4-4 Comments and Suggestions

4-4-1 Comments on CONARSUD's Feasibility Study

CONARSUD's feasibility study was the first of its kind ever conducted in Argentina in a full scale. Despite the extreme shortage of available data, all necessary analyses and planning were performed quite satisfactorily. To cover up the shortage of data, CONARSUD conducted a questionnaire survey on transporters and probed into case studies of foreign countries. The methodology adopted was generally adequate and normative, and the logical argument was highly persuasive and convincing. It deserves special attention that CONARSUD exercised scrupluous care in the site location, measurement of economic benefit, and examination of financial feasibility of tariff rates.

If any comments are to be made on this survey despite the restraints imposed on CONARSUD in terms of availability of data and survey period, then the following points may be cited.

(1) Shortage of information on cargo movement in Capital Region

A comprehensive traffic survey of the Capital Region has never been conducted in Argentina since the beginning of the 1960s. Accordingly, there were no statistical data showing the structure of traffic demand of cargoes moving within the Capital Region and moving in/out of the region, although such data were essential for estimating the demand for the terminal. In this survey, CONARSUD limited the cargoes passing through the terminal only to small-lot cargoes, and prepared on OD table on the basis of a questionnaire survey conducted on 235 small-lot cargo transporters. The OD table thus prepared cannot be expected to be strictly accurate.

The Capital Region was divided into 10 zones to prepare the OD table, but this zoning was rather rough for the purpose of estimating the demand for 1 - 2 terminals. In the economic benefit calculation of the terminal, CONARSUD concluded that a reduction in total running distance and time sufficed to estimate a cut in total running cost, and there was no need to consider the rise in loading factor of small trucks for cargo collection service. In general, however, the concentration of cargoes at a terminal results in an increase in total running distance. It is possible that the assignment of OD volume was performed with sufficient accuracy because the zoning and the network for simulation lacked in minuteness.

(2) Uncertainty of estimated number of tenant transporters

The success of the project depends primarily whether or not private transporters will be inclined to use the terminal. If the estimated number of tenant transporters is inaccurate, then the whole process of analysis for the project justification loses its validity.

In the feasibility study, 711 transporters were assumed as potential terminal users on the basis of a sample survey, and the first phase development plan was formulated to accommodate 300 of them. Here, the accuracy of the sample survey may be questionned

because the sample size of 235 could be too small as compared with the population of more than 4,000. The questionnaire survey also lacked in the coverage of questions. Specifically, questions were limited to general ones (e.g., respondent concern for the terminal) which were asked at the pre-planning stage. Questions for clarifying the reactions/usage intent of potential users should have been asked at the post-planning stage by presenting the location of the terminal, the type of service to be offered, fees to be charged, etc.

(3) Uncertainty of conditions for economic evaluation

In the feasibility study, the project benefit was calculated by forecasting that the terminal operation would raise the loading factor of cargo collecting trucks as well as the operating rate of large trucks for inter-urban cargo transportation. However, the CONARSUD failed to present any well-grounded data on which this calculation was based, and did not consequently verify its reliability.

(4) Evaluation of land price

In the economic evaluation of the project, the land price was not included in the project cost. The opportunity cost of La Matanza site should have been included in the project cost because if the site is not used for the terminal development, there is possibility that it will be used for some other productive activities. This will result in a slight decline in the project valuation, but will reverse the conclusion reached by CONARSUD.

4-4-2 Proposal for Supplementary Survey

None of the problems cited in 4-4-1 in comments on CONARSUD's feasibility study are of any crucial importance so long as tenant transporters are secured as planned. However, during lapse of four years since the feasibility study was conducted in 1982, the general environment surrounding the project has undergone a number of unfavorable changes such as the stagnation of Argentina's economy, aggravation of the inflation, slow growth of traffic demand, and general depression in the transportation industry. If the project is to be pushed ahead as originally planned by CONARSUD, the following reexamination will have to be made with consideration to the impact of these changes.

(1) Reexamination of construction cost and tariff

The original plan calls for a general reexamination and needs to be revised. In particular, the construction cost and the facilities tariff should be reviewed and updated.

(2) Intent survey of potential tenant transporters

An intent survey should be conducted on transporters to determine their intents of terminal usage by presenting the services to be offered by the terminal, advantages of such services, and the revised tariff. At the same time, the financial capability of respondent transporters for paying various fees for using terminal facilities

should also be surveyed.

(3) Reexamination of truck loading factor/operating rate improving effect

The possibility of raising the truck loading factor and operating rate by the terminal development should be studied and substantiated by comparing the project with similar foreign projects including, for example, those in Brazil.

(4) Examination for terminal utilization for industrial products transportation

In CONARSUD's feasibility study, cargoes passing through the terminal were limited to small-lot cargoes. In Japan, small-lot cargoes account for less than half of cargoes handled at general terminals. There are many Japanese manufacturers that make use of terminals to cut down their stock level and reduce the storage cost.

A survey for checking Argentine manufacturers' intent to use the terminal for the same purpose may deserve consideration.

(5) Examination for increasing return cargoes

At present, about 25% of trucks and 65% of freight cars return unloaded from local areas to Buenos Aires. The route-wise differences in traffic demand between the Capital Region and local areas not only cause a hindrance to productivity improvement in cargo transportation service, but also greatly reduce the terminal development effect. Studies should therefore be made for effective utilization of return trips for transportation of fresh vegetables, grains, livestock products, forest products, etc. from local areas to the Capital Region. The concentration of economic activities and cargo traffic in the Buenos Aires - Rosario - Santa Fe - Cordoba corridor suggests an approach in this direction. Specifically, it may be recommended that a second terminal be built in the neighborhood of Cordoba for establishment of a new freight liner route covering the Buenos Aires - Cordoba corridor for transportation of cargoes bound from local areas for the Capital Region.

La Matanza site adjoins the existing Buenos Aires Central Market. It may therefore deserve attention to develop an information system capable of providing the traffic demand data of both this market and the terminal for more effective utilization of trucks and railways.

4-4-3 Suggestions for Cargo Terminal Development Strategy

Construction of general cargo terminals in Japan began in the mid-1960s, and there are 24 terminals across the country at present (private terminals are established in about 1,500 different places). The Capital Region has four large-scale general cargo terminals developed for cargo traffic to local areas in different directions, and the construction of another large terminal in the Capital Region is now being planned. The Progress Report (III) on the Buenos Aires Terminal Development Project, presented to the Argentine Government in May 1986,

contains a brief of description of the operation, development plans, institutional background, management, etc. of these cargo terminals.

The following suggestions for realizing the Buenos Aires cargo terminal project are based on the Japanese experience in cargo terminal development. These suggestions are advanced only by way of giving a clue to the success of the project because it is not possible to make full use of the Japanese experience in Argentina owing to the difference in the background environment between the two countries.

All Japanese enterprises engaged in trucking service are required to be licensed by the Minister of Transport. The license is classified into the following three kinds.

1) License for route trucking service	Periodical trucking service of small-lot cargoes along the predetermined route at the request from an intermediate number of consignors.
2) Lincense for area trucking service	Trucking service by each truckload shipment with the designated area as the origin or destination, offered at the request of an indeterminate number of consignors.
3) License for special trucking service	Trucking service of cargoes within a certain area, offered under a trucking service contract concluded with specific consignors.

The truck terminals are the bases established in the network of route trucking service.

General truck terminals used by trucking service companies are developed with part of the construction fund covered by the central or local government. This is because they are large in size (average number of berths - 154), call for a huge capital input because they are located in large cities where the land price is high, and their systematic development can diminish disorderly construction of private terminals and can also realize relational physical distribution and adequate land use compatible with the objectives of city planning.

The most notable of all differences in terminal design conditions between Argentina and Japan is found in the operational scale of transporters and the structure of cargo traffic demand. In Argentina, those operating with just one truck account for one third of all transporters, and the average operational holding of transporters is 7.4 trucks. In Japan, on the other hand, nearly all route trucking companies using general cargo terminals own 50 or more trucks. It is likely that the small operational scale of Argentine transporters will influence the module operation efficiency as well as the contract conditions pertaining to the fees for using terminal facilities.

In Japan, the traffic demand between two giant cities of Tokyo and Osaka is far the greatest, and the cargo traffic from Tokyo to Osaka is generally balanced with that from Osaka to Tokyo. In local areas where cities with a population of 0.5 - 1.0 million are found, a small-lot cargo collection system is established within the influence sphere of

each of such cities. In Argentina, the cargo traffic bound for Buenos Aires City is small, and this diminishes the terminal development effect, as described earlier. Solution of this problem calls for the enforcement of a long-range policy for decentralization of population and economic activities, promotion of regional industrial development, etc. However, short-range measures such as the development of a small-lot cargo traffic information network and the consolidation of local cargo collection bases will certainly produce notable improvement effects.

Table IV-4-10 shows a comparison between Keihin Truck Terminal opened in 1968 in the Tokyo Capital Region and the Buenos Aires Terminal planned in CONARSUD's feasibility study.

The following suggestions for the Buenos Aires terminal development are advanced with a clear understanding of the aforementioned difference in the project development environment between Argentina and Japan.

(1) Necessity for terminal

Judging from the population, economic activities and cargo traffic demand in the Buenos Aires Capital Region and considering the quality of existing private cargo stations and their distribution, it can be said that the Capital Region has now reached stage calling for the development of a general cargo terminal.

(2) Development method

The Buenos Aires cargo terminal development has thus far been studied with the concession type development based on private sector investment as a premise. Considering the extensive land area and a huge capital input required for its development and the heavy burden of fees that will be imposed on its users, the terminal project is not essentially a profitable undertaking. If due consideration given to the objective of its development, it will be concluded that the tariff should not be set to yield a high income from the terminal operation. The terminal's highly public nature and its urban environment improvement effects serve as good reason for the Government to take part in the project by appropriating public resources and fund for its implementation. It is to be pointed out, however, that when an undertaking like this is run only by the public sector, it is prone to lead to a decline in service quality and financial condition, as evidenced in many countries.

From the said viewpoint, it is considered advisable to study the possibility of introducing the third sector system which is adopted by many Japanese cargo terminals. Under this system, the terminal will be operated as a joint undertaking of the central and local governments and private sector enterprises. In general, public sector will make investments for land and infrastructure, and private sector for superstructure and facilities, and the management will be vested in a joint managerial body. Some of the advantages of this system are that the terminal can be operated to provide impartial service to all users without submitting to commercialism, funds can be raised with ease, and the private sector's efficient operation method can be introduced in the actual terminal operation. In addition, it is

Table IV-4-10 Comparison of Buenos Aires Cargo Terminal and Keihin Truck Terminal in Tokyo

		Buenos Aires terminal (design figures)	Keihin truck terminal (actual figure)
1.	Area	55 ha	22.2 ha
2.	Number of berths (modules)	270	433
3.	Number of tenant enterprises	711	38
4.	Average operational holding of tenants	7.4 trucks	85 trucks (excl. those using other terminals)
5.	Daily cargo handling volume	3,480 tons	8,987 tons
6.	Project cost	US$13.2 million excl. land price (base year - 1981)	US$76.8 incl. land price (base year - 1967)
7.	Legal system	-	Japan Motor Terminal Co., Ltd. Act, Motor Terminal Structure and Facilities Act, Distribution Buniness City Area Development Act.
8.	Mode of operation	Concession type	Third sector type

Source: CONARSUD Report and a brochure of Keihin Truck Terminal.

possible to privatize the terminal after its management is set on the right track. In the case of the aforementioned Keihin Truck Terminal which was developed under the third sector system, privatization was realized in 1985, 17 years after it was opened, when Tokyo Metropolitan Government and private owners purchased one half each of the Central Government shares.

(3) Consolidation of legal system

In order for the project to be supervised and financed by the Government and to receive preferential tax treatments from the Government, it is necessary to consolidate the relevant legal system by enacting a number of new laws.

Laws enacted in Japan for these purposes are the Motor Terminal Act (1959), the Motor Terminal Structure and Facilities Act (1959), and the Japan Motor Terminal Co., Ltd. Act (1965).

1) Motor Terminal Act

Under this law, the general bus terminal business and the general cargo terminal business are required to be lincensed by the Minister of Transport, and any company applying for a license for operating such business is required to submit a plan of its business operation and a statement of estimated income and expenditure. Furthermore, the operator of such business must undergo an inspection of his facilities before initiating his service, and is also required to obtain the Transport Minister's approval for fees for using terminal facilities.

2) Motor Terminal Structure and Facilities Act

This law provides for the structural conditions to be satisfied and the facilities to be installed under an automobile terminal construction plan to obtain a license from the Transport Minister. Specifically, it designates the places where the terminal entrance/exit should not be provided, the design automobile load (20 tons), the roadway width (6.5 m or more, but 3.5 m or more in case of one-way roads), the minimum turning radius (12 m), the maximum gradient (10%), the duty to install drainage, venting and lighting facilities, etc.

3) Japan Motor Terminal Co., Ltd. Act

This law provided for the establishment of Japan Motor Terminal Co., Ltd. operating the cargo terminal business in and around large cities, and thus made it possible for the central and local government to invest in it. The law also stipulated for preferential tax treatments to be accorded to this company. It was abolished in 1985 when the terminals run by this company (including Keihin Truck Terminal) were privatized.

(4) Emergency Measures

Although restrictions are imposed on the passage of large trucks on the streets of Buenos Aires, there are many transporters conducting transshipping operation on the road side owing to the shortage of existing transshiping facilities in both quality and quantity. As a means of solving this problem, top priority should be given to a plan to provide a transshipping yard equipped with the minimum required facilities in a number of important points in different cargo traffic routes. For this purpose, enforcement of suitable legal actions intended to use all vacant lots, whether owned publicly or privately, for the transshipping purpose, should be reviewed, including actions for granting government subsidy or according preferential tax treatments.

(5) Long-range Development Measures

La Matanza site is very favorably located for cargo transportation. While it adjoins the Central Market, there are found many vacant lots in its vicinity. It can therefore be perceived to develop this district not just for the cargo terminal construction but as a complex of transport and distribution-oriented industries.

Transport-oriented industries that could be accommodated in this complex would include the cargo terminal, container depot, truck exhibit yard, parts center, car repair service center, and car inspection center. Distribution-oriented industries would include a wholesale business center, distribution and processing center, trade center, warehousing business, trade fair hall, etc. To promote the development of such distribution bases, the Distribution Business Area Development Law was enacted in 1966 in Japan, which specified the organization qualified to carry out the land formation work for development of distribution industry complexes and also made it possible to exercise the right of eminent domain for the purpose of such development.

To develop La Matanza district to a complex of transport and distribution industries, a land use master plan must be formulated first. This may be followed by preferential introduction of highly profitable businesses such as a truck exhibit yard and parts center from which private sector investment can be expected, so that the income from such businesses will be used for development of public facilities including the cargo terminal.

In any event, the projected terminal cannot be run successfully unless it is used by private transporters, so that the project will have to be pushed forward by maintaining close contact with transporters' associations such as the FADEEAC and CATAC. Equally important is the cooperation with the Central Market not just because the project site is owned by it but also because the market does not have restaurants, gas stations and repair shops much needed by more than 1,000 trucks entering and leaving the market every day. When these facilities are developed in the terminal, they will be used as common facilities of the market and the terminal.

5. DEVELOPMENT OF ALTERNATIVE ACCESSES TOWARD THE PACIFIC

5-1 Accesses toward the Pacific and Hinterlands

5-1-1 Background of Development of Accesses toward the Pacific

When anyone in Argentina speaks of "Salida del Pacifico" or "Trans-Andes", he means a transport route connecting to the Pacific coast across the Andes. Such a route does not necessarily link the northwestern region (NOA) of Argentina and the northern region of Chile. It is known that American Indians, the aborigines of the Andes area, engaged in trade in former days between the Pacific coast side and the Pampa-Patagonia side by passing the natural roads (Paso) that ran through the valleys in the Andes. There are many such natural passages leading from the northwestern region of Argentina to the northern part of Chile and from Patagonia of Argentina to the southern part of Chile across the Andes. The Trans-Andes routes development plan now under examination is intended to make use of these time-honored passes by carrying out a full-scale improvement work. At present, studies are being made mainly for the development of the following routes (see Figure IV-5-1).

1) Jujuy - Jama Pass - Antofagasta (road transportation route)

2) Salta - Sico Pass - Antofagasta (road transportation route)

3) Salta - Socompa - Antofagasta (railway route)

4) Tucuman/Catamarca - San Francisco Pass - Caldera (road transportation route)

5) La Rioja - Pircas Negras - Caldera (road transportation route)

6) San Juan - Agua Negra - Coquimbo (road transportation route)

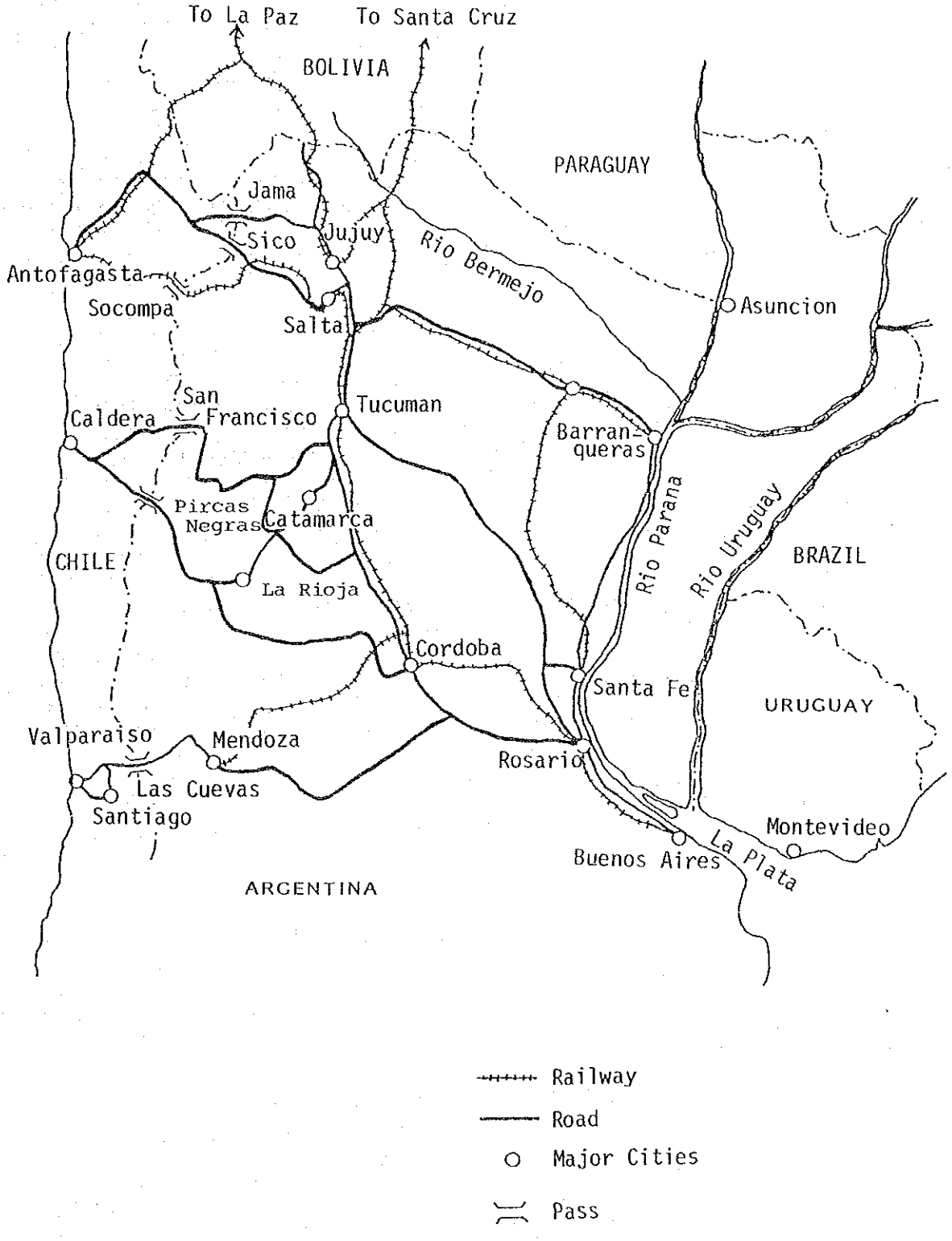
7) Mendoza - Las Cuevas Pass - Valparaiso (road transportation route)

8) Zapala - Lonquimai (railway route)

Of these routes, the railway route 3) has been used for regular train operation and 5) for road transportation, 2) has recently been used for regular bus service, 1) and 4) are being developed under the improvement project of the relevant provincial governments, and others are at the development planning stage.

These routes have thus been used for trans-Andes transportation service since many years ago, but they are now given special importance for development of accesses to the Pacific coast. This is ascribable to the settlement of a territorial dispute between Argentina and Chile over three islands in the Beagle Channel which gave an impetus to the promotion of friendly relations between the two countries and consequently provided a political basis for embarking on a full-scale development of trans-Andes transportation routes linking the two countries.

Figure IV-5-1 Alternative Accesses toward the Pacific



The cooperative atmosphere recently created between the two countries is evidenced by the meeting of the Argentine-Chilean Binational Committee on Economic Cooperation and Physical Integration held in April 1986. At this meeting, the two countries agreed that they would cooperate in the development of the Salta-Antofagasta railway service and the trans-Andes passes linking the two countries, as well as in the simplification of formalities required for transportation between them. It is hoped that the agreement reached at the said meeting will be followed by discussions at the working level for actual implementation of development programs.

The hinterland of those passes, provinces of Jujuy, Salta, Tucuman, Catamarca and La Rioja in the NOA region, have high development potentials of agricultural products, mineral products and energy resources, but the development of these provinces has been delayed because they are located far from Buenos Aires, the country's largest consumer city and sea port.

The greater part of economic activities in Argentina have thus far been concentrated in the Pampean region which lies within a radius 600 km from the capital city of Buenos Aires. The country's economy has been sustained mainly by the production of grains and livestock products in this region and their export to overseas markets from Buenos Aires, river ports along the Parana including Rosario, and Bahia Blanca on the Atlantic coast.

At present, however, Argentina is faced with an economic impasse that cannot resolved by the export of farm produce of Pampean region alone. In order to break the country's current economic stagnation and open up the way to its stabilized, long-range growth, it must direct its potential strength not only to the existing agricultural production of established region but also to accelerated regional development of underdeveloped regions. It must be prompted by increasing the productivity of the Pampean region and by making the best use of the high development potential of the areas surrounding the region. Now that the planned development of transport routes to the Pacific coast has opened up the possibility of shortening the distance to the sea port, all provinces in the NOA region, including those lying along the Andes, are ready to take part positively in the trans-Andes route development project.

In connection with the NOA region development, special mention must be made of the Rio Bermejo Development Project. This project is aimed at developing the voluminous water resources of the Rio Bermejo to promote the development of the Gran Chaco area which now remains intact. The project area covers the entire NOA region, the southern part of Bolivia and Paraguay, and the central part of the Cuenca del Plata extending from the Andes to Rio Parana. The Rio Bermejo basin development scheme is a century-old project dating back to the 19th century, but it is not long ago that the Rio Bermejo National Commission was established as a permanent organ to promote the project by taking necessary steps for its actual implementation. The project is now at the stage of formulating construction plans, of which the most important is one for constructing small multipurpose dams in various places in the basin for flood control, irrigation and power generation. The

feasibility study for the dam construction plan is expected to be financed by the Inter-American Development Bank (IDB).

The Rio Bermejo Development Project needs to be promoted by coordinating its progress with that of the NOA development plan and the trans-Andes transport routes development plan, so as not to cause any hindrance to its smooth implementation.

5-1-2 Existing State of National Land Development in Argentina

The Government policy for promoting the development of unexploited areas is to narrow down the economic gap existing between developed and underdeveloped areas for the purpose of balanced land utilization and revitalized economic activities in the entire country. Such regional development is considered for the northeastern region (NEA), northwestern region (NOA), Cuyo, and Patagonia. However, none of these are delineated clearly by law as new development areas, but they represent the general notion of regional development areas in the broadest sense.

There are a number of preconditions for promoting regional development in Argentina. It is necessary to formulate a regional development policy and put it in a statutory form. It is also necessary to secure the consensus of opinion regarding the responsibility sharing and coordination among the central and local governments as well as other government ministries and agencies engaged in regional development in different sectors or under different programs. Neither of the two requirements having been satisfied yet, it may be said that Argentina is still at the stage of finding an orientation in its approach to regional development.

The following are the central government offices concerned with regional development.

1) Direccion Nacional de Analisis y Planificacion Regional, Secretaria de Planification, Presidencia de la Nacion

2) Sub-secretaria de Provincias, Ministerio del Interior

3) Secretaria de Desarrollo Regional, Ministerio de Economia

The relationships between these government offices are not clear at present. Their jurisdictional responsibilities are not clearly demarcated and sometimes overlap. Furthermore, how the central and provincial governments will coordinate and cooperate in promoting regional development still remains a matter to be determined in the future.

In this connection, it deserves attention that the Ministry of Economy is now making an assessment of development potentials of the NEA, NOA and Cuyo regions in cooperation with the UNDP to work out development strategies for these regions. This assessment is certain to prove useful in charting the future course of regional development in Argentina as well as in training planners and economists specializing in regional development planning and administration.

5-2 Development Trend and Potential of NOA Region

5-2-1 Development Trend of NOA Region

(1) Changes in population

A historical review of the migration of Spanish colonists to Argentina, which began in the mid-18th century, indicates that earlier immigrants established their settlement in the northwestern region of the country. At early stages of its development, therefore, the NOA region carried a heavier weight in total population than it does at present. According to the INDEC's statistics, shown in Table IV-5-1, the NOA region accounted for about 27% of total population in 1869. With the development of Buenos Aires and Pampean region, however, the relative importance of the region declined gradually until its share in total population dropped to 9.7% in 1970. The share recovered slightly in later years and registered 10.8% in 1980.

Table IV-5-1 Trend of Population Increase in NOA Region (1869-1980)

(persons)

Year	Tucuman	Salta	Jujuy	La Rioja	Catamarca	Sgo. Estero	Percentage to national total
1869	108,953	88,933	40,379	48,746	79,962	132,898	27.3
1895	215,742	118,015	49,713	69,502	90,161	161,502	17.4
1914	332,933	142,156	77,511	79,754	100,769	261,678	12.6
1947	593,371	290,826	166,700	110,746	147,213	479,473	11.3
1960	773,972	412,854	241,462	128,220	168,231	476,503	11.0
1970	765,962	509,803	302,436	136,237	172,323	495,419	9.7
1980	972,655	662,870	410,008	164,217	207,717	594,920	10.8

Source: INDEC, Censos Nacionales de Poblacion y Vivienda, 1980.

The population of the NOA region as a whole kept declining in terms of share in national total, while increasing steadily in terms of absolute value. But the population of some provinces in the region, i.e., Salta, Jujuy and Tucuman, showed an upturn at an early stage (1947) in terms of share in national total. This is because these provinces, originally producing areas of commercial crops for the domestic market such as sugarcane and tobacco, secured the basis for early economic development under the government policy for encouraging the production of import-substituting crops. As a whole,

however, the region's economic development has not been dynamic enough to build a firm economic structure that can retain and absorb natural incrases in its population. For this reason, the outflow of population from the region has continued for more than 100 years in the past.

(2) Trend of economic development

According to the CEPAL's (Economic Commission for Latin America and the Caribbean) analysis of the NOA region's economic growth as compared with the national economic growth in the 10-year period from 1970 to 1980 which is shown in Table IV-5-2, all provinces in the region registered higher annual growth rates than the national average of 2.44%. Growth of per capita production in the said 10-year period has also been higher for the region than for the national average. Specifically, all provinces in the region registered an annual average growth rate of more than 2.0%, with Catamarca Province placing first with 4.79%, whereas the national average recorded a low rate of 0.79%. However, the level of per capita production in the region is still lower than the national average. In 1980, for example, per capita production in Tucuman Province, which is most developed in the region, was about 20% lower than the national level.

Table IV-5-2 Economic Growth in NOA Region (1970-1980)

Province	Rate of increase of production, 1970-1980 (%)	Production (million pesos)		Rate of increase (%)
		1970	1980	
Salta	4.92	1.92	2.40	2.25
Jujuy	6.27	2.04	2.79	3.18
Tucuman	5.17	2.29	3.00	2.73
Catamarca	6.78	1.34	2.14	4.79
La Rioja	4.65	1.33	1.76	2.84
Sgo. del Estero	4.30	1.40	1.76	2.31
Country Total	2.44	3.42	3.70	0.79

Source: CEPAL, Un Enfoque Alternativo para el Analisis del Desarrollo Regional; Estudio de la Estrategia de Crecimiento Agricola de la Region N.O.A. en el Decenio 1970-80, Jan. 1984.

(3) Development trend of different industrial sectors

In the NOA region, agriculture holds the dominant position among all industrial sectors. However, unlike the Pampean region where export grains and livestock products constitute the greater part of agricultural production, the region's agricultural products are quite versatile, varying from province to province. The main products are sugarcane produced in Jujuy and Tucaman, tobacco in Jujuy, Salta and Tucuman, and fruits in Salta, Catamarca and La Rioja, and these are supplied for consumption within the region or other parts of the country. Grains like beans, sorghum and maize are produced in Salta Province, but they occupy by far the smaller share in total agricultural production than they do in the Pampean region.

The region's agriculture is now confronted with two major problems. First, there is an acute need for diversfying crops owing to the dwindling international market price of sugar which accounts for a large portion of the region's agricultural production. Second, the market competitiveness of the region's agricultural products is weakened by the high transportation cost because of the long distance to Buenos Aires, the country's largest consumer city and export port. A special preferential measure to ease the burden of high transportation cost is enforced in order to promote the region's grain production. Specifically, a freight for a maximum of only 500 km is charged for railway transportation of grains produced in the region regardless of the actual distance covered, and the difference is covered up by the National Grain Board (JNG).

In the mining industry sector, petroleum and petroleum-associated natural gas produced in Salta Province hold an important position in the country's mineral production. Metals like silver, lead and zinc produced in Jujuy Province are also given great importance in Argentina, but the scale of their production is small as compared with the international level.

The manufacturing industry is limited to the processing of agricultural products, except that high-quality steel is manufactured at Zapla, Jujuy Province. Main products are alcohol manufactured from sugarcane, fruit juice and wine. In Tucuman and La Rioja, industrial estates have been developed and many industries including the textile industry have located their new plants under an incentive taxation scheme introduced by the Industrial Development Promotion Law. However, the operational scale of these industries is far smaller than it is in Buenos Aires and Cordoba.

5-2-2 Development Potential of NOA Region

The NOA region's development potential is high for agriculture. The region embraces an extensive flatland area with an annual rainfall of 400 - 1,200 mm on the east of the dry Andean district as well as an unexploited arable land of as large as 7 million ha in Salta Province alone. Furthermore, the Rio Bermejo abounding in water resources flows through the region. If the Rio Bermejo's water resources are developed, it is expected that the region's production of grains, fruits and

industrial crops can be augmented phenomenally without any problems related to agricultural techniques. Accordingly, the question at the moment is how to cut down the transportation cost to a level which is low enough to solve the problem of distance to the market which is the heaviest bottleneck in the region's agricultural development, or how to supply agricultural products as processed goods with greater value-added, not as raw products, and thereby cut down the transportation cost.

Regarding the mining development potential, the distribution of mineral resources in the region is investigated by all provincial governments, but further prospecting efforts are required for detailed analysis of total deposits/reserves and grade.

As for the manufacturing industry, each provincial government is positive in promoting the development of existing industrial sectors, including the agricultural products processing, and in inviting industries to locate their plants. However, the incentive policy adopted for encouraging industrial location in the region remains far from successful because it has not been formulated without regard to all conditions essential for the location and operation of each individual industry. Thus, there are many factors to be examined and consolidated to judge the region's industrial development potential.

Infrastructural improvement is lagging behind the required level in many sectors, with the exception of the energy supply system and the inter-urban truck roads. An innovative infrastructural improvement strategy needs to be framed and enforced for the region's accelerated development in the future. Table IV-5-3 shows the existing state and focal points of development as well as the distribution of dormant natural resources in the five provinces in the NOA region.

In studying the possibility of developing trans-Andes accesses to the Pacific and the NOA region which is the hinterland area of such accesses, it is necessary to make a comparative evaluation of the development condition and distribution of natural resources in all provinces in the region at the same level. At present, however, existing data are not sufficient to make such evaluation possible.

At present, the Federal Investment Council (CFI) is conducting the "Study for the Technical Grounds to Open Mountain Passages in the North of Mendoza (Estudio para la Fundmentacion Tecnica de Habilitacion de Pasos Cordilleranos al Norte de Mendoza) commissioned by the relevant provincial governments. It is hoped that the data base for making a comparative study of sub-regions in the NOA region will be built in the course of this study. Formulation of any development plan should begin with the identification of the kinds and contents of data required at the initial stage of development, method of collecting and consolidating such data, importance and priority order of data development, cost required for data collection and consolidation, etc., and it is necessary to monitor the progress of development after the project is put into execution.

When the data base covering the existing state of development and distribution of resources is completed, then the development potential

Table IV-5-3 Current State of Developments, and Future Development Potential in the Provinces Surveyed

Province	Jujuy	Salta	Tucuman	Catamarca	La Rioja
Current state of developments	. Agriculture: Sugar-cane, tobacco, beans, fruits . Mining: Silver, lead, zinc, cadmium . Manufacturing: Zapla's high-quality steels, alcohol, cement, etc.	. Agriculture: Sorghum, beans, maize, tobacco, vegetables, forest resources, fruits . Mining: Oil, natural gas, borates, manganese . Manufacturing: Oil refinery, winery, etc.	. Agriculture: Sugar-cane, tobacco, citruses . Manufacturing: Alcohol production, processing of citrous fruits, etc. . Road network already developed . Three universities - Supply of human resources . The largest population in NOA (approx. 1 million in 1980)	. Agriculture: Potatoes (seed potatoes), walnuts, grapes, olives . Livestock farming	. Agriculture: Fruits (figs, grapes, plums, peaches) . Manufacturing: Juice production, textile production
Priorities of development policies	. Promotion of agricultural produce processing industry . Mine development . Construction of trans-Andes road	. Natural gas development, and processing industry . Promotion of agricultural produce processing industry . Construction of trans-Andes road . Expansion of the use of C-14 railroad	. Diversification of agricultural production . Development of mineral resources . Promotion of industrialization; expansion of existing industries . Construction of trans-Andes road	. Seed production, and promotion of exports (alfalfa and potatoes) . Construction of trans-Andes road	. Invitation of factories to the industrial park . Construction of trans-Andes road
Untapped resources in reserve	. Water resources in Rio Bermejo . Mineral resources	. 7 mil. ha of arable land left uncultivated . Mineral resources (manganese) . Water resources in Rio Bermejo		. Mineral resources (tin, copper, mica, stone)	. Production of meat and fruits . Mineral resources

Source: Data available from provincial governments and data obtained by hearing surveys conducted in respective provinces.

of such resources should be evaluated. This evaluation should include the examination of all adverse conditions restricting the actulization of the development potential and measures for removing such restrictive conditions. Development potential of individual resources cannot be measured accurately by grasping their physical distribution alone. It is necessary to study whether or not such resources can be supplied to domestic as well as international markets at competitive price. The data currently made available by each provincial government seems to lack in the elaboration in this respect.

5-3 Alternative Accesses toward the Pacific, and their Technical Development Potential

5-3-1 Alternative Accesses toward the Pacific

(1) Historical background

All existing routes go over the Andes rising to an elevation of more than 4,000 m in the highest point, so that each route has a number of critical sections and none of them permit the passage of 10-ton or heavier trucks. A scheme for opening fully consolidated trade routes between Argentina and Chile by improving the trans-Andes routes according to the standard paving requirements is a long-standing one dating back to many years ago, but it has not been carried out to date mainly because of the political disharmony between the two countries and the lack of domestic demand for transporting Argentine products over the Andes for export to the Pacific countries.

In the 1980s when the Argentine Government gave high priority to the development of the NOA and NEA regions, the trans-Andes routes to the Pacific came into the limelight because of the long distance between these regions and the river ports in the Parana-La Plata river system. Another factor that motivated Argentina to develop these trans-Andes accesses to the Pacific was that the country is required to open up new outlets for its products in the Pacific countries, including those in North and South Americas and Asia, owing to the slowdown of market growth in the EC countries.

In 1980, the National Institute of Economic Planning (INPE) conducted a survey for the "Road Project for Cargo Transport from NOA Region to Antofagasta Port." In this survey, the INPE made a transport cost comparison between the trans-Andes routes to Antofagasta and the routes to the Atlantic coast and proved the economic advantage of the former over the latter, and also examined which of the trans-Andes routes would entail the least technical difficulty.

From this time on, the Chilean scheme for improving Antofagasta as a foreign trade port to promote the development of the northern region assumed a realistic phase. Specifically, the Institute for Latin American Integration, IDB studied the possibility of utilizing Antofagasta as one of regional ports in South America in 1982. In the following year, the Chilean Government commissioned a Norwegian

consulting firm to undertake a feasibility study for developing transportation routes between the "Capricornio Andino" region (Chile, Argentina, Paraguay and Bolivia) in the east and the sea ports on the Pacific coast.

Responding to these moves in Chile, all Argentine provinces on the Chilean border conducted a feasibility or prefeasibility study to promote the development of trans-Andes routes in their respective territorial areas. Findings of most of these studies were reported at two geoeconomic seminars, one held at Copiapo, Chile, in November 1984 and the other at Cordoba, Argentina, in June 1985. The enthusiasm of these provinces for the trans-Andes routes developed rapidly after the territorial dispute between Argentina and Chile over the Beagle Channel was settled under the Alfonsin administration and the diplomatic relations between the two countries were normalized.

As a consequence, inter-governmental and inter-provincial meetings between the two countries came to be organized frequently to discuss various matters related to the development of the trans-Andes routes. At the first inter-governmental meetng held at Mendoza in October 1983, the problems related to international land transportation between the two countries were discussed. The most recent meeting was one held at Buenos Aires in September 1985. As a result of these meetings, the two countries have reached a basic agreement on the necessity of developing the trans- Andes routes, but no decision has yet been made as to which route should be given the highest development priority. In order to achieve unity on the question of development priority, representatives of seven related provinces gathered at Capianpo in May 1984 and those of nine provinces met again at Capiapo in August 1985, but no consensus of opinion was reached. For this reason, the evaluation of each route is now commissioned to the Federal Investment Council (CFI) which is operated with a fund contributed by all related provincial governments.

Economic evaluation of trans-Andes routes is made also in the private sector by related provincial chambers of commerce and their international organization, the GEICOS (Grupo Empresarial Interregional del Centro-oeste Sudamericano).

(2) Alternative trans-Andes routes to the pacific

As each province on the border insists on the development of the pass (paso) running through it, the five alternative routes shown in Table IV-5-4 and Figure VI-5-1 (in 5-1-1) are required to be examined. In Salta Province, the C-14 line, which is a part of the General Belgrano line, runs on the Paso de Socompa and connects to a Chilean line leading to Autofagasta Port. In the following, a brief description of each alternative route is given.

5-3-2 Railway Routes to the Pacific Coast

The following shows four alternative railway routes from Argentina to the Pacific Coast.

Table IV-5-4 Alternative Trans-Andes Routes in the North of Mendoza

Province	Pass	Characteristics			
Jujuy	Jama	1.	Mode	:	Road
		2.	Route	:	Jujuy - (260 km) - Jama - (466 km) - Antofagasta
		3.	Highest Point	:	4,490 m a.s.l.
Salta	Sico	1.	Mode	:	Road
		2.	Route	:	Salta - (300 km) - Sico - (470 km) - Antofagasta
		3.	Highest Point	:	4,600 m a.s.l.
Salta	Socompa	1.	Mode	:	Railway
		2.	Route	:	Salta - (571 km) - Socompa - (332 km) - Antofagasta
		3.	Highest Point	:	4,475 m a.s.l.
Catamarca	San Francisco	1.	Mode	:	Road
		2.	Route	:	Catamarca - (560 km) - S.F - (300 km) - Caldera
		3.	Highest Point	:	4,786 m a.s.l.
La Rioja	Pircas Negra	1.	Mode	:	Road
		2.	Route	:	La Rioja - (582 km) - P.N. - (330 km) - Caldera
		3.	Highest Point	:	4,100 m a.s.l.

Source: Study Team

1) Salta (Argentina) - Socompa (frontier of Argentina and Chile) - Antofagasta (Chilean port)

The General Belgrano Line (C-14 Route) in Argentina is in service as a transportation route between Argentina and Chile. The line is constructed on the meter gauge on both sides of the Chile-Argentine frontier, and has been established as an international transportation route leading to the Pacific according to the railroad treaty between the two countries. This line is used not only for transportation service between Argentina and Chile, but also for the trial transportation of grains from Argentina to Mexico.

2) Mendoza (Argentina) - Las Cuevas (in the frontier) - Valparaiso (Chilean port)

This route interlinks the capitals of the two countries. About 160 km of the Argentine section of it falls on the A-12 section of the Belgrano Line, and is constructed on the meter gauge. On the other hand, about 200 km of the Chilean section is constructed on a broad gauge. In the past, this route had been used for service by exchanging bogies. It has been left unused since a rockslide interrupted the Chilean section. The affected area shows a hilly terrain, and has a steep slope of about 61 o/oo. There is a 76 km rack section on the Chilean side for electrification by 3 kVdc. The annual number of serviceable days was about 230 because the route was held up by snowfalls, etc.

3) Zapala (Argentina) - Mallin Chileno (in the frontier) - Talcahuano (Chilean port)

This route spans about 1,300 km from Bahia Blanca through Neuquen to the Pacific Coast. This plan needs the construction of a new line over a distance of about 190 km between Zapala and Lonoquimay (incl. about 50 km of a new extension in Chile). The routing and associated details are under study between the two countries in an effort to provide an international broad-gauged transportation route.

4) Jujuy (Argentina) - La Quianca (in the frontier) - Viacha (Bolivia) - Matarani (Peruvian port)

This is a segment of the South America International Transportation Route under study for linking Peru and Brazil. At present, the southern line in the Bolivian section terminates in Lake Titicaca, and a 12-hour trip ferry service is available from there to Peru. A line is planned on the south of the lake. The Peruvian side is a standard-gauge track, and either transshipping or bogie exchange is necessary.

Of all these four alternative routes, the C-14 route (Salta - Socompa - Antofagosta route), which is in active service, is considered the most promising for railroad transportation to the Pacific Coast from the viewpoints of transit efficiency, investments required for reconstruction, and its socio-economic impact on the development of the hinterland. It is worth going ahead with a study for the improvement of the C-14 route.

(1) Topography and climate

The trans-Andes route in the northwestern part of Argentina (NOA) needs to run a long way because it has to skirt around the skirt mountainous areas in excess of 4,000 m in altitude. Namely, the C-14 route runs from the plains in the Argentina at an elevation of about 1,200 m above sea level to the heights, called "Altiplano" or "Puna" lying at an altitude of 4,000 m reaches the mountain mass of the Andes, goes through the trans-Andes route, passes through Socompa in the frontier, crosses Cordillers de la Costa in Chile (the valley originating in Copiapo runs deep into the north of Chile), and then goes down to the sea level.

The area across which the C-14 route is to run has scarce rainfalls even in summer; the rainfalls during the 1985-1986 period was 40 mm in the monthly maximum, and was about 20 mm in the daily maximum. In winter, the border area suffers sand-laden snowfalls, taxing the people there heavily for snow removal.

(2) Antecedents and features of C-14 route construction

In 1852, the railroad connection between the northern part of Chile and the northwestern part of Argentina was studied on a project for the construction of a railroad route leading to Caldera via San Francisco. With the progress of railroad construction in Argentina, various projects were given birth to encourage the traffic connection between the two countries. But, actually implemented was the branch line, C-14 alone. The C-14 route was open up to Rasario de Lersua in 1909, and was extended to San Antonio de Los Cobres in 1929. In 1932, the route was put to commission. In February 1948, the C-14 route was consummated reaching Socompa. Highlighting the C-14 route is the adoption of two switchback sections and two loop sections in order to clear a maximum grade of 25 o/oo.

The principal particulars of the C-14 route are as follows.

1) Trackage:

Salta-Socompa	:	571 km
Socompa-Antofagasta	:	332 km
Aggregate length	:	903 km
Gauge	:	Narrow gauge (1,000 mm)

2) Altitude; Max 4,476 m at Abra Chorillo

The route rises steadily from Campo Quijano (alt. 1,520 m) to Abra Munano (alt. 4,000 m), passes through the undulations ranging in altitude from 4,475 m (max.) to 3,401 m, and reaches the foot of Volcano Socompa to 3,866 m.

3) Structures:

- Steel river bridge: 33 places; 730 m in aggregate length
- Tunnel : 21 places; 3,234 m in aggregate length; 504 m in the maximum tunnel length

- Overpass : 13 places; 1,256 m in aggregate length; the longest and tallest is La Palvarilla which measures 63 m in height and 210 m in length.

4) Load capacity and effective length of track:

The load capacity of the structures is 17 tons/axle, and the effective train length is limited to 282 m by the length of the draw-out track at Chorrillos Station.

As regards the Chilean section, it is reported that there is no particular problem except that the load capacity of the structures is 15 tons/axle, though any futher detail is left unknown.

(3) Transportation capacity

Because of high altitude and high grade, the traction load of a locomotive (Type 624) now in service is limited to a net 500 tons (effectively 336 tons at present) for ascending and a net 600 tons for descending. The maximum daily number of train services is 8 each for up and down on account of the freight train speed and station-to-station distance. Cave-in faults due to rainfalls in summer are not so serious, and can be remedied in a matter of a few hours. In winter, however, sand-laden hard snow interrupts the traffic for 6 to 14 days on an annual average because of snow removal work.

The following shows the maximum capacity of transportation to Chile under existing conditions and when slight modifications of three alternative cases are made.

1) Maximum transportation capacity under existing conditions

A maximum of 20 trains a week each for up and down services is available, provided that the freight trains and sightseeing trains are excluded. If the number of weeks available for train service is 45 a year, the annual transportation capacity is about 300,000 tons for up trains.

2) Case I:

If each train is double-headed under the current service schedule, the net traction capacity can be increased to 675 tons for up. As a result, the annual transportation capacity can be increased to about 600,000 tons.

3) Case II:

Judging from the maximum available train services under the existing infrastructure, the maximum potential transportation capacity is about 1,780,000 tons a year.

4) Case III:

At present, the Chuculaqui-Quebrada del Agua section limits the train services. It is possible to construct a passing track in this section at a low cost. With this, the number of train services can be increased to 12 a day (or even to 14 a day).

As a result, the annual up-bound transportation capacity can be increased to about 2,670,000 tons.

For the purpose of increasing the transportation capacity. It is necessary not only to build up the rolling stock such as locomotives and freight cars, but also to promote the reinforcement of tracks which have been left run down without repair since their construction (at present, replacement of inside and outside rails is under way to provide against rail wear, however) and the improvement of station facilities (particularly, extension of effective length) and communication facilities.

(4) Actual volume of transportation

Annual volume of freight transportation remained at about 50,000 tons as against an estimated maximum demand of about 270,000 tons, partly because of poor relations with Chile. Commodities transported from Argentina to Chile were sugar, soybeans, beans, oranges, alcohol, paper, etc. On the other hand, copper, fertilizer, etc. were transported from Chile to Argentina.

In 1985, 21,000 tons of soybeans was exported to Mexico from the Pacific Coast by National Grain Board (JNG). In 1986, it is expected to export 27,000 tons of beans on a private basis and 25,000 tons by JNG. Containers are used for export shipping, and customs clearance is carried out at the producing center. Exports from the Pacific Coast are carried out on trial for the time being because the Chilean freightage is somewhat higher and because the storage facilities at the Chilean port are insufficient. In order to increase the exports by this route, it will be necessary to improve the railroad facilities, adjust the tariff system between the two countries, and build up the port and harbor facilities and cargo terminals in Chile. In addition, a study for the justifiability of government subsidies (those for part of freight discount and of construction cost, etc.) should be carried out from the viewpoint of national objectives such as the development and consolidation of a new transportation route and the socio-economic development of underdeveloped local areas.

(5) Transportation cost

At present, exports from NOA are transported by rail to the port on the Parana River, and are shipped abroad while gathering additional export cargoes at the estuary of La Plata river or at Bahia Blanca. As regards exports from the Pacific coast, the cost of inland transportation to Chile is too much for the haul, but the cargo handling at the Chilean port is inexpensive (US$1.44/ton). The haul to the Far East can be cut by about 3,000 sea miles, and the total cost of shipping from around Salta is estimated to be cut by about

US$10 per ton of grains. As regard the transportation cost, however, a careful study must be made about the shipping volume, investment cost and operating expenses.

5-3-3 Jama Pass Route

(1) Chronological background

In Jujuy Province, a movement for promoting the research and development of the Jama route has been conducted since many years ago by many organizations including government offices, private enterprises and universities. Prior to the aforementioned INPE's study in 1980, the National University of Jujuy conducted a survey entitled "From the Atlantic to the Pacific through Jama" in 1977. The provincial government made a study entitled "Jama Pass, the Road of the Future" in 1983, and further conducted a "Pre-feasibility Study of the International Route to Chile through Jama Pass." It is making strenuous efforts to obtain an official recongition of the Jama route from the governments of the two countries, and is taking every opportunity accentuating the importance and advantages of the route. In 1985, the Commercial Bank of the North Foundation made an economic analysis of the route on the basis of past survey data to frame development strategies to be followed by both the government and private sector enterprises.

(2) Existing state of the route

There is no established route between San Salvador de Jujuy, the provincial capital, and Jama Pass on the border, and a number of alternative routes can be conceived for this section. In the 1985 prefeasibility study, it was concluded that the following route, covering a total distance of about 260 km, would be most suitable.

San Salvador de Jujuy —— Purmamarca —— Cieneguillas —— Aguas Blancas —— Mal Paso —— Susques —— Jama Pass.

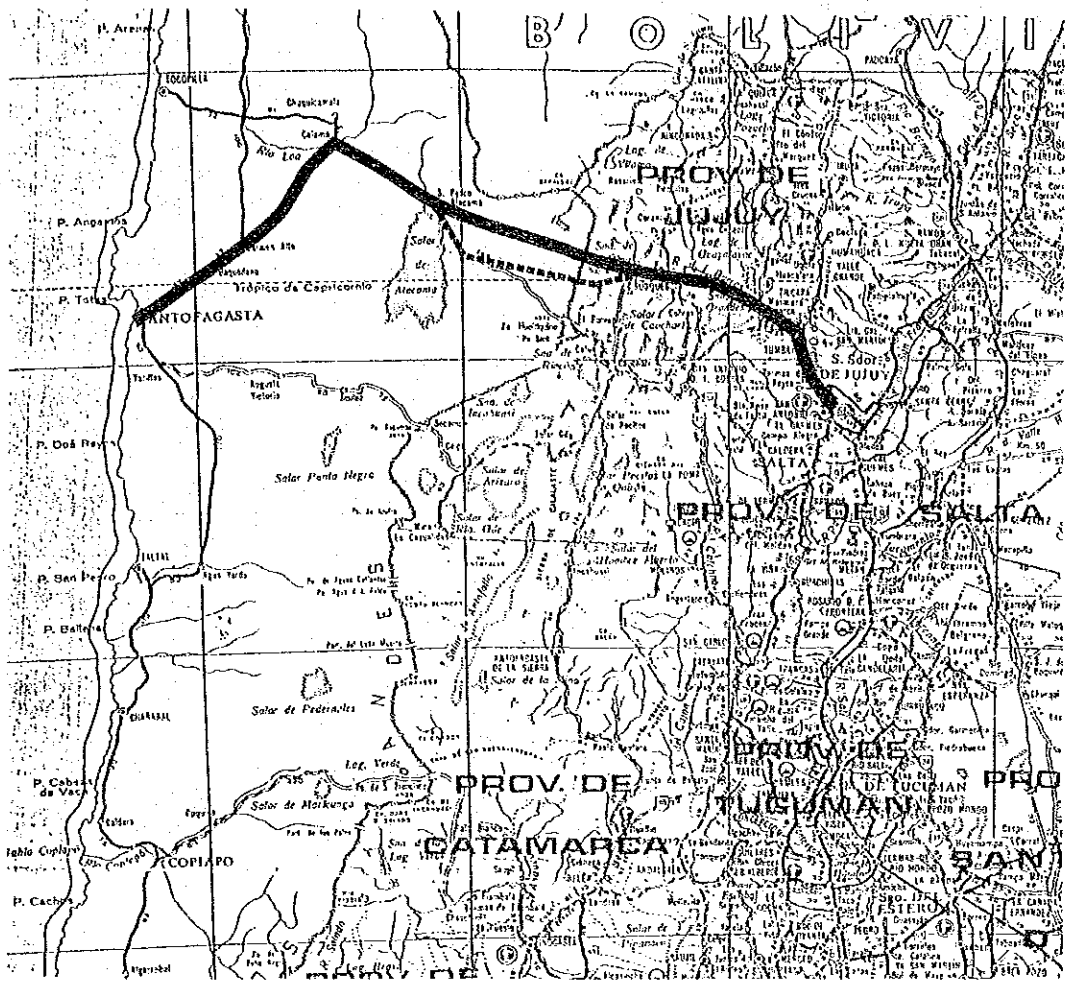
The Chilean side route proposed in the said study, which is shown below, covers a distance of 466 km.

Jama Pass —— Salar de Quisquiro —— Salar de Pujsa —— Laguna Verde —— Toconao —— San Pedro de Atacama —— Calama —— Antofagasta.

The total route length covering both the Argentine and Chilean sections is 726 km, which is about one third of the distance between Jujuy and Buenos Aires.

National Highway No. 9, which is a paved road, runs from San Salvador de Jujuy which is at an elevation of 1,259 m to a point 10 km before Purmamarca. From Purmamarca to Cieneguillas runs a road which is already improved. The 26-km section from Cieneguillas to Aguas Blancas, which is covered National Highway 52, is the first critical section in the route having a height difference of about 1,100 m. From Aguas Blancas to the point where the route intersects National Highway No. 40, the grade is generally mild and the road improvement

Figure IV-5-2 Jama Pass Route



work is easy. In the 69-km section between the said intersection with National Highway No. 40 and Susques, the route is nearly flat in about 70% of it, and it is not difficult to construct a road with a mild gradient in the remaining 30% section, although it has some undulations. In this section, the route crosses the narrowest part (about 5 km) of Salinas Grandes, a salt lake.

The route extends westward from Susques and intersects Provincial Road No. 70. The road in this 40-km section is flat. In the final 32-km section between Provincial Road No. 70 and the border, the route crosses Salar de Jama and Laguana Murcar, but the road construction is not difficult in this section because of its flat topography.

Two alternative routes can be conceived for westward extension from Susques, i.e., the almost straight route leading to San Pedro de Atacama in Chile, and the one connecting to the existing road at a distance of about 45 km to the southeast of San Pedro de Atacama. The road running westward from San Pedro de Atacama is paved. The route passes its highest point (4,490 m) near Salar de Quisquiro, Chile.

The route is planned as an asphalt road having a design speed of 100 kmh, minimum radius of curvature of 25 m, maximum grade of 7.5%, width of 11 m, and carriageway width of 7.2 m, and will permit the passage of 30-ton trailer trucks when completed.

Advantages pointed out for this route include the short overall distance, ease of constructing a low-grade road due to its mild topography, and relative freedom from snowfalls. It is also emphasized that the route is easier of access from Bolivia, Paraguay and Brazil than any other alternative routes because of its northernmost location and consequently offers the highest possibility of being used for international traffic.

(3) Traffic demand and economic evaluation

In the 1985 survey of the Commercial Bank of the North Foundation, the cargo volume that would be transported from the NOA region across the Andes for shipment to Asia and the US West Coast was estimated at about 313,000 tons on the basis of the region's 1977-1979 export data. This is about one third of the region's total export cargo traffic. If 30-ton trucks are to be used to meet this traffic demand, they will have to make 10,433 trips a year, or about 200 trips a week. This is the minimum predictable traffic excluding the traffic demand from other parts of Argentina or from other countries such as Brazil, Paraguay and Uruguay.

In this survey, a simple cost-benefit analysis was made using the data of the 1980 survey of the INPE and the 1982 prefeasibility study. The benefit was obtained by deducting the land and marine transportation cost of cargoes to be shipped from a port on the Atlantic coast when no trans-Andes route is available from the trans-Andes transportation and marine transportation cost of cargoes to be shipped from Antofagasta. The cost was sum total of the initial investment (US$72 million) and the maintenance cost. The analysis disclosed that the Paso de Jama route paved road construction

project will produce an internal rate of return of 8.2 - 14.1% in a number of hypothetical cases and 9.6% in the standard case.

It is to be noted, however, that no consideration is given to the Chilean side construction cost in the above analysis. If the benefit derivable from this project is not large enough to offset the road construction cost in Chile, then the feasibility of developing this route will be lost totally.

In the said survey, it was pointed out that the following benefits can be expected in addition to the direct benefit mentioned in the cost-benefit analysis, i.e., reduction of transportation cost.

1) The route can actually be used for traffic from other provinces and other countries.

2) Congestion of carriers in port areas can be alleviated.

3) Generated/induced traffic can be expected.

4) Shipment of mineral recources will become possible by the improvement of Antofagasta Port.

5) Incentive effect on the tourist sector and other social benefits can be expected.

5-3-4 Sico Pass Route

(1) Chronological background

The Salta - Sico Pass - Antofagasta route is better consolidated than other routes in the north of Mendoza. On the Argentine side, it is already covered by National Highway No. 51 extending to the border, though not fully paved. On the Chilean side, it is possible to reach Antofagasta from Sico Pass via San Pedro de Atacama, and there is a daily traffic 50 - 60 cars across the border. This is the only route running in the north of Mendoza for which the two countries reached an official agreement on development.

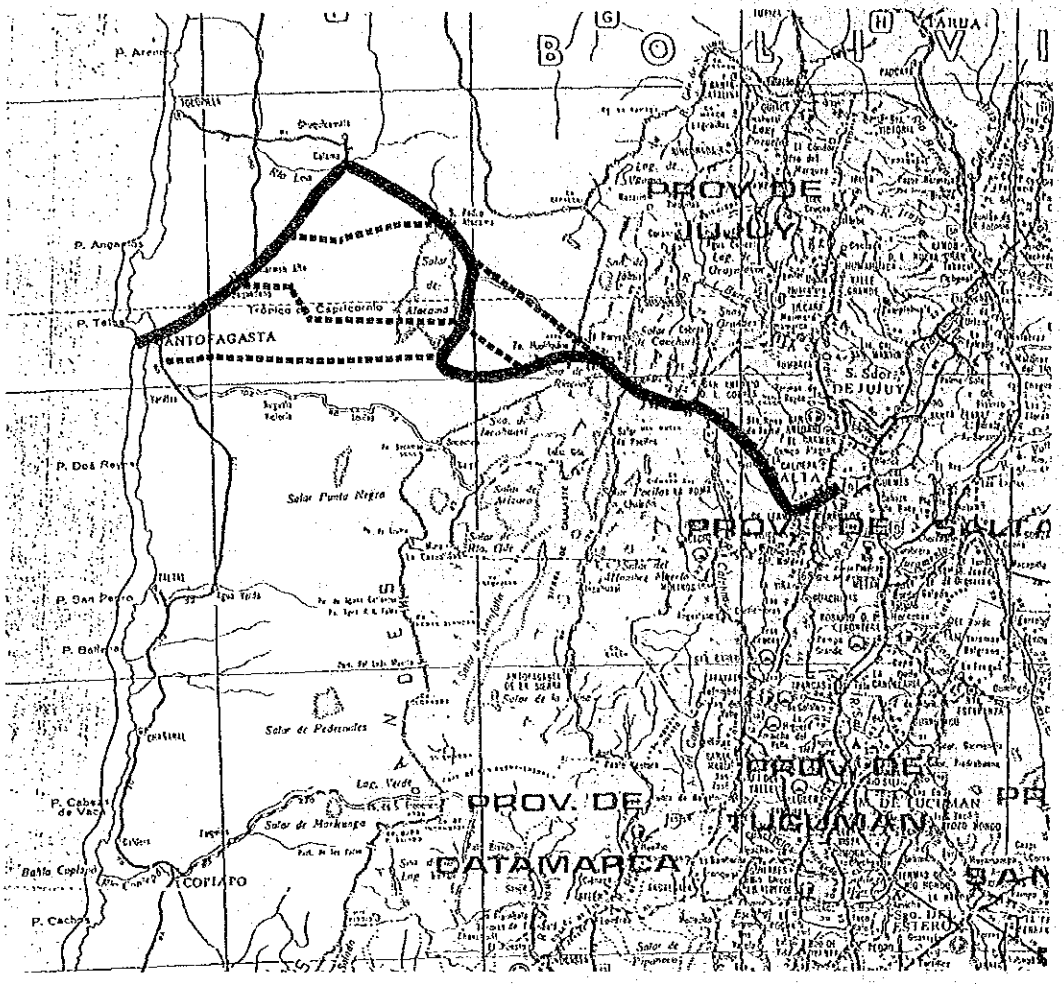
In Argentina, a technical study for improving this route was made in 1978. Furthermore, an economic evaluation of export cargo transportation by this route was made in 1981 by the provincial government and the CFI, and the results of this evaluation were reexamined and updated in the 1984-1985 period. The Chilean side also conducted a technical study for the route improvement in 1981, but has no definite plan for carrying out the improvement work.

(2) Existing state of the route

The existing route, passing by the following points, covers a total distance of 770 km (300 km in Argentina, 470 km in Chile)(see Figure IV-5-3).

Salta —— Campo Quijano —— Ing. Maury —— Alfarcito —— Santa Rosa de Tastil —— Las Cuevas —— La Encrucijade —— Munano —— San

Figure IV-5-3 Sico Pass Route



Antonio de los Cobres —— Chorrillos —— Alto Toconar —— Cauchari —— Sico Pass (border) —— Toconao —— San Pedro de Atacama —— Calama —— Baquedano —— Antofagasta.

On the Argentine side, the route is paved only in the Salta - Campo Quijano section (about 10 km), beyond which it is a gravel or earth road. Since the road is narrow and poor in alignment in many sections, the route is not suitable for passage of trucks heavier than 10 tons, trailer trucks and semi-trailer trucks. It also runs on riverbed in many sections where the traffic is often shut off after a flood.

On the Chilean side, an earth road runs from the border to El Laco. The El Laco - San Pedro de Atacama section (about 102 km) has a stabilized bed, but is poor in surface condition owing to deficient maintenance service. In this section, traffic is often shut up in winter especially between Socaire and Cos de Cas. The route is paved from San Pedro de Atacama to Antofagasta.

The Argentine side is planning to improve the existing road to make the year-round operation possible at least for 25-ton trucks. In the following, the improvement project formulated in March 1984 is outline for each individual section.

1) Campo Quijano - Ingeniero Maury section (33 km)

The route runs along the Toro river over a distance of about 16 km in this section where the road is constructed on the riverbed in some parts. For this reason, traffic is shut up on 10 - 15 days each year when the river stage rises. Construction of protective walls and defences is therefore required.

2) Ingeniero Maury - Alfarcito section (27 km)

The route crosses the Toro by running on its bed in two places in this section, so that traffic is shut up on many days in summer. Construction of a 20 m-span bridge and protective walls is therefore required.

3) Alfarcito - Santa Rosa de Tastil section (11 km)

Trailer trucks cannot run in this section because the road alignment is poor and there are many curves with a small radius. Improvement of alignment, including the construction of small bridges, is necessary.

4) Santa Rosa de Tastil - Las Cuevas - La Encrucijada section (24 km)

The road in this section is satisfactory in both plane and longitudinal alignment and permits the passage of all types of vehicles.

5) La Encrucijada - Abra Munano - Estacion Munano section (25 km)

This section involves a passage crossing the Munao mountains along valleys, which is the most critical part of the entire route. Since the topography of this section provides no room for alignment improvement, there is no choice but to reroute the road by finding a new route that passes other valleys from La Encrucijada. This rerouting work will be the largest of all route improvement work to be undertaken on the Argentine side, and the new alignment of this section will determine the types of vehicles that can be operated on the entire route.

6) Estacion Munano - San Antonio de los Cobres section (23 km)

The route in this section runs through an area with mild undulations and presents no problems of alignment.

7) San Antonio de los Cobres - Chorrillo - Alto Toconar section (30 km)

In this section, the route crosses the Chorrillos mountains rising to a height of 4,600 m above sea level. Snowfall is observed only in this section, but it causes no specific hindrance because the traffic is shut up only on 3 days or less a year due to snowfall. The existing road on the slope of the Chorrillos is poor in alignment, but its improvement is difficult. Since rerouting is the only plausible solution, aerial photography was conducted in the spring of 1984 on the scale of 1/10,000, which made it possible to prepare topographic maps of the section on the scale of 1/2,000.

8) Alto Toconar - Cauchari section (38 km)

This section lies in a flatland area, so that the road construction work will not involve any difficulty.

9) Cauchari - Paso Sico section (65 km)

The 51-km portion of this section was improved from the former earth road to a gravel road in the 1977-1978 period, and the design for the remaining 14-km portion has already been completed. No difficulty is expected to be encounted in the road improvement work of this 14-km portion.

Total cost of the above road improvement work was estimated to amount to 1,841 pesos (about US$12.5 million if converted by the exchange rate of US$1 = 147.68 pesos effective in November 1984, the month before the report on the project was finalized).

(3) Traffic demand and economic evaluation

The DNV's data indicates that the traffic at three counting stations between Salta and Paso de Sico was as shown in Table IV-5-5.

Table IV-5-5 Annual Average Daily Traffic along National Route 51 in 1983

Type of Vehicle	Counting Station (km from Salta)	El Alisal (47)	Toconar* (184)	Catua (244)
Truck		17	34	5
Bus		2	2	-
Car and Light Truck		25	39	3
Total		44	75	8

Source: DNV
Note : * data in 1982.

As seen in the table, the traffic is smaller than 100 vehicles at all stations. Especially at Catua 56 km from the border, the annual average daily traffic (AADT) registered only 8 vehicles. Although the route makes the traffic between the two countries possible, it does not permit the passage of trucks heavier than 10 tons, nor is it used for operation of commercial trucks carrying international cargoes. The only trucks using the route at present are limited to private trucks operated for the mining industry near the border. The route was one used for regular twice-a-week international passenger bus service, but the operation of this service has already ceased.

The provincial government of Salta estimates that when this route is developed and permits the operation 25 - 30-ton trucks (trailer trucks), its sphere of influence will cover not only Salta Province and northern Chile, but also provinces of Jujuy, Tucuman, Chaco, Formosa and Santiago del Estero, southern Bolivia and surrounding countries, Mexico and the US West Coast, thereby augmenting the export of agricultural products such as grains, fruits and meat as well as mineral and industrial products to Asian markets including Japan. The provincial government also expects that by developing the tourist infrastructure in parallel with the route improvement, it will become possible to attract an augmented number of tourists to Salta Province.

The Chilean Government shows a strong interest for the development of this route because it will open up the possibility of transporting iron ores from Laco to the iron foundries in Jujuy Province.

5-3-5 San Francisco Pass Route

(1) Chronological background

The route leading to Caldera Port, Chile, via San Francisco Pass in Catamarca Province has been discussed as part of the transcontinental route linking Santos in Brazil and Caldera in Chile.

It covers a distance of 3,569 km between the two ports on both sides of the continent by passing the following points.

Santos —— Sao Paulo —— Curitiva —— Iguazu —— Posadas —— Corrientes —— Roque S. Peno —— Quimili —— Santiago del Estero —— Catamarca —— Paso de San Francisco —— Copiapo —— Caldera

Countries having an access route to this transcontinental pass include Bolivia, Paraguay and Uruguay besides Argentina and Chile.

Although the development of this pass is justified by the geopolitical cause of regional unity of southern cone countries, the route improvement work has not been in smooth progress because of the conflict of interests and complex power relations between related countries which make it difficult to obtain a consensus of opinion of all countries.

In May 1984, representatives of the seven related provinces of Argentina gathered at Copiapo, Chile. At this meeting, it was agreed that efforts would be made to enhance the economic cooperation and personnel interchange between Argentina and Chile, and the importance of the Paso de San Francisco route was also confirmed.

The provincial government of Catamarca presented reports emphatically pointing out the importance and significance of the Paso de San Francisco route at the second geo-economic seminar held at Copiapo in November 1984 and at the third seminar held at Cordoba in June 1985. The provincial government also studied the feasibility of the road improvement work and Caldera Port development in Chile.

Tucuman Province adjoining Catamarca Province will receive just about the same benefit whichever route is developed, but its government gives higher development priority to the Paso de San Francisco route.

(2) Existing state of the route

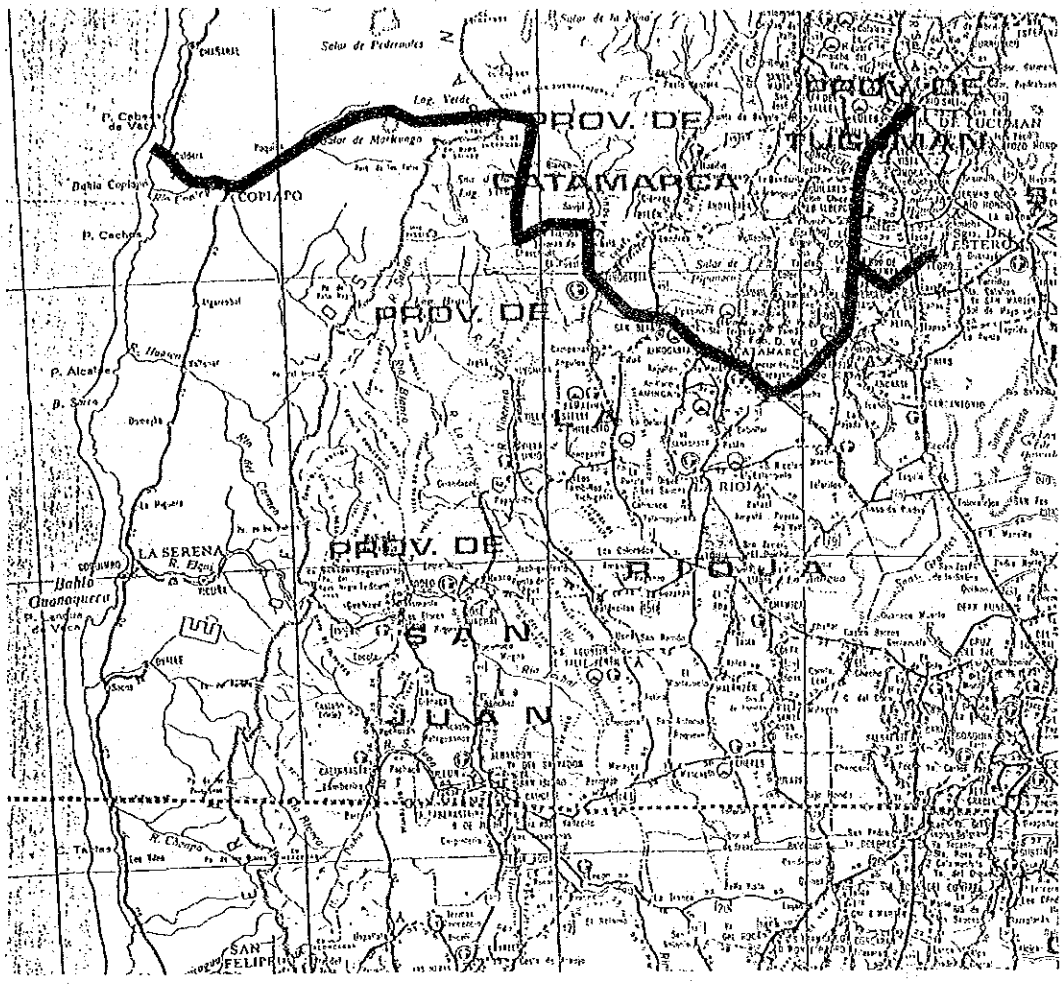
The route covers a distance of 467 km from Catamarca to the border and 467 km from the border to Caldera, and passes by the following points (see Figure IV-5-4).

Catamarca —— Chumbicha —— Tinogasta —— Fiambala —— San Francisco Pass —— Copiapo —— Caldera

Between Catamarca and Chumbicha runs National Highway 38, and from Chumbicha to the border runs National Highway 60. The Chumbicha - Fiambala section is covered by a paved road. (Pavement plan has already been finalized for the approximately 35-km earth road section of the route running in La Rioja Province, with a budget of $30 million expected to be appropriated for its execution in 1986.)

Accordingly, the route development required for the Argentine side means the improvement of the 208-km section between Fiambala and the border. The earth road running in this 208-km section is generally well consolidated and in good condition. In the 8-km

Figure IV-5-4 San Francisco Pass Route



section from Fiambala, there were two places where this earth road crossed the river bed, but this problem has already been solved by the recent realignment of the route.

At a point 23 km past Palo Blanco, the route enters a steep mountainous area. Improvement is required in about 11-km section between Aguita and Loro Huasi where the passage of trailer trucks is prevented by sharp slopes. The Las Paladas - San Francisco section does not permit the passage of trucks heavier than 14 tons at present. Route realignment is required for this section to make it an international road designed for operation of 30-ton trucks.

On entering the Chilean territory, the route is connected to CH31 route which intersects the longitudinal road C2 at Paipote which is at a distance of 216 km from the border. The Paipote - Copiapo - Caldera section is covered by a paved road and does not present any specific problem, but there are three critical points between Paipote and the border, i.e., Portezuelo San Luis, Cuesta de Codoceo, and Cuesta de los Colorados. The Chilean Atacama Road Engineering is planning the development of the Santa Rosa alternative route bypassing these three points. This new route will cut down the distance between the border and Caldera by about 30 km.

The provincial government of Catamarca has a plan to improve the following road sections during the term of its 5-year road development project to improve the Fiambala - San Francisco Pass route and accesses to this route from neighboring provinces.

1) Belen - Santa Maria section, National Highway No. 40.

2) La Merced - Rumi Punco section, National Highway No. 38 (Cuesta del Totoral).

3) Andalgala - El Alamito (Catamarca) - Alpachiri (Tucuman) section, National Highway No. 65.

4) Vinchina (La Rioja) - Valle Hermoso - Chaschuil (Catamarca) section, Provincial Road No. 21.

Catamarca Province insists on early development of the Paso de San Francisco route, claiming that it is advantage over other routes in the following points.

1) San Francisco Pass is situated near the approximate center of the border line extending from San Juan Province to Jujuy Province. In other words, the route is in the geographical center of all alternative routes and easy of access from any province.

2) While the Andes generally stretches south to north, the route crosses it by going over the highest point of 4,700 m along the San Buenaventura mountains running in the east-west direction. This means that the route can be constructed safely at low cost without any irrational factors in design.

3) The route is relatively free from snowfall.

(3) Traffic demand and economic analysis

The provincial government of Catamarca is now conducting a feasibility study for the Chilean side route improvement and pavement and for the Caldera Port development project. In this study, the traffic demand of the route is estimated as follows. In 1983, the export cargo traffic from the NOA region and Cordoba Province to Chile totaled about 710,000 tons. Since Salta Province and Jujuy Province can make use of railway transportation service, the generated traffic demand in the provinces of Cordoba, La Rioja, Santiago del Estero, Tucuman and Catamarca would amount to 510,000 tons, assuming that it will pass the San Francisco route. 75.7% of this cargo traffic will go to overseas markets through Chile and 25.0% will go the Chilean domestic market.

The above cargo traffic is equivalent to an annual average daily traffic of 99 vehicles, which will comprise 93 heavy (3-ton) trucks, 5 light trucks and 1 bus. It is predicted that this traffic will increase at annual rate of 9% in the initial five years after opening the route and at 5% in the subsequent years.

In this study, the Chilean side is expected to derive the following benefits from the opening of the route.

1) Increased income of the transport company EMPORCHI.

2) Increased value-added resulting from the sale of fuels and lubricants to foreign vehicles.

3) Increased value-added resulting from stowage service for foreign exporters/importers.

4) Income from toll collection from foreign vehicles, if a toll road system is introduced.

5) Increased value-added resulting from the multiplier effect on hotels, car repair and maintenance service, tourist industry, etc.

In the same study, the Chilean side road improvement cost and the Caldera Port development cost are estimated at US$19.9 million (1984 price) and US$8 million (commercial berths, warehouses, customs office, etc.). Comparing these costs with the estimated total amount of the above-listed benefits, it is foreseen that the Chilean side will evaluate the San Francisco Pass route project as having a net present value of US$32.7 million (discount rate: 12%) and an internal rate of return of 25.5%.

5-3-6 Pircas Negras Pass Route

(1) Chronological background

Two passes cross the border of La Rioja Province, Pena Negra Pass and Pircas Negras Pass, which have been trodden by men and animals

from old times. A scheme for developing one of these passes to an international route linking Cordoba and Caldera in Chile has been in existence since 1927.

In 1973, Argentina designated the Pircas Negras Pass as an important route under Law No. 20576. This instigated the provincial government of La Rioja to carry out surveying, engineering design and construction cost estimation of the Argentine side section of this route in 1975. At the third geoeconomic seminar held at Cordoba in 1985, the provincial government emphatically underscored the advantages of this route, voicing the need for its development.

(2) Existing state of the route

The Pircas Negras Pass route does not go through the provincial capital of La Rioja, but it passes by the following points (see Figure IV-5-5).

Cordoba —— Patquia —— Villa Union —— Jague —— border —— La Guardia —— Copiapo —— Caldera

The Cordoba - Patquia section is covered by the paved National Highway No. 30, and the 186-km section from Patquia and Villa Union by a provincial road which is paved and calls for no improvement. In the 100-km section from Villa Union to Jague runs Provincial Road No. 21 which is a consolidated gravel road permitting the passage of 20-ton trucks. Beyond Jague is found only a natural road running in the Jague - (181 km) - border - (70 km) - La Guardia section, but the topography in this section is generally flat and causes no difficulty in road construction. From La Guardia lies a paved road leading to Caldera.

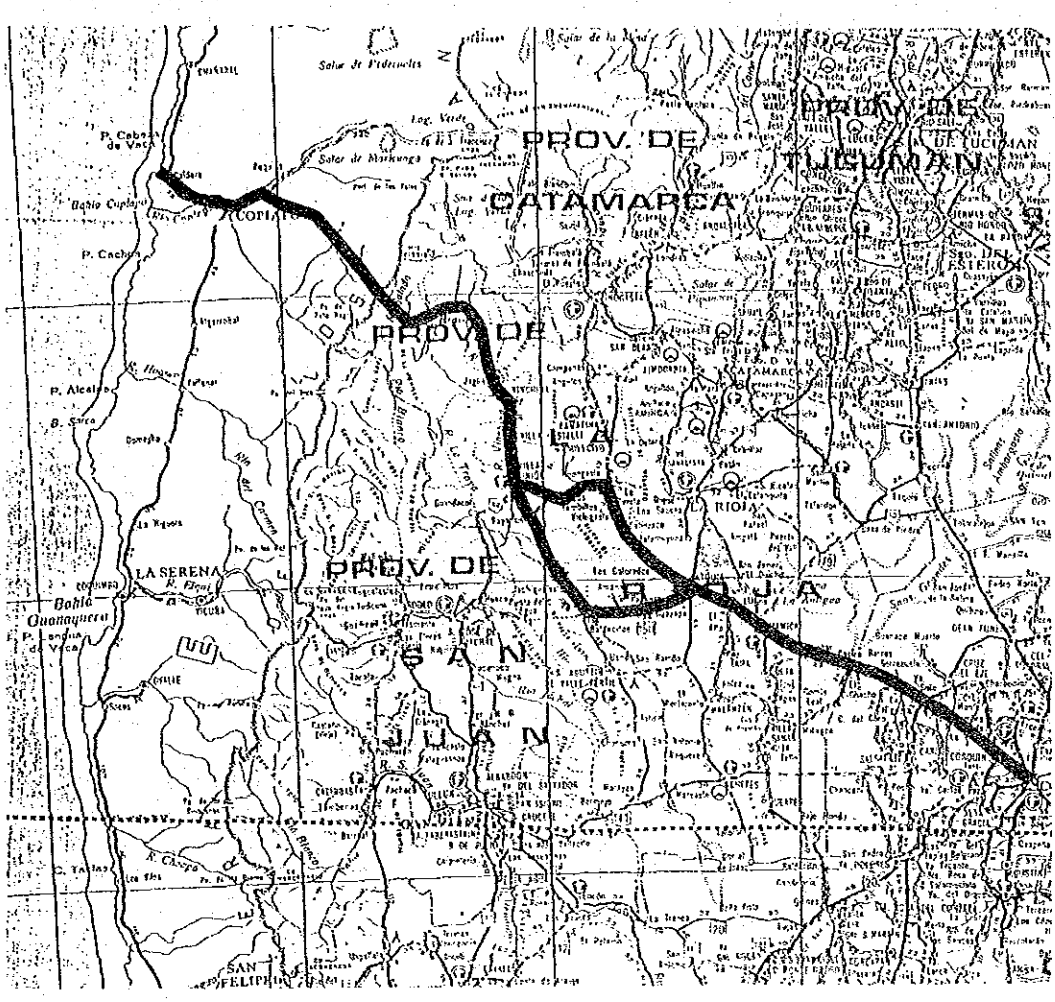
Jague has an elevation of 1,700 m. The route running toward the border reaches a piedmong area with an elevation of 2,100 m at a distance of about 20 km from Jague, and ascends in the following 40-km section to Yegua Quemada rising to an elevation of 3,100 m. The highest point between Yegua Quemada and the border has an elevation of 4,100 m.

In 1975, engineering design (scale: 1/100) of the said 40-km ascending route to Yegua, Quemada was carried out. Design criteria adopted at this time for construction of an asphalt paved road in this section were 13.7 m for total width, 6.7 m for carriageway width, and 5% for maximum grade. Asphalt was planned to be transported from Mendoza about 800 km away from this section, and the total construction cost was estimated at US$25 million (1975 commodity price). This section lies in an arid zone with an annual rainfall of 80 mm.

The provincial government of La Rioja cites the following points as geographical advantages of the route.

1) Elevation of the highest point (4,100 m) is the smallest of all alternative routes, which makes it possible to maintain a relatively high level of efficiency in the road construction work and vehicle operation.

Figure IV-5-5 Pircas Negras Pass Route



2) The road can be designed with a grade of less than 4% over the entire route, so that it will permit the operation of 22-ton trucks.

3) Water supply is possible over the entire route, which will mitigate the aggressivity of the scenery along the route and make the trans-Andes trips more comfortable.

4) The route can be used for year-round cargo transportation.

5) Distance to be covered by new road construction is shorter than any other routes on both Argentine and Chilean side, so that the initial capital input can be reduced correspondingly.

(3) Traffic demand and economic analysis

The provincial government of La Rioja expects that the route will generate the following traffic demand in due recognition of the anticipated size of traffic demand in the province which will be too small to justify the development of the route.

1) Transportation of mineral products

Argentina is now a copper importing country, and has copper mine development projects now in progress in La Rioja Province and Catamarca Province. On the other hand, the largest copper smeltry in Chile located at Capiapo is operated only to half the capacity. It is therefore planned to transport Argentine copper ores to Capiapo for smelting to satisfy the domestic demand and supply the exportable surplus to overseas markets. It is also hoped that black granite produced in La Rioja Province will be exported from the Chilean port to Japan which is now importing it from Sweden and South Africa. If the route is developed, the land transportation distance of black granite for export from the Chilean port will be only 600 km as compared with the 1,500-km distance to be covered for shipment from a port on the Atlantic coast.

2) Transportation of export grains

The provincial government expects that the route will open up the possibility of exporting meat to neighboring South American countries, fruits (grapes in particular) to North American and Asian countries, and soybeans to the Asian markets.

3) Transportation of industrial products

Since the 1960s, the provincial government of La Rioja has been positive in developing industrial estates and inviting enterprises to locate their plants in the province. In the 1980s, it succeeded in developing a number of new industrial estates and inviting manufacturers of textiles, shoes, marble products and household equipment to set up their plants in the province under the Industrial Development Promotion Law No.22021. Some 250 enterprises newly located in La Rioja Province have made a total investment

amounting to about US$180 million, creating employment opportunities for 7,000 people. The provincial government hopes that the trans-Andes route will open new outlets in the neighboring countries for industrial products manufactured by these enterprises.

4) Tourist demand

The provincial government is of the view that when the route is developed, the spectacular scenery of the mountain range through which it runs will attract many tourists. It also predicts that the traffic demand of the route to be generated in La Rioja Province alone will amount to an AADT of 30 - 40 trucks (20-ton) transporting copper ores and products and 10 vehicles carrying industrial products.

5-3-7 Existing State and Development Potential of Chilean Ports

Chile has a total 40 major ports including 25 foreign trade ports. In 1984, the cargoes handled at these ports were about 17,000,000 tons for foreign trade and 14,000,000 tons for domestic trade, or 31,000,000 tons in all (excl. transit cargoes). Of the foreign trade cargoes, exports accounted for about 12,000,000 tons, and imports for about 5,000,000 tons. Leading the list of annual cargo handling volume are: from south up, San Vincente Port, San Antonio Port, Valparaiso Port, Quinero Port, Guayacan Port, Huasco Port, Antofagasta Port, etc. Ports which are most promising as an outlet of the northwestern region of Argentina are Antofagasta and Caldera.

(1) Antofagasta port

Lying in the north of Chile, this port handled about 2,100,000 tons of cargoes in 1984 - 988,000 tons for domestic trade, 742,000 tons for exports, and 246,000 tons for imports. Major commodities handled are copper and other mineral products, and flour for foreign exports, and mineral products and chemical products for foreign imports. On top of the domestic exports are mineral products. The transit cargoes are mostly wheat and liquid fuels.

The major port facilities are as shown in Table IV-5-6. There are seven berths (Berth 1 through Berth 7) that can accommodate large vessels. The water depth is 7.3 m to 10.1 m. The maximum size of the bulk carriers that are allowed to enter the port under fully loaded conditions is about 20,000 DWT. The port has a calm basin well protected by breakwaters. Sitio 1 through Sitio 3 are equipped three warehouses each just behind the quays. From Sitio 4 to Sitio 7, there are yards of about 30 m in length (excl. apron) behind respective quays. Part of these yards is reserved for railroad location, and the open space available is little. All the berths are served with railroad tracks (See Figure IV-5-6).

Table IV-5-6 Port Facilities of Antofagasta

Berth No.	ZONA PESQ.	1	2	3	ZONA EMBAR.	4	5	6	7
Length (m)	205	220	165	165	130	185	185	175	175
Water Depth (m)	7.3	9.14	9.14	9.14	4.87	9.14	9.14	9.45	10.06
Apron (m)	22.4	22.4	22.4	22.4	23.0	22.4	22.4	20.0	20.0
Whalf Post	6	7	6	7	6	6	8	7	6
Railway	3	3	3	3	-	2	2	2	2
Warehouses	-	1	1	1	-	-	-	-	-
Warehouses for Bolivian Cargo	-	-	1	-	-	-	-	-	-
Whalf Crane	-	4	2	4	-	2	2	-	-
Telephone Service	1	2	3	2	-	-	2	1	0

Source: Study Team

To ship volumes of agricultural products from Antofagasta Port, new cargo handling and storage terminal facilities will have to be constructed. But, it seems difficult to provide installation space for such new facilities within the port area. The water depth is also insufficient for the accommodition of PANAMAX type carriers.

Accordingly, additional investments not only in the construction of new terminal facilities but also in the development of port infrastructure will be indispensable.

(2) Caldera Port

Caldera Port lies 400 km south of Antofagasta Port. In 1984, it handled about 196,000 tons of cargoes including those handled at Calderille Port, far behind other major ports so far as the trade volume is concerned. The foreign trade amounted to about 96,000 tons, of which about 69,000 tons was accounted for by exports, and the remaining 27,000 tons by imports. Major commodities handled in foreign trade are products of agriculture and livestock, liquid fuels and mineral products in the descending order. Caldera Port has just a small jetty, but is well situated at a deepwater bay. The prevailing southwest onshore waves are cut off by a cape extending northwest from the head of the bay. Caldera Port has a high development potential as a deepwater port. (See Figure IV-5-7.)

5-4 Development Method of Accesses toward the Pacific

5-4-1 Necessity for Obtaining National Consensus

Development of accesses toward the Pacific is not a project for developing the existing heavy traffic route to meet the growing traffic demand. It is a leading-investment-type road or rail development project to be implemented as a strategic means of promoting regional development. Accordingly, it must be implemented while maintaining consistency with the development of the NOA region which is the hinterland area of the proposed route.

Figure IV-5-6 Layout Plan of Antofagasta Port (1:5,000)

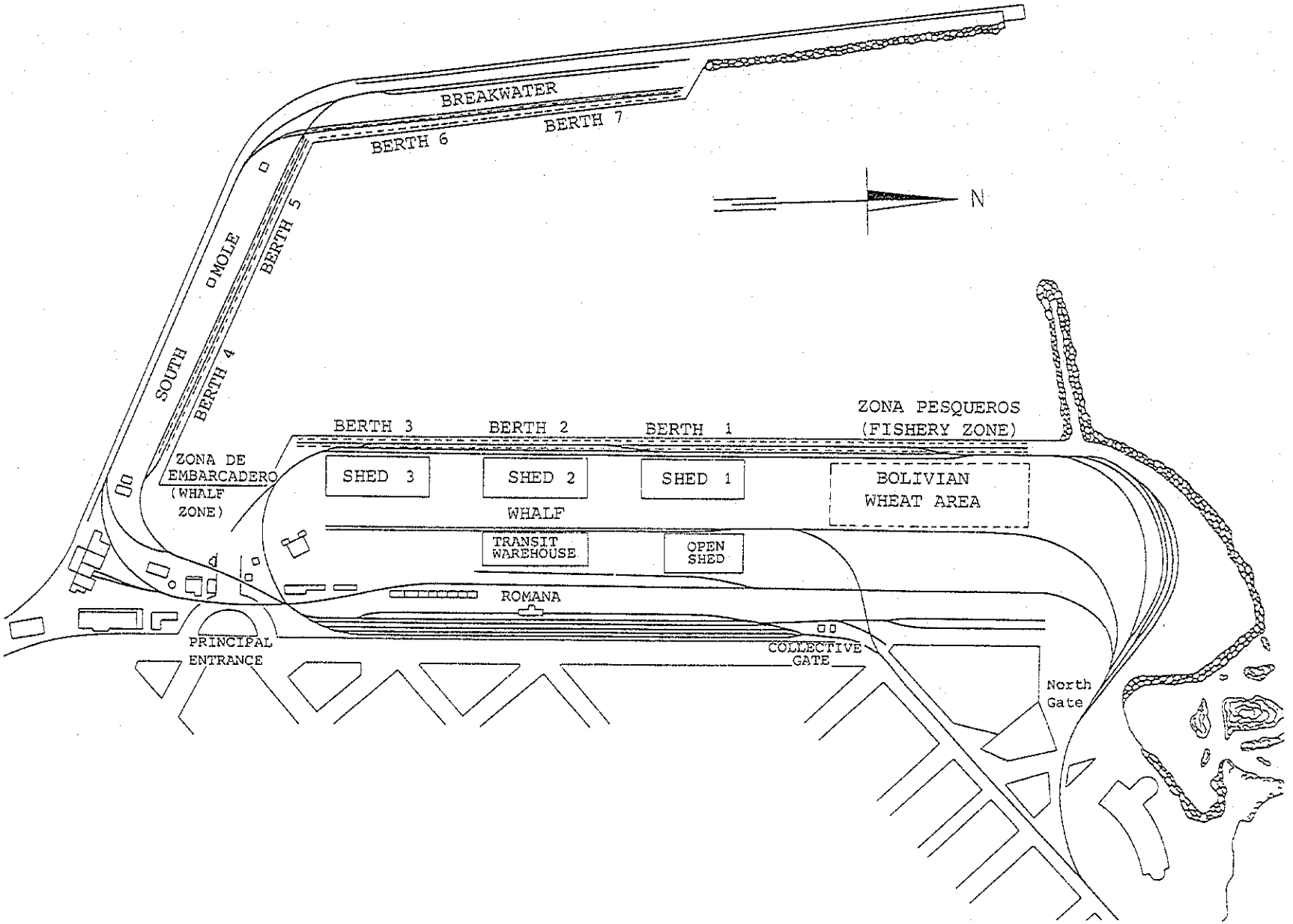
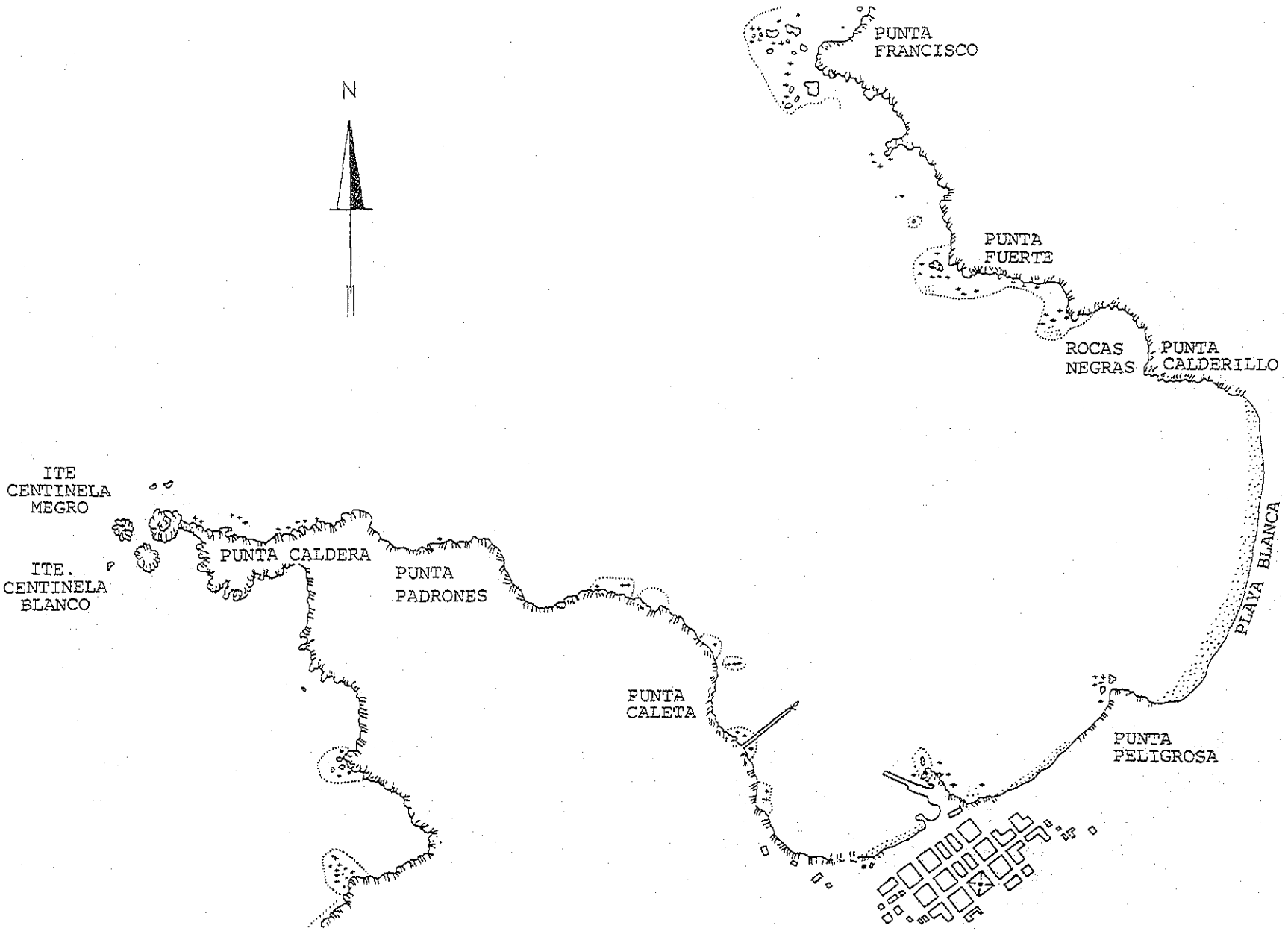


Figure IV-5-7 Location of Caldera Port (1:20,000)



To carry out the project successfully from the above point of view, it is necessary to obtain the consensus of opinion on the following three points.

1) Consensus of opinion regarding the priority ranking of the NOA region among a number of alternative areas proposed for regional development such as NEA, Cuyo, and Patagonia.

2) Consensus of opinion regarding the formulation of a regional development policy, responsibility sharing between the central and local governments, selection of the executing agency of regional development and its authorities.

3) Consensus of national opinion and an agreement between the Argentine and Chilean sides regarding the priority of development of alternative road and railway routes and the schedule of development.

Regarding the degree of development priority to be given to the NOA region among other proposed development areas such as the NEA, Cuyo and Patagonia, which is mentioned in 1) above, it is hoped that a decision will be made under the Government policy for regional development. Since the scheme for capital relocation to Viedma was announced by the Alfonsin Administration, the relative importance of developing Patagonia has been increasingly magnified. It is therefore necessary to formulate a clear-cut regional development policy to determine whether the 1) parallel development of the NOA region and Patagonia is financially feasible and justifiable, or 2) Patagonia's development should be started first with all available funds invested in it to carry out the NOA region's development later while checking its progress.

Adjustment and coordination should be made at an early stage for well-balanced, mutually compatible development of the NOA and NEA regions and for the Rio Bermejo basin development covering the NOA region and the western NEA region.

Regarding the responsibility sharing between related organs mentioned in 2), a definite system should be established to promote the regional development, as mentioned in 5-1-1. Promotion of the NOA's development also calls for the consolidation of the legislative system to provide explicitly for the responsibility sharing between the central and local government, cooperation between local governments, and establishment of clear-cut lines of responsibility and authority between an NOA regional development committee (tentative name) and the central/local government, if such a committee is organized as the executing agency of the NOA development.

Besides obtaining a consensus of opinion regarding the development policy and system, it is necessary to make a route selection for determination of development priority on the basis of a detailed survey. Seen from a long-range point of view, it is evident that the capacity of the currently used Las Cuevas road route and the Socompa railway route is not large enough to meet the future trans-Andes traffic growth between Argentina and Chile, and this will necessitate the development of new routes which will be promoted according to increasing

socio-economic ties between the two countries and in proportion to the growing international traffic to third countries via Argentina and Chile. However, the short-range prospect based on the present financial stringency of the government and its investment progress is that it will be necessary to give top priority to one or two of alternative routes and carry out the selective development of the priority route. Accordingly, the priority route needs to be selected after a survey and examination of all alternative routes to be conducted on the basis of the consensus of opinion of all parties concerned regarding the method of route selection. This is an essential procedure for minimizing friction among the parties concerned.

The necessity of an agreement between Argentina and Chile is also indispensable since the trans-Andes routes is an international highway linking Argentina and Chile and embracing the neighboring countries within its zone of influence. If it is to be developed as a trade route to the Pacific coast, Argentina must resort to Chile for the development of the route and the port. Accordingly, an accord of opinion and cooperation between the two countries is an essential pre-requisite for the project.

It is therefore advisable to establish a system for close mutual cooperation under which the development work can be carried out simultaneously in parallel with each other by frequent exchange of information within the same framework even at the stage of surveying and planning for route selection. Frequent, vigorous bilateral discussion will be required for institutional arrangement regarding the international trade and transport system and tariffs, customs duty, and clarification of the facilities development body and management body.

The survey to be conducted for the itmes mentioned in 5-4-2 and 5-4-3 for the new route development will prove most fruitful if it is conducted after securing the consensuses of opinion mentioned above.

5-4-2 Project Features and Problems

The following are the basic problems involved in the trans-Andes route development project and the questions to be solved for its promotion.

(1) Strengthening of traffic demand forecasting capacity

Traffic demand is one of important factors affecting the feasibility of the trans-Andes route development project. All of the routes reviewed in the preceding section have virtually no traffic at present on the border, and the expected traffic after the route development is diverted traffic of cargoes currently transported to the Atlantic coast and newly generated traffic. Although the estimation of this kind of traffic entails great difficulty, the traffic forecast given in all past surveys is limited to the presentation of mere assumptive data not based on elaborate forecasting techniques.

In order to raise the accuracy of traffic demand forecasting, it is necessary to make an evaluating of export markets and study the

export policy besides predicting the production and export in the influence zone.

(2) Unification of design standards

Amount of investment, which is another factor influencing the project feasibility, varies largely according to the design standards for facilities. Maintenance cost was estimated for a number of routes in the past surveys, but no route-wise comparison of maintenance cost can be made on the basis of these surveys because of the difference in design standards. It is therefore necessary to decide at first whether the road is to be paved or not and the maximum size of trucks to run on it, then determine conditions for alignment, such as the maximum grade, maximum radius of curvature and sight distance. Conditions for alignment and the necessity of pavement are generally determined according to the traffic demand. In the case of this project this relation is reverse, i.e., the traffic demand is determined by the conditions for alignment and pavement, so that these will have to determine a priori not only from an economic but also policy-based point of view.

5-4-3 Suggestions for Systematic Survey

Both the central and local governments are aware of the necessity for evaluating alternative routes by an unified method for selection of the priority route, and have recently embarked on a survey for this purpose.

Regarding the prospect for production in regional areas, the Regional Development Office (Secretaria de Desarrollo Regional) of the central government is now formulating a development plan for underdeveloped areas (NOA, NEA, Cuyo, Patagonia) with the cooperation of the UNDP. This is aimed at completing the evaluation of the growth potential of each province, formulation of a development strategy, and planning of development projects in the 1984-1988 period. It is hoped that this study will produce reliable data on the future production and export of each province for use in the feasibility study for the trans-Andes route development project. To attain this purpose, however, the budgetary appropriation for this survey (US$140,000 from the UNDP and US$70,000 from the Argentine Government each year) is not large enough, nor is the staffing sufficient. If this survey is to be utilized for the feasibility study for the project, it will be necessary to strengthen its financial, personnel and institutional aspects.

The Federal Investment Council (Concejo Federal de Inversiones: CFI), which was established 30 years ago with a fund contributed by all related provincial governments to engage in the formulation of provincial development project and consulting service for the project feasibility study, started a systematic study (Study for the Technical Foundation of Finance to the Andian Passes North of Mendoza) covering the following items in May 1986 commissioned by the related provincial governments.

1. Analysis on existing infrastructure
   1.1 Road and railway
   1.2 Port

2. Analysis on trade to be channelized via the Pacific
   2.1 Argentine trade of the areas under the influence of the Pacific ports
   2.2 Argentine trade with Chile

3. Analysis on products to be exported from the Pacific
   3.1 Products identification
   3.2 Actual structure of commercialization

4. Analysis on costs and tariffs
   4.1 Land transportation
   4.2 Maritime transportation
   4.3 Tariffs of maritime trasportation

5. Analysis on institutional aspects

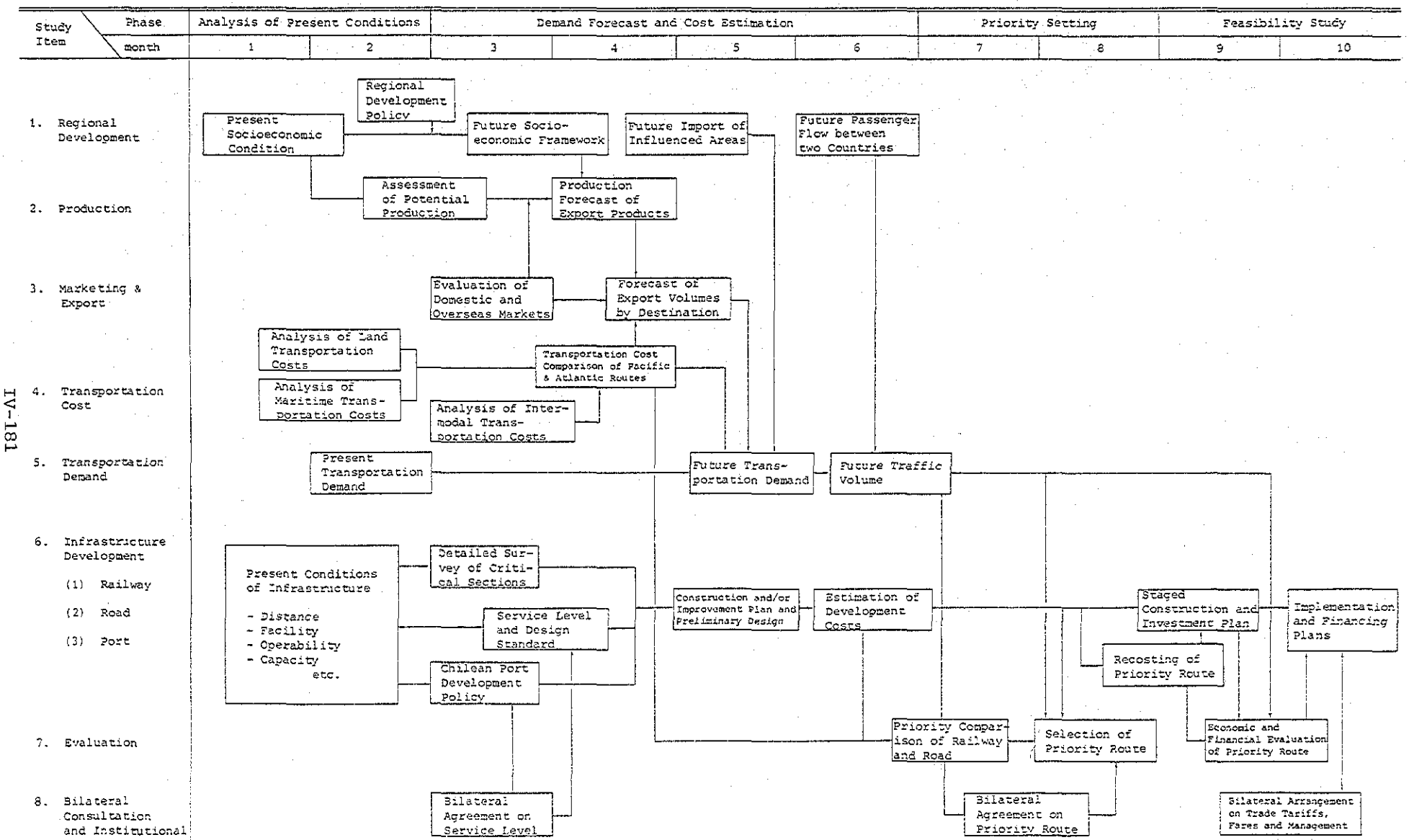
6. Conclusions and decision matrix

Routes covered in this study are those running through the passes of Jama, Sico, Socompa, San Francisco, Pircas Negras, and Agua Negra. When this study is completed in August 1986 as scheduled, it will be followed by a phase II study of the production, export and transportation of each principal export item. Since the prediction of the export traffic from the Pacific coast calls for a detailed analysis and review of the Pacific markets, special efforts will have to be made for such analysis and review in the phase II study.

The phase I study is expected to produce conclusions and a decision matrix showing the natural/topographical conditions, infrastructural condition, production and export data, transportation cost, and other restrictive conditions of each route. Considering the extreme short period allowed for the survey (4 months), however, it is probable that the actual survey activities will be limited to the reviewal of past survey data and consolidation of existing data. In the study of infrastructural condition, it is expected that the short-, intermediate- and long-range operability will evaluated for roads, railways and ports, and this will influenced largely by the method/degree of maintenance of facilities, i.e., the scale of investment. In the studies made by related provincial governments, different maintenance levels were adopted for facilities, causing difficulty in making a comparison of the future operability. It will therefore be necessary to estimate the investment amount required to attain the same level of service and operability and make a route-wise comparison of the investment.

The decision matrix is useful in obtaining a general grasp of the advantages and disadvantages of each route, but it will not be easy at all to derive conclusions from an overall evaluation based on this matrix. The CFI will find it difficult to determine the priority route because all related provincial governments are its clients. It is therefore probable that the Governments of the two countries will

Figure IV-5-8 General Flowchart of the Trans-Andes Route Development Study



Source: Study Team

consult with each other on the basis of survey data and adopt a final conclusion reflecting their highly political considerations.

Figure IV-5-8 is a flowchart showing a general plan of the study for the trans-Andes route development, which the study team has prepared to facilitate the on-going study and following studies. The following points need to be given due attention in carrying out these surveys.

1) Joint bilateral study

The route development cost, traffic demand and benefit derivable from regional development show differences between Argentina and Chile. There is no guarantee that the optimum route selected by the Argentine side coincides with that selected on the other side of the border. Furthermore, the investment effect will be greatly reduced unless the maintenance standards (design standards) of the two countries are unified. It is therefore advisable to organize a task force comprising exports from the two countries so that the survey will be carried by their joint, cooperative efforts. If this is not feasible, it will be necessary to establish a system for frequent exchange of information on the scope of survey, design standards, etc.

2) Marine transport cost

Freight of nonregular grain and ore carriers is not fixed, and varies largely according to market demand for ships and route. For comparison of marine transportation cost between the Pacific and Atlantic routes, therefore, efforts should be directed toward making the cost data updated and realistic, while at the same time making an analysis of risks.

3) Design standards for roads

Since the trans-Andes route development is a development investment project in nature, the traffic that can be generated by its completion varies largely especially by the level of facilities development/maintenance. Considering the extremely long distance convered by the route and the low economy of small truck operation, the entire route should be planned as an asphalt-paved road permitting free passage of 3-ton trailer trucks, although this may call for phased route development.

4) Priority order of railway and road routes

Whether the development priority should be given to the railway route or the road route is a question to be decided after a careful examination. Railway transportation will certainly offer greater cost advantage than truck transportation if the traffic demand is as high as several million tons. Judging from the National Railways' present performance and share in total cargo traffic, it is hard to believe that the railway route development will greatly accelerate the development of areas in its zone of influence. If the estimated traffic demand is large enough to make the railway transportation advantageous, then the development plan should be formulated and examined for both the railway route and the road route.

5) Benefit evaluation

In the past measurement of benefit from reduction in transportation cost, a comparison of total transportation cost was made between the Pacific route and the Atlantic route, with the traffic demand (export volume) held at a constant level. It is to be noted that there will actually be a considerable amount of goods that will not be exported (or produced) unless the trans-Andes route is developed. If the traffic and production vary by the existence/non-existence of the trans-Andes access to the pacific, then the value-added resulting the production increase should be measured as a benefit of the trans-Andes route development.

As mentioned already, the related agencies or departments of the central and provincial governments individually have completed or have been conducting studies connected to possible trans-Andes routes. Each of these studies is partial in its coverage, but when combined together, they cover most of the study items shown in the flowchart. Therefore, it is now considered important that the related agencies and departments follow through their respective studies in line with the common methodological framework, and that they designate a special organization in the central government which coordinates the systematic execution of the on-going and future studies on trans-Andes route.