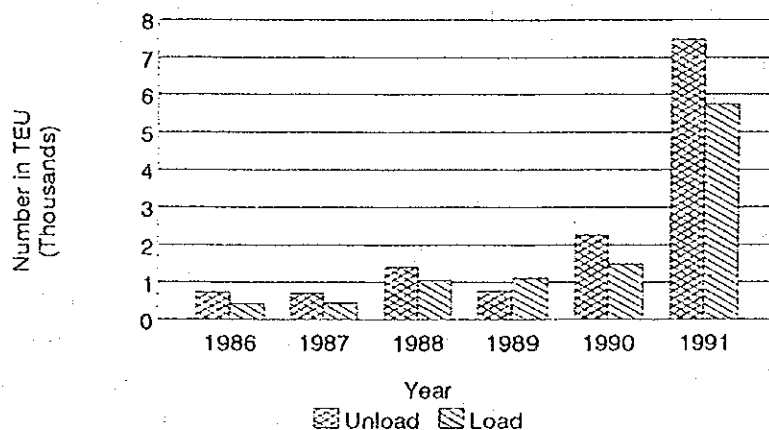


Figure 6-1-7 Past Records of Container Cargo
by Unloading/loading Operations
Port of Coco Solo Norte

(Source: Autoridad Portuaria Nacional)

(3) Port of Bahia Las Minas (carga seca)

1) Cargo Handled

All cargo handled in the port of Bahia Las Minas is for overseas trade incoming from/outgoing abroad and no domestic trade cargo is handled. In 1988 (when U.S. economic sanctions were imposed), the cargo volume handled in this port slightly decreased in comparison to the other ports, an average annual growth rate of around 12% to 15% was recorded recently. However, the cargo volume in 1991 decreased 8% from the previous year. Despite this, the cargo volume in 1992 is expected to increase according to the records as of August 1992. The share of cargo handled tends to decrease.

As for cargo movement by import and export, 75% of the total volume was imported in 1991. By packing type, container cargo and general cargo had a share of 80% and 20% respectively. Solid bulk cargo (coal, charcoal, gypsum, etc.) had traditionally been handled in this port until 1990. Since 1991, however, all handling of solid bulk cargo was transferred to the port of Cristobal, and no bulk cargo is handled at present. Figures 6-1-8 and 6-1-9 show the transitions of cargo volume by import/export operations and by packing types respectively. Iron and steel products, fertilizers etc. are handled as general cargo.

Vehicles are handled by Ro/Ro vessels calling at this port. 5,674 vehicles (import: 4,481, re-export: 1,193), 15,505 metric tons were handled in 1991. Major types of vehicles are heavy vehicles such as tractor-head, buses, trucks, construction equipment, etc. Table 6-1-7 shows the past records of vehicles handled in this port.

Transshipment cargo was handled at a share of 9% in 1991.

2) Container Cargo

The share of container cargo was 80% in 1991 and it was the lowest value since 1988 (88% in 1988, 86% in 1989, 87% in 1990). 216,595 metric tons, 45,276 TEUs were handled in 1991, a 15.5% decrease in weight and 6.2% increase in TEU from the previous year 1990 (256,330 metric tons, 42,651 TEUs). The major commodities in containers are foods (including coffee), textiles and clothes, various manufactured articles, electric appliances, etc., the same as the other ports.

Ratio of laden containers (total 30,393 TEUs) to the total TEUs was 67%, of which 99% (22,387 TEUs) in case of unloading and 35% (8,006 TEUs) in case of loading. Average weight of a laden container was approx. 7 metric tons/TEU. Table 6-1-8 shows summary of container cargo. Figure 6-1-10 shows the past records of container cargo by unloading and loading operations.

The number of unloading containers had exceeded that of loading since 1985 and both numbers in 1991 were well balanced. No LCL container has been handled in this port.

Refrigerated cargo was handled in 1991 at 13% of the total volume. No facility for reefer containers exists but box units (called "furgons" and equivalent to 40 feet container), which have their own generators for refrigerating and wheels, are handled. The major commodities are fresh fruit, fish, meat, etc.

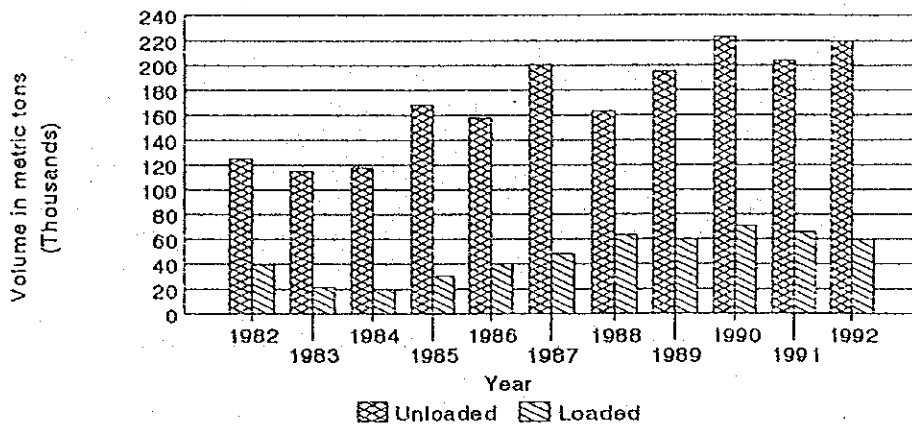


Figure 6-1-8 Past Records of Cargo Volume Handled by Unloading and Loading Operations
Port of Bahia Las Minas
(Source: Autoridad Portuaria Nacional)

Table 6-1-7 Past Records of Number of Vehicles
Port of Bahia Las Minas

Port of Bahia Las Minas		1983	1984	1985	1986	1987	1988	1989	1990	1991
Number of Vehicles	Unload	821	1,137	1,490	2,120	2,568	2,599	2,652	5,583	4,481
	Load	543	1,015	1,378	1,318	1,421	2,017	1,952	2,168	1,193
Total		1,364	2,152	2,868	3,438	3,989	4,616	4,604	7,751	5,674
Weight (m.tons)	Unload	2,849	3,669	4,465	5,255	5,386	4,982	6,252	10,898	13,469
	Load	671	1,405	1,871	1,975	2,134	2,840	3,087	3,829	2,036
Total		3,520	5,074	6,336	7,230	7,520	7,822	9,339	14,727	15,505

Source: Autoridad Portuaria Nacional (APN)

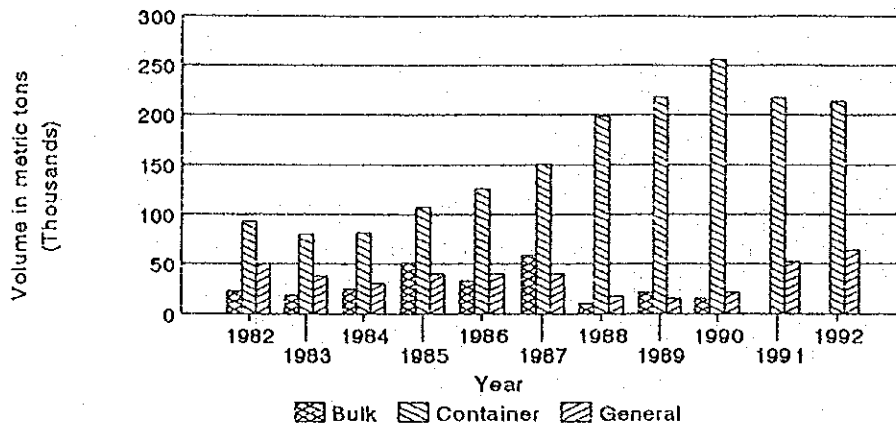


Figure 6-1-9 Past Records of Cargo Volume Handled by Packing Types: Port of Bahia Las Minas
(Source: Autoridad Portuaria Nacional)

Table 6-1-8 Past Records of Container Cargo Handled Port of Bahia Las Minas
(Source: Autoridad Portuaria Nacional)

		1987	1988	1989	1990	1991
Cargo Volume In Containers (Ton)	Unload	104,521	138,862	160,755	188,607	160,780
	Load	45,678	59,794	57,573	67,723	55,815
	Total	150,199	198,656	218,328	256,330	216,595
Total Number of Containers (TEU)	Unload	14,884	18,826	21,669	25,767	22,591
	Load	12,819	16,003	11,543	16,864	22,685
	Total	27,703	34,829	33,212	42,631	45,276
Number of Laden Containers (TEU)	Unload	14,648	18,520	21,248	25,137	22,387
	Load	7,399	9,450	9,871	10,191	8,006
	Total	22,047	27,970	31,119	35,328	30,393
Average volume per Container (Ton/TEU)	Unload	7.1	7.5	7.6	7.5	7.2
	Load	6.2	6.3	5.8	6.6	7.0
	Total	6.8	7.1	7.0	7.3	7.1
Ratio of Laden Containers (%)	Unload	98.4%	98.4%	98.1%	97.5%	99.1%
	Load	57.7%	59.1%	85.5%	60.4%	35.3%
	Total	79.6%	80.3%	93.7%	82.8%	67.1%

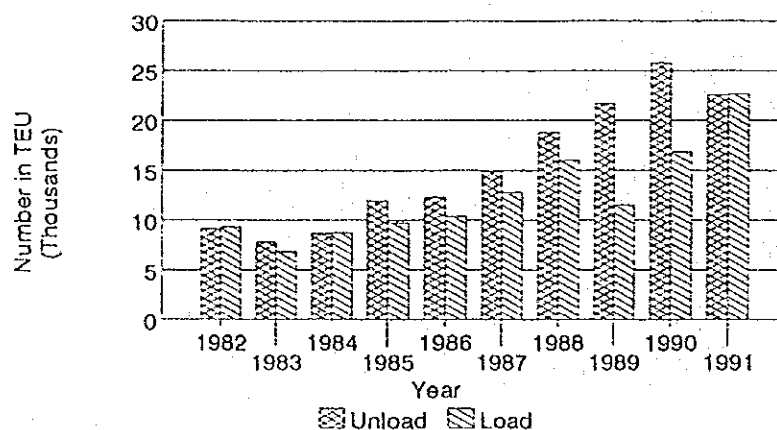


Figure 6-1-10 Past Records of Container Cargo by Unloading/loading Operations Port of Bahia Las Minas
(Source: Autoridad Portuaria Nacional)

(4) Port of Balboa

1) Cargo Handled

The port of Balboa is located on the Pacific side, south west of Panama city and opposite the three ports above, and is ranked second among foreign trade ports. This port handles only overseas cargo. The cargo volume handled has fluctuated and gradually decreased since 1982. The lowest volume was recorded in 1988. Then the volume grew and recovered its level of 1984. The annual growth rate in 1991 was approx. 21%. The share of the total cargo in APN's ports has been decreasing and was 13% in 1991.

With regard to cargo movement by import and export, 89% of the volume was imported in 1991 (the highest share among the four ports). By packing types, the shares were 19% for container cargo, 12% for general cargo and 69% for bulk cargo. Figure 6-1-11 and Figure 6-1-12 show the transitions of cargo volume by unloading/loading operations and by packing types.

Bulk cargo had been handled steadily at between 150 thousand and 200 thousand metric tons until 1989. It has been increasing from 1990 and the highest volume since 1982 of 276 thousand metric tons was recorded in 1991. The major commodities of bulk cargo are oil (olive etc.) in liquid and wheat, corn, soy bean flour, etc. in solid and 99% of those were imported in 1991.

General cargo consists mainly of agricultural products, iron and steel products, wood, etc., and is imported. The handling of vehicles largely decreased in 1988 and 1989. From 1990, however, the volume handled has increased and 26,105 vehicles (15,563 imported and 10,542 re-exported), 30,331 metric tons were handled in 1991. Passenger cars are the main vehicles. The past records of vehicles handled are shown in Table 6-1-9.

Transshipment cargo of only 3% was handled in 1991.

2) Container Cargo

Volume of containers handled in the port of Balboa was the smallest among the four major ports in 1991 (19%). Container cargo volume handled had been kept at a level of 200 thousand metric tons until 1986. The volume in 1987 sharply decreased by 57% from the previous year and it has fluctuated between 50 thousand and 80 thousand metric tons since then. 74,036 metric tons, 12,508 TEUs were handled in 1991 at growth rates of 33.8% in weight and 16.6% in TEU over the previous year (55,338 metric tons and 10,724 TEUs in 1990). There is a tendency for container cargo to increase in 1992 according to the records as of August 1992. The major commodities in containers are the same as those of other ports.

Ratio of laden containers (total 9,111 TEUs) was approx. 73% to the total TEUs in 1991 and the same ratios were recorded in both unloading (5,040 TEUs) and loading (4,071 TEUs). Average weight of a laden container was approx. 8 metric tons/TEU in 1991. This value was larger than the recent values. Table 6-1-10 shows summary of container cargo. Figure 6-1-13 shows the past records of container cargoes by unloading and loading operations.

Approx. 96% of laden containers (in TEU) were FCL containers in 1991. This FCL ratio has been stable in these years. Table 6-1-11 shows the past records FCL and LCL ratios for container cargo.

Refrigerated cargo was handled in 1991 at 14% of the total volume. This value has been stable between 16% and 18% and is a little higher than that of the port of Bahia Las Minas.

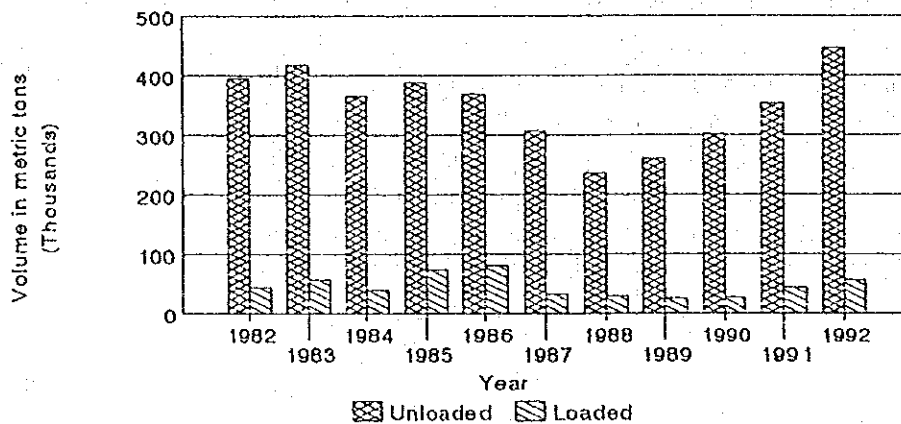


Figure 6-1-11 Past Records of Cargo Volume Handled by Unloading and Loading Operations
Port of Balboa
(Source: Autoridad Portuaria Nacional)

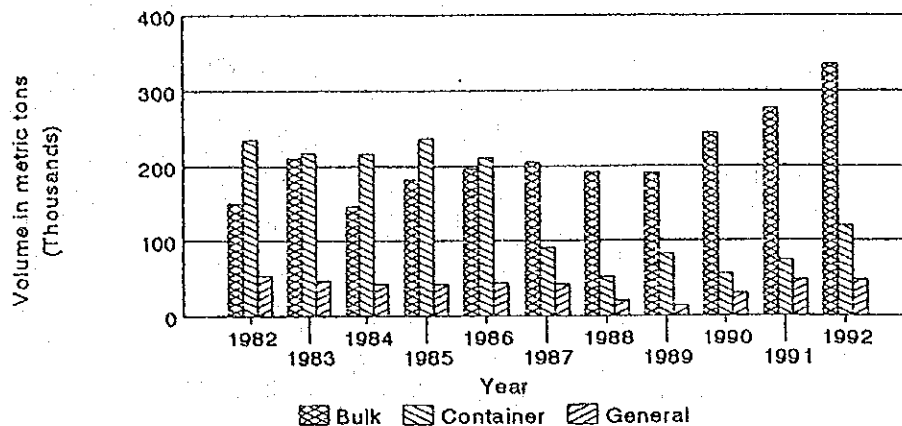


Figure 6-1-12 Past Records of Cargo Volume Handled
by Packing Types: Port of Balboa
(Source: Autoridad Portuaria Nacional)

Table 6-1-9 Past Records of Number of Vehicles
Port of Balboa
(Source: Autoridad Portuaria Nacional)

Port of Balboa		1983	1984	1985	1986	1987	1988	1989	1990	1991
Number of Vehicles	Unload	16,953	14,956	20,746	14,827	14,354	2,269	3,928	11,290	15,563
	Load	1,517	1,659	2,345	1,650	902	1,224	990	2,611	10,542
	Total	18,470	16,615	23,091	16,477	15,256	3,493	4,918	13,901	26,105
Weight (m.tons)	Unload	19,597	18,625	25,652	19,311	18,114	3,159	5,438	13,620	17,535
	Load	2,043	2,343	3,054	2,736	1,959	1,291	1,296	2,911	12,796
	Total	21,640	20,968	28,706	22,047	20,073	4,450	6,734	16,531	30,331

Source: Autoridad Portuaria Nacional (APN)

Table 6-1-10 Past Records of Container Cargo Handled
Port of Balboa

(Source: Autoridad Portuaria Nacional)

		1987	1988	1989	1990	1991
Cargo Volume in Containers (Ton)	Unload	74,150	37,632	63,050	35,430	46,857
	Load	16,378	14,804	19,836	19,908	27,179
	Total	90,528	52,436	82,886	55,338	74,036
Total Number of Containers (TEU)	Unload	9,287	4,840	7,750	5,181	6,896
	Load	8,965	5,131	6,335	5,543	5,612
	Total	18,252	9,971	14,085	10,724	12,508
Number of Laden Containers (TEU)	Unload	9,141	4,364	7,430	4,635	5,040
	Load	2,675	2,367	3,130	3,094	4,071
	Total	11,816	6,731	10,560	7,729	9,111
Average volume per Container (Ton/TEU)	Unload	8.1	8.6	8.5	7.6	9.3
	Load	6.1	6.3	6.3	6.4	6.7
	Total	7.7	7.8	7.8	7.2	8.1
Ratio of Laden Containers (%)	Unload	98.4%	90.2%	95.9%	89.5%	73.1%
	Load	29.8%	46.1%	49.4%	55.8%	72.5%
	Total	64.7%	67.5%	75.0%	72.1%	72.8%

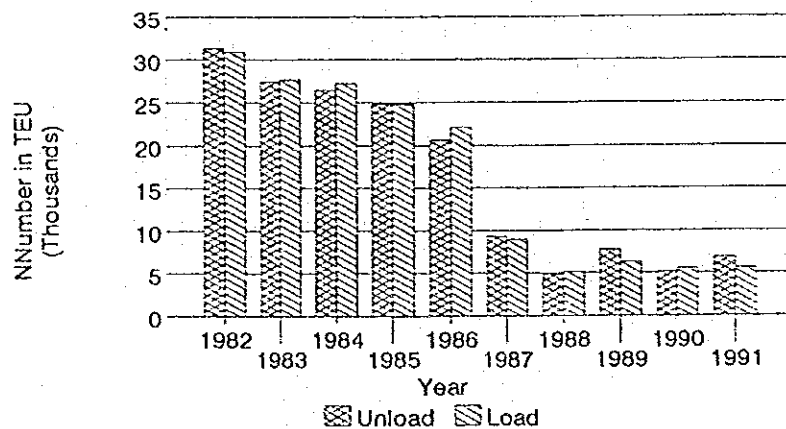


Figure 6-1-13 Past Records of Container Cargo
by Unloading/loading Operations: Port of Balboa

(Source: Autoridad Portuaria Nacional)

Table 6-1-11 Past Records of FCL/LCL Ratio
of Containers: Port of Balboa

(Source: Autoridad Portuaria Nacional)

Port of Balboa		(TEU's)							
Year	1983	1984	1985	1986	1987	1988	1989	1990	1991
FCL	28,507 87.0%	29,214 88.2%	30,034 93.4%	26,622 94.0%	6,613 56.0%	6,432 95.6%	10,327 97.6%	7,451 96.4%	8,776 96.3%
LCL	3,939 12.1%	3,926 11.8%	2,119 6.6%	1,699 6.0%	5,203 44.0%	299 4.4%	233 2.2%	278 3.6%	335 3.7%
Total	32,446	33,140	32,153	28,321	11,816	6,731	10,560	7,729	9,111

Source: Autoridad Portuaria Nacional (APN)

6.1.2 Passenger Movement

Panama is home to the world renowned Panama Canal and needless to say, Panama also has maintained its status as the key figure in international maritime transportation. Nature abounds here and there are many noted places in every area in the country. It can be said that Panama is blessed with tourism resources. In recent years, however, the dangerous conditions such as political instability, worsened security, etc. have made tourists wary. The public security of the city of Colon behind the port of Cristobal has worsened in particular and thus international cruise ships are reluctant to call at the port.

The transportation of passengers embarking and disembarking can be classified into three types; by air, by land and by ship. In the case of Panama, approx. 83% of the total passenger movement was by air during 1990 (preliminary), followed by 14% by land and 3% by ship. Tendency of the total passenger movement shows a gradual decrease since 1980 and the number of passengers largely decreased in 1988. It was expected that the number of passengers would increase, but it has not yet recovered to the level of 10 years ago.

The number of passengers (both embarking and disembarking) by passenger ships has slightly fluctuated. Most passengers used the ports of Cristobal and Balboa. Table 6-1-12 shows the past records of passenger movement in the major ports. Since the port of Bahia Las Minas is located far from the city of Colon and there is no facility for passengers' use around the port (there is only a power plant and oil refinery), it is functioning as a commercial port only. Therefore, no description of passenger traffic at this port is made in this section.

(1) Port of Cristobal

There are many attractions for tourists such as the Panama Canal (Gatun Lake, Gatun Locks), Free Zone in the city of Colon, plentiful nature along the Caribbean Coast, etc. After turning over the facilities of the port of Cristobal etc. from the Panama Canal Commission to the Government of Panama by the Canal Treaty in 1978, the number of passengers by passenger ships calling at the port sharply decreased in 1987 due to the worsened public security in the city of Colon. The number of passengers in 1990 was 2,479 persons; less than half of that in 1980. At the same time, the share of the passenger movement of this port has decreased; it was 12% of the total passengers by ship in Panama in 1990. There is no terminal for passengers at all (there is a small duty free shop in the port area).

It is necessary not only to improve security in the city of Colon but also to develop facilities and to develop tourism including re-development of the city. Otherwise, the number of passengers will not increase in the future.

(2) Port of Coco Solo Norte

There is passenger service only for domestic transportation at this port. The number of passengers was recorded in the statistics from 1989 as shown in Table 6-1-12. The number (1,296 persons) in 1990 exceeded that of Cristobal. 2,113 persons were transported in 1987 according to the statistics of APN.

Since this port is also located near the Free Zone in France Field expanded from the Colon side, there is a potential to attract visitors (tourists), mainly users of the Free Zone.

(3) Port of Balboa

The port of Balboa has a big commercial area in its hinterland, that is the city of Panama, the Capital of Panama. This port, with its entrance on the Pacific side, is often compared with the port of Cristobal, on the Atlantic side of the Panama Canal.

The number of passengers at this port has gradually been decreasing in the last 10 years in general. In 1984, the number slightly increased and after that, it has been maintained a steady rate while the numbers on the port of Cristobal continued to decrease. This means that passengers' visits were transferred to the port of Balboa from the port of Cristobal due to poor facilities and unsafe conditions. The share of passengers in this port had been maintained at 40% to 50% and it became 32%, 6,599 persons in 1990.

Table 6-1-12 Past Records of Passenger Movement
in Major Ports

Disembarkation											
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*
Cristobal	3,243	2,690	2,631	3,654	2,142	2,558	3,388	2,031	836	306	1,020
Coco Solo										762	1,296
Bahia Las Minas				359	195	39	30	28			
Balboa	5,111	5,167	4,720	3,987	3,210	3,806	4,016	4,020	3,959	7,649	3,615
Others	1,839	2,278	1,153	1,408	1,499	1,612	1,833	2,256	2,206	4,158	5,036
TOTAL	10,193	10,135	8,504	9,408	7,046	8,015	9,267	8,335	7,001	12,875	10,967

Embarkation											
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990*
Cristobal	3,144	2,648	2,657	2,280	2,111	2,686	2,118	1,797	963	506	1,459
Coco Solo										756	939
Bahia Las Minas				57	30	53	43				
Balboa	4,339	4,636	3,940	3,630	3,040	3,524	3,624	3,881	3,409	5,302	2,984
Others	1,299	1,578	876	979	973	1,955	1,790	2,099	2,307	3,941	4,228
TOTAL	8,782	8,862	7,473	6,946	6,154	8,218	7,575	7,777	6,679	10,505	9,610

Source: Oficinas de Migración en la República (Immigration Office of Republic)

* Preliminary figures in 1990

6.2 Current Situation of Cargo Movement

6.2.1 Origins and Destinations of Cargo

(1) Port of Cristobal

1) Import

Major origins of imported cargo are the Far East, South East Asian countries and the developed western countries, and European countries. As for destinations, most cargo is bound for Panamanian domestic areas and the Colon Free Zone just behind the port; 49% of the total imports were for local areas, followed by 46% for the Free Zone and 5% for transshipment in 1991. The cargo volume for local areas sharply decreased in 1988, but the volume in 1991 exceeded the level in 1987. The average annual growth rate over the last three years (1989 to 1991) was 30%. Although cargo volume for the Free Zone also decreased in 1988, it recovered to the level of the previous year in 1989 and the average annual growth rate over the last three years was 27%. On the other hand, cargo volume for the U.S. Army was very small, only 242 metric tons.

All bulk cargo was for local consumption, the Panama Cement Factory in particular.

As for container cargo, 63% of the total container cargo was for the Free Zone followed by 35% for local.

Figure 6-2-1 shows the past records of imported cargo by destinations.

2) Export

Major origin of exported cargo is the Free Zone and its share is more than half of the total exports; 69% from the Free Zone, followed by 20% from local areas and 11% of transshipment in 1991. Few cargo from the U.S. Army is exported. Major destinations are Central and South American countries, North America, Caribbean countries, European countries, etc. In particular, Central and South American countries received the majority (according to the statistics of the Free Zone Administration, 75% of the total exported cargo from the Free Zone went to Central and South America).

The cargo volume exported from the Free Zone shows a tendency to increase and a rapid annual increase rate of 33% has been recorded in the last three years. Exports from local origins are also increasing and the average growth rate per annum was 13% in these years.

As for container cargo, 75% of exported cargo was concentrated in the Free Zone, and 20% from local areas in 1991. Exported cargo volume is controlled by the Free Zone, and imports as well.

Figure 6-2-2 shows the past records of exported cargo by origins.

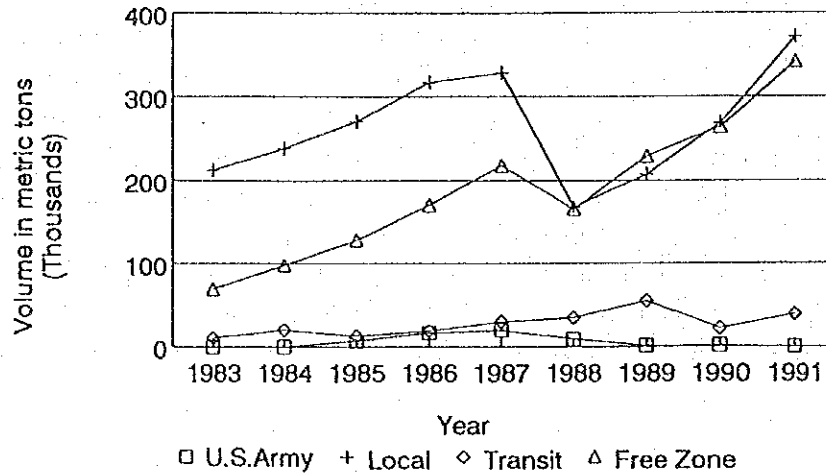


Figure 6-2-1 Past Records of Imported Cargo by Destinations: Port of Cristobal
(Source: Autoridad Portuaria Nacional)

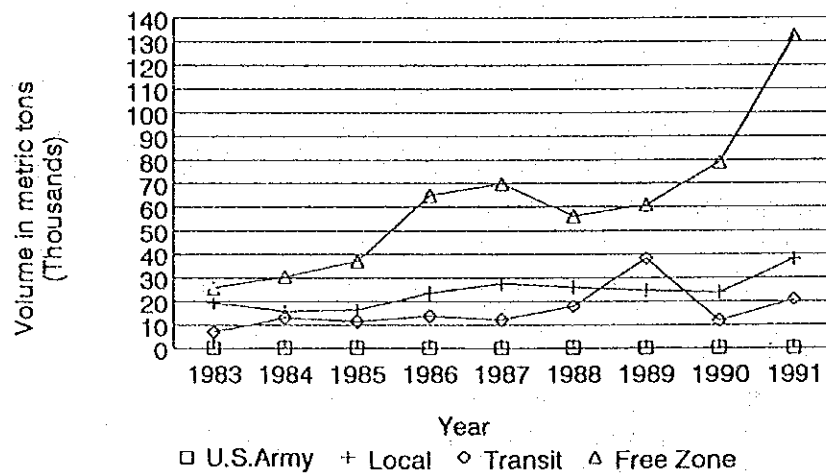


Figure 6-2-2 Past Records of Exported Cargo by Origins: Port of Cristobal
(Source: Autoridad Portuaria Nacional)

(2) Port of Coco Solo Norte

1) Import (or Unloading)

Major origins of imported cargo are the Far East, South East Asian countries, the United States and the developed western countries. Sea-Land Service Inc. began weekly shipping services from Miami in October 1991. 55% of the imported cargo were for the U.S. Army, 31% for the Free Zone and 14% for local areas. The cargo for the U.S. Army has been handled since 1990. The cargo for local areas has fluctuated and as of August 1992, it was slightly increasing. The cargo for the Free Zone largely decreased in 1989 and 1990, however in 1991, the largest cargo volume was recorded since 1982. The cargo volume in 1992 will increase according to the trade expansion of the Free Zone.

Regarding container cargo, 66% of the total container cargo was for the U.S. Army followed by 34% for the Free Zone.

Figure 6-2-3 shows the past records of imported cargo by destinations.

2) Export (or Loading)

Exported cargo from the Free Zone had a share of 76%, 12% from local areas and 11% from the U.S. Army. Major destinations are Central and South American countries, North America (Miami), Caribbean countries, etc., in particular, Netherlands Antilles (Aruba Island). All bulk cargo is for local consumption, in particular, the supply of diesel oil for a power plant in Bocas del Toro.

Exported cargo volume from the Free Zone exceeded imports to the Zone, different from the inclination of the port of Cristobal. The cargo volume handled from the Free Zone has steadily been increasing at an annual growth rate of approx. 20%.

As for container cargo, 51% of the total container cargo was from the Free Zone, and 48% from local origins.

Figure 6-2-4 shows the past records of exported cargo by origins.

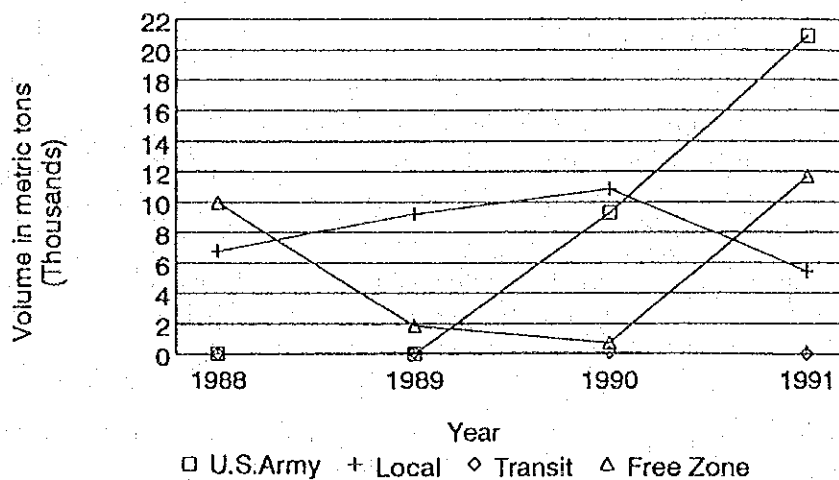


Figure 6-2-3 Past Records of Imported Cargo by Destinations: Port of Coco Solo Norte
(Source: Autoridad Portuaria Nacional)

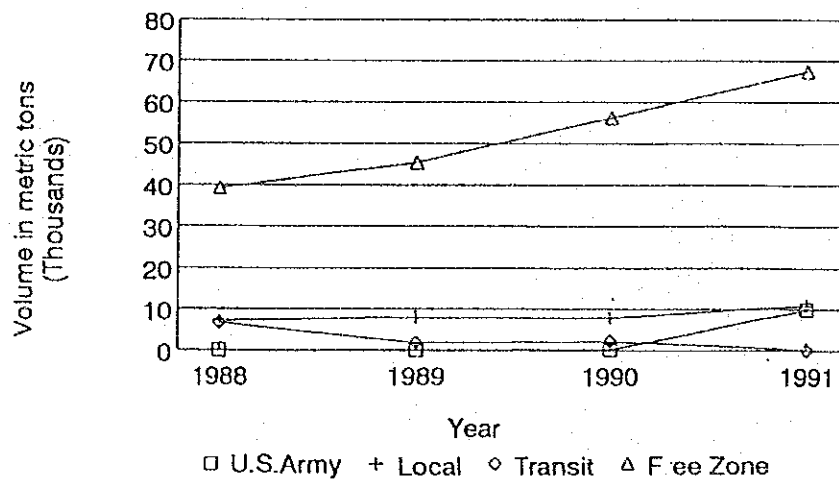


Figure 6-2-4 Past Records of Exported Cargo by Origins: Port of Coco Solo Norte
(Source: Autoridad Portuaria Nacional)

(3) Port of Bahia Las Minas (carga seca)

1) Import

Major origin of imported cargo is North America (Miami, etc.). 57% of the total cargo was for local areas, followed by 24% for the U.S. Army, 11% for the Free Zone and 8% for transshipment. The cargo for local consumption sharply increased in 1987 and decreased in 1988. Since then it has been stable. The cargo volume for the Free Zone stagnated in 1989 and 1990 and increased again in 1991. The cargo for the U.S. Army shows a tendency to decrease.

Container cargo for local areas has been increasing recently.

Figure 6-2-5 shows the past records of imported cargo by destinations.

2) Export

Origins of exported cargo were local areas with a share of 53%, 26% from the Free Zone, 15% from transshipment and 6% from the U.S. Army in 1991. Major destinations are Central and South American countries, North America, Caribbean countries, etc.

The cargo from the Free Zone and local areas have been increasing in these years. Average annual growth rates of the last six years are 10% (local origins) and 19% (Free Zone).

The volume of container cargo from local origins has recently been stagnant.

Figure 6-2-6 shows the past records of exported cargo by origins.

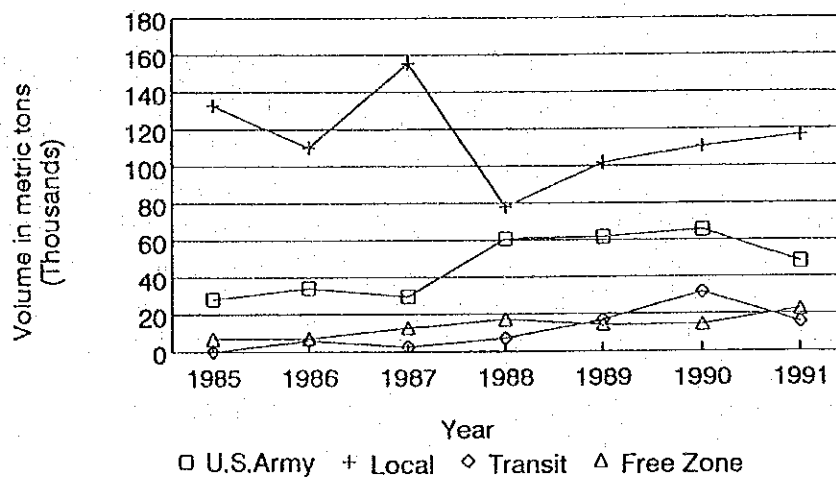


Figure 6-2-5 Past Records of Imported Cargo by Destinations: Port of Bahia Las Minas
(Source: Autoridad Portuaria Nacional)

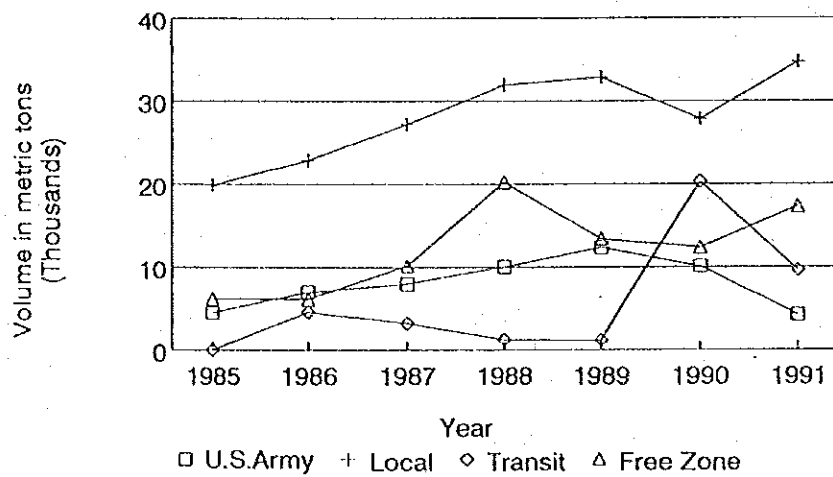


Figure 6-2-6 Past Records of Exported Cargo by Origins: Port of Bahia Las Minas
(Source: Autoridad Portuaria Nacional)

(4) Port of Balboa

1) Import

Major origins of imported cargo are the Far East, South East Asian countries and the developed western countries. As for destinations, most cargo was bound for local areas with a share of 94% and this tendency has been intensified recently. The Colon Free Zone and transshipment followed at 3% of the share in 1991. The cargo volume for local areas and the U.S. Army has been decreasing.

Most bulk cargo is for local consumption.

For container cargo, the cargo volume for local areas had the biggest share in 1991 but is decreasing while the container cargo for the Free Zone has been increasing.

Figure 6-2-7 shows the past records of imported cargo by destinations.

2) Export

Origins of exported cargo were local areas with a share of 47%, 43% from the Free Zone, and 9% from transshipment in 1991. The cargo from the U.S. Army has been decreasing in these years and the volume in 1991 was only 250 metric tons. Major destinations are Central and South American countries, North America, etc. The cargo from local areas has been decreasing in volume and share in these years. Reversely, the cargo from the Free Zone had been stagnated but has been increasing recently.

Regarding container cargo, 53% of cargo was from local areas, followed by 40% from the Free Zone and 5% from transshipment in 1991.

Figure 6-2-8 shows the past records of exported cargo by origins.

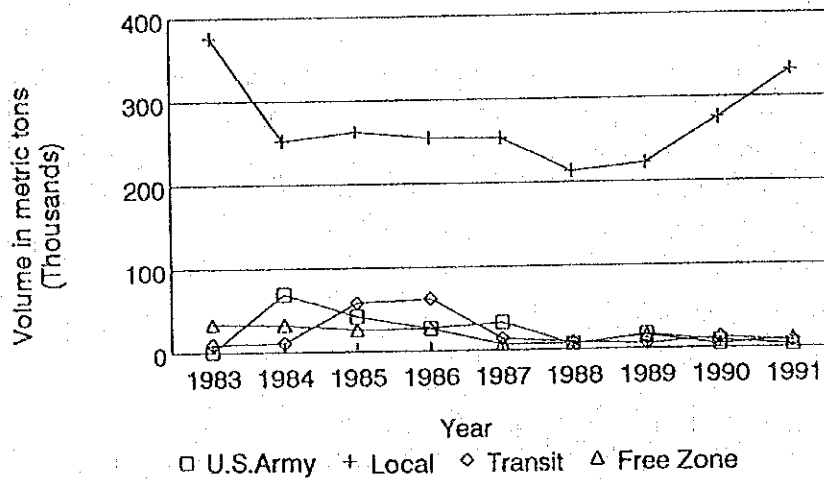


Figure 6-2-7 Past Records of Imported Cargo by
Destinations: Port of Balboa
(Source: Autoridad Portuaria Nacional)

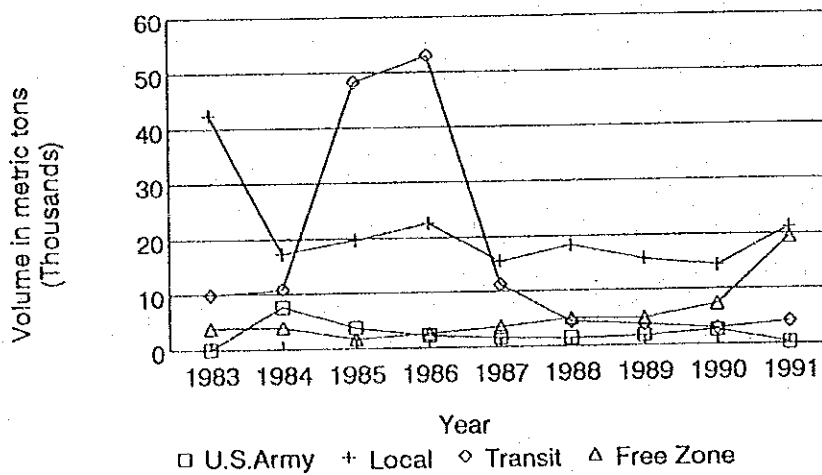


Figure 6-2-8 Past Records of Exported Cargo by
Origins: Port of Balboa
(Source: Autoridad Portuaria Nacional)

6.2.2 Cargo Movement in Port Area

In this section, the areas of the ports of Cristobal, Coco Solo Norte and Bahia Las Minas are to be defined as "the Port Area".

(1) Cargo Movement in the Port of Cristobal

With regard to cargo movement in terms of distribution patterns of cargo handling on each pier at the port of Cristobal, the following is found according to the records of four months (March, June, September and December) in 1990;

- a) unloading operation of containers was concentrated on Pier No.9,
- b) loading operation of containers was also concentrated on Pier No.9 although the operation was distributed to the other piers,
- c) unloading and loading operations of general cargo were concentrated on Pier No.6.

Distributions on cargo handling by piers are shown in Figure 6-2-9 (for unloading) and Figure 6-2-10 (for loading). Since this is not the complete data of the whole year, the above facts may not necessarily represent general characteristics.

Modification work on Pier No.7, to widen its aprons, was carried out in 1992. This will result in an increase in the cargo volume handled (container cargo in particular) on Pier No.7, since Piers No.9 and 10 are already congested.

(2) Cargo Movement in Port Area

There are no statistics available on cargo movement among the ports of Cristobal, Coco Solo Norte and Bahia Las Minas.

The cargo for/from local destinations/origins is considered to be moved directly from/to each port. Bulk cargo is also moved between each port and its origin/destination directly according to the balance of cargo volume unloaded and loaded. As for transshipment cargo, while most is handled at the ports of Cristobal and Bahia Las Minas, there is small scale cargo movement between the ports of Cristobal and Balboa by the Panama Railroad (98 metric tons from Balboa, 2 metric tons from Cristobal in 1991).

Since the cargo flow for/from the Colon Free Zone, which has a great share of total cargo handled in the ports, passes through the Free Zone, there is no direct movement among the ports. Most imported cargo for the Free Zone is handled at the ports of Cristobal and Bahia Las Minas, and re-exported cargo from the Free Zone is handled at the ports of Cristobal and Coco Solo Norte. With only regard to container cargo through the Free Zone, most is handled at the port of Cristobal due to insufficient container handling facilities in the ports of Coco Solo Norte and Bahia Las Minas.

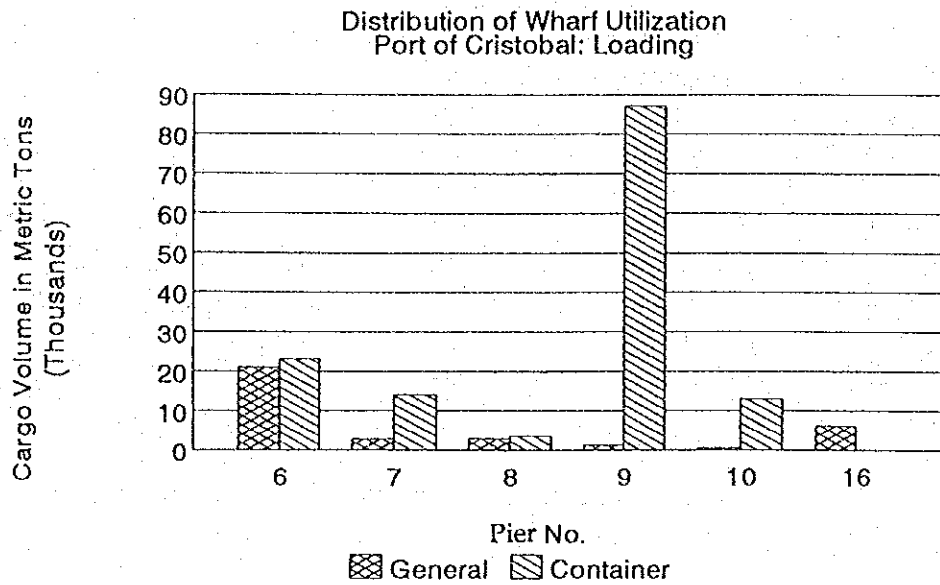


Figure 6-2-9 Distributions of Cargo Handling by Piers
Unloading: Port of Cristobal (Mar, Jun, Sept, Dec. 1990)
(Source: Autoridad Portuaria Nacional)

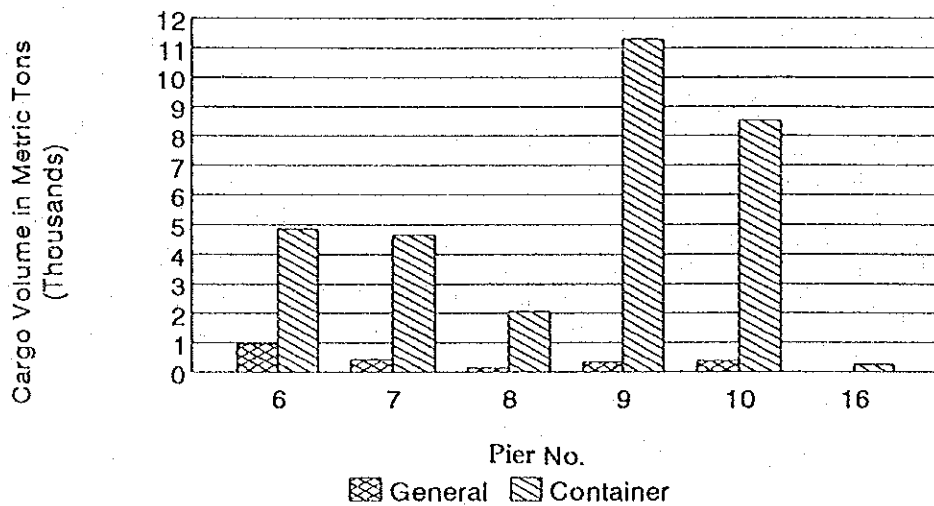


Figure 6-2-10 Distributions of Cargo Handling by Piers
Loading: Port of Cristobal (Mar, Jun, Sept, Dec. 1990)
(Source: Autoridad Portuaria Nacional)

6.3 Current Situation of Passenger Movement

6.3.1 Passenger Ship Services

There is no regular passenger ship service calling at Panamanian ports at present. According to the information from IPAT (Instituto Panameno de Turismo), no passenger have stayed overnight in Panama recently even if a ship calls. Most passenger ships call at the ports of Cristobal and Balboa for bunkering services.

The numbers of passenger ship calls and the average gross tonnage (G.T.) of ships at the ports of Cristobal and Balboa in 1990 and 1991 are shown below.

	<u>1990</u>	<u>1991</u>
Port of Cristobal :	11 9,463 G.T.	13 6,818 G.T.
Port of Balboa :	28 14,396 G.T.	26 11,156 G.T.

6.3.2 Passenger Movement

There is no statistics available regarding the characteristics of passengers by ship such as nationality, sex, ages, etc.

6.4 Hinterlands and Inland Transportation

6.4.1 Hinterlands of Port

(1) Ports of Cristobal, Coco Solo Norte and Bahia Las Minas

These three ports are located closely to one another in the vicinity of the city of Colon and the characteristics of cargo handled in these ports are quite similar. Therefore, the hinterlands of these ports could be regarded as the same.

There are two large hinterlands for these ports; Panamanian local areas and the Colon Free Zone according to the origins and destinations of the cargo handled. As for local areas, although no information about origins and destinations by provinces, etc. is available, it is obvious that the largest hinterland is the Panama Province including the city of Panama where approx. half of the population is concentrated. The other is the Free Zone; the transit trade center as described in Chapter 4 of Part I, has a great potential to generate foreign trade. In this sense, final destinations of exported cargo from the Free Zone are also considered as hinterlands of the ports.

(2) Port of Balboa

According to the origins and destinations of the cargo handled in this port, the largest hinterland consists of Panamanian local areas, the same as the above-mentioned ports. Since the port of Balboa is located near the city of Panama, the Capital, the activities of this port are essential for the nation. For this port, as in the past, the Free Zone is a small market for handled cargo in comparison with the above three ports.

6.4.2 Inland Transportation

(1) Railway Transportation

The Panama Railroad has a function to transport cargo and passengers between the cities of Panama and Colon along the Canal.

No passenger has been transported in these years and only cargo handled in ports is transported between the ports of Cristobal and Balboa by railway.

According to past records since 1982, the cargo volume transported by railway had been decreasing until 1988, decreasing sharply in 1983 and 1988. It has fluctuated in these years and the cargo transported in 1991 was 28,146 tons, 40% of the volume in 1982. This is a small transportation volume compared to that of 1982 and will continue in the future unless all facilities are maintained properly.

Most of the cargo (98.6% in 1991) was transported from the port of Cristobal and almost all cargo was for local consumption.

The cargo from the port of Balboa consisted of commodities for local consumption, for the Free Zone and transshipment. As for cargo for the Free Zone, it had been transported with a large share until 1986. It suddenly decreased in 1987, and since then quite a small volume has been transported to the Free Zone (only 35 metric tons in 1991).

Figure 6-4-1 shows the cargo movement by railway.

(2) Road Transportation

There is no detailed information available on cargo volume transported by road, in particular, by routes.

Regarding transportation between Colon and Panama, there is only one main route, namely, Panama Isthmus Highway. It is not too much to say that most cargo is transported to and from the ports of Cristobal, Coco Solo Norte, Bahia Las Minas and Balboa through this highway.

Considering the roads network in Panama, almost all main roads run radially from the city of Panama. Therefore, the cargo handled in the ports is once transported to the city of Panama through Panama Isthmus Highway and then to the other provinces and cities through other roads network.

According to the information from the Colon Free Zone, the cargo volume (for both imports and exports) transported by land was approx. 98,700 metric tons (18% of the total trade of the Zone) in 1989, including cargo imported and re-exported through the Tocumen International Airport. The majority of cargo is considered to be transported through the Highway.

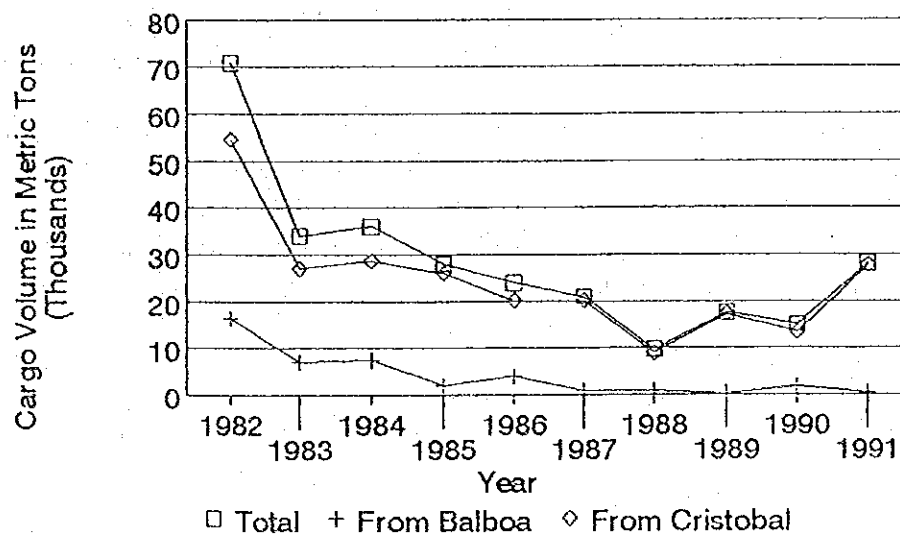


Figure 6-4-1 Cargo Movement by Railway
(Source: Panama Railroad)

6.5 Vessel at the Ports

In this section, vessel activity in the four ports is described based on the existing statistical data.

6.5.1 Past Record of the Number of Vessels

The past record of the number of vessels for each port during the period from 1981 to 1992 is shown in Figure 6-5-1. (The figures for 1992 are estimated from the data from January to August)

The number of vessels calling at the port of Cristobal and Balboa has decreased over the long term but has remained at a constant level in recent years. The number of vessels at Cristobal sharply decreased in 1988 and after that there is no significant increase in the number of vessels in spite of remarkable increase in the cargo volume.

The number of vessels at Bahia Las Minas has kept a constant level in recent years after an increase during the period from 1986 to 1988 which coincided with the increasing trend of containerized cargoes. At Coco Solo, the number of vessels increased sharply in 1988 when container cargo handling began. It remained almost at the same level after that, but the number in 1992 may exceed the number of Cristobal or Balboa since Sea Land Co. began containerized cargo handling at this port.

The total number of vessels calling at Cristobal, Coco Solo and Bahia Las Minas shows an approximate 2,500 level with rather remarkable annual fluctuations.

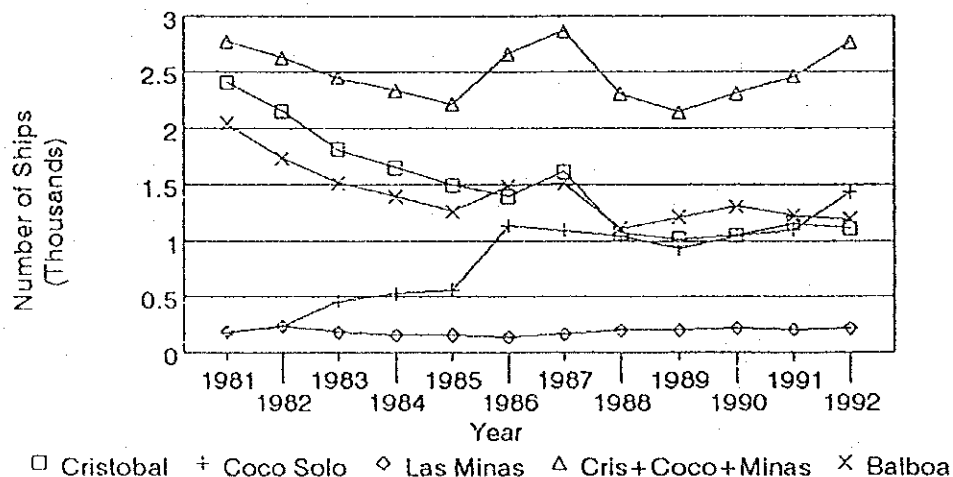


Figure 6-5-1 Number of Ships Call at Each Port

(Source: APN)

6.5.2 Characteristics of Ship Type and Ship Size

Types and sizes of ships calling at the ports of Cristobal are illustrated below based on statistical data mainly from 1990.

(1) Cristobal

Reflecting the high percentage of containerized cargo, Ro-Ro and container ships are in the increasing trend with a large share of approximately 30%. Many of the large ships are in this category and even a large Ro-Ro vessel over 50,000 DWT enters this port.

(2) Coco Solo Norte

Almost all vessels are under 1,000 DWT size, and half of them are under 200 DWT.

(3) Bahia Las Minas

More than half of vessels are Ro-Ro type. Approximately 60 vessels exceed 10,000 DWT in every year. In recent years, small size Ro-Ro vessels less than 5,000 DWT are increasing.

(4) Balboa

Tuna fishing boats make up a large part of the vessels. The number of container ships and Ro-Ro ships is rather small with less than a 10% share.

The past record of ship size distribution of each port is shown for each port in Figure 6-5-2. It is remarkable that the overall ship size is increasing in Cristobal and Coco Solo Norte. On the contrary the ship mix in Balboa has been stable or slightly decreasing in size in recent years after a sharp decrease in the share of large ships during the years 1984 - 1986.

In the case of Bahia Las Minas, the ratio of large ships has been gradually decreasing recently following a continuous increase up to 1985.

6.5.3 Use of Berth

The berth occupancy ratio is a useful index to know the extent of the utilization of berths or ports. The ratio of each major port has been reported by APN annually. (During the year 1984-1989, the ratio was reported only for February and June.) This ratio is calculated by dividing the actual berthing time of ships during a certain period by the total available berthing capacity which is the product of total time by the number of berths mainly used for cargo handling. It excludes the berthing time of the ships calling at Pier No.16 in Cristobal or Pier No.6 in Balboa for the purpose of bunkering.

The time trend of the berth occupancy ratio for each port is shown in Figure 6-5-3. (For the port of Bahia Las Minas, the ratio was not reported in 1990.)

The occupancy ratio for Coco Solo is surprisingly high because many small ships swarm at the same pier. They are often moored parallel to other ships on berth when berthing space is not available. On Pier No.1, in particular, they are sometimes moored even in threefold.

The ratio has been decreasing since 1986 in spite of the increase in calling ships. There seems to be two reasons. One is that Pier No.2 and 3 came into use for cargo handling only after 1989. The other is that the berthing time of each ship has greatly decreased (but it still far exceeds 100 hours in average) due to the improvement of cargo handling efficiency.

The occupancy ratio for Cristobal has also been decreasing continuously since 1985. This does not necessarily coincide with the trend of the number of ships. The reason is supposed to be the convergence of berth usage at some specific piers. Container ships calling at Pier No.9 do not stay a long time on berth.

No significant tendency in the past record can be found in the case of Balboa, however, it has a common tendency with the time trend of the number of ships calling at the port.

The past record of the average waiting time of each port reported by APN is shown in Table 6-5-1. No available data is reported for the port of Coco Solo Norte except in 1986. It has a similar trend with the berth occupancy ratio in general, however, the overall level of the waiting time seems too short considering the high level of the berth occupancy ratio. It seems necessary to investigate the reason in further detail.

The past record of the number of vessels at each berth in the port of Cristobal is shown in Figure 6-5-4.

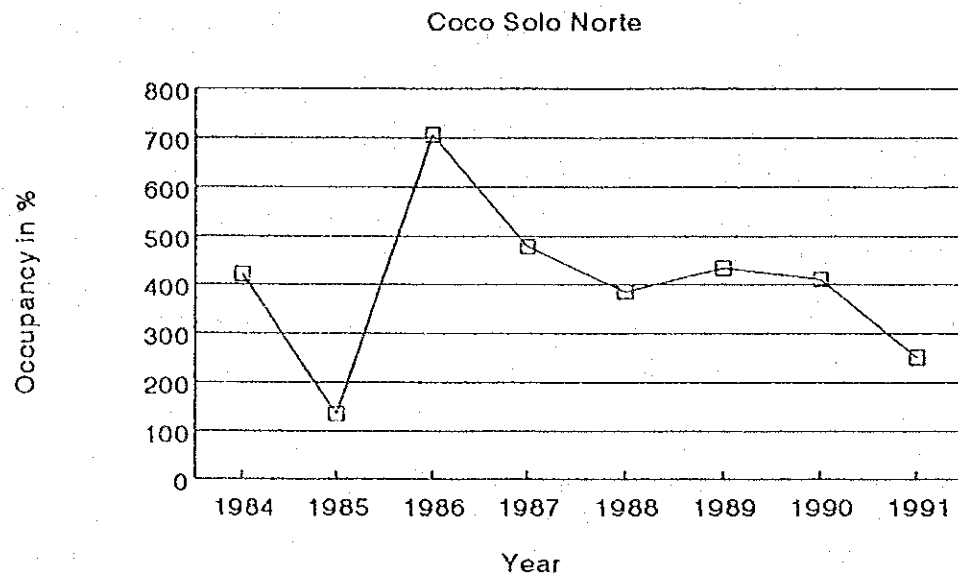
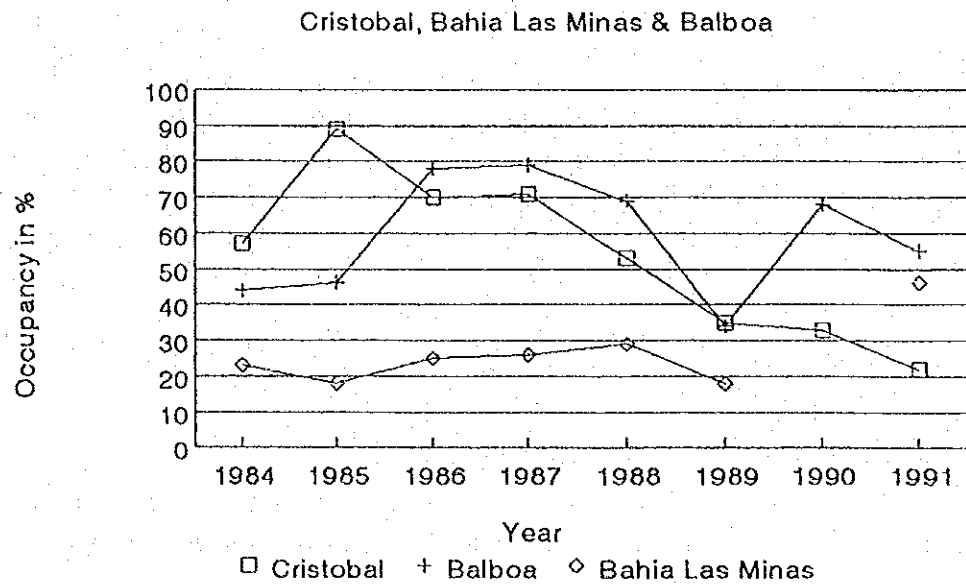


Figure 6-5-3 Berth Occupancy Ratio
(Source: APN)

Table 6-5-1 Past Record of Average Waiting Time (Hours)

	1984	1985	1986	1987	1988	1989	1990	1991
Cristobal	3	4	5	4	4	7	4	6
Coco Solo			24					
Bahia Las Minas	4	3	5	4	5	7		10
Balboa	4	3	12	12	11	10	2	17

Source: APN

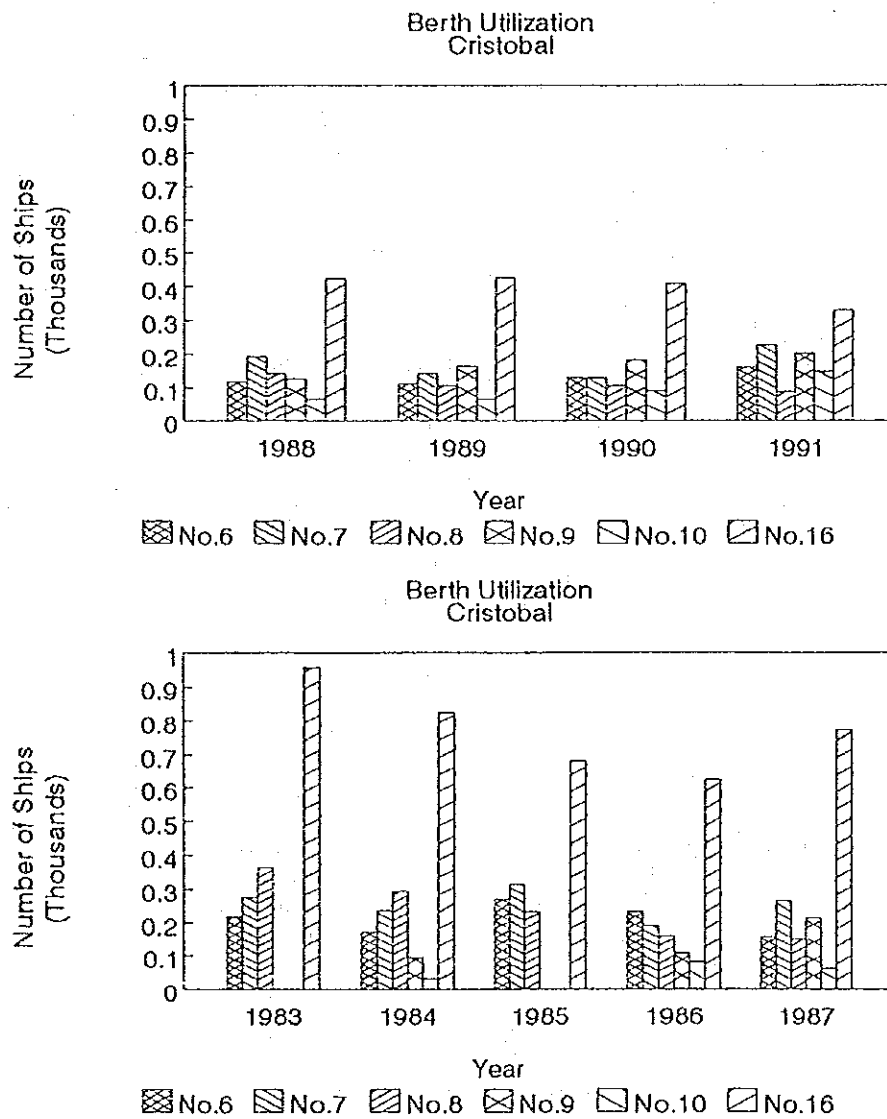


Figure 6-5-4 Number of Vessels at Each Pier (Cristobal)

(Source: APN)

It is significant that the utilization of Piers No.6, 7, 8 and 16 has lowered. On the other hand, the number of vessels berthed in Piers No.9 and 10 has been increasing its share in the port since 1986 when the actual container terminal operation began.

There may be two reasons for this trend. One is that the type of cargo has been shifted from general cargo to containerized cargo. The other is that the advantage of the bunkering facility of this port is decreasing due to the high price of fuels compared to that of other competitive ports such as Miami.

Average waiting time and berth occupancy ratio for each berth may differ according to the function of the berth and the number of ships calling at the respective berth. A further investigation on the berth usage will be necessary.

CHAPTER 7 EXISTING PORT FACILITIES OF THE PORT OF CRISTOBAL

This chapter deals with the existing port facilities in the port of Cristobal. Major port facilities were built in 1910's, almost the same period as the Canal opening.

The port of Cristobal is a typical conventional port because of its physical arrangement. Recently there is a question whether to modify the existing facilities or to build a new container terminal. The purpose of this study is to answer to this question.

7.1 General Information

The port of Cristobal has various advantages as follows:

- a. Well protected by the existing outer breakwater against waves.
- b. Wide and deep basin for vessel maneuvering and anchorage. Most of this basin is currently managed by PCC, however there is a strong possibility that the port area be expanded after 2000.
- c. Business activities in Colon are accelerated by foreign investors.
- d. Well prepared access to the Pacific coast, however some rehabilitation should be given.

Every year more than 1,000 vessels berth at the port. The port has approx. 4,000 meter long berth. The maximum water depth is 12 meters (40 feet). The main berths are divided into three finger piers, namely piers No. 6, No. 7 and No. 8 and two marginal wharves, namely piers No. 9 and No. 10. Pier No. 16 with U-shaped structure is also providing port services.

Transit sheds are provided on the finger piers. The most recent development is a 7.5 ha container yard behind the Pier No. 9 with two gantry cranes which are capable of handling 3,000 TEU daily. A CFS of 6,500 m² is also provided.

Rehabilitation works including renewal of fenders and widening of apron were given accordingly.

7.1.1 Purpose of Study and Its Scope

The final objective of this study is to prepare both a Long Term Plan for the year 2010 and a Short Term Development Plan for the year 2000.

The first question will be:

"How much more traffics can the existing facilities handle when necessary rehabilitation and up-grading were given to them?"

An answer to this question will show the timing of a new terminal development and its required capacity.

The second question will be:

"What functions should there be allocated to the existing facilities and a new terminal?".

In order to answer exactly to these questions, an evaluation of the capacities of the existing facilities is a must. The capacities can be estimated by the following basic figures including:

- a. Physical space
- b. Structural durability and its life
- c. Access to the hinterland

Thus, this chapter aims to evaluate the status of the existing facilities of the port of Cristobal. To carry out the evaluation, both current utilization and structural conditions of the facilities were investigated.

Since most of the structures are rather aged, visual inspection over the entire structures was carried out.

Investigation covers the areas as follows:

- a. Finger Piers No. 6, No. 7 and No. 8
- b. Mole
- c. Marginal Wharves Pier No. 9 and No. 10 and their back-up yard
- d. U-shaped Pier No.16
- e. Main access to the national road

7.1.2 Port Limit

(1) Jurisdictions

The "Treaty Map", maps of the land and water areas for the operation and defense of the Panama Canal, shows both jurisdiction by the United States of America and the Republic of Panama.

Figure 7-1-1 shows the port of Cristobal and its vicinities.

Figure 7-1-2 "Attachment No.2 to Treaty Map" gives more details.

(2) Port Limit and Dredging Limit

a. Port Limit in Treaty

As shown in Figure 7-1-3, "Port Limit" covers a series of finger piers No. 6, No. 7 and No. 8, mole, marginal wharves No. 9 and No. 10 with their back-up area, and a narrow access to the Mount Hope Tank Farm.

In addition, Pier No. 16 and its vicinity are under the jurisdiction of APN, Panama.