




**THE REPUBLIC OF PARAGUAY  
REPORT OF FEASIBILITY STUDY  
ON  
FLEET EXPANSION PROJECT**

**OCTOBER 1978**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

SDS

78-44





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REPORT OF FEASIBILITY STUDY  
ON  
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## PREFACE

In response to the request of the Republic of Paraguay, the Government of Japan decided to take up a feasibility study of the Fleet Expansion Project of Paraguay as part of Japan's overseas technical cooperation, and The Japan International Cooperation Agency (JICA) conducted the study.

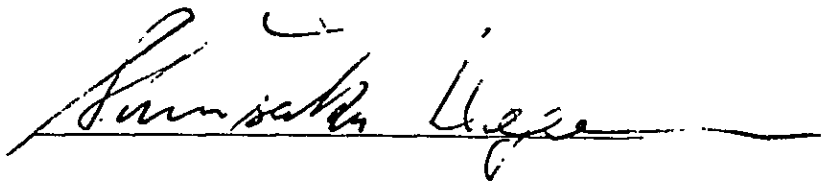
JICA dispatched a survey team consisting of 7 experts, headed by Mr. T. KURIYAMA, Director, Technology Division, Ship Bureau, Ministry of Transport, to Paraguay for 17 days from March 26th 1978 to carry out the survey.

The findings of the survey have been carefully reviewed, and compiled into the present report which is submitted herewith.

I sincerely hope that this report will contribute to the Fleet Expansion Project of Paraguay and to help promote the friendly relations now existing between two countries.

I wish to express my deep appreciation to the authorities of the Government of the Republic of Paraguay, Flota Mercante del Estado, and other authorities and people concerned for their cooperation extended to the survey team.

October, 1978

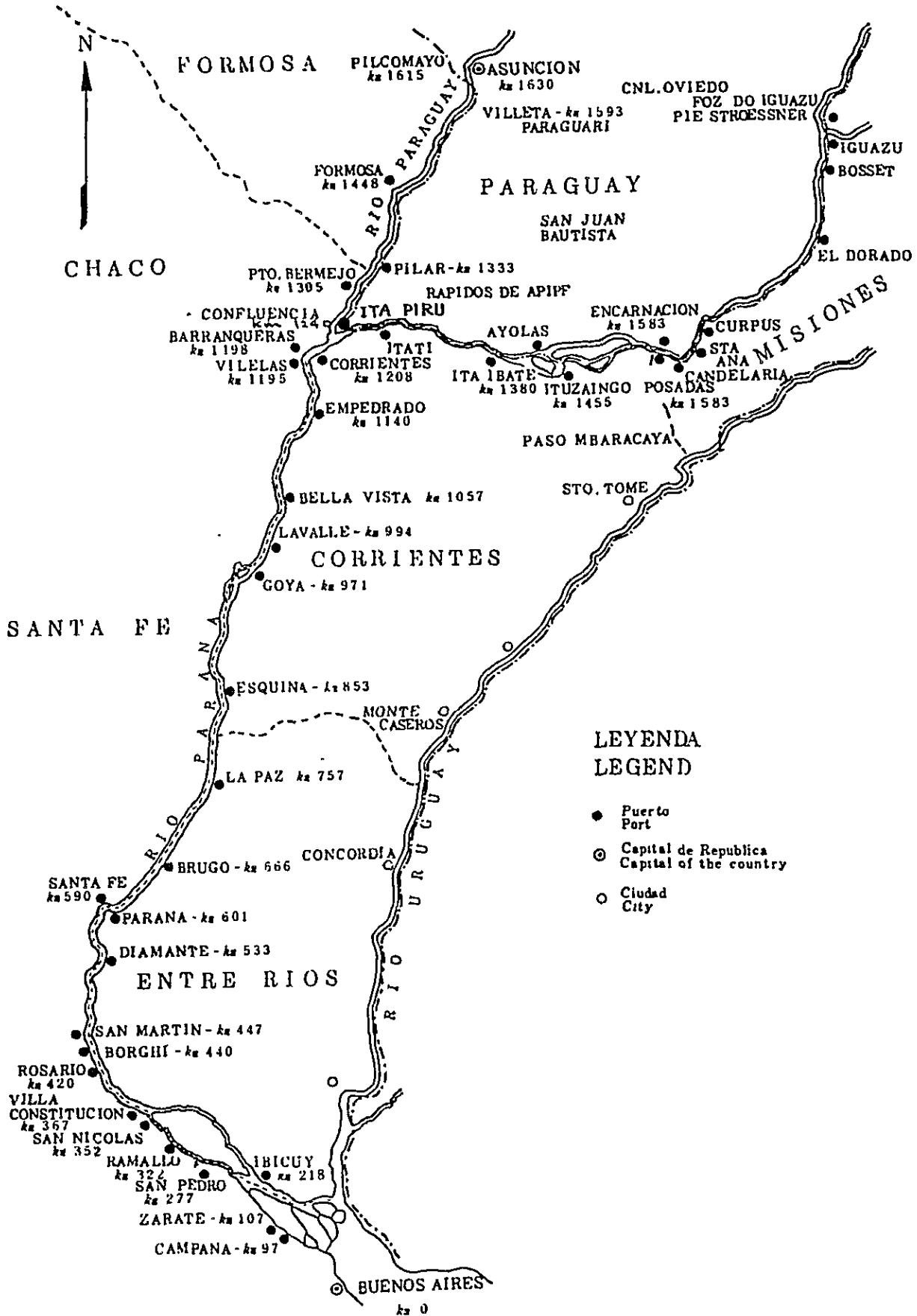
A handwritten signature in black ink, appearing to read 'Shinsaku Hogen', written over a horizontal line.

Shinsaku HOGEN - President

Japan International Cooperation Agency



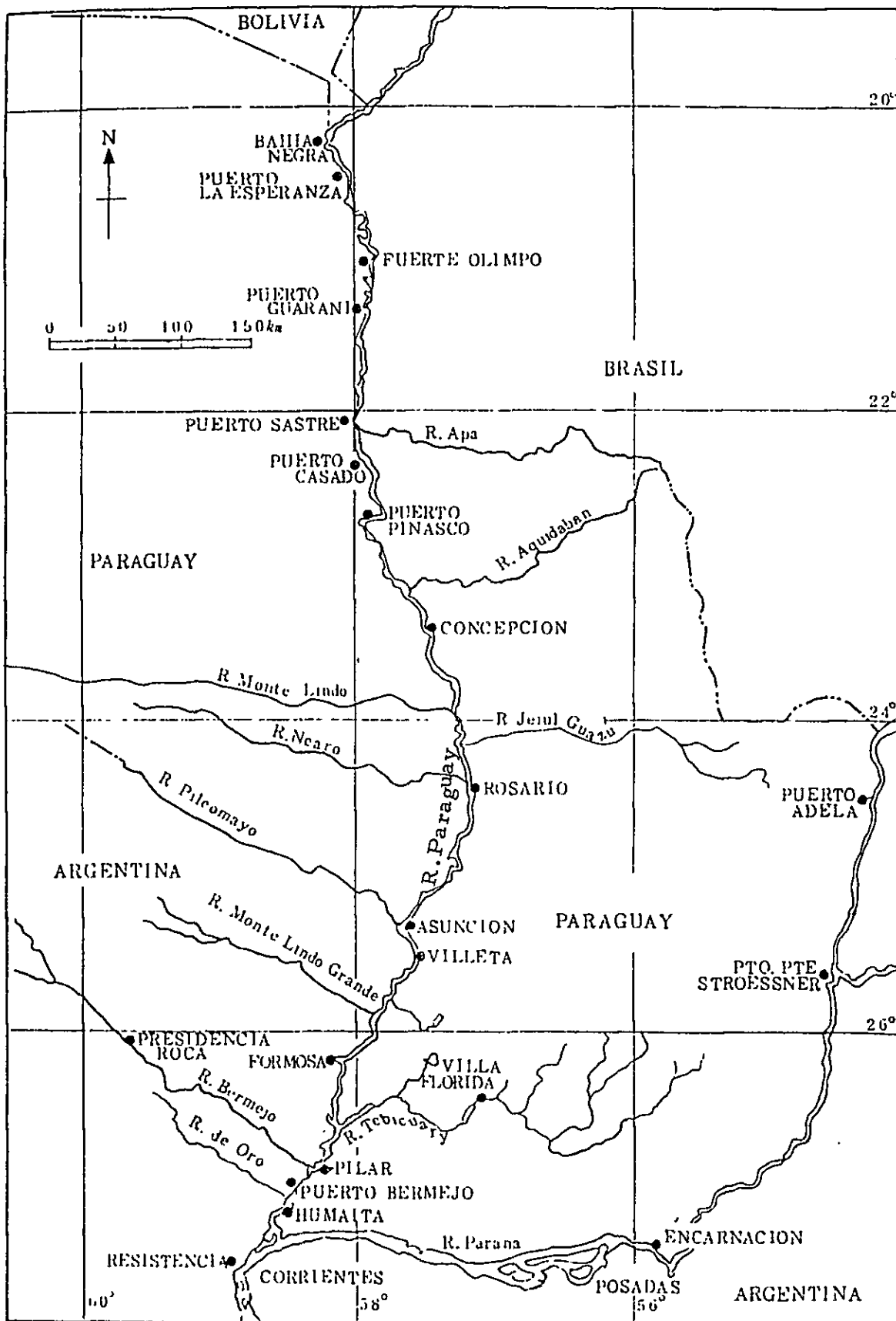
Map of River, Ports  
and  
Distance between Buenos Aires and each ports on the run of a ship







### Ports along Rio Paraguay and Parana





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**Part I Summary and Recommendations**





## Part I Summary and Recommendations

### 1. Summary

Based on a request from the Government of the Republic of Paraguay, a feasibility study in relation to a fleet expansion project of that country was carried out by the Japan International Cooperation Agency (JICA). The survey team, which was formed of 7 members, carried out surveys at the site for a period of 17 days from March 26th, 1978. Collection and analysis of the data were also continued in Japan.

Although Paraguay is a land-locked country in South America with agriculture as her principal industry, her economy has slowly developed to this date. However, with improvements in key facilities such as the construction of roads and power generation dams, expansion in production volume and growth in exports may be anticipated.

River transportation in Paraguay plays an extremely great role compared with other means such as roads and railroads. The port of Asuncion is the most important port in the nation as it handles approximately 40% of the water borne cargo including the small ports in the vicinity. The other ports of any consideration are Encarnacion, Concepcion and Vallemi. Although there is sufficient width of the rivers for ship navigation, limitations as to ship draft must also be taken into consideration.

218 Ships totalling 42,055 gross tons are registered in Paraguay and FME shares more than half of them, namely 33 ships for a total tonnage of 25,844 tons. The central force in Paraguay's sea transportation is therefore the FME. FME is also an organ under the direct jurisdiction of the Ministry of Public Works and shipping policies of the nation are actually managed by FME as the nucleus. Although FME's business conditions were unsatisfactory until 1975 with cumulative deficits annually, with a shake up in management personnel from that year, deficits were greatly reduced in 1976 with profits actually registered in 1977.

In international river transportation, foreign ships such as Argentine ships command a very high loading ratio, on the other hand, the loading share by Paraguayan ships are limited to approximately 20%. The Paraguayan Government, however, has a strong desire to secure a loading ratio of 50% of the international river transportation cargo.

The current plan of fleet expansion drawn up by the Republic of Paraguay was based on forecasts of increased import and export and expansion of loading ratio in future and the results of a feasibility study conducted according to ship type are as follows.

- (1) 360 DWT and 800 DWT barge systems will be feasible, if the management is suitable for collecting cargoes.
- (2) 2,000 m<sup>3</sup> Oil barge system and 1,500 DWT river and ocean ships are sufficiently feasible.
- (3) Although the operational profitability of the 6,000 DWT ocean-going ship is not satisfactory, it is sufficiently feasible from the standpoint of the overall project, and moreover has the following merits.

By possessing a 6,000 DWT ship

- 1) Shipments of domestic products from Paranagua, a free port, will be facilitated
  - 2) Will make it possible to save on foreign reserves.
  - 3) Will enable acquisition of ocean navigation technology and training and will also be of significance as a step towards possessing large ocean liners in future.
- (4) The value (including transportation costs) of procurable repair components for the vessel previously constructed with yen loans will be approximately 246 million yen (\$1,230 thousand).

- (5) Pontoon with Transshipment Machine

Although this was suggested after completing surveys of the site, after holding discussions between the survey team and the Paraguayan side, it was decided to exclude this at this time as it was learned that feasibility was difficult.

The total cost for items (1) to (3) (including consultant costs) will be ¥7,374 million (\$36,870 thousand). It was assumed to produce the panel portion of the barge in Japan and to transport the panels to be assembled in Paraguay.

When the internal rate of return is obtained by considering items (1) to (3) as unified project, it will be 4.7%.

## 2. Recommendations

Consultants to supervise design and construction will be required to

implement this project.

Technical instructors for assembly of the panels at the site will be required.

It is recommendable to dispatch a specialist to offer operational guidance for 2 or 3 years after commencing operation of newly constructed ships. Special considerations such as aid measures from the Paraguayan Government will be desirable in relation to the operation of the 6,000 DWT ocean-going ship.



**Part II Introduction**



## Part II Introduction

### 1. Background and Circumstances of the Survey

Situated in the middle part of the South American continent, the Republic of Paraguay is the inland country hemmed in by three countries of Brazil, Argentina and Bolivia. It is the agricultural country which centers around the fertile south surrounded by the Paraguay River, which runs through the middle part of the nation, and the Parana River, which penetrates the southernmost part. For this reason, Paraguay depends in its trade with foreign countries mostly on river transport, which makes use of the Paraguay and Parana Rivers. Given this situation, there has been an unusually high interest in the ships which take charge of river transport. Now that Paraguay is an inland country, the essential imperative she has had for many years is to maintain means of transport for export and import cargoes -- particularly, how domestic products may be delivered to foreign markets at competitive prices.

Under these circumstances, the Japanese Government sent a survey team in 1957 in response to a request from the Government of Paraguay and has provided a ship loan (US\$3,800,000) for the purchase of river boats. At present, Paraguay is possessed of a total of 32 vessels, including the eight river boats purchased with a loan from Japan, but they are already timeworn and there is a marked drop in the service ratio, with the consequence that they are no longer able to fulfill their mission as means of transport for Paraguay, which is dependent mostly upon river transport. There was another call from Paraguay for a survey against this background this time. As the visit to Paraguay of a La Plata economic mission from Japan in June 1975 served as a momentum, a request was made by Paraguay for technical assistance to solve these questions. In response to Paraguay's request, a JICA dispatched a survey team consisting of two experts in maritime transport and shipbuilding for a "basic survey for a maritime transport program" in order to look into the management conditions of the FME and its expansion program in relation to a "program for an expansion of the transport capacity of the national mercantile fleet of Paraguay" in December 1976. The management of the national mercantile fleet and the present situation of the ships owned by Paraguay as well as the countermeasures and the general conditions of shipbuilding were surveyed for



an assessment. In November 1977, there was a request for a feasibility survey of the expansion program of the national mercantile fleet. In response to this call, the related data attached to the request were studied and it turned out that there were many points that had yet to be clarified in detail. In January 1978, there was a call for the dispatch of the feasibility survey team. The request was accepted and the way was paved for this survey.

## 2. Purpose and Policy of the Survey

In conjunction with the feasibility of the projects contained in the program for an expansion of the national mercantile fleet of the Republic of Paraguay, the survey is designed to look into the economic, transport and traffic conditions, administrative machinery for maritime transport and maritime transport (shipbuilding) policy, present situation of maritime transport, present situation of ports and waterways and present situation of shipbuilding in Paraguay, so that an assessment may be made of the technical capabilities and also an economic assessment may be made for an overall economic criterion.

The realistic policy of this survey is to conduct a survey and collect data with particular reference to the national mercantile fleet (FME), which is virtually the central institution of maritime transport for Paraguay and hold discussions on submitted relevant data. At the same time, we intend to carry out an on-the-spot survey with respect to shipbuilding repair facilities, ports and loading and unloading facilities.

## 3. Organization, Lines of Duty and Survey Period of the Survey Team Leader (General supervision)

Takashi Kuriyama, Director, Technology Division, Ship Bureau,  
Ministry of Transport

### Team Member (Ship demand)

Mitsuji Asano, Chief, Second Measurement Subdivision, Inspection and  
Measurement Division, Ship Bureau, Ministry of Transport

### Team Member (Service program)

Susumu Naruse, Overseas Division, Shipping Bureau, Ministry of Transport

### Team Member (Economic and financial analysis)

Keiichi Tango, Office of Control, Overseas Economic Cooperation Fund  
(OECF)

Team Member (Ship management)

Taishin Ono, The Japanese Ship Owner's Association

Team Member (Bottoms and ship types)

Yasushi Jogo, Overseas Shipbuilding Cooperation Centre (OSCC)

Team Member (Business coordination)

Fumiaki Kuwakino, Social Cooperation Department, Japan International Cooperation Agency

Note: Mr.K.Tango and Mr.Y.Jogo transferred to other sections, so their business were taken over Mr.T.Watanabe (OECF) and Mr. K.Komatsuzaki (OSCC)

#### 4. Itinerary of the Survey

- Mar. 25 (Sat.), 1978 Leaves Tokyo (Kuriyama, Asano, Naruse, Engo, Jogo and Kuwakino)
- Mar. 26 (Sun.) Arrives at Asuncion
- Mar. 27 (Mon.) Pays a courtesy call at, and negotiates with the Japanese Embassy. Pays a courtesy call to the FME President and carries out a survey. Pays a courtesy call to, and makes arrangements with the director of the JICA's local branch.
- Mar. 28 (Tues.) Surveys and negotiates at the FME.
- Mar. 29 (Wed.) Pays a courtesy call to the Minister of Public Works and Communications and carries out a survey at the Navy Yard.
- Mar. 30 (Thurs.) Surveys and negotiates at the FME.  
Surveys the San Sidro and Kanonnikoff Shipyards.
- Mar. 31 (Fri.) Surveys at the Port Bureau and Asuncion Port
- Apr. 1 (Sat.) Processes data. Onoda joins the survey team.
- Apr. 2 (Sun.) Processes data. Encarnacion surveyed (by Asano and Jogo till Apr. 4)
- Apr. 3 (Mon.) Surveys and negotiates at the FME.
- Apr. 4 (Tues.) Surveys at the Ministry of Public Works and Communications, Economic Planning Agency and REPSA
- Apr. 5 (Wed.) Surveys and negotiates at the FME. Gathers information in Vallemi and Yacyreta. Kuwakino returns to Japan.
- Apr. 6 (Thurs.) Negotiates and makes arrangements at the FME. Buenos Aires Port surveyed (Asano, Naruse and Ono till Apr. 8)
- Apr. 7 (Fri.) Processes data

Apr. 8 (Sat.)	Surveys at the FME and the FME Survey Department
Apr. 9 (Sun.)	Processes data and prepares conference data
Apr. 10 (Mon.)	Reports on the survey to, and negotiates with, the Japanese Embassy
Apr. 11 (Tues.)	Surveys and negotiates at the FME
Apr. 12 (Wed.)	Leaves Asuncion
Apr. 14 (Fri.)	Arrives at Tokyo (Kuriyama, Asano, Naruse, Tango, Ono and Jogo).

5. Places and Persons Visited, Collection of Data, Etc.

5-1 Places and Persons Visited

Places Visited

- \* Ministerio de Obras Publicas y Comunicaciones
- \* Secretaria Tecnica de Planificacion Economica
- \* Flota Mercante del Estado (FME)
- \* Marina Mercante Nacional
- \* Administracion Nacional de Navegacion y Puertos (ANNP)
- \* Armada Nacional, Direccion de Material Naval y Astilleros
- \* Armada Nacional, Direccion de Dique Seco
- \* Entidad Binoacional "Yacyreta"
- \* Industrial Nacional del Cemento "Vallemi"
- \* Astillero "San Isidro"
- \* Transporte Fluvial "Kanonnikoff"
- \* Refineria Paraguaya S.A. "REPSA"
- \* Administracion del Puerto de Buenos Aires
- \* Moore-McCormack S.A.
- \* Embajada del Japon en el Paraguay
- \* Consulado del Japon en Encarnacion
- \* Cia. Aceitera de Itapua Com. e Ind. S.A. "CAICISA"
- \* Embajada del Japon en la Argentina

Persons Visited

- \* Flota Mercante del Estado
  - Dr. Oscar V. Johannsen S., President
  - Dr. Carlos Alberto Coronel Acosta. Administrador General

- Capt. de Corbeta (SR) Carlos Careaga, Inspector General  
 LIC Juan Jose Busto, Jefe del Departamento Administrativo  
 Capt. Navio Francisco Heisele, Jefe del Departamento Tecnico  
 Mr. Rogelia Espinola, Adscripto a la Presidencia  
 LIC Severieno Jimenes, Adscripto a la Presidencia  
 Ing. (Naval) Miguel Angel Anazco
- \* Administracion Nacional de Navegacion y Puerto (ANNP)  
 Dr. Saturnino Espinola, Jefe de Metodo (operacional)  
 Ing. A. Cabrera, Jefe del Departamento de Obras Portuarias  
 Ing. Celestino Terso Gennari, Jefe de Departamento de Navegacion e  
 Hidrografica  
 Ing. Hans Georg Voigt, Mision Tecnica Alemana  
 Dr. Rufino Estigarribia, Jefe de Relaciones Publicas
  - \* La Marina Mercante Nacional  
 Mr. Adolfo Roig Franco, Consejero de Estado y Director General  
 Mr. Francisco Campos Ros, Capitan de Corbeta Vice-Director  
 Lte. Fragata Juan B, Carres, Jefe Tecnico Mavegation y Pero Maritimo
  - \* Refineria Paraguaya S.A. "REPSA"  
 Mr. Jorge A. Alayon, Gerente Administration
  - \* Armada Nacional Direccion de Dique Seco  
 Capt. de Navios Ciilo Burgos Delvaue
  - \* Armada Nacional, Direccion de Material Naval y Astilleros  
 Capt. de Navio D. Vicente Speratti  
 Capt. de Fragata Ing. D. Ramiro Gofierrezy  
 Capt. de Fragata D. Ezequiel Fernadez
  - \* Yacyreta  
 Ing. Zoil Podas Ortiz, Director Ejecutivo Adjunto
  - \* Industria Nacional del Cemento  
 Dr. Ramon Centurian Nunez, presidente
  - \* TTE. V. Kanonnikoff  
 Luiatoslav Kanonnikoff  
 Astillero San Isidro S.A.  
 Vicent Mayor, Presidente  
 Luis Carlos Rocholl, Director Gerente  
 Rafael Jose Ginard, Director

- \* Secretaria Tecnica del Plaficacion Economica .  
Federico Mandellinger. Secretario Ejecutivo
- 5-2 Data List
  - \* Cargas Transportados y Fletes Percibidos Durante el Año, 1976, 1977
  - \* Detail of Fixed Expenses
  - \* Detail of Variable Expenses
  - \* Detalle de la Cuenta "Gastos de Explotacion - Buques de Pasajeros" al 31 de Diciembre de 1976 y 1977
  - \* Detalle de la Cuenta "Explotacion" al 31 de Diciembre de 1976. Buques Cargueros, Petrileros y Gabarras
  - \* Dettale de la Cuenta "Gastos de Explotacion -- Buque de Ultramar" at 31 de Diciembre de 1976, 1977
  - \* Detalle de La Cuenta "Gastos de Administración General" al 31 de Diciembre de 1976 y 1977
  - \* Plantilla de Estadistica Sobre Viajes Realizados por los Buques de la F.M.E., 1975, 1976, 1977
  - \* Especificacions Tecnicos Barcazas de 370 Toneladas
  - \* Especificacions Tecnicos Barcazas de 800 Toneladas
  - \* Especificacions Tecnicos Barcazas de 1,500 Toneladas
  - \* Especificacions Tecnicos de Buque de Ultramar de Carga de 1,500 Roneladas
  - \* Especificacions Tecnicos Barcazas Cisternas-Petroleras de 2,000 m<sup>3</sup>
  - \* Especificacions Tecnicos Remolcador de Empuje de 1,500 H.P.
  - \* Especificacions Tecnicos Remolcador de Empuje de 2,400 H.P.
  - \* Especificacions Tecnicos Remolcador de Empuje de 3,000 H.P.
  - \* Especificacions Tecnicos Buque de Ultramar de Carga de 6,000 Toneladas
  - \* Caracteristicas Tecnicos y Especificacions Generales de las Unidades de la F.M.E., 1976
  - \* Boletin Estadistica (Banco Central de Paraguay)
  - \* Anuario Hydrografico ano 1971-1973
  - \* Memoria Correspondiente al Ano 1976, 1977
  - \* Plan nacional de Desarrollo Economico y Social 1977-1981, Tomo I, Tomo II

- \* Que Crea la Entidad Denomina a "Flota Mercante del Estado"
- \* Breve Memoria Sobre las Instalacion de la Direccion del Material Naval y Astilleros
- \* Estudio de Anteproyecto para la Modernizacion del Varadero para la Direccion del Material Naval y Astilleros
- \* Tarifas por data Mil Kilogramos fu Guaranies Cargas de Bajoda de Asuncion
- \* Ley No. 1199 Que Crea la Entidad Denominada "Flota Mercante del Estado"
- \* Codigo de Navegacion Fluvial y Maritima
- \* "Salarios Minimios" Suplemento 185 y 186
- \* Respuestas Correspondientes
- \* "Rio Negro," "Pisabebe"
- \* Fuentes y Usos de Fondos, Cubriendo un Periodo de Operacion de 120 dias
- \* Gastos de Explotacion
- \* Reglamente de Navegacion de Cabotaje y Comercio en los Rios Nacionales
- \* Reglamento de Trabajo del Personal de Estibadores Maritimos
- \* Reglamento de Trabajo y Rol de Funciones del Personal Embarlado
- \* Reglamento de Personal Minino de Trifulacion para los Buques de la Marinsa Mercant
- \* Cuadro Comparativo Estado de Resultado
- \* Resolucion No. 55
- \* Decreto No. 26, 524
- \* Decreto No. 6984
- \* Decreto No. 31, 257
- \* Decreto No. 29, 687, & 22, 445
- \* El Puerto de Buenos Aires
- \* Aprovechamiento Yacyreta
- \* Boletin Estadistico
- \* Balanza de Pagus
- \* Cuentas Nacionales
- \* Resena Economica, Financiera y Monetaria, 1976
- \* Sintesis de la Conyuntura Economica y Financiera del

- \* Cargas Transportacion por Buques de la Flota Mercante del Estado Clasificadas por Tipos y Especies en Ton/M<sup>3</sup> e longresos Devengados en Milos de Guaranies
- \* Balanco General, Practicado al 31 de Diciembre de 1976, 1977 (Flota Mercante Estado)
- \* Cuadro Demonstrativo de Ganancias y Perdidas al 31 Diciembre de 1976, 1977
- \* Datos Basicos
- \* Estudio para la Adquisicion de un Buque de Ultramar de 6,000 Toneladas que opera entre puerto de la costa sur del Brasil y puerto del Norte de Europa
- \* Pronostico del Resultados Economico Financiero de las Operaciones que Habran de Realizarse por la Flota Mercante del Estado, consistente en la Construccion y Suministro de 2 Remolcadores de Empuje y 20 Barcas a Empuje Ayo Costo Total - se Estima en US\$5,900,000

### 5-3 Scope of Work

Before local work was started, the Scope of Work had been submitted to the Ministry of Public Works and the FME.

## The Scope of Work The Feasibility Study of Fleet Expansion Project of the Republic of Paraguay

### 1. Introduction

In response to the request of the Government of the Republic of Paraguay, the Government of Japan has decided to conduct a feasibility study of the fleet expansion project in accordance with laws and regulations in force in Japan, and the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will carry out the study.

The present document sets forth the scope of work in regard to the above-mentioned study which is to be carried out in close cooperation with the Government of the Republic of Paraguay and authorities concerned.

## 2. Objective of the Study

The objective is to study technical and economic feasibility of the fleet expansion project.

## 3. Outline of the Study

The study includes field survey, investigation and analysis on the following items.

A. Review and evaluation of the report on fleet expansion project of Paraguay

B-1 Transportation in general, present and future

-2 Shipping

Trade structure, domestic and international

Import and export demand forecast

National merchant fleet, its capacity and activities

Condition of ship cargo flow

-3 Ship's tonnage demand forecast

-4 Shipyard facilities, present and future

-5 Hydrographic and meteorological conditions of the rivers

-6 Basic concept of fleet expansion plan including ocean going ships

-7 Economic and financial analysis

## 4. Reports

The JICA will prepare and submit the following reports. All documents are written in English.

A. Draft final report

B. Final report

## 5. Undertaking of the Government of the Republic of Paraguay

A. To provide the study team data and information necessary for the study.

B. To exempt the team from the taxes and duties on the materials, equipment and personal effects brought into Paraguay by the team

C. To assign official counterpart personnel during the field survey

D. To make necessary arrangements for the team to visit authorities and project related sites



6. Schedule

Month Division	1978						
	3	4	5	6	7	8	9
Field Survey	-----						
Home Work		-----					
Draft Final Report					-----		
Final Report							-----

**Part III Economic, Transport and Traffic Situations**



## Part III Economic, Transport and Traffic Situations

### 1. Economic Situation

#### 1-1 General Characteristics

The Republic of Paraguay, measuring about 410,000 square kilometers in area, is the inland country hemmed in by Argentina, Brazil and Bolivia. Most of its national land consists of plains with few undulations, and the national land is divided into the West Chaco Region (about 250,000 square kilometers) and the Eastern Region (about 160,000 square kilometers). The climate is warm, the average temperature standing at 25°C. There is a seasonal distinction between summer and winter, but the distinction between the dry and wet seasons is not clear.

The national population was estimated at 2,550,000 in 1975, and the population increase rate averaged 2.6 percent a year. Most of the population is concentrated in the southern area. Ethnically, people with mixed Guarani and Spanish blood account for 97%. Religiously, the majority of the people are Catholic. There is neither ethnical nor religious trouble.

Paraguay's major cities include Asuncion (about 420,000), Encarnacion (about 40,000) and Concepcion (about 30,000). Chaco Region, situated on the west side of the Paraguay River, is less populated and has yet to be economically developed. The economic center of Paraguay is the triangular area connecting Asuncion, Encarnacion and Iguazu. The land is fertile and agriculture and stock farming are well developed.

The transport network of Paraguay centers around the trunk road connecting the three cities (however, the section between Iguazu and Encarnacion has yet to be completed). International transport depends primarily on the river transport of the Paraguay. At present, there are signs of an increase in truckage through Brazil (loaded at Paranaga Port) and Argentina. Politically, diplomatically and economically, fluvial transport is the most economical one, and it turns out that it will also be the most reliable means of transport in the future.

#### 1-2 Status of the Economy and Structural Characteristics

1-2-1 In Paraguay, the sector of agriculture and stock farming accounts for about one third of the GDP, 51.2% of the working population (1975) and about

80% of the total export value. Generally, Paraguay is considered an agricultural country, but the annual average growth rate of this sector is low as it stands at only 6.4%. The mining and industrial sector accounts for only about one-fifth of the GDP, whereas the service sector in a broad term, including transport and communications, has a share of about 50%.

The present situation of the Paraguayan economy is interpreted as a sign of economically developing. For the background of this phenomenon, consideration must be given to the geographical environment in which Paraguay is placed. The inland country of Paraguay has no means to contact advanced Western countries other than the fluvial transport of the Paraguay and Rio de la Plata and is situated too far away from them as a market. These are the primary factor for the slow development. Another reason is that the regional unit of this country is too small for comprehensive development.

Therefore, Paraguay embarked very lately upon comprehensive national development for the establishment of stable industries, although it had flat and fertile lands fitted for agriculture and stock farming. Given this situation, the Government of Paraguay puts emphasis on the promotion of agriculture and stock farming and strives for the development of agriculture and stock farming. However, agriculture and stock farming tend to be influenced by nature as well as fluctuations in global business, so that there is also a need to make efforts for the development of the mining and industrial sector from the standpoint of a long-range imperative to establish a stable industrial structure. Particularly, it is an urgent task to survey and examine methods of using electric power, the generation of which is scheduled to be begun by the Itaipu and Yacyreta power plants in the latter half of the 1980's.

1-2-2 By sector, the outline may be summarized as follows:

(1) The agricultural sector is the key industry of Paraguay, as it accounts for slightly less than 50% of the working population and 74% of the total export value. In spite of the fact that 20% of the national land is cultivatable, however, only 2-3% is under cultivation and therefore the productivity is low. At present, this sector has a share of only about 18% in the GNP. The agricultural products are broad in range, including corn, soybeans, cassava, cotton, tobacco, sugar beet and vegetables. In recent years, there

have been signs of a concentration of efforts on the production of soybeans and cotton. With respect to food, Paraguay is a self-sustaining country with the exception of wheat. The self-sustaining ratio of wheat stands at only 30%. For this reason, efforts are being made to reclaim waste land for farm work and increase the farm productivity.

Now that unused cultivatable land accounts for 8 times as much as the present, the output and exports may be increased, if improvements are made in the infrastructure, such as a replenishment of the physical distribution facilities, in proportion to an increase in the acreage of cultivated land.

(2) About 40 percent of the total national land is used for stock-farming, which accounts for about 12.1 percent of the GDP and 13.3 percent of the total export value (1976). It is considered possible to increase the acreage of the present stock farms to a point where three times the present number of heads of cattle may be raised. Modernization of the facilities, extermination of the epidemics and replenishment of the credit system will assure a further growth of the stock farming industry in the future. In an international context, however, the Paraguayan stock farming industry is placed has many difficulties, such as competition with neighboring Argentina and the EC's restrictions on canned food imports.

(3) The forestry industry, sustained by the forests accounting for 50 percent of the national land, shares four percent of the GDP and about 6.7 percent of the exports (1976). The exports of material wood accounted for 52.9 percent of the total export value in 1968. But the exports have been prohibited since 1973 for a possible decrease in the availability of forest resources and a shift has been made to the exports of processed wood. For this reason, there have since been signs of a decrease in the share of the forestry industry in the total export value. As one condition for the forestry industry to develop into a stabilized one, the first essential step will be to formulate as soon as possible legitimate plans for felling and reforestation.

(4) The mining sector produces only lime stone, marble and other nonferrous products, and their share in the GDP is extremely small. The availability of oil and iron ores in the northern part may be predicted. At present, prospecting and test drilling are conducted, but definite information has yet to be made available.

(5) Industry centers around the production of consumer goods, such as

cement, cotton cloth, processed meat and alcohol. It accounts for about 15 percent of the GDP, 15 percent of the working population and five percent of the exports. Cement, processed food and alcohol are produced by national enterprises, whereas most of these products are manufactured by small private businesses. In the latter half of the 1980's, hopes may be pinned on industry of the kind which makes full use of electricity to which reference will be made later, but now that no concrete programs are available, it is an urgent task in a short-range perspective to accelerate the development of industries of the kind which will take the place of imports.

(6) Electricity has remained almost completely undeveloped in the past, but the development of the Parana River which runs along the border with Brazil is expected to generate at least 17,000 MW of electric power. The development will be conducted under an agreement with Brazil and Argentina. Upon completion, electricity will be sold to each country for the development of its industry.

At present, the construction of hydroelectric power plants at Itaipu, Yacyreta and Corpus is under way with the collaboration of the Brazil and Argentina.

(7) At present, the Government of Paraguay is carrying out measures to cut down tax rates for (1) stabilization of the prices, (2) financial and income policies, and (3) stimulation of both domestic and foreign investments. Therefore, a stable economic growth is anticipated.

1-2-3 Farm production is largely responsible for fluctuations. In a short-term perspective, great influences are produced by the promotion of exports. For example, the GDP in 1974 registered a rise of 8% in 1974, but the increase remained at 5% in 1975 and 7% in 1976. In 1975, for example, the reason was that the rise in exports turned to a drop of 5% due to the shutdown of the meat and wood markets and a global recession. In 1976, the reason was that the big rise in the production of farm produce, such as cotton and soybeans, was offset by a dull export market tone which arose from the shutdown of the canned meat market.

Due to the measures taken by the Government for the formation of savings and investments, the savings reached to a point equivalent to 24% of the GDP in 1976, whereas the consumption was reduced 85% of the GDP in 1972 to

76% in 1976. Inflation has been deterred due to the adoption of money, financial and income measures. The prices were up 25% in 1974 but the percentage was reduced to 6.7% in 1975 and 4.5% in 1976. The restraint of rises in wage was the principal reason for a restraint of inflation.

1-2-4 The financial scale is only about 9% of the GDP, so it does not produce any significant influence on the whole economy. Tax receipts account for about 87% of the earnings, so that the reduction of tax rates which was taken to stimulate investments inevitably made it necessary to take measures to restrain the current expenditure and the balance of the current expenditure and revenue is favorable. But a rise in the capital expenditure since 1975 has put the overall balance into the red, and the situation is coped with by an inudction of great amounts of external funds.

1-2-5 The foreign trade balance has become increasingly unfavorable due to a dilatory increase in the total export value, the oil crisis and a sharp rise in the import of materials and equipment for hydroelectric power plants. (a black-ink balance of US\$2,000,000 was registered in 1973, but a deficit was marked to the tune of US\$50 million in 1974, US\$86 million in 1975 and US\$131 million in 1976.) For this reason, the unfavorable balance of the current account reached US\$205 million in 1976. Eventually, this deficit was covered up by direct investments, inflow of foreign currency for the construction of dams and loans of the Government from foreign countries. The principal export items include soybeans, cotton, tobacco and other farm products which are readily affected by weather in addition to meat and lumber. The import items include, among others, machinery, crude oil, iron and steel and automobile parts. Insofar as the trade partners are concerned, Paraguay, which is an inland country, is dependent in large measure upon Argentina, which accounts for 20-30% of the total export and import volumes. Argentina is followed by the Netherlands, West Germany, the United States, Great Britain and other European countries. As is evidenced from the fact that restrictions are imposed on such major export items as meat and lumber at the places of their destination as elucidated earlier, Paraguay's bargaining power is extremely weak. For this reason, the relations with Brazil have become closer in the last several years, as Paraguay hopes for a diversification of its export destinations.



### 1-2-6 Prices, Wages and Employment

The prices continued to rise at a rate of about 3% in the 1960's. In 1973 and 1974, they sharply rose by 12.8% and 25.2%, respectively. These sharp increases reflected rises in the prices of import goods, particularly oil and food. Thanks to the money and income measures taken by the Government of Paraguay, however, inflation was clamed down, and the rise in price was pegged to 6.7% in 1975 and 4.5% in 1976. As a link to this policy, the wages rose by 8% in the public sector in 1974-76 and the minimum wage registered an increase of 5% in 1975. However, there was no rise in 1976. The actual wage rise ration in the urban areas, inversely, marked a drop of 13%. These measures for a restraint on an increase in wage resulted in increasing job opportunities but encouraged an outflow of experts and skilled workers from the public sector as an adverse product. For this reason, the Government concentrated itself on education and the training of technicians. It is now making efforts for the upbringing of skilled workers through SENADE (National Employment Service) and SNAPP (National Service for Professionals). Now that employment marked a rise of 6% in 1976, the unemployment ratio dropped to 2% from 3% in 1975, but the potentially unemployed persons are estimated to run up to a considerable number in the agricultural sector. All told, the composition of the working population by industry is 52% in agriculture, 14.8% in industry and 33.2% in the service sector.

### 1-3 Five-Year Economic Development Program (1977-81)

#### 1-3-1 Targets

At the time when the five-year program covering the period of five years from 1971 to 1975, the formulation of a program for the subsequent five years was not completed, so that the year 1976 was considered to be an extension of the preceding program. The new five-year program covering the period of 1977 to 1981, which was completed one year behind schedule, basically follows the line of the previous five-year period of 1971-75.

(1) In the new five-year program covering the period of 1977-81, the following targets are enumerated:

1. Upgrading of the national income level and expansion of job opportunities.
2. Encouragement of the national capital formation and preferential

treatment to foreign investments .

3. Equation of income distribution
4. Increased export of natural resources .
5. Economic solidarity through regional development
6. Promotion of public investments and increase of social capital .
7. Harmony of loans from both domestic and foreign sources and stable economic growth .

(2) In order to attain these long-term targets, the following short-term targets are established:

1. Increased efficiency of the administrative mechanism
2. Encouragement of private savings .
3. Exploration of natural resources and formulation of a program for the utilization of electric power generated by the Parana River's hydro-electric power plants .
4. Establishment of a comprehensive development organ .

(3) The concrete development strategies which were incorporated in the previous five-year program are also taken up in the new five-year program. They are:

1. Access to foreign markets with increased exports .
2. Promotion and development of agriculture and industry .
3. Development of industries taking the place of imports .

This policy of the Government of Paraguay was adopted with full consideration given to the fact that the Paraguayan market is too limited. It is also recognized that the narrowness of the domestic market stems from a delay in national economic solidarity. To solve this question, attempts are to be made for an eventual national economy solidarity by working for regional development through:

1. Promotion of agriculture, stock farming and forestry, and
2. Switch to the export of processed goods from that of raw materials .

Regionally, Chaco Region which might well be described as virgin soil may become important in terms of development.

(4) In regard to the foreign economic relations, the primary target is a promotion of the exports as elucidated earlier, but in the light of its geographical position as an inland country, it is a categorical imperative to

maintain friendly relations with Brazil, Argentina, Uruguay and other Latin American countries as in the past.

(5) The following concrete development targets may be enumerated.

1. The GDP growth rate will be set at 7.6% a year on the average (6.1% under the five-year program covering the period of 1971-75)
2. The per capita national income will be raised to US\$400 in 1981 (US\$32.6 in 1972).

Table III - 1 - 3 - 1. PRODUCTO INTERNO BRUTO a Precios de Mercado  
(En millones de guaraníes Constantes de 1972)

POR RAMAS DE ACTIVIDAD	ANOS	△ a. a. 1970/75	ESTIMADO		PROYECTADO					△ a. a. 1976/81
			1976	1977	1978	1979	1980	1981		
Agricultura		6,6	22750,3	24216,1	25839,6	27616,7	29563,5	31727,5		6,9
Ganadería		3,3	14750,2	15327,7	15954,4	16651,7	17364,2	18173,3		4,3
Explotación Forestal		6,4	5352,0	5727,4	6136,9	6581,4	7064,4	7589,0		7,2
Caza y Pesca		1,2	107,1	112,5	118,1	124,0	130,2	136,8		5,0
<b>PRODUCCION PRIMARIA</b>		<b>5,3</b>	<b>42959,6</b>	<b>45383,7</b>	<b>48049,0</b>	<b>50953,8</b>	<b>54122,3</b>	<b>57626,6</b>		<b>6,1</b>
Pinería		23,7	258,0	273,0	290,0	307,0	326,0	344,0		5,9
Industria		5,3	20528,0	22697,0	24689,0	26751,0	29367,0	32539,0		9,7
Construcción		13,6	4367,0	4788,0	5261,0	5836,0	6497,0	7286,0		10,8
<b>PRODUCCION SECUNDARIA</b>		<b>6,7</b>	<b>25153,0</b>	<b>27748,0</b>	<b>30240,0</b>	<b>32894,0</b>	<b>36190,0</b>	<b>40169,0</b>		<b>9,8</b>
<b>TOTAL PRODUCCION DE BIEMES</b>		<b>5,8</b>	<b>68112,6</b>	<b>73131,7</b>	<b>78289,0</b>	<b>83847,8</b>	<b>90312,3</b>	<b>97795,6</b>		<b>7,5</b>
Electricidad		17,4	1808,3	1973,3	2464,7	3043,4	3577,5	4192,2		18,3
Agua y Servicios Sanitarios		15,1	326,9	343,1	418,2	505,9	566,0	659,0		14,3
Transporte y Comunicaciones		8,3	5514,8	6012,2	6523,2	7074,1	7854,3	8718,7		9,6
<b>PRODUCCION DE SERVICIOS BASICOS</b>		<b>10,4</b>	<b>7650,0</b>	<b>8328,6</b>	<b>9406,1</b>	<b>10623,4</b>	<b>11997,8</b>	<b>13549,9</b>		<b>12,1</b>
Comercio		6,3	29520	31880,8	34028,1	36382,3	39186,4	42433,4		7,5
Gobierno General		1,2	5057,3	5277,1	5569,6	5854,4	6138,6	6457,0		5,0
Viviendas		5,6	3331,8	3525,8	3773,6	4022,1	4276,2	4560,9		6,5
Servicios Diversos		7,2	13346,1	14146,0	15080,5	16084,6	17246,2	18585,5		6,8
<b>PRODUCCION DE SERVICIOS NO BASICOS</b>		<b>5,9</b>	<b>51287,2</b>	<b>54829,7</b>	<b>58451,8</b>	<b>62343,4</b>	<b>66847,4</b>	<b>72036,8</b>		<b>7,0</b>
<b>TOTAL PRODUCCION DE SERVICIOS</b>		<b>6,4</b>	<b>58937,2</b>	<b>63158,3</b>	<b>67857,9</b>	<b>72966,8</b>	<b>78845,2</b>	<b>85586,7</b>		<b>7,7</b>
<b>PRODUCTO INTERNO BRUTO</b>		<b>6,1</b>	<b>127049,8</b>	<b>136290,0</b>	<b>146146,9</b>	<b>156814,6</b>	<b>169157,5</b>	<b>183382,3</b>		<b>7,6</b>

FUENTE : División de Programación General.  
Secretaría Técnica de Planificación.

### 1-3-2 Issues about New Five-Year Program

The new five-year program covering the period of 1977-81 might well be described as an extension of the previous five-year program.

(1) The main strategies incorporated in the five year program consist of:

1. Increase of the exports, and
2. Development of industries taking the place of imports

These two principal measures are designed to unify the small economic units which are scattered all over Paraguay and build the foundations for comprehensive development in the future. The Government of Paraguay decided to carry out these strategies. Being aware of the roles which are played by the Government and other public institutions, the Government is striving for an upgrading of their efficiency. On the other hand, it is also contemplating stimulating production activities in the nongovernmental sector and encouraging the induction of foreign investments. A key to their realization will be the building of an environment for them, such as an improvement of the tax system.

(2) There is reason to believe that this five-year program will become important in the future. It is that the method of making use of hydroelectric power along the Parana River will be worked out and incorporated in the five-year program. The simplest way of using this enormous electric power would be to sell it to Brazil and Argentina. When attention is focused on the fact that the electric power which will be generated along this river is quantitatively big enough to sustain the demand of the economic structure of the Paraguayan economy, however, it is evident that it will not be of advantage to sell all the quantity of hydroelectric power. Therefore, it might be described as an urgent task to work out methods for its utilization.

## 2. Businesses Associated with the Project

### 2-1 REPSA

REPSA (Refineria Paraguaya S.A.) is a Paraguayan oil refining corporation. In terms of capital, a consortium is formed with BOC International, international oil capital of Uruguayan nationality. The head office and plants of the REPSA are situated about 20 kilometers down the Paraguay River from Asuncion.

The tanks on the land have a total capacity of 15,000 kt, and the plants are capable of producing oil to the tune of 6,000-10,000 barrels a day or 350,000-400,000 kiloliters a year. On this score, the oil producing facilities might well be described as giving full play to their capacities. As a sign of these circumstances, it is understandable that there has recently been a rise in the share of half-finished products in the import or transport sector in order to raise the oil producing capacities. For the time being, however, there will be no plans for an expansion of the facilities.

The oil unloading pier is about 150 meters in length and wooden (with a water depth of 12 feet). Two barges may be moored alongside the pier at one time. In addition, there is a pier for general merchandise.

The pumps equipped to the plants are not so powerful. For this reason, oil carriers or barges are normally equipped with pumps.

Primarily, the NAVIPAR, an associated firm, takes charge of transport (See Part VI, 2). Jurisdictional control is exercised by the Ministry of Commerce and Industry, which also enter into contracts for the imports of crude oil.

## 2-2 Vallemi (Common Name of the Cement Public Corporation)

The Cement Public Corporation is commonly known as Vallemi. At present, Vallemi produces 200,000 kt. of cement a year, most of which is consumed at home. However, none of this product is used for the construction of roads at present, and its use has just begun for an airport, blocks for roads. It is difficult to estimate how big the demand will become in the future.

At present, 30,000 kt. of heavy oil a year is transported from the PEPSA by nongovernmental means of transport for use in production activities.

No specific concrete programs are formulated for an expansion of the cement output. If a new cement plant is introduced in June 1978 as envisaged by the Government, it will become possible for this plant to start producing cement in the middle of 1981, and the output is expected to reach 500,000 kt. For this output, the Corpus and Yacyreta power generation programs are taken into consideration. In this situation, it is estimated that there will be a lack of transport capacities for produced cement, so that the question will be how to maintain means of transport. At present, it is hoped that the transport will be maintained by ship. For this interest, an unusual interest is paid in the FME's

program for an increase of its fleet.

However, it is exceedingly difficult to make an estimate on the future demand of cement because it is difficult to estimate as elucidated earlier how big the demand will become in the future. For this reason, it is conceivable that the demand will fall below the present output.

### 2-3 Yacyreta (Committee)

The Yacyreta Committee is jointly organized by members from Paraguay and Argentina. The committee is established to study a hydroelectric power plant construction program which will make use of the land form of Yacyreta Region between Encarnacion and Ita Ibate.

The primary project of this committee calls for the installation of 10 hydroelectric power generation turbines for the generation of 1,360,000 KW. Under the second project, an additional 10 hydroelectric power generation turbines will be installed to bring the generation to a total of 2,700,000 KW. Under the third project, another 10 hydroelectric power generation turbines will be installed to realize the generation of an ultimate total of 4,050,000 KW.

This program is fully translatable into action in economic, technical and fund terms. The realization of this program will make it possible not only to maintain electric power but to stabilize the water quantity of the Parana River, and the water depth of this river will become 12 feet at the junction of the Yacyreta and Parana River, which will become the shallowest place of the Parana River. Therefore, it will also become possible for ships of the 2,000-2,500 DWT class to go up the Parana River to a point about 50 km further up from Encarnacion.

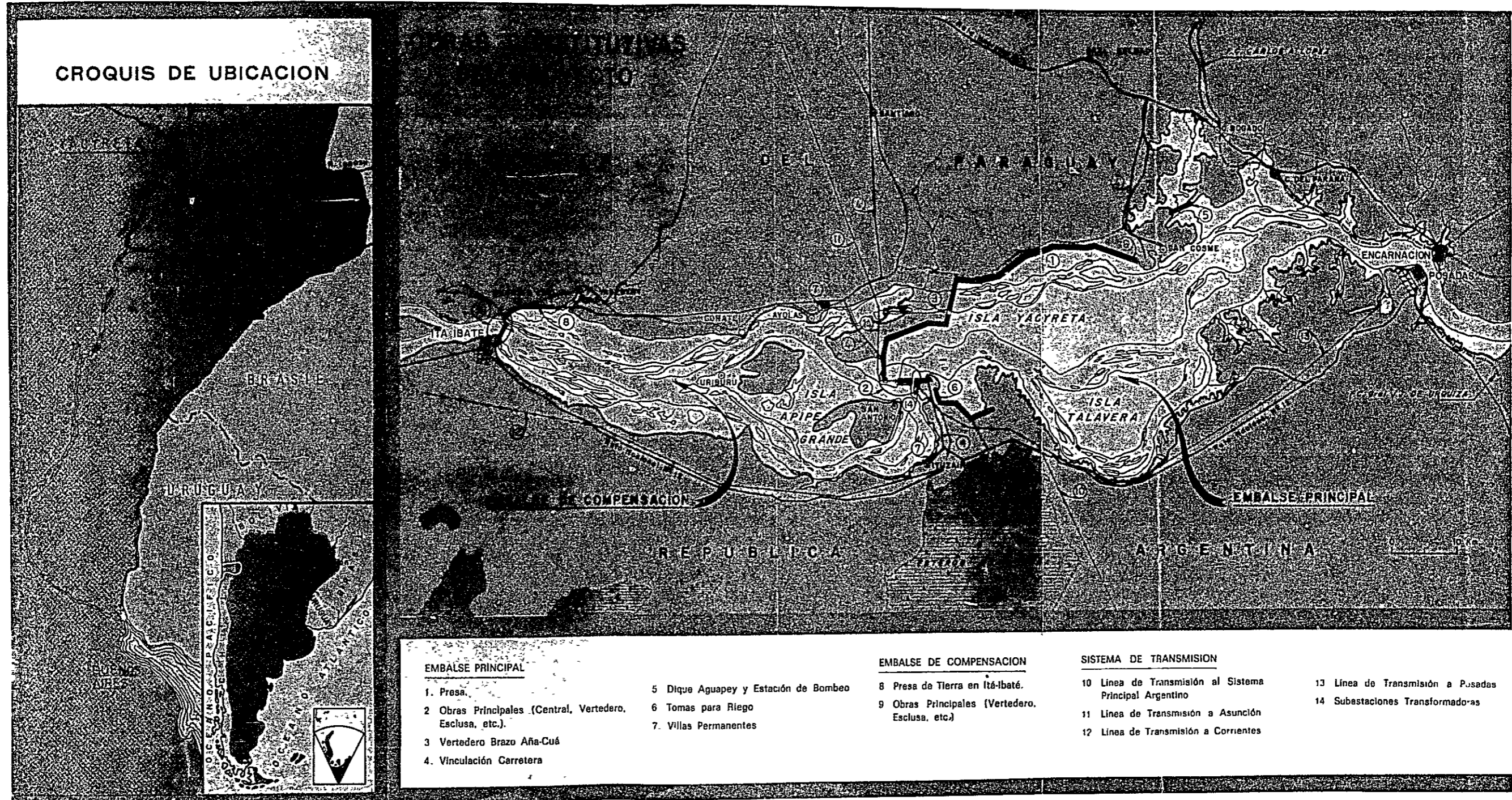
Under the existing plans, the first project will be completed in 1985 to start power generation.

Incidentally, river boats will be passable during the construction period from the first to the third project (See Fig. III-2-3-1).





Fig. III-2-3-1



100

### 3. Transport and Traffic Situation

#### 3-1 Position of Transport Sector

Under Paraguay's long-range program, the transport sector is positioned as one of the prime movers for the development of the nation, as it plays the role of "solidifying the nation's physical, geographical and economic unification and increasing opportunities for all sectors of the nation to participate in the development process."

As internally viewed, the redevelopment of the transport facilities is most important as an impact on the development of communities for the Republic of Paraguay. By realizing an organic linkage of each region, the development of the nation as a whole will become possible. From the standpoint of making inroads into foreign markets, an earnest desire of the Republic of Paraguay, the availability of means of transport to foreign countries by and for herself will enable her to reduce freight rates, and the benefits which will be produced on industrial and regional development might be considered immeasurable. Particularly when it is taken into consideration that the exports of the Republic of Paraguay evolve around primary products, the share of the freight rates in their CIF prices is great. Given this situation, the redevelopment of the transport sector is taken up as an urgent task.

As things now stand, however, the redevelopment of the transport sector in the Republic of Paraguay cannot be considered adequate, as a wide variety of issues are involved. With attention focused on freight transport and with the transport sector divided into river transport, road transport and railway transport, an attempt will be made to analyze each subdivision.

#### 3-2 River Transport

The river transport network of the Republic of Paraguay consists of the Paraguay and Parana Rivers. The Parana River branches off into two at Confluencia, 1,240 km up the river from Buenos Aires. The river which goes up north is the Paraguay, which passes Asuncion about 390 km up the river from Confluencia and goes up in Paraguayan territory along her border for an other distance of about 930 km to join the Apa River at the border with Brazil. The other branch, still remaining as the Parana River, passes Encarnacion at a point about 360 km up from Confluencia and changes its course to northeast

eventually to reach the border with Brazil.

These rivers are adequate in terms of width, but changes are observed thus imposing a variety of restrictions on ship navigation and representing a big barrier to the development of ship transport in the Republic of Paraguay. For this reason, a feasibility study is under way on the navigability of the Paraguay River, and a conclusion has yet to be drawn. In regard to the Parana River, the improvement of its waterways remains pending, as the construction of hydroelectric power plants is under plan.

A check of the shares in transport volume by means of transport in the Republic of Paraguay indicates that 82% of the exports (totaling 388,000 kt) were actually transported by river in 1975, 14% by road and 4% by railway. In the sector of the imports (totaling 440,000 kt), 85% were transported by river, 10% by road and 5% by railway. It is worthy of note that the share of river transport is extremely high. In the total domestic transport, the share of the rivers account for roughly half.

The mercantile fleet of the Republic of Paraguay engaged in river transport consisted of 218 vessels, 42,000 GT, as of the end of 1974. The average ship size was small, standing at 193 GT. Of these vessels, 33 ships weighing 25,844 GT, belong to the FME. The number of ships is small for the FME, which is possessed of cargo carriers and ocean-going vessels, so that the FME ships account for the majority in terms of gross tonnage (Table III-3-2-1). However, the mercantile fleet of the Republic of Paraguay cannot necessarily be considered adequate in scale. In foreign trade, the share of Argentine and other foreign vessels is greater, and the loading ratio of the Paraguayan vessels stands at only 20%.

A check of the port facilities for these activities reveals that Asuncion Port and small ports in its periphery have a high share of about 80%. Encarnacion Port, which is utilized as a loading port for the loading of export farm products, has a share of nearly 20% in exports. These port facilities are extremely small in scale with the exception of those of Asuncion Port. (Table III-3-2-2)

In regard to future river transport, it is to be hoped that ships centering around those of the FME be strengthened, port facilities appropriately located and conditions for river navigation improved.

Table III-3-2-1 Parque Fluvial del Pais Diciembre de 1974

Total	Embarcaciones	Tipo	Flota Mercante del Estado				Privadas	
			Cantidad	Tonelaje		Cantidad	Tonelaje	
				Neto	Bruto		Neto	Bruto
33	Cargueros	15	8.302.98	14.533.76	18	1.135.94	1.384.07	
7	Petroleros	3	1.544.66	3.286.00	4	3.683.64	3.691.58	
3	Ultramar	1	713.00	1.825.00	2	686.06	1.592.02	
9	Gabarras	6	2.553.08	3.098.68	3	127.89	130.41	
3	Pasajeros	2	1.489.30	2.348.48	1	740.00	745.97	
1	Frigorificos	1	237.47	491.80	-	-	-	
14	Barcazas	-	-	-	14	2.161.02	2.215.17	
22	Remolcadores	3	73.88	260.55	19	238.94	287.99	
10	Chatas	-	-	-	110	5.308.55	5.871.70	
12	Lanchas	-	-	-	12	220.05	253.44	
4	Balsas	2	-	-	2	38.00	38.00	
218		33	14.914.37	25.844.27	185	14.340.09	16.210.35	

Table III-3-2-2 Resumen del Trafico de Carga de todos los Puertos, controlados por la Administracion Nacional de Navegacion y Puertos

Enero a Diciembre de 1975

Puertos	Importacion	%	Exportacion	%	Trafico Int.	%	Total
Asuncion	92.806.5	21.1	175.942.5	45.3	22.238.2	50.5	291.067.2
Ftos. Menores	269.516.6	67.4	46.360.2	11.9	-	-	342.876.8
Concepcion	1.910.7	0.4	28.669.8	7.4	21.756.4	49.5	52.336.9
Stroessner	26.697.8	6.0	13.845.3	5.0	-	-	45.543.1
Villeta	277.0	0.1	47.131.4	12.0	-	-	47.408.4
Encarnacion	21.636.4	5.0	70.846.1	18.2	-	-	92.482.5
Total:	439.845.0	100.0	387.795.3	100.0	43.994.6	100.0	871.634.9
Porcentaje:	<u>50.5</u>		<u>44.5</u>		<u>5.0</u>		<u>100.0</u>

### 3-3 Road Transport

A total of 7,477 km of roads is available in the Republic of Paraguay, of which 905 km are paved. The pavement ratio is low with 12.1%. The main roads are concentrated in and around Asuncion. The highway running east to Brazil and the highway running south to Argentina from Asuncion are the most important roads. The density of roads is extremely high on the outskirts of Asuncion, but the density in Chaco is about 1/16 that of Asuncion, suggesting that there exist an imbalance between regions. On the other hand, the redevelopment of roads does not necessarily make smooth progress. The total length of roads in 1975 was up 18% from 1970 and the increase in the total length of paved roads was a mere 11%.

In contrast, there has been a steady increase in the number of cars owned. The number reached 52,071, up 80% from the 29,094 registered in 1970. By type of vehicle, the rise in the number of trucks is extremely conspicuous.

The principal issues posed for road transport at present are that the total length of roads is inadequate and that there are many roads which cannot be passed through, suggesting that there is something wrong with the redevelopment of roads and services in the road transport system are inferior. For this reason, there is a need to construct new roads as one of the most essential parts of the infrastructure for an upgrading of the national life and at the same time to improve transport services.

### 3-4 Railway Transport

The total length of railways is a little more than 2,000 km, and the most important section is 376 km between Asuncion and Encarnacion. The railway lines in the northern part are placed under the management of a private firm and most of these lines are suspended at present.

The line between Asuncion and Encarnacion is connected with Argentine by an Argentine national railways' ferryboat service which starts at Encarnacion. Thus, it serves as a means of transport to a foreign country.

Although the railways in the Republic of Paraguay are nearly 20 years older than in Japan, however, laying and repair work have not since been carried out to the full extent and the facilities and cars are timeworn. For this reason, the average speed of trains is limited to 20 km/h and they cannot be

put into normal operation. Given this situation, the railway transport of cargoes and passengers has in the last several years levelled off or shown signs of a decrease, thus placing the railway management in an increasing deteriorated condition. However, there have been signs of an annual increase in the average distance of transport and there has been an increase in the railway transport of oil. In the light of its relationships with automobile transport, it is expected that the demand for railway transport will further increase as a means of long-distance transport in the future. The development of railway facilities to cope with this situation has become an issue.





Part IV Present Situation of Ports and Waterways



## Part IV Present Situation of Ports and Waterways

### 1. Asuncion Port

Asuncion Port, 1,630 km up the Paraguay River from Buenos Aires, is situated in the bay of the same name. Its cargo handling accounts for nearly 40% of Paraguay's total cargo movements. It is Paraguay's largest port.

Asuncion Port has 11 berths, 885 m in total length and 12 feet in water depth. As 125 m is reserved exclusively for passenger services, however, the length of berths at which cargoes may be handled is 760 m. There are eight buildings, the scale of which is indicated in Table IV-1-1.

Table IV-1-1 Bonded Buildings at Asuncion Port

A.	1,650 m <sup>2</sup>	General merchandise
B.	1,650 m <sup>2</sup>	General merchandise
C.	1,650 m <sup>2</sup>	General merchandise
D.	800 m <sup>2</sup>	Air cargoes
E.	800 m <sup>2</sup>	Air cargoes
F.	790 m <sup>2</sup>	Salt
1.	3,500 m <sup>2</sup>	General merchandise
2.	3,500 m <sup>2</sup>	General merchandise

As is discernible from this table, the area of effective custody of cargoes is 11,950 m<sup>2</sup>. Then there are small buildings used for workshops, warehouses, etc.

The machinery and facilities indicated in Table IV-1-2 are available as loading and unloading facilities.

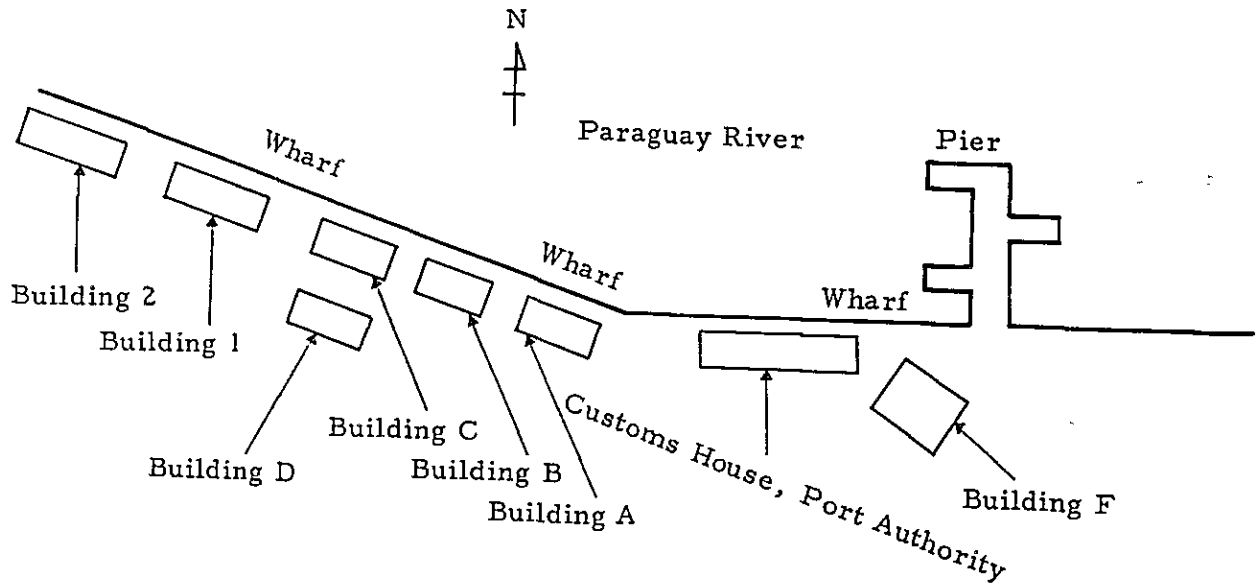
Table IV-1-2 Loading and Unloading Facilities At Asuncion Port

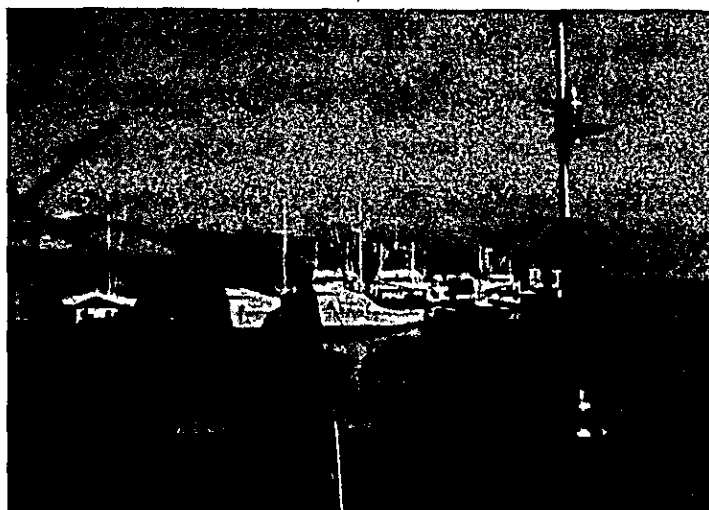
20-ton winch	1
9-ton winches	3
3-ton winches	9
17-ton crane	1
7-ton cranes	3
Small cranes	2
Forklifts	15
Push wagon	1
Belt conveyers	2

In 1975, Asuncion Port handled 291,000 kt, which included 93,000 kt of imports, 176,000 kt of exports and 22,000 kt of goods for domestic transport. The handling per meter of pier was about 380 kt. Viewed from the general pier redevelopment standards, it is conceivable that Asuncion Port has ample room. In regard to the warehouses, however, there is likely to be a shortage of room when there is a rise in the quantity of imported goods.

As for the redevelopment of Asuncion Port in the future, the port authorities do not have any concrete program, as they are of the view that the existing port facilities will be sufficient to cope with the cargo movement for the time being. However, the port authorities have plans, albeit not yet concrete, to expand the port to the west in some future.

Fig. IV-1-1 Rough Plan of Asuncion Port





Asuncion Port

2. Small Ports Around Asuncion

2-1 San Antonio Port

A freezing warehouse is situated here for the Meat Packing Division of the International Products Corporation.

2-2 Villeta Port

Villeta Port is situated 50 km south of Asuncion Port and equipped with 100-m ferroconcrete pier, alongside which two vessels of the 1,500 DWT class may come at one time. The cargo movement is shown below:

	1966	1968	1971	1974	1975	(unit:KT)
Imports	-	-	-	2,154	277	
Exports	52,800	47,330	13,643	34,924	47,051	
Total	52,800	47,330	13,643	37,078	47,328	

Until 1971, there had been many exports of material wood. Since the exports of material wood were prohibited, there have been increases in the exports of lumber, soybeans and feed. The imports are extremely small in quantity.

2-3 Villa Elisa Port

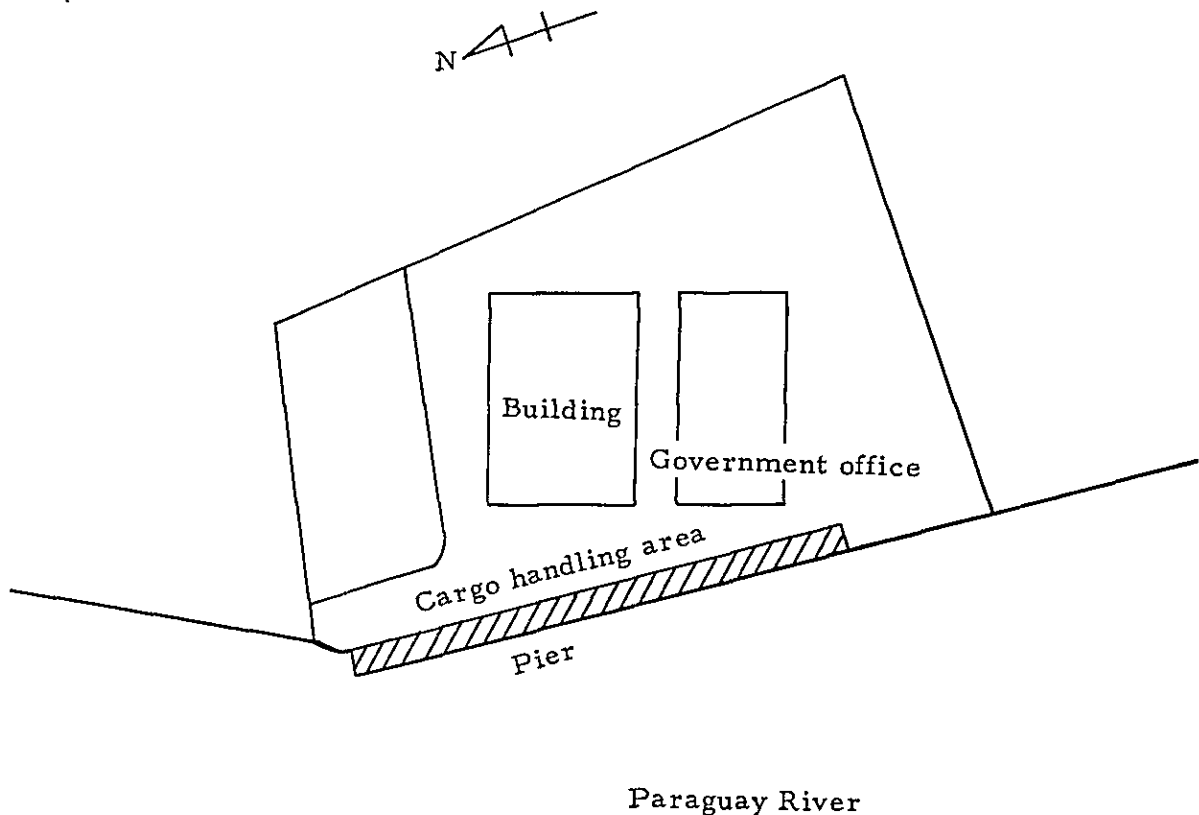
Villa Elisa Port, situated south of Asuncion Port, is owned by REPSA. It has a wooden pier, alongside which two boats may come at one time.

### 3. Concepcion Port

Concepcion Port is the most important port in the area north to Asuncion. It is situated 310 km up the river from Asuncion. The premises of this port measure 16,000 m<sup>2</sup>. The wooden pier measures 150 m in total length and there is a bonded building with a floor space of 1,600 m<sup>2</sup>. The loading and unloading facilities include a steam crane, a 3-ton unloader, etc.

In 1975, this port handled 52,000 kt of cargoes, of which 41.5% was for domestic transport and 58.5% for export and import. A check of the compatibility of the cargo handling with the facilities reveals that the facilities have some latitude. Unless there is a sharp rise in the movement of cargoes, the existing facilities may be fully able to cope with the movement.

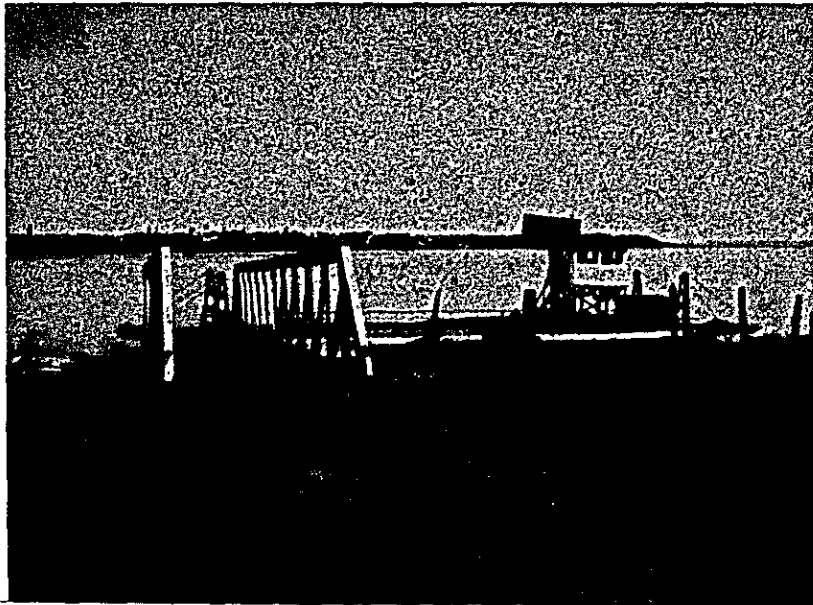
Fig. IV-3-1 Rough Plan of Concepcion Port



#### 4. Encarnacion Port

Encarnacion Port is situated 1,580 km up the Parana River from Buenos Aires. In this area, there are two industrial plants in addition to a tung oil plant of the Japanese-affiliated CAISISA. About 10,000 kt of tung and soybean oils are shipped by pipeline a year. In recent years, the shipment of soybeans has become brisk. About 40,000 kt of soybeans are shipped from areas around the port, and the shipment is expected to mark a sharp increase in the future. The cargoes handled in 1975 included 71,000 kt of exports and 22,000 kt of imports.

However, it can hardly be said that the port facilities are adequate. Loading and unloading are carried out while making use of the natural river bank, and space has not been fully redeveloped for a silo and the maneuvering of trucks.



Encarnacion Port

#### 5. Present Situation of Waterways

The river waterways include the Paraguay and Parana River. The Parana River measures 1,240 km, stretching from Buenos Aires to Confluencia, and branches off into two rivers at Confluencia. The river which goes up north is the Paraguay River. It passes through Asuncion, 390 km up from Confluencia, and runs 930 km farther up in Paraguayan territory to join the River Apa at the

border with Brazil. The other one, called the Parana, as is the same name for its down-stream, goes up 360 km east to Encarnacion. There, it changes its course to northeast and reaches up to Salto das Sete Aquedas 820 km apart from Encarnacion.

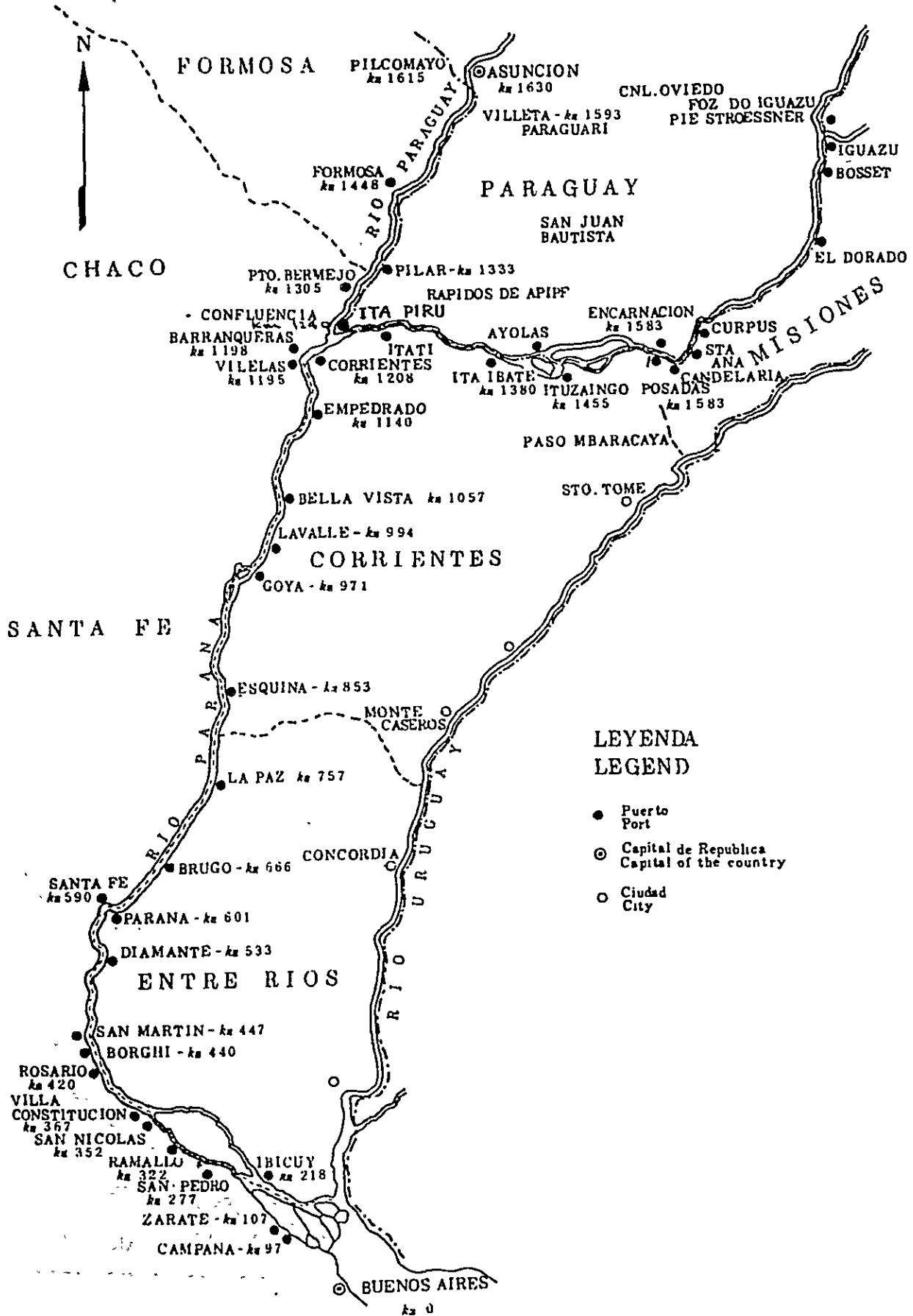
The most important river waterways for the Republic of Paraguay consist of the Paraguay and Parana River.

Both rivers are enough in width but big fluctuations take place in water level, reaching 6-7 m at times.

The normal permissible draft for a trip between Buenos Aires and Asuncion is 3.7 m in dry season. It should be limited to less than 1.5 m (5 feet) in the River Parana in dry season as there is a sandbank at Yacyreta. Depending on the year, however, the water depth goes down to less than 4 feet in the dry season, so it is necessary to exercise a full care about navigation.



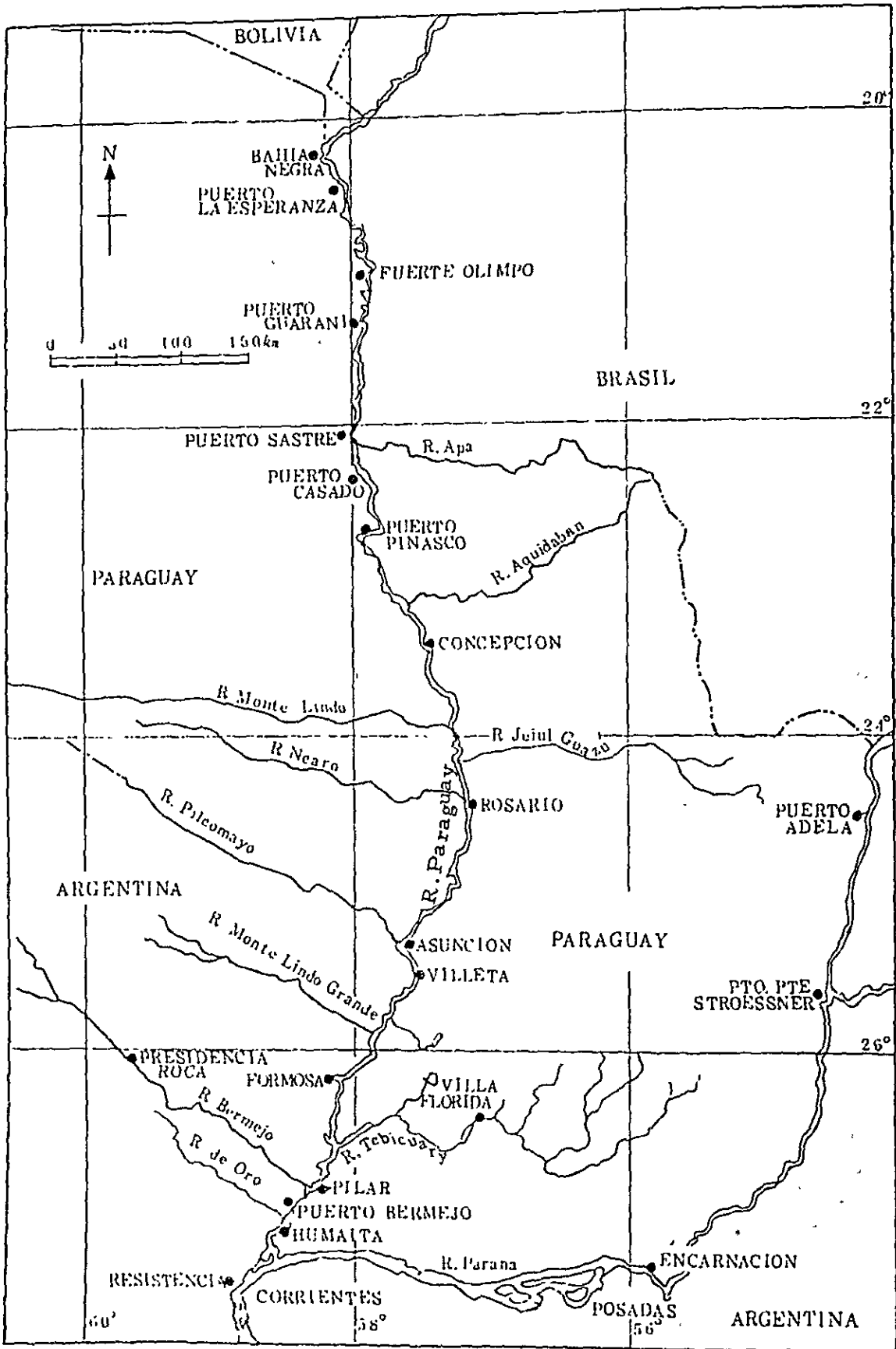
Map of River, Ports  
and  
Distance between Buenos Aires and each ports on the run of a ship



LEYENDA  
LEGEND

- Puerto  
Port
- ⊙ Capital de Republica  
Capital of the country
- Ciudad  
City

Ports along Rio Paraguay and Parana



Part V Administrative Organizations for Maritime Transport and Shipbuilding,  
and Maritime Transport and Shipbuilding Policy



Part V. Administrative Organizations for Maritime Transport and Shipbuilding,  
and Maritime Transport and Shipbuilding Policy

1. Administrative Organizations for Maritime Transport and Shipbuilding

Administration for maritime transport in the Republic of Paraguay is carried out by Ministerio de Obras Publicas y Comunicaciones, under which Direccion de Marina Mercante is placed. The main line of administration of the Direccion de Marina Mercante is to exercise control and supervision over private shipping companies except FME. In addition, it examines the regulations for crewmen and the regulations for river navigation. However, this institution is not empowered to formulate a shipping policy for the whole of the Republic of Paraguay. At present, the shipping policy for the whole of the Republic of Paraguay is examined primarily by the FME.

2. Maritime Transport and Shipbuilding Policy

In the Republic of Paraguay, a policy for cargo reservation is implemented under the Law No. 43 of 1971.

Under this law, consideration is given to:

- (1) That the necessity of protecting national merchantmarine is of importance,
- (2) The legal function of the measures under this law is compatible with the conditions which are already observed in foreign countries, and
- (3) That in accordance with the principles of reciprocity and international arrangements, the reservation of cargoes for national merchantmarine and the development of activities producible from sea and river transport are of benefit to the public.

With these considerations,

(1) Under a condition where ships are available, all export and import cargoes will be reserved for national flag carriers at the following rates in trading by waterway with the countries which do not belong to the Latin-American Free Trade Association (ALALC).

- a) Up to 50% between sea sections.
- b) At least 50% between river sections.

(2) Up to 50% of all export and import cargoes with member countries of the ALALC by waterway will be transported by national flag carriers.

This law is totally nominal under the present situation where there is a decisive lack of ships. When it is taken into account that there are cases, even in the future, where:

(1) There has been a review, to be sure, but this law is contradictory to the "principles of freedom in maritime transport" under which maritime transport is never subject to any legal restriction but is left to free competition; and

(2) Maritime transport is an arena of commercial dealings for international competition.

Given these factors, it would seem considerably difficult for a country, such as the Republic of Paraguay, where neither competitive power nor foundations are established, to realize the policy of reserving 50% of the cargoes.

Nevertheless, the basic posture of the Republic of Paraguay to maintain a transport share of 50% is fully appreciable. For this purpose, it is an urgent task to solidify its comprehensive "maritime transport power", such as by obtaining necessary volume of ships and improving shipping services.

In regard to the shipbuilding policy, no specific administrative institution is available to make policy studies, so there exists no independent shipbuilding policy. Shipbuilding is merely included in the maritime transport policy.

Part VI Present Situation of Maritime Transport





## Part VI Present Situation of Maritime Transport

### 1. Small Fluvial Vessels of Paraguay

Coastal transport by small vessels between small ports on each river is carried out by a large number of private shipowners. For their organization, a Water Transport Shipowners Center (CAF) is established, and about 80% of the shipowners have become its members. There are many small vessels and 20 barges, less than 100 DWT. In 1974, about 150,000 kt (the principal cargoes being 60,000 kt of oil and cement) was transported by about 70 small vessels and barges. In conjunction with a rise in the transport of cement, it is believed that upwards of 200,000 kt is transported at present.

Incidentally, according to Table III-3-2-1, 19 tug boats and 124 small vessels (Barcazas and Chatas) are registered at present.

### 2. NAVIPAR (Navegacion del Paraguay y Rio de la Plata)

The NAVIPAR, a Paraguayan corporation, takes charge of the transport of more than half of crude oil and half-finished products between Buenos Aires and Asuncion for the REPSA, a Paraguayan oil refinery company. It specializes in tanker transport.

The International Development Center (Japan) reports that the NAVIPAR transported 160,000 kiloliters, or about 80% of crude oil and others in 1971. A report from the FME says that the NAVIPAR has recently transported about 180,000 kiloliters, or about 51% of about 350,000 kiloliters of crude oil and others (of the remaining 49%, 36% has been transported by Argentine ships and 13% by the FME).

The ships are as follows: (Data in the five-year program)

(Convoy No.1)

Self-propulsion barge: 746GT, capacity 2,400 m<sup>3</sup>, 1,500 HP, Schottel type.

Barge: 729 GT, capacity 2,400 m<sup>3</sup>.

Barge: 729 GT, capacity 2,400 m<sup>3</sup>.

(Convoy No.2)

Pusher: 2,500 HP.

Barge: 1,117 GT (-NT), capacity 3,000 m<sup>3</sup>.

Barge: 1,117 GT (-NT), capacity 3,000 m<sup>3</sup>.

### 3. FME (Flota Mercante del Estado)

#### 3-1 Outline

Under a law of 1945, the FME was established as an entity of public works. It was renewed under the Law No. 1,199 in 1966. According to this law, the FME is a special corporation placed under the direct supervision of the Ministry of Public Works and Communications and a self-supporting accounting system is adopted. In actuality, it takes on the character of a bureau of projects for the Government like the Japanese National Railways in Japan. After several increases and decreases, the capital stands at 1,221,186,686 Guarani (about US\$10 million). In the meantime, the FME received a historic ship loan (US\$3,800,000) from Japan in 1961 and another loan from Spain in the following year to increase the number of ships. Both loans have already been repaid, and the Republic of Paraguay is rated as a good loanee.

However, financial condition of the FME was such that a deficit of 32 million Guarani was registered in 1970, 68 million Guarani in 1972, 35 million Guarani in 1973 and 74 million Guarani in 1974. Due to this accumulation of deficits, the management of the FME was reshuffled in the middle of 1975. Dr. Oscar V. Johannsen S. was sent in from the central bank to take over the presidency. Assisted by two lieutenants, he is now engaged in reconstructing the management. Owing to his efforts, the accumulated deficit was reduced to 38 million Guarani in 1975 and 15 million Guarani in 1976 and in 1977, a favorable balance of three million Guarani was appropriated.

In succession to the improvement of the balance, the management embarked upon the repair of ships, for which nothing had been done for many years, with a budget of about 100 million Guarani in 1977. On the other hand, it formulated programs for an increase in the number of ships in 1976 and planned to expand ships under the New Five-Year Program (1977-81) worked out in 1977. For the realization of this program, a request was made for a loan from Japan. (For the initial 1976 program, a preliminary survey was carried out by a JICA survey team of Japanese experts and a report on this preliminary survey was prepared in March 1977.) (Hereinafter referred to as "JICA Survey")

#### 3-2 Vessels in Possession

- (1) Motor cargo ships (Buque Motor): 12 ships.

- o Spanish type: 5 ships  
1,086 GT, 950 DWT, 1,810 m<sup>3</sup> (bales), 3 holds, draft 2.5 m each
  - o Spanish type, small: 2 ships  
499 GT, 499 DWT, 785 m<sup>3</sup> (bales), 2 holds, draft 1.98 m each
  - o Japanese type: 4 ships  
1,100 GT, 1,000 DWT, 1,616 m<sup>3</sup> (bales), 3 holds, draft 2.50 m each
  - o Japanese type (usable also for cattle): 1 ship  
1,155 GT, 750 DWT, 1,300 m<sup>3</sup> (bales), 2 holds, draft 2.50 m
  - (2) Barges (Gabarra) (Spanish): 4 ships  
517 GT, about 600 DWT, 1,045 m<sup>3</sup> (bales), 2 holds, draft 1.83 m each
  - (3) Tug boat "Itakyry" (Japanese): 1 ship  
123 GT, 700 PS (350 PS x 2), draft 1.80 m
  - (4) Tankers (Buque Tanker): 3 ships  
1,350 GT, 2,100 m<sup>3</sup>, 8 tanks, draft 3.20 m  
1,086 GT, 1,900 m<sup>3</sup>, 8 tanks, draft 3.20 m  
850 GT, 1,100 m<sup>3</sup>, 6 tanks, draft 3.25 m  
(Oil barge "Ytororo," nonoperational, 487 GT, 800 m<sup>3</sup>, 6 tanks, draft 1.80 m)
  - (5) Freezing Barge (Buque Frigorifico): 1 ship  
"Jejui," 491 GT, 559 m<sup>3</sup>, draft 1.80 m
  - (6) Freezing Ship (Gabarra Frigorifico): 1 ship  
"L. Valentinas", 541 GT, 578 m<sup>3</sup>, draft 1.83 m
  - (7) Ocean-going Vessel (Buque Ultramar): 1 ship  
"Guarani," 713 GT, 1,030 DWT, 2,460 m<sup>3</sup>, 2 holds, draft 3.74 m
  - (8) Passenger boat (Buque Pasajero): 2 ships  
1,174 GT, passenger capacity 324 persons each
  - (9) Others Launch: 2 ships
- Total: 27 ships, 22,040 GT

In addition to the above ships, there are three cargo ships (American, timeworn) and two tug boats (one is Japanese) (the conditions are now on operational).

For details, refer to Table VI-3-2-1~3

Table VI-3-2-1 Ships Possessed by FME

Ship type	Power cargo ships					
	LIO BLANCO	SALTO DE GUAIRA	PIRABEBE	OLIMPO	RIO APA	BERMEJO
Name of ship	"TOMAS RUIZ DE VELAZCO"			BILBAO	SPAIN	DEL CADAGUA SPAIN
Shipyard						
Year built	1960	1960	1960	1961	1961	1966
Class	LR					LR
Length, o.a.	72.0m					47.48 m
Length, p.p.	68.0m					
Breadth	12.0m					9.74 m
Depth	3.9m					3.10 m
Draft	2.5m					1.98 m
Gross tonnage	1,086T					499T
Net tonnage	627T					232T
Deadweight	950T					499T
Hold capacity						
Grain	1,940m <sup>3</sup>					850 m <sup>3</sup>
Bale	1,810m <sup>3</sup>					785 m <sup>3</sup>
Number of holds	3					2
Output of main engine	900 PS x 1					275PS x 1
Average speed	9.2 KT					
Cargo gear	3T , 5T					3T, 5T
Complement	14P	31				12P
Others		220T				
Conditions of operation	Under operation	Under operation	Under operation	Under operation	Under operation	Under operation

Type of ship	Power cargo ships					
Name of ship	AQUIDABAN	RIO NEGRO	COMUNROS	PARANA	YHAGUY	CHAQUENO
Shipyard	DEL CADUGUA SPAIN		IHI JAPAN			NKK JAPAN
Year built	1966	1961	1960	1961	1961	1961
Class.	LR	LR				LR
Length, o.a.	47.48 M	73.0 M				80.0 M
Length, p.p.		68.0 M				72.0 M
Breadth	9.74 M	12.0 M				10.2 M
Depth	3.10 M	4.0 M				3.4 M
Draft	1.98 M	2.5 M				2.5 / 1.8
Gross tonnage	499 T	1,100 T				1,155 T
Net tonnage	232 T	728 T				808 T
Deadweight	499 T	1,000 T				750 T
Hold capacity						
Grain	850 M <sup>3</sup>	1,740 M <sup>3</sup>				700 M <sup>3</sup>
Bale	785 M <sup>3</sup>	1,616 M <sup>3</sup>				1,300 M <sup>3</sup>
Number of holds	2	3				2
Output of main engine	275PS x 1	1,000PS x 1				350PS x 2
Average speed		9.7 KT				11.1 KT
Cargo gear	3T, 5T	3T, 5T				2T x 4
Complements	12 P	14 P				14 P
Others						Usable for cattle
Condition of operation	Under operation	Under operation	Under operation	Under operation	Under operation	Under operation

Type of ship	Power cargo ships			Power oil tankers		
	PACAGUALI	YDORA	YGURAY	CAGO YPOA	LDGUNA VERA	LAGO YPALARAI
Name of ship	CAVANAUGH WILMINGTON	MACHINES	WORAS	T. RUIS DE V. SPAIN	URAGA JAPAN	CAVANAUGH U.S.A.
Shipyard						
Year built	1948	1948	1948	1960	1960	1944
Class.	LR			LR	LR	LR
Length, o.a.	55.62 M			72.0 M	72.0 M	55.62 M
Length, p.p.				68.0 M	68.0 M	
Breadth	9.14 M			12.0 M	12.0 M	9.14 M
Depth	4.11 M			3.9 M	3.9 M	4.11 M
Draft	3.25 M			3.2 M	3.2 M	3.25 M
Gross tonnage	850 T			1,086 T	1,350 T	850 T
Net tonnage	328 T			628 T	589 T	328 T
Deadweight	850 T					
Hold capacity Grain	1,088 M <sup>3</sup>			1,900 M <sup>3</sup>	2,100 M <sup>3</sup>	1,100 M <sup>3</sup>
Bale						
Number of holds	2			8 tanks	8 tanks	6 tanks
Output of main engine	340 PS x 2			900PSx1	1,000PSx1	315PSx2
Average speed	7.8 KT					
Cargo gear	5 T x 4					
Complements	14 P			15 P	15 P	15 P
Others						
Condition of operation	Non- operational	Non- operational	Non- operational	Oper- ational	Oper- ational	Under Operation

Type of ship	Power freezing ship	Ocean-going ship	Cargo ships			
Name of ship	JEJUI	GUARANI	CURUPAYTY	TAYAYIBA	TUYUTI	PIKYSRY
Shipyard	T.RUIS DE V. SPAIN	T.RUIS DE V. SPAIN	INDUNAVAL SPAIN		DEL CADAGUA SPAIN	
Year built	1961	1965	1960	1960	1960	1960
Class.	LR	LR	LR			
Length, o.a.	50.6 M	73.6 M	48.7 M			
Length, p.p.	46.5 M	65.6 M	46.5 M			
Breadth	9.8 M	11.6 M	10.0 M			
Depth	3.38 M	6.1/3.7M	3.3 M			
Draft	1.8 M	3.66/3.74M	1.83 M			
Gross tonnage	491 T	713 T	517 T			
Net tonnage	237 T					
Deadweight	338 T	1,030 T				
Hold capacity Grain		2,460 M <sup>3</sup>				
Bale	559 M <sup>3</sup>		1,045 M <sup>3</sup>			
Number of holds	2	2	2			
Output of main engine	125PSx2	1,300PSx1				
Average speed		12.75KT				
Cargo gear	3 T x 4	5 T x 4 3 T x 2 15 T x 1				
Authorized crew	15 P	14 P	6 P			
Complements Others						
Condition of operation	Under operation	Under operation	Under operation	Under operation	Under operation	Under operation

Type of ship	Oil barge	Tug boats			Passenger boats	
		ITAKYRY	ITACURUBI	ITA YBATE	PRESIDENTE STROESSNER	PRESIDENTE C.A. LOPEZ
Name of ship	YTORORO	ITAKYRY	ITACURUBI	ITA YBATE	PRESIDENTE STROESSNER	PRESIDENTE C.A. LOPEZ
Shipyard	HOLLAND	NKK, JAPAN		ENGLAND	TOMAS RUIZ DE VEVAZCO SPAIN	
Year built	1960	1960	1960	1960	1965	1965
Class.		LR			G.L.	
Length, o.a.	47.07 M	26.0 M		14.6 M	77.84 M	
Length, p.p.	45.60 M	23.7 M		14.2 M	71.60 M	
Breadth	8.77 M	6.2 M		3.4 M	5.45 / 3.10 M	
Depth	1.84 M	2.6 M		1.5 M	10.00 M	
Draft	1.80 M	1.8 M		0.9 M	1.37 M	
Gross tonnage	487 T	123 T		13 T	1,174 T	
Net tonnage	234 T	33 T		7 T	244 T	
Deadweight						
Hold capacity Grain	800 M <sup>3</sup>					
Bale						
Number of holds	6 tanks					
Output of main engine	-	350PSx2		75PSx1	920PSx2	
Average speed						
Cargo gear		-				
Complements		10 P			324 P	
Others						
Condition of operational	Non-operational	Under operation	Non-operational	Non-operational	Under operation	Under operation



Type of ship	Freezing barge	Lunches	
		VILLA HAYES	VILLA FLORIDA
Name of ship	LOMAS VALENTINAS	VILLA HAYES	VILLA FLORIDA
Shipyard	INDUNAVAL SPAIN	JAPAN	SPAIN
Year built	1960	1960	1962
Class.			
Length, o.a.	48.7 M		
Length, p.p.	46.5 M		
Breadth	10.0 M		
Depth	3.3 M		
Draft	1.83 M		
Gross tonnage	541 T		
Net tonnage	400 T		
Deadweight tonnage			
Hold capacity			
Grain			
Bale	578 M <sup>3</sup>		
Number of holds			
Output of main engine	-		
Average speed	-		
Cargo gear	3 T x 4		
Complements	7 P		
Others			
Condition of operation	Under operation	Under operation	Unknown

### 3-3 Organization

Under the Law No. 1,199 of the Republic of Paraguay, the FME was established in order to "connect ports in the Republic and ports of the Republic and those of foreign countries, carry out the river and sea transport of passengers and cargoes and offer public services in conformity with the national economic policy." It is placed under the supervision of the Ministerio de Obras Publicas y Comunicaciones.

The supreme organ is a board of five directors (Consejo de Administracion), under which a President (Dr. Oscar V. Jogansens) and an executive system are placed. The President is concurrently serving as chairman of the Board of Directors. The President has two assistants (Sr. Esponola, and Sr. Jimenez). An Administrative General Manager (Administracion General; Dr. Coronel) works under the President. The Administrative General Manager supervises the following four department.

(1) Inspection General (Inspeccion General; Chief: Capt. Careaga with a staff of six officials). Unlike its name, this department takes charge of administrative work on navigation and crewmen.

(2) Technical Department (Departamento Tecnico; Chief: Capt. Heisele with a staff of 58 officials). Controls the maintenance of ships, repair shops and off-shore repair team.

(3) Business Department (Departamento Comercial; Chief: Dr. Duarte with a staff of nine officials). This department takes charge of business with respect to passengers and cargoes.

(4) Administration Department (Departamento Administracion; Chief: Capt. Lic. Busto with a staff of 41 officials). Takes charge of coordination, welfare and accounting.

The total number of officials is 129, including secretaries. A total of 306 crewmen are registered.

### 3-4 Business Conditions

In regard to the points on which recommendations were made for an improvement of the operational efficiency in the JICA Survey of 1977, it is commendable that some improvements were observed in the actual records of 1977, but there still is room for improvement.

### 3-4-1 Freighter Sector

This is the most important division, accounting for a little more than 40%.

Using 12 motorboats (seven of the Spanish type, four of the Japanese type and one of the Japanese type usable for cattle) and four barges (towing by a tug boat or a motorboat), trips are made on the main international route between Asuncion and Buenos Aires (occasionally, trips are extended to Montevideo or Concepcion). On this main route, competition is made with many Argentine ships. The FME has a share of about 20% at present.

The recent actual records by year are shown below.

		Transport (FT)	Incomings (Guarani)	Outgoings (Guarani)	Balance (Guarani)
1975	Cargo ships	108,758	167,796	172,309	-4,513
	Barges	16,325	27,684	34,047	-6,363
	Total	125,083	195,480	206,356	-10,876
1976	Cargo ships	81,610	122,325	139,367	-17,042
	Barges	12,736	20,246	27,051	-6,805
	Total	94,346	142,571	166,418	-23,847
1977	Cargo ships	106,993	176,405	170,496	5,908
	Barges	17,686	30,813	31,012	-199
	Total	124,679	207,218	201,508	5,709

The drop in dealings in 1976 is presumably ascribable to the repair of a large number of vessels. The recovery was conspicuous in 1977.

Notes: 1) "FT for the transport quantity stands for freight ton, which is a mixture of deadweight ton and capacity ton. Freightwise, for the down route between Asuncion and Buenos Aires, KT (kilo ton) is used, whereas KT or capacity ton (m<sup>3</sup>) is used for the up route. Statistically, it is difficult to unify weights in KT due to such nature of data.

2) In the cost of transport, frozen cargoes are included in small quantities. They are left as they are for convenience's sake.

### 3-4-2 Freezing Carrier Sector

The freezing ship "Jejuí" and the freezing barge "L. Valentinas" are assigned to the route between Asunción or San Antonio, where there is a meat plant, and Buenos Aires to transport frozen meat, etc. However, as the livestock products market is sluggish, the volume of transport and the earnings are not satisfactory, as shown in the following table. If the earnings are

	Volume of transport (kt/m <sup>3</sup> )	Total (1,000 Guarani)	Freight rate (1,000 Guarani)	Total (1,000 Guarani)
1975	Jejuí 1,274		5,408	
	L.Valentinas 1,028	2,302	4,448	9,856
1976	Jejuí 1,010		4,538	
	L.V.Alentinas 850	1,860	4,113	8,651
1977	Jejuí 1,726		7,415	
	L.V.Alentinas 2,000	3,726	8,111	15,526

similar to those of 1977, the deficit may be limited to an insignificant one. Therefore, there is no other choice but to wait for a recovery of the market.

### 3-4-3 Tanker Sector

Fifty thousand to 60,000 kiloliters of crude oil and half-finished products are transported by the aforementioned three tankers (5,100 m<sup>3</sup> in all) between Buenos Aires and Asunción for REPSA. The conditions of their operation are extremely favorable as there are only one consignor and one port. Each ship makes 13-18 voyages. In 1977, the L. Vera made a record 21 voyages.

	Quantity of transport (kiloliters)	Incomings (1,000 Guarani)	Outgoings (1,000 Guarani)	Favorable balance (1,000 Guarani)
1975	50,564	84,253	47,096	37,157
1976	52,493	97,182	49,133	48,049
1977	74,184	127,108	62,133	64,975

The contract between the Government and the REPSA for the purchase of crude oil contains a clause stating that priority will be given to the

use of FME vessels. In actuality, however, the FME's share in the transport is 13%. (See Part VI, 2. NAVIPAR)

#### 3-4-4 Ocean-Going Ship Sector

The Guarani is assigned to a direct route between Asuncion and Europe. This vessel is owned by the Government and concurrently serves as a training ship for the Navy. The Guarani No. 1 might be described as a kind of chartered ship. For this reason, the FME shares half of the crewmen's cost and does not have any share in the costs for depreciation, insurance and major repair work. At the time the JICA survey was carried out, it was known that inspite the Guarani made only one voyage the balance of receipt and payment was generally favorable, but some doubt was entertained about the profitability of this ship for an independent navigation. However, a check of the actual records of both 1976 and 1977 indicates that the ship was engaged in three voyages each year as indicated in the table given below and the collection of cargoes was smooth due to its advantages as a direct voyage ship, suggesting that there are bright prospects for this ship in independent voyages.

	Number of voyages (kt/m <sup>3</sup> )	Cargo tonnage (kt/m <sup>3</sup> )	Incomings (1,000 Guarani)	Outgoings (1,000 Guarani)	Balance (1,000 Guarani)
1975	1 voyage	2,785	57,954	30,159	27,794
1976	2 voyages	7,665	121,582	58,613	62,969
1977	3 voyages	7,044	134,810	84,631	50,179

Note: The depreciation and other company costs are not included in the outgoings.

#### 3-4-5 Passenger Boat Sector

The passenger boat sector is an important project for the FME, as fluvial transport is an arterly for the Republic of Paraguay. With two passenger boats (of Spanish make), a north-bound route has been operated between Asuncion and Concepcion and a south-bound route between Asuncion and Corrientes (Argentina) since 1965. A regular service has been operated once every week on each route, carrying 200-300 passengers (up to 350), but the operation of these two routes turns out to be an unprofitable undertaking as indicated in the following table.

	Incomings (1,000 Guarani)	Outgoings (1,000 Guarani)	Balance (1,000 Guarani)
1975	31,689	71,032	-39,343
1976	23,949	58,830	-34,880
1977	31,298	65,362	-34,064

This business condition may be considered inevitable when it is taken into account that the management of passenger boats is such that it is difficult to raise fares in the light of the public nature of the business and that subsidies from the Government are required for the building and operation of passenger boats. To make the management of the FME sound in the future, there is a need to raise passenger fares to some extent and extend Government subsidies.

#### 3-4-6 Summary on Each Sector

For reference purposes, the gravity of each sector is shown in the following table as viewed from the incomings registered in 1977.

	Incomings (1,000 Guarani)	Ratio (%)
Freighter Sector	207,218	41.4
Tanker Sector	127,108	25.4
Ocean-Going Ship Sector	134,810	26.9
Passenger Boat Sector	31,298	6.3
Total	500,434	100 (%)

In terms of balance, the following table may be prepared.

	1975 (1,000 Guarani)	1976 (1,000 Guarani)	1977 (1,000 Guarani)
Cargo vessels	-4,513	-17,042	5,908
Barges	-6,363	-6,805	200
(Subtotal)	-10,876	-23,847	5,708
Tankers	37,157	48,048	64,974
Ocean-going vessels	27,795	62,969	50,179
Passenger boats	-39,343	-34,880	-34,064
Company cost	-59,749	-66,452	-79,353
Others	7,000	-1,230	-4,308
Total	-38,015	-15,393	3,136

The above table shows that the balance is favorable for tankers and ocean-going vessels, that receipt and payment are barely balanced for cargo vessels, and that the passenger boat service is bothered by a perpetual deficit. For an improvement of the management, there is a need to work for an improvement of the ship service efficiency (particularly, the cargo vessel sector), as pointed out in the JICA survey. In terms of share, it is an urgent task to expand the cargo vessel and tanker sectors.

### 3-5 Situation of Financial Management

In Part VI, 3 - 4, an attempt was made to study the conditions of management of the FME by sector. In the following, an attempt will be made to analyze them in terms of financial management.

In regard to the conditions of management in 1975-77, it might be said that the management is getting sound as is evidenced by a switch to a favorable balance in the period of 1977.

In 1976, the maritime transport earnings totaled 385,286,000 Guarani, up only 4.3% from the previous year. On the other hand, the cost for maritime transport registered a drop of 6.5% due to a cost reduction policy. In 1977, the maritime transport earnings totaled 500,435,000 Guarani and the cost for maritime transport stood at 401,204,000 Guarani, up 30% and 24.5%, respectively. For this reason, the total business earnings, current balance and current-term balance went into the black.

Efforts were being made to improve the financial conditions with long-term loans (to be paid over three years at an annual interest rate of 6%), difficulties were still encountered in raising funds. The term-end balance of the account payable registered a rise of 35-40% from the previous year both in 1976 and 1977.

A check of the liquid assets indicates that the cost for deferred and advance payments has a great share, with the consequence that the liquidity ratio accounts for more than 300%. However, this fact must be taken into account with a grain of salt in the light of its nature. The current account ratio is about 50%, but the sale liabilities account for more than 90%.

No new investments were made from 1975 to 1977, and attempts were made to maintain the existing vessels primarily with repair work. There seems to be a need, however, to replace the ships the durability of which has passed in terms of years. Both fixed ratio and fixed long-term adaptability ratio are less than 100% and may be considered favorable at least in terms of values. When the aforementioned superannuation is taken into account, they are not necessarily satisfactory in substance.

All told, the deteriorated financial management conditions from 1975 on may be boiled down to the fact that the cost for maritime transport was higher than the low level of the earnings of maritime transport, or in other words, to a lack of business efforts. For this reason, attempts were made to improve the financial conditions with loans from the central bank and other institutions, but it would be difficult to make the management sound unless a high level of earnings was maintained. (See Table VI-3-5-1 and Table VI-3-5-2).



Table VI-3-5-1 Current Balance Conditions

	(1,000 Guarani)		
	1975	1976	1977
Earnings of maritime transport	369,378	385,286	500,435
Cost of maritime transport	344,525	322,171	401,204
Profits of maritime transport	3,002	842	4,610
(Total business profits)	(27,855)	(63,957)	(103,841)
Cost of general control	69,870	77,279	91,787
(Business profits)	(-42,015)	(-13,322)	(12,054)
Non-operating earnings	2,558	6,379	3,642
Non-operating cost	1,853	5,581	11,549
(Current balance)	(-41,310)	(-12,524)	(4,147)
Special profit	3,295	-	-
Special loss	-	2,869	1,011
(Balance of current term)	(-38,015)	(-15,393)	(3,136)

Table VI-3-5-2 Financial Conditions

	(1,000 Guarani)		
	1975	1976	1977
Liquid assets	379,846	436,886	508,546
Current assets	52,023	53,713	66,556
Inventory assets	108,229	137,641	147,236
Other assets	219,594	245,532	294,754
Fixed assets	1,147,369	1,103,231	1,059,336
Tangible fixed assets	1,147,369	1,103,231	1,059,336
Carried over assets	-	-	-
Liabilities	277,081	304,842	325,769
Liquid liabilities	107,741	95,541	131,084
Fixed liabilities	169,340	209,302	194,685
Capital	1,250,134	1,235,275	1,242,111
Capital	1,270,897	1,232,880	1,221,187
Reserve fund	17,253	17,788	17,788
Current-time loss	-38,016	-15,393	3,136
Liquidity ratio (%)	352	457	388
Current account ratio (%)	48	56	50
Fixed long-term adaptability ratio (%)	80	76	74
Fixed ratio (%)	92	89	85
Liability ratio (%)	22	25	26

### 3-6 Problem of Crewmen

At present, there are a total of 300 crewmen for 20 powerboats excluding barges. The number of crewmen required for this project -- that is, for a total of six vessels including four push boats, one small ocean-going vessel and one large ocean-going vessel-- is 106. Even if there is a lack of crewmen, it will be possible to obtain assistance from the Navy, according to the FME. Therefore, there seems to be nothing to worry about.

### 3-7 Five-Year Program of the FME drafted in 1976

The FME drafted a program for five years from 1976 to 1980 and submitted it to the Government.

According to this five-year program, a budget of about 40 million Guarani is earmarked. This is an additional budget, and a total of about 100 million Guarani including 53 million Guarani in 1975 and another 53 million Guarani in 1976 has been borrowed from the Central Bank to do repair work on the hulls of most of the vessels.

The ships which will be newly built include:

500 DWT barges	6	} 600 mil. Guarani
1,000 DWT barges	4	
1,200-2,000 PS pushers	2	
1,000 DWT ocean-going ships	2	US\$2,000,000
5,000 DWT ocean-going ships	2	US\$5,000,000

In the survey conducted in 1972, the UNDP recommended the building of two push boats and 20 barges (about 10,000 DWT) by 1982, whereas it was recommended in the JICA survey in 1977 a replenishment of 16,000 DWT of ships in 10 years. The tentative plan worked out by the FME in 1976 correspond to the recommendations. The tentative plan constituted the basis of the ship expansion program (new five-year program for 1977-81) for which a loan has been requested.

#### 4. Ocean-Going Ship Company

In addition to the FME's ocean-going vessel Guarani, several small vessels are assigned to the routes between Asuncion and Europe for direct voyages (some of them navigating to the east coast of North America).

The survey conducted by a Japanese shipping company stationing in Argentina is given below, suggesting that there has been a rise in ship assignment since the time of the JICA survey.

- (1) Villarrica, 1,171 DWT, built in 1961, 12 knots
- (2) Asuncion, 1,142 DWT, built in 1961, 11 knots

The shipowner is Cia. Paraguaya de Navegacion de Ultramar (PNU), a company of Paraguayan nationality with Dutch capital and Cia. Maritima Paraguaya (Cia. M.P.) serves as agent. However, as the Van Nievelt, Goudriaan Co. is a stockholder of the aforementioned PNU, both ships are hired by the Van Nievelt, Goudriaan Co.

- (3) Situla, 1,580 DWT

The shipowner is Zudamerikalyn-Rotterdam of the Netherlands.

- (4) Adara, 1,580 DWT
- (5) Moggens, 905 DWT (Danish nationality)  
The shipowner is the Van Nievelt Goudriaan Co.
- (6) Cathrina, 747 DWT (British nationality)
- (7) Britt Ann, 736 DWT (Dutch nationality)

For the ships 3 to 7, above, Cia. MP is serving as agent.

It appears that the aforementioned seven vessels, totaling 7,861 DWT, are assigned to three to four voyages. In addition, the Edda (1,122 DWT) and the Soren Fridolf(748 DWT) visit at times. Cia. MP is also serving as agent for these ships.

On the other hand, the general agent in Europe for the FME is the Van Nievelt, Goudriaan Co., so that it is believed that this firm exercises general control over the collection of cargoes with respect to the ships assigned to the direct service route between Asuncion and Europe.

The transport by the aforementioned seven foreign vessels is estimated to average about 2,000 FT per voyage and it is assumed that there are three voyages yearly. In this situation, the volume of transport is an estimated 40,000 FT. If the transport of the FME's Guarani is included, it will follow that an estimated 47,000 FT (or an estimated 35,000 KT) is transported by the vessels assigned to the direct service route. This quantity accounts for slightly less than 30% of 130,000 KT of exports and imports (excluding soybeans) between Paraguay and Europe.

#### 5. Trunk Route between Asuncion and Buenos Aires

As stated earlier, vessels call at Asuncion directly from Europe, but their cargoes account for about 20% of Asuncion's trade and most of the trade is channeled by this fluvial route. This is an international route, and also foreign trade route.

As elucidated earlier, the FME puts stress on this route (sharing a little over 41% of the earnings), but a large number of competitive Argentine vessels are assigned to this route. In addition to the routes to Argentina, however, Argentine vessels take charge of transport to the Argentine banks of the Paraguay, Rio de la Plata and tributaries. Particularly, most of the ships of the Flota Fluvial del Estado Argentino are assigned to the coastal and tributary routes of Argentina.

According to the survey of a Japanese shipping firm stationing in Argentina, the conditions of ships of each firm and the composition of convoys as of 1977 are given below:

- (1) Flota Fluvial del Estado Argentino (Flota F.D.E. Argentino)  
Barge system: 1 motor-boat, 43 pushers and 122 barges (400-2,000 DWT), 16 oil barges
- (2) Vilas y Cia.  
Barge system: 3 pushers, 26 barges (500-1,000 DWT) and 3 oil barges
- (3) Trafluem  
Barge system: 2 pushers, 19 barges (300-800 DWT) and 7 oil barges
- (4) Fluvialco  
Barge system: 1 pusher, 8 barges (1,000 DWT)
- (5) AFA  
Concurrent use of motorboats and barge system: 9 motor-boats (300-900 DWT), 3 pushers and 12 barges (300-1,000 DWT)
- (6) Rioflete (separated from AFA in Sept. 1977)  
Concurrent use of motor-boats and barge system: 9 motor-boats and 13 barges (500-1,000 DWT)
- (7) A.M. Litoral  
Motor-boats: 6 motor-boats (700 DWT)
- (8) Juan Solazzi  
Motor-boats: 6 motor-boat (500 DWT)
- (9) Zagros  
Motor-boats: 6 motor-boats (500 DWT)
- (10) E.N.J. Tomasells  
Barge system: 2 pushers and 18 barges (300-800 DWT)
- (11) Gutnisky  
Barge system: 3 pushers and 13 oil barges (800 DWT)

These barge systems used to be of the towing type but they have been gradually replaced by those of the push type.

According to the same survey of the Japanese shipping company stationing in Argentina, the conditions of transportation between Asuncion and Buenos

Aires by these shipping firms are shown as follows:

Table A

	1975		1976	
	AS/BA (KT)	BA/AS (KT)	AS/BA (KT)	BA/AS (KT)
Flota F.D.E.				
Argentino	34,272	15,615	35,290	40,085
Vilas y Cia	77,834	9,670	93,396	6,913
Trafluem	17,576	6,014	16,106	600
Fluvialco	19,106	12,947	4,164	4,102
A.F.A.	45,834	35,025	41,500	22,000
E.N.J. Tomasells				
Juan SoLazzi				
Zagros and Others	Unknown	Unknown	65,000	28,000

The FME's actual transport is estimated in terms of KT as follows:

Table B

	1975		1976	
	AS/BA (KT)	BA/AS (KT)	AS/BA (KT)	BA/AS (KT)
FME	46,545	35,000 (78,539KT/M <sup>3</sup> )	26,346	30,000 (68,00 KT/M <sup>3</sup> )
Total	241,166	114,275	281,802	131,700

In 1976, many of the FME ships were repaired, with the result that the share dropped to less than 14%. Judging from the actual records in 1975 through 1977, the share is believed to stand at a little over 20%. Among the Argentine vessels, it is worthy of note that there has been a marked rise in the share of Flota F.D.E. Argentino.

#### 6. Transshipment in Buenos Aires

In regard to the trunk route between Asuncion and Buenos Aires, cargoes in trade with Argentina (20-30% of Paraguay's exports and 40-50% of her imports) are loaded by truck at the pier, and there is nothing unusual.

Cargoes in trade with other foreign countries are transhipped to

fluvial boats which come alongside ocean carriers. To save the cost, usually ocean carriers prefer direct transshipment to fluvial boats, instead of going in for temporary unloading to Dock Sec 5. For this reason, and transshipment lot of cargo being small quantity, fluvial vessels, when they are big in size, are compelled to stay in Buenos Aires over long periods. At the same time extra money has to be paid for towing, too big fluvial vessels prove uneconomical.

Practically every cargo bound for Paraguay from foreign countries is of the through-B/L type, so that ocean carriers are inclined to choose direct transshipment to fluvial boats, which are less expensive. (Incidentally, insofar as the cargoes exported by Paraguay are concerned, the B/L becomes invalid after the Asuncion-Buenos Aires route, and then a new B/L is issued in Buenos Aires.)

The freight rates between Asuncion and Buenos Aires are following to the basis of the FME's tariffs, and some discounts are available, depending on the period. The rates are all quoted in f.i.o. For the route from Asuncion to Buenos Aires, the rates are quoted on the basis of tonnage (KT), whereas for the route from Buenos Aires to Asuncion, the rates are quoted on the basis of KT or m<sup>3</sup>, whichever is larger. This is called as freight ton, FT, which is statistically inconvenient.

Freight rates: US\$9.80 per KT or m<sup>3</sup> for general merchandise from Buenos Aires to Asuncion; US\$17.30-20.00 per KT for general merchandise from Asuncion to Buenos Aires.

Cost for transshipment (at Buenos Aires Port): about US\$8.00 for general merchandise per KT (about US\$4.00 for soybeans)

The rate of transshipment additional for Asuncion is US\$22.00 by the Japanese freight conference and about US\$28.00 by the European freight conference. Ocean carriers select direct-transshipment fluvial ships within these scopes of freightage.

Fluvial barges on the Paraguay disassemble their convoy at a point 50 km outside Buenos Aires Port and start using Argentine tug boats at a point 5 km outside Buenos Aires Port, according to a regulation. In this instance, only one tug boat is enough for barges of the Gabarra type (with crewmen and rudders), as long as their tonnage is less than about 500 DWT, but two tug boats are requested for barges of the Barcazas type without relation to their tonnage. As the situation is similar in the port, and viewed from cargo movements, it will be

more efficient if barges of the Gabarra type tugged by motorboats are less than 500 in deadweight tonnage. (The cost for tug vessels is US\$80-100 a time, so that it is not negligible, depending on the frequency.)

Pusher barges of the Barcazas type do not produce any merits in the use of tug boats even though their tonnage is less than 500 DWT, so that it is advisable to determine the tonnage of barges from a standpoint of cargo movements.

If barges stay over a long time, it will incur a complaint from the consignees and also will not be profitable. Therefore, thinking of all conditions, barges of the 600-1,000 DWT type would be recommendable.

The transshipment at Monte Video Port (in Uruguay) is small in frequency, but barge systems have some difficulty by reason of rough sea so that motorboats have to be put to use.

The agent in Buenos Aires for the FME is Moor Macormac (an Argentine Corporation) of American affiliation. As elucidated in the section on 1,500-DWT ocean-going ships, there will be a rise relatively in the volume of Argentine cargoes and cargoes of places other than Europe in respect to the route between Buenos Aires and Asuncion, if the ratio of transport of Europe cargos by vessels directly navigating between two ports increases, so that it seems to be advisable for the shipowners to make effective use of this agent.



**Part VII Present Situation of Shipbuilding**



## Part VII Present Situation of Shipbuilding

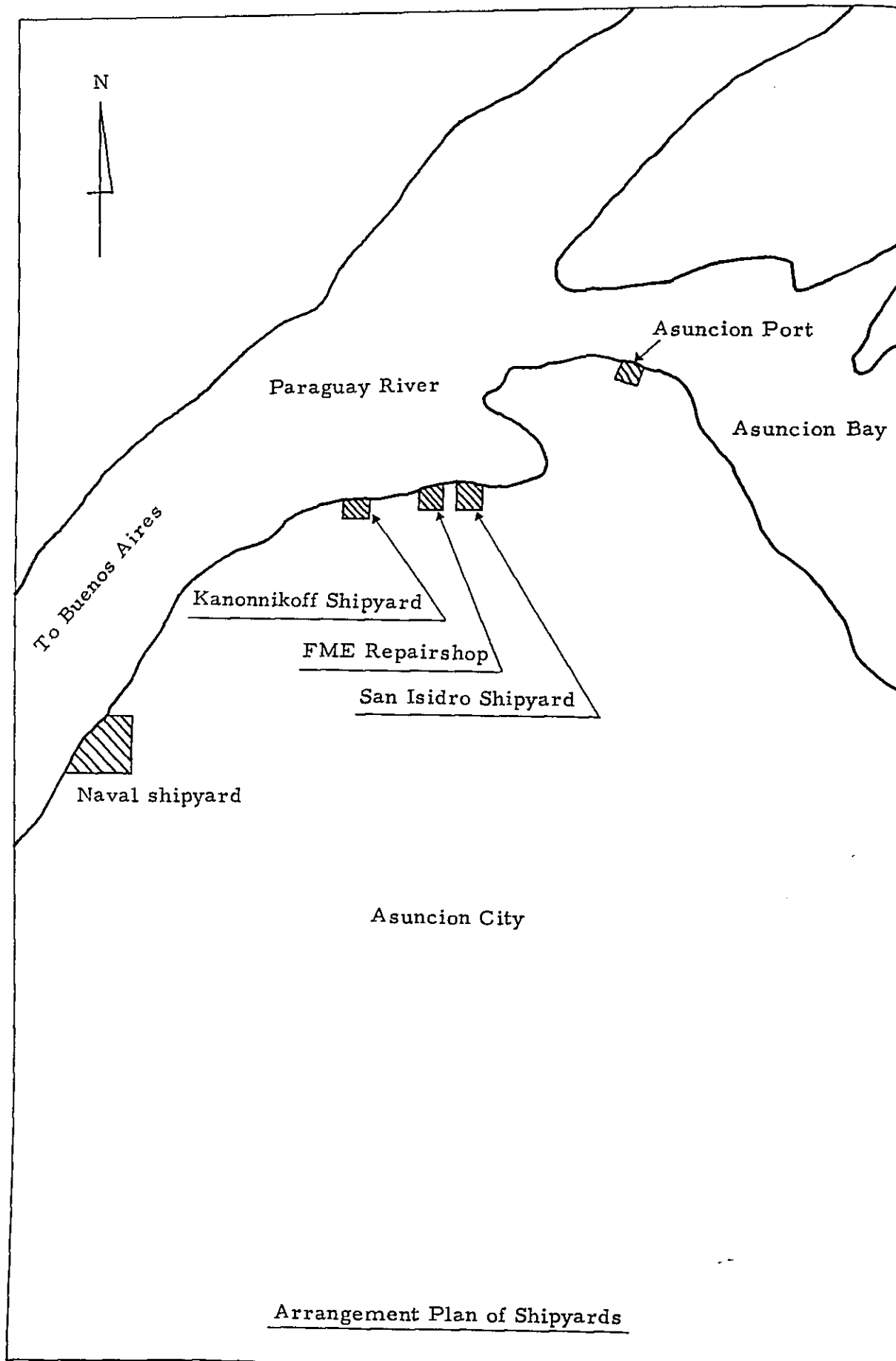
### 1. Shipyards

In order to survey the possibility of building in Paraguay the ships planned under this project, we visited the following shipyards. As reported in la Memoria Correspondiente al Año 1977, Paraguay strongly hopes to build vessels by herself. At the places we visited -- particularly, in the shipyards, strong desires were called for domestic shipbuilding. Therefore, conditions and measures for shipbuilding will be clarified in the following by analysing the present situation objectively.

#### 1-1 Naval shipyard

Direccion del Material Naval y Astilleros and Direccion de Dique Seco

We call the combination of these two departments naval shipyard, but the fact of the matter is that the yard is not operated exclusively for warships but it is engaged primarily in doing repair work on vessels including vessels of FME other than naval ships. In the early years, these facilities used to be called Direccion del Material Naval y Astilleros. When a dry dock was completed with a loan from Spain, A Dry Dock Department was established for a separate account for the repayment. Naturally, both departments are situated on the same premises and each has its own head, but these departments are not placed under the command of a joint chief. The chief of each department are directly under the control of Comando de la Armada Nacional.



In the following, descriptions will be given on both departments .

Area: 97,000 m<sup>2</sup>

Including:	Factories and Warehouses	10,000 m <sup>2</sup>
	Offices	2,000 m <sup>2</sup>
	Billets	2,800 m <sup>2</sup>
	Total	14,800 m <sup>2</sup>

The above are buildings.

Place: On the east bank of the Paraguay River 6 km downstream from  
Asuncion Port

Facilities:

(1) Floating dock

Overall length	61 m
Inner width	14 m
Max.draft above dock bottom	4.27 m (15 ft)
Lifting capacity	1,000 tons
Crane	5 tons x 1
Others	Ballast pump Air compressor

(2) Work ship

43 m (length) x 12 m (width). Equipped with various machinery,  
but the working ratio is low.

(3) Slipway

Length	about 90 m
Width	about 30 m

If barges are constructed, this slipway will be used. The  
width may be made larger.

(4) Dry dock

Length	106 m
Width	18 m
Crane	8 tons x 16 m

Workshops;

(1) Machine shop

Equipped with lathes, shapers, drilling machines, etc.

(2) Casting shop

Cupolas	2,000 kg/h 2 sets
---------	-------------------

Revoluing furnace	400 kg	1 set
Furnace for copper alloy		1
Crane	2 tons	1 set

(3) Preparation shop

100 m x 15 m, equipped with overhead crane, cutter, etc.

(4) Other shops

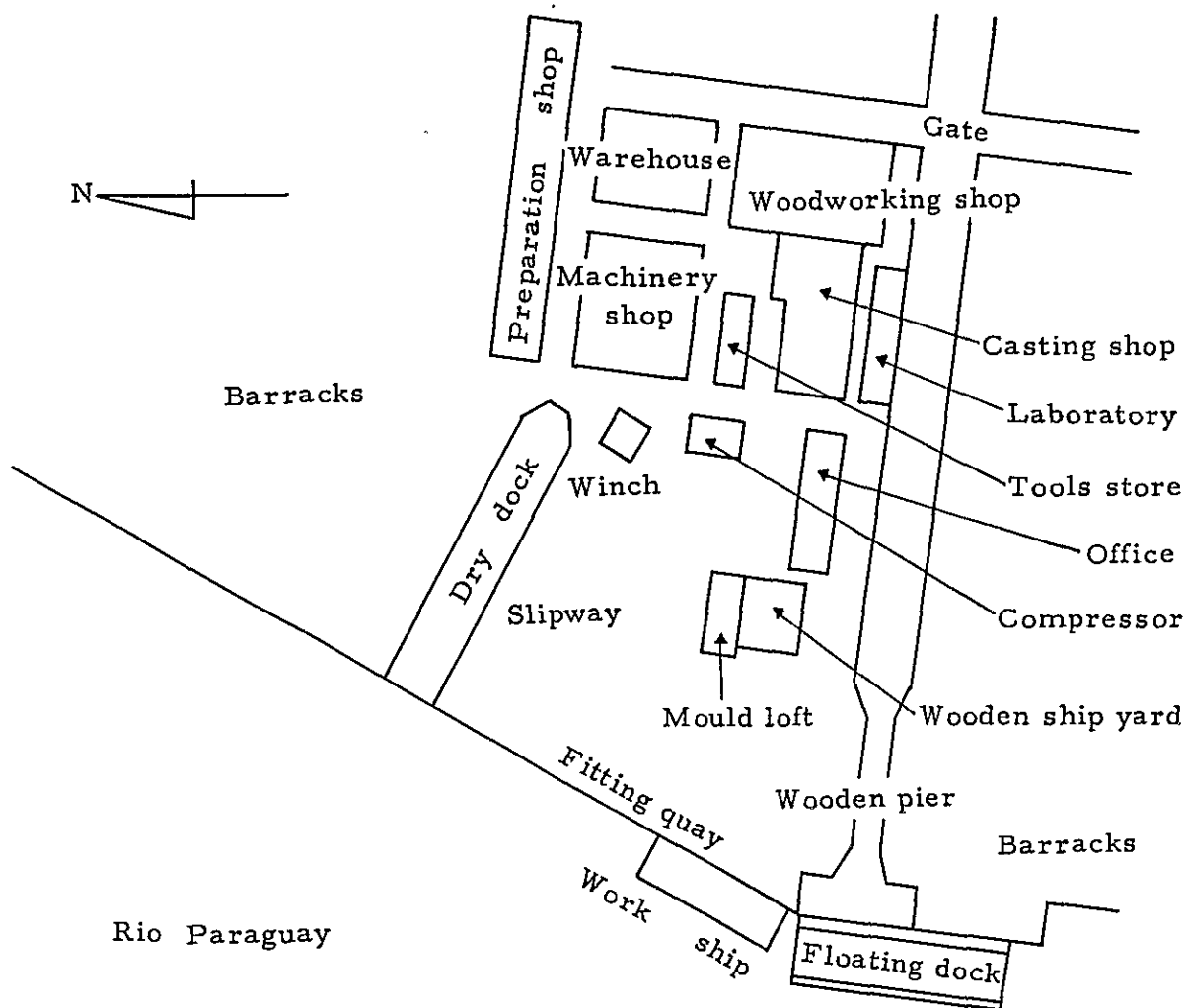
Include forging shop, woodworking shop, electric shop, fitting shop, painting shop, and welding shop.

Work Force:

Officers	25	
Engineers	6	(Shipbuilder, machinist, electrician, civil engineering worker and controller)
Indirect employees	20	
Direct employees	150	
Total:	About	200

Ships Constructed:

370 DWT cargo ships	2
Pontoons	3 (only one completed)
Yacht for the President	1 (under out-fitting)
150 PS tugboats	3



Naval Shipyard

1-2 San Isidro Shipyard (Astillero San Isidro S.A.)

This shipyard is also engaged exclusively in repair work on ships.

Area: About 6,000 m<sup>2</sup>

Place: Situated on the southern bank of the Paraguay

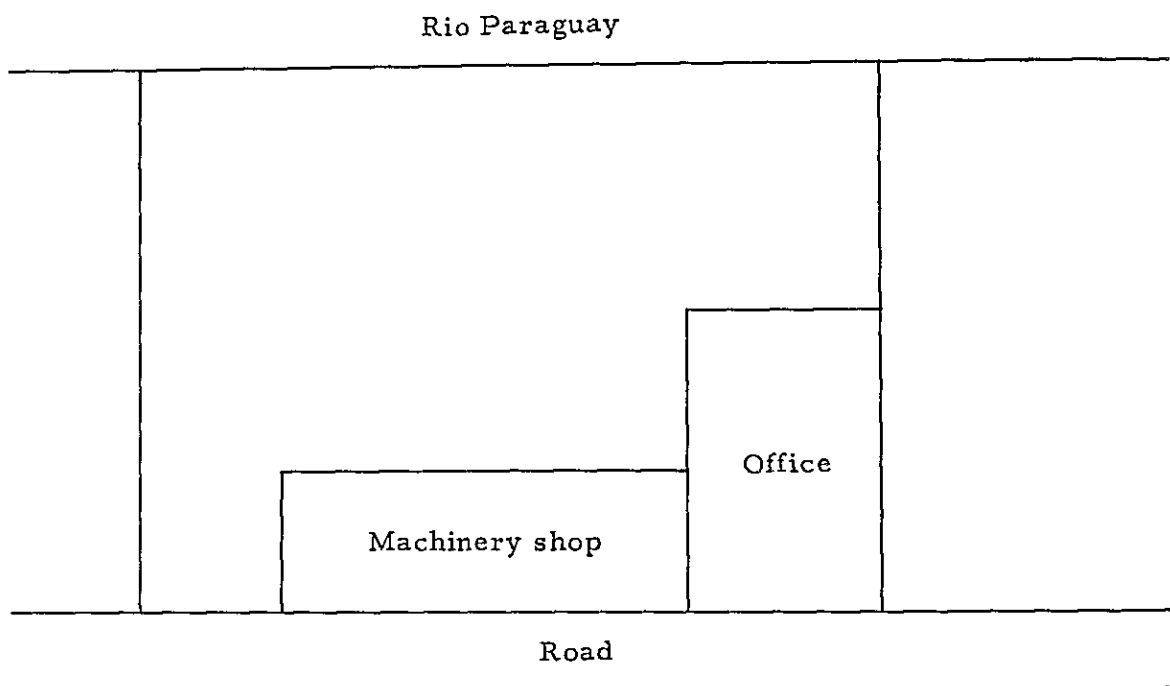
River 1.5 km downstream from Asuncion Port.

Employees:	Welders	7
	Assembly workers	8
	Machinists	5
	Maintenance men	9

Others	9
Total	30
Hours of work:	48 hours a week
Mon. - Thurs.	6:30-11:00, 13:00-17:00
Fri.	6:30-11:30, 13:00-17:00
Sat.	6:30-11:30

Overtime work, two shifts and three shifts are possible.

Rough Sketch



The premises are sufficiently spacious, but it is necessary to prepare facilities for the building of barges.

1-3 Kanonnikoff Shipyard (Transporte Fluvial)

This company is one of the owners of inland water ships who operate inland water ships. It has a repair shop to do repair work primarily on its own vessels.

Area: About 13,500 m<sup>2</sup>  
(including 600 m<sup>2</sup> for buildings)



Place: Situated on the east bank of the Paraguay River about 2 km downstream from Asuncion Port.

Employees:

Welders	4
Assembly workers	4
Others	17
Total	25

Hours of work:

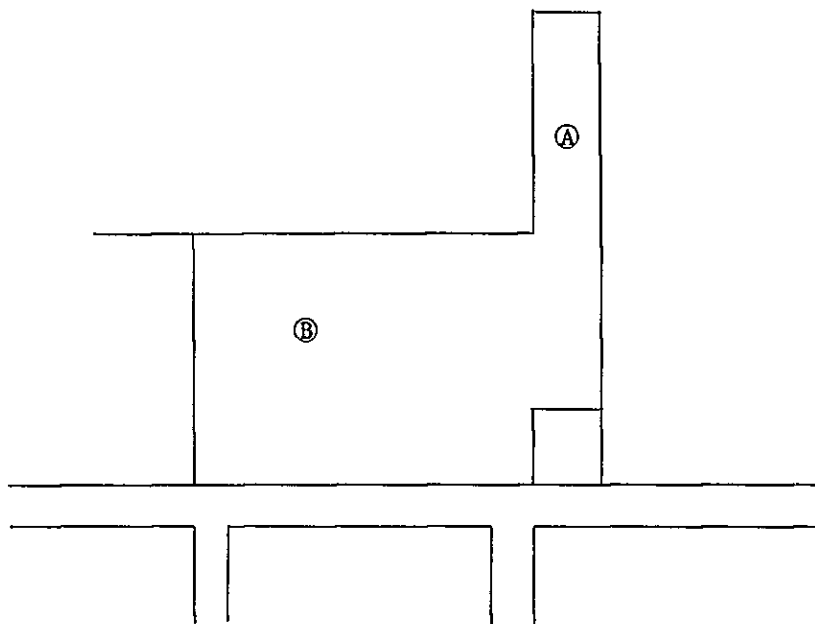
48 hours a week

Mon. - Sat. 7:00-11:00, 13:00-17:00

Rough Sketch:

A shipway is available in part A for repair work, but no facilities are available in part B.

The construction of barges will be carried out in part B after leveling of its ground.



1-4 FME Repair Shops

The formal appellation of this organization is el Departamento Tecnico de Flota Mercante del Estado, and it is engaged in repairing components of the ships which belong to the FME. Topographically, it is impossible to prepare a slipway, nor is it possible to construct it. For this reason, an outline of this shop is given below for reference purposes.

Area: About 10,800 m<sup>2</sup>

Place: Situated immediately west to the San Isidro Shipyard

Employees: About 50

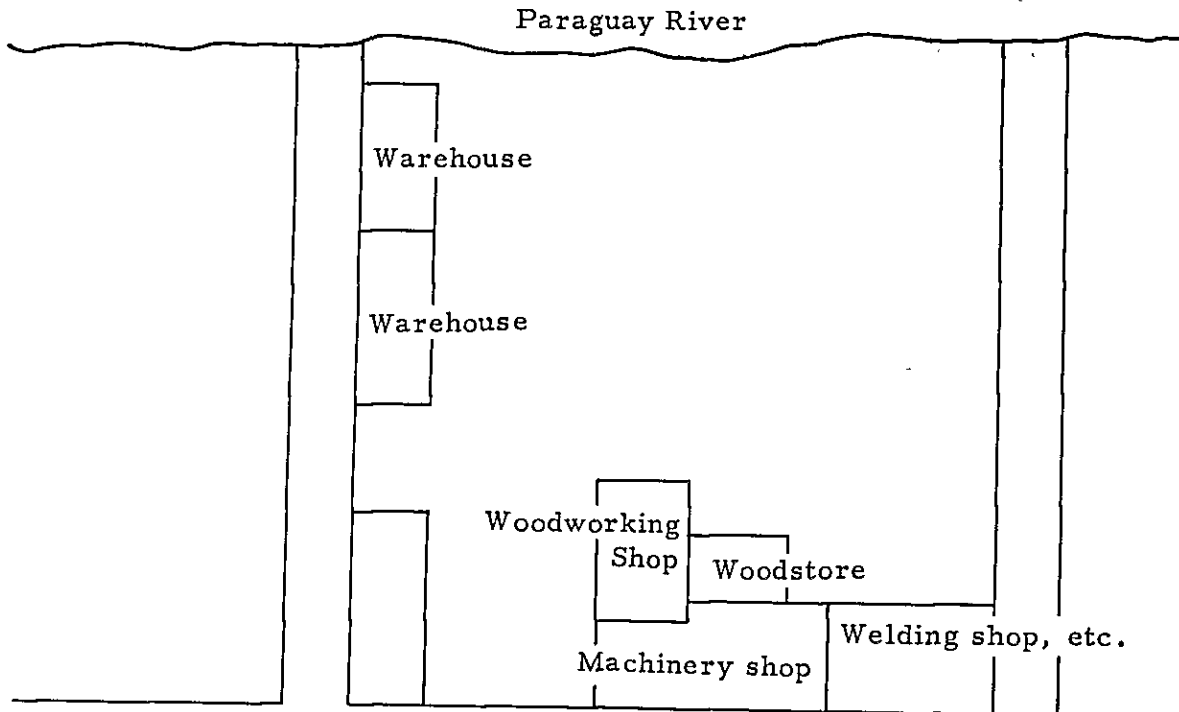
Hours of work:

45 hours a week

Mon. - Fri.

7:00-11:00, 15:00-17:30

FME Repair Shops



2. Shipbuilding Possibilities

An overall check of shipbuilding in Paraguay in respect to this project indicates that of the shipyards covered in the aforementioned survey, the Naval shipyard, San Isidro Shipyard and Kanonnikoff Shipyard are capable of building barges, but it is too early to build ocean-going vessels and pushers there. It is difficult to build barges at the FME repair shop.

In case the barges envisioned in this project are to be built at any of the above-mentioned shipyards, the following two shipbuilding systems are conceivable.

- a. In Japan, panels will be prepared by fitting frames to plates, and they will be transported to Paraguay for assembling. (Panel assembly method)

b. In Japan, materials are fabricated to some extent (to the extent of cutting and bending) for transport to Paraguay, where barges are constructed from sub-assembly. (processed material assembling method)

Of the aforementioned methods, it is advisable to adopt the panel assembly method for the building of barges in Paraguay in terms of human capacity and facility cost, to which reference will be made later.

Next, an attempt will be made to elucidate on the number of persons and facilities required for the building of barges in Paraguay. The premises for the construction are set forth as follows:

a. The barges will be constructed at two shipyards.

b. In order to work for a better coefficient with the building of barges of the same type in succession, four 2,000 m<sup>3</sup> barges and twenty 360 DWT dry cargo barges at one shipyard (heretofore referred to as Shipyard A) and ten 800-ton dry cargo barges at the other shipyard (heretofore referred to as Shipyard B) in succession.

c. It is assumed that sufficient space will be available for the slipway and assembly shop.

d. The construction period will be set at 1.5 years (18 months).

e. The amount of work during this period will be evened by building barges in lots of two or four.

#### 2-1 Number of Workers Required

From the hours of work required for the construction given on Pages 77 and 78, the number of workers required for the building is computed as follows:

Work by stage		Panel assembly method				Processed material assembling method			
		Shipyard A		Shipyard B		Shipyard A		Shipyard B	
		Hours	Workers	Hours	Workers	Hours	Workers	Hours	Workers
Block assembly	Assembly	12,400	5	6,800	4	123,000	34	67,700	19
	Welding	22,800	6	12,600	4	228,700	64	125,700	35
	Finishing, etc.	12,000	3	4,800	1	57,600	16	24,300	7
Production of fittings		48,600	14	29,300	8	48,600	14	29,300	8
Slipway	Mounting	42,600	12	19,400	5	42,600	12	19,400	5
	Welding	127,900	36	58,000	16	127,900	36	58,000	16
	Piping & Outfitting	21,600	6	13,000	4	21,600	6	13,000	4
	Cleaning & Testing	6,400	2	3,000	1	6,400	2	3,000	1
	Painting	24,700	7	16,300	5	24,700	7	16,300	5
	Transport, etc.	76,600	21	50,000	14	76,600	21	50,000	14
Total by shipyard		112		62		212		114	
Total by system		174				326			

- Notes: 1. The aforementioned numbers of workers are computed on the assumption that workers are engaged in eight hours a day and 25 days a month and the building is to be completed in 18 months.
2. The preassembly workers in the block assembly under the panel assembly system include two workers who will do repair work on damage caused in sea transport.

Hours Required for Building  
(1) Panel Construction Method

Work by stage		Shipyard A				Shipyard B		Notes
		2,000 m <sup>3</sup> oil barge		360 DWT dry cargo barge		800 DWT dry cargo barge		
		Quantity controlled	Hours	Quantity controlled	Hours	Quantity controlled	Hours	
Block assembly	Assembly	1,300 m	1,000	540 m	420	880 m	680	Coefficiency 1.3m/hr
	Welding	↓	1,860	↓	770	↓	1,260	" 0.7m/hr
	Finishing	↓	130	↓	50	↓	90	" 10m/hr
	Transport, etc.		790		360		390	
Production of fitting			2,660		1,900		2,930	
Slipway	Mounting	2,930 m	3,260	1,330 m	1,480	1,740 m	1,940	Coefficiency 0.9m/hr
	Welding	↓	9,770	↓	4,440	↓	5,800	" 0.3m/hr
	Piping & fitting		640		950		1,300	
	Cleaning & testing		600		200		300	
	Painting	2,500m <sup>2</sup>	830	3,200m <sup>2</sup>	1,070	4,900m <sup>2</sup>	1,630	Coefficiency 3m <sup>3</sup> /hr
	Transport & scaffolding		5,250		2,780		5,000	
Total			26,790		14,420		21,320	
Number of barges built		4		20		10		
Total hours		107,160		288,400		213,200		
Total by shipyard		395,560				213,200		
Grand total		608,760						

## (2) Processed material assembling method

Work by stage	Shipyard A				Shipyard B		Notes	
	2,000 m <sup>3</sup> oil barge		360 DWT dry cargo barge		800 DWT dry cargo barge			
	Quantity controlled	Hours	Quantity controlled	Hours	Quantity controlled	Hours		
Block assembly	Assembly	13,000 m	10,000	5,400 m	4,150	8,800 m	6,770	Coefficiency 1.3m/hr
	Welding	↓	18,570	↓	7,720	↓	12,570	" 0.7m/hr
	Finishing	↓	1,300	↓	540	↓	880	" 10 m/hr
	Transport, etc.		3,150		1,450		1,550	
Production of fittings		2,660		1,900		2,930		
Slivay	Mounting	2,930 m	3,260	1,330 m	1,480	1,740 m	1,940	Coefficiency 0.9m/hr
	Welding	↓	9,770	↓	4,440	↓	5,800	" 0.3m/hr
	Piping and fitting		640		950		1,300	
	Cleaning and testing		600		200		300	
	Painting	2,500 m <sup>2</sup>	830	3,200m <sup>2</sup>	1,070	4,900m <sup>2</sup>	1,630	Coefficiency 3m/hr
	Transport, scaffolding, etc.		5,250		2,780		5,000	
Total		56,030		26,680		40,670		
Number of barges	4		20		10			
Total hours	330,840		533,600		406,700			
Grand total	864,440				406,700			
Grand total	1,271,140							

The above data suggest that about 170 workers are required in the panel assembly method and about 320 workers in the processed material assembling method. As mentioned earlier, shipyards in the city of Asuncion is now operated by about 180 workers, it may be concluded, therefore, that the retraining of the workers available at present will make it possible to build barges in case of panel assembly method. In the processed material assembling system, on the other hand, it will be necessary to train 140-150 persons from the beginning, and the implementation of this system may be considered virtually

impracticable when a construction period of 1.5 years is taken into account.

## 2-2 Facilities and Cost

A check of the facilities available at the shipyard situated in the city of Asuncion suggests that there exist no competent facilities to produce 34 barges over a period of 1.5 years. Particularly at the nongovernmental shipyards, it might be said that such facilities are not simply unavailable.

Therefore, in stepping up this project, it will be reasonable to newly build these facilities.

### Facilities Required and Cost

#### (1) Panel Construction System

(Unit: thousand yen)

	Shipyard A		Shipyard B		Notes	
	Quantity	Cost	Quantity	Cost		
Assembly slab	10 set	2,500	4 set	10,000	6.5m x 5.5m/set	Fixed facilities
Launching device	1	10,000	1	9,000		
Gas, oxygen storing device	5	1,500	3	900		
Cable holder, etc.		7,200		3,600		18 months' lease
Scaffold		2,400		1,800		
Crane truck	6	64,800	3	32,400	5t	
Forklift	1	1,300	1	1,300	2t	Fixed facilities
Welder	62	5,000	30	2,400	To be sold in two years	
Power supply device for welder	600 KW	9,800	290 KW	4,700		
Total by shipyard		104,500		57,100		
Total				161,600		

## (2) Fabricated materials assembling system

	Shipyard A		Shipyard B		Notes
	Quantity	Cost	Quantity	Cost	
Assembly slab	36	9,000	12	3,000	6.5m x 5.5m /sets
Launching device	1	10,000	1	9,000	Fixed facilities
Gas, oxygen storing device	10	3,000	5	1,500	
Cable holder, etc.		12,000		6,000	
Scaffold		2,400		1,800	18 months lease
Crane truck	7	75,600	3	32,400	
Forklift	1	1,300	1	1,300	
Welder	140	11,200	75	6,100	To be sold in two years
Power supply device for welder	1,340 kw	21,800	720 kw	11,700	Fixed facilities
Total by shipyard	146,300		72,800		
Total	219,100				

- Notes: 1. The price at which a welder is to be sold in two years is set at 60% of the purchase price.
2. Civil engineering work on the slipway is excluded, as it varies to a great extent, depending on the site condition.

As the premises for a study of the facilities, the following conditions are set forth.

- a. The shipyards, the barges and the construction period are the same as aforementioned.
- b. In the panel assembly method one block consists of two panels.

The blocks in the processed material assembling system are the same in size as those in the panel assembly system.

On the basis of these premises, the required facilities are figured out as shown on above. As is discernible from this, there will be a need to invest a total of about ¥162 million in the panel assembly system and about ¥219 million in the material assembling system. In the meantime, the residual



value of fixed facilities after 1.5 years will be 63% of the initial value on the assumption that it will be depreciated at the fixed rate and residual value of 5% after a period of 10 years. The allotment on the facilities associated with this project are given below:

	Panel assembly method	Processed materials assembling method
Fixed facilities	¥20,100,000	¥33,700,000
Lease and selling	107,200,000	127,900,000
Total	127,300,000	161,600,000

### 2-3 Training of Workers

In the panel assembly method, practically every work can well be accomplished by presently available workers. Therefore, it will be sufficient if local workers are trained by instructors to be dispatched from Japan. There will be a need for a total of four instructors from Japan to provide guidance on assembly, welding, mounting and production of fittings. Presumably, the training period will be about one year.

In the processed material assembling method, it will be necessary to newly train 140-150 workers, and this type of training cannot be conducted only by instructors to be dispatched from Japan. There will be a need for education and training by well-trained local workers. For this reason, it will be necessary for about 14 local workers to be sent to Japan to undergo training. This training period will be about 90 days. It will be required for about six instructors to be dispatched from Japan over a period of 16 months.

