(3) Typical Layers

There are three characteristics by which the layers can be stated.

Layer One: Filled Materials

This surface layer consists of mainly filled materials such as sand with coral fragment and boulders. Soil characteristics of this layer changes from place to place, however typical features can be shown as below.

- Average SPT N = 10 - 20
- Density 1.8 - 1.9 t/m^3
- Water Content 20% - 50%

Layer Two (Ac): Clay and Sand

This layer consists of a soft alluvial sedimentary layer such as silt, loose sand, clay, sand with coral fragment and coral itself.

- Average SPT N = 0 - 10
- Density 1.4 - 1.7 t/m^3
- Water Content 50% - 100%

Layer Three (R): Sandy Rock / Gatun Formation

This layer consists of sandy mud stone which belongs to Gatun Formation (Sandy Rock) and distributes widely around the project site. This layer is considered to be the bedrock and also the bearing layer of the site.

- Average SPT N = 30 - 50 over
- Density 1.8 - 2.1 t/m^3
- Water Content 20% - 40%

Figures 2-6-3, 2-6-4, 2-6-5, 2-6-6 and 2-6-7 show the typical layer composition based on the boring results.
Table 2-6-2 shows the summary of boring and laboratory test.

Table 2-6-2 Summary of Boring and Laboratory Test

**TECNILAB, S. A.**

SOILS AND MATERIALS LABORATORY

LABORATORY TEST RESULTS SUMMARY

Project: REPAIR OF THE CRISTOBAL PORT. Work No. 4-130 Date: DECEMBER 11, 1992 Sheet No. 1

| LAB No | BORING | Distance from ℄ | Sample No | DEPTH (m) | Natural Moisture % | MECHANICAL ANALYSIS PERCENT PASSING 3" | 1½" | ¾" | #4 | #10 | #40 | #200 | ATTERBERG LIMITS LL | PL | PI | SPECIFIC GRAVITY | PROCTOR Maximum Density | Optimum Moisture (%) | C.B.R. DETERMINATION Compaction Density | Compaction Time Moisture (%) | % of Compaction | C.B.R. | CLASSIFICATION (UNIFIED) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | BH-1 | - | 2 | 13.0-13.45 | 96.0 | - | - | - | HYDROMETER | | | | 45.9 | 18.3 | 26.7 | 2.74 | - | - | - | - | - | - | CL |
| | BH-1 | - | 8 | 22.0-22.45 | 37.2 | - | - | - | 100 | - | - | 31.0 | 28.3 | 13.2 | 15.1 | 2.66 | - | - | - | - | - | - | SC |
| | BH-2 | - | 3 | 14.25-14.70 | 36.7 | - | - | - | HYDROMETER | | | | 47.5 | 19.4 | 28.1 | 2.33 | - | - | - | - | - | - | CL |
| | BH-2 | - | 7 | 20.25-20.70 | 25.9 | - | - | - | 97.0 | - | - | 7.0 | - | N.P | | 2.60 | - | - | - | - | - | - | SM |
| | BH-3 | - | 11 | 21.35-21.80 | 86.0 | - | - | - | 100 | - | - | 44.3 | 41.7 | 19.3 | 22.4 | 2.50 | - | - | - | - | - | - | SC |
| | BH-4 | - | 3 | 15.15-15.60 | 46.0 | | HYDROMETER | | | | | | 35.8 | 17.4 | 18.4 | 2.25 | - | - | - | - | - | - | CL |
| | BH-4 | - | 5 | 18.15-18.60 | 62.8 | - | - | - | 100 | - | - | 64.0 | 64.7 | 29.7 | 35.0 | 2.68 | - | - | - | - | - | - | CH |
| | BH-5 | - | 2 | 6.20-6.65 | 92.7 | | HYDROMETER | | | | | | 43.2 | 23.2 | 20.0 | 2.58 | - | - | - | - | - | - | CL |
| | BH-5 | - | 9 | 16.50-16.95 | 46.4 | - | - | - | 100 | - | - | 68.8 | 71.8 | 31.5 | 40.3 | 2.31 | - | - | - | - | - | - | CH |
| | BHL-2/3 | - | 5 | 6.0-6.45 | 51.1 | - | - | - | 100 | - | - | 56.7 | 51.2 | 25.6 | 25.6 | 2.76 | - | - | - | - | - | - | CH |
| | BHL-2/3 | - | 11 | 15.0-15.45 | 71.6 | - | - | - | 100 | - | - | 71.8 | 79.8 | 33.2 | 46.6 | 2.81 | - | - | - | - | - | - | CH |
| | BHL-1 | - | 6 | 7.50-7.95 | 45.4 | - | HYDROMETER | | | | | | 42.0 | 24.2 | 17.8 | 2.79 | - | - | - | - | - | - | CL |
| | BHL-1 | - | 13 | 18.00-18.45 | 58.6 | - | HYDROMETER | | | | | | 51.0 | 22.4 | 28.6 | 2.71 | - | - | - | - | - | - | CH |

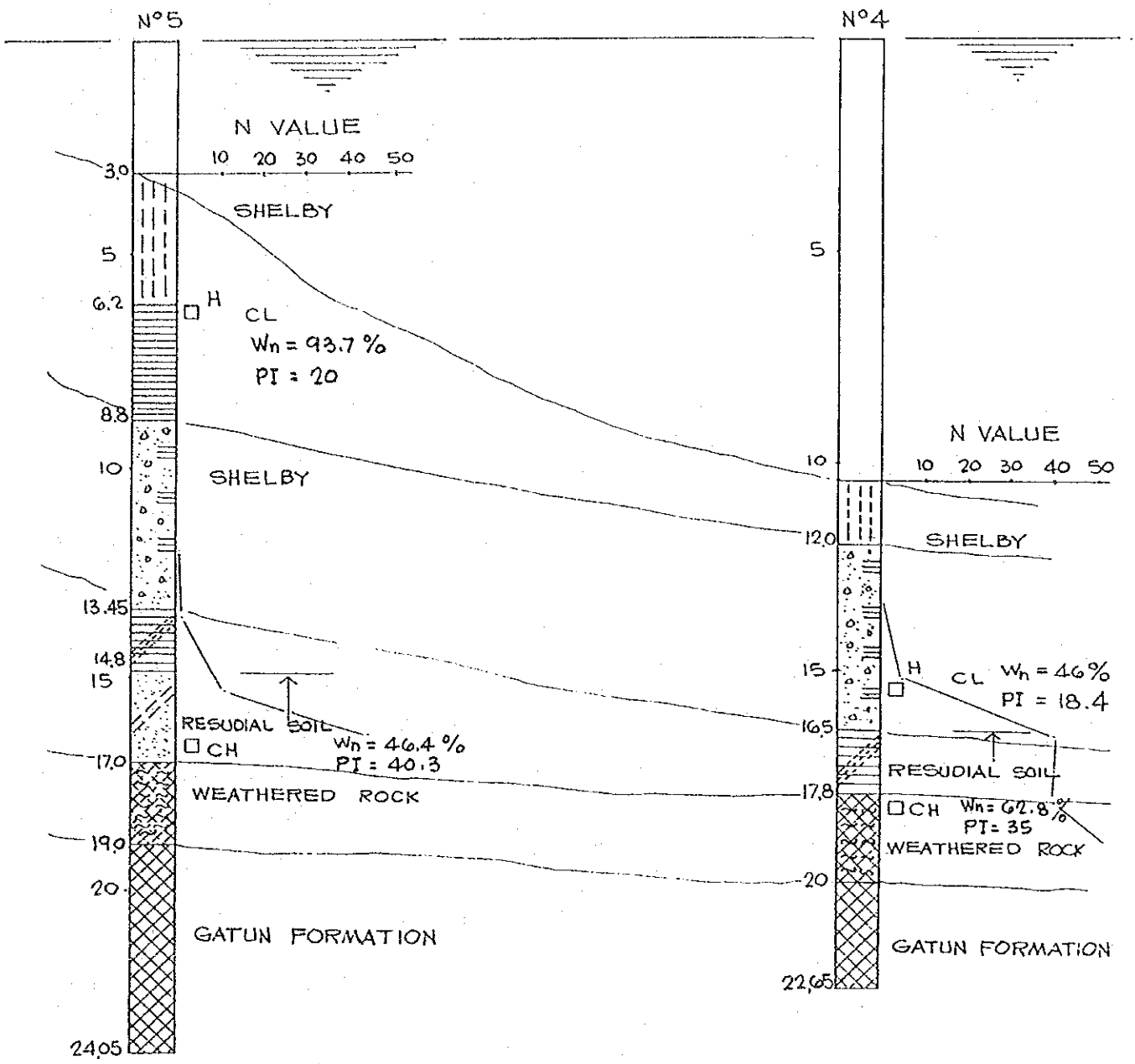



Figure 2-6-3 Soil Profile at Site-T
Longitudinal Section (BH No.4 to BH No.5)

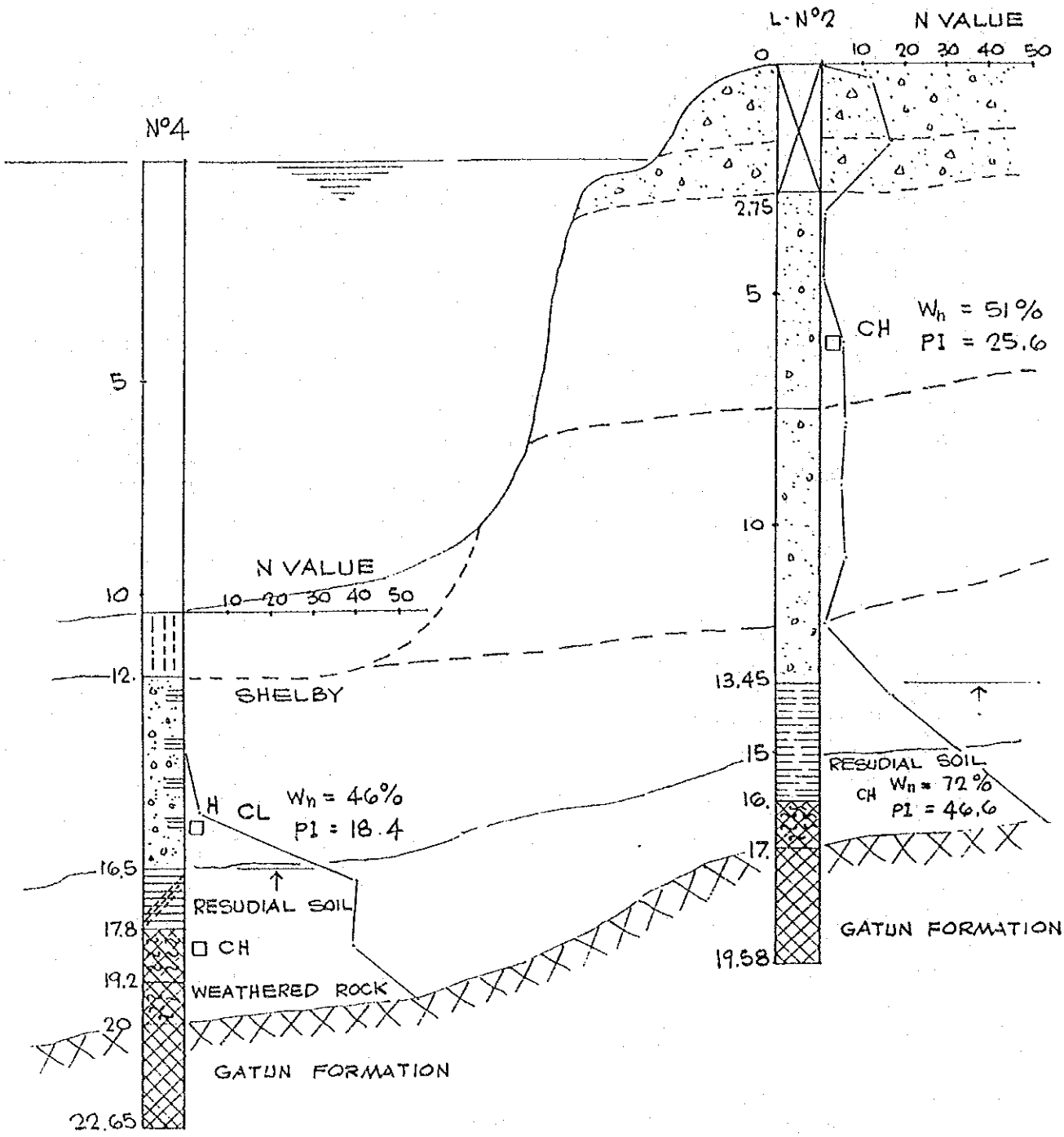



Figure 2-6-4 Soil Profile at Site-T
Cross Section (BH No.4 to BH No.L-2)

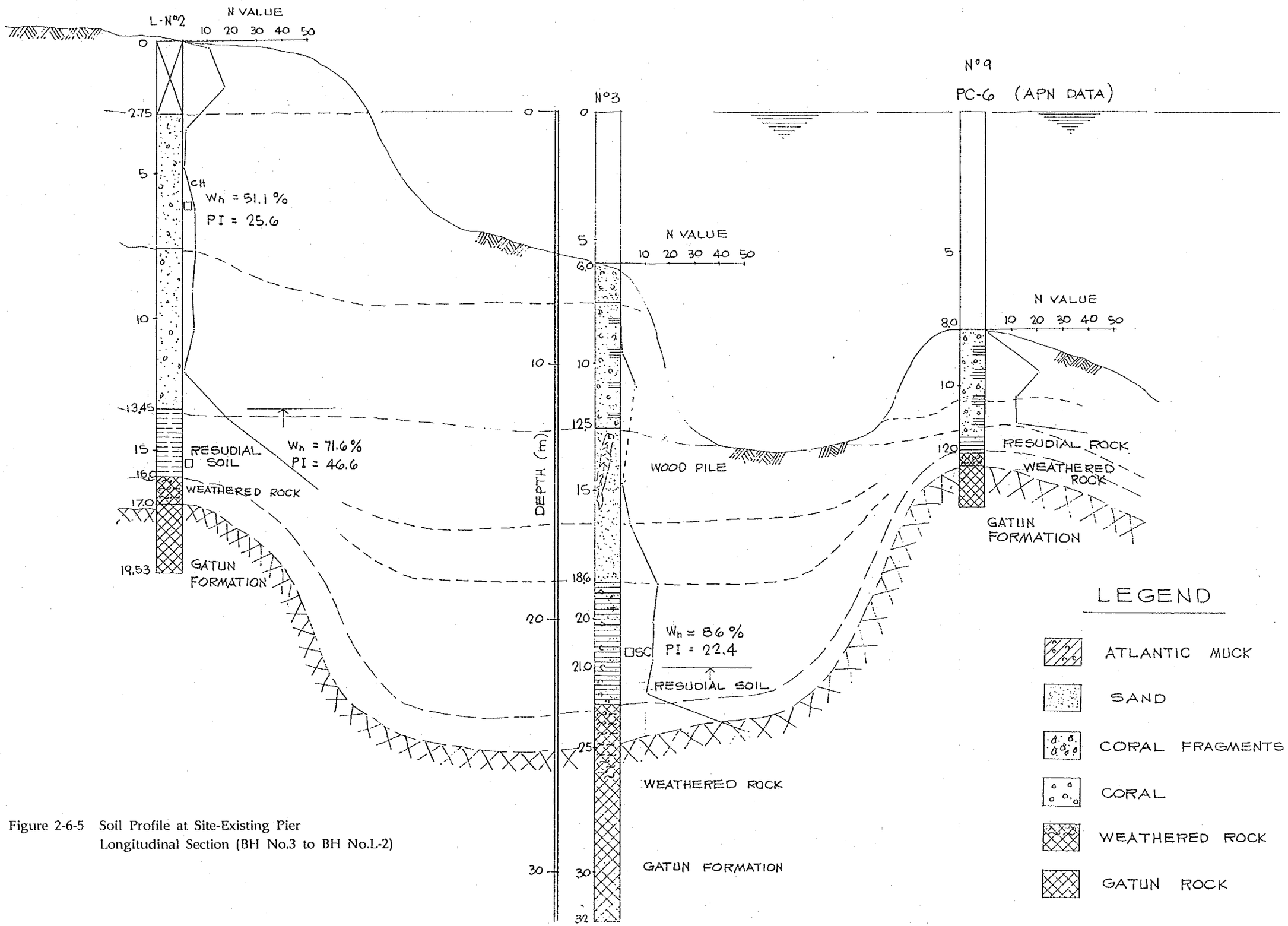



Figure 2-6-5 Soil Profile at Site-Existing Pier
Longitudinal Section (BH No.3 to BH No.L-2)

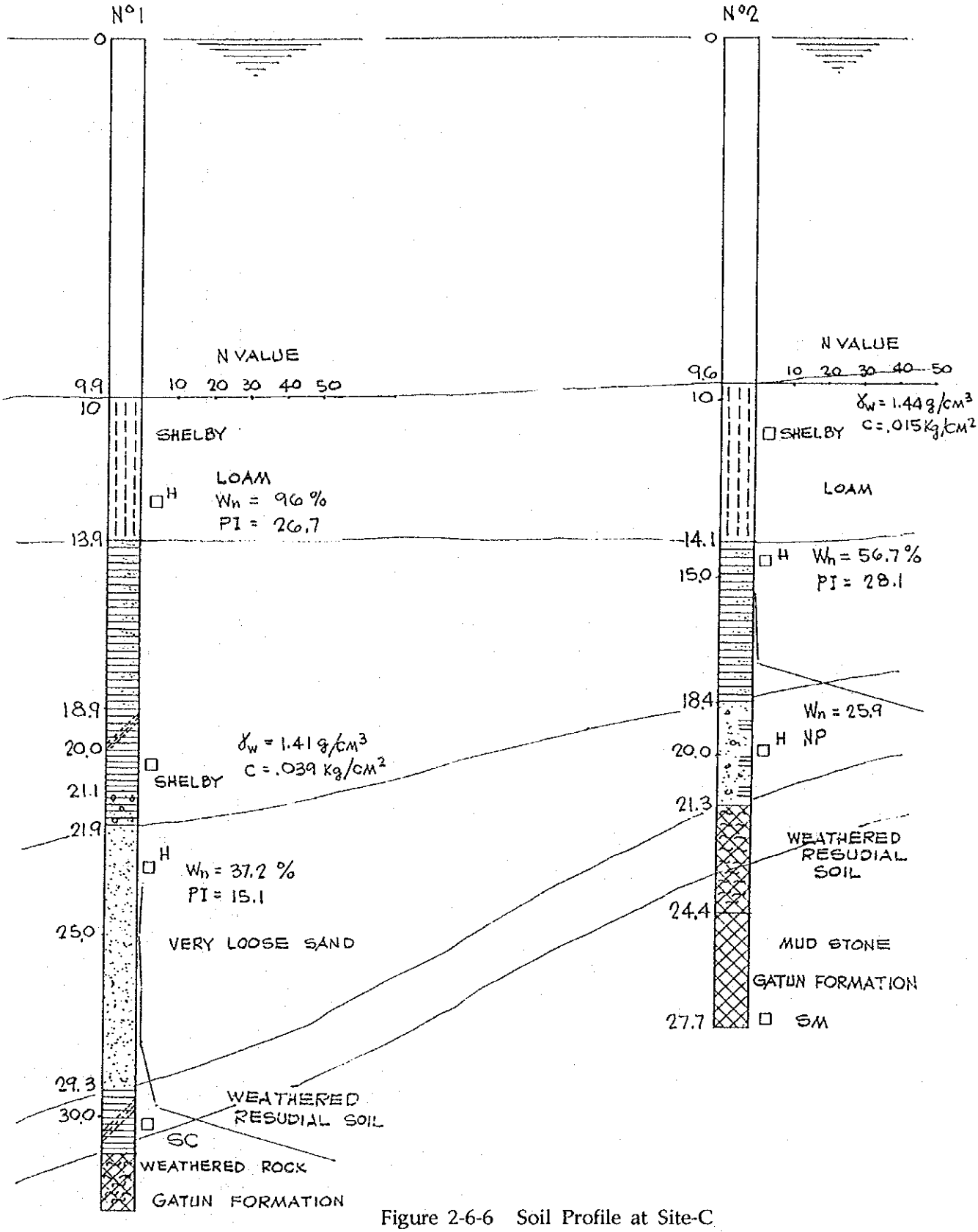



Figure 2-6-6 Soil Profile at Site-C
Longitudinal Section (BH No.1 to BH No.2)

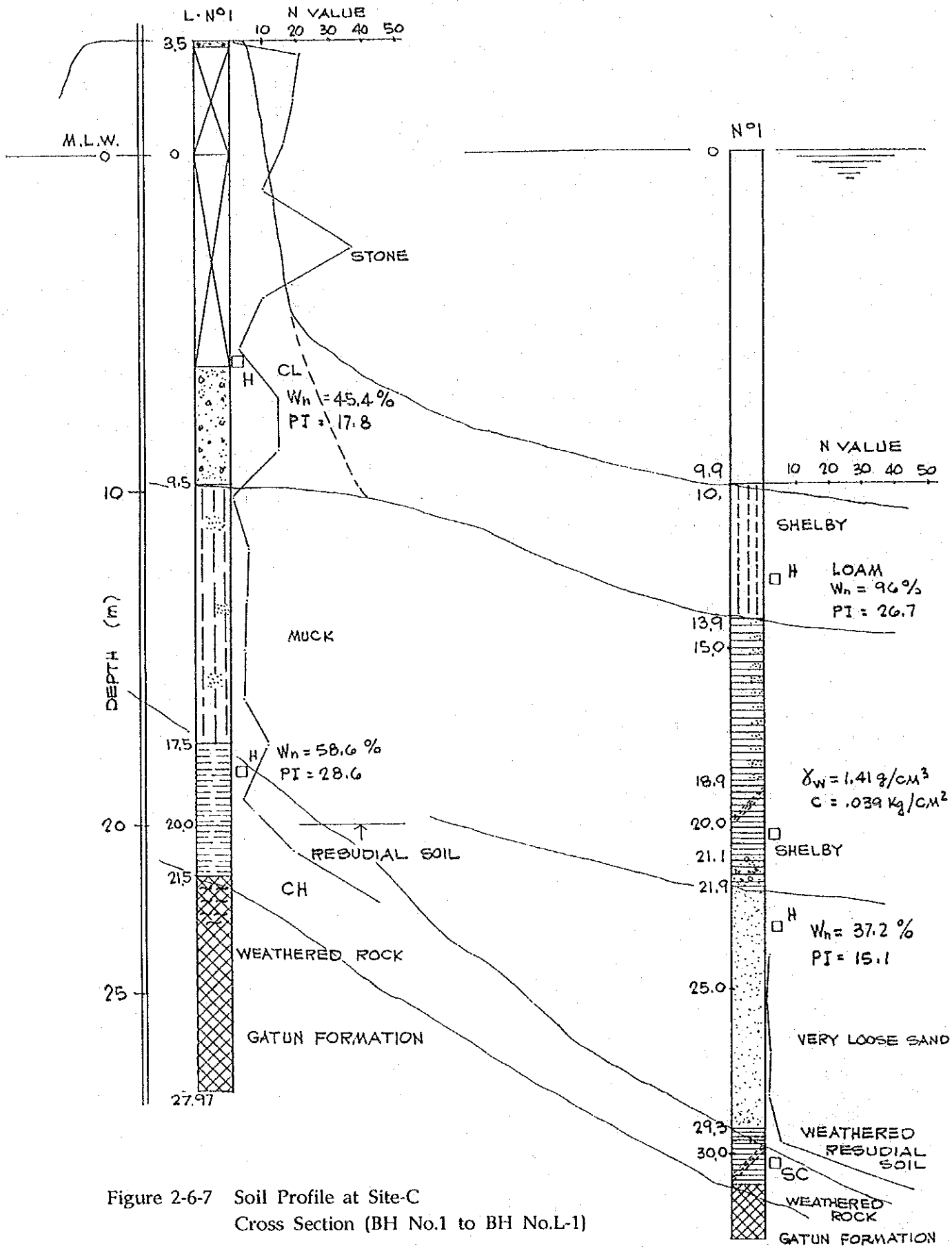



Figure 2-6-7 Soil Profile at Site-C
Cross Section (BH No.1 to BH No.L-1)

### 2.6.4 Comments for Facility Design

Based on the existing soil data and new data surveyed by the Study Team, a preliminary evaluation was carried out for port facility design. The evaluation was made based on the following assumptions.

a. New wharf faceline at Site-T will be located on the line along BH No.3 and BH No.4.

b. New wharf faceline at Site-C will be located on the line along BH No.1 and BH No.2.

c. Crown height and depth of the wharf structure will be MLW +3.6 m and MLW -13.0 m respectively.

d. Dredged surplus soil (mud) will be disposed of at a specified dumping site on the weather side of the breakwater.

e. Sandy material will be dredged at a specified borrow pit and will be used for reclamation for new land.

(1) Dredging and Reclamation

The mud layer should either be dredged/disposed of by dredgers or be treated by soil improvement like paper drain.

So far hard layer is not found upto the dredging depth. Reclamation can be conducted in a temporary wall to retain reclaimed soil.

(2) Bearing Stratum and Pile Tip

The boring data show that the bearing capacity of the bearing stratum in the project site, the Gatun Rock Formation, is hard enough to accept any loads created by such wharf structure as pile type or gravity type.

It is recommended that the pile tip penetration into the Gatun Rock should not be less than 2.5 meters and should conform to the loading requirement in case a pile type structure were applied. In order to obtain the required penetration, either a large pile driver or pre-boring work may be necessary.

(3) Pavement

The existing surface soil at Site-T seems good for pavement. However, design parameters for reclamation at Site-C should be decided based on the characteristics of soil for reclamation. It is recommended that silt contents of the reclamation material be less than 10% for base course for pavement.

## 2.7 Earthquake

### 2.7.1 Past Earthquakes in Panama

Recorded data of the past epicenters in Panama is shown in Figure 2-7-1.
According to the figure, the magnitude of large earthquakes within 100 km from Colon is 6.5 in Richter Scale. It is roughly estimated that the recurrence of this magnitude is 90 years.

### 2.7.2 Earthquake Design and Design Method

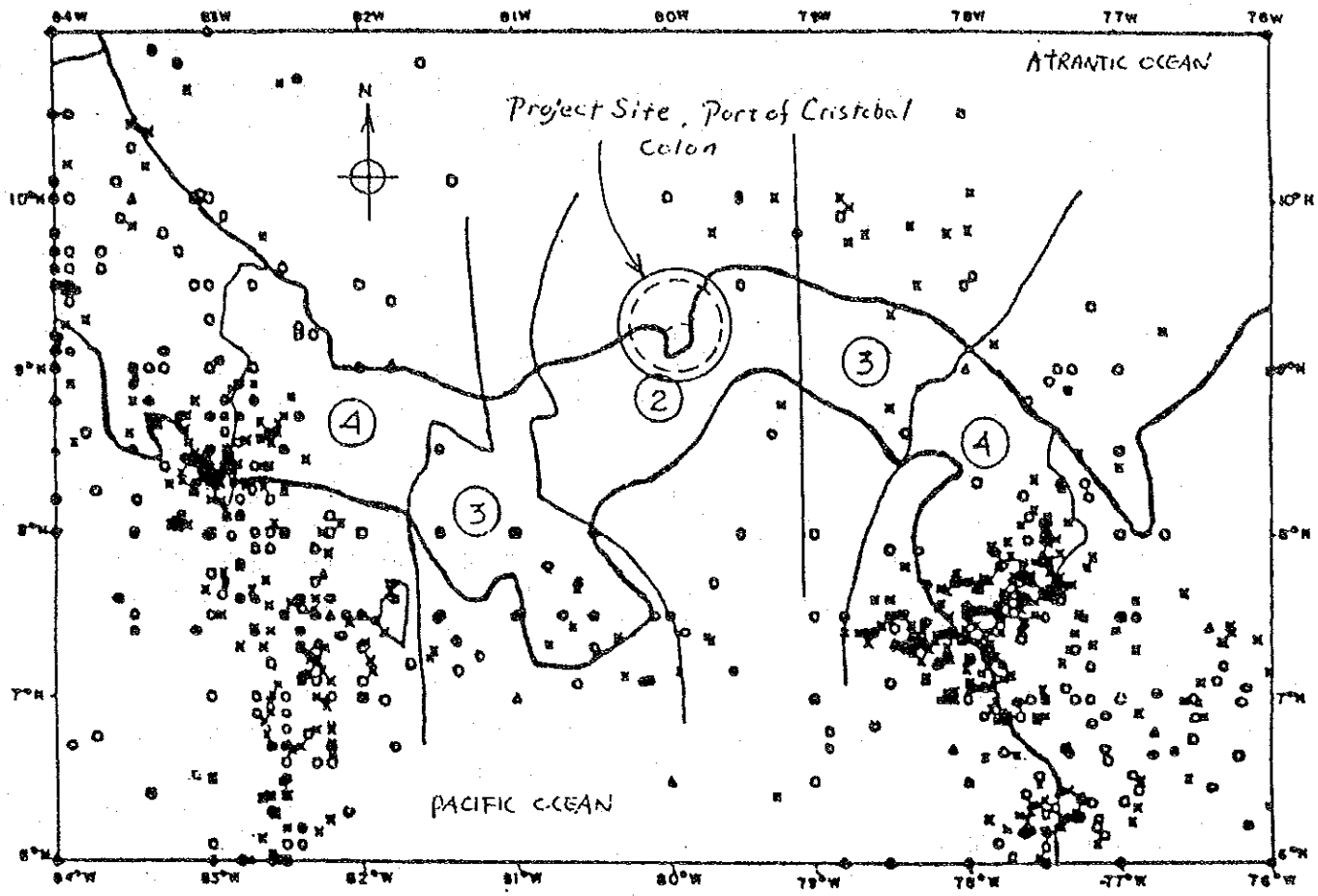
The conventional calculation method which is the statical structural calculation will be applied in the port facility design. Lateral seismic force can be obtained by using the following formula.

$$Hs = Kh \times W$$

Where, Hs = Horizontal force acting on the mass. (Not dynamic but statical)
A = Seismic coefficient. This figure depends on the local seismic conditions.
W = Dead weight of structure mass to be analyzed for the stability during the earthquake.

According to "Codigo Anti-Sismico de Panama", a coefficient for structural design in the Canal zone is used as Kh = 0.16.
It is also reported that the structure for the landward wharf crane foundation at Pier No.9 in the Second Project was designed at Kh = 0.20.

It is recommended that the seismic design coefficient for a preliminary design in the study be Kh = 0.20.




NGSDC/EDIS/NOAA BOULDER, COLORADO

923 EARTHQUAKES PLOTTED

83/04/11 15.00.39

ZONIFICACION SISMICA DE LA REPUBLICA DE PANAMA

CODIGO DE INGENIERIA ANTISISMICA

MAGNITUDES

- 0.08 - 4.49
- 4.49 - 6.49
- 6.49 - 8.30

Figure 2-7-1 Earthquake Records in Panama

## 2.8 Present Vehicular Traffic

It is understood that the existing access improvement should be incorporated in the proposed Long Term Plan. Therefore, the measurement of present vehicular traffic has been conducted.

### 2.8.1 Traffic Survey

Vehicular traffic was counted for 15 hours a day for a week.
Two grade intersections were selected for this survey. Figures 2-8-1 and 2-8-2 show the location of survey points and their typical sections.

Point A

This is a crossing point of the main access to the port entrance and the municipal road. It is one of the most congesting points in the port vicinity.

Point B

This is a crossing point of the main road to Panama City and the sole access to Telfers Island. The present vehicular traffic is rather light comparing to Point A. However, port cargo and vehicular traffic would dramatically increase, if a new container terminal is constructed at Site-T.

Grouping of vehicle type is made as follows:

Type 1 Heavy Trucks
Type 2 Heavy Buses
Type 3 Container Trailers
Type 4 Light Bus, Micro Bus and Jeep
Type 5 Sedans
Type 6 Motor Bikes

### 2.8.2 Major Findings

Traffic show its daily peak on Monday followed by Friday. The daily peak factor is 1.6 comparing to the daily average.

The peak hour happens twice a day between 8:00 a.m. and 10:00 a.m. and 4:00 p.m. and 6:00 p.m. The peak hour factor is 1.4 comparing to the hourly average. Contents of heavy traffic is rather flat showing 20% to 30%.
(Note: Heavy traffic includes all vehicles of Type 1, Type 2 and Type 3.)

The largest vehicular traffic was observed at 3:00 a.m. on Friday, 450 vehicles passed Point B.

The contents of port related traffic is 20% at Point A and about 8% at Point B.

The estimated road capacity is shown in Table 2-8-1. The existing traffic at Point B is nearly the maximum capacity.

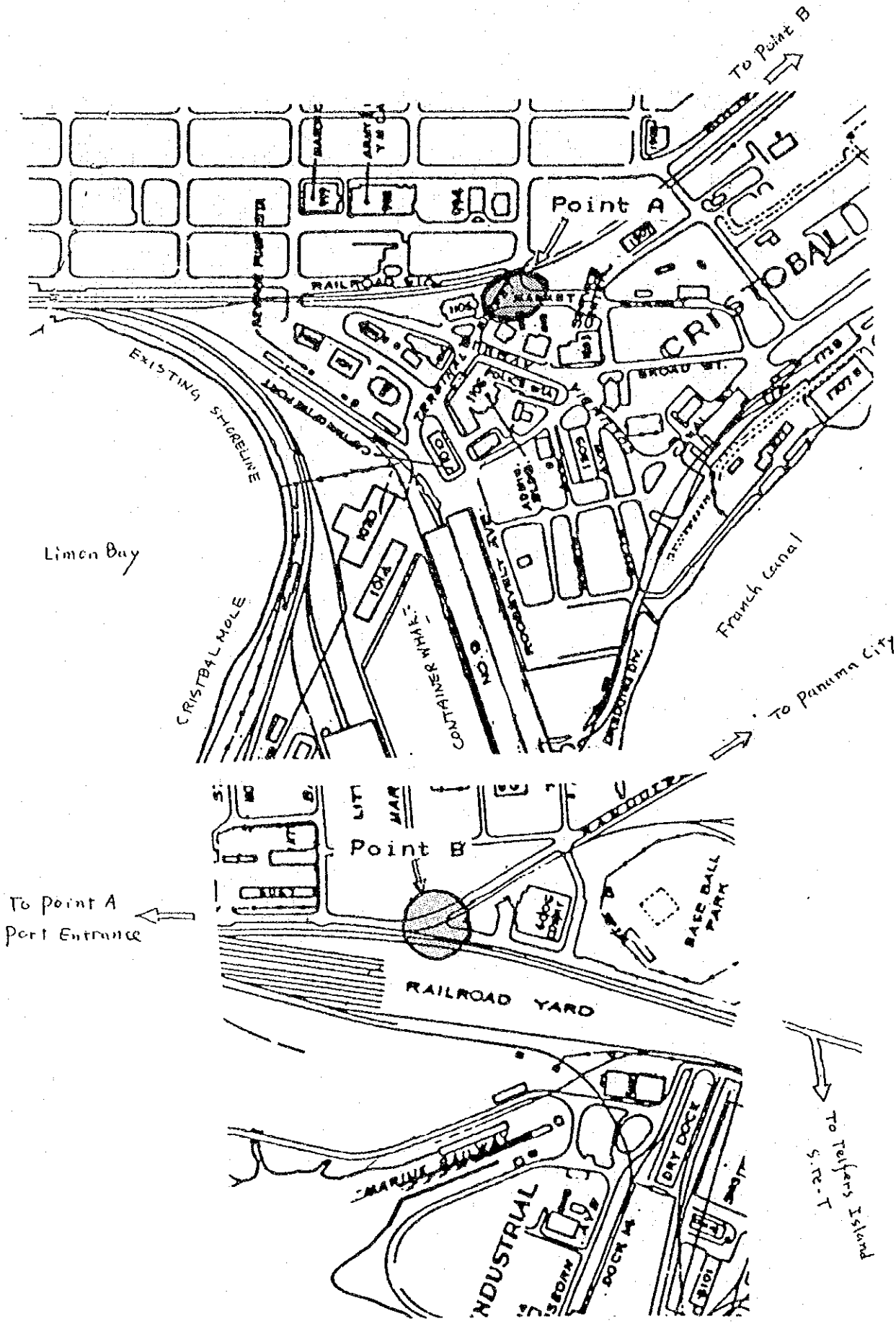



Figure 2-8-1 Traffic Survey Points

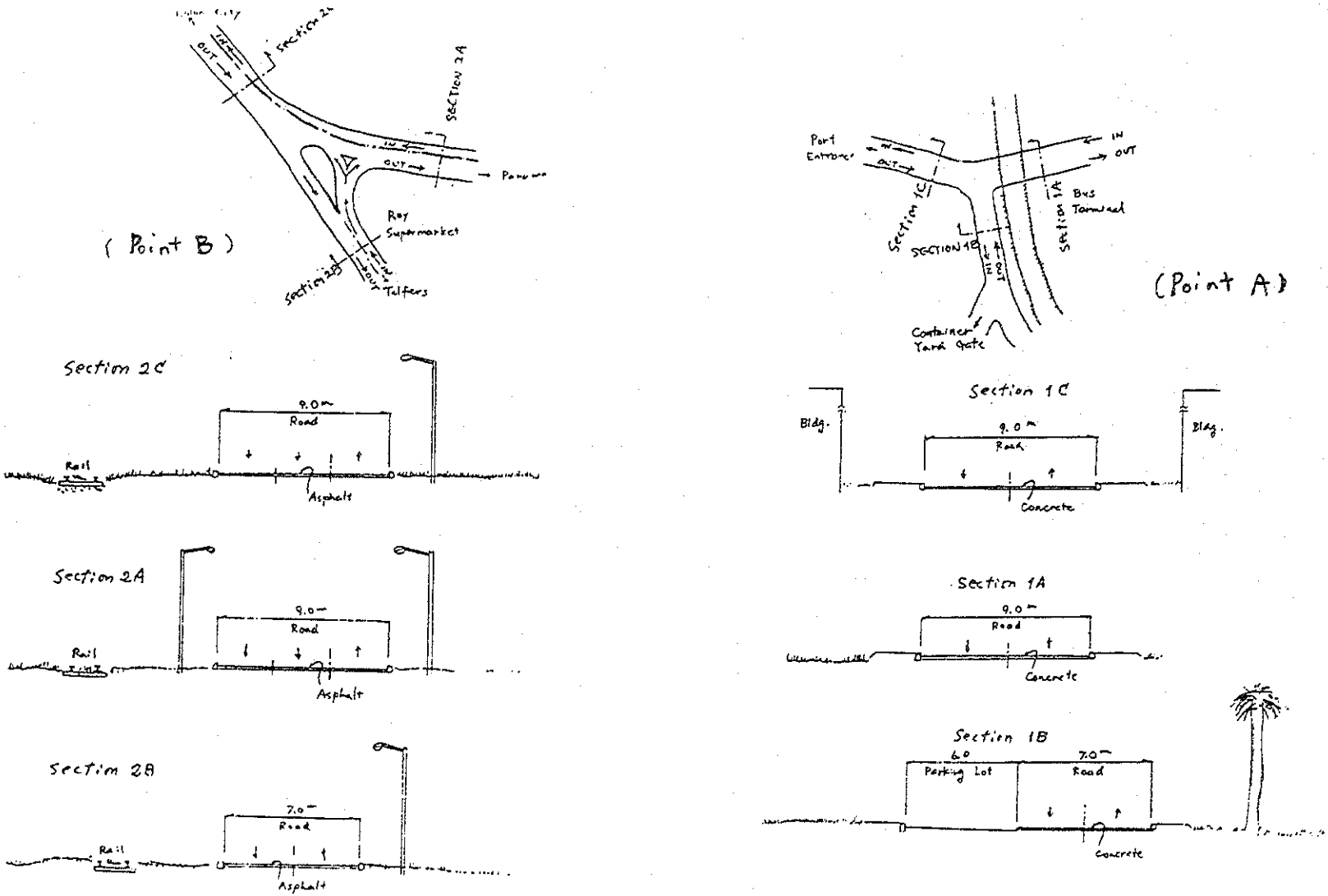



Figure 2-8-2 Traffic Counting Sections

Table 2-8-1 Traffic Capacity and Actual Volume

Unit: Vehicles/hour

| Section | Point A (Sec - 1A) | Point B (Sec - 2C) |
|---|---|---|
| Traffic Capacity | 700 | 1,050 |
| Peak Traffic | 450 | 1,150 |

# CHAPTER 3 THE REGIONAL TREND OF INTERNATIONAL CONTAINER TRANSPORT

This chapter briefly illustrates the regional trend of international container transport, which may have a certain influence in future container traffic at the port of Cristobal, by introducing the current situations and future prospect of some background factors including the Panama Canal and its alternative study, Mini Land Bridge now getting active in the United States, Center Port Concept proposed by a consultant in 1987, the activities of several competitive Caribbean ports concerned, and the vital roles of the Colon Free Zone.

## 3.1 The Panama Canal and Alternative Study

### 3.1.1 Brief History of the Panama Canal

The history of Panama is the history of the Canal,and the history of the Canal itself tells the history of Panama. This is true in that the Canal continues to play a significant role in supporting the country as the most vital infrastructure of Panama.
The construction work of the Canal was virtually completed by the end of 1913, and the Canal received for the first time a French tugboat in early 1914. It had taken about thirty two years to complete the construction work of the Canal, beginning in 1881 when the earliest team of French engineers had ventured into the construction site of the Canal.

Prior to 1979, when the Panama Canal Treaties became effective, the Canal was managed and operated mostly under the control of the United States in accordance with the original bilateral canal treaty signed in 1903, which had been a cause of many conflicts between the United States and Panama. After two adjustments of the original treaty in 1936 and 1955, and after a bloody incident of riots in January 1964, the negotiations for a new treaty were began by U.S. president Lyndon B. Johnson seeking a wholly different regime for the Canal. After long and extended negotiations, the new treaties were signed on 7 September 1977 under the Jimmy Carter administration.

The two treaties signed which were on that date and became effective 1 October 1979 consist of the Panama Canal Treaty and the Treaty concerning the permanent Neutrality and Operation of the Panama Canal, which contain a complex scheme that determines U.S. rights and obligations concerning the canal and also allow the use of military bases by the United States until 2000.

### 3.1.2 The Current Regime of the Canal Operation

The Panama Canal is currently operated by the Panama Canal Commission which was established by the Panama Canal Act of 1979 as an agency of the Executive Branch of the U.S. Government. The commission is under the authority of the Secretary of Defense and the Army, and supervised by a nine-member Board of Directors. Since 1991 a

Panamanian has been chief executive officer (Administrator) and a U.S.citizen has been his deputy. Until the expiration of the treaty in 2000, five board members are nationals of the United States and four are Panamanians. Figure 3-1-1 shows the organization of the Panama Canal Commission.

In order to carry out the responsibilities of the United States with respect to the Panama Canal, the Commission manages, operates, and maintains the Canal, its complementary works, installations and equipment, and provides for the orderly transit of vessels through the Canal. Under the Panama Canal Treaty, the Commission is to perform these functions until the time when the treaty will terminate on December 31, 1999. After that, the Republic of Panama will assume full responsibility for the Canal.

In accordance with the Panama Canal Treaty, the Canal operation is conducted on a self-financing basis. The Commission should recover all costs of operating and maintaining the Canal through its tolls and other miscellaneous revenues. Revenues from tolls and all other sources are deposited in the U.S. Treasury in an account known as the Panama Canal Revolving Fund. The resources in this fund are available for continuous use and serve to finance Canal operating and capital programs which are reviewed annually by the Congress.

### 3.1.3 Outlines of the Canal Facilities

The Panama Canal is a 82 kilometer (51 mile) long lock-type canal connecting the Atlantic and Pacific Oceans through the Republic of Panama. The minimum width of the navigable channel is approximately 150 meters (500 feet). While the navigable channel depth is dependent on the amount of water available in Canal reservoirs, the normal range of permissible transit draft is maintained up to about 11.85 meters (39 feet 6 inches) of tropical fresh water. For the general location of the Canal, see Figure 3-1-2.

The Canal has three sets of locks, namely Gatun, Pedro Miguel and Miraflores locks which are 305 meters long and 33.5 meters wide, limiting the size of ships able to transit the Canal to 65,000 DWT fully laden and some 85,000 DWT partially laden. Vessels passing the Canal from the Atlantic Ocean side are raised at Gatun Locks up to the level of Gatun Lake, which is about 26 meters higher than the sea level of the Atlantic Ocean, through a three step operation of the locks. After passing through Gatun Lake, vessels are lowered to sea level again in three steps (one step of 8 meters at Pedro Miguel, and another two steps of 18 meters at Miraflores Locks). The three sets of Canal locks are paired so that traffic can flow simultaneously in both directions. The widest ship ever to transit the Canal was the battle ship New Jersey, which had a beam of 33 meters. Figure 3-1-3 shows a longitudinal profile of the Canal.

In addition to the above described basic facilities, the Commission owns and operates towing locomotives at the lock side and various types of working vessels including dredgers, tugs, barges and launches, for safe and smooth operation of the Canal.

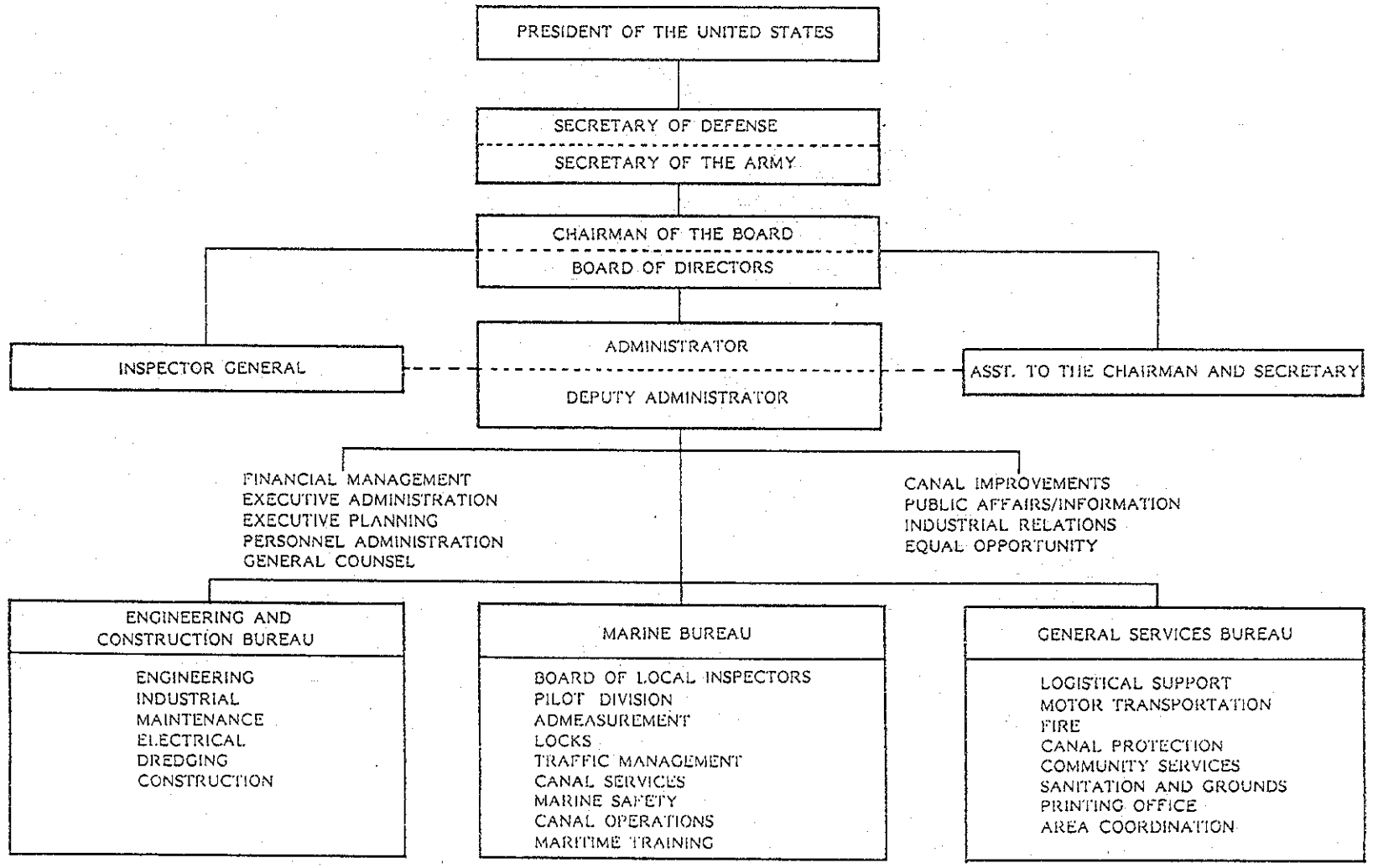



Figure 3-1-1 Organization of Panama Canal Commission

Source: Annual Report, Fiscal Year ended September 30, 1991
The Panama Canal Commission

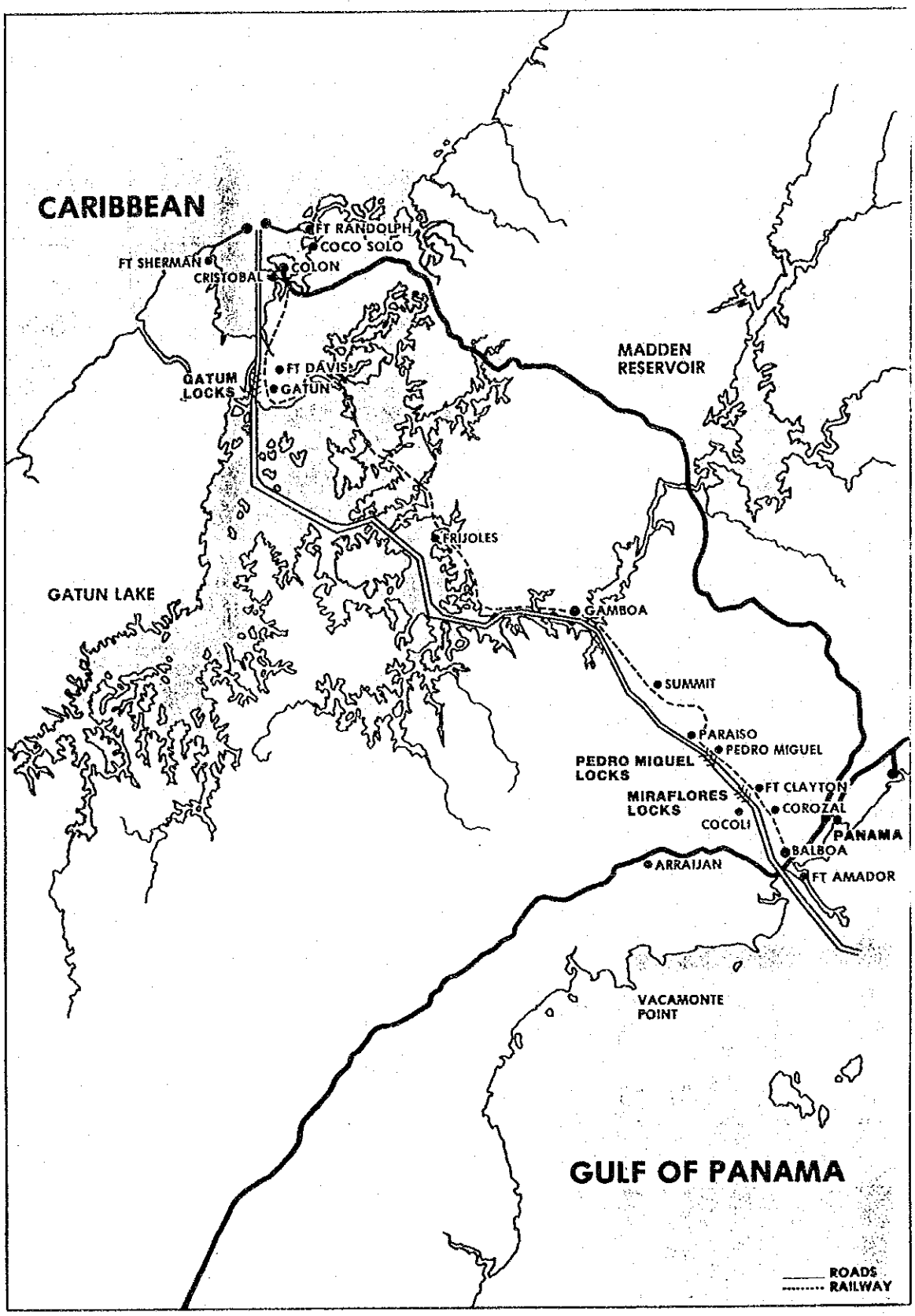



Figure 3-1-2 Location of the Panama Canal

Source: Panama Handbook, 1982, APN.

Table 3-1-1 Panama Canal Traffic (Fiscal Years 1982-1991)

| Fiscal year | Total traffic | | | Traffic assessed tolls on net tonnage basis | | Traffic assessed tolls on displacement tonnage basis | |
|---|---|---|---|---|---|---|---|
| | Number of transits | Tolls | Long tons of cargo | Number of transits | Panama Canal net tonnage | Number of transits | Displacement tonnage |
| 1982 | 15,271 | $325,589,097 | 185,738,781 | 14,930 | 203,737,116 | 341 | 473,253 |
| 1983 | 12,954 | 287,791,023 | 145,948,818 | 12,615 | 170,376,563 | 339 | 502,303 |
| 1984 | 12,523 | 289,155,035 | 140,801,136 | 12,185 | 163,522,412 | 338 | 560,829 |
| 1985 | 12,766 | 300,807,914 | 138,903,258 | 12,426 | 170,141,227 | 340 | 356,687 |
| 1986 | 13,278 | 322,734,202 | 140,125,818 | 12,899 | 183,517,249 | 379 | 421,102 |
| 1987 | 13,444 | 329,858,775 | 148,899,425 | 13,159 | 187,139,260 | 285 | 381,036 |
| 1988 | 13,441 | 339,319,326 | 156,780,203 | 13,139 | 192,275,497 | 302 | 264,537 |
| 1989 | 13,389 | 329,765,627 | 151,868,548 | 13,055 | 186,828,878 | 334 | 227,028 |
| 1990 | 13,325 | 355,557,957 | 157,322,924 | 13,015 | 182,495,977 | 310 | 384,786 |
| 1991 | 14,108 | 374,624,737 | 163,212,553 | 13,719 | 192,760,402 | 389 | 614,650 |

[1] Oceangoing traffic includes ships of 300 net tons and over, Panama Canal measurement, or of 500 displacement tons and over on vessels paying tolls on displacement basis (dredges, warships, etc.).

[2] Free traffic includes ships of the Colombian and Panamanian Governments and ships transiting for repair by the Commission.

[3] Includes vessels under 300 net tons, Panama Canal measurement (or under 500 displacement tons for vessels assessed on displacement tonnage).

Source: Annual Report, Fiscal Year ended September 30, 1991
The Panama Canal Commission

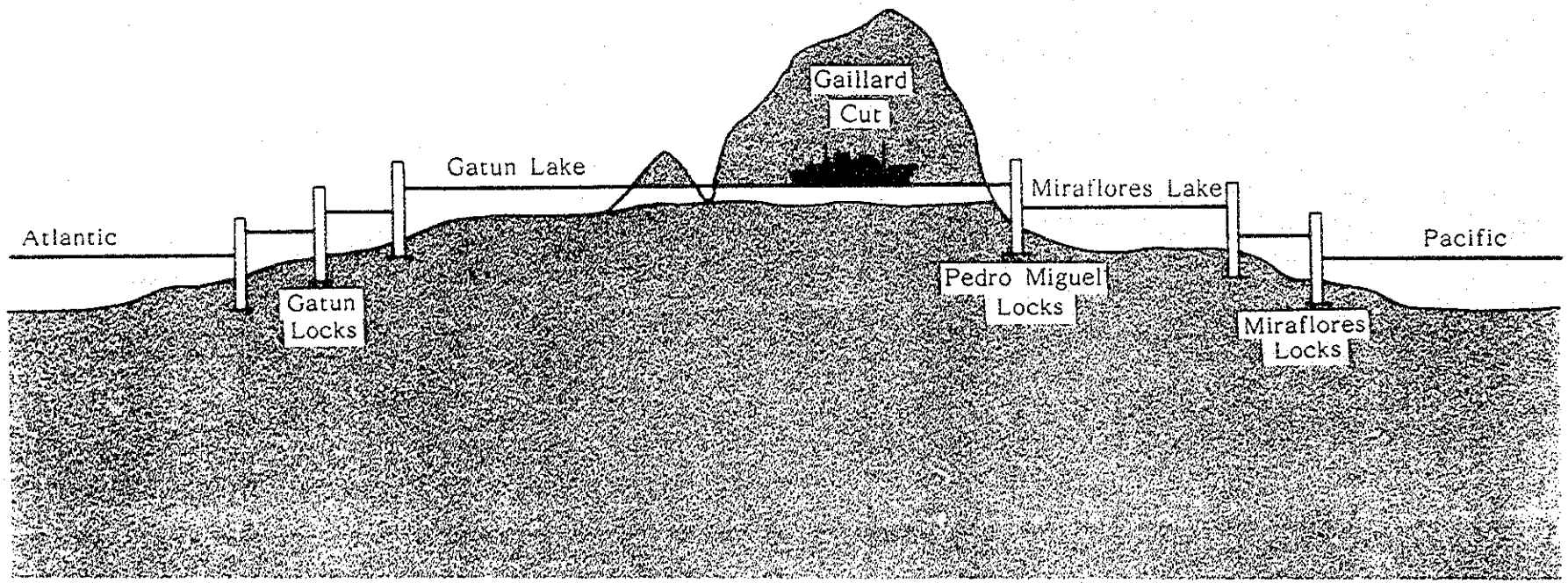



Figure 3-1-3 Longitudinal Profile of the Canal

### 3.1.4 Toll Rates, Revenues and Traffic

The operating revenues of the Canal are mostly dependent on tolls revenue. During fiscal year 1991, about 73% of total operating revenues was derived from tolls revenue.

Current toll rates, which have been in effect since October 1, 1989, are:

a) $2.01 per net vessel ton of 100 cubic feet on;
merchant vessels, Army and Navy transports, hospital ships, supply ships and yachts, when carrying passengers or cargo.

b) $1.60 per net vessel ton of 100 cubic feet on;
such vessels in ballast, without passengers or cargo.

c) $1.12 per ton of displacement.

All tonnage applied to above toll rates is determined in accordance with "Rules of Measurement of Vessels for the Panama Canal". By treaty, the United States continues to provide to Colombia free transit through the Canal of its troops, materials of war and ships of war.

The total operating revenues including tolls revenue and other revenues are variable depending on the amount of Canal traffic. Recent records show that the total operating revenues including tolls and other revenues amounts to around $500 million annually. Table 3-1-1 summarizes annual records of vessel traffic, tolls revenue and cargo traffic, from fiscal years 1982 through 1991.

As for the vessel traffic, there was an immediate sharp decrease in the number of transits in 1983 from the highest point of 15,271 transits recorded in 1982. After the lowest point in 1984, it has been increasing gradually, reaching 14,108 of transits in 1991.

Tolls revenue generally fluctuates according to the level of traffic and toll rate. In recent two years, the total tolls revenue increased due to the revised rates effected in October 1989.

### 3.1.5 The Current Status of Alternative Study

Article XII of the Panama Canal Treaty, entitled "A Sea-Level Canal or a Third Lane of Locks" says in the first paragraph:

> "1. The United States of America and the Republic of Panama recognize that a sea-level canal may be important for international navigation in the future. Consequently, during the duration of this Treaty, both Parties commit themselves to study jointly the feasibility of a sea-level canal in the Republic of Panama, and in the event they determine that such a waterway is necessary, they shall negotiate terms, agreeable to both Parties, for its construction."

On the basis of the above Article, the Government of Panama and the United States exchanged the notes on September 30, 1982 to establish a Preparatory Committee for the study of alternatives to the Panama Canal, including a sea-level canal. The signatories of the exchange of notes agreed to invite the Government of Japan to join the Preparatory Committee as a full member, which Japan accepted. In accordance with the above mentioned exchange of notes and its annexes, the Preparatory Committee was constituted and commenced to prepare the terms of reference for studies, which were finalized and presented as a recommendation to the member Governments in June 1985. Upon receipt of the recommendation of the Preparatory Committee, the three member Governments exchanged the notes and its annex on September 26, 1985 under which The Panama Canal Alternatives Study Commission was established and the Panama Canal Alternatives Study was commenced officially on the same date under the responsibility of the Commission organized by the three member Governments. The actual progress of the Study up to date is almost in final stage, since the Study should be terminated exactly by 25th of September in 1993 when the extended duration of the agreement for the Study expires. While the official conclusion of the Study is not known at this moment, several alternatives have been elaborately examined and two different types of alternatives are to be selected to further upgrade the function of the Canal.

The most likely alternative plans to be recommended for expanding the Canal include;

a) High Rise Lock Canal Alternative (Alternative-A)
b) Sea Level Canal Alternatives (Alternative-B)

Alternative-A is a plan which involves a new third set of locks to be constructed next to the existing Gatun Lock and Miraflores Lock. All the existing locks are assumed to be operational together with the new locks. Under this concept, two alternatives are being considered. One with the design ship having 150,000 DWT and the other having 200,000 DWT.

Alternative-B calls for the construction of a sea level canal along the new route which is about 20 km to the west of the existing canal route. This alternative assumes the simultaneous operation of the existing canal with widened Clebra Cut. In this case, the

scale of design ship is 250,000 DWT.
In the Final Report, which is to be submitted to the Committee by 25th of September in 1993, the best alternative will be recommended with the comprehensive feasibility analysis for consideration of the three member Governments.

## 3.2 Mini Land Bridge (MLB)

### 3.2.1 General Concept of Mini Land Bridge

The name of Mini Land Bridge was created for one of the inter-modal container transport systems designed for more efficient and reliable operation of container transport from the Far East to the east coast or the Gulf area of the United States via container terminals along the U.S. west coast. While most traditional transport routes of sea-born cargo from the Far East to the U.S. east coast are those passing the Panama Canal (All Water Service), MLB provides a new route by utilizing the transcontinental railroad network for such container cargo from the Far East. Under the new concept of MLB, therefore, the containers should be transshipped to the container train at the inter-modal terminal in the ports along the U.S. west coast.

Due to the severe cost consciousness of consignors and constant competition between shipping companies, the container transport system is always requested to guarantee a regular, safe, reliable, speedy and economical handling of cargo. In this respect, MLB does not appear to be in a competitive position against All Water Service because of its sophisticated inter-modal operation with highly standardized transport equipment. The practical use of idling capacity of railroad network and intensive innovation of transshipment technology may, however, allow MLB to be another possible channel of container flow across the continent.

Another advantage of MLB against All Water Service via Panama Canal is that the size of container ship is free from the physical capacity of the Canal. Since the so called Panamax type of container vessel has the maximum size allowed for the Canal, the 4th generation of container vessel called Super-Panamax, which is about 30% larger than Panamax in its width and 25-33% in capacity, can serve only for MLB route at this moment.

### 3.2.2 Current Operation of MLB

There are three groups of mother ports serving for MLB along the U.S. west coast. The first group includes those ports on the north-western coast such as Seattle, Tacoma, and Portland. The second group is the ports in the San Francisco bay area, namely the port of San Francisco and Oakland. The members of the third group are the port of Los Angeles and Long Beach which are located on the south-western coast of the United States. The container terminals in the above listed ports are connected to major railroad lines operated by about 20 different companies. The major destinations of the containers

transported from the Far East through MLB are the various container terminals including so-called Intermodal Container Transfer Facilities (ICTF) or Interior Point Intermodal (IPI) located in major east coast or Gulf area ports or inland cities. The container traffic from the European or South American countries served by MLB shows more or less the same pattern except for its direction.

Recent trend of MLB traffic shows a drastic increase in the volume of containers. The main reasons for this trend can be illustrated by the timely innovation of inter-modal transshipment technology and deregulation policy for the railroad operation and motor carrier business.

One of the most recent stimulating technological developments was the Double-Stack Train (DST) which was first introduced by American President Companies (APC) in 1984 to the railroad lines of Chicago & North Western Transportation Company and Union Pacific Railroad. In the beginning, APC started DST operation between Los Angeles and Chicago with a weekly service using 20 DST with its capacity of 200 FEU (40ft container equivalent unit). Since then, DST service under MLB operation has been increased at a dramatic pace reaching a weekly service of more than 120 DST between west coast ports and major market cities in the U.S. east coast and east Canadian areas. The total number of containers carried by DST accounted for more than 770,000 FEU annually in 1990. Figure 3-2-1 shows major railroad network in the United States, and DST network is illustrated in Figure 3-2-2.

In addition to above the development, vital contrivances or attempts have been made by almost all major shipping companies and port authorities seeking more efficient and economical transshipment of containers from ship to train or from train to trailer truck. These efforts have yielded rich results such as a new concept for transshipment technologies and information systems such as ICTF (Inter-modal Container Transfer Facility), On-Dock DST, and CCIS (Community Cargo Information System) which are now under operation or in the planning stages in port of Long Beach and other major mother ports for MLB.

Another encouraging factor for MLB transfer was the series of deregulation policies represented by The Motor Carrier Act in 1980. The Staggers Railroad Deregulation Act in 1980, and The Shipping Act in 1984. Under these deregulation policies, most U.S. railroad companies and motor carriers have enjoyed free competitive market for transport business which has greatly contributed to the rapid growth as experienced in recent MLB operation.

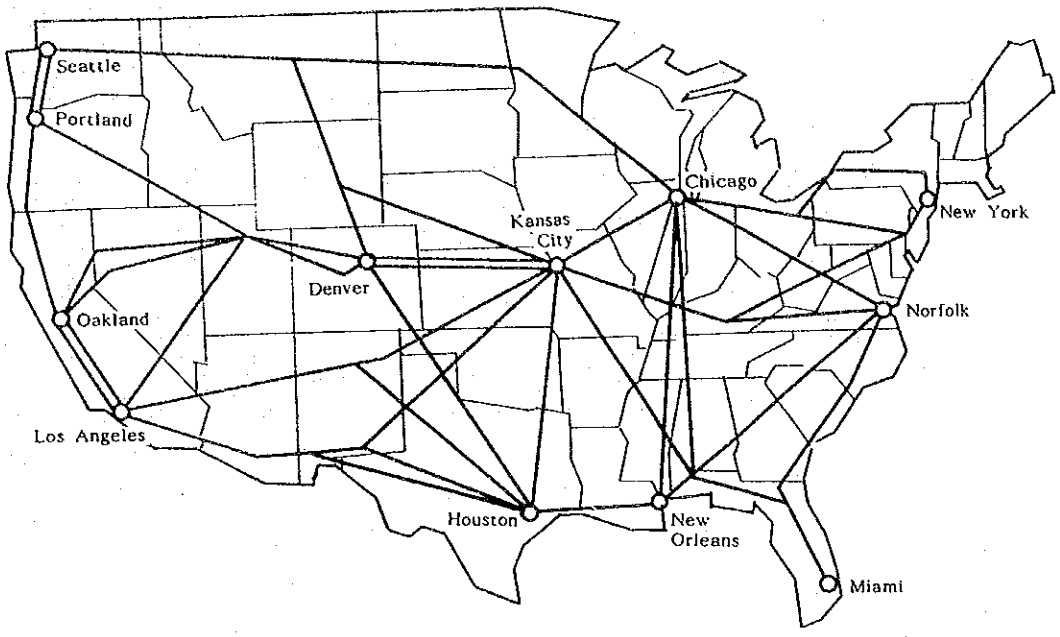



Figure 3-2-1 Major Railroad Network in the United States

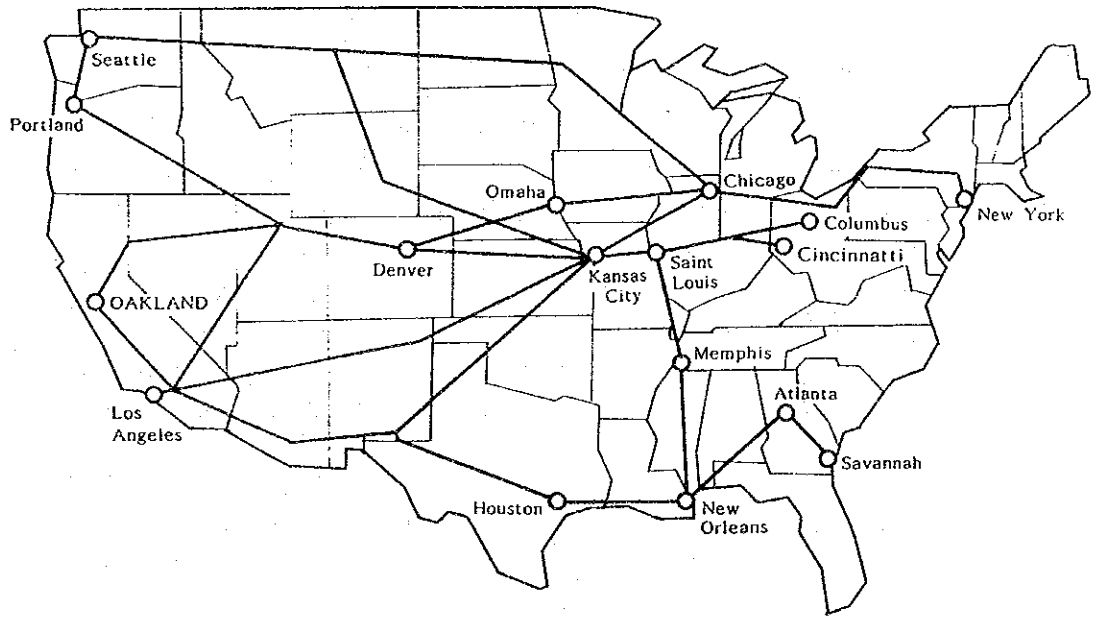



Figure 3-2-2 DST Network in the United States

### 3.2.3 Future Prospect of MLB Traffic

According to the recent record,the number of containers handled in major ports in U.S. west coast has been increasing by an average of 12% annually since 1982. The above fact no doubt illustrates that the inter-modal transport by MLB has been getting more popular in transporting containers from the Far East to the U.S. east coast.

The following factors are pointed out by the leading shipping companies concerned as the advantages of container transport from the Far East to the U.S. east coast by MLB against all water service.

a) The major commodities for the U.S. east coast under all water service are limited to those of canned goods, equipment and machinery, frozen cargo, and heavy containers of which volume is not expected to increase substantially.

b) Under all water service, all vessels are operated at full load. The marginal portion of exporting/importing cargo is, therefore, shifted automatically to the inter-modal transport.

c) Net transport hours required in all water service is longer than those of in inter-modal transport.

d) Since the difference of transport fare between all water service and inter-modal transport became very small, all water service becomes less attractive to those cargoes.

e) Reduction of transport cost and high reliability in inter-modal transport could be realized through introducing DST of which net work is expected to expand.

f) Inter-modal transport can keep its strong competitive position thanks to the increase of cargo flow from the U.S. east coast and inland area to west coast which is supported by the total increase of U.S. export.

While the above observation might suggest that the future prospect of MLB operation is bright, there may be others views on the future of MLB. From the short or medium term point of view, the advantages of container transport by MLB may exist as pointed out by the well informed circles. It is, however, still uncertain from the long term point of view whether MLB could maintain adequate transport capacity with sufficiently reasonable cost and fare to compete with the all water service through the Canal, mainly because;

a) The existing railroad network available for MLB has been fully utilized almost to its maximum capacity to date.

b) In order to meet the future increase of transport demand across the U.S. continent, substantial scale of investment will, therefore, be needed in upgrading

the total railroad network capacity including huge number of trains, inter-modal facilities and storage areas as well.

c) In such case, the relevant port facilities should be improved accordingly.

d) There are several alternative plans progressing or under consideration for improving transport channel from the Pacific to Atlantic Ocean including the Panama Canal Alternative Study, Center Port Concept (CTC) in Panama or other new canals or land bridges in Nicaragua, Columbia, and Mexico, some of which are considered to be competitive with MLB for container transport in the long term basis in particular.

Considering the above observations and recent trend of the Canal traffic, which shows a steady increase of total ship transit with constant portion of container traffic of 15%, it may be fair to say that the movement of MLB may not greatly influence the future Canal traffic at least in medium or long term.

## 3.3 Centerport Concept (CPC)

### 3.3.1 Outlines of CPC

While the development concept similar to CPC for a set of transport facilities for cargoes crossing the isthmus of Panama had been discussed several times during the years, the comprehensive idea of this kind of concept was first presented to the Government of Panama in 1987 by a consortium of consultants (PRC Engineering-Ingenieria Caribe) hired by the Government of Panama under financing of IDB (Inter-american Development Bank). The official title of the report submitted was "Strategic Master Plan for the Development of Panama Centerport".

"The basic concept of Panama Centerport is to take advantage of the unique concentration of transportation services created by the Panama Canal to carry out container cargo transshipment operations. These operations offer the possibility of reducing costs and increasing the efficiency of container transport services by creating a center for distribution and concentration of traffic in an area which, being necessary passage of many trade routes, implies neither detours nor unproductive sailing time. Basically, transshipment operations would be carried out while ships await their transits, which would not constitute a waste of the vessel's time, but instead an alternative that will make maximum use of its capacity and operation costs." (extracts from executive summary of the report)

The above described concept of CPC is derived from the understanding that the savings generated by the Panama Canal are based on the reduction in operation costs of vessels and the shorter sailing time offered by the Canal in comparison with other available options. The actual target of the development scheme under the concept is to create a large scale transshipment center by connecting both ports of Balboa in the Pacific side

and Cristobal in the Atlantic side with high standard rail and road system so that the above two ports could function jointly as one port. Figure 3-3-1 shows the conceptual layout of CPC.

Since the most important requirement of this concept is quick and reliable transshipment between ships and trains or trucks, the proposed terminals located near the ports should be furnished with sophisticated inter-modal facilities to meet the demand on the market of transshipment services. The total maximum ship time in Centerport is set within 12 hours with the minimum number of container handling of 30 TEUs per hour and maximum 2.5 hours of transport time between the terminals.

The prospective market for transshipment services for worldwide containerized cargo traffic include;

a) transshipment services between main and feeder lines
b) transshipment services between main lines
c) collection and distribution services for domestic cargoes

Among the above, the largest demand of traffic is expected in transshipment services between main lines. The conceptual flow of transshipment services between main and feeder lines is illustrated in Figure 3-3-2, and those between main lines in Figure 3-3-3.

The most important merit of this project for the shipping companies or consignors is realization of effective and economical operation of transshipment of cargoes in the world wide maritime transport. The Panamanian economy could also enjoy a wider range of positive effects through the dramatic increase of cargo transshipment at Centerport if the project would be successfully completed and operated as planned without any delay.

### 3.3.2 Current Status of CPC

When the report was once submitted to the Government of Panama in 1987, the Government had requested the consultants to elaborate some parts of the report including demand forecast and marketing policy of the project. Since then, many discussions have been made on the feasibility of the project among the agencies and parties both in public and private sectors concerned.

While the basic idea of the project was considered reasonable enough and acceptable in general, the scale of the project appeared too large in the context of the amount of investment and terms of improvement works for relevant facilities. It is fair to say that the majority of people concerned have, now, a feeling that there are a lot of things to do before starting the project. Thus, CPC has been suspended and any authorization by the Government has not yet been given. The details of the various issues on CPC are discussed in following paragraphs.

### 3.3.3 Issues on CPC and Its Prospect

As discussed in the previous paragraphs, CPC is expected to offer a wide range of socio-economic benefits to the country subject to its timely realization. The benefits include direct and indirect economic effects derived from a huge amount of investment for the project totaling $323 million at 1988 dollar values, increase of job opportunities and revenues of the public sector through the operation of the CPC facilities, further expansion and activation of Colon Free Zone, and reinforcement effects to international trade and financing function of the country.

On the other hand, the various deficiencies and problems of the project are pointed out below:

a) Both initial and total cost of the project are far beyond the reasonable range of normal investment by the interested parties. The investment necessary for improving the Panama Railroad accounts for a substantial part in particular.

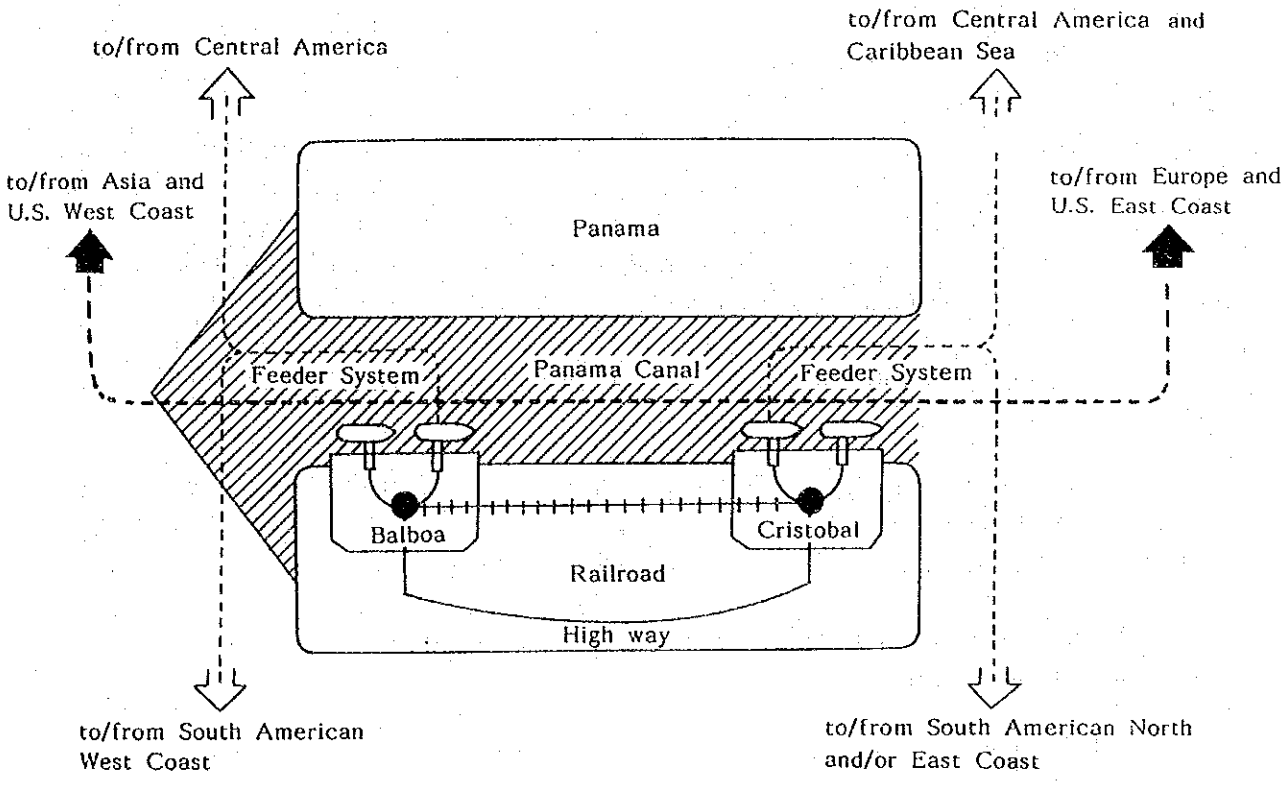
b) There remain considerable uncertainty which does not always guarantee the success of the project.

c) Adjustment of the interests among the shipping companies may be extremely difficult.

d) In order to avoid possible investment risk, the shipping companies may not be interested in joining the project at its initial stage. From the shipping companies' point of view, it is apparently reasonable to join the project at its later stage where the more profitable and less risky business may be expected so that they can enjoy the profits derived from operating the ready for use facilities for transshipment of cargoes.

e) While highly reliable operation is the priority requirement for the container terminal and railroad system as well, the rail and port operation between or at Balboa and Cristobal are considered neither reliable nor efficient. Under such a situation, it may be quite hard for the Government to manage and operate such a very complex system as combining the different modes of transport including rail, road, and port.

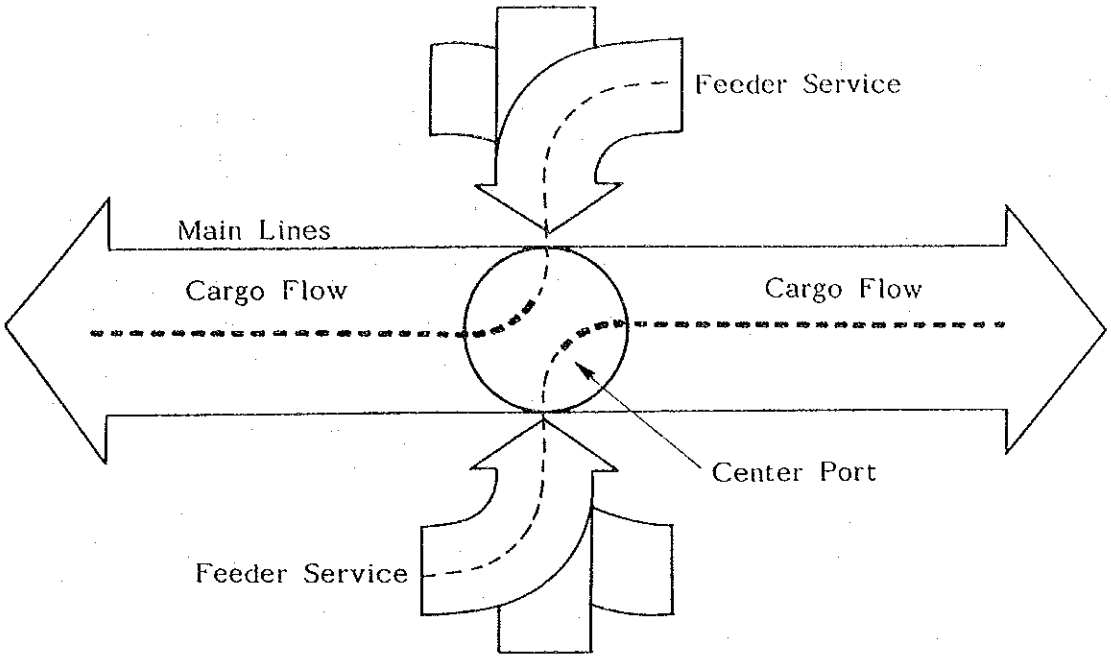
On the basis of above observation, it may be fair to say that CPC is not really feasible at this moment, if the project implementation should follow the original scale and schedule as recommended by the consultants.




Functions of Center Port

- O Port Service
- O Transshipment
- O Collection and Delivery of Containers
- O Storage
- O Free Zone
- O Ship Repair
- O Maintenance of Containers and chassis
- O Banking and Financing
- O Warehousing

Figure 3-3-1 Conceptual Layout of CPC



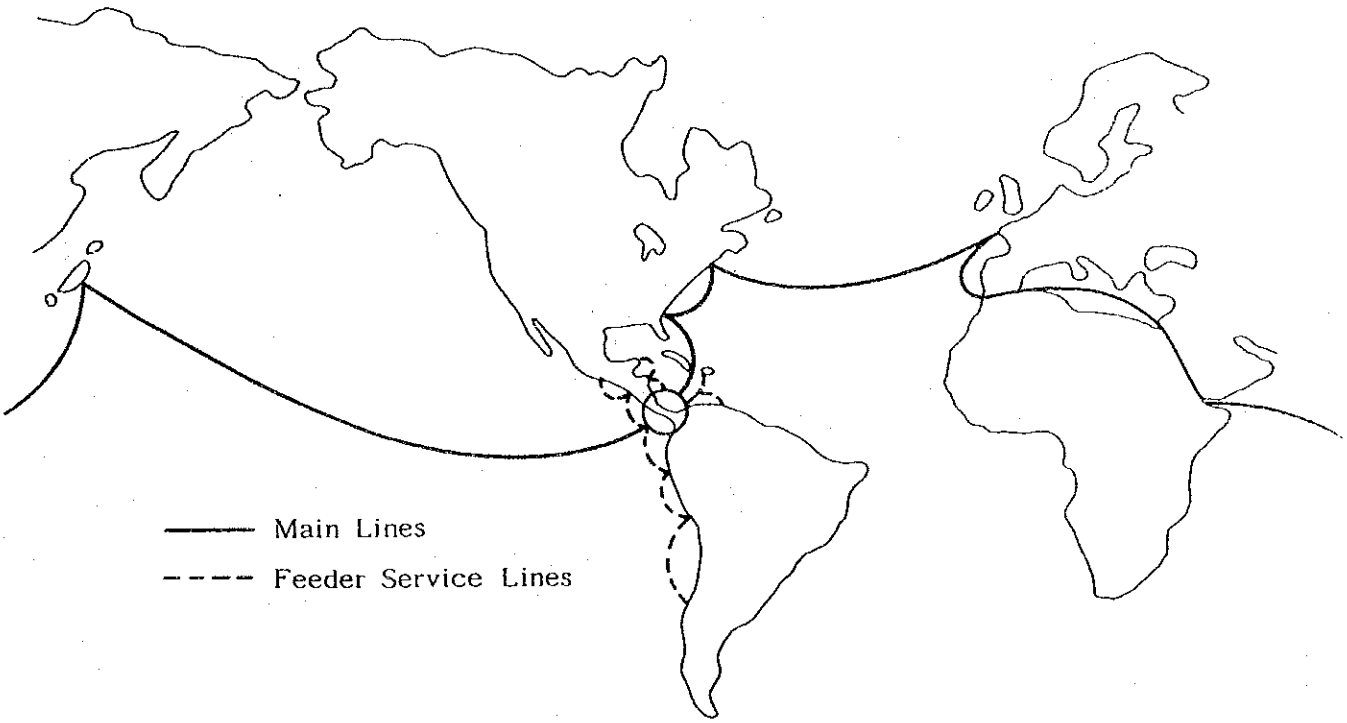
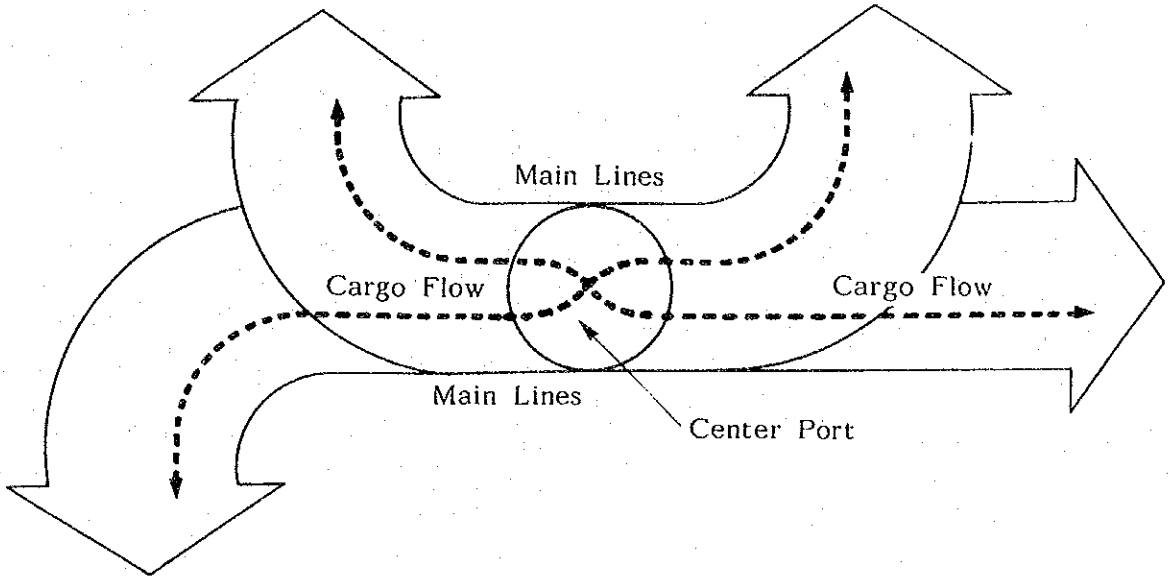




Figure 3-3-2 Conceptual Flow of Transshipment Services between Main and Feeder Lines



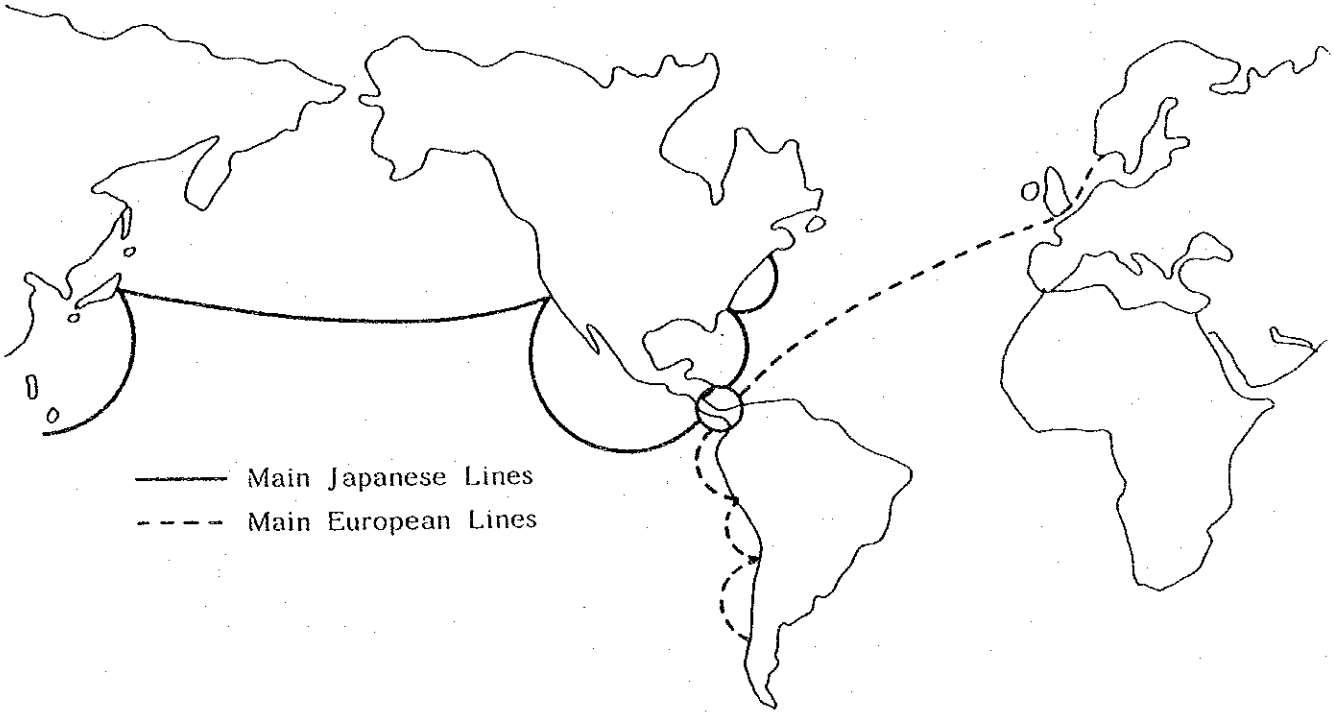




Figure 3-3-3 Conceptual Flow of Transshipment Services between Main Lines

## 3.4 The Current Position and Activities of Competing Caribbean Ports

### 3.4.1 Outlines of Caribbean Ports

There are about 33 major ports in total along the Caribbean sea coast divided among 19 countries (Cuba is excluded as detailed information is not available). The general location of major Caribbean ports is shown in Figure 3-4-1. Since the sizes of most Caribbean countries in terms of their population and economic/trading activities are rather small, the port facilities and their activities remain generally at substandard levels compared with large main ports in countries like the U.S.A. or Japan.

The major functions of the Caribbean ports are to handle the import cargoes for domestic consumption and the export cargoes of domestic products such as banana, sugar and other agricultural or industrial products. Transshipment services for containers are provided at only a few ports such as the ports of Kingston, Jamaica or Cristobal, Panama. Table 3-4-1 illustrates major port facilities of selected Caribbean ports. Those of the port of Miami in the U.S.A. are also shown in this table for easy reference. The terminal areas at the ports in this table are mostly small with less than 10 ha. except for the ports of Miami and Kingston. The maximum depth at available berths is around 10-12 meters which makes it possible to accept medium size container vessels. The total length of berths varies widely among the ports from less than 100 meters to 2000-3000 meters. While an area for container storage is prepared at most Caribbean ports, their scale is relatively small according to the number of containers being handled. Container gantry cranes are equipped at almost all ports except for Puerto Castilla, Honduras and Port Castries, St. Lucia. Due to the substandard level of current container traffic, an exclusive area for container marshalling is not prepared at all ports in the Table, except for the port of Miami.

Since the ports listed in Table 3-4-1 are all considered leading ports in each Caribbean country, most of them provide direct-call liner service to secure stable import and export channels for sound national economy and everyday life of the citizens.

### 3.4.2 Container Traffic and Its Future Prospect at Caribbean Ports

Table 3-4-2 shows the container traffic trend of the last decade in five year intervals at major Caribbean ports plus the port of Miami. Among the Caribbean ports, the port of San Juan, Puerto Rico has the largest through put of container handling amounting to a total of about 1.4 million TEUs in 1990, which is slightly less than 65% of the total amount of container handling at 13 Caribbean ports in the Table. At the port of Cristobal, on the other hand, total container handing accounts for about 0.12 million TEUs with only 6% in total TEUs. During the last decade from 1980 to 1990, the total number of containers including empty vans handled at the Caribbean ports has increased about three times in TEU.

While the exact statistics on transshipment operation of containers are not available at

each Caribbean port, it is estimated that the transshipment containers between main lines and/or main and feeder lines have increased at the ports of Miami, Kingston and Cristobal in particular. Considering severe time saving requirement to the large full container vessels serving for main lines, it is fair to say that the transshipment operation with rather small vessels at the selected Caribbean ports will increase even into the deep future. It is considered at this moment that the most competitive ports against the port of Cristobal in handling the transshipment containers in this area are the ports of Miami, Kingston and Puerto Cortes. Considering the above situation, it is vital for the future development of Cristobal to establish firm foundation in providing attractive port facilities and management systems for transshipment operation.

As shown in Table 3-4-1, some of the Caribbean ports have strong intention to expand their container handling capacity so that they can cope with possible future increase of container traffic demand. While such development projects under planning at the Caribbean ports are not always guaranteed their successful completion under severe budget constraint, such movements should be looked into carefully in formulating the future development scheme for the port of Cristobal.


Figure 3-4-1 Major Caribbean Ports

## Table 3-4-1 Port Facilities of Major Caribbean Ports

| Port<br>Country | Miami<br>U. S. A. | Puerto Limon/ Moin<br>Costa Rica | Puerto Castilla<br>Honduras | Puerto Cortes<br>Honduras | Bahia las Minas<br>Panama | Cristobal<br>Panama | Freeport<br>Bahamas | Bridgetown<br>Barbados | Port-au-Prince<br>Haiti | Kingston<br>Jamaica | Pointe-a-Pitre<br>Leeward Island | Willemstad<br>Netherlands Antilles | San Juan<br>Puerto Rico | Port Castries<br>St. Lucia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Direct-call liner services (companies) | 41 | 13 | 0 | 16 | 2 | 24 | 1 | 18 | 14 | 10 | 11 | 14 | 24 | 12 |
| 2. Terminal facilities (ha) | 242.9 | 7.5 | 8 | 6.2 | n.a. | 7.5 | n.a. | 6 | 4 | 35.6 | 25 | 16 | n.a. | 2.6 |
| 3. Berths*: total | n.a. | 2 | 1 | 2 | 1 | 2 | 2 | n.a. | 5 | 4 | 2 | 3 | 9 | 2 |
| 4. Berths*: total length (m) | 3,855 | 459 | 150 | 352 | 91.4 | 428 | n.a. | 702 | 977 | 640 | 400 | 500 | 1,688 | 310 |
| 5. Berths: depth (m) | 7.6/11.6 | 10/11 | n.a. | 10.6 | 8.5 | 10.7~12.2 | n.a. | 9.8 | n.a. | 10.4~11.9 | 11 | 12.2 | 9 | 10.7 |
| 6. Container/trailer parking & marshalling area (ha) | 197.5 | | | | | | | | | | | | 28.8 | |
| 7. Total container storage (TEU) | 24,000 | 560 | 2,500 | 2,800 | n.a. | 3,000 | n.a. | 4,000 | 1,800 | 6,500 | 3,000 | 1,700 | 6,200 | 600 |
| 8. CFS: total | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 9. CFS: total area (ha) | 7.2 | 0 | 0 | 0 | 0 | 0.63 | 0 | 3 | 8 | 1 | 20 | 0.28 | 2.18 | 2.8 |
| 10. Container gantry cranes | 6 | 1 | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 5 | 3 | 1 | 6 | 0 |
| 11. Rail facilities in port area (km) | 5.2 | 0 | 0 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12. Future plans | Additional container berths | | Additional equipment, expansion of storage area | Extension of berth | | Additional equipment | Container terminal, Ro/Ro. terminal | | Container berth, CFS, storage areas, equipment | Stacking area, expansion of berth, rail facilities | Industrial & foreign trade zone, container berth | | | |

Source: Containerization Yearbook 1992

* Note: berths used for handling containers

To be revised

Table 3-4-2 Container Traffic at Major Caribbean Ports

| Port (Country) | TEU / Tonnage | 1980 | 1985 | 1990 |
|---|---|---|---|---|
| Miami (U. S. A.) | Import / Loaded TEU | 52,840 | 83,068 | 169,619 |
| | Empty TEU | | | 16,775 |
| | Tonnage | 326,206 | 869,977 | 1,816,349 |
| | Export / Loaded TEU | 45,480 | 60,976 | 170,584 |
| | Empty TEU | | | 16,872 |
| | Tonnage | 432,679 | 472,218 | 1,454,542 |
| | Total TEU | 98,320 | 144,044 | 373,850 |
| | Total Tonnage | 758,885 | 1,342,195 | 3,270,891 |
| Puerto Limon/Moin (Costa Rica) | Import / Loaded TEU | | 21,185 | (estimate) 28,948 |
| | Empty TEU | | 25,757 | 24,868 |
| | Tonnage | | 278,519 | 605,587 |
| | Export / Loaded TEU | n. a. | 38,613 | 45,245 |
| | Empty TEU | | 8,411 | 6,023 |
| | Tonnage | | 471,008 | 901,869 |
| | Total TEU | | 93,966 | 105,084 |
| | Total Tonnage | | 749,524 | 1,507,456 |
| Puerto Castilla (Honduras) | Import / Loaded TEU | | | 7,192 |
| | Empty TEU | | | 16,954 |
| | Tonnage | | | 41,318 |
| | Export / Loaded TEU | n.a. | n.a. | 23,170 |
| | Empty TEU | | | 196 |
| | Tonnage | | | 210,258 |
| | Total TEU | | | 47,512 |
| | Total Tonnage | | | 251,576 |
| Puerto Cortes (Honduras) | Import / Loaded TEU | 6,245 | 79,663 | 29,788 |
| | Empty TEU | 9,611 | | 36,407 |
| | Tonnage | 83,136 | 201,287 | 221,581 |
| | Export / Loaded TEU | 13,462 | 79,515 | 55,233 |
| | Empty TEU | 2,451 | | 11,313 |
| | Tonnage | 225,384 | 642,947 | 522,301 |
| | Total TEU | 31,769 | 159,178 | 132,741 |
| | Total Tonnage | 308,520 | 844,234 | 743,882 |
| Bahia las Minas (Panama) | Import / Loaded TEU | 9,729 | 11,581 | 25,137 |
| | Empty TEU | 64 | 323 | 650 |
| | Tonnage | 81,199 | 79,216 | 188,607 |
| | Export / Loaded TEU | 2,492 | 5,404 | 10,191 |
| | Empty TEU | 7,886 | 4,330 | 6,673 |
| | Tonnage | 18,124 | 28,277 | 67,723 |
| | Total TEU | 20,171 | 21,638 | 42,651 |
| | Total Tonnage | 99,323 | 107,493 | 256,330 |
| Cristobal (Panama) | Import / Loaded TEU | 27,758 | 37,134 | 59,092 |
| | Empty TEU | 1,468 | 1,393 | 2,064 |
| | Tonnage | 180,619 | 267,632 | 447,011 |
| | Export / Loaded TEU | 4,325 | 7,736 | 14,577 |
| | Empty TEU | 22,884 | 31,038 | 47,531 |
| | Tonnage | 26,188 | 52,687 | 100,980 |
| | Total TEU | 56,435 | 77,301 | 123,264 |
| | Total Tonnage | 206,807 | 320,319 | 547,991 |

To be revised

Container Traffic (continued)

| Port (Country) | TEU / Tonnage | 1980 | 1985 | 1990 |
|---|---|---|---|---|
| | | | | (Jan-May) |
| Freeport | Import / Loaded TEU | 7,106 | 11,065 | 3,336 |
| | Empty TEU | 268 | 76 | 509 |
| | Tonnage | 76,596 | 103,323 | 51,015 |
| (Bahamas) | Export / Loaded TEU | 163 | 1,386 | 473 |
| | Empty TEU | 6,127 | 5,947 | 3,001 |
| | Tonnage | 13,508 | 10,618 | 2,617 |
| | Total TEU | 13,664 | 18,474 | 7,319 |
| | Total Tonnage | 90,104 | 113,941 | 53,632 |
| Bridgetown | Import / Loaded TEU | 9,275 | 13,173 | 17,754 |
| | Empty TEU | 138 | 1,557 | 528 |
| | Tonnage | 139,401 | 263,460 | 390,588 |
| (Barbados) | Export / Loaded TEU | 2,213 | 3,367 | 3,852 |
| | Empty TEU | 6,961 | 12,755 | 14,567 |
| | Tonnage | 47,117 | 67,340 | 84,744 |
| | Total TEU | 18,587 | 30,852 | 36,701 |
| | Total Tonnage | 186,518 | 330,800 | 475,332 |
| Port-au-Prince | Import / Loaded TEU | 15,637 | 19,441 | 13,801 |
| | Empty TEU | 994 | 665 | 643 |
| | Tonnage | 276,504 | 161,002 | 201,925 |
| (Haiti) | Export / Loaded TEU | 8,006 | 9,056 | 5,226 |
| | Empty TEU | 7,814 | 11,132 | 9,319 |
| | Tonnage | 65,844 | 53,584 | 49,326 |
| | Total TEU | 32,451 | 40,294 | 28,989 |
| | Total Tonnage | 342,348 | 214,586 | 251,251 |
| Kingston | Import / Loaded TEU | 39,852 | 78136 | 34,501 |
| | Empty TEU | 16,307 | 33,392 | 8,448 |
| | Tonnage | 708,110 | 1,071,297 | 887,482 |
| (Jamaica) | Export / Loaded TEU | 32,085 | 65,405 | 20,576 |
| | Empty TEU | 21,319 | 45,738 | 21,097 |
| | Tonnage | 531,932 | 900,048 | 548,768 |
| | Total TEU | 109,563 | 222,671 | 84,622 |
| | Total Tonnage | 1,240,042 | 1,971,345 | 1,436,250 |
| Pointe-a-Pitre | Import / Loaded TEU | | 35,400 | 51,571 |
| | Empty TEU | | 267 | 2,672 |
| | Tonnage | | 447,143 | 668,946 |
| (Guadeloupe) | Export / Loaded TEU | n.a. | 19,876 | 17,338 |
| | Empty TEU | | 19,327 | 30,559 |
| | Tonnage | | 316,141 | 310,255 |
| | Total TEU | | 74,870 | 102,140 |
| | Total Tonnage | | 763,284 | 979,201 |
| Willemstad | Import / Loaded TEU | 11,228 | 10,046 | 28,996 |
| | Empty TEU | 293 | 761 | 1,839 |
| | Tonnage | 155,527 | 172,664 | 258,570 |
| (Curacao) | Export / Loaded TEU | 1,379 | 2,836 | 12,607 |
| | Empty TEU | 9,848 | 7,893 | 17,930 |
| | Tonnage | 13,644 | 66,210 | 115,209 |
| | Total TEU | 22,748 | 21,536 | 61,372 |
| | Total Tonnage | 169,171 | 238,874 | 373,779 |

Container Traffic (continued)

| | | | | |
|---|---|---|---|---|
| San Juan (Puerto Rico) | Import / Loaded TEU | 214,050 | 440,815 | 635,445 |
| | Empty TEU | -- | 0 | 55,256 |
| | Tonnage | 3,328,568 | 3,871,311 | 5,283,838 |
| | Export / Loaded TEU | 214,050 | 176,326 | 138,140 |
| | Empty TEU | -- | 264,488 | 552,562 |
| | Tonnage | 967,312 | 1,334,807 | 1,239,419 |
| | Total TEU | 428,100 | 881,629 | 1,381,403 |
| | Total Tonnage | 4,295,880 | 5,206,118 | 6,523,257 |
| Port Castries (St. Lucia) | Import / Loaded TEU | 2,206 | 3,282 | 13,720 |
| | Empty TEU | -- | 342 | 4,036 |
| | Tonnage | 34,828 | 54,000 | 261,888 |
| | Export / Loaded TEU | 395 | 447 | 7,536 |
| | Empty TEU | 1,866 | 3,079 | 10,585 |
| | Tonnage | 10,552 | 8,000 | 148,267 |
| | Total TEU | 4,467 | 7,150 | 35,877 |
| | Total Tonnage | 45,380 | 62,000 | 410,155 |

Source: Containerization Yearbooks

Notes: 1) Container figures are in 20ft equivalents (TEU).

2) Tonnage units in the table as they relate to tare weights are specified below.

| | |
|---|---|
| Miami: | Short tons include tare weight except in 1985. |
| Puerto Limon/moin: | Metric tons include tare weight in 1990. |
| Puerto Castilla: | Short tons exclude tare weight in 1990. |
| Puerto Cortes: | Metric tons exclude tare weight. |
| Bahia las Minas: | Metric tons exclude tare weight. |
| Cristobal: | Metric tons exclude tare weight. |
| Freeport: | Short tons exclude tare weight. |
| Bridgetown: | Metric tons include tare weight. |
| Port-au-Prince: | Metric tons are used in 1980 and 1985, while long tons are used in 1990. In each case tare wieight is included in tonnage. |
| Kingston: | Metric tons are used in 1980, while freight tons are used in 1985 & 1990. In each case tare weight is excluded from tonnage. |
| Pointe-a-Pitre: | Metric tons include tare weight. |
| Willemstad: | Metric tons include tare weight except in 1985 when tare weight is excluded from tonnage. |
| San Juan: | Short tons exclude tare weight. |
| Port Castries: | Short tons, freight tons and revenue tons are used respectively in 1980, 1985 and 1990. Tare weight is excluded in each case. |

## CHAPTER 4 FREE TRADE ZONE POLICY IN PANAMA

### 4.1 Role of Free Trade Zones in Panama

(1) The building of the Panama Canal which opened the doors to international navigation in 1914 made the port of Colon a gateway to international trade.

In 1917, only three years after the Canal opened, serious thought was being given to the possibility of establishing a duty-free zone in Colon, though the idea was not realized until 1948.

(2) In 1948, the Republic of Panama conceived a project which aimed to extend and to strengthen its economy using the Isthmus's advantageous geographic location, and began the creation of the Colon Free Zone under the Decree-Law No. 18 of June 17, 1948.

Initially, the Colon Free Zone consisted of 38 hectares when its activities started in September 1953, but since then the commercial volume and importance of the Zone have been continuously growing (in the latest decade, volume and value almost tripled). See Table 4-1-1.

The Colon Free Zone has now become a great source of wealth for Panama as well as the principal free zone in the Western Hemisphere, holding a strong position in world-wide trade.

(3) In 1970, the Bank Law was amended (Law No. 238), granting various fiscal benefits to the bank with adapting an approval system under severe criteria of its establishment.

As a result, the number of banks increased from 24 in early 1970 to 116 (including representative offices) in January 1987, making Panama an International Financial Center. The statement of the Center at the end of the year 1991 is as follows;

| | (Million $) |
|---|---|
| Total assets: | 20,680 |
| Loan | 11,630 |
| Deposit | 17,120 |

Around 20 of these banks have branches operating from the Colon Free Zone itself contributing to international trade.

(4) On the other hand, the Republic attempted to create and operate Export Processing Zones under Law No.16 of November 6, 1990 in order to expand and to develop the export of goods and services manufactured, assembled or processed in a free trade system. But this law was not enough to attract international business enterprises and was repealed by the new Law No.25 of November 30, 1992.

At present, three Zones, namely Isla Margarita, PANEXPORT and Panama Teleport have been set up, and it is expected that other Zones would be created elsewhere in the country to develop the economy.

(5) The Government of Panama also approved Law No.29 on December 30, 1992, implementing a special free port system to be initially applicable in the City of Colon.

This free port system is considered a most revolutionary plan for development of a region that had been overwhelmed by multiple economic and social problems. It is expected that this economic plan will create a total economic reactivation of the second city of the Republic and first commercial activity center of the Isthmus.

Retail sales, not allowed in the Colon Free Zone, may attract many tourists and recapture the cruising ships and ship crews transiting the Canal.

The Colon Free Port has also the possibility of becoming a complement to the Colon Free Zone with its advantage of neighboring location insofar that the retail sales would take place in the city, turning it into the showroom of wholesale business of the Zone.

(6) As stated above, there exist three types of Free Trade Zone system in Panama, Colon Free Zone, Export Processing Zones, and Colon Free Port. The last two, however, are very new compared with the first which has a history of operations of more than 40 years.

The Free Trade Zone scheme seems an inevitable and natural conclusion based on commercial and historical tradition and in accordance with the comparative advantages of the geographic position of Panama for the rest of the world.

It can be said that the Free Trade Zone scheme offers a powerful impetus for the Panamanian economy equal to the Panama Canal (13,441 cargo ships of over 75 nations transited in the latest year) and the International Financial Center of Panama.

Table 4-1-1 Commercial Movement in the Colon Free Zone (in weight and values) 1970-1992

| YEARS | COMMERCIAL MOVEMENT | | IMPORTATION | | RE-EXPORTATION | |
|---|---|---|---|---|---|---|
| | WEITGHT (MET. TON) | VALUE (MILLIONS $) | WEITGHT (MET. TON) | VALUE (MILLIONS $) | WEITGHT (MET. TON) | VALUE (MILLIONS $) |
| 1970 | 76,294 | 440.6 | 43,704 | 191.2 | 34,590 | 249.4 |
| 71 | 92,185 | 471.7 | 51,310 | 216.5 | 40,875 | 255.2 |
| 72 | 100,192 | 558.2 | 53,194 | 245.5 | 46,998 | 312.7 |
| 73 | 106,378 | 686.0 | 58,040 | 309.9 | 48,338 | 376.1 |
| 74 | 166,655 | 940.1 | 96,379 | 462.2 | 70,276 | 477.9 |
| 75 | 153,545 | 946.2 | 82,082 | 415.3 | 71,463 | 530.9 |
| 76 | 184,340 | 1,209.5 | 97,756 | 560.3 | 86,584 | 649.2 |
| 77 | 242,518 | 1,691.5 | 128,883 | 786.7 | 113,635 | 904.8 |
| 78 | 299,144 | 2,288.3 | 158,319 | 1,081.6 | 140,825 | 1,206.7 |
| 79 | 330,669 | 2,854.0 | 170,851 | 1,324.9 | 159,818 | 1,529.1 |
| 80 | 380,353 | 3,837.1 | 197,082 | 1,781.2 | 183,271 | 2,055.9 |
| 81 | 383,755 | 4,320.1 | 200,915 | 1,992.0 | 182,840 | 2,328.1 |
| 82 | 364,744 | 3,849.0 | 185,318 | 1,703.4 | 179,426 | 2,144.6 |
| 83 | 275,929 | 2,611.1 | 135,564 | 1,139.4 | 140,365 | 1,471.7 |
| 84 | 294,976 | 2,870.7 | 156,410 | 1,338.1 | 138,566 | 1,532.6 |
| 85 | 354,459 | 3,373.6 | 183,323 | 1,585.6 | 171,136 | 1,788.0 |
| 86 | 476,904 | 4,113.4 | 250,757 | 1,930.8 | 226,147 | 2,182.6 |
| 87 | 513,297 | 4,283.2 | 270,922 | 2,005.2 | 242,375 | 2,278.0 |
| 88 | 437,654 | 3,963.0 | 226,954 | 1,843.6 | 210,700 | 2,119.4 |
| 89 | 533,262 | 4,642.3 | 281,847 | 2,272.8 | 251,415 | 2,369.5 |
| 90 (P) | 597,804 | 5,762.9 | 309,746 | 2,676.6 | 288,058 | 3,086.3 |
| 91 (P) | 859,822 | 7,640.8 | 450,235 | 3,681.1 | 409,587 | 3,959.7 |
| 92 (P) | 1,013,695 | 9,180.4 | 533,198 | 4,358.9 | 479,497 | 4,821.5 |

(P) Preliminary Figures

SOURCE: Administration of Colon Free Zone

4.2 Outline of Laws and Regulations Related to Free Trade Activity and System.

(1) Having recently added the Export Processing Zones and the Colon Free Port system to the Colon Free Zone, the Republic of Panama today has three different tax-free systems.

(2) Main objectives of these systems are to expand and strengthen the national or regional economy through the advantageous geographic location of Panama, but there are different functions among them according to their respective final aims.

(3) Table 4-2-1 compares the three systems in terms of Basic Laws and Regulations, Objective Activities, Development and Management Body, Tax Incentives, Other Incentives, Restriction on Activities, and Areas and Projects Applied.

Table 4-2-1 Free Trade Systems in Panama

| | Colon Free Zone | Export Processing Zones | Colon Free Port |
|---|---|---|---|
| 1. Basic Laws and Regulations | 1. Decree-Law No.18 (Jun. 17 1948)<br>2. Decree No.428 (Sept. 7, 1953)<br>3. Act.No.23 (Jun. 23,1977)<br>4. Decree No.48 (Apr. 14, 1978)<br>5. Decree No.5 (Jan. 19, 1979) | 1. Law No.16 (Nov. 6, 1990)<br>But repealed by:<br>2. Law No.25 (Nov. 30, 1992) | Law No.29 (Dec.30, 1992) |
| 2 Main Objective Activities | Re-exportation for Central & South America | Export of services and goods | Retail of imported goods |
| 3. Development and Management Body | Administration of Colon Free Zone | 1. General control Panamanian Institute of Foreign Trade (IPCE).<br>2. Site: Promoter and Operator Company. | Province of Colon |
| 4. Tax Incentives | 1. Tax exempt on dividends earned abroad or derived from offshore operations<br>2. No tax on capital investments<br>3. No municipal or local tax<br>4. Tax exempt on all goods imported<br>5. Preferential tax on income from export<br>6. Income tax discount by number of Panamanian workers | 1. Total exemption from taxes, duties and other levies on importation of machinery, material etc. required for operations.<br>2. No income tax<br>3. No export tax<br>4. No sales tax<br>5. No tax on capital or assets<br>6. Others | No tax, duties and other levies on imported goods. |
| 5. Other Incentives | | Special labor provisions | |
| 6. Restriction on Activities | 1. More than 60 % for re-exportation<br>2. More than 10 Panamanian workers to be employed<br>3. No retail<br>4. No residence | | |
| 7. Areas and Projects applied (As of July 1993) | Colon: 56.3 ha.<br>France Field: 54 ha.<br>Future Expansion: 255.2 ha.<br>(Within Province of Colon) | Margarita Island: (68 ha.)<br>PANEXPORT: (30 ha.)<br>Panama Teleport: (100 ha.)<br>(Additional designation available anywhere in Panama) | Manzanillo Island Area (Expansion available in Province of Colon) |

## 4.3 Colon Free Zone

### (1) Establishment

The Government of Panama issued the Decree-Law No. 18 on the 17th of June, 1948 (some articles amended by Act. No. 22 of June 23, 1977) to establish the Colon Free Zone. The Colon Free Zone was created as an Institution of the State which has its own legal identity and is autonomous. Also at that time, the administration to operate the Free Zone was organized.

(2) Location and Activities

The Colon Free Zone is a tax-free area situated in the city of Colon, the second largest city in Panama with a population of 140,908 (according to the census in 1990) and is located at the entrance of the Atlantic side of the Panama Canal. This Free Zone presently is divided into two large areas, one is located in Casco Viejo and acts as the commercial area, south-east of the city separated by a big wall, and the other in France Field, opposite side of the city across the Folk River as the area for warehouses. The area of Casco Viejo consists of 56.3 hectares including part of COFRISA project area, while France Field consists of 54 hectares.

Today there are over 1,400 companies established in the Zone to expedite importation, storage, assembly, repacking and re-exportation of large amounts of goods from all over the world, from electronic devices of all kind to pharmaceutical products, including also other goods such as liquor, cigarettes, office and home furniture, clothing, shoes, jewels, toys, etc.

The Free Zone is functioning as a transit center to re-export the above goods mainly to Central and South America.

Major activities are classified into the following three types;

(a) Transit trade using warehouses,
(b) Direct trade by documentation only without any import of goods into Panama
(c) Processing trade using imported raw materials.

A private entity may set up operations after having entered into one of the following contract types. Each scheme has its own advantages and thus a prospective company can choose the one which best suits its interests.

(a) Land lease contracts with the administration of the Zone for a 20-year period
(b) Office lease contracts
(c) Contracts with a representative agent
(d) Public warehouse lease contracts

The Free Zone has many incentives. One of the incentives is in the form of tax exemptions. Major tax benefits are as follows:

(a) Tax exemption on dividends earned from operating abroad or derived from "offshore" operations.
(b) No tax on capital investments.
(c) No municipal or local tax.
(d) All imported goods exempted from tax.
(e) Preferential tax on income or profits from export:

| Taxable Income | | Taxes |
|---|---|---|
| up to | $ 15,000 | 2.5 % |
| up to | $ 30,000 | $ 375 + 4.0 % over $ 15,000 |
| up to | $100,000 | $ 975 + 6.0 % over $ 30,000 |
| over | $100,000 | $ 5,175 + 8.5 % over $100,000 |

(f) Income tax discount according to the number of Panamanian workers:

| Number of Workers | Tax Discount |
|---|---|
| 30 - 100 | 0.5 % |
| 101 - 200 | 1.0 % |
| 201 and over | 1.5 % |

(3) Past Records of Commercial Activities

In September 1952, the Government of President José A. Remón opened the first building in the Free Zone, and the commercial activities in the Zone started in September 1953 with an area of 5.6 hectares and 10 companies. The Zone expanded remarkably during the 70's economical development in Central and South America and by 1978 the entire area was occupied. To meet the great demand for more space it became necessary to use the land known as "France Field", which had been returned to Panama through the Torrijos-Carter Treaties. Between 1980 and 1983, a total of 130 million dollars furnished by a private bank group, the World Bank and so on, was used to prepare land areas and maintain the roads in France Field.

However, after commercial activities peaked in 1981 (volume of 383,755 metric tons and value of 4.32 billion dollars), the volume and value of trade handled in the Free Zone decreased dramatically because of the currency devaluation and the tremendous increase of foreign debt in Central America.

After 1984, activities expanded steadily again and in 1986 surpassed the peak volume of 1981 by 24.3%. Due to U.S. economic sanctions against Panama in 1988 and the U.S. military invasion in 1989, its commercial activities declined, but the damage was fortunately small, and the total trade volume and value handled in 1992 was 1,013,695 metric tons and 9.18 billion dollars respectively (both are preliminary figures), almost three times in the latest decade.

Average annual growth rates for past five years from 1988 to 1992 were recorded at around 26% for both trade volume and values and this shows a rapid increase of activities in recent years.

Past records of trade in the Colon Free Zone from 1970 to 1992 are shown in Figure 4-3-1 (trade volume in metric tons) and Figure 4-3-2 (trade values in dollars). Considering the area expansion plan in the Free Zone to be described later, it is anticipated that the trade volume in the Zone will increase steadily in the future.

As to the import origins of cargo (or goods) through the Free Zone, the share of import volume from East Asia, mainly Japan, Taiwan, Hong Kong and South Korea, was 64% of the total in 1991. The other origins are the United States, Thailand, Italy, Colombia, France, Singapore, Switzerland, etc. Regarding the re-export destinations of cargo (or goods) through the Free Zone by area, the most important is Central and South America. The main countries are Aruba (the Netherlands Antilles), Colombia, Panama, Ecuador, Venezuela, Chile, Paraguay, Mexico, Brazil, Costa Rica, Nicaragua, etc.

As aforementioned, all types of goods are handled in the Free Zone from electronic devices to pharmaceutical products, but the major commodities are household appliances and textile products.

As for the transit means of cargo, more than 90% of importation is transported by ship and its share has been more than 95% in the latest few years. The share of importation of the port of Balboa was around 20% of the total import in the early 1980's (only 2.7% in 1989). In recent years, however, most of the imported cargo has been handled in three ports: Cristobal, Coco Solo Norte and Bahia Las Minas, around the city of Colon. Predominant among them is the port of Cristobal, handling around 80% of cargo for the Free Zone. Importation by air is around 3% of the total.

In regard to re-exportation, unlike imports, transit means is not exclusively by ship because the main destinations are Central and South America, both accessible by land. Land transportation has slightly expanded its share (24.7% in 1989), while air transportation has been decreasing in recent years to around 15% (only 10.7% in 1989). It was about 20% in the early 1980's. The share of transportation by ship has also been increasing slightly and it was 64.6% in 1989. Most re-exported cargo from the Free Zone is handled in three ports around the city of Colon; Cristobal, Coco Solo Norte and Bahia Las Minas, as importation. In 1989, 56.7% of re-exported cargo (87.8% of the total ship cargo) was handled in these three ports, Cristobal and Coco Solo Norte in particular.

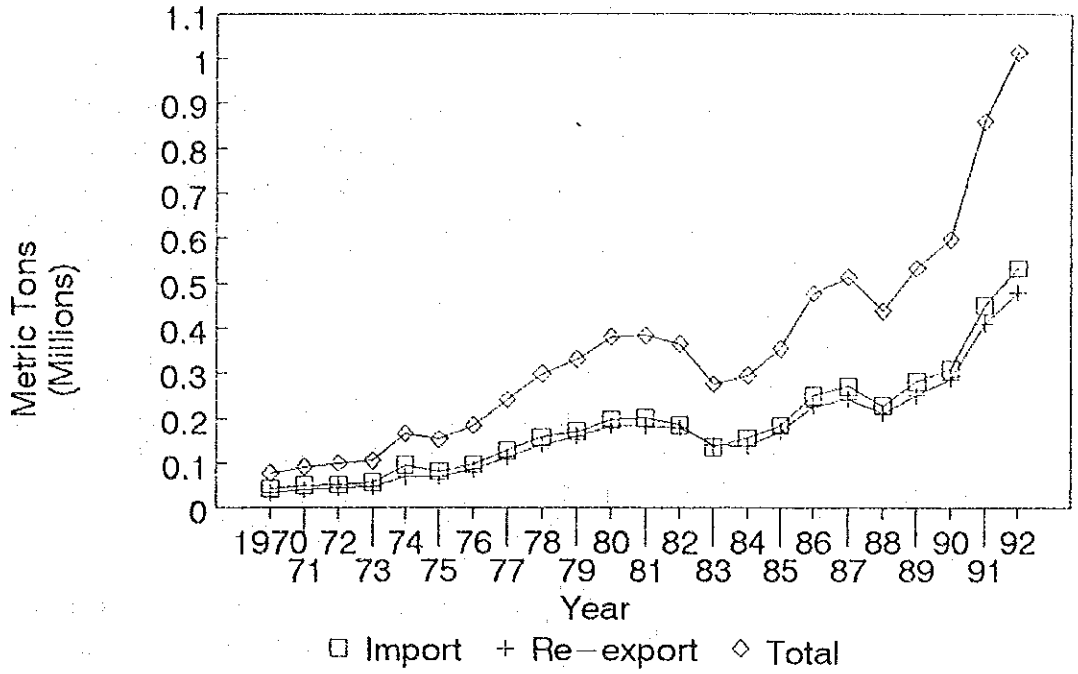



Figure 4-3-1 Trade in Colon Free Zone: Volume in Metric Tons
1990-1992: Preliminary Figures
(Source: The Colon Free Zone Administration)

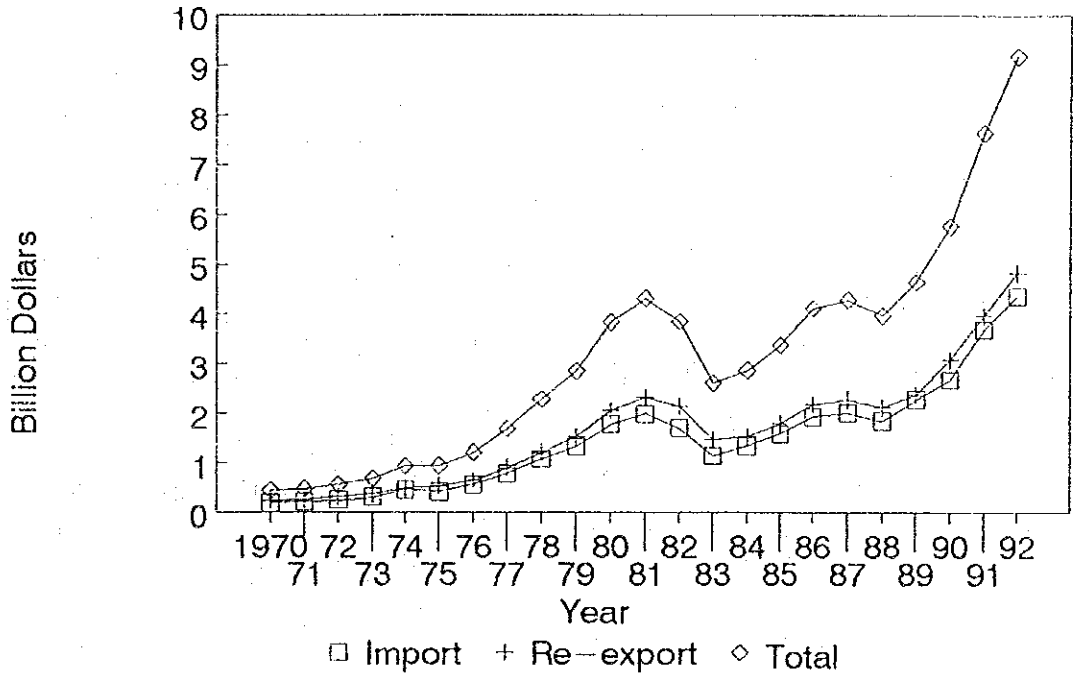



Figure 4-3-2 Trade in Colon Free Zone: Value in Dollars
1990-1992: Preliminary Figures
(Source: The Colon Free Zone Administration)

(4) Future Prospect of Trade Activities

As aforementioned, the main destinations of the Free Zone cargo are countries in Central and South America. Needless to say, the reason why the trade volume in the Free Zone has been increasing in recent years, as described above in the Figures, mainly comes from the policies of economic liberalization in these countries. It is anticipated that the trade volume in the Free Zone will increase continuously in the future in connection with the steady demand in these countries provided that their economies continue to grow.

From a long term point of view, however, there may be several countries that face politically volatile conditions, so unconditional optimism should be avoided. But it is expected that the volume handled within the Zone will have a tendency to expand in the future, though it might decrease in any given year.

Further, there is a possibility that free zones in South America like the Colon Free Zone will be established, but because of the geographical and fiscal advantages (especially, no currency controls) of the Zone, it will not have an unduly negative effect. Actually, the Colon Free Zone is a major supplier of goods for other free zones such as San Andres in Colombia, Margarita Island in Venezuela, and the Commercial Center of Aruba. Also, in the near future the importation from the Export Processing Zones in Panama itself may take place in the Free Zone.

(5) Future Expansion Plan

The Free Zone remarkably developed after its establishment in 1948 and the entire commercial area was occupied by 1978. To meet the great demand for more space, through the Agreement between the Government of the United States and that of Panama in 1979, it was determined that the area formerly used as the U.S. Army's landing strip, opposite side of the city of Colon across the Folk River, would be used for expansion space. The Government of Panama approved the development plan in areas of the city of Colon and its surroundings in 1980. As aforementioned, this expansion program was financed by the World Bank and the commercial banks, and the construction of the warehouse area in France Field and surrounding roads were executed.

Furthermore the Consortium for the Development of Folk River, S.A. (COFRISA) was established led by Japanese enterprises to fill in the Folk River Bay (45 hectares) adding 4.5 hectares adjacent to the original area (1st. phase project).

The total area which has been used or for use at present (June 1993) is as follows:

| | | | |
|---|---|---|---|
| (a) | Casco Viejo | 50 | hectares |
| (b) | COFRISA 1st. Phase | 4.5 | |
| (c) | COFRISA part of 2nd. Phase | 1.8 | |
| (d) | France Field | 54 | |
| | Total: | 110.3 | hectares |

(Source: Colon Free Zone Administration)

COFRISA, also, has now been filling in the Bay area of 12.8 hectares as a 2nd. phase project, according to the administration.

To meet the expected demand for more space by the enterprises for increase of the trade volume in the future, the administration of the Colon Free Zone has a plan to prepare more lands, as follows;

(a) Reclamation around France Field 80 hectares

(b) Coco Solite 114 hectares

East side of France Field across Randolph Av. where at present containers are stacked in part.

(c) Nueve de Enero 18 hectares

North side of France Field where some habitants live at present, so the matter of their relocation or acquisition of an alternative land area should be studied.

Furthermore, there are 30.4 hectares to be reclaimed of COFRISA project as 3rd. phase and after (49.5 hectares - (4.5 + 1.8 + 12.8 hectares)).

Based on the above figures, the total area of the Free Zone in the future will be 365.5 hectares of which 110.3 hectares are already completed.

The administration also has an Industrial Park plan near the France Field Airport, but many problems exist including environment that should be studied and resolved, so presently this plan is pending.

In 1992, the administration began construction of a 400 yard (around 360 meters) bridge at a cost of US$ 3.7 million to unite the Colon city sectors and the France Field, reducing in this way the 5-kilometer distance that currently connects both sectors. The bridge is scheduled to be completed in late 1993.

Figure 4-3-3 shows the expansion plan for the Free Zone described above.

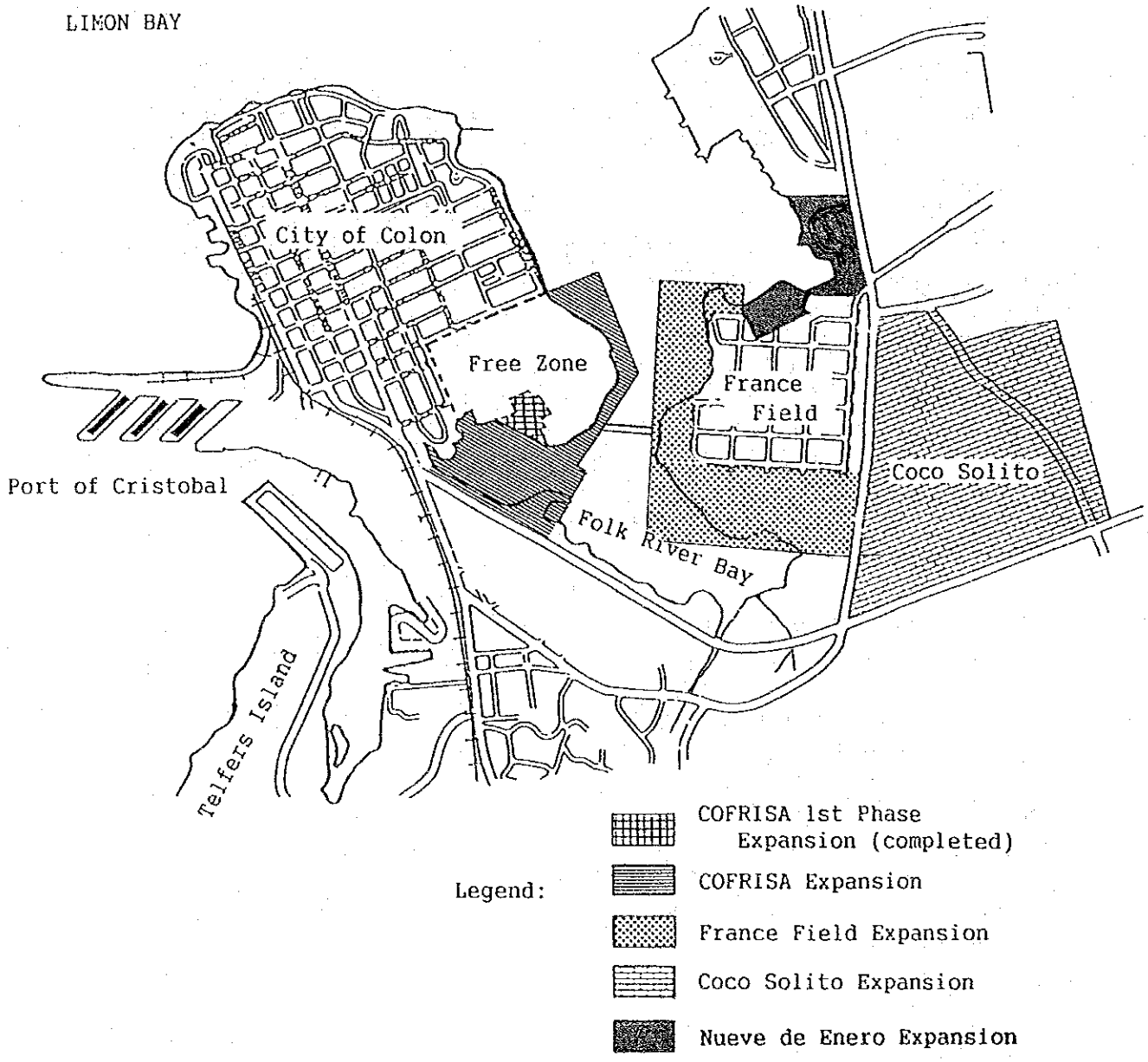



Figure 4-3-3 Colon Free Zone Expansion Plan

(Source: The Colon Free Zone Administration)

## 4.4 Export Processing Zones (EPZs)

### (1) Establishment

On November 6, 1990, the Republic of Panama issued Law No. 16 which regulates the creation and development of Export Processing Zones within the country, but this law was not enough to attract foreign investors or business entrepreneurs and was repealed by the new Law No. 25 of November 30, 1992.

The Panama Trade Development Institute (IPCE) acts as Technical Secretariat for the fulfillment of the functions of the National Commission of Export Processing Zones, and Promoter and Operator, natural or juridical person, private or public, national or foreign, assume the responsibility to plan, direct, administrate, operate and supervise the integral functioning of the Zones.

### (2) Location and Activities

Currently three Zones have been established, Isla Margarita, Panama Teleport and PANEXPORT.

#### 1) Isla Margarita

Isla Margarita is located at the Atlantic entrance of the Panama Canal, near the port of Coco Solo Norte, and a ten minute drive to the city of Colon.

The area of Isla Margarita is around 68 hectares, of which a 30-hectare area is for the industrial zone while the other adjacent 38-hectare area is for the tourist and residential zone. The Isla Margarita Group, a private company, acts as a Promoter and Operator to plan, administrate and operate the Zone. The first project, the Export Processing Zone, has already started and two textile industries whose production is export oriented are actually operating in the Zone.

#### 2) Panama Teleport

Panama Teleport is located beside the Tocumen International Airport. The area is around 100 hectares and is planned to be divided into the following Zones; International Business Park, Export Processing Zone, Scientific and Technological Research Zone, and Advanced Telecommunications Zone.

The Panama Teleport Corporation, the owner of the area, acts as a Promoter and Operator of the Zone.

The construction schedule of the first period starting from the year 1991 has already begun and the access roads, information office, the offices and industries buildings (assembly and warehouse buildings for light industry) and infrastructure are under construction.

3) PANEXPORT, Ojo de Agua

PANEXPORT is located in San Miguelito, a suburb of Panama City, and is a 15 minute drive from the Banking Center, 20 minute drive from the Tocumen International Airport and 20 minute drive to the port of Balboa.

The PANEXPORT consists of a total area of around 30 hectares including Forest area of around 5.5 hectares. The total area of lots for industry is around 22 hectares where mainly light industries, services and technological enterprises are expected to be established.

The Sucasa Group, the owner of the land, acts as a Promoter and Operator of the Export Processing Zone, that is, PANEXPORT at Ojo de Agua, and is seeking to establish joint-ventures with companies from abroad.

The construction of the access roads and the preparations of 37 lots for industry have just now started as phase 1, and will be completed within 3 years.

(3) Future Prospect of Activities

1) Isla Margarita

As aforementioned, two textile industries are operating in the Zone and it is expected that eight more industries will be established within two years.

According to the Isla Margarita Group, the project is planned to be accomplished over a period of 15 years, and 1993 is the fourth year. The Export Processing Zone will, in the future, consist of 44 Factory Buildings (88 companies), Training Center, Administration Building, International Trade Center, Bus Terminal and Cafeteria. Light industry, assembly, value-added, or services are the target industries for the Zone.

Figure 4-4-1 shows the entire project of the Zone.

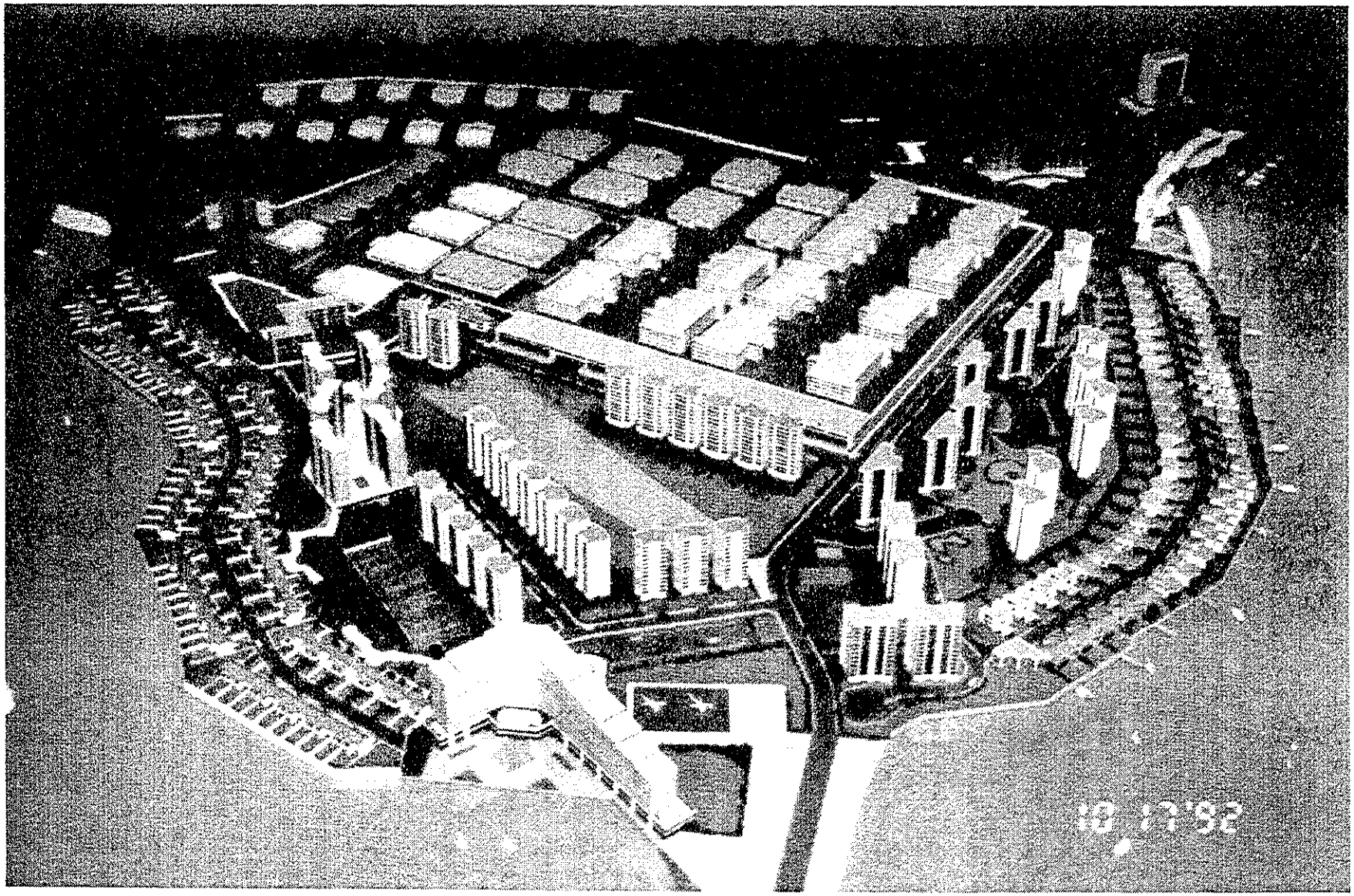


Figure 4-4-1 Export Processing Zone at Isla Margarita

2) Panama Teleport

The 100 hectares will be divided into the following sections; a) World Business Center Plaza, b) Industrial Section, c) Office Buildings and International Trade Section, d) Containers Park Section, e) Scientific and Technological Research Section, f) General Services Area, g) The Earth Station and h) The Telecenter.

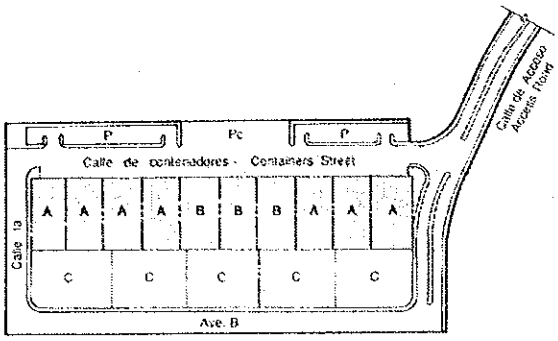
The project is programmed to be accomplished over a period of 20 years, divided into 4 five-year periods starting from the year 1991 (final year is 2010). The development area of the first period for the Export Processing Zone is 5 hectares + 8,650 m2, as shown in Figure 4-4-2.

The Export Processing Zone is designed for the establishment and operation of:

a) Industrial companies in manufacturing, assembling and processing of all types of goods for exportation, mainly focused on hi-tech industries, including electronics, bio-technology and superconductors.

b) Services companies in production and processing of all kinds of services for worldwide users. Information processing activities (data bank, data entry, data processing, software production, translation, etc.) are main targets.

The total investment for the project is estimated at 1 billion dollars over a period of 20 years. Figure 4-4-3 shows the International Business Park and Export Processing Zone.

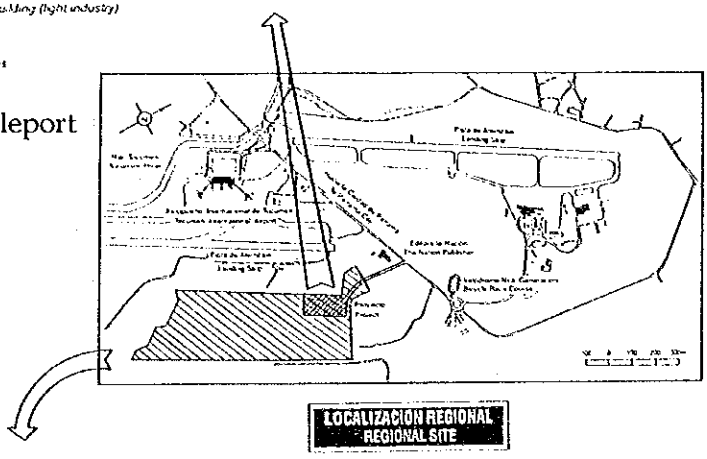



PRIMERA ETAPA: 5 HECTAREAS + 8,650m
FIRST STEP: 5 HECTARES + 8,650 mts²

AREA DE DESARROLLO / Development area

A Edificio para oficinas y salas de exhibición, compañías comerciales, mercadeo, seguros, banca, servicios de información, etc.
Offices and showrooms building, trading companies, marketing, insurance, banks, information services, etc.
B Edificio de ensamblaje y depósitos (industria liviana) Assembly and warehouse building (light industry)
P Estacionamientos Parking
Pc Estacionamientos de Contenedores Containers Park
C Futuros Edificios para Oficinas e Industrias Future Office and Industries Buildings

Figure 4-4-2 Plan of Panama Teleport



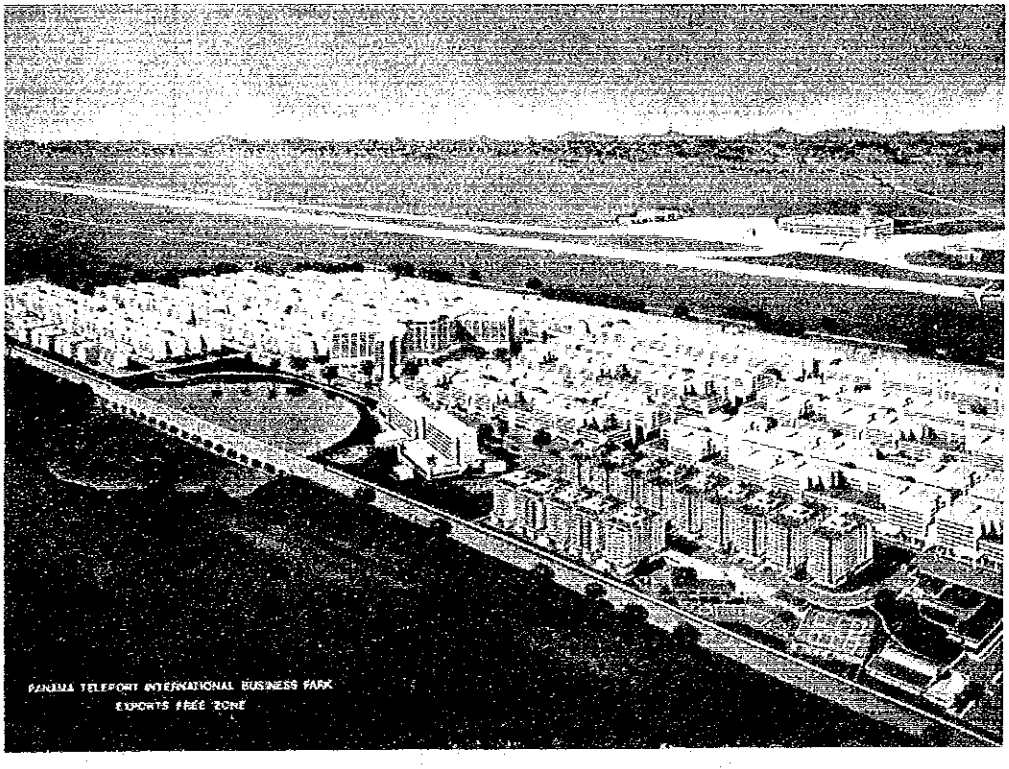




Figure 4-4-3 View of Panama Teleport International Business Park Exports Free Zone

3) PANEXPORT, Ojo de Agua

PANEXPORT EPZ is intended for the establishment of companies dedicated to export activities, so around 22 hectares of the total area of 30 hectares are planned for industrial companies.

The construction schedule of the Zone is programmed to be accomplished over a period of 7 years, starting from 1993. Figure 4-4-4 illustrates phase 1 and 2, and phase 1 consists of lot No. 1 to No. 37, phase 2 from lot No. 38 to No. 55.

The entire scale of model of the Zone is shown in Figure 4-4-5. Total number of lots for industrial use will be 85.

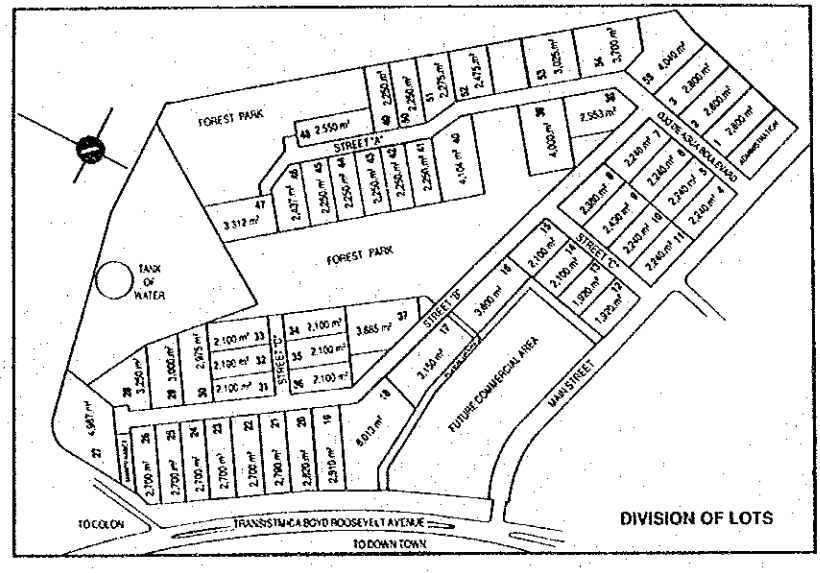



Figure 4-4-4 Plan of PANEXPORT, Ojo de Agua

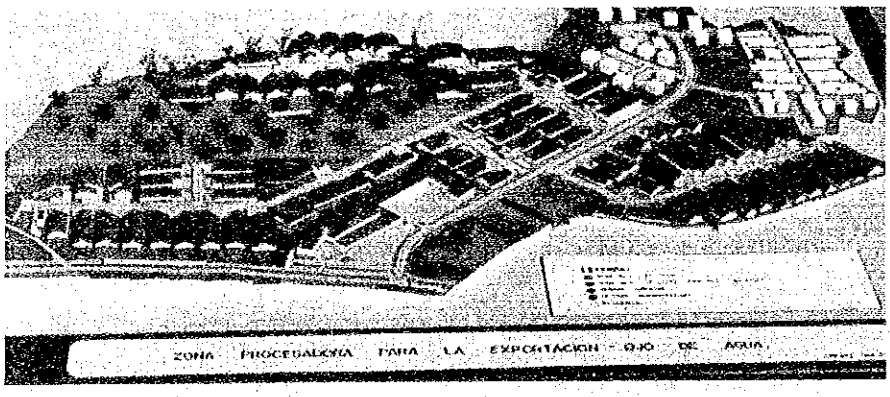



Figure 4-4-5 Model View of PANEXPORT, Ojo de Agua

(4) Future Expansion Plan

As above mentioned, since the new Law was just introduced at the end of November 1992, presently there exist only three Export Processing Zones in Panama, and they have recently stated their activities with a long term plan for 21st century.

The said Law No. 25 hopes that the Export Processing Zones may contribute to the country's development, and to employment and foreign currency generation through the export of goods and services, promoting the scientific, technological, economic, cultural, educational, and social development of Panama.

To this effect, the Law allows for Zones to be established anywhere in the country, and stipulates the advantageous fiscal system (aforementioned), special labor provisions, and special immigration system applicable especially to the Zones. The biggest incentive will be the permanent exemption from income tax.

The Export Processing Zones may be private, governmental or mixed (Article II), but most will be private. To establish the Zone, Promoter and Operator are necessary, and the future expansion of the Zone will depend on the possibility of success of the above three Zones and on the political and economic conditions of Panama.

4.5 Free Port

(1) Establishment

On December 30, 1992, the Republic of Panama issued Law No. 29 by which a special system of Free Port is adopted for the Province of Colon.

The Government issued Decree No. 58 of April 6, 1993 to integrate the Advisory Board consisting of the Minister of Finance and Treasury, the Governor of the Province of Colon, etc. and the Board was established on April 29, 1993.

(2) Location and Activities

The Free Port is initially circumscribed within the limits of Manzanillo Island, the site of the city of Colon, except the Free Zone area.

It is expected that retail sales, not allowed by Colon Free Zone legislation, will attract a substantial number of tourists, and will be able to recapture the cruising ships and ship-crews transiting the Canal.

Nevertheless, for this project to be successful, it is necessary that concrete, fast, and efficient plans be implemented in the city of Colon that would restore the city's previous environment of security and beauty, and that all the infrastructure be renewed to give the local and foreign investors the additional incentive of a healthy,

clean and safe city.

(3) Future Prospect of Activities

Located beside the Colon Free Zone, the Colon Free Port will rapidly become the Free Zone complement as the show-window of the Zone's wholesale business.

In so far as the tax-free retail sales would take place in the Free Port at very attractive prices, the tourist flow that today accounts for 300,000 to 400,000 a year, could increase on a large scale and reach other free port levels.

(4) Future Expansion Plan

As above mentioned, the Colon Free Port is initially circumscribed in Colon city except the Free Zone area and it could be enlarged to other areas of the Province of Colon with approval of the Congress.

Nevertheless, to establish a free zone, geographical advantages accessible by sea, air and/or land from abroad should be considered. From this point of view, the city of Colon will stay as the only free port for the time being and if it could be amplified to other areas in the future, the new Free Port would be created in an area near the city of Colon.

4.6 Future Prospect and Effect on Port Development

(1) As stated above, there are three types of Free Trade system in Panama; the Colon Free Zone, the Export Processing Zones and Colon Free Port. Although similar in that they are all free trade systems, the background and function of each are different, and there is officially no long term future prospect of integration at present.

(2) The Colon Free Zone with a history of more than 40 years has steadily expanded into the principal free zone of the Western Hemisphere, and the activities are forecasted to be enlarged in line with land expansion plans in the future.

The Export Processing Zones that exist presently in 3 sites with a total area of around 200 hectares have just started construction of the first phase under a long term schedule (one of which is over a period of 20 years), and the activities of the enterprises which will be established in the Zones are expected to be expanded year by year. Furthermore, other EPZs may be created elsewhere in the future.

The Colon Free Port is already a legal reality, but it will take time before it becomes truly functional, depending upon the local authorities and all of the residents of the Colon City. But there is no doubt that this system will create an economic reactivation of the city through the import and retail sales of tax-free goods.

As stated above, the importance and scale of the activities of the free trade systems of Panama will increase in the future.

(3) Transit share by ship of imported goods of the Colon Free Zone has been more than 95% in recent years and that of the re-exported goods more than 60% (64.6% in 1989). In case of the Export Processing Zones and the Colon Free Port, the transit share by ship of imported goods will probably be the same as the Colon Free Zone, and that of the exported goods (import only in Colon Free Port) will be more than the Colon Free Zone because the destinations are not concentrated within Central and South America.

Therefore, to meet the increase of free trade activities in the future, it will be necessary to develop the ports and other transport infrastructure.

As to the ports handling cargoes from or to the Colon Free Zone, Cristobal is principal; its share is approx. 80% of the total import and more than 30% of the total re-export. The present conditions of the port of Cristobal are not sufficient to meet future demand of commercial activities of the Colon Free Zone and it is necessary to rehabilitate and modernize the port facilities including the existing container terminal. But even this would not suffice because the capacity of the port is limited, and a new development site for the port facilities including container terminal is thus needed to meet the future Colon Free Zone activities and the development of trade activities of the Export Processing Zones and the Colon Free Port. Not only the Colon Free Port and Isla Margarita which are located on the Atlantic side, but also the Export Processing Zones Panama Teleport or PANEXPORT Ojo de Agua which are located at the Pacific side will utilize the ports of the Atlantic side in trade with Europe, Africa, Middle East, Atlantic South America, the Caribbean countries, the east side U.S. etc.

# CHAPTER 5 OUTLINE OF PANAMANIAN PORTS

## 5.1 Ports Location and Major Functions

### 5.1.1 General

The Republic of Panama is geographically situated in an important position which connects the North and the South American Continents, and at the same time, separates the Pacific Ocean from the Atlantic Ocean. According to the development of world maritime transport, Panama's geographical characteristics figure the world's attention and Panama has established its status as a key place in world maritime transport since the opening of the Panama Canal in early 20th century.

### 5.1.2 Location of Ports

In Panama, there are nineteen ports; nine ports in the Atlantic side, ten ports in the Pacific side as shown in Table 5-1-1. Of those, the National Port Authority (APN) controls thirteen ports, and the remaining (six ports) are owned and operated by private entities such as oil companies.

The locations of these ports are shown in Figure 5-1-1.

Table 5-1-1 Ports in Panama

| [Atlantic Side] | | | |
|---|---|---|---|
| No. | Name of Port | Use | |
| 1 | Cristobal | Overseas Commercial Port | APN |
| 2 | Coco Solo Norte | Overseas Commercial Port | APN |
| 3 | Bahia Las Minas (carga seca)<br>Bahia Las Minas (Oil Term.) | Overseas Commercial Port<br>Oil Berth | APN<br>- |
| 4 | Obaldia | | - |
| 5 | Chiriqui Grande | | - |
| 6 | Chiriqui Grande Terminal | Oil Berth | - |
| 7 | Bocas del Toro | Domestic Port | APN |
| 8 | Almirante | Overseas Port for Banana | APN |
| 9 | Almirante Terminal | Oil Berth | - |
| [Pacific Side] | | | |
| No. | Name of Port | Use | |
| 10 | La Palma | Domestic Port | APN |
| 11 | Panama | Overseas Port | APN |
| 12 | Balboa | Overseas Commercial Port | APN |
| 13 | Taboga | | - |
| 14 | Vacamonte | Fishery Port | APN |
| 15 | Aguadulce | Overseas Port for Sugar | APN |
| 16 | Mutis | Domestic Port | APN |
| 17 | Pedregal | Overseas Port | APN |
| 18 | Almuelles | Overseas Port for Banana | APN |
| 19 | Charco Azul | Oil Berth | - |

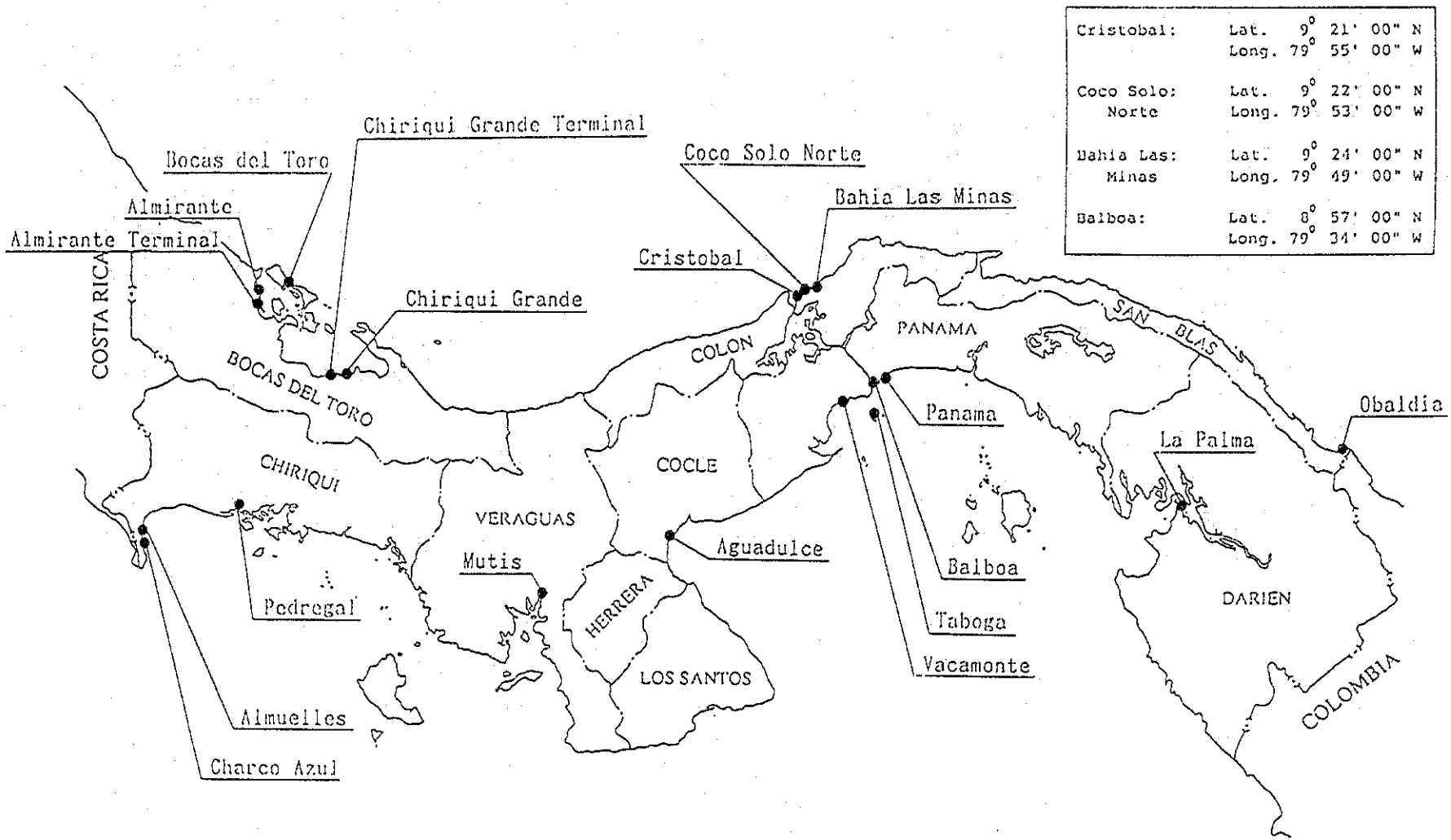



Figure 5-1-1 Locations of Ports in Panama

(Source: Autoridad Portuaria Nacional)

### 5.1.3 Major Functions of Ports

Among the thirteen ports controlled by APN, there are five main ports (port of Cristobal, port of Coco Solo Norte, port of Bahia Las Minas (carga seca), port of Balboa and port of Vacamonte) and the remaining eight ports constitute secondary ports.

Major functions of Panamanian ports including ports for special purposes controlled by private companies are described below. Port classifications below are in accordance with the annual statistic report prepared by APN in 1992.

(1) Ports for Overseas Cargo

1) Cristobal, Coco Solo Norte,
Bahia Las Minas (carga seca) and Balboa

Regarding four ports: port of Cristobal, port of Coco Solo Norte, port of Bahia Las Minas (carga seca) and port of Balboa, the details are described in the following paragraph. These four ports handle more than half of the total cargo handled in Panama and consequently, these ports are playing vital roles for Panamanian maritime activities. Excluding the port of Coco Solo Norte, the other three ports handle only overseas cargo. The domestic cargo volume handled in the port of Coco Solo Norte is decreasing but overseas cargo volume has been increasing recently. Excluding ports for special purposes, like handling banana and sugar, these four ports are handling most overseas cargo in Panama. The ports of Cristobal and Balboa are identified as a "Port Complex" according to the APN port classifications.

2) Pedregal

The port of Pedregal is located in the Chiriqui Province on the Pacific side. General cargo (sacked sugar, fertilizer, shrimp etc.) and bulk sugar are mainly handled in this port. The cargo volume handled was 23,425 metric tons in 1991 and has been decreasing in this decade. The number of ship calls in 1991 was 243 (219 ships handled cargo).

3) Panama

The port of Panama is classified as a port for overseas cargo, but 90% of the total cargo handled was for domestic trade. General cargo (loading) and agricultural products (wood, corn, banana; unloading) from the Darien Province are mainly handled at this port. The cargo volume handled was 20,126 metric tons in 1991 and has been decreasing in this decade. The number of ship calls in 1991 was 463 (411 ships handled cargo).

(2) Ports for Special Purposes

1) Vacamonte

The port of Vacamonte which was designed to serve the fishing activities in Panama is located 20 km south-west of the port of Balboa. The facilities provided consist of a T-shaped pier for overseas tuna ships with cold storage, two wharves for unloading shrimp with processing and refrigeration plants behind them, piers for services and a ship lift for repair and maintenance. The major cargoes handled at this port are tuna, shrimp, fish flour, fertilizer etc. Most cargo is categorized as overseas trade. All tuna is transhipped abroad. The cargo movement in 1991 was 40,659 metric tons with a growth rate of 11% over the previous year, however, as of August 1992, the cargo movement is anticipated to decrease. The number of ship calls in 1991 was 3,851 (3,171 ships handled cargo). Most ships handle tuna.

2) Aguadulce

The port of Aguadulce is situated in the Cocle Province on the Pacific side. The major cargoes handled are sugar (56% in 1990) and fertilizer (25% in 1990) and the majority of both cargoes are handled in bulk. All cargo is for foreign trade. The cargo volume handled in 1991 was 111,817 metric tons (-8% of the volume in 1990). The number of ship calls in 1991 was 105 (101 ships handled cargo).

3) Almirante

The port of Almirante is located on the western side of the Almirante Bay in the Bocas del Toro Province (Atlantic coast). There are facilities for handling general cargo, handling fruit (banana) exclusively and for domestic cargo. The major cargo handled is banana (84% of total cargo handled in 1990), of which nearly 100% is loaded for exportation. The cargo volume handled was 471,482 metric tons in 1991 (-14% of the volume in 1990) and the past records indicate steady cargo handling in the last 10 years. The number of ship calls in 1991 was 233 (228 ships handled cargo).

4) Armuelles

The port of Armuelles is located in the Chiriqui Province on the Pacific coast, near the border with Costa Rica. The major cargo handled is banana (453,969 metric tons, 89% of the total volume handled in 1990) for exportation. The cargo volume handled at this port has steadily been increasing since 1982 except in the years 1986 and 1989. The number of ship calls in 1991 was 181 (163 ships handled cargo).

5) Bahia Las Minas

The terminal of Bahia Las Minas is located just north of the port of Bahia Las Minas (carga seca) in the Colon Province on the Atlantic side of Panama. The major cargo handled is crude oil (58% of the volume in 1990) and the others are petroleum products. The Panama Refinery is located just behind the terminal.

6) Charco Azul

The terminal of Charco Azul is located in the Charco Azul Bay, Chiriqui Province on the Pacific side. There are three oil terminals exclusively used for unloading crude oil coming from Alaska. The crude oil is transferred to the Atlantic side across the Isthmus of Panama with a capacity of 100,000 barrels per minute. The crude oil handled and the number of ship calls in 1990 were 91,455 barrels and 62 (an average gross tonnage of ships is 101,493 tons) respectively.

7) Chiriqui Grande

The terminal of Chiriqui Grande is situated on the Chiriqui Lagoon in the district of Chiriqui Grande, Bocas del Toro Province, on the Atlantic side. This port is one of the ports having the oil pipeline across the Isthmus of Panama and handling crude oil from Alaska. The crude oil handled in 1990 was 90,908 barrels. The number of ship calls was 179 with an average gross tonnage of 40,209 tons in 1990.

(3) Ports for Domestic Cargo

1) Bocas del Toro

The port of Bocas del Toro is located in the Province of the same name on the Atlantic side. The cargo volume handled had been decreasing until 1989 but began to increase since 1990. In 1991, 1,208 metric tons (most were unloaded) of cargo was handled. The major commodities are industrial products (diesel oil, cement, etc.). The main domestic ports of origin and destination are Coco Solo Norte and Almirante. The number of ship calls in 1991 was 102 (92 ships handled cargo).

2) La Palma

The port of La Palma is located in the estuaries of the Tuira River and Sabanas River which flow into the Gulf of San Miguel in the Darien Province. While the cargo volume handled had been increasing in general, a decrease of 14% was recorded in 1991. The cargo volume handled in 1991 was 57,171 metric tons. The major commodities handled are traditional agricultural

products of the province; log (83% in 1990), timber, corn, banana, etc. and most of them are loaded. The number of ship calls in 1991 was 661 (578 ships handled cargo).

3) Mutis

The port of Mutis is situated on the Gulf of Montijo on the Pacific side of the Veraguas Province. There are two facilities; a wooden pier and a concrete pier. The cargo volume handled in this port sharply increased in 1990 and also increased in volume at a growth rate of 76% in 1991 (2,426 metric tons). The major commodities are rice, fish, urea, etc. and most are unloaded. The number of ship calls in 1991 was 1,886 (1,220 ships handled cargo).

## 5.2 Cargo Volume Handled in APN Ports

Transition of cargo volume handled in thirteen ports under APN for the last 11 years is shown in Table 5-2-1 and Figure 5-2-1.

The cargo volume handled until 1987 increased at an average growth rate of approx. 4% per annum. It decreased sharply in 1988 to 15% of the previous year due to the direct influence of the economic sanctions imposed by the U.S. Government. In the next year 1989, however, the cargo volume handled increased again, mainly in ports for foreign trade; the highest volume of approx. 2,995 thousands metric tons was recorded in 1991, in spite of the subsequent U.S. military invasion in 1989.

Regarding the volume handled in 1991, within the ports for foreign trade, the port of Cristobal was ranked first (approx. 945 thousands metric tons), followed by the port of Balboa (approx. 398 thousands metric tons), the port of Bahia Las Minas (approx. 269 thousands metric tons). It should be noted that the cargo volume handled in the port of Coco Solo Norte increased dramatically in 1990 and 1991, and further, tendency to increase will continue such that the volume by the end of 1992 will be twice that of the previous year. Also the cargo volume in 1991 in the port of Cristobal had a growth rate of 40% over the volume in 1990 and this indicates its steady increase in the trade. On the other hand, the cargo volume in the port of Bahia Las Minas (carga seca) decreased in 1991 and this tendency will continue. In the port of Balboa, an important port on the Pacific side of Panama, the cargo volume has fluctuated for these 10 years but seems to have leveled off.

Among ports for special purposes, the leading port in 1991 was the port of Armuelles (approx. 527 thousands metric tons, mainly loading banana), followed by the port of Almirante (approx. 471 thousands metric tons, also mainly banana).

In general, after the drastic decrease of cargo volume in 1988, the cargo volume at most APN ports sharply increased to recover to levels of previous years and as a result, there is no consistent pattern. Furthermore, cargo volume has shown a tendency to

concentrate in the four major ports: Cristobal, Coco Solo Norte, Bahia Las Minas (carga seca) and Balboa.

The cargo volume per population was between 1.0 and 1.2 metric tons during the last decade and it was over 1.2 metric tons in 1991. As for number of containers handled per population and GDP per capita relationship, the number of containers (TEU) per population was a little higher than countries, which had the same GDP per capita of around 2,000 US dollars as Panama, excluding containers handled at the Free Zone. This is not characteristic. In the event that containers handled at the Free Zone were included, the number of containers per population became much higher to the level of developed countries. Accordingly, it can be said that Panama truly occupies an important position in the world container transportation system and container cargo handled in Panama is strongly affected by the activities of the Free Zone. This also means that there is a potential for a steady increase in cargo volume (including container cargo) based on world maritime transport demand without direct relation to the domestic economy.

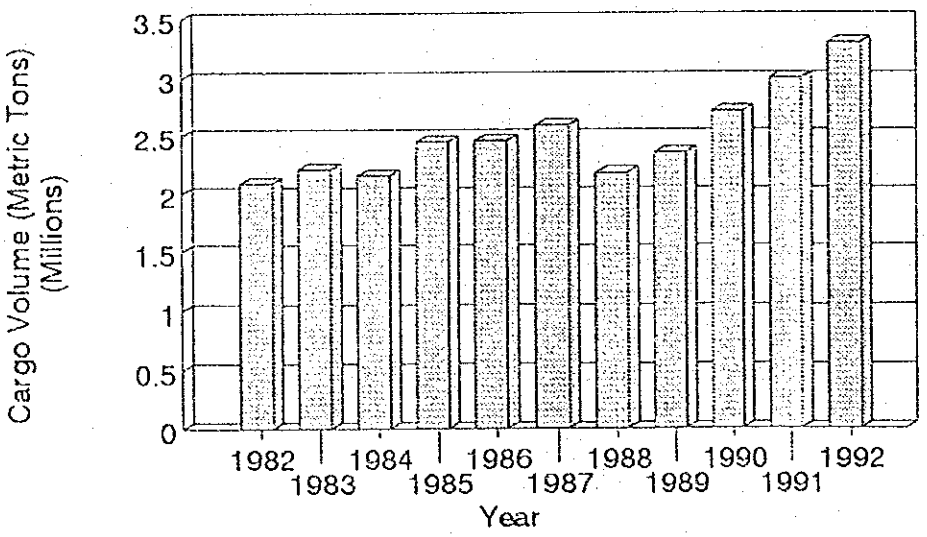



Figure 5-2-1 Transition of Total Cargo Volume in APN Ports
(Source: Autoridad Portuaria Nacional)

Table 5-2-1 Summary of Cargo Volume Handled in Each Port

(Unit: Metric Tons)

| Name of Port | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic Ocean | | | | | | | | | | | |
| Bahia Las Minas (Carga Seca) | 165,290 | 136,354 | 137,194 | 198,706 | 197,804 | 248,846 | 226,423 | 254,403 | 293,368 | 269,319 | 277,858 |
| Coco Solo Norte | 41,009 | 31,672 | 24,745 | 35,451 | 65,318 | 63,911 | 69,781 | 66,323 | 87,390 | 126,275 | 296,524 |
| Cristobal | 341,506 | 343,663 | 416,021 | 482,645 | 626,026 | 704,890 | 477,709 | 616,095 | 672,026 | 945,103 | 1,050,170 |
| Bocas del Toro | 20,174 | 9,016 | 2,715 | 2,126 | 2,098 | 1,537 | 1,066 | 876 | 1,159 | 1,208 | 1,364 |
| Almirante | 490,289 | 540,365 | 491,850 | 538,524 | 542,460 | 577,031 | 519,345 | 543,573 | 547,570 | 471,482 | 514,093 |
| Pacific Ocean | | | | | | | | | | | |
| La Palma | 6,877 | 5,347 | 8,372 | 33,652 | 29,254 | 41,572 | 44,783 | 48,868 | 66,298 | 57,171 | 55,588 |
| Balboa | 437,190 | 474,916 | 404,268 | 460,622 | 449,329 | 338,590 | 264,678 | 285,945 | 328,400 | 398,331 | 502,686 |
| Vacamonte | 20,243 | 28,094 | 39,723 | 52,462 | 51,585 | 40,305 | 33,552 | 36,788 | 36,501 | 40,659 | 19,151 |
| Aguadulce | 161,133 | 168,198 | 125,950 | 124,357 | 129,590 | 114,370 | 51,071 | 53,877 | 122,078 | 111,817 | 107,690 |
| Mutis | | | | | | 933 | 324 | 347 | 1,378 | 2,426 | 2,712 |
| Pedregal | 52,078 | 53,386 | 52,464 | 40,520 | 38,249 | 27,907 | 15,189 | 16,092 | 27,450 | 23,425 | 29,271 |
| Armuelles | 276,374 | 374,656 | 411,862 | 436,837 | 277,749 | 401,746 | 450,709 | 401,787 | 512,212 | 527,245 | 423,855 |
| Panama | 41,724 | 28,531 | 30,097 | 24,362 | 37,508 | 28,607 | 23,642 | 26,268 | 18,837 | 20,126 | 20,168 |
| Indistinct Volume | 31,678 | 16,062 | 13,871 | 20,640 | 9,186 | | | | | | |
| Grand Total | 2,085,565 | 2,210,260 | 2,159,132 | 2,450,904 | 2,456,156 | 2,590,245 | 2,178,272 | 2,351,242 | 2,714,667 | 2,994,587 | 3,301,130 |

Source : Autoridad Portuaria Nacional (APN)

## 5.3 Location and Historical Background of Major Ports

Here is described the location and historical background of the four major ports under investigation in this study.

At the entrance of both sides of the Panama Canal, there are two major ports in Panama: the port of Cristobal on the Atlantic side and the port of Balboa on the Pacific side. Since both ports face a major international shipping route, they have great potential as commercial trade ports.

On the Atlantic coast, there are two supplemental ports to support the capacity constraint of the port of Cristobal: the port of Coco Solo Norte and the port of Bahia Las Minas. These three ports, located in close proximity to one another, form a port complex, sharing a common hinterland featuring Colon Free Zone which is looked upon as the largest international free trade zone in the Western Hemisphere with a function of distribution center of industrial products to Central and South America.

The Port of Cristobal (Lat. 9°21'N; Long. 79°55'W) is located west of Colon City on the east shore of Limon Bay. Existing major facilities of the port were constructed by the Panama Canal Company during the years 1914 - 1919, just after the Canal was opened to world maritime traffic. Originally, the major function of the port was to supply coal and fuel oil, and this activity developed considerably over the years to the extent that it became the world's major coal supplying center.

When the Panama Canal was transferred under the administration of the Panama Canal Commission (PCC) according to the Panama Canal Treaties effectuated on 1 October 1979, the Port of Cristobal was transferred to the Government of Panama and came under the administration of APN.

The Port of Coco Solo Norte (Lat. 9°22'N; Long. 79°53'W) lies opposite the city of Colon, on the east side of Manzanillo Bay and is accessible from the Transisthmian Highway via Randolph Road. It was developed by the United States Armed Forces between the mid 1920's and early 1940's as a supply base for naval submarine vessels. After the War it had been almost abandoned. Since it was transferred to the Government of Panama in the year 1979, it has been operated as a commercial port.

The Port of Bahia Las Minas (Lat. 9°24'N; Long. 79°49'W) is located in the Las Minas Bay, east of Coco Solo. It consists of the Carga Seca area equipped with a marginal pier for general cargo and the petroterminal which serves the oil refinery base located in the backside. The Carga Seca area is mainly used for Ro-Ro vessel. It was constructed by the oil refinery company in the year 1974.

The Port of Balboa (Lat. 8°57'N; Long. 79°34'W) is located on the Pacific coast entrance of the Canal in the west of Panama City. The existing major facilities were constructed during the years 1914 - 1918 by the Panama Canal Company. It was transferred to the Government of Panama in 1979 according to the Panama Canal Treaties and came under

the administration of the APN.

## 5.4 Port Facilities of the Major Ports

The present condition of the major port facilities of the port of Cristobal, Coco Solo Norte, Bahia Las Minas and Balboa is described below.

### 5.4.1 The Port of Cristobal

(1) General

The port of Cristobal has six piers divided into 23 berths with a total length of 3,200 meters of berthing space. Piers identified as No. 6, 7, 8 and 16 are finger type piers. Piers No.9 and No.10 are marginal (See Figure 5-4-1). Pier No.9 is used exclusively for containers and has two 40 ton container cranes.

The entrance of the port is protected by a pair of breakwaters. The access and berthing areas are maintained at a maximum draft of 12 m (40 ft).

(2) Port Area

Since the port of Cristobal faces the Canal, the border of the port area (land and water) is set against the Canal area in a complex manner. Within the land area of the port, there still remains an exclusive area of the Canal facilities that belongs to PCC. The water area of the port is limited to the nearby area of Piers No.6 to No.10 with a width of 70.57 ha. No anchorage area is located in this area.

Pier No.16 is located in the Canal Water Area, however, it is virtually operated by the APN. The administration of this area is now under negotiation between the APN and the PCC.

(3) Piers

The finger type Piers No.6, 7 and 8 are poking out to the South-East direction in parallel from the mole constructed on the north side to protect the piers from the dominant north winds and waves in dry season. The face line of the berth of these piers are almost parallel to the dominant direction of the winds.

These piers have an approximately 12 m depth and 300 m length, so Panamax type vessels can be berthed on all these piers. However, the slips between these piers are only 90 m wide and inconvenient for maneuvering the large size vessels of today.