2) Ports/waterways

Costs for improvement of ports are as follows, according to existing data. Improvement cost depends on details, but as the objective of this study is to grasp the outline of improvement cost, we used the amount of 12,000,000 dollars/site as an average cost.

Table 55 Improvement Cost of Ports Based on Existing Data

Name of port	Improvement cost (US$1,000)	Data source
Ayolas	11,300	Necesidades de los Puertos de la Hidrovía Paraguay-Paraná, Comisión de las Comunidades Europeas, Julio-1998
Villeta	15,220	
Concepción	9,480	
Pilar	3,000	Proyecto para la Construcción de una "Terminal Multipropósito" en la Ciudad de Pilar, ANNP, Marzo-2000

3) Railway

The following is the cost for the rehabilitation proposed by Spain and Switzerland. Regarding newly proposed railway projects, the unit cost of 900,000 dollars/km has been applied for the section Gral. Artigas – Encarnación.

Table 56 Cost of Railway Rehabilitation Project

Section	Distance (km)	Cost (thousand dollars)	Unit cost per km (thousand dollars/km)	Remarks
Asunción-Ypacarai	44	10,900	247.7	Rehabilitation
Villarrica-Gral.Artigas	141	58,000	411.3	Rehabilitation
Gral.Artigas-Encarnación	79	70,000	886.1	Construction of new line

4) Others

Regarding projects estimated in the Global Transport Plan Research of 1992, the following transformation index was prepared based on deflator (nominal) of construction sector and variation of the dollar exchange rate.

Deflator of construction sector 1991→1999: 3.48

Exchange rate guaraní / dollar 1991→1999: Gs3119.1/Gs1322.0 = 2.36

1991→1999 actual deflator of construction sector: 3.48/2.36 = 1.47

(3) Investment plan

Table 57 shows the result of necessary investments calculated based on the above method, and the investment plan. As for the projects already in progress, they follow the schedule. Regarding the other projects, they were established taking into consideration the distribution of investment amount for each phase and their importance.

As explained, according to trial calculations, about 4 billion dollars of special resource for transport improvement will be acquired by 2010 through increased fuel taxes and collection of a vehicle acquisition tax and a vehicle ownership tax. The necessary investment until 2010 for transport infrastructure was estimated as approximately US$ 2.6 billion. The cost for maintenance will be around US$70 million per year (US$700 million in 10 years), so it can be said that the project is balanced as to its financial resources.

Figure 64 Required Investment Amount and Investment Plan

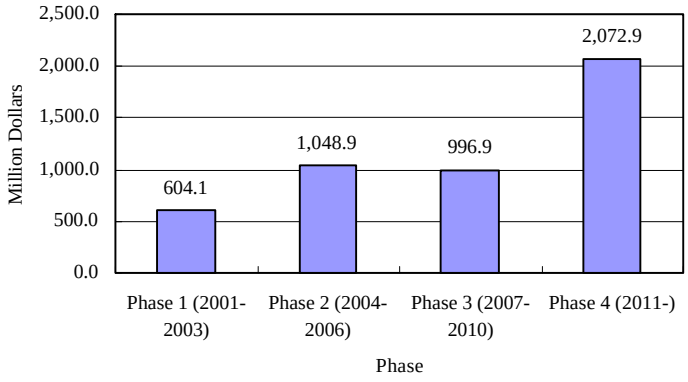

Table 57 Result of Calculation for Necessary Investment Amount and Investment Plan

Program/Project	Project Cost (Million US$)	Phase 1 2003	Phase 2 2006	Phase 3 2010	Phase 4 2011-	Related Organization
T.1 Improvement of the Export Corridor						
T.1.1 Road Projects for Export Corridor Development						
T.1.1(1) Asunción - Guazú Cuá	74.6		○			MOPC
T.1.1(2) Cdad. Del Este - Natalio	92.7		○			MOPC
T.1.1(3) Carmelo Peralta - Loma Plata - Route 9	60.4	○				MOPC
T.1.1(4) Mcal. Estigarribia - Infante Rivarola	127.6	○				MOPC
T.1.1(5) Neuland - Pozo Hondo	87.6	○				
T.1.1(6) Second Amistad Bridge	88.2		○			MOPC
T.1.1(7) Pilar - Argentine Bridge	-			○		MOPC
T.1.1(8) Route 9 (La Patria to Sargento Rodriguez)	54.4	○	○			MOPC
T.1.1(9) Route 2 and 7 (San Lorenzo to Caaguazú)	82.0	○	○	○		MOPC
T.1.2 Port and River Projects for Export Corridor Development						
T.1.2(1) Expansion of Pilar Port	12.0		○			ANNP
T.1.2(2) Expansion of Encarnación Port	12.0		○			ANNP
T.1.2(3) Acquisition of Dredgers to be used in Paraguay River	40.0	○	○			ANNP
T.1.2(4) Rehabilitation and functional expansion of Foreign Free Trade Zone located in Neighbor Countries	36.8		○	○		Privado
T.1.2(5) Improvement on River Navigation System	5.0	○	○			
T.1.3 Railway Projects for Export Corridor Development						
T.1.3(1) Functional Renovation between Asunción - Encarnación	149.3		○			FF.CC.
T.1.3(2) Villarrica - Cdad. Del este (Cascavel)	234.0			○		FF.CC.
T.1.3(3) Cdad. Del Este ' Encarnación	270.0				○	FF.CC.
T.1.3(4) Ypacarai - Villeta Port	31.5				○	FF.CC.
T.2 Improvement of Domestic Mobility						
T.2.1 Project for Domestic Main Road Improvement	2,578.2	○	○	○	○	MOPC
T.2.2 Project for Provincial Road Improvement	227.3	○	○	○	○	Gobernacion
T.2.3 Project for Improvement of Water Transport for Passengers						
T.2.3(1) Asunción - Concepción	6.6		○			Privado
T.2.3(2) Fuerte Olimpo - Bahia Negra	2.6			○		Privado
T.3 Improvement of Transport Infrastructure Supporting Distribution						
T.3.1 Distribution Basis Improvement Project						
T.3.1(1) Storage Facilities	-		○	○	○	MAG, Privado
T.3.1(2) Cargo - Pickup Point	-		○	○	○	Privado
T.3.1(3) Truck Terminals (Cdad. del Este, Ypacarai)	-		○	○	○	Privado
T.3.2 Local Road (Farm Road) Improvement Project	450.0	○	○	○	○	Gobernacion
TOTAL	4,722.8	604.1	1,048.9	996.9	2,072.9	

3.4 PROPOSAL ON ORGANIZATION AND SYSTEM

A proposal regarding the organization and system was made by the National Transport Plan (called "ETNA") of 1992, but few things have been realized. Improvement of the transport infrastructure requires a huge amount of cost and time, so it is necessary to have a continuous administration organization and system.

(1) Reinforcement of transport infrastructure maintenance and control functions

With few exceptions, almost all powers related to the construction/maintenance and repair of roads belong to MOPC. However, due to the limitation in financial and human resources, almost nothing is being done about the local roads. Therefore, it shall be impossible for MOPC to control everything related to the transport infrastructure, which is increasing, and a revision of organization is proposed.

In MOPC, the General Transportation Planning Department (OPIT) is now in charge of planning regarding transport in general, but it is not functioning at a satisfactory level. Nearly 90% of the annual budget is used for roads, making it difficult to realize projects for ports and railways. However, taking

into consideration the future role of waterways, and the importance of railways as a mass transport system, it is necessary to expand and improve an organization that can grasp the issues on transportation as a whole and make proposals for the repair of each transport facility. On the other hand, control of Departmental roads and Local (farm) roads shall be transferred to local authorities, for more efficient control. In this case, local authorities shall have to establish new administrative units in charge of planning and maintenance of roads.

Besides a review of organization, it is important to prepare technical standards and to keep good control of data. As for technical standards, it's necessary to prepare standards related to geometric structures of roads and standards on maintenance. Moreover, it's necessary to grasp the current situation of roads and transport, in order to elaborate an outstanding plan. Accurate data shall be put in order within a well-arranged organization, and establishment of a data control system is needed in combination with reorganization. It is not sufficient to collect data once; there needs to be regularly updated. Regarding important data, it is required to make clear who prepares and who controls the data, and to establish a system for regular updates. Table 58 shows the principal statistical data (tentative) related to transport that shall be maintained, among which road/bridge structure and data on traffic situation are indispensable.

Table 58 Principal Statistic Data Related to Transport that Shall be Maintained (Tentative)

Transport facility	Data	Details of data
Roads	Road inventory	Starting/ending point of the road, extent, width (standard road cross section), pavement type, pavement structure, design CBR, repair history, traffic volume, etc.
	Bridge inventory	Name of the bridge, place of the bridge, general drawing, material applied, design instructions, completion year, estimated construction cost, repair history, etc.
	Heavy machinery Inventory	
	Traffic volume	By type of vehicle, by time zone, by month, etc.
	Bus companies registered	
	Transport companies registered	
	Traffic accidents	Place of occurrence, details of the accident, time, cause, etc.
Waterways	Freight handled at the port	Items, freight type, tons handled, terminal port, through port, transport method, etc.
	Ships arriving/leaving	Vessel type, nationality of the ship, items transported, volume, etc.
	Port facilities inventory	Facility type, facility size, facility structure, completion year, investment amount, etc.
	Waterway inventory	Water level of the river, flow volume, flow velocity, shape of river, depth, nature of the soil, etc.
	Vessel registered	Kind of vessel, vessel type, nationality of the ship, construction year, owner, etc.
Railway	Structure inventory	Bridges, rail type, dimensions, completion year, reform year, etc
	Rolling stock inventory	Type, dimensions, mileage, etc.
	Traffic volume	Number of passengers by terminal, volume of freight by terminal (by item, by month)
Airlines	Airport facility inventory	Facility distribution, facility size, structure, number of floors, owner, name of building, completion year, etc.
	Air passengers/cargo	By company, by line, by month, etc.
General	Population statistics	By place of residence, by age, by gender, by occupation, etc.
	Corporate statistics	Location, number of offices, number of employees, industrial output, commercial sales, etc.
	Trade statistics	Export/import volume, export/import amount, etc.

(2) Financial resources

Transport facilities play an important role as a basis of the society, but they require a huge cost. It is very important to secure appropriate funds for their construction and maintenance. There are mainly 4 types of resource applicable to public investments:

- general resources
- special resources
- aid from abroad
- government bonds

Besides supporting the country's economical growth, improvement of transport infrastructure has the

effect of improving people's lives, so any of the above resources has good reason to be applied for this purpose. However, as there is a limitation in the resources, we propose to secure a special resource for the improvement of transport infrastructure, based on the principle that the beneficiaries should pay. In other words, it's appropriate to collect part of the cost, as a utilization fee or fixed property tax, from the users of the road to be repaired and people living along it, and from the users of the ports/waterways to be repaired and private ports. With regard to the sharing of methods, fairness and clearness are indispensable factors. When economy in Paraguay improves and they have enough financial resources, it is worthwhile introducing the system.

(3) Creation of transport companies

Besides creation of the industry for exports, it is indispensable to create transport companies in order to promote exports from Paraguay. There are approximately 800 freight transport companies registered to MOPC, among which 171 are Paraguayan, corresponding to only one-fifth of the total. Taking into consideration that so many foreign companies are operating in Paraguay, it shall be very difficult for Paraguayan companies to compete against foreign companies who have bigger funds, and some preferential treatments (tax, financing system) shall be required in order to foster and encourage Paraguayan companies.

Table 59 shows the programs/projects explained above.

Table 59 Proposed Institutional Programs/projects on Organization and System

Program/Project	Project Cost (1000US$)	Phase 1 2003	Phase 2 2006	Phase 3 2010	Phase 4 2011-	Related Organization
T.4 Prgram for Decentralization of Infrastructure Improvement						
T.4.1 Project for Reinforcement of Planning Coordination Functions in the Country	500	○				MOPC
T.4.2 Project on Division of Road Administration Tasks	-	○				MOPC Gobernacion
T.4.3 Project for Establishment of Road Planning Departments in Prefectures	-	○				Gobernacion
T.5 Program for Improvement of River Transport Regulation						
T.5.1 Project on Improvement in Transport Efficiency by means of Law Modification		○				
T.6 Program for Strengthening Transport Infrastructure Maintenance and Administration						
T.6.1 Project on Elaboration of Administrative Standards	15	○				MOPC Gobernacion
T.6.2 Project on Implementation of Road Trasnport Census	20	○				MOPC
T.6.3 Road/Bridge Database Elaboration project	75	○				MOPC
T.7 Program for Securing Funds for Infrastructure Improvement						
T.7.1 Project for Creation of Special Funds Collection System for Road Improvement	-		○			MH, MOPC
T.7.2 Project for Creation of Special Funds Collection System for Port/Waterway Improvement	-		○			MH, MOPC
T.8 Creation and Promotion of Transport Sector						
T.8.1 Establishment of the Special Tax System for Transport Companies	-		○			MH
T.8.2 Establishment of the Special Financing System for Transport Companies	-		○			MH
TOTAL	610					