REPORT AND RECOMMENDATION

OF THE

PRESIDENT

TO THE

BOARD OF DIRECTORS

ON

PROPOSED LOANS

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR THE

HEILONGJIANG AND YUNNAN EXPRESSWAYS PROJECTS

August 1994

CURRENCY EQUIVALENTS
(as of 1 September 1994)

Currency Unit - Yuan (Y)

Y 1.00	=	$0.115
$1.00	=	Y 8.70

On 1 January 1994, the PRC's dual exchange rate system was unified. The exchange rate of the Yuan is now determined under a managed floating exchange rate system.

ABBREVIATIONS

EA	-	Executing Agency
EIA	-	Environmental Impact Assessment
EIRR	-	Economic Internal Rate of Return
HPCD	-	Heilongjiang Provincial Communications Department
ICB	-	International Competitive Bidding
JPCD	-	Jilin Provincial Communications Department
MOC	-	Ministry of Communications
NTHS	-	National Trunk Highway System
OECF	-	Overseas Economic Cooperation Fund
PRC	-	People's Republic of China
PCD	-	Provincial Communications Department
SPC	-	State Planning Commission
TA	-	Technical Assistance
WBG	-	World Bank Group
VOC	-	Vehicle Operating Costs
YPCD	-	Yunnan Provincial Communications Department

NOTES

(i) The fiscal year of the Government coincides with the calendar year.

(ii) In this Report, "$" refers to US dollars.

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LOAN AND PROJECT SUMMARY

Borrower	:	The People's Republic of China
Outline of the Projects	:	The Projects will include (i) civil works for the construction of a two-lane limited access toll expressway of about 350-km, connecting Harbin and Jiamusi cities in Heilongjiang Province, and of a four-lane limited access toll expressway of about 200-km connecting Chuxiong and Dali cities in Yunnan Province, including access roads, interchanges with toll facilities, service and parking areas, bridges, and tunnels; (ii) procurement of equipment and facilities for road maintenance and road safety, construction supervision and materials testing, and toll road operations and communications; and (iii) consulting services for construction supervision and training.
Classification	:	Economic growth
Rationale	:	To address some of the transport infrastructure constraints, the Government plans to develop a National Trunk Highway System (NTHS). Twelve key transport corridors have been identified for construction over a 30-year period. The objective of NTHS is to interconnect all provincial capitals and cities with population of more than 500,000. Towards this end, about 30,000 km of expressways will be constructed. During the ongoing Eighth Five-Year Plan (1991-1995) and the subsequent Ninth Plan (1996-2000), priority will be accorded to routes that are heavily congested and have become a bottleneck to economic activity. The proposed Projects meet these criteria and represent sections of 2 of the 12 major north-south NTHS transport corridors: (i) the Tongjiang-Harbin-Dalian-Shanghai-Guangzhou-Haikou corridor, and (ii) the Shanghai-Kunming-Ruili corridor. The proposed Projects will relieve traffic congestion, link economic growth areas with consumer centers, and foster trade and regional integration. In addition, the Projects will improve livelihood opportunities in poverty areas by integrating agricultural production and consumption centers.
Objectives and Scopes	:	The principal objectives of the proposed Projects are to improve the capacity and integration of the road transport network in Heilongjiang and Yunnan provinces and to help eliminate road transport bottlenecks that constrain continued economic growth. Specifically, the proposed Projects will (i) alleviate congestion and reduce traffic

accidents and vehicle operating costs; (ii) improve access to Dalian and Dandong Ports, Beijing, Shanghai, and the Pearl River Delta; and (iii) reduce pressure on the overburdened railway lines in the related corridors. The Projects will also support policy reforms in (i) road safety, (ii) human resource development, and (iii) strengthening of institutions responsible for highway planning, construction, operation, and maintenance.

Cost Estimates : The total cost of the proposed Heilongjiang Project is estimated at $330.0 million equivalent, of which $142.0 million (43 per cent) is the foreign exchange cost and $118.4 million (57 per cent) is the local currency cost equivalent. The total cost of the Yunnan Project is estimated at $461.4 million equivalent, of which $201.7 million (43.7 per cent) is the foreign exchange cost and $259.7 million (56.3 per cent) is the local currency cost equivalent. The cost estimates include adequate provisions for price escalation and physical contingencies and interest and other charges on the Bank loan during construction.

Financing Plan : ($ million equivalent)

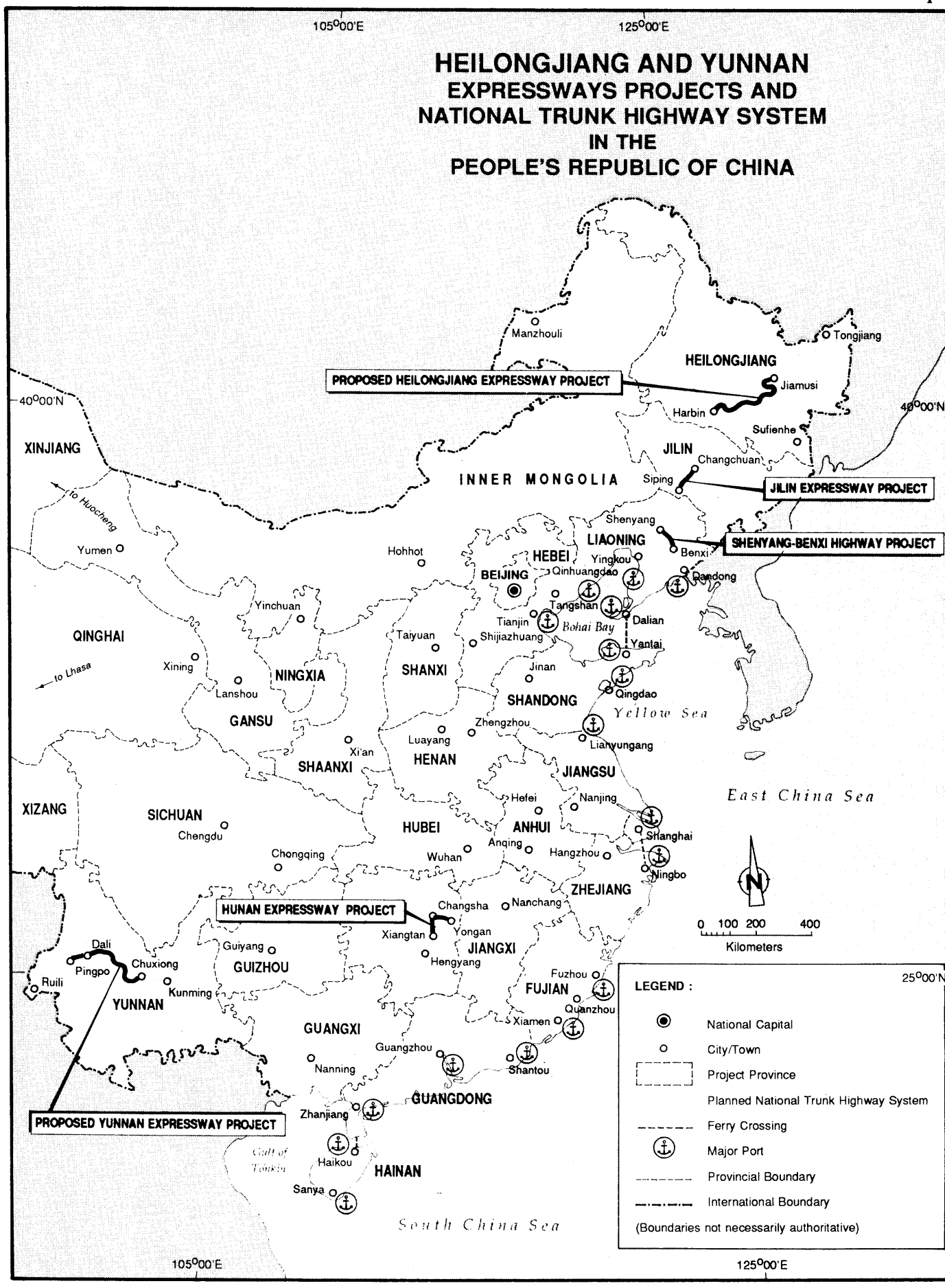
Source	FOREIGN EXCHANGE	LOCAL CURRENCY	TOTAL
I. Heilongjiang Province			
Bank Loan	142.0	0.0	142.0
Government Financing	0.0	188.0	188.0
Total	**142.0**	**188.0**	**322.0**
II. Yunnan Province			
Bank Loan	150.0	0.0	150.0
Government Financing	51.7	259.7	311.4
Total	**201.7**	**259.7**	**461.4**

Loan Amounts and Terms : Loans totaling $292 million ($142 million for the Heilongjiang Project and $150 million for the Yunnan Project) will come from the Bank's ordinary capital resources, with interest to be determined in accordance with the Bank's pool-based variable lending rate system for US dollars, and with an amortization of 24 years, including a grace period of 4.5 years and a commitment charge of 0.75 per cent per annum.

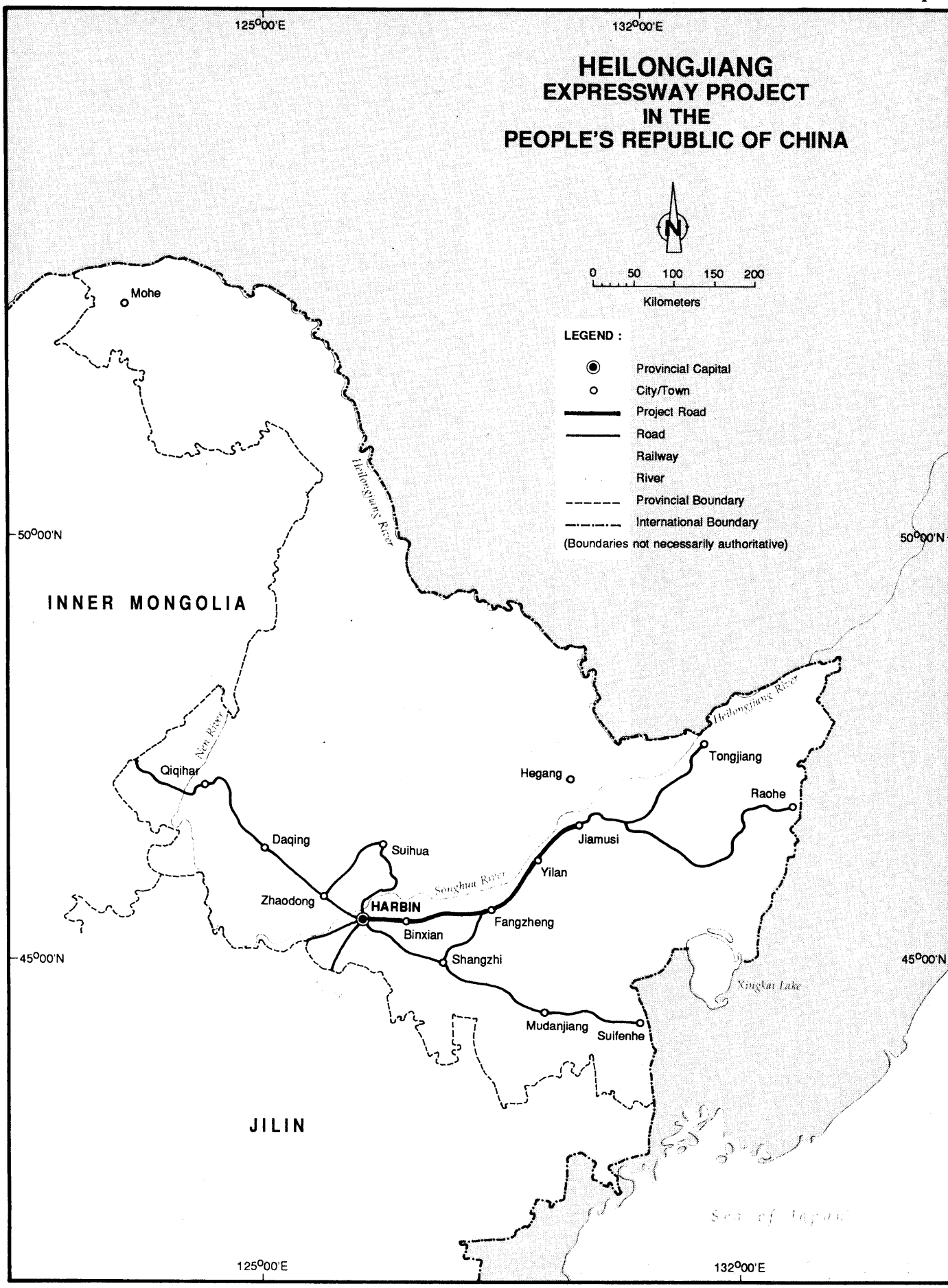
Period of Utilization : Until 31 December 1999

Implementation Arrangements	:	Responsibility for implementation will be assigned to the directors of the expressway corporations under the overall supervision of the Directors, Heilongjiang and Yunnan Communications Departments. Project management offices will handle day-to-day implementation and administration of contracts. All preconstruction activities will be completed by early 1995. Construction is expected to commence in May 1995 and completion is expected by October 1998.
Executing Agencies	:	Expressway Corporations of Heilongjiang and Yunnan Provinces
Procurement	:	Goods and services for the Projects will be procured in accordance with the Bank's *Guidelines for Procurement*. For civil works, procurement will be undertaken using international competitive bidding procedures, except that one package under each Project for ancillary expressway operation facilities will be implemented by force account.
Consultant Services	:	International consultant services will be required for supervising construction and training to address weaknesses related to project and contract management, quality control, traffic engineering, and procurement. All other supervisory positions will be filled by domestic consultants. The international consultants will also identify the training needs and recommend overseas training courses for suitable candidates to strengthen the institutional and engineering capacities of the Executing Agencies. The main fields for overseas training are project and contract management and administration, highway planning, pavement design, materials testing, and traffic and structural engineering. All consultants to be financed under the loan and technical assistance (TA) will be recruited in accordance with the Bank's *Guidelines on the Use of Consultants.*
Estimated Completion Date:		31 October 1998
Benefits and Beneficiaries	:	The quantifiable benefits from the Projects consist of savings in transport costs and value added resulting from generated traffic. The economic internal rate of return of the Heilongjiang Project has been estimated at 18.8 per cent and that of the Yunnan Project at 17.8 per cent.
Technical Assistance	:	Two TA grants of $600,000 each are proposed to address road traffic safety concerns and for provincial highway network planning.

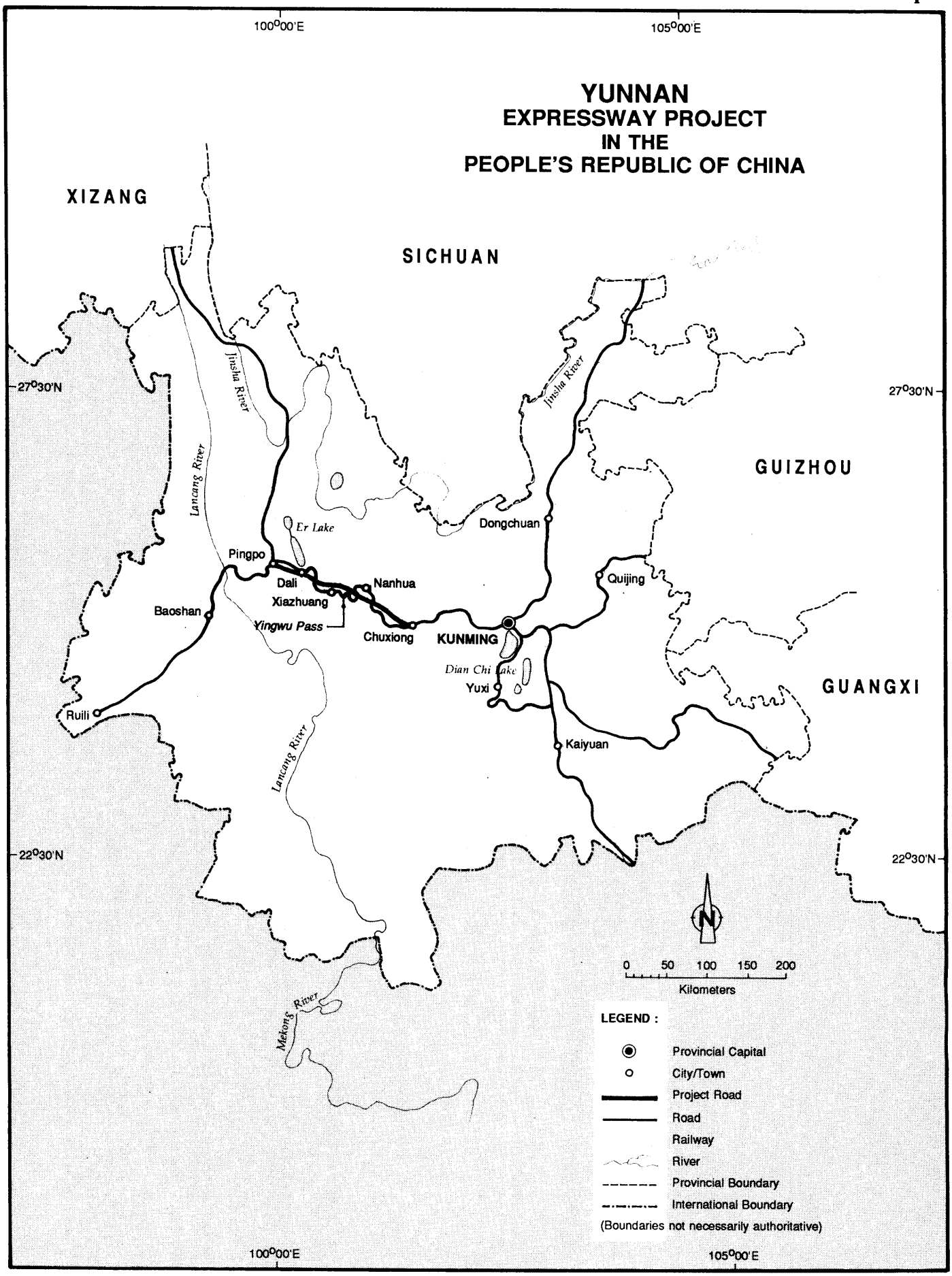
Map


HEILONGJIANG AND YUNNAN
EXPRESSWAYS PROJECTS AND
NATIONAL TRUNK HIGHWAY SYSTEM
IN THE
PEOPLE'S REPUBLIC OF CHINA
105°00'E
125°00'E
40°00'N
25°00'N
PROPOSED HEILONGJIANG EXPRESSWAY PROJECT
JILIN EXPRESSWAY PROJECT
SHENYANG-BENXI HIGHWAY PROJECT
HUNAN EXPRESSWAY PROJECT
PROPOSED YUNNAN EXPRESSWAY PROJECT
HEILONGJIANG
JILIN
LIAONING
INNER MONGOLIA
XINJIANG
QINGHAI
XIZANG
SICHUAN
YUNNAN
GANSU
NINGXIA
SHAANXI
SHANXI
HEBEI
BEIJING
HENAN
SHANDONG
JIANGSU
ANHUI
HUBEI
ZHEJIANG
FUJIAN
JIANGXI
GUIZHOU
GUANGXI
GUANGDONG
HAINAN
Manzhouli
Tongjiang
Jiamusi
Harbin
Sufienhe
Changchuan
Siping
Shenyang
Yingkou
Benxi
Dandong
Qinhuangdao
Tangshan
Tianjin
Bohai Bay
Dalian
Yantai
Qingdao
Yellow Sea
East China Sea
Lianyungang
Nanjing
Shanghai
Ningbo
Hangzhou
Anqing
Hefei
Wuhan
Chongqing
Changsha
Nanchang
Xiangtan
Yongan
Hengyang
Fuzhou
Quanzhou
Xiamen
Shantou
Guangzhou
Nanning
Zhanjiang
Haikou
Sanya
Gulf of Tonkin
South China Sea
Hohhot
Yinchuan
Xining
Lanshou
Taiyuan
Shijiazhuang
Jinan
Zhengzhou
Luoyang
Xi'an
Yumen
to Huocheng
to Lhasa
Chengdu
Guiyang
Kunming
Dali
Pingpo
Chuxiong
Ruili
0 100 200 400
Kilometers
N
LEGEND :
National Capital
City/Town
Project Province
Planned National Trunk Highway System
Ferry Crossing
Major Port
Provincial Boundary
International Boundary
(Boundaries not necessarily authoritative)

Map 2


HEILONGJIANG
EXPRESSWAY PROJECT
IN THE
PEOPLE'S REPUBLIC OF CHINA
N
0 50 100 150 200
Kilometers
LEGEND :
Provincial Capital
City/Town
Project Road
Road
Railway
River
Provincial Boundary
International Boundary
(Boundaries not necessarily authoritative)
125°00'E
132°00'E
50°00'N
45°00'N
INNER MONGOLIA
JILIN
Mohe
Heilongjiang River
Nen River
Qiqihar
Daqing
Suihua
Zhaodong
HARBIN
Binxian
Songhua River
Fangzheng
Shangzhi
Yilan
Hegang
Jiamusi
Tongjiang
Raohe
Mudanjiang
Suifenhe
Xingkai Lake
Sea of Japan

Map 3


YUNNAN
EXPRESSWAY PROJECT
IN THE
PEOPLE'S REPUBLIC OF CHINA
XIZANG
SICHUAN
GUIZHOU
GUANGXI
100°00'E
105°00'E
27°30'N
22°30'N
Jinsha River
Lancang River
Mekong River
Er Lake
Dian Chi Lake
Pingpo
Dali
Xiazhuang
Yingwu Pass
Nanhua
Chuxiong
KUNMING
Dongchuan
Quijing
Yuxi
Kaiyuan
Baoshan
Ruili
N
0 50 100 150 200
Kilometers
LEGEND :
Provincial Capital
City/Town
Project Road
Road
Railway
River
Provincial Boundary
International Boundary
(Boundaries not necessarily authoritative)

I. THE PROPOSAL

1. I submit for your approval the following Report and Recommendation on proposed loans to the People's Republic of China (PRC) for the Heilongjiang and Yunnan Expressways Projects. The Report also describes two proposed technical assistance (TA) projects for the preparation of a road traffic safety program, and for provincial highway network planning. If the proposed loans are approved by the Board, I, acting under the authority delegated to me by the Board, shall approve the two technical assistance grants.

II. INTRODUCTION

2. The rapid growth of the PRC economy and the ensuing transport demand are straining the country's transport system. Serious bottlenecks have emerged in the road subsector. The Government is addressing these constraints by developing a National Trunk Highway System (NTHS). Twelve key transport corridors have been identified for construction over a 30-year period, based on population, production, and socioeconomic criteria. The objective of NTHS is eventually to connect all provincial capitals and cities with populations of 500,000 and more. Towards this end, about 30,000 kilometers (km) of expressways will be constructed over a 30-year period. During the Eighth (1991-1995) and the Ninth (1996-2000) Five-Year Plans, seven expressways totaling about 12,000 km in length will be completed.

3. The proposed Projects will form part of NTHS. The Projects have been processed simultaneously because they are components of the PRC's trunk highway network program, are urgently needed, and are similar in terms of design as well as policy issues to be addressed. A similar approach was adopted for processing the Hunan and Jilin Expressway Projects, which were approved by the Bank in 1993. Feasibility studies for the Projects were carried out by the Heilongjiang and Yunnan Provincial Communication Departments (PCDs) in 1993, and were reviewed by Bank staff in January 1994 and March 1994. Fact-finding for the proposed Projects was completed in March 1994. The Projects were appraised by a Bank Mission, which visited the PRC from 3 to 23 May 1994.[1] This Report is based on the Mission's findings in the field, its discussions with Government officials, and other Project preparatory work. Formal loan negotiations were held from 24-25 August 1994 with authorized representatives of the Government.

4. If approved, the proposed loans will be the thirty-fifth and thirty-sixth loans to the PRC and the ninth and tenth loans for the PRC transport sector.

III. BACKGROUND

A. The Transport Sector

1. General

5. In the PRC, transport services absorb substantial economic resources, which is reflected in the high share of transport costs in the manufacturing industry as well as in overall economic output. The underlying causes are the long distances over which most commodities need to be shipped, a relatively large heavy industry sector, reliance on coal as the major source of energy, and the low degree of vertical integration of the PRC's industries. On the other hand, the density of the PRC's transport network, measured both on the basis of geographic area and population, is among the lowest in the world. The transport system consists of rail transport, road

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[1] The Mission was composed of Peter C. Darjes, Senior Project Economist (Mission Chief); Francis Sharpley, Senior Project Engineer; Haruya Koide, Project Economist; and Philip Daltrop, Counsel. G. Hecker, Manager, IFTE, joined the Mission in Heilongjiang Province from 6 to 11 May 1994.

transport, inland waterway and coastal shipping, civil aviation, and pipelines. Rail transport is the dominant mode for internal freight and passenger traffic. Currently, about 60 per cent of freight and 46 per cent of passenger traffic are moved by rail. Because the economy depends on coal as its principal energy source, coal and other bulk commodities associated with heavy industry constitute the majority of railway freight traffic in the PRC. However, much capacity is also utilized by short-distance break-bulk freight traffic, which could be more economically handled by road transport. The substantial passenger rail traffic is a consequence of the limited private ownership of automobiles. However, motorized road traffic and civil aviation have been growing rapidly during the past decade and are expected to absorb an increasing share of the passenger market in the future.

6. The economic reforms introduced since 1979 have provided the impetus for an upsurge in both freight and passenger traffic. Total freight traffic has grown at about 8 per cent per annum, port freight traffic at about 9 per cent per annum, and intercity highway freight traffic at about 16 per cent per annum — consistently higher than the growth of gross domestic product. These rates would have been higher were it not for the capacity constraints that are evident in all modes. The transport system is further strained by the marked growth in demand for passenger travel during the last decade. Since 1979, passenger traffic has grown at nearly 10 per cent per annum. Nonetheless, passenger travel per capita in the PRC remains very low, in part because of severe capacity constraints. Demand for transport services is thus suppressed, and sustained rapid traffic growth can be expected when adequate capacity is provided.

a. Transport Planning and Coordination

7. Transport sector responsibilities are shared by several Government agencies. On the national level, the State Planning Commission formulates five-year development plans and sets out the transport sector's priorities and targets in consultation with the ministries responsible for transport subsectors and representatives of transport users. The Ministry of Communications (MOC) is responsible for national highways, inland waterways, coastal shipping, and major ports; the Ministry of Railways, for the national rail system; and the Civil Aviation Administration, for air transport and airports. In line with the country's restructuring policies, many of the administrative and operational functions have been delegated to Provincial Communications Departments (PCDs), which are part of the provincial governments. MOC has also transferred primary control of major ocean ports to the local governments. MOC nevertheless still exercises control of the tariff structure of the national transport system and continues to play an important role in providing guidance to the provincial governments. Its main responsibility lies in planning and coordinating transport sector investments and in formulating transport policies. MOC has also established road design standards. MOC finances only those national highway projects that use these standards in their feasibility studies.

b. Investments

8. Because of chronic underinvestment in the past, the development of transport capacity has not kept pace with demand. Transport investments have been low, in terms of their share in overall public investments and in gross national product. Investments were focused on the need for moving large volumes of bulk commodities (particularly coal) over long distances, which has favored the development of railways, but even their resources were inadequate. The Government has been addressing these problems by constructing and upgrading transport facilities to expand overall capacity and by rationalizing the allocation of traffic to available transport modes. Although the Government has been increasing public investment allocations to the transport sector, the sector's share of total public investments has been stagnant during the past two decades.

2. The Road Subsector

a. Road Network

9. The highway network, which totaled about 1,056,700 km in 1992, is classified by MOC as Expressway, and Highway Classes 1, 2, 3, and 4 for various traffic capacities in different terrain for the purposes of design and technical specifications.[1] For administrative purposes, roads are classified as national, provincial, county, village, and special purpose. About 84 per cent of the road network (covering about 888,000 km) is paved with variety of structures and materials. Of the paved roads, only about 24 per cent is paved with cement concrete or bituminous mixed materials, 31 per cent with crushed stone or graded gravel, and 29 per cent primarily with stabilized soil using local materials. Relative to population or geographic area, the network is among the smallest in the world, and about 30 per cent of PRC villages have no access to roads suitable for motor vehicles. Many roads have exceeded their design life, and, although well maintained, have neither the capacity nor structural strength to carry current traffic volumes and loads. As a result, roads tend to be congested and their pavements are increasingly showing signs of roughness and failure.

b. Vehicle Fleet and Traffic

10. Over the past decade, road traffic volume has grown rapidly. Between 1984 and 1992 freight traffic on roads grew at about 15 per cent per annum, while passenger traffic rose at 12 per cent per annum. The road network expanded on average by about 7 per cent per annum, from 942,395 km in 1980 to 1,056,700 km in 1992. The surge in traffic took place despite adverse operating conditions, leading to mounting congestion, particularly on the main roads. The high share of slow-moving traffic, mainly tractors, bicycles, and nonmotorized agricultural vehicles, not only aggravates road congestion, but also is a major cause of traffic accidents.

11. The vehicle fleet included 6.9 million trucks, buses, and cars in 1992, with trucks comprising over 64 per cent of this total. Most trucks are of four-ton capacity with outmoded designs and low fuel efficiency. Most of the trucks and buses are gasoline powered. These vehicles were manufactured domestically and, until recently, the production of trucks was barely sufficient to replace the retired vehicles, let alone meet growing demand. Not until the early 1980s were modern vehicles imported and joint-ventures with foreign manufacturers started to produce trucks. Vehicle production grew steadily to reach 647,000 units in 1988, but the growth rate dropped in 1989 and 1990 as the economy slowed. Owing to the economic upswing since 1991, production has regained momentum and is contributing at a fast rate to the modernization of the fleet.

12. The privately-owned fleet of motor vehicles (cars, buses, and trucks) has increased sharply from 0.3 million vehicles in 1985 to 1.4 million vehicles in 1992, or an annual growth rate of 22 per cent. In 1992, standard trucks constituted 64.1 per cent of the total privately owned vehicles, while passenger cars comprised 35.4 per cent and other specialized vehicles 0.5 per cent. In 1985, there were only 19,342 privately owned passenger vehicles. By 1992, the number had increased by 700 per cent to 140,000 cars. Similarly, there were 264,839 privately-owned trucks in 1985. By 1992, this number had increased by 135 per cent to 600,000 trucks.

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[1] Highway classes 1 and 2 comprise paved roads, class 3 have a gravel surface, and class 4 are earth roads.

c. Road Transport Industry

13. PCDs are responsible for regulating the road transport industry by licensing drivers, vehicles and intercity bus services. The Government has deregulated the road freight industry to permit free entry and pricing and to enable provision of more flexible and diversified transport services. The three types of commercial road transport enterprises in the PRC include state-owned, collective, and privately owned transport firms. In addition, a large number of non-transport enterprises and institutions have vehicle fleets to meet their own needs and offer additional transport services. The relaxation of trucking regulations in the early 1980s allowed privately owned trucks to haul cargo for other factories and cooperatives and thus promoted competition between public and private trucks. Nonpublic trucks have absorbed most of the growth in traffic during the past few years. The market share of state-owned transportation companies is declining.

d. Road Subsector Revenues and Expenditures

14. Investments in highway infrastructure are financed mainly from earmarked user charges. In this regard, the two main sources of revenues are, at the provincial level, a road maintenance fee, and at the national level, a vehicle purchase fee. The road maintenance fee is the main source of revenue and is levied by PCDs on the revenue of freight and passenger transport companies and on the capacity of private vehicles. MOC generates revenues from the vehicle purchase fee, a supplementary earmarked tax on vehicle imports and sales, and contributes 30-50 per cent of construction costs of national highways. MOC funds are concentrated in the poorer provinces, while the coastal, wealthier provinces normally receive a smaller share. MOC also provides contributions for constructing or rehabilitating rural roads in poverty-stricken areas. In specific cases, such as Xizang (Tibet Autonomous Region), MOC has contributed the entire cost of the national road network. The road maintenance fee and the vehicle purchase fee together account for about 70 per cent of the revenues currently collected from road users and have been sufficient to finance road construction and maintenance. However, with the anticipated growth in road traffic and the concomitant increase in capacity requirements, new sources of finance will have to be found (see para. 17).

15. Fuel taxes amount to 43 per cent of the base price of gasoline and 13 per cent of the base price of diesel fuels, and accrue to general revenues. Fuel prices at the pump, including taxes, are significantly higher than international market prices, even for the fuels sold under planned allocations. Four other user charges, which are not earmarked for road construction and maintenance, include (i) the vehicle use fee, (ii) the transport administration fee, (iii) the license plate fee, and (iv) the annual vehicle examination and certification fee. The revenues from these fees are relatively insignificant and accrue to the general revenue. On the whole, current road user charges together contribute satisfactorily to the recovery of costs related to road usage. Some distortions exist within the road user charge tariff and will be addressed through technical assistance from the Bank (see para. 36).

16. Foreign and domestic borrowing and domestic bonds have become increasingly important sources for funding highway construction. The PRC has successfully expanded its foreign borrowings in the road sector during the last 10 years, mainly from the Bank, the Overseas Economic Cooperation Fund (OECF) of Japan, and the World Bank Group (WBG). Domestic loan and bond financing is still relatively insignificant, accounting for less than 5 per cent of all highway investments. Domestic loans can be obtained from a number of banks, with the People's Construction Bank as the principal lender. Some municipalities have started to issue infrastructure bonds, part of which are used for road construction. However, these initiatives are strictly controlled under the Government's tight monetary policy.

17. Financial projections indicate that by the year 2000 the existing revenue sources will fall about 30 per cent short of the financing needs. Harnessing new revenue sources is therefore important if the Government's road construction targets are to be achieved. Because of the need to mobilize additional resources, the Government has decided to collect tolls on modern access-controlled expressways. Almost all the newly constructed interprovincial expressways are being planned as toll roads. Recent reforms have opened the transport infrastructure, notably ports and expressways, to foreign commercial financing. However, the number of highway projects with sufficient traffic to attract private financing is still small. Nonetheless, diversification of financing sources is appropriate as current and anticipated revenues from road users will not meet the financing requirements for the construction of expressways under NTHS and those stemming from other road construction projects. This issue, which is part of the ongoing policy dialogue between the Government and the Bank, will be addressed by increased private sector participation in highway financing and mobilization of commercial financing.

e. Road Administration

(i) Organization and Structure

18. Road administration in the PRC is decentralized. At the provincial level, PCDs are responsible for the highway system and act as the administrative arms of the provincial governments for planning, budgeting, and financing road projects. PCDs are generally financially independent of the Central Government, except for large projects of national significance. MOC provides policy guidance and technical support to PCDs through national policies, regulations, and design and construction standards. Development plans and project approvals are sanctioned by the Provincial Planning Commissions.

19. PCDs, through their city, prefecture, and county level units, take full responsibility for planning and administering the road sector in the provinces, including constructing and maintaining the road network and transport operations. Road safety is the responsibility of the Public Security Bureaus at the local government level.

20. The road sector is generally well staffed with trained technical personnel, particularly at the central and provincial levels. Education and training systems, established in each province under the PCDs, provide regular training of technical workers or operators and various technicians for most of the activities in the sector, as well as on-the-job training.

(ii) Planning and Design

21. At the national level, the State Planning Commission (SPC) is responsible for overseeing the planning and evaluation of infrastructure in all sectors of the economy. SPC also decides on the allocation of Government investment and the level of foreign borrowing for the various sectors, including the transport sector. The Provincial Planning Commission has similar responsibilities in each province.

22. MOC carries out three types of plans in conjunction with the provincial authorities:

(i) the long-term strategic plan, which focuses on strategic development perspectives over 10 - 30 years;

(ii) the five-year plan, which identifies highway investment projects proposed for implementation during the plan period; and

(iii) the annual plan, which specifies a yearly construction program for the projects approved under the five-year plan.

23. Projects belonging to NTHS are subject to the approval of the State Council, after consultation with SPC. National highways or other major projects require approval by MOC, but the remaining infrastructure is planned under the guidelines of MOC. PCDs prepare the provincial five-year road development plans to reflect national and provincial development policy guidelines and objectives of the plan period. The highway administration units at the prefecture and county levels have some autonomy in planning small road investments, such as county and village roads, subject to approval by PCDs.

(iii) Engineering, Construction, and Maintenance

24. Road and bridge projects are designed by the planning and design institutes at the provincial, prefectural, and county levels. Computer-aided design methods are used for engineering estimates, costs, and structural computations, but most of the drafting work is done manually. The design institutes at the municipal and county levels are responsible for preparing highway designs for provincial and national roads. These design institutes are, in general, competent and have experienced personnel for carrying out highway design tasks.

25. Construction of roads and bridges is supervised by personnel from county, city, and prefectural highway units. The municipal and county highway bureaus have their own construction units for minor projects within their administrative districts. In recent years, competitive bidding has been introduced, mainly a result of SPC's directive that all major civil works be awarded based on the results of competitive bidding. Many of the larger provincial and urban construction bureaus and railway engineering units are being reorganized into financially independent contracting companies and have been awarded contracts on previous Bank-financed highway projects.

26. Budget allocations and expenditures for maintenance have increased substantially in the past decade. Road maintenance is well organized and is carried out adequately, mainly through labor-intensive operations. MOC has established an advanced road maintenance management system, consisting of a road data bank and a pavement management system. The road maintenance management system will be introduced to all provinces in stages and will become the key tool for projecting and programming future maintenance needs and budgets.

B. Government Policies and Plans

27. The centerpiece of MOC's strategy to meet the transport needs of the growth-oriented sectors of the PRC economy is the long-term development of NTHS, a high-quality system of interprovincial roads (see para. 2). A core network of four routes of about 14,000 km in length (two north-south routes and two east-west routes) will be completed during the next ten years (see Map 1). NTHS will be supplemented by new provincial, county, and village roads throughout the PRC. Overall, the Government's investment plans for the highway subsector have an appropriate regional and social balance. The focus on NTHS is justified in view of the need to sustain economic growth, create employment, and mitigate poverty.

C. External Assistance to the Road Subsector

28. External assistance to the road subsector has come mainly from the WBG, OECF, and the Bank. Since 1985, the WBG has provided about $1,460 million for 10 highway projects and 2 urban transport projects. The WBG assistance has been geared mainly to construction of national and provincial roads and the expansion and improvement of rural roads and major

bridges. The projects were also designed to provide technical assistance and training of personnel in areas such as construction supervision, quality control, design, and planning. The WBG has also supported studies on key institutional and policy issues, such as development of NTHS, road safety, pavement management, and road user charges. The OECF has provided about $321 million equivalent for five bridge construction projects and two highway projects. The Mission has had discussions with all donors concerned with the road transport sector in the PRC and has coordinated with them the proposed measures under the Projects.

29. The Bank has provided five loans totaling $405 million to the PRC road subsector, three for expressway development and two for urban transport in Shanghai.[1] All projects are progressing satisfactorily. The Shanghai Nanpu Bridge project connects the east and west banks of the Huang Pu River and included construction of a 846-meter bridge. Construction of the bridge was completed in December 1992, and the bridge was opened to traffic in 1993. The Shenyang-Benxi Highway Project consists of a 75-km four-lane paved expressway. Project implementation is progressing well and is ahead of schedule. The Shanghai Yangpu Bridge, a six-lane toll bridge, was opened to traffic in early 1994, almost one year ahead of schedule. Implementation of the Hunan and Jilin expressways is progressing according to schedule and construction commenced in April 1994. All projects are in compliance with loan covenants. Bank's TA to the road sector has complemented the development of physical infrastructure and has aimed at addressing many of the policy and institutional concerns, including human resource development, transport pricing, resource mobilization, transport efficiency, and commercialization.[2]

D. Lessons Learned

30. Bank experience in the PRC transport sector has shown that the absorptive capacity, preparation and implementation capability of the agencies concerned are strong. All loans provided by the Bank to the sector are performing well and contract awards, disbursements, speed of project implementation, and compliance with loan covenants are satisfactory. The main factor underlying the positive performance is the strong sense of project "ownership" among all agencies concerned with project concept, design, assessment, implementation, loan administration and management, from the Central Government agencies and provincial governments through to the project executing agencies (EAs). This sense of ownership provides the basis for a rigorous internal screening and preparation of each project proposed for Bank financing to ensure that there are (i) good technical skills in the executing agencies (EAs); (ii) well developed institutional arrangements for project implementation; (iii) clear lines of responsibility and accountability for project supervision and debt servicing; (iv) adequate provision of counterpart funds; and (v) close attention to financial returns, financial capacity, and debt service capability. This internal screening is coupled with major efforts by central agencies to familiarize EAs with Bank procedures and guidelines prior to Bank involvement, and close and

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[1] Loan No. 1082-PRC: Shanghai Nanpu Bridge, for $70 million approved on 28 May 1991;
Loan No. 1168-PRC: Shenyang-Benxi Highway, for $50 million approved on 2 July 1992;
Loan No. 1188-PRC: Shanghai Yangpu Bridge, for $85 million approved on 17 November 1992;
Loan No. 1261-PRC: Hunan Expressway, for $74 million approved on 9 November 1993; and
Loan No. 1262-PRC: Jilin Expressway, for $126 million approved on 9 November 1993.

[2] TA No. 1724-PRC: Institutional Strengthening for Highway Operation and Management Improvement, for $500,000 approved on 2 July 1992;
TA No. 1725-PRC: Jilin Province Highway Network Study, for $600,000 approved on 2 July 1992;
TA No. 1940-PRC: Efficiency Improvements in the Road Transport Sector, for $550,000 approved on 25 August 1993; and
TA No. 1972-PRC: Policy and Institutional Support in the Road Sector, for $1.2 million approved on 9 November 1993.

continuous monitoring by the central agencies throughout all phases of the project cycle with appropriate interventions to address problem areas when necessary.

31. International consultancy is generally limited to providing specialized advice. PRC engineers possess adequate capabilities for design and construction supervision and local contractors have proven competent. The EAs are making good use of knowledge transfer and training opportunities provided under the projects, both in-country and abroad. The Bank's strategic use of TA to upgrade the capabilities of EAs, combined with a concerted effort to spread the benefits of the TA findings to other agencies with similar responsibilities has contributed to project quality.

E. The Bank's Sectoral Strategy

32. The rapid economic growth of the PRC during the past decade has overloaded infrastructure, particularly in the transport and communications sectors. Recognizing the catalytic role these sectors play in the development and diversification of a market-oriented economy, the Bank's strategy aims at removing infrastructure bottlenecks and at facilitating supplementary policy and institutional reforms. The central objective of the Bank's strategy in the PRC is to help the country achieve sustained and equitable economic growth. To realize this goal, the strategy supports the ongoing market-oriented reforms aimed at raising productivity and efficiency. At the same time, the strategy tries to address issues that may result from the pursuit of efficient resource use, i.e. growing income disparity and environmental degradation.

33. Within this framework, the broad thrust of Bank assistance to the transport sector focuses on alleviating key railway, highway, port, and telecommunications bottlenecks in order to promote efficient economic growth and support Government initiatives to develop a market-oriented economy. The Bank strategy aims to improve efficiency in transport and communications enterprises, increase their commercial orientation, and enhance the quality of services. In recognition of the increased importance of road transport, the Bank supports the construction of highways that connect major growth centers and promote linkages with hinterland economies. The operational strategy also acknowledges the need for further institutional strengthening to increase the commercial orientation and managerial efficiency of expressway corporations and to improve highway planning and evaluation techniques and safety standards. The Bank will also promote the adoption of appropriate pricing policies for the highway and road subsector and alternative methods of investment financing, including private sector participation, to help meet the huge financing requirements of the highway development program.

F. Policy Dialogue

1. Ongoing Policy Dialogue

34. The Bank has been active in policy dialogue in the PRC road sector and a number of ongoing initiatives are being examined fully under various TAs. The principal areas currently under discussion include: Investment planning, pricing policies for road users, resource mobilization, expressway management and operations, and issues related to the trucking industry.

(a) Investment Planning

35. The successful implementation of NTHS will require suitable techniques for project evaluation, screening, and prioritizing. Uniform investment criteria and decision making in the provinces are crucial for a rational ranking of proposed road links in NTHS as well as for reaching a consensus between MOC and the provinces on investment decisions. The

Government and the Bank have agreed that appropriate evaluation methods will be introduced within MOC, and the Bank is providing TA for this purpose. The Government has agreed to disseminate to provincial governments involved in NTHS implementation expertise gained through the training program on highway planning and evaluation techniques.

(b) Pricing Policies for Road Users

36. The Bank's policy on cost recovery through road user charges rests on the principle that optimum economic utilization of transport capacity is encouraged. In this regard, the general situation in the PRC is satisfactory (see paras. 14 and 15). However, the principal road user charges, the road maintenance fee and the vehicle purchase fee, do not bear a direct relation to traffic and thus to the cost caused by road users. The degree of cost recovery is therefore not aligned with the growth in traffic and the wear and tear inflicted on road pavements. The setting of appropriate toll tariffs on expressways has emerged as a new and important issue given the Government's decision to operate NTHS expressways as toll roads. Toll tariffs have to be determined cautiously and in line with what the market can bear. Full cost recovery through tolls alone could overprice road users and could cause traffic to divert from NTHS expressways to other roads, as has happened on PRC expressways where tolls have been too high and traffic volumes low. This outcome runs counter to the objectives of alleviating congestion on roads and the demand pressure on the railway. An urgent task for attracting traffic to expressways is therefore to determine an appropriate toll standard under varying traffic conditions. These issues are being addressed in full by a Bank TA.[1] On that basis and reflecting the views exchanged between the Bank and the Government on various occasions, a regime of road user charges will be formulated that bears, as far as feasible, a more direct relationship with the actual costs caused by road users.

(c) Resource Mobilization

37. Current and anticipated revenues from road users will not meet the financing requirements for the construction of expressways under NTHS, other road construction, and road maintenance obligations. Given the huge investment required in the road sector and the limited financial resources, it is essential to explore ways to diversify financing and to mobilize additional resources. Thus, nontraditional financing sources, such as bond financing, build-operate-transfer (BOT), and other forms of private sector participation in road financing and operation, will play an important role in closing the financing gap. The Government has agreed to develop policies that will facilitate the mobilization of innovative sources of financing, particularly by focusing on private sector financing, including BOT and other forms of limited-recourse financing. The Bank through TA is supporting the Government in this effort.[2]

(d) Expressway Management and Operations

38. The proposed NTHS expressways are expected to be operated and managed by commercial, largely autonomous expressway organizations. These organizations will have full responsibility for operating and maintaining the expressways. The issues that arise are related to human resource development in commercial management practices (cost accounting, toll setting); adoption of suitable traffic engineering standards (operating speeds, safety devices, traffic signals, etc.); and interprovincial coordination of the application of such standards by MOC.

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[1] TA No. 1972-PRC: Policy and Institutional Support in the Road Sector, approved for $1.2 million on 9 November 1993.

[2] TA No. 1972-PRC: Policy and Institutional Support in the Road Sector, for $1.2 million approved on 9 November 1993.

Under ongoing Bank financing and TA, training is being provided to staff from EAs to develop skills in toll road management and operations, particularly in areas related to traffic engineering, cost accounting, financial management, and toll collection procedures.[1] These measures are providing the basis for further action to complete commercialization of the expressway organizations. Towards this end, staff reviews and progress reports from the TA consultants point to encouraging results.

(e) Trucking Industry

39. The road transport industry is characterized by inefficient utilization of vehicle and fuel resources, particularly for freight transport. Thus, transport costs are generally high. This issue was identified as an area that must be addressed urgently. Under the Bank TA for Efficiency Improvements in the Road Transport Sector,[2] the policy environment for and operational and managerial practices of the road passenger and freight transport industry in the PRC are currently being investigated. By increasing the market orientation of the industry, encouraging better operating practices, and promoting private sector participation, the TA will contribute to a major improvement in the efficiency of the road transport industry. This, in turn, will result in more efficient use of physical infrastructure being constructed under NTHS.

2. New Policy Initiatives

(a) Traffic Safety

40. In addition to the Bank's continuing policy dialogue on the above issues, the Mission has initiated dialogue to address the problem of road traffic safety, which has emerged as a major issue in the PRC transport system. Vehicle ownership in the PRC is increasing at a fast pace, traffic congestion is escalating, and road safety is deteriorating. The road network is already under pressure from existing traffic and is expected to become even more severely strained, as traffic volumes are forecast to triple during the next decade. PRC's accident rate of 100 deaths per 10,000 vehicles is already among the highest in the world. Road accidents are rapidly becoming the primary cause of death, outweighing all other major fatality groups.

41. Addressing the road safety problem comprehensively has been hampered by the transfer, in 1988, of responsibility for highway safety matters from MOC and PCDs to the Ministry of Public Security and its provincial units. Road safety concerns are related to various disciplines and cut across administrative responsibilities, making coordination of mitigating measures difficult. Aggravated by administrative barriers, little progress has been achieved in improving road safety.

42. The Mission, in consultation with MOC and the Public Security Bureau of Heilongjiang Province, has developed an approach to address the safety problem at the provincial level. Technical assistance is proposed to formulate a comprehensive safety program under a first phase and to help implement the program under a second phase (see para. 75). The TA will promote road safety, which have direct social benefits.

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[1] These issues are being addressed by: TA No. 1724-PRC: Institutional Strengthening for Highway Operation and Management Improvement, for $500,000 approved on 2 July 1992, and Loan No. 1262-PRC: Jilin Expressway, for $126 million approved on 9 November 1993.

[2] TA No. 1940-PRC: Efficiency Improvements in Road Transport, for $550,000 approved on 25 August 1993.

(b) Network Integration

43. MOC has developed a comprehensive plan for NTHS to service the main transport arteries throughout the PRC. The principal objectives of NTHS are to alleviate congestion on the main transport corridors, support industrial and agricultural production, and promote market integration. MOC has recognized that these objectives can only be achieved if NTHS is adequately supported at the provincial and county levels by a system of feeder roads that can provide the necessary access for the population to the economic centers of the country. NTHS will therefore be supplemented by new provincial, county, and village roads throughout the PRC. The construction targets for the length of these roads during the remainder of this century exceed by far the targets for NTHS construction. MOC has instructed PCDs to prepare 30-year investment plans for the roads under their purview. The Government has requested TA assistance to address the needs of highway planners for training in the areas of network planning and investment prioritization (see para. 78).[1]

IV. THE PROJECTS

A. Outline

44. The proposed Projects consist of two expressways that will enhance the Dalian-Harbin-Tongjiang transport corridor in the northeastern provinces and the Shanghai-Kunming-Ruili corridor in the southwestern provinces and surrounding hinterlands. The Projects are a logical continuation of the Bank's involvement in the expressway sector, which started with the Shenyang-Benxi Expressway that feeds into the transport corridor now being developed under the Hunan and Jilin Expressways Projects. The Projects will include (i) civil works for the construction of a two-lane limited access toll expressway of about 350-km, connecting the Harbin and Jiamusi cities in Heilongjiang Province, and of a four-lane limited access toll expressway of about 200-km connecting Chuxiong and Dali cities[2] in Yunnan Province, including access roads, interchanges with toll facilities, service and parking areas, bridges and tunnels (see Maps 2 and 3); (ii) procurement of equipment and facilities for road maintenance and road safety, construction supervision, materials testing, and toll road operations and communications; and (iii) consulting services for construction supervision and training.

B. Rationale

45. The Government's strategy for the highway subsector focuses on the development of NTHS (see para. 27). During the ongoing Eighth Five-Year Plan and the subsequent Ninth Plan (1996-2000), priority will be accorded to routes that are heavily congested and thus hinder economic activity. The proposed Projects meet these criteria and represent sections of 2 of the 12 major north-south transport corridors of NTHS: (i) the Tongjiang-Harbin-Dalian-Shanghai-Guangzhou-Haikou corridor, and (ii) the Shanghai-Kunming-Ruili corridor. The proposed Projects will relieve traffic congestion, link economic growth areas with consumer centers, and contribute to fostering trade and regional integration. In addition, the Projects will help improve livelihood opportunities in poverty areas by integrating agricultural production and consumption centers.

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[1] The Bank, under TA No. 1725-PRC: Jilin Province Highway Network Study, for $600,000 approved on 2 July 1992, has assisted the Jilin Provincial Communications Department to establish a model for the planning exercise. The model needs to be refined and spread to other provinces. Heilongjiang Province also needs to develop its 30-year program, for which Bank TA is proposed (see para. 78).

[2] The Project road starts in Chuxiong, which is about 90 km west of Kunming, and ends at Pingpo, a town approximately 20 km west of Dali. Kunming and Chuxiong are connected by an expressway that was completed in February 1994. The proposed Project is a continuation of the staged construction.

C. Objectives

46. The principal objectives of the proposed Projects are to improve the capacity and integration of the road transport network in Heilongjiang and Yunnan provinces, and to help eliminate road transport bottlenecks that constrain continued economic growth. Specifically, the proposed Projects will (i) alleviate congestion, and reduce traffic accidents and vehicle operating costs; (ii) improve access to Dalian and Dandong Ports, and to Beijing, Shanghai, and the Pearl River Delta; and (iii) reduce pressure on the overburdened railway lines in the related corridors. The proposed Projects will also support policy reforms related to road safety; human resource development; and strengthening of institutions responsible for highway planning, construction, operation, and maintenance.

D. Scope

47. The proposed Projects cover civil works, provision of maintenance equipment, and consulting services for construction supervision and training as follows:

1. Heilongjiang Project

(a) Civil works for the construction of a two-lane limited access toll expressway of about 350-km in length, connecting Harbin and Jiamusi cities, including seven interchanges with toll facilities, service areas, and eight bridges.

(b) Procurement of equipment and facilities for road maintenance and road safety, construction supervision, and materials testing and toll road operations and communications.

(c) Consulting services for construction supervision and training.

2. Yunnan Project

(a) Civil works for the construction of a four-lane limited access toll expressway of about 200-km in length, connecting Chuxiong and Dali cities, including seven interchanges with toll facilities, eleven bridges, service areas, and two tunnels.

(b) Procurement of equipment and facilities for road maintenance and road safety, construction supervision, materials testing, and toll road operations and communications.

(c) Consulting services for construction supervision and training.

48. An integral part of Bank financing for the proposed Projects focuses on upgrading technical skills of personnel from the PCDs and the EAs to promote technology transfer and human resource development. Training will be carried out both at the construction sites and overseas and will concern project management, contract administration, traffic engineering relating to access-controlled expressways, structural and tunnel engineering, pavement quality control, and material testing. To ensure that the benefits of the overseas training are distributed widely in the PRC, MOC will arrange and coordinate a series of inter-provincial workshops in which the consultants and the returning trainees will serve as resource persons and trainers to key personnel in other bureaus. Such arrangements with the consultants and the returning trainees financed under the ongoing Bank-financed highway projects have been initiated by MOC.

3. Project Areas

49. Heilongjiang and Yunnan are landlocked provinces and are neighboring foreign countries. The roads will facilitate access to their borders and will thus stimulate international commerce and trade, which will contribute to regional development. The proposed Projects will also support the development of (i) the Dalian-Harbin corridor in the northeastern provinces, (ii) the Shanghai-Kunming-Ruili corridor, and (iii) surrounding hinterlands that have significant potential for benefiting from regional trade and integration. The Heilongjiang Project traverses one poverty area (Tonghe) and is expected to have an indirect positive impact on eight poverty areas in the hinterland of the Project.[1] The Yunnan Project passes through six poverty areas, which are targeted by the Government for investment promotion and infrastructure development. The proposed Project supports this strategy.

(a) Heilongjiang Project

50. Heilongjiang Province is at the north of northeastern PRC and borders the Russian Federation to the north and east, Jilin Province to the south, and Inner Mongolia to the west. The provincial capital, Harbin, is located at the south-central part of the province. In 1992, the total population of the province was 35.2 million, 56 per cent of which was engaged in agriculture. The province covers an area of 454,000 square kilometers (sq km), about 20 per cent of which is cultivated and about 15 per cent is forest area. Heilongjiang has abundant natural resources, particularly mineral and nonmineral reserves, including oil, coal, graphite, and silicon.[2] The total length of the highway network was 47,882 km in 1992. Despite growing road transport demand in the province, about 88 per cent of all roads are unpaved.

51. During the last decade, heavy and light industries have been rapidly developed. These industries are mainly located in and around Harbin, Qiqihar, and Mudanjiang. The petroleum industry is concentrated in Daqing, in the western part of the province, coal mining is the dominant economic activity in the eastern area and forestry based industry are in the northern area. During 1980-1992, gross industrial value increased from Y 284.4 billion to Y 110.3 billion with an annual average growth rate of 13.5 per cent, while gross agricultural value grew at 10.5 per cent from Y 8.6 billion to Y 28.5 billion during the same period. Per capita income of the province grew annually at 10.7 per cent during 1980-1992 and reached Y 1,997/person in 1992, which is higher than the national average of Y 1,703/person.

52. The proposed expressway starts in the south at Harbin, traverses Binxian, Fangzheng, and Yilan and ends in the north at Jiamusi. The route is a major provincial artery, and is the main transport corridor between Liaoning, Jilin and Heilongjiang provinces. The route passes through a relatively poor area with per capita income of Y 912 per person compared with the national average (Y 1,703 per person) and the provincial average (Y 1,997 per person). The Project expressway will serve both urban and rural people through 15 local roads which will be directly connected to the expressway. In 1992, population in the Project area totaled 9.7 million (27.6 per cent of the provincial population). The Project area (56,973 sq km) occupies 12.5 per cent of the province's total land area.

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[1] These include the counties of (i) Fuyuan, (ii) Tongjiang, (iii) Lindian, (iv) Mingshui, (v) Tailai, (v) Huanan, (vi) Qinggang, and (vii) Tonghe.

[2] Major reserves include (i) the largest graphite reserve in the country, totalling 112.2 million tons; (ii) the country's largest silicon deposit, totalling 6.8 million tons; (iii) oil reserves that account for 46.2 per cent of the national total oil reserve; and (iv) coal deposits that total 19.7 billion tons (the fourth largest in the country).

(b) Yunnan Project

53. Yunnan Province is located at the southwest of the PRC and borders Sichuan Province to the north; Myanmar, the Lao PDR, and Viet Nam to the south; the Tibet Autonomous Region to the west; and the Guangxi Autonomous Region and Guizhou Province to the east. The provincial capital is Kunming, in the central part of the province. In 1992, Yunnan's population was 38.3 million, about 55 per cent of which is engaged in agriculture. The province covers an area of 394,000 sq km, 70 per cent of which is cultivated and 10 per cent is forest area. The province has a diverse range of agricultural produce and abundant natural resources, particularly nonmineral reserves. It also has a number of famous cultural tourist attractions. The highway network had a total length of 60,045 km in 1992. Though road transport is the main transport mode, 99 per cent of the network comprises unpaved roads.

54. Yunnan's economy is undergoing rapid change from its current agricultural orientation towards an increasing reliance on heavy and light industries, including agro-industry. During 1980-1992, gross industrial value increased from Y 6.5 billion to Y 47.7 billion with an annual average growth rate of 18.0 per cent, while gross agricultural value grew at 14.7 per cent, from Y 4.8 billion to Y 25.3 billion during the same period. Heavy and light industrial activities are mainly concentrated at Kunming. Although Yunnan's per capita income grew annually at 14.2 per cent during 1980-1992, per capita income in 1992 was Y 1,175/person which is 34 per cent lower than the national average of Y 1,703/person.

55. The proposed expressway starts in the east at Chuxiong, passes through Dali and ends in the west at Pingpo. The route is a major provincial artery and is part of the Shanghai-Kunming-Ruili national artery highway. The route passes through a relatively poor area with per capita income (Y 905 per person) compared with the national average (Y 1,703 per person) and the provincial average (Y 1,175 per person). The Project expressway will be well integrated in the provincial road network through 16 local roads with a total length of 2,294 km, which will directly connect the Project expressway to rural areas. In 1992, population in the Project area totaled 5.6 million, which constitutes 14.6 per cent of the provincial population. The Project area (58,717 sq km) occupies 14.9 per cent of the total provincial land area.

4. Traffic on the Project Roads

56. Between 1985 and 1993, traffic on the Project roads has on average grown at 6.5 per cent per annum in Yunnan Province and at 12.6 per cent per annum in Heilongjiang Province. The present traffic level (about 1,900 medium truck units[1] per day in Heilongjiang Province and about 4,100 medium truck units per day in Yunnan Province) exceeds the capacity of the existing roads and causes frequent congestion. As a result, average speeds on the existing roads are below cost-effective levels. This situation is aggravated by road and railway intersections, pedestrian crossings, and mixed motorized and nonmotorized agricultural traffic near and in villages and towns. The expansion of the market economy will continue to favor high growth rates in road traffic. Owing to the anticipated sustained growth in foreign trade, increases in transport demand will be concentrated in transport corridors serving the main ports and their hinterlands. The Project road users are expected to benefit from this development. Heilongjiang and Yunnan are experiencing rapid economic development, especially their manufacturing industries. As a consequence, traffic growth rates are forecast at about 7-9 per cent per annum for the remainder of this decade, to level off to about 4-5 per cent per annum thereafter (see Appendix 1).

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[1] One medium truck equivalent unit corresponds to approximately two passenger cars.

E. Technical Justification

57. The proposed expressways are a logical response to the traffic problems in the Project areas. The existing roads were constructed about 40 years ago. Their design capacities range from 200 medium truck units per day for sections built to the Class 4 standard to 2,000 medium truck units per day for road sections built to the Class 3 standard. Current traffic volumes are exceeding these ceilings and are causing traffic congestion and an increasing number of traffic accidents. Therefore, construction of a two-lane highway was recommended in the feasibility study for the Heilongjiang Project, while a four-lane configuration was recommended in the feasibility study for the Yunnan Project. The observed traffic congestion justifies the expansion of highway capacity. The controlled expressway concept is justified by the need to separate slow-moving, nonmotorized agricultural traffic from motorized traffic. In terms of design and layout, the expressways are least-cost and viable solutions. Furthermore, road transport has a comparative advantage over other modes in the Project areas because of the substantial volume of high-value manufactured goods that travel short distances.

F. Cost Estimates

58. The total cost of the proposed Heilongjiang Project is estimated at $330.0 million equivalent. The foreign currency costs, totaling $142.0 million, account for 43.0 per cent of the total cost, and local currency costs of $188.0 million equivalent contribute the remaining 57.0 per cent.

59. The total cost of the Yunnan Project is estimated at $461.4 million equivalent. The foreign currency costs, totaling $201.7 million, account for 43.7 per cent of the total cost, and local currency costs of $259.7 million equivalent contribute the remaining 56.3 per cent. The cost estimates of each Project include adequate provisions for land acquisition and relocation of people (see para. 90), price escalation and physical contingencies, and interest and other charges on the Bank loan during construction. A detailed break-down of cost items is provided in **Appendix 2** and a summary in Table 1 and Table 2.

Table 1: Heilongjiang Project Cost Estimates
($ million)

Item	FOREIGN EXCHANGE	LOCAL CURRENCY	TOTAL COST
I. Heilonjiang			
Civil Works [a]	92.7	109.6	202.3
Incremental Costs	0.0	5.9	5.9
Equipment [a]	11.8	0.0	11.8
Land Acquisition [b]	0.0	21.3	21.3
Supervision	0.6	4.3	4.9
Training	0.4	0.0	0.4
Contingencies [c]	16.5	46.9	63.4
IDC	20.0	0.0	20.0
Total	**142.0**	**188.0**	**330.0**

Table 2: Yunnan Project Cost Estimates
($ million)

Item	FOREIGN EXCHANGE	LOCAL CURRENCY	TOTAL COST
Civil Works [a]	143.8	175.6	319.4
Incremental Costs	0.0	5.0	5.0
Equipment [a]	11.0	0.0	11.0
Land Acquisition [b]	0.0	9.9	9.9
Supervision	1.0	4.8	5.8
Training	0.4	0.0	0.4
Contingencies [c]	22.9	64.4	87.3
IDC	22.6	0.0	22.6
Total	**201.7**	**259.7**	**461.4**

IDC — Interest and other charges on the Bank loans during construction
[a] Base cost at 1994 prices.
[b] Including land acquisition and relocation costs.
[c] Physical contingencies at 10 per cent of civil work base costs and price escalation at 2.5 per cent annually for foreign exchange, and 12 per cent for 1994 and 7 per cent from then onwards for local currency costs.

Source: Heilongjiang and Yunnan Communications Departments

G. Financing Plan

60. It is proposed that the Bank provide a loan of $142 million to finance the total foreign exchange cost of the Heilongjiang Project and a loan of $150 million to finance part of the foreign exchange cost of the Yunnan Project. The Government will finance the rest of the foreign exchange costs of the Yunnan Project and the entire local currency costs of both Projects from two sources: the vehicle purchase fee fund administered by MOC and the road maintenance fee fund administered by the PCDs. The Government has given assurances that these funds will be made available on a timely basis. Detailed financing plans for both Projects are provided in **Appendix 3**. The proposed Bank loans, from ordinary capital resources, are each proposed to have maturity periods of 24 years, including grace periods of 4.5 years, equivalent to the remaining implementation period after loan approval. The interest rates for the two loans will be based on the Bank's pool based variable interest rate lending system for US dollars. The Borrower will be the PRC. The Government will relend the proceeds to the EAs on substantially the same terms and conditions as the proposed Bank loans. The interest rate, repayment periods, and grace periods will be the same as the Bank loans and the EAs will bear the risk of interest rate variations and the foreign exchange risk.

Table 3: Financing Plan
($ million)

Source	FOREIGN EXCHANGE	LOCAL CURRENCY	TOTAL
I. Heilongjiang Province			
Bank Loan	142.0	0.0	142.0
Government Financing	0.0	188.0	188.0
Total	**142.0**	**188.0**	**330.0**
II. Yunnan Province			
Bank Loan	150.0	0.0	150.0
Government Financing	51.7	259.7	311.4
Total	**201.7**	**259.7**	**461.4**

H. Implementation Arrangements

1. Organization

61. The agencies that will implement the proposed Projects are the Heilongjiang Harbin-Tongjiang Highway Corporation under the Heilongjiang Provincial Communications Department (HPCD) for the Heilongjiang Project, and the Yunnan Chuxiong-Dali Highway Corporation under the Yunnan Provincial Communications Department (YPCD) for the Yunnan Project. Responsibility for implementation will be assigned to the directors of the provincial expressway corporations under the overall supervision of the Directors, HPCD and YPCD. The Project Directors will be assisted by two senior highway engineers. Project management offices, responsible to the two senior highway engineers, will be established and will handle day-to-day implementation and administration of contracts.

2. Implementation Schedule

62. Designs for the project roads were carried out by the Provincial Survey and Design Institutes in accordance with Technical Standards on Highway Engineering issued by MOC. Other preconstruction activities, such as prequalification of contractors, tendering, and awarding of contracts will be undertaken during the second half of 1994 and early 1995. Both Projects will be implemented over about 4.5 years, including the preconstruction phase. In Heilongjiang, construction will commence in May 1995 and completion is expected by October 1998. In Yunnan Province, construction is scheduled to commence in August 1995 and the Project will be completed by July 1998. Implementation schedules showing the individual activities of the various Project stages are provided in **Appendix 4**.

63. The Bank approved advance action for all civil works packages in view of the need to start construction works in March 1994. Advance action will involve prequalification of contractors, tendering, and bid evaluation. Similarly, advance action has been approved for the procurement of materials, plant, equipment, and vehicles in order to meet the target date for the start of construction. In addition, retroactive financing of civil works contracts awarded prior to

loan effectiveness has been proposed. The retroactive financing is not expected to exceed 10 per cent of each loan amount. The Bank's approval of retroactive financing does not commit the Bank to finance the Projects.

3. Procurement

64. Contracts for civil works, goods, and services to be financed by the Bank will be procured in accordance with the Bank's *Guidelines for Procurement*. For civil works, procurement will be undertaken using international competitive bidding (ICB) procedures. One package under each Project for ancillary expressway operation facilities (small buildings and traffic engineering facilities) will be implemented by force account. Materials, plant, and equipment for construction laboratories and field testing, road maintenance, and toll operation, as well as vehicles for site supervision and equipment for offices will be procured as appropriate using ICB, international shopping, and direct purchase. Detailed contract packages are listed in **Appendix 5**. ICB and international shopping procurement, including prequalification, tendering, and bid evaluation, will be undertaken by two international tendering companies, each responsible for one Project. The tendering companies are well qualified to perform these tasks as they have gained relevant experience under other externally financed projects, including those of the World Bank, the Bank, and bilateral finance agencies.

4. Consulting Services

65. Services of international consultants will be needed for construction supervision. The proposed Projects also provide training components to strengthen project management, contract administration, and traffic, structural, and tunnel engineering. All consultants to be financed under the loans will be recruited by the EAs in accordance with the Bank's *Guidelines on the Use of Consultants*. International consultants under Bank financing will be engaged for the following tasks:

(i) Under **the Heilongjiang Project**, two internationally experienced engineers will be attached to the Project Management Office to provide advisory services and guidance on (i) project management, construction supervision, contract administration, and quality control; and (ii) structural engineering. All other supervisory positions will be filled by domestic consultants. An estimated 27 person-months of international and 8,800 person-months of domestic private consultant services will be required.

(ii) For **the Yunnan Project**, international consultant services will be needed in the fields of: (i) project management, construction supervision, contract administration, and quality control; (ii) traffic engineering; and (iii) tunnel engineering. All other technical and administrative positions will be staffed by domestic consultants. An estimated 43 person-months of international and 9,400 person-months of domestic consultant services will be needed.

66. The international consultants will provide for HPCD and YPCD staff, the EAs, the domestic consultants, and contractors, on-the-job training in project management/contract administration, internationally accepted construction and quality control techniques, and traffic, tunnel, and structural engineering. The consultants will also identify the needs and recommend overseas training courses for suitable candidates from HPCD, YPCD, and the EAs, to strengthen the institutional and engineering capacities of these institutions. Tentatively, about 60 person-months of overseas training will be needed under each Project. The main fields for overseas

training are in project management and contract administration, highway planning, pavement design and materials testing, as well as traffic, tunnel, and structural engineering. Details of the overseas training program, including formal selection procedures for training candidates, will be determined by HPCD, YPCD and the EAs, in consultation with the international consultants. The details will be submitted to the Bank for approval. Candidates trained abroad will be required to submit a report on the training received to HPCD, or YPCD, (as appropriate) and the Bank. The report format will also be developed by HPCD, YPCD, and the international consultants. The proposed training program, selected candidates, and report format will be forwarded to the Bank for approval.

67. Technical and administrative positions will be staffed by domestic consultants for construction supervision, who will be recruited in accordance with procedures acceptable to the Bank. The EAs will select short lists of firms accredited by the National Government, evaluate them on their experience and the technical competence of personnel proposed, and rank them. The evaluation, ranking and recommendations on selection will be forwarded to the Bank for review. Outline terms of reference for consulting services for construction supervision and training are shown in **Appendix 6**.

5. Land Acquisition

68. The Project roads are largely along new alignments. Acquisition of land is under way. The Government has assured the Bank that all necessary land, properties, rights-of-way, etc. required for the roads will be made available promptly to ensure timely implementation. Land must also be acquired for resettling 392 families under the Heilongjiang Project and about 700 families under the Yunnan Project (see paras. 91-94). Land acquisition and resettlement activities have been properly planned by the EAs and are governed by the Land Administration Law of the PRC and Provincial Land Administration Regulations, on which basis resettlement schemes under previous Bank-financed projects have been carried out satisfactorily. The existing legislation also ensures that people to be relocated will be adequately compensated. The costs are included in the Projects' cost estimates.

6. Reports, Accounts, and Audit

69. The Government has agreed that, as in previous Bank-financed projects, arrangements satisfactory to the Bank will be made for reporting progress of Project implementation. The EAs will provide the Bank brief monthly reports in such form and detail as the Bank may reasonably request. To facilitate post evaluation of the proposed Projects, the EAs will also furnish the Bank, within three months of Project completion, completion reports providing implementation, costs, benefits, and other details as requested by the Bank.

70. The Government has agreed to cause the EAs to furnish the Bank annually with audited accounts and related financial statements for the Projects. Such statements will be audited by independent auditors and in a format acceptable to the Bank. The audited accounts and financial statements will be submitted within six months of the end of each related fiscal year. In addition to financial statements for the Project accounts, the EAs have agreed to submit to the Bank within six months of each related fiscal year, for a period of five years after commencement of toll road operations, their financial statements (income statements and balance sheets) in a format acceptable to the Bank.

7. Benefit Monitoring and Evaluation

71. The Government has agreed to undertake, with assistance from the consultants, benefit monitoring and evaluation activities to ensure that the facilities to be improved under the Projects are managed efficiently and that their benefits are maximized. The data required will be collected and analyzed immediately after Project completion, and again five years later. The 1993 traffic surveys will constitute the baseline survey that is normally carried out prior to construction. The nature of the data to be collected, the methodology for analysis and the reporting requirements have been agreed upon between the Government and the Bank. A midterm review of both Projects is envisaged for early 1997. By this time, progress in civil works implementation, TA implementation, and policy and institutional reforms will enable a meaningful review of the accomplishments under the proposed Projects.

I. Executing Agencies

72. The EA for the Heilongjiang Project will be the Heilongjiang Harbin-Tongjiang Highway Corporation, under HPCD; and the EA for the Yunnan Project will be the Yunnan Chuxiong-Dali Highway Corporation under YPCD. Consistent with the Government's commercialization policy, the Highway Corporations were formed to collect tolls and to maintain the roads within the purview of provincial governments. The business licenses were recently issued by the concerned Provincial Industrial and Commercial Administration Bureaus. The Corporations are re-employing staff from the erstwhile High Class Highway Headquarters and Highway Administration Bureaus. The organization charts for the two EAs are shown in **Appendix 7**.

J. Environmental Aspects

73. Both Projects have had adequate environmental examinations. Neither presents any specific environmental problems. This assessment is based on the assumption that the expressways will be limited access toll roads and that ribbon development along them will not be permitted. This will reduce traffic congestion and pollution in urban areas. The establishment of a 400-meter corridor (200 meters on each side of the highways), within which no new construction of hospitals, schools, or other similar public buildings will be allowed, will ensure that air and noise pollution impacts on the population are minimized, and will permit future widening of the highways with minimum environmental disturbance, or engineering and construction problems.

K. The Proposed Technical Assistance

74. To expand ongoing policy dialogue with the Bank, the Government has requested that TA be provided to address the mounting road safety concerns. The Government has also requested that TA be provided to further develop human resources in highway planning. The Mission and the Government have agreed that the findings of the ongoing Bank-financed TAs will be disseminated in other provinces through MOC in conjunction with implementation of the proposed Projects. The TAs will be financed by the Bank on a grant basis.

1. Technical Assistance for the Preparation of a Road Safety Program

75. The TA will formulate for Heilongjiang Province a comprehensive highway safety program that will serve as a model for similar programs in other provinces. The TA will establish

and/or improve capacities in the institutions concerned to enable them to approach the problem of unsafe road transport in a systematic manner. The TA will (i) assess common problems associated with organizations responsible for road safety, and (ii) identify the prerequisites necessary for them to be more effective. The analysis will include a review of human resources and training needs, identification of the legal framework, assessment of the accident data base and its quality, and enforcement of vehicle and driving standards and regulations. The results of this analysis will enable a framework to be developed for systematically assessing training needs, and establishment of base lines against which improvements in the effectiveness of road safety activities can be measured.

76. The TA will require about 17 person-months from international consultants experienced in (i) highway design and planning, (ii) road safety regulation and enforcement, (iii) traffic engineering, (iv) road worthiness standards of motor vehicles, and (v) data base development for accident records. The consultants will also coordinate overseas training of staff of the agencies concerned with road safety in Heilongjiang Province. Under the TA about 20 person-months of overseas training will be provided.

77. The total cost of the TA is estimated at $800,000, including a foreign exchange component of $549,000 and a local cost component of about $251,000 equivalent. The Government has requested the Bank to provide a TA grant of $600,000 to cover the entire foreign exchange cost and a portion of the local currency costs ($51,000). Outline terms of reference for the TA and details of the cost estimates are shown in **Appendix 8**.

2. Technical Assistance for Provincial Highway Network Planning

78. The TA will assist HPCD to prepare the 30-year investment program and to bring provincial planners up to a technical level that will enable them to understand transport planning computer software and to undertake transport modeling. The TA will help identify priority roads with a focus on the network of provincial and county roads that feeds into national trunk roads. The development of such a secondary network will distribute the benefits of the expressways to people of all income strata, and will ensure that the Government's investment plans for the highway subsector have an appropriate regional and social balance. The main activities under the TA will include (i) designing and processing of origin-destination surveys, (ii) calibration of traffic counts, (iii) computerized modeling to assign traffic flows, and (iv) economic evaluation of proposed investments.

79. Three international experts experienced in transport planning and computer modeling will be required for a total of about 18 person-months. The experts will act as advisors and will assist local staff in the four main activities. The local staff will be required to assemble the requisite data, such as road inventories, traffic counts, economic activities, road construction and maintenance costs, and development plan projects.

80. The total cost of the TA is estimated at $800,000, including a foreign exchange component of $500,000 and a local cost component of about $300,000 equivalent. The Government has requested the Bank to provide a TA grant of $600,000 to cover the entire foreign exchange cost and a portion of the local currency costs ($100,000 equivalent). Outline terms of reference and details of the cost estimates are shown in **Appendix 9**.

V. JUSTIFICATION OF THE PROJECTS

A. Financial and Economic Analyses

1. Financial Analysis

81. The Government has adopted the policy of mobilizing resources by collecting tolls from the users of the new roads. The toll tariffs are a part of the entire road user charge tariff. The degree of cost recovery through these charges is satisfactory (see paras. 14, 15, and 36). As only one element in the total collection of road user charges, toll tariffs have to be determined in line with what the market can bear. Full cost recovery, if attempted through tolls in addition to other road user charges, could cause traffic to divert from the expressways. The EAs assisted by consultants have considered these issues and have determined appropriate tolls for the proposed expressways. The level of tolls is set in accordance with traffic demand and based on loan amortization schedules, as loan repayments have to be met by toll revenues. Thus, the proceeds from toll collections will be retained by the expressway corporations and earmarked for interest and amortization payments of the credit obligations incurred in connection with expressway construction. With the proposed toll rate of Y 0.34 per vehicle-km and the expected development of traffic, the Project roads can generate sufficient revenue to meet this objective. **Appendix 10** provides cash flow projections, and pro forma income statements and balance sheets for the two EAs.

82. Although the proposed toll tariffs will generate enough revenue to adequately contribute to cost recovery and to meet loan amortization obligations of the EAs, the Project expressways will in the medium term not be profitable, because of the composition, volume and growth of traffic. The financial and traffic conditions surrounding the Project expressways will therefore not enable commercial operation, nor yield returns on investment sufficient to attract private participation in the financing. Based on the proposed toll rates, the Heilongjiang Project yields an FIRR of 3.7 per cent per annum and the Yunnan Project an FIRR of 2.4 per cent per annum. The financial analyses further show that very high toll rates (about Y 1.4 per vehicle km for Heilongjiang and Y 1.20 per vehicle km for Yunnan) would be required to make the Projects attractive for private investors. These rates would, however, significantly exceed the level of the average economic vehicle operating cost (VOC) savings, and would thus discourage traffic and eventually be detrimental to the Projects' viability in both financial and economic terms.[1]

2. Economic Analysis

83. The economic evaluation of the proposed Projects is based on a comparison of the "with" and "without" Project scenarios. Without the Projects, the existing roads will be used until they reach the limits of their capacity leading to an increasing degree of traffic congestion and mixture of fast and slow moving vehicles. This will cause costly upgrading of the roads to enable them to cope with anticipated future traffic. With the Projects, the new highways with improved horizontal and vertical alignments will be extensively used for intercity traffic because

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[1] The principle to be observed in setting the toll rate is that the users, after paying the toll, must still be better off, than if they used the old road, where no toll had to be paid. The quantifiable economic benefit accruing to the users of the Projects are Y 0.83 per vehicle-km in Heilongjiang and Y 0.88 per vehicle-km in Yunnan. Toll rates, which were to be set at these levels, would even out the advantages provided by the Projects and thus would do little to attract traffic to the new roads. Therefore, only a portion of the economic benefits can be converted into financial revenues. As a consequence, the FIRRs of the Projects must be expected to be lower than their EIRRs.

of (i) lower VOCs, (ii) shorter travel time because of higher vehicle speeds, and (iii) distance reductions. The existing roads will be used mostly by local traffic and slow moving vehicles such as tractors, motor cycles, and bicycles. Based on regional macroeconomic parameters and historical traffic growth, the capacity of the existing road in Heilongjiang Province will be fully utilized by 2002, and in Yunnan Province by 1997. The Project roads will provide capacity sufficient to cope with the projected traffic growth during the period under consideration. Considering the nature of traffic on the existing roads and the effect of the toll charges, an estimated 70 per cent of the current traffic will divert to the Project highways.

84. The principal sources of economic benefits from the Projects are (i) VOC savings for vehicles using the highways that would otherwise have to travel on the old roads, (ii) savings in road maintenance costs, (iii) benefits from reduced congestion accruing to traffic that remains on the old roads after the highways open, and (iv) benefits to traffic that diverts from rail to road transport and traffic that is generated by the availability of the new highways.

85. VOC savings amount to about 80 per cent of the total benefits expected. Unit economic VOC for passenger and freight traffic "with" and "without" the Projects were estimated. VOC savings will come from increased vehicle speed, improved road surfaces and alignments and reduced traffic congestion. Based on the traffic projections for the new roads, benefits of VOC savings were calculated for increased average speed plus a better road surface, and for traffic diverted from the old roads to the new highways.

86. The diversion of about 70 per cent of traffic to the new highways will relieve congestion, increase operating performance, and generate VOC savings for the vehicles remaining on the old roads. Additionally, economic benefits will come from increased economic activity and transport demand generated by the improved accessibility offered by the new highways. The benefit to the traffic arising from generated economic activity was conventionally valued at 50 per cent of the unit saving accruing to the diverted road traffic.

87. The above assumptions have resulted in Economic Internal Rates of Return (EIRRs) for both Projects in excess of 17 per cent for both Projects. The EIRR of the Heilongjiang Project has been estimated at 18.8 per cent and that of the Yunnan Project at 17.8 per cent. The EIRRs have been subject to sensitivity analyses to test the effects of possible unfavorable changes in the key parameters. The analyses indicated that both Projects will maintain satisfactory economic viabilities, with EIRRs of more than 13 per cent, even under adverse scenarios (10 per cent cost increase, 10 per cent traffic decrease, and a one- year implementation delay). Detailed economic analyses are shown in **Appendix 11**.

3. Project Risks

88. There is little risk in the Projects because of the following reasons: (i) past and expected rapid growth in road traffic in the two corridors; (ii) ease of construction because of the terrain in the Project areas; and (iii) proposed strong Project management organization. The risk that the facilities will be under-utilized is minimal. The past and expected growth in road traffic in the two corridors is substantial. Adequate quality control measures and the uncomplicated terrain of the Project areas mitigate against construction risks. The EAs' capabilities in project execution and the proposed strong Project management organization will prevent delays in Project implementation. The Projects are not expected to face any major technical or managerial risk. The past record of road maintenance in the PRC is very favorable, which indicates that the risk of inadequate maintenance of the roads is limited.

B. Environment

89. Environmental impact assessment (EIA) studies were undertaken for each expressway project by the EAs assisted by consultants and Bank staff using the Bank's *Environmental Guidelines for Selected Infrastructure Projects* (Highways and Roads). The summary EIA reports were circulated to the Board on 1 June 1994. The studies revealed that (i) the proposed expressways will not traverse environmentally sensitive areas such as forests, archaeological sites, national parks, wildlife reserves and sanctuaries; and (ii) the Projects' adverse environmental impacts, i.e., landslides, drainage disruptions, and soil erosion, can be avoided or minimized through appropriate measures outlined in the EIA reports.

C. Social Dimensions

90. People living in the Projects' influence areas will benefit through improved transport services and easier conditions for traveling to agricultural processing, commercial, educational, health and administrative centers. The civil works are expected to generate local employment of about 1,500 person-years, including 600 person-years for unskilled workers. The reduction in congestion and traffic conflicts on the existing roads will reduce traffic accidents and will thus benefit the users of these roads. Reduced VOCs resulting from improved traffic and road conditions will initially benefit road users, particularly road transport operators. Transport charges in the Projects' influence areas vary in accordance with road conditions. Because of this, it is expected that a portion of the VOC savings accruing from the road improvements will be passed on to road users.

91. An estimated 392 households (about 1,100 people) will have to be relocated in Heilongjiang and 770 households (about 2,300 people) in Yunnan. In both provinces, the relocated people will be predominantly farm workers. Institutional mechanisms are being established to provide alternative livelihood opportunities. First, leased farmland will be replaced so that alternative cultivable land will be available. Secondly, the prescribed compensation fees (administered by the provincial authorities) will be held in local development funds to augment employment options. In addition, township enterprises will be expanded to absorb surplus labor and opportunities will be created in nearby state-owned enterprises for absorption of displaced agricultural households wishing to pursue alternative employment.

92. The Projects are not expected to cause loss of jobs. New employment opportunities will be created, including construction work on the Projects and work in the service industry (such as catering, retailing, and vehicle servicing), which will develop around the expressways' access areas. In the longer term, the Projects will also lead to diversification of the two provinces' economies and employment opportunities. Increased service employment related to tourism in Yunnan is likely.

93. In Heilongjiang as in Yunnan, all relocated people will be resettled within 1 km of their original dwellings (and often substantially less). In Yunnan, settlements of minorities will be left intact. To minimize impacts caused by community separation, an average of one overpass or underpass will be built for every 800 meters in populated areas. Particular attention will be paid to the construction of underpasses near primary schools in order to maintain proximity between the schools and the new dwellings of relocated families. Extensive preparation of the host settlement communities will be unnecessary because the scale and distance of the resettlement is limited. The relocated families will almost invariably use the same schools, health

centers, and recreational grounds and will not be moving to unfamiliar communities or villages. Social impacts will be minimal compared to similar projects in more densely populated areas.

94. Land acquisition and resettlement are scheduled to take place between July 1994 and January 1995 for the Heilongjiang Project and between November 1994 and April 1995 for the Yunnan Project. Adequate funds have been allocated to the EAs and are included in the Projects' cost estimates. For both Projects, implementation of the resettlement action plans will be monitored by the relevant highway department within the provincial governments. Progress will be monitored continuously, through collection of data, interviews, and on-site spot checks of resettlement activities. Sample surveys will be carried out at the village level early in the resettlement process to review compensation actually received by individuals. There will also be random checks and interviews to monitor resettlement.

VI. ASSURANCES

95. The Government has given the following assurances, in addition to the standard assurances, which have been incorporated in the legal documents:

(i) **Road Traffic Safety**: Within one year of the completion of the Road Safety TA, the Government will review the outcome of the TA with a view to its applicability to provinces other than Heilongjiang, and will prepare and submit to the Bank for review and comments a road safety program including measures to improve the road safety situation in the medium and long term.

In specifying and selecting equipment and facilities for road traffic safety on the Harbin-Tongjiang expressway, HPCD will closely coordinate with the Provincial Public Security Bureau and will submit to the Bank a list of such equipment endorsed by the Provincial Public Security Bureau.

(ii) **Network Integration**: Within one year of the completion of the Network Integration TA, the Government will, in accordance with the recommendations of the TA accepted by the Government and the Bank, submit to the Bank for review and comments an investment program for the provincial highway network of Heilongjiang Province incorporating the investments proposed for roads that are subordinate to the main traffic arteries.

(iii) **Training**: Prior to undertaking overseas training, the EAs will, in consultation with the international consultants, prepare a training program, select candidates for training, and develop the format of the report that will be submitted by such candidates upon completion of training. The EAs will submit the training program, the list of candidates, the report format, and the training reports to the Bank for review.

The Government shall disseminate to the provincial governments involved in NTHS implementation expertise gained through the training program on highway planning and evaluation techniques.

(iv) **Operation and Maintenance**: The Government shall ensure that, upon completion of the Projects, the Projects' facilities will be adequately operated and maintained. To this end, the Government will provide, or cause to be provided, to the EAs on a timely basis all funds needed in addition to their internally generated revenues.

(v) **Environmental Aspects**: The Government will ensure that such environmental concerns as drainage, landslides, erosion and related prevention of damage to the natural environment receive due attention in the design, construction, operation, and maintenance of the Projects' facilities.

The Government will ensure that the mitigation measures, environmental monitoring program, and recommendations included in the Environmental Action Plans are strictly implemented by the EAs.

(vi) **Resettlement Plan**: The EAs will promptly and efficiently carry out the agreed resettlement action plans and will keep the Bank informed of the progress of their implementation. The EAs will ensure in particular that persons affected by the proposed Projects will improve or at least maintain the standard of living they were enjoying before the proposed Projects.

(vii) **Tolls**: The EAs, in consultation with the Bank, will establish appropriate toll charges for the use of the expressways so as to encourage traffic and cost recovery. The level of tolls will be reviewed from time to time by the EAs and the Bank to ensure that appropriate toll levels are maintained.

(viii) **Financial**: The EAs, in consultation with the Bank, shall adopt appropriate measures, including timely toll rate increases, to ensure that the EAs generate sufficient revenue to meet all cash operating costs and debt service payments.

(ix) **Mid-Term Review**: The Government will cause the EAs to conduct periodic reviews of progress in Project implementation, in consultation with the Bank. In particular, the EAs in consultation with the Bank will, within two years of the Loans becoming effective, undertake a comprehensive mid-term review of the implementation of the Projects.

(x) **Benefit Monitoring and Evaluation**: The Government shall cause the EAs to undertake regular benefit monitoring and evaluation of the Projects to ensure that the Projects' facilities are managed efficiently and that Projects' benefits are maximized. To this end, the required data shall be collected and analyzed immediately after the Projects' completion and again five years thereafter in accordance with the methodology agreed with the Bank.

VII. RECOMMENDATION

96. I am satisfied that the proposed loans would comply with the Articles of Agreement of the Bank and recommend that the Board approve:

(i) the loan of $142.0 million to the People's Republic of China for the Heilongjiang Expressway Project from the Bank's ordinary capital resources, with interest to be determined in accordance with the Bank's pool-based variable lending rate system for US dollar loans and with an amortization of 24 years, including a grace period of 4.5 years and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan Agreement and Project Agreement (Heilongjiang Expressway Project) presented to the Board; and

(ii) the loan of $150.0 million to the People's Republic of China for the Yunnan Expressway Project from the Bank's ordinary capital resources, with interest to be determined in accordance with the Bank's pool-based variable lending rate system for US dollar loans and with an amortization of 24 years, including a grace period of 4.5 years, and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan Agreement and Project Agreement (Yunnan Expressway Project) presented to the Board.

M. Sato
President

31 August 1994

LIST OF APPENDIXES

TRAFFIC ON THE PROJECT ROADS

Origin-destination surveys were conducted by the Heilongjiang Provincial Communications Department and Yunnan Provincia Communications Department on their road sections of the proposed Projects. The origin-destination traffic data have been calibrated based on the time series traffic counts conducted on the existing roads. The base year (1993) annual average daily traffic has then been estimated at 1,847 medium-sized truck units per day for the Heilongjiang Project and at 4,076 medium-sized truck units per day for the Yunnan Project.[1] Traffic projections for 1994 to 2018 have been derived taking into account the time series traffic data and macroeconomic parameters for cities and counties through which the proposed highways will pass. These parameters include the growth rate of total output value of industry and agriculture, growth rate of population, and per capita income. Income elasticity of demand for transport has also been estimated and incorporated in the projections of passenger traffic growth. Based on the traffic projections, it is estimated that the capacity of the existing roads in the Heilongjiang Project area would be fully utilized by 2002 and in the Yunnan Project area by 1997.

[1] These traffic data are equivalent to 3,694 passenger car units for the Heilongjiang Project and 8,152 passenger car units for the Yunnan Project.

(Reference in text: page 14 , para. 56)

TRAFFIC PROJECTION
(Average Daily Traffic in Medium Truck Unit)

Table 1: Heilongjiang Project

Year	Truck			Passenger Car			Trailer	Total
	Small	Medium	Large	Small	Medium	Large		
Actual								
1985	78	275	35	138	68	73	51	717
1986	91	320	40	161	80	85	58	835
1987	105	352	45	180	91	94	63	931
1988	138	449	58	234	114	119	83	1,196
1989	149	491	65	258	123	134	100	1,320
1990	148	490	65	258	123	136	107	1,327
1991	172	568	75	297	145	157	115	1,528
1992	192	646	86	334	162	175	122	1,717
1993	204	687	91	366	177	192	130	1,847
Projection								
2000	335	1,129	150	750	363	393	214	3,334
2010	510	1,720	228	1,199	580	629	326	5,192
2018	651	2,196	291	1,555	752	815	416	6,676
Average Annuan Growth Rate (%)								
1985–1993	12.8	12.1	12.6	13.0	12.6	12.9	12.6	12.6
1993–2000	7.3	7.3	7.3	10.8	10.8	10.8	7.3	8.8
2000–2010	4.3	4.3	4.3	4.8	4.8	4.8	4.3	4.5
2010–2018	3.1	3.1	3.1	3.3	3.3	3.3	3.1	3.2

Source: Provincial Communications Department

Table 2: Yunnan Project

Year	Truck			Passenger Car			Trailer	Total
	Small	Medium	Large	Small	Medium *	Large		
Actual								
1985	198	1,042	178	309	–	151	585	2,462
1986	195	1,010	177	300	–	146	579	2,407
1987	199	1,046	178	312	–	151	586	2,473
1988	225	1,176	200	352	–	169	661	2,784
1989	231	1,209	207	357	–	172	682	2,860
1990	254	1,295	225	379	–	184	737	3,075
1991	264	1,363	234	402	–	193	771	3,227
1992	289	1,526	253	458	–	217	845	3,588
1993	324	1,746	279	534	–	248	946	4,076
Projection								
2000	533	2,878	460	847	–	394	1,518	6,629
2010	797	4,301	687	1,194	–	555	2,269	9,803
2018	1,026	5,533	884	1,501	–	698	2,920	12,561
Average Annuan Growth Rate (%)								
1985–1993	6.3	6.7	5.8	7.1	–	6.5	6.2	6.5
1993–2000	7.4	7.4	7.4	6.8	–	6.8	7.0	7.2
2000–2010	4.1	4.1	4.1	3.5	–	3.5	4.1	4.0
2010–2018	3.2	3.2	3.2	2.9	–	2.9	3.2	3.1

* Included in large passenger car.

Source: Provincial Communications Department

PROJECT COST ESTIMATES

Table 1: Heilongjiang Project
($ million)

Component	Foreign Exchange	Local Currency	Total
I. Civil Works			
Civil Works	92.7	109.6	202.3
Incremental Project Costs	–	5.9	5.9
Subtotal	92.7	115.5	208.2
II. Equipment			
Operation and Maintenance	9.5	–	9.5
Road Safety	1.5	–	1.5
Supervision	0.8	–	0.8
Subtotal	11.8	–	11.8
III. Land Acquisition and Relocation			
Land Aquisition	–	17.7	17.7
Relocation	–	3.6	3.6
Subtotal	–	21.3	21.3
IV. Construction Supervision and Training			
Supervision and Domestic Training	0.6	4.3	4.9
Overseas Training	0.4	–	0.4
Subtotal	1.0	4.3	5.3
Base Cost	105.5	141.1	246.6
V. Contingencies			
Physical [a]	9.3	11.6	20.9
Price Escalation [b]	7.2	35.3	42.5
Subtotal	16.5	46.9	63.4
VI. IDC	20.0	–	20.0
TOTAL	142.0	188.0	330.0

Source: Provincial Communications Department

– = magnitude zero
IDC – Interest During Construction

[a] 10 per cent of civil work base costs.
[b] 2.5 per cent annually for foreign exchange costs, and 12.0 per cent for 1994 and 7.0 per cent from then onwards for local currency costs.

(Reference in text: page 15 , para. 59)

Table 2: Yunnan Project
($ million)

Component	Foreign Exchange	Local Currency	Total
I. Civil Works			
Civil Works	143.8	175.6	319.4
Incremental Project Costs	–	5.0	5.0
Subtotal	143.8	180.6	324.4
II. Equipment			
Operation and Maintenance	9.3	–	9.3
Road Safety	0.3	–	0.3
Supervision	1.4	–	1.4
Subtotal	11.0	–	11.0
III. Land Acquisition and Relocation			
Land Acquisition	–	6.3	6.3
Relocation	–	3.6	3.6
Subtotal	–	9.9	9.9
IV. Construction Supervision and Training			
Supervision and Domestic Training	1.0	4.8	5.8
Overseas Training	0.4	–	0.4
Subtotal	1.4	4.8	6.2
Base Cost	156.2	195.3	351.5
V. Contingencies			
Physical [a]	14.4	18.1	32.5
Price Escalation [b]	8.5	46.3	54.8
Subtotal	22.9	64.4	87.3
VI. IDC	22.6	–	22.6
TOTAL	201.7	259.7	461.4

[a] 10 per cent of civil work base costs.

[b] 2.5 per cent annually for foreign exchange costs, and 12.0 per cent for 1994 and 7.0 per cent from then onwards for local currency costs.

Appendix 3

FINANCING PLAN

Table 1: Heilongjiang Project
($ million)

Source	Foreign Exchange	Local Currency	Total
Bank	142.0	–	142.0
Government	–	188.0	188.0
Total	142.0	188.0	330.0

– = magnitude zero

Source: Provincial Communications Department

Table 2: Yunnan Project

Source	Foreign Exchange	Local Currency	Total
Bank	150.0	–	150.0
Government	51.7	259.7	311.4
Total	201.7	259.7	461.4

– = magnitude zero

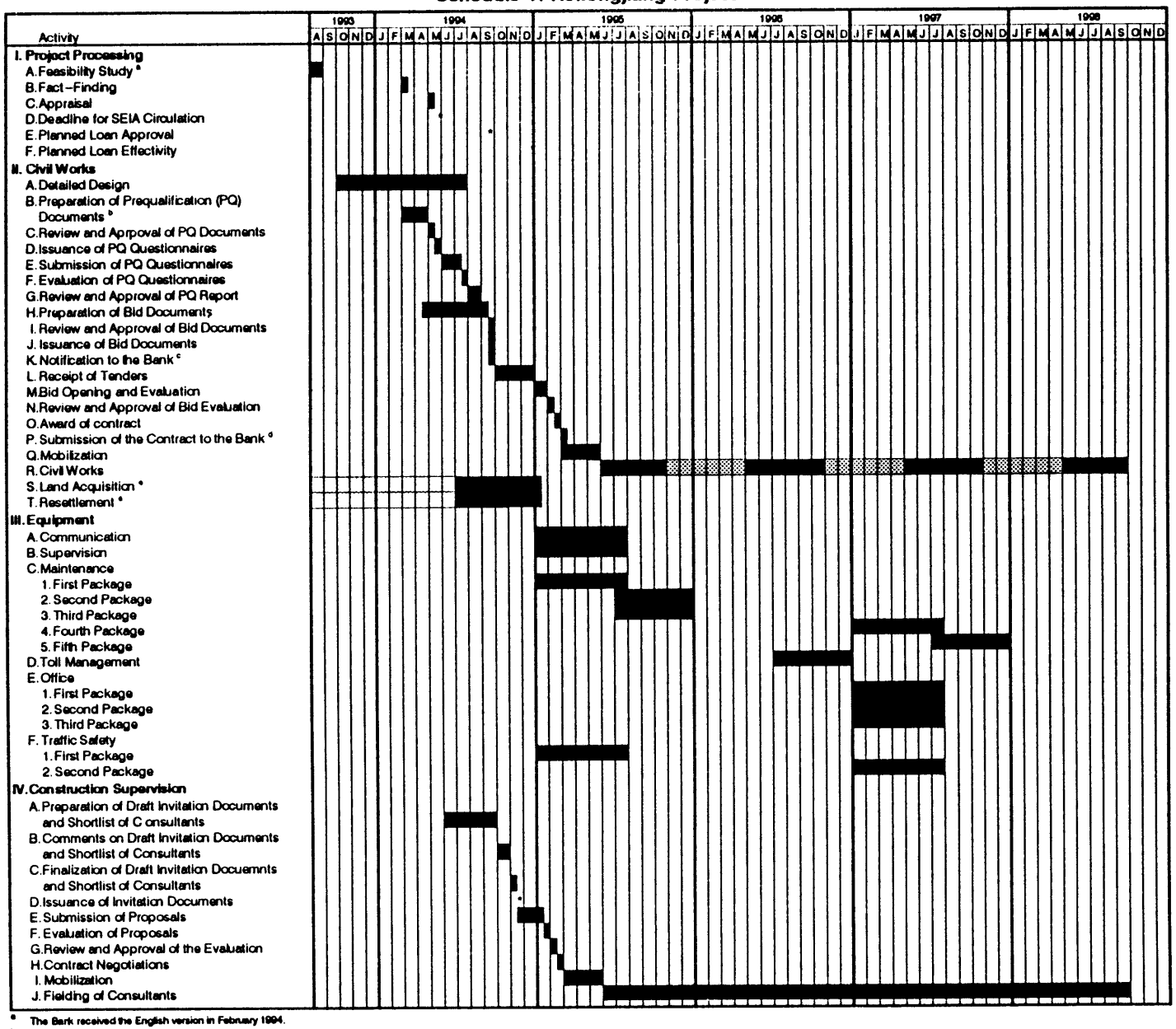
Source: Provincial Communications Department

(Reference in text: page 16 , para. 60)

(Reference in text: page 17 , para. 62)

PROJECT IMPLEMENTATION SCHEDULE

Schedule 1: Heilongjiang Project



a The Bank received the English version in February 1994.

b PQ Questionnaire, Advertisement and evaluation criteria.

c Date of availability of Tender Documents and Date, Time and Place for closing of Tenders.

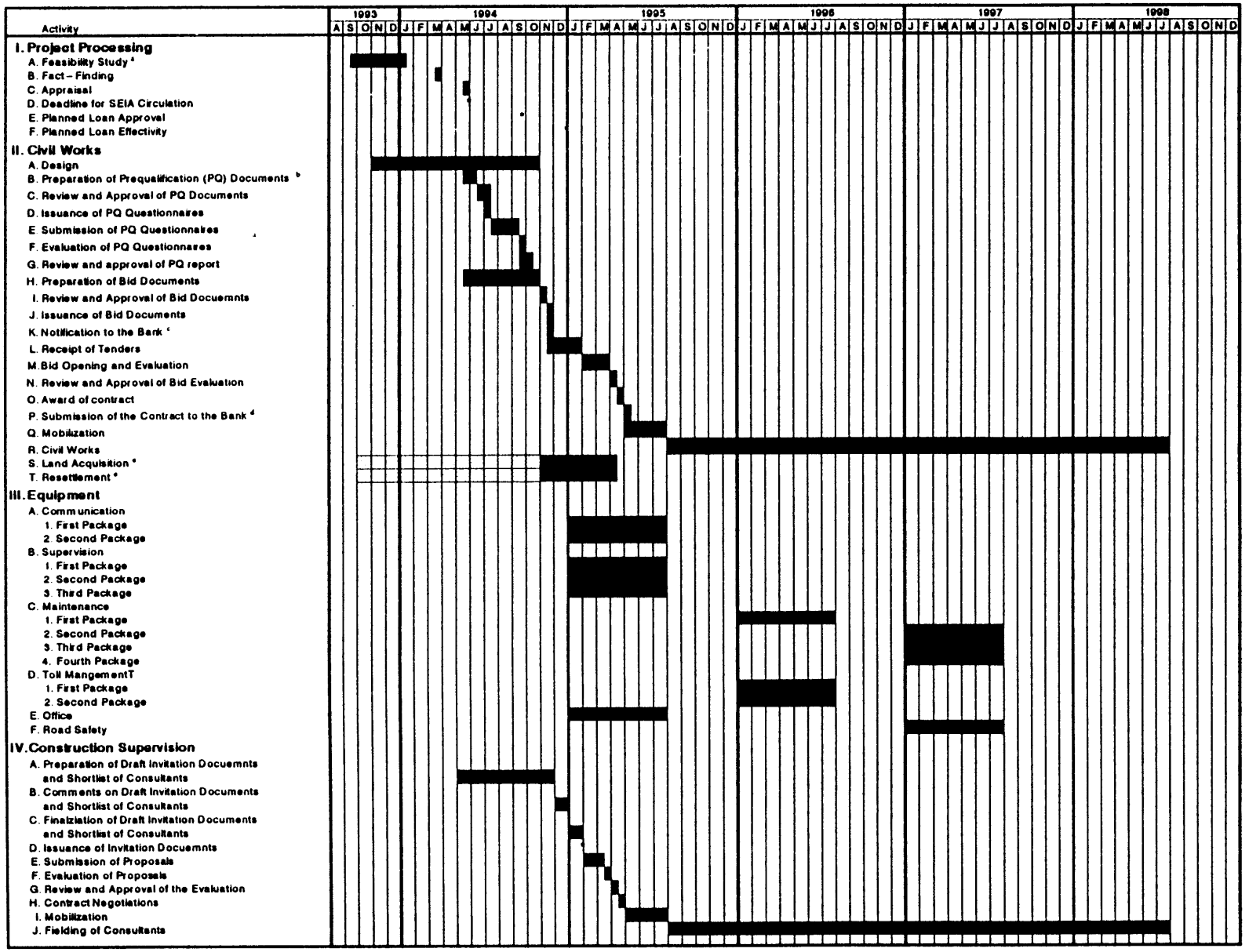
d (i) Form of Tender and Award of Contract; (ii) Performance Bond; (iii) Advance Payment Guarantee; and (iv) Priced Bills of Quantities, together with (a) signedconditions of contract; (b) signedconditions of particular application; (c) signed specification; (d) signed special provisions; and (e) signed reduced set of drawings.

e To be completed prior to award of contracts.

Legend: Full Scale Activities.
: Construction activities will be restricted because of the severe climatic conditions in Heilongjiang Province during winter.
: Preparatory activities.

Source: Provincial Communications Department

Schedule 2: Yunnan Project



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d (i) Form of Tender and Award of Contract; (ii) Performance Bond; (iii) Advance payment guarantee; and (iv) Priced bills of quantities, together with (a) Signed conditions of contract; (b) Signed conditions of particular application; (c) Signed specification0 (d) Signed special provisions; and (e) Signed reduced set of drawings.

e To be completed prior to award of contracts

LEGEND FULL SCALE ACTIVITIES

PROCUREMENT PACKAGES AND MODE

Table 1: Heilongjiang Project
($ million)

	Bidding Section (km)			Location	Contract Value	Procurement Method
CIVIL WORKS	267+700	–	572+213			
Package 1	267+700	–	267+700	Jiamusi	12.6	ICB
Package 2	267+700	–	307+000	Yilan	18.8	ICB
Package 3	307+000	–	319+500	Yilan	9.0	ICB
Package 4	319+500	–	344+700	Yilan	11.7	ICB
Package 5	344+700	–	368+800	Fangzheng	13.7	ICB
Package 6	368+800	–	392+727	Fangzheng	13.5	ICB
Package 7	392+727	–	423+000	Fangzheng	17.9	ICB
Package 8	423+000	–	454+000	Fangzheng	15.2	ICB
Package 9	454+000	–	477+000	Binxian	11.4	ICB
Package 10	477+000	–	518+600	Binxian	20.9	ICB
Package 11	518+600	–	546+300	Binxian	26.0	ICB
Package 12	546+300	–	572+213	Harbin	27.7	ICB
Package 13	Ancillary Expressway Operation Facilities				3.9	FA
				Subtotal	202.3	
EQUIPMENT						
Operation and Maintenance					9.5	ICB/IS/DP
Traffic Safety					1.5	ICB
Supervision					0.8	ICB
				Subtotal	11.8	

ICB International Competitive Bidding
IS International Shopping
DP Direct Purchase
FA Force Account

Source: Provincial Communications Department

(Reference in text: page 18 , para. 64)

Table 2: Yunnan Project
($ million)

	Bidding Section (km)			Location	Contract Value	Procurement Method
CIVIL WORKS	172+220	–	366+340			
Package 1	172+220	–	190+000	Chuxiong	27.7	ICB
Package 2	190+000	–	210+000	Chuxiong	31.1	ICB
Package 3	210+000	–	225+000	Chuxiong	22.7	ICB
Package 4	225+000	–	241+000	Chuxiong	24.3	ICB
Package 5	241+000	–	257+000	Dali	24.9	ICB
Package 6	257+000	–	275+000	Dali	26.6	ICB
Package 7	275+000	–	293+000	Dali	26.8	ICB
Package 8	293+000	–	311+000	Dali	29.7	ICB
Package 9	311+000	–	315+000	Dali	23.5	ICB
Package 10 [a]	315+000	–	337+000	Dali	22.0	ICB
Package 11	337+000	–	345+000	Dali	15.0	ICB
Package 12	345+000	–	356+000	Dali	18.1	ICB
Package 13	356+000	–	366+340	Dali	19.2	ICB
Package 14	Ancillary Expressway Operation Facilities				7.8	FA
				Subtotal	319.4	
EQUIPMENT						
Operation and Maintenance					9.3	IS/ICB
Traffic Safety					0.3	ICB
Supervision					1.4	IS/ICB
				Subtotal	11.0	

[a] Chainage equality = 8.12 km.

Source: Provincial Communications Department

TERMS OF REFERENCE FOR CONSTRUCTION SUPERVISION AND TRAINING

A. Introduction

1. International and domestic consultant services will be needed for Project management and construction supervision. The Projects also provide substantial training to enhance project management, contract administration, and quality control. All international consultants to be engaged under the Projects will be recruited in accordance with the Bank's *Guidelines on the Use of Consultants*.

2. International consultants under Bank financing will be engaged for the following:

i. Heilongjiang Project

(a) An internationally experienced engineer will be attached to the Project Management Office to provide advisory services and guidance on Project management, contract administration, and quality control procedures. It is estimated that about 25 person-months of international consultant services will be required.

(b) An internationally experienced structural engineer will be needed for about 2 person-months, to review structural designs with the Executing Agency (EA) and to agree on measures for monitoring construction quality and measurements.

ii Yunnan Project

(a) An internationally experienced engineer will be attached to the Project Management Office to provide advisory services and guidance on Project management, contract administration, and quality control procedures. It is estimated that about 36 person-months of international consultant services will be required.

(b) An internationally experienced tunnel engineer will be needed for about 4 person-months, to review tunnel designs with the EA and to agree on measures for monitoring construction quality and measurements.

(c) An internationally experienced traffic engineer will be needed for about 3 person-months, to review the design standards with respect to traffic safety such as speed zoning, specification and provision of road furniture, and intersection design and to carry out a safety audit of the proposed highway design.

(Reference in text: page 19 , para. 67)

3. Apart from international consultants, technical and administrative positions will be staffed by domestic consultants for construction supervision. About 8,800 person-months of domestic consultant services will be required for the Heilongjiang Project and 9,400 person-months for the Yunnan Project. The consultants will be recruited in accordance with the EAs procedures acceptable to the Bank. In this regard, the EA will prepare a short list of firms accredited by the National Government, evaluate them on their experience and the technical competence of personnel proposed, and rank them. The evaluation, ranking, and recommendation for selection of a firm will be forwarded to the Bank for review.

4. The international consultants will provide on-the-job training for staff of the EA and the domestic consultants in the areas of project management and contract administration, internationally accepted construction and quality control techniques and standards, and bridge design and monitoring of construction. The consultants will also identify the needs and recommend overseas training programs for suitable candidates from the EAs to strengthen the institutional and engineering capacities of these two institutions.

B. Objectives

5. The purpose of the services of the international and domestic consultants (the consultant team) is to ensure that

(i) all civil works are carried out in full compliance with the drawings and specifications;

(ii) the EA's engineers and domestic engineers on the joint supervision team receive on-the-job training in civil works supervision; and

(iii) to ensure that designs are carried out and implemented to internationally accepted traffic engineering standards.

1. General Duties of Consultant Team

(i) Assist the EA with contractor's applications for subcontracting parts of the civil works.

(ii) Explain and/or adjust ambiguities and/or discrepancies in contract documents and assist the EA in settling disputes with contractors.

(iii) Review the contractors' working drawings and if necessary advise the EA to produce further drawings and/or to give instructions to the contractors.

(iv) Ensure that all data is provided for setting out the civil works.

(v) Assist the EA, as directed by the Project Managers, to select/review the contractor's superintendence, key personnel and/or construction programs, materials and/or sources of materials.

(vi) Monitor the progress of the civil works against programmed targets and advise the EA on measures to be taken to improve progress and quality, as required.

(vii) Assist the EA to review proposed variation orders, evaluate variations, determine rates for works, order day-works and/or decide on alternatives.

(viii) Advise the Project Managers as to how and when to prepare and issue certificates of payment to the contractor and certify the completion of the civil works or parts thereof.

(ix) Inspect the quality of the civil works with regard to workmanship and compliance with specifications; order, supervise, or perform tests on materials and/or civil works; and advise on approval or disapproval of the contractors' plant and equipment.

(x) Propose, if required, the uncovering of completed civil works and/or the removal and substitution of improper materials and/or civil works.

(xi) Check the progress of the civil works and, as directed by the EA, order the initiation of certain civil works that are part of the contract.

(xii) Examine and review a sampling measurement of any work that is about to be covered up or put out of view before permanent work is placed thereon, and/or examine the measurement of the completed civil works.

(xiii) Examine the contractors' accounts, invoices, claims, and other statements for errors and compliance with the contract and, if required, suggest and make corrections thereto.

(xiv) Supervise the contractors in all matters concerning safety and care of civil works and, if required, request from the contractor the necessary lights, guards, fencing, and security.

6. The consultant team is to ensure that the administrative systems and procedures are prepared and implemented to ensure the effective supervision of the civil works in accordance with generally accepted international standards.

2. Training

7. The consultant will provide on-the-job training for the engineers assigned to them by the EA, specifically covering:

(i) organization and administration of the supervision of bridge and highway contracts;

(ii) quality control and testing to ensure compliance with specifications;

(iii) preparation of systems and procedures for recording progress, quality control testing, costs, variations or extra works, etc.; and

(iv) arrangements for longer term training overseas of senior level technical staff of the EA and short-term study tours for management staff.

3. Staffing

8. The consultant will provide the requisite number of supervisory staff to the joint supervision team, who will be resident at the Project site and who will be responsible for the overall supervision of the contractors' operations. Additional personnel such as inspectors, surveyors, and soil technicians will be provided by the EA or hired locally by the consultant. The number of experienced and qualified staff for the work involved should be sufficient to meet the requirements of the Project. The consultant team should be composed of graduate engineers or the equivalent with at least 12 years of practical site experience on major road and bridge works in the following fields; supervision and administration of major road and bridge contracts; structural engineering including foundations, tunnel design and construction, pavement design, earthworks, drainage, and soils and materials quality control.

9. The consultant team will purchase all equipment, office supplies, and instruments required over and above that furnished by the construction contractors. The EA will purchase vehicles for supervision and will furnish the consultant team with the vehicles complete with drivers for the duration of their contract. Field laboratories, with the required equipment to carry out field materials testing, will be furnished by the EA. The operations and maintenance cost of all equipment will be the responsibility of the consultant.

4. Control of the Work

10. The consultant team will establish all benchmarks on the ground and will supervise the initial engineering stake-out to establish line and grade, and the setting of stakes for alignment and structures, and will check and verify subsequent stake-out control by field survey parties supplied by the contractor to ensure satisfactory control of the work.

11. The consultant team will submit to the EA for review and approval, the necessary changes, improvements on the drawings, specifications and other work in reasonable time to permit compliance with the design and construction schedule.

12. The consultant team will, however, make minor changes in grade or alignment as needed to balance quantities, changes in size and type of culverts, etc.

5. Material Inspection and Control

13. The consultant team will carry out all test sampling in the field and perform such tests as can be made in the field laboratory provided by the contractor to maintain quality control. Other inspection and testing of materials and finished articles to be incorporated in the work may be made by the consultant team or by a competent and acceptable independent inspection agency subject to the authorization and approval of the EA and at no cost to the

consultant team. The consultant team will notify the contractor of any defects in his work and, if necessary, stop operations concerned with the defective work until the defects are corrected.

6. Measurement and Payment

14. The consultant team will make field measurements of quantities of materials incorporated in the Project and maintain up-to-date records containing such computations or other information concerning the use of construction materials, properly separated into sections of construction.

15. Periodic reports will be prepared and transmitted to the EA showing quantities incorporated in the work at the end of each pay period, and also showing monies earned by and due to the contractor.

16. The consultant team will maintain up-to-date records of the remaining quantities to be incorporated in the work, and of the cost estimates relating thereto broken down into foreign and local currency components.

7. Claims and Arbitration

17. The consultant team will review claims that the contractor may present for additional compensation and/or additional time allowances, recommend appropriate action, and issue change orders as necessary during the progress of the work to cover possible changes within the general scope of the construction contract. The consultant team will evaluate the contractor's requirement for payment and will certify the request or have it changed so that it can be certified.

18. The consultant team will decide all claims and accounts, questions, disputes, and differences that are delegated under the terms of the contract for their settlement and decisions. The team will also assist the EA in dealing with all other claims and accounts, disputes, and differences relating to the works.

19. The consultant team will assist and advise the EA on any matter that may be the subject of arbitration, inquiry, or litigation, if necessary in court proceedings.

20. In the event of any arbitration or litigation, if the consultant is called upon to assist before a board of arbitration proceedings or before a court of law, he will receive separate remuneration for such assistance.

C. Records and Reports

21. The consultant team will maintain records of deviations from or changes in the contract plans, and will provide one marked-up master set of drawings can be corrected by others to correspond with the "as built" conditions.

22. The consultant team will provide all required services for certifications of the Projects in accordance with the Loan Agreements and subsequent matters of implementation. They will:

(i) prepare and/or assist the EA in preparing periodic progress and financial status reports, and prepare a final report on the Project;

(ii) provide certification where required by the EA for interim and final payments;

(iii) provide the EA with such technical and engineering consultation required in its day-to-day activities pertaining to the Project, as may be requested;

(iv) keep records of all work done in the engineering and construction phases of the work, and prepare activity and progress reports for each month of operation;

(v) prepare estimated progress schedule reports for the construction phase prior to beginning the construction work; and

(vi) keep records of all payments approved and report such in the regular progress reports; the regular progress reports to be completed at the end of each calendar month will contain three sections:

(a) description of activities (with photographs)

(b) progress charts, and

(c) expenditure records.

23. The three sections of the regular monthly reports will be compared with the work program and progress schedules as originally anticipated. The reports will be signed by the head of the consultant team and 15 copies submitted to the EA, and 2 copies to the Bank.

D. Support Services Provided to the Consultants

24. The following will be made available to the consultants by the Ministry of Communications and the EA:

(i) administrative assistance in obtaining visas, customs clearances, and any other administrative permits required by the consultants in the performance of their duties;

(ii) all relevant reports and studies relating to the assignment;

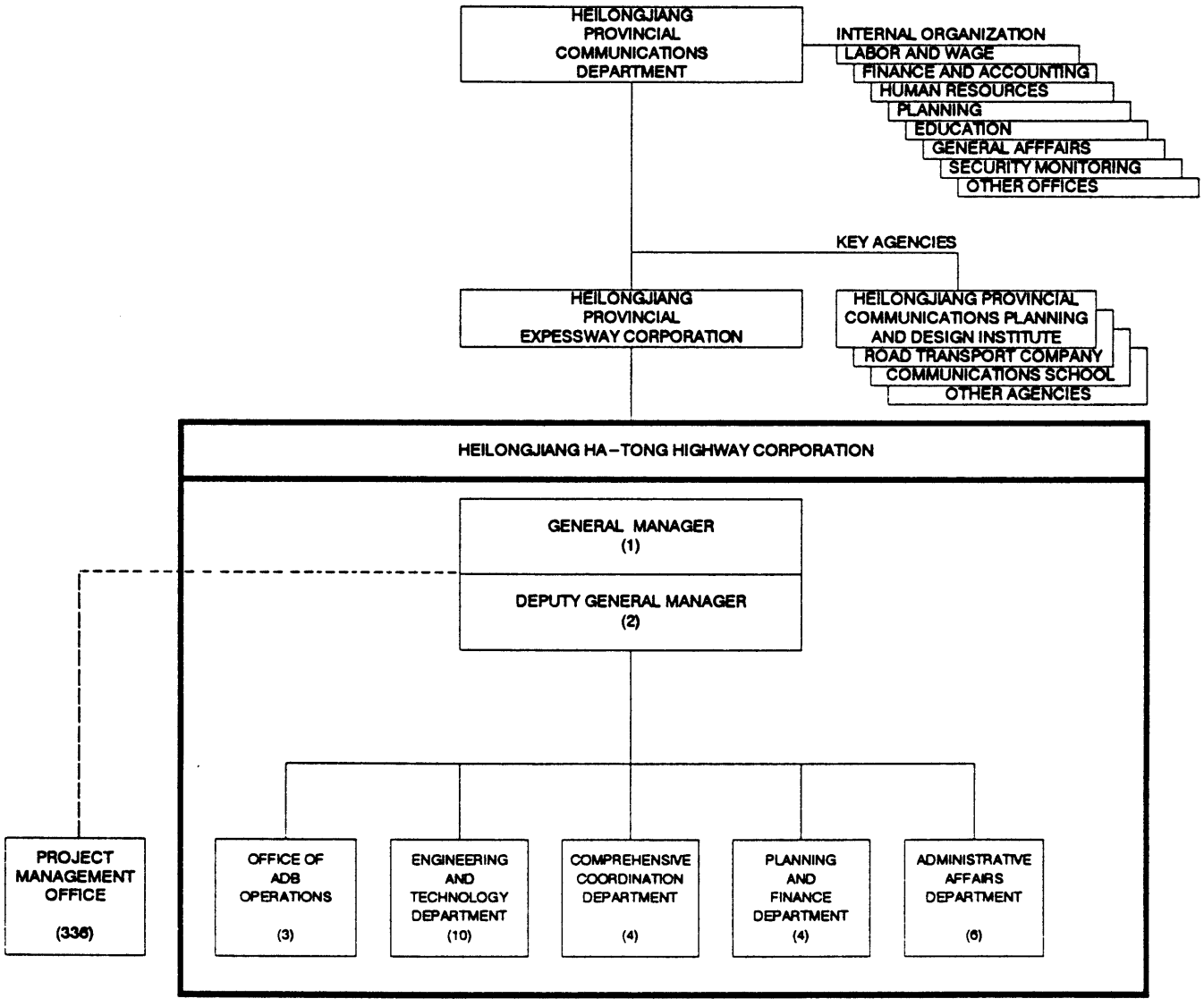
(iii) appropriate and suitably qualified counterpart staff;

(iv) suitable office accommodation, and secretarial and clerical support; and

(v) local transportation with driver as required at the various Project sites.

ORGANIZATION CHARTS OF THE EXECUTING AGENCIES

Figure 1: Heilongjiang Project

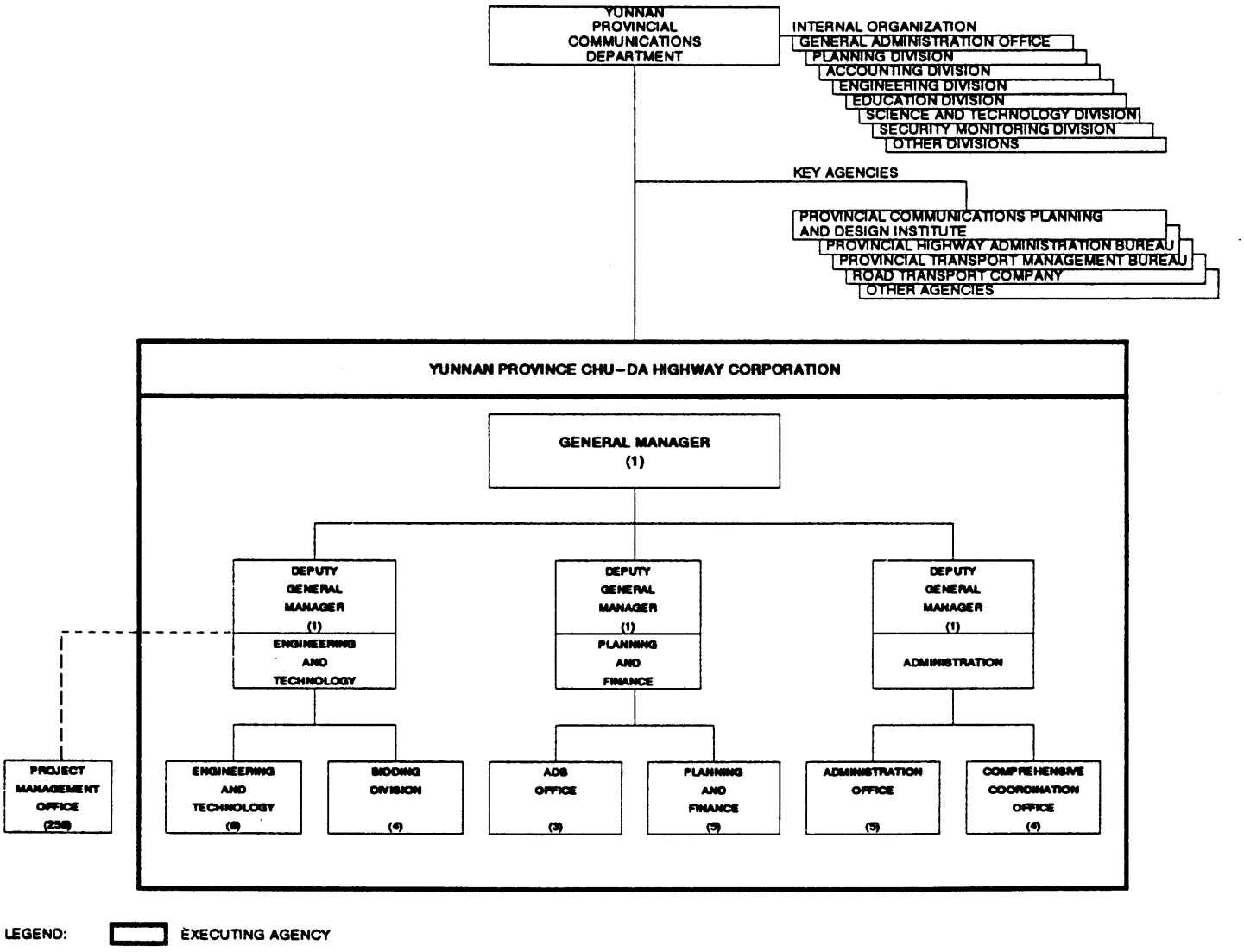


LEGEND: ▭ EXECUTING AGENCY

NUMERICAL FIGURES IN PARENTHESIS DENOTE NUMBER OF STAFF.

(Reference in text: page 20 , para. 72)

Figure 2: Yunnan Project



LEGEND: ▭ EXECUTING AGENCY

NUMERICAL FIGURES IN PARENTHESIS DENOTE NUMBER OF STAFF.

TERMS OF REFERENCE FOR TECHNICAL ASSISTANCE FOR PREPARATION OF A ROAD TRAFFIC SAFETY PROGRAM IN HEILONGJIANG PROVINCE

A. Objectives

1. The objectives of the Technical Assistance (TA) are to:

(i) quantify the scale and nature of the road accident problem in Heilongjiang Province;

(ii) review existing activities in the key agencies with road safety responsibilities to identify areas for improvement;

(iii) after reviewing all sectors affecting safety, develop a comprehensive master plan for the gradual and systematic improvement of road safety;

(iv) liaise with the key agencies to develop and implement pilot or demonstration projects to provide opportunities for practical training of local specialists so that they can contribute more effectively to solving the country's road safety problems; and

(v) develop key institutions, procedures, and systems such that the provincial capability to tackle and improve road safety effectively will be established.

B. Scope of Work

2. The work to be undertaken can be broken into two distinct phases:

(i) Phase 1: Review of road safety and preparation of a strategic Action Plan and 5-year Master Plan; and

(ii) Phase 2: Implementation of the most urgent road safety improvements and development of institutional capability to tackle road safety problems.

(Reference in text: page 21 , para. 77)

3. The proposed TA covers only the first phase. The consultants will review road safety related sectors. The broad review should include, but not necessarily be limited to, the following sectors:

(i) Road safety administration and coordination;
(ii) accident data collection, storage, and analysis;
(iii) accident blackspot improvement;
(iv) traffic policing resources, manpower, and training;
(v) driver training/testing;
(vi) road safety publicity and propaganda;
(vii) emergency medical treatment of accident casualties;
(viii) traffic education of children;
(ix) motor insurance and accident cost estimation;
(x) pedestrian and cyclist safety; and
(xi) road safety research

4. The review should help identify deficiencies (in terms of road safety) in each of these sectors and the principal causes of road accidents and should specify the actions required to improve road safety in the People's Republic of China. The conclusions of the study should be presented as a five-year road safety improvement master plan and strategy.

C. Consultancy Inputs Required

5. For the first phase of the TA, a total of 15 person-months of international consultancy inputs will be required for the following experts:

(i) team leader,
(ii) accident system specialist,
(iii) traffic education specialist ,
(iv) accident blackspot specialist, and
(v) police specialist.

1. Project Manager and Team Leader

6. The team leader will coordinate the efforts of the various other specialists, will provide continuity during the project, and will ensure that the limited time of the visiting specialists is used effectively. The team leader is expected to be an experienced manager who is familiar with and has supervised teams engaged in accident blackspot work, data analysis, and road user education activity. The team leader will provide ongoing technical inputs to each agency and manage the Project on a day-to-day basis.

2. Accident System Specialist

7. The accident system specialist is expected to have had previous experience in adapting and installing accident data systems for police and government agencies in developing countries. The specialist must have experience developing accident data forms and accident location coding systems, and training police and other agencies in all aspects of collecting, storing reviewing, and analyzing road accident data.

3. Traffic Education

8. The traffic education specialist must have previous experience in road user education, and particularly in developing and disseminating children's traffic education materials. The specialist should ideally have worked in a government agency and have had responsibilities for road safety publicity or road user education activities, or have been responsible for developing teaching materials for children and teacher guides in road safety.

4. Accident Blackspot Specialist

9. The accident blackspot specialist is expected to be an experienced engineer specializing in road safety. The specialist should have previously worked in or led a government agency unit engaged in identifying and improving accident blackspots. The specialist will have experience in all aspects related to identification, analysis, ranking, and improvement of hazardous locations in safety audit procedures. The specialist should have experience developing procedures and in practical training of professional staff on road safety issues.

5. Traffic Police Specialist

10. The traffic police specialist will be an experienced ex-police officer with extensive experience training and advising traffic police personnel in developing countries. The specialist must have been a senior officer responsible for traffic policing activities such as traffic and highway patrols, law enforcement and accident investigation, etc., and should also have had experience developing teaching materials and training traffic police personnel.

D. Duration and Reporting Requirements

11. The TA will be implemented over a period of about eight months. The consultants will prepare an interim report within four months after the commencement of their services. They will also provide the Bank and the Government with a draft final report at the completion of their services, and the final report 30 days after the consultants receive the comments on the draft report from the Bank and the Government.

TERMS OF REFERENCE FOR TECHNICAL ASSISTANCE FOR HEILONGJIANG PROVINCIAL HIGHWAY NETWORK STUDY

A. BACKGROUND AND OBJECTIVES

1. MOC has developed a comprehensive National Trunk Highway System (NTHS) for the main transport arteries throughout the PRC. The principal objectives of the NTHS are to alleviate congestion on the main transport corridors, support industrial and agricultural production and market integration. MOC has recognized that these objectives can only be achieved if NTHS is adequately supported by a system of feeder roads on the provincial and county levels which provide the necessary access of population and production centers to the economic mainstream of the country. MOC has therefore instructed the Provincial Communications Departments to prepare 30-year investment plans for the roads under their purview. The Government has requested technical assistance to help develop a metyhodology and carry out the planning exercise. The main objectives of the proposed technical assistance are to assist the Executing Agency in the preparation of the 30-year investment program and to bring provincial planners up to a technical level that will enable them to understand transport planning computer software and to undertake transport modeling.

B. SCOPE OF WORK

2. The principal activities under the TA will include: (i) designing and processing of OD surveys; (ii) calibration of traffic counts; (iii) computerized modelling to assign traffic flows; and (iv) economic evaluation of proposed investments. Three international experts with experience in transport planning and computer modelling will be required for 6 man-months each. The experts will act as advisors and will assist local staff in the four main areas shown above. The local staff will be required to assemble the requisite data such as road inventory data, traffic count data, economic activity data, road construction and maintenance costs and development plan projects. The Executing Agency will undertake surveys and other investigations necessary to carry out the modelling work. The Executing Agency will make the necessary arrangements with Jilin Provincial Communications Department (JPCD) to ensure that the work under the proposed TA can build on the expertise gained by JPCD under the Jilin Province Highway Network Study (TA No. 1725-PRC).

3. The Consultants shall:

(i) prepare a comprehensive approach and methodology for the preparation of the 30-year investment programs;

(Reference in text: page 21 , para. 80)

(ii) provide a work program for the planning study, detailing the proposed techniques and individual working steps as appropriate to achieve the study's objectives;

(iii) advise the PRC counterparts on the proposed concept and work program and assign the tasks to be performed by them;

(iv) design origin-destination surveys and supervise traffic counts at appropriate locations;

(v) select and calibrate an appropriate computer model to assign traffic and establish traffic flow patterns;

(vi) train counterpart staff in the use of the computer model; and

(vii) advise counterpart staff on economic principles applied in the evaluation of proposed highway projects.

C. IMPLEMENTATION

4. The TA will be implemented over a period of about 8 months. HPCD under the guidance of MOC will implement the TA.

D. REPORTING REQUIREMENTS

5. The Consultants will prepare an inception report within six weeks and an interim report within 4 months after the commencement of their services. The Consultants will provide the Bank and the Executing Agency with a draft final report at the completion of their services, and the final report 30 days after the consultants receive the comments on the draft report from the Bank and the Executing Agency.

HEILONGJIANG PROVINCIAL NETWORK PLANNING
TA COST ESTIMATES AND FINANCING ARRANGEMENTS

Source	Amount ($)
Bank Financing	
Foreign Exchange Costs	
Consultants' Remuneration	306,000
Subsistence and Per Diem	79,000
International Travel	40,000
Computers & Software	15,000
Photo Copiers	10,000
Reports and Office Supplies	5,000
Contingencies	45,000
Subtotal	**500,000**
Local Currency Costs	
Local Counterparts	60,000
Domestic Travel incl. Car Hire	30,000
Contingencies	10,000
Subtotal	**100,000**
TOTAL BANK FINANCING	**600,000**
Government Contribution (in kind)	
Office Space and other Logistical Support	84,000
Secretarial Assistance	90,000
Contingencies	26,000
Subtotal	**200,000**
TOTAL BANK AND GOVERNMENT FINANCING	**800,000**

FINANCIAL ASSESSMENT

1. The financial assessment for both Executing Agencies (EAs) includes:

(i) cash-flow forecasts that reflect the revenues and costs that have led to cash inflows and outflows in the same period;

(ii) income statements that include revenues and costs accrued in a given period; and

(iii) balance sheet forecasts, which reflect the development of assets and capital over time.

2. The financial analyses are based on financial data that will be used to prepare opening balance sheets and income statements as per 1 January 1995. As many of the financial data used are still tentative, in particular the construction cost estimates to be capitalized, all statements presented are of a pro-forma nature. Similarly, potentially important items, such as construction of service stations along the expressways, their sale or lease, could not be reflected in the financial analysis, as related arrangements are still under review.

3. Nonetheless, the financial forecasts provide important insights in several ways.

(i) The EAs will continue to depend, at least for the next five years (until toll collection starts), on financial support from the Provincial Communications Department (PCD).

(ii) After the commencement of toll collection, the EAs will be able to maintain relatively balanced cash-flows without regular cash injections from the PCDs.

(iii) However, the toll revenue will not enable the EAs to mobilize sufficient funds for periodic maintenance, nor to recover the full capital costs involved in the Projects. This is reflected in a gradually declining asset base and predominantly negative income statements.

(iv) The level of toll of Y 0.3 per vehicle km accounts for approximately 50 per cent of the perceived economic benefits accruing to the users of the new expressways. A higher percentage would probably discourage traffic and depress the financial performance of the EAs.

(Reference in text: page 22 , para. 81)

4. The conclusions that emerge from the analysis are that the proposed expressways, given their traffic volumes, do not lend themselves to outright privatization as the return on capital would be insufficient. A Financial Internal Rate of Return (FIRR) that could be considered to be attractive to private investors would be at least 16 per cent and would require a toll rate of about Y 1.6 per vehicle-kilometer (km), which is almost 100 per cent above the economic benefit per vehicle km. Nonetheless, the proposed commercialization provides a basis and necessary precondition for privatization at a later stage.

Table 1: Financial Analysis of the Heilongjiang Expressway Project
(Y million)

Year	Costs			Toll Revenue	Net Benefits
	Capital Investment	Operation and Maintenance	Total		
1995	614		614	0	−614
1996	642		642	0	−642
1997	642		642	0	−642
1998	428		428	0	−428
1999		23	23	109	86
2000		23	23	119	95
2001		23	23	124	100
2002		23	23	129	106
2003		23	23	135	112
2004		23	23	141	118
2005		23	23	148	124
2006		82 [a]	82	154	72
2007		23	23	161	138
2008		23	23	168	145
2009		23	23	176	152
2010		23	23	184	160
2011		23	23	189	166
2012		23	23	195	172
2013		23	23	202	178
2014		82 [a]	82	208	126
2015		23	23	215	191
2016		23	23	222	198
2017		23	23	229	205
2018	−1,163 [b]	23	−1,140	236	1,376
Financial Internatal Rate of Return = 3.7%					

[a] Periodic maintenance for the asphalt concrete section (about 100 km).

[b] Salvage value.

Source: Provincial Communications Department

Table 2: Financial Analaysis of the Yunnan Expressway Project
(Y million)

Year	Costs			Toll Revenue	Net Benefits
	Capital Investment	Operation and Maintenance	Total		
1995	737		737	0	−737
1996	977		977	0	−977
1997	977		977	0	−977
1998	651		651	0	−651
1999		33	33	152	118
2000		33	33	158	124
2001		33	33	164	131
2002		33	33	171	137
2003		33	33	178	144
2004		33	33	185	151
2005		33	33	192	159
2006		324 [a]	324	200	−124
2007		33	33	208	175
2008		33	33	216	183
2009		33	33	225	192
2010		33	33	232	199
2011		33	33	240	206
2012		33	33	247	214
2013		33	33	255	222
2014		324 [a]	324	263	−61
2015		33	33	272	238
2016		33	33	280	247
2017		33	33	289	256
2018	−1,671 [b]	33	−1,637	298	1,935
Financial Internal Rate of Return = 2.4%					

[a] Periodic maintenance (asphalt concrete overlay).

[b] Salvage value.

Source: Provincial Communications Department

HEILONGJIANG EXPRESSWAY PROJECT
(Yuan million)

CASH – FLOW ANALYSIS

YEARS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CASH INFLOWS																
BANK LOAN	370.6	494.2	247.1	123.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MOC FUNDS	234.9	313.2	156.6	78.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PCD FUNDS	255.8	341.0	170.5	85.3	0.0	0.0	0.0	0.0	76.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET OPERATING INCOME	−0.3	−0.3	−0.3	27.4	107.5	120.8	123.3	125.3	126.8	127.7	127.6	126.5	124.1	120.1	114.2	103.1
ROAD MAINTENANCE FEE	13.5	61.0	78.0	59.0	9.0	0.0	0.0	0.0	27.6	0.0	0.0	29.0	0.0	0.0	0.0	0.0
TOTAL FUNDS AVAILABLE	874.5	1209.1	651.9	373.5	116.5	120.8	123.3	125.3	230.4	127.7	127.6	155.5	124.1	120.1	114.2	103.1
CASH OUTFLOWS																
CONSTRUCTION	758.6	1148.4	574.2	287.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.9	0.0	0.0	0.0	0.0
EQUIPMENT	102.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	133.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN AMORTIZATION	13.0	60.5	77.8	86.5	116.6	116.6	116.6	116.6	116.6	116.6	116.6	116.6	116.6	116.6	116.6	116.6
TOTAL FUNDS UTILIZED	874.3	1208.9	652.0	373.6	116.6	116.6	116.6	116.6	250.1	116.6	116.6	177.5	116.6	116.6	116.6	116.6
NET CASH FLOW	0.2	0.2	−0.1	0.0	−0.1	4.2	6.7	8.7	−19.6	11.1	11.0	−22.0	7.5	3.5	−2.4	−13.5
ACCUMULATED CASH FLOW	0.2	0.4	0.2	0.2	0.1	4.3	10.9	19.6	0.0	11.1	22.1	0.1	7.6	11.1	8.7	−4.8

HEILONGJIANG EXPRESSWAY PROJECT
(Yuan million)

INCOME STATEMENT

YEARS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
INCOME																
TOLL REVENUES	0.0	0.0	0.0	27.8	126.0	142.6	149.0	155.7	162.7	170.1	177.7	185.7	194.1	202.8	211.9	218.7
GROSS INCOME	0.0	0.0	0.0	27.8	126.0	142.6	149.0	155.7	162.7	170.1	177.7	185.7	194.1	202.8	211.9	218.7
COSTS AND EXPENSES																
ROAD MAINTENANCE	0.0	0.0	0.0	0.0	17.9	21.2	25.1	29.7	35.2	41.6	49.3	58.3	69.1	81.8	96.8	114.6
OVERHEADS	0.3	0.3	0.3	0.4	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0
DEPRECIATION (fixed assets)	5.5	16.6	33.2	47.1	52.6	55.4	55.4	55.4	55.4	55.4	55.4	55.4	55.4	55.4	55.4	55.4
DEPRECIATION (equipment)	1.3	5.1	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
INTEREST	13.0	64.2	79.1	83.0	86.5	80.8	75.5	70.6	66.0	61.7	57.6	53.9	50.3	47.0	44.0	41.1
TOTAL COSTS AND EXPENSES	20.1	86.3	125.4	143.3	170.4	170.9	169.5	169.2	170.1	172.3	175.9	181.2	188.5	197.9	209.9	224.9
NET OPERATING INCOME	−20.1	−86.3	−125.4	−115.5	−44.4	−28.2	−20.5	−13.5	−7.3	−2.2	1.8	4.5	5.6	4.9	2.0	−6.2
ROAD MAINTENANCE FEE	13.5	61.0	78.0	59.0	9.0	0.0	0.0	0.0	27.6	0.0	0.0	29.0	0.0	0.0	0.0	0.0
NET INCOME	−6.6	−25.3	−47.4	−56.5	−35.4	−28.2	−20.5	−13.5	20.3	−2.2	1.8	33.5	5.6	4.9	2.0	−6.2

HEILONGJIANG EXPRESSWAY PROJECT
(Yuan million)

ASSETS AND LIABILITIES

YEARS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ASSETS																
WORKING CAPITAL	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4
NET FIXED ASSETS	373.8	1884.9	2425.9	2665.9	2613.3	2557.9	2502.6	2447.2	2391.8	2336.5	2281.1	2286.6	2231.3	2175.9	2120.5	2065.2
EQUIPMENT	50.0	96.2	83.4	70.6	57.7	44.9	32.1	19.2	53.9	107.8	95.0	82.1	69.3	56.5	43.6	30.8
TOTAL ASSETS	481.3	2038.6	2566.7	2793.9	2728.5	2660.3	2592.1	2523.9	2503.2	2501.7	2433.5	2426.2	2358.0	2289.8	2221.6	2153.4
CAPITAL																
LIABILITES	370.6	864.8	1111.9	1198.3	1235.4	1199.6	1158.5	1112.5	1061.9	1006.9	947.9	885.2	818.9	749.3	676.7	601.1
RESERVES	0.2	0.4	0.2	0.2	0.1	4.3	10.9	19.6	0.0	11.1	22.1	0.1	7.6	11.1	8.7	−4.8
EQUITY	110.4	1173.4	1454.6	1595.4	1493.0	1456.4	1422.6	1391.7	1441.3	1483.7	1463.5	1540.9	1531.5	1529.4	1536.3	1557.1
TOTAL CAPITAL	481.3	2038.6	2566.7	2793.9	2728.5	2660.3	2592.1	2523.9	2503.2	2501.7	2433.5	2426.2	2358.0	2289.8	2221.6	2153.4

YUNNAN EXPRESSWAY PROJECT
(Yuan million)

CASH–FLOW ANALYSIS

YEARS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CASH INFLOWS																
BANK LOAN	391.5	522.0	261.0	130.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MOC FUNDS	234.9	313.2	156.6	78.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PCD FUNDS	577.9	770.5	385.2	192.6	0.0	0.0	0.0	0.0	76.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OPERATING INCOME	−0.3	−0.3	−0.3	178.0	783.9	838.6	872.4	907.6	944.2	982.2	1021.6	1062.7	1105.3	1149.6	1195.7	1231.3
ROAD MAINTENANCE FEE	14.2	64.5	83.0	67.3	9.0	4.0	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL FUNDS AVAILABLE	1218.2	1669.9	885.5	646.7	792.9	842.6	872.4	907.6	1034.2	982.2	1021.6	1062.7	1105.3	1149.6	1195.7	1231.3
CASH OUTFLOWS																
CONSTRUCTION	1108.6	1605.7	802.8	401.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.4	0.0	0.0	0.0	0.0
EQUIPMENT	95.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	124.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOAN AMORTIZATION	13.7	63.9	82.2	91.4	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2
TOTAL FUNDS UTILIZED	1218.0	1669.6	885.1	492.8	123.2	123.2	123.2	123.2	247.6	123.2	123.2	155.5	123.2	123.2	123.2	123.2
NET CASH FLOW	0.2	0.3	0.5	154.0	669.7	719.4	749.2	784.4	786.6	859.0	898.5	907.1	982.1	1026.5	1072.5	1108.1
ACCUMULATED CASH FLOW	0.2	0.5	0.9	154.9	824.6	1544.0	2293.3	3077.7	3864.3	4723.2	5621.7	6528.8	7511.0	8537.4	9609.9	10718.0

YUNNAN EXPRESSWAY PROJECT
(Yuan million)

INCOME STATEMENT

YEARS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
INCOME																
TOLL REVENUES	0.0	0.0	0.0	178.4	794.2	849.8	884.7	920.9	958.7	998.0	1038.9	1081.5	1125.8	1172.0	1220.1	1257.9
GROSS INCOME	0.0	0.0	0.0	178.4	794.2	849.8	884.7	920.9	958.7	998.0	1038.9	1081.5	1125.8	1172.0	1220.1	1257.9
COSTS AND EXPENSES																
ROAD MAINTENANCE	0.0	0.0	0.0	0.0	9.7	10.6	11.6	12.6	13.8	15.1	16.5	18.0	19.6	21.4	23.4	25.6
OVERHEADS	0.3	0.3	0.3	0.4	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9	1.0	1.0
DEPRECIATION (fixed assets)	0.0	7.8	15.7	66.6	74.5	78.4	78.4	78.4	78.4	78.4	78.4	78.4	78.4	78.4	78.4	78.4
DEPRECIATION (equipment)	0.0	1.2	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
INTEREST	5.5	67.9	83.5	87.7	91.4	85.4	79.8	74.6	69.7	65.1	60.9	56.9	53.2	49.7	46.4	43.4
TOTAL COSTS AND EXPENSES	5.8	77.2	111.5	166.7	188.1	186.9	182.4	178.2	174.6	171.3	168.5	166.0	164.0	162.4	161.2	160.3
NET OPERATING INCOME	-5.8	-77.2	-111.5	11.8	606.1	662.9	702.3	742.7	784.1	826.7	870.4	915.5	961.8	1009.6	1058.9	1097.6
ROAD MAINTENANCE FEE	14.2	64.5	83.0	67.3	9.0	4.0	0.0	0.0	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NET INCOME	8.4	-12.7	-28.5	79.1	615.1	666.9	702.3	742.7	798.1	826.7	870.4	915.5	961.8	1009.6	1058.9	1097.6

YUNNAN EXPRESSWAY PROJECT
(Yuan million)

ASSETS AND LIABILITIES

YEARS	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ASSETS																
WORKING CAPITAL	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3	80.3
NET FIXED ASSETS	554.3	2706.4	3493.6	3828.4	3753.9	3675.5	3597.2	3518.8	3440.4	3362.1	3283.7	3237.7	3159.3	3080.9	3002.6	2924.2
EQUIPMENT	47.9	94.5	82.5	70.6	58.6	46.7	34.7	22.7	50.2	100.5	88.5	76.6	64.6	52.6	40.7	28.7
TOTAL ASSETS	682.4	2881.2	3656.4	3979.2	3892.8	3802.5	3712.1	3621.8	3571.0	3542.8	3452.5	3394.5	3304.2	3213.9	3123.5	3033.2
CAPITAL																
LIABILITES	391.5	913.5	1174.5	1265.9	1305.0	1267.2	1223.8	1175.2	1121.7	1063.6	1001.3	935.0	865.0	791.5	714.8	635.0
RESERVES	0.2	0.5	0.9	154.9	824.6	1544.0	2293.3	3077.7	3864.3	4723.2	5621.7	6528.8	7511.0	8537.4	9609.9	10718.0
EQUITY	290.7	1967.2	2480.9	2558.5	1763.2	991.2	195.1	−631.1	−1415.0	−2244.0	−3170.5	−4069.3	−5071.8	−6115.1	−7201.2	−8319.8
TOTAL CAPITAL	682.4	2881.2	3656.4	3979.2	3892.8	3802.5	3712.1	3621.8	3571.0	3542.8	3452.5	3394.5	3304.2	3213.9	3123.5	3033.2

OUTLINE OF THE ECONOMIC ASSESSMENT METHODOLOGY

A. General

1. Economic assessment has been conducted for "with" and "without" Project cases. Under the "without" Project scenario, the existing narrow and winding roads will be used until they reach their capacities with an increasing degree of traffic congestion and mixture of fast and slow moving vehicles. After reaching the capacities, the existing roads will need major maintenance to accommodate future traffic. Under the "with" Project scenario, the new highways with improved horizontal and vertical alignments will be extensively used for intercity traffic because of lower vehicle operating costs (VOCs), and shorter travel time because of higher vehicle speeds and distance reductions, while the existing roads will be mostly used to serve local traffic and by slow moving vehicles such as tractors, motor cycles, and bicycles. Economic lives of the proposed Projects are assumed to be 20 years. The economic assessment for the proposed Projects has been conducted based on the comprehensive feasibility studies prepared in 1993 by the Heilongjiang Provincial Communications Department and the Yunnan Provincial Communications Department on their respective road sections of the proposed Projects.

B. Costs

2. The economic costs of implementing the Projects have been estimated based on financial costs of civil works with 10 per cent physical contingency, equipment, land acquisition, consulting services, and training. Costs of price escalation and interest during construction as well as various taxes have been excluded from the estimation of economic costs. To arrive at the appropriate economic costs, goods and services to be used in Project implementation are divided into tradable and nontradable groups. The financial costs of tradables are expressed in border prices plus transport and handling costs, while the financial costs of nontradables are converted into economic costs by using the standard conversion factor of 0.9.[1] Financial operating and maintenance costs are also adjusted by the same approach to obtain economic costs. Periodic maintenance of asphalt concrete sections is assumed to take place at eight year intervals. Since cement concrete sections (200 km) proposed for the Heilongjiang Project do not need periodic maintenance during the economic life of the Project, it is not included in the economic assessment. All economic costs are estimated at 1994 prices.

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[1] Memo, Manager PE1, " PRC: Price Contingencies, the Standard Conversion factor and the January 1994 Devaluation of the Yuan ", 19 January 1994.

(Reference in text: page 23 para. 87)

C. Benefits

(1) Sources of Benefits

3. The principal sources of economic benefits from the Project are (i) savings in VOCs for vehicles using the new highways, which would otherwise have to travel on the existing roads; and (ii) benefits from reduced congestion accruing to traffic which remains on existing roads after opening of the new highways. Generated traffic is assumed to develop in proportion to the reduction in VOC savings. Consumer surplus from generated traffic has been estimated at 50 per cent of the VOC savings on the new roads. Considering possible toll rates and VOC savings including those VOC savings arising from distance savings, 70 per cent of traffic is conservatively assumed to divert from the existing roads to the new highways.

(2) Conditions of the Existing Roads and Vehicle Operating Costs

4. The existing road (368 km) along the alignment proposed for the Heilongjiang Project is mostly unpaved except urban areas. More than 83 per cent of the total length was built to the Class 3 standards with design capacity of 200-2,000 medium truck units per day and/or Class 4 standards, with design capacity of 200 medium truck units per day. Average roughness on the existing road exceeds 10 m/km in international roughness index, which indicates a bad road condition. The existing road (236 km) of the Yunnan Project is mostly paved and traverses a mountainous area. More than 87 per cent of the total road length was constructed to the Class 3 or 4 standards. Winding Yingwu Pass (about 50 km) between Nanhua and Xiazhuang is the severe road transport bottleneck. Because of increasing traffic, the pavement shows signs of distress in several locations. Road roughness on the existing road ranges from 6.0 to 9.0 m/km, which represent bad to very bad road conditions.

5. VOCs for the proposed Projects and the existing roads are estimated by using the HDM III VOC module. In the case of the Heilongjiang Project, VOCs on an unpaved road in a fair/poor road condition on a flat/rolling terrain are conservatively assumed for the road condition without Project. With Project, this road condition will be improved to a good condition. It is assumed for the Yunnan Project that VOCs in the present poor road condition on the mountainous terrain will be improved to VOCs in a good road condition under the with Project scenario. VOCs estimated are shown below:

Table 1: Vehicle Operating Costs (Y/vehicle-km)

	Small Truck	Medium Truck	Large Truck	Passenger Car	Medium Bus	Large Bus	Trailer
I. Heilongjiang							
Without Project	1.135	1.332	1.899	0.859	1.257	1.870	3.760
With Project	0.510	0.570	0.776	0.394	0.510	0.764	1.625
VOC Savings	0.625	0.762	1.123	0.465	0.747	1.106	2.135
II. Yunnan							
Without Project	1.177	1.340	1.912	0.971	1.431	2.130	4.076
With Project	0.683	0.741	1.009	0.575	0.750	1.115	2.375
VOC Savings	0.494	0.599	0.903	0.396	0.681	1.015	1.701

D. Economic Evaluation

6. The economic internal rates of return (EIRRs) of the Heilongjiang Project have been estimated as 18.8 per cent for the Heilongjiang Project and at 17.8 per cent for the Yunnan Project. These EIRRs have been subject to a sensitivity analysis to test the effects of possible unfavorable scenarios related to changes in the key parameters. The analysis has indicated that both Project would maintain their economic viabilities, with EIRRs of 13.6 per cent for the Heilongjiang Project and 14.3 per cent for the Yunnan Project, even under the most adverse scenario (10 per cent cost increase, 10 per cent benefit decrease and one year implementation delay, see Table 2, 3, and 4).

Table 2: Economic Analysis of the Heilongjiang Expressway Project
(Y million)

Year	Costs			Benefits						Net Benefits
				VOC Savings				Avoided Investment		
				New Road			Existing Road			
	Capital Investment	Operation and Maintenance	Total	Diverted Traffic	Generated Traffic	Distance Reduction	Reduced Congestion	Major Maintenance	Total	
1995	574		574						0	-574
1996	583		583						0	-583
1997	583		583						0	-583
1998	388		388						0	-388
1999		21	21	263	75	50	24		411	390
2000		21	21	286	81	55	60		482	460
2001		21	21	299	85	57	102		543	521
2002		21	21	312	89	60	0	199 [a]	660	638
2003		21	21	326	93	62	0	199 [a]	681	660
2004		21	21	341	97	65	0	199 [a]	703	681
2005		21	21	357	101	68	0		526	505
2006		82 [b]	82	373	106	71	0		550	468
2007		21	21	390	111	74	0		575	554
2008		21	21	407	116	78	3		604	583
2009		21	21	426	121	81	6		634	613
2010		21	21	445	126	85	10		666	645
2011		21	21	459	131	88	13		691	670
2012		21	21	474	135	90	19		717	696
2013		21	21	489	139	93	26		748	726
2014		82 [b]	82	505	143	96	32		777	695
2015		21	21	521	148	100	47		816	794
2016		21	21	537	153	103	67		860	838
2017		21	21	555	158	106	97		916	895
2018	-1,064 [c]	21	-1,042	572	163	109	130		974	2,017
EIRR = 18.9%										

[a] Major maintence of the existing road will be necessary after reaching the capacity under the "without" Project scenario.

[b] Periodic maintenance for the asphalt concrete section (about 100 km).

[c] Salvage value.

Source: Provincial Communications Department

Table 3: Economic Analysis of the Yunnan Expressway Project
(Y million)

Year	Costs			Benefits						
				VOC Savings				Avoided Investment		
				New Road			Existing Road			
	Capital Investment	Operation and Maintenance	Total	Diverted Traffic	Generated Traffic	Distance Reduction	Reduced Congestion	Major Maintenance	Total	Net Benefi
1995	702		702						0	-70
1996	925		925						0	-92
1997	925		925					178 [a]	178	-74
1998	616		616					178 [a]	178	-43
1999		32	32	278	62	136	4	178 [a]	658	62
2000		32	32	289	64	142	6		501	47
2001		32	32	301	67	147	9		524	49
2002		32	32	313	69	153	15		551	51
2003		32	32	325	72	159	22		579	54
2004		32	32	338	75	166	28		607	57
2005		32	32	352	78	172	36		638	60
2006		324 [b]	324	366	81	179	73		699	37
2007		32	32	381	84	186	103		755	72
2008		32	32	396	88	194	136		813	78
2009		32	32	411	91	201	255		959	92
2010		32	32	424	94	208	350		1,076	1,04
2011		32	32	438	97	214	452		1,201	1,16
2012		32	32	451	100	221	559		1,332	1,30
2013		32	32	466	103	228	672		1,469	1,43
2014		324 [b]	324	480	106	235	793		1,615	1,29
2015		32	32	496	110	243	954		1,802	1,77
2016		32	32	511	113	250	1,090		1,964	1,93
2017		32	32	527	117	258	1,268		2,170	2,13
2018	-1,584 [c]	32	-1,552	544	120	266	1,459		2,389	3,94
				EIRR =	17.8%					

[a] Major maintence of the existing road will be necessary after reaching the capacity under the "without" Project scenario.
[b] Periodic maintenance (asphalt concrete overlay).
[c] Salvage value.

Source: Provincial Communications Department

Table 4: Results of Sensitivity Analysis

Component	Heilongjiang Project		Yunnan Project	
	EIRR	SI [a]	EIRR	SI [a]
1. Base Case	18.9		17.8	
2. Increase in Costs (10%)	17.6	0.7	16.4	0.8
3. Decrease in Benefits (10%)	17.4	0.8	16.4	0.8
4. One Year Implementation Delay	17.5		16.8	
5. Combination of 2 and 3	16.1		15.1	
6. Combination of 2 and 4	16.3		15.5	
7. Combination of 3 and 4	14.8		15.5	
8. Combination of 2, 3 and 4	13.7		14.3	

[a] Sensitivity indicator = $\frac{\text{Percentage Change in EIRR}}{\text{Percantege Change in Variable Tested}}$

Source: Provincial Communications Department