

**REPORT AND RECOMMENDATION
OF THE
PRESIDENT
TO THE
BOARD OF DIRECTORS
ON A
PROPOSED LOAN
TO THE
PEOPLE'S REPUBLIC OF CHINA
FOR THE
SOUTHERN SICHUAN ROADS DEVELOPMENT PROJECT**

August 2002

CURRENCY EQUIVALENTS

(as of 1 August 2002)

Currency Unit	–	yuan (CNY)
CNY1.00	=	\$0.1208
\$1.00	=	CNY8.2766

The exchange rate of the yuan is determined under a floating exchange rate system. In this report, a rate of \$1.00 = CNY8.277, the rate prevailing at the time of appraisal of the Project, was used.

ABBREVIATIONS

AAOV	–	average annual output value
ADB	–	Asian Development Bank
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
FYP	–	five-year plan
GDP	–	gross domestic product
ha	–	hectare
JBIC	–	Japan Bank for International Cooperation
km	–	kilometer
LIBOR	–	London interbank offered rate
LCB	–	local competitive bidding
m ²	–	square meter
MOC	–	Ministry of Communications
MTE	–	medium-truck equivalent
O&M	–	operation and maintenance
PCR	–	project completion report
PRC	–	People's Republic of China
RRP	–	report and recommendation of the president
SPCD	–	Sichuan Provincial Communications Department
SPG	–	Sichuan provincial government
TA	–	technical assistance
VOC	–	vehicle operating cost
SPECL	–	Sichuan Panxi Expressway Development Shareholding Company Limited (or Sichuan Panxi Expressway Company Limited)

NOTES

- (i) The fiscal year (FY) of the Government ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

CONTENTS

	Page
LOAN AND PROJECT SUMMARY	iii
MAPS	vii
I. THE PROPOSAL	1
II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES	1
A. Performance Indicators and Analysis	1
B. Analysis of Key Problems and Opportunities	2
III. THE PROPOSED PROJECT	5
A. Objectives	5
B. Components and Outputs	5
C. Special Features	5
D. Cost Estimates	9
E. Financing Plan	10
F. Implementation Arrangements	11
IV. PROJECT BENEFITS, IMPACTS, AND RISKS	14
A. Economic Benefits and Distribution Analysis	14
B. Financial Benefits	15
C. Impact on Poverty	16
D. Risks	17
V. ASSURANCES	18
A. Specific Assurances	18
B. Condition for Loan Effectiveness	20
VI. RECOMMENDATION	20
APPENDIXES	
1. Project Framework	21
2. Road Sector Analysis	24
3. Summary Poverty Reduction and Social Strategy	29
4. Economic and Financial Analysis	36
5. External Assistance	45
6. Road Safety and Vehicle Emissions	48
7. Summary Resettlement Plan	51
8. Stakeholder Participation and Consultations	53
9. Cost Estimates and Financing Plan	55
10. Implementation Schedule	56
11. Contract Packages	57

SUPPLEMENTARY APPENDIXES (available upon request)

- A. Traffic Trends
- B. Road Sector Revenues and Expenditures in Sichuan Province
- C. Traffic Forecasts
- D. Project Performance Management System
- E. Concession Framework Agreement
- F. Corporate Development Plan
- G. Private Sector Development in the PRC Road Sector
- H. Resettlement Plan
- I. Organization Charts of the Executing Agency
- J. Outline Terms of Reference for Consultants

LOAN AND PROJECT SUMMARY

Borrower	The People's Republic of China (PRC)
Classification	Poverty: Other Thematic: Economic growth
Environment Assessment	Category A. An environmental impact assessment was undertaken, and the summary was made public through web site of the Asian Development Bank (ADB) on 5 March 2002.
Project Description	The Project is located in Sichuan Province in the poor southwestern region of the PRC. In 2001 the per capita gross domestic product of Sichuan was about two thirds of the national average. The Project will support the Government's Western Region Development Strategy by building an important section of the western region route in Sichuan Province by (i) constructing an expressway across hilly to mountainous terrain; (ii) improving local roads servicing poor counties and townships; and (iii) providing consulting services and training to enhance construction quality, road safety, and project monitoring and evaluation.
Rationale	To enhance economic development and reduce poverty in the western part of the PRC, the Government adopted the long-term Western Region Development Strategy, which is the key theme of the Tenth Five-Year Plan (2001–2005). The strategy aims to reduce development disparities between the western and coastal regions. The road sector forms an important part of the strategy, as it provides a vital link between these two regions. The Project will support the strategy by building part of the western region route in Sichuan Province and will improve the access of the southern part of Sichuan Province.
Objectives	The main objective is to accelerate economic development and thereby reduce poverty in Sichuan Province. The Project will (i) alleviate congestion and reduce traffic accidents and vehicle operating costs; (ii) improve access between Chengdu and Kunming, two major centers in the western PRC; and (iii) improve access for the poor rural residents in the transport corridor. The Project comprises (i) construction of a 160 kilometer (km) of four-lane, access-controlled toll expressway from Xichang to Panzhihua, including access roads, interchanges with toll stations, tunnels, bridges, administrative stations, and service areas; (ii) upgrading of 558 km of county and township roads to improve access of the poor and minority areas to the economic mainstream; (iii) procurement of equipment for road maintenance, toll collection, surveillance and communications, vehicle weigh stations, road safety, and office administration; (iv) land acquisition and resettlement; and (v) consulting services for construction supervision, safety audits, monitoring and evaluation, and capacity building.

Cost Estimates

The total cost of the Project, including physical and price contingencies and interest during construction, is estimated at \$1,019 million equivalent, of which \$464 million (46%) is in foreign exchange and \$555 million equivalent (54%) in local currency.

Financing Plan

(\$ million)

Source	Foreign Exchange	Local Currency	Total Cost
Asian Development Bank	300	0	300
Ministry of Communications	0	145	145
Sichuan Provincial Government	164	144	308
China Development Bank	0	266	266
Total	464	555	1,019
%	46	54	100

Loan Amount and Terms

A loan of \$300 million from ADB's ordinary capital resources will be provided under ADB's LIBOR-based lending facility. The loan will have a 25-year term including a grace period of 5 years, an interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.75% per annum, a front-end fee of 1.0%, and such other terms and conditions set forth in the draft Loan and Project Agreements.

Allocation and Relending Terms

The ADB loan proceeds will be relent by the Borrower to Sichuan Province, which will onlend it to the Sichuan Panxi Expressway Development Shareholding Company Limited (also known as Sichuan Panxi Expressway Company Limited [SPECL]) with the same financial terms and conditions as those of the ADB loan. SPECL will bear the interest rate variation and foreign exchange risks.

Period of Utilization

Until 31 March 2008

Estimated Project Completion Date

30 September 2007

Implementation Arrangements

The project implementation unit established within SPECL will be responsible for the expressway. Sichuan Province will implement the local road component through local governments.

Executing Agency

Sichuan Provincial Communications Department (SPCD)

Procurement

Goods and services financed by the ADB loan will be procured in accordance with ADB's *Guidelines for Procurement*. Civil works for the expressway will be procured through international competitive bidding. Civil works for local roads will be procured through local competitive bidding or force account. On 7 March 2002, ADB approved advance action for procurement of civil works. Equipment will be procured through international competitive bidding or international shopping.

Consulting Services

About 64 person-months of international consulting services will be provided under the Project to (i) assist in project management

during the construction period; (ii) provide expertise in tunnel and bridge construction; (iii) conduct a safety audit of the project design, and make recommendations on improving the safety of completed construction works; (iv) help set up and implement quality control procedures; (v) assist in formulating a human resource development and training program; and (vi) help establish and implement a project performance management system, including assessing the impact on poverty reduction. About 4,350 person-months of domestic consulting services will be required for construction supervision. The international consultants will be financed from the ADB loan and be recruited based on the quality- and cost-based selection method in accordance with ADB's *Guidelines on the Use of Consultants*. On 7 March 2002, ADB approved advance action for recruitment of international consultants. The domestic consultants will be financed by SPCD and will be recruited in accordance with Government procedures acceptable to ADB.

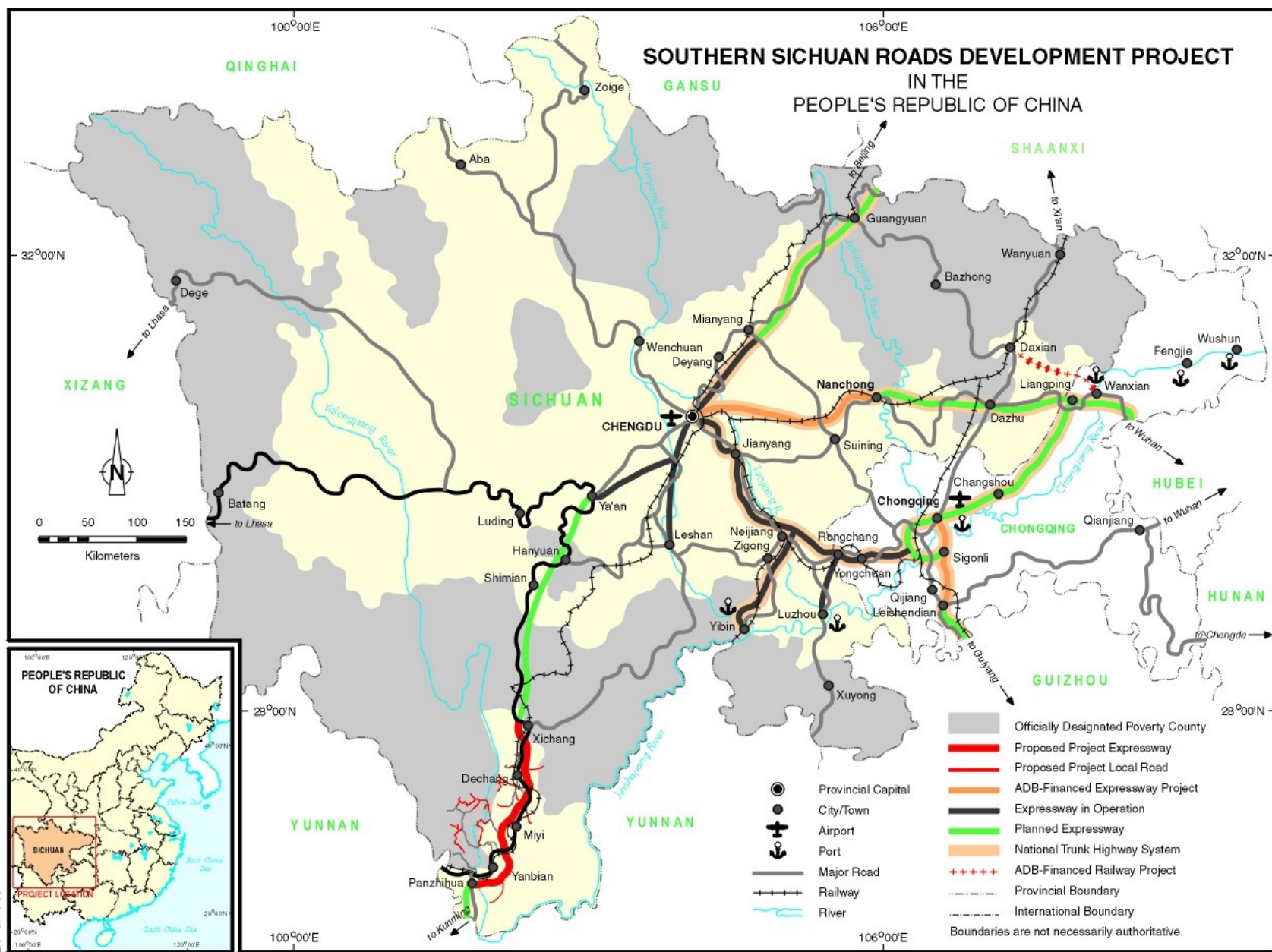
Project Benefits and Beneficiaries

By improving local roads to poor counties and townships in addition to constructing the expressway, the Project will help improve access to market opportunities and social services for the poor rural residents in the project area. The Project will reduce transport time and costs, and thereby promote investments, enhance incomes, and create employment opportunities. The economic internal rate of return is estimated at 16.2%. The financial internal rate of return after tax for the expressway component is 5.5%, which is higher than the real weighted average cost of capital. There are 197,000 project beneficiaries, or 20% of the total, living below the income levels of CNY1,000 in rural and CNY3,000 in urban areas. The distribution analysis shows that the proportion of net project benefits passed on to the poor, or the poverty impact ratio, is 24%. This ratio is higher than the country's poverty incidence and the income share of the poor. The main project beneficiaries of the local road component will be households in poor counties and townships in the project area, providers of rural transport services, industrial and agricultural businesses, agriculture-based households producing grains and vegetables for local markets, people visiting the historical sites along the expressway alignment, people living in the project area who will have easier access to long-distance transport services, and transport operators and their customers for transit traffic. The Project will also help reduce traffic accidents, vehicle emissions, and traffic noise on the existing roads.

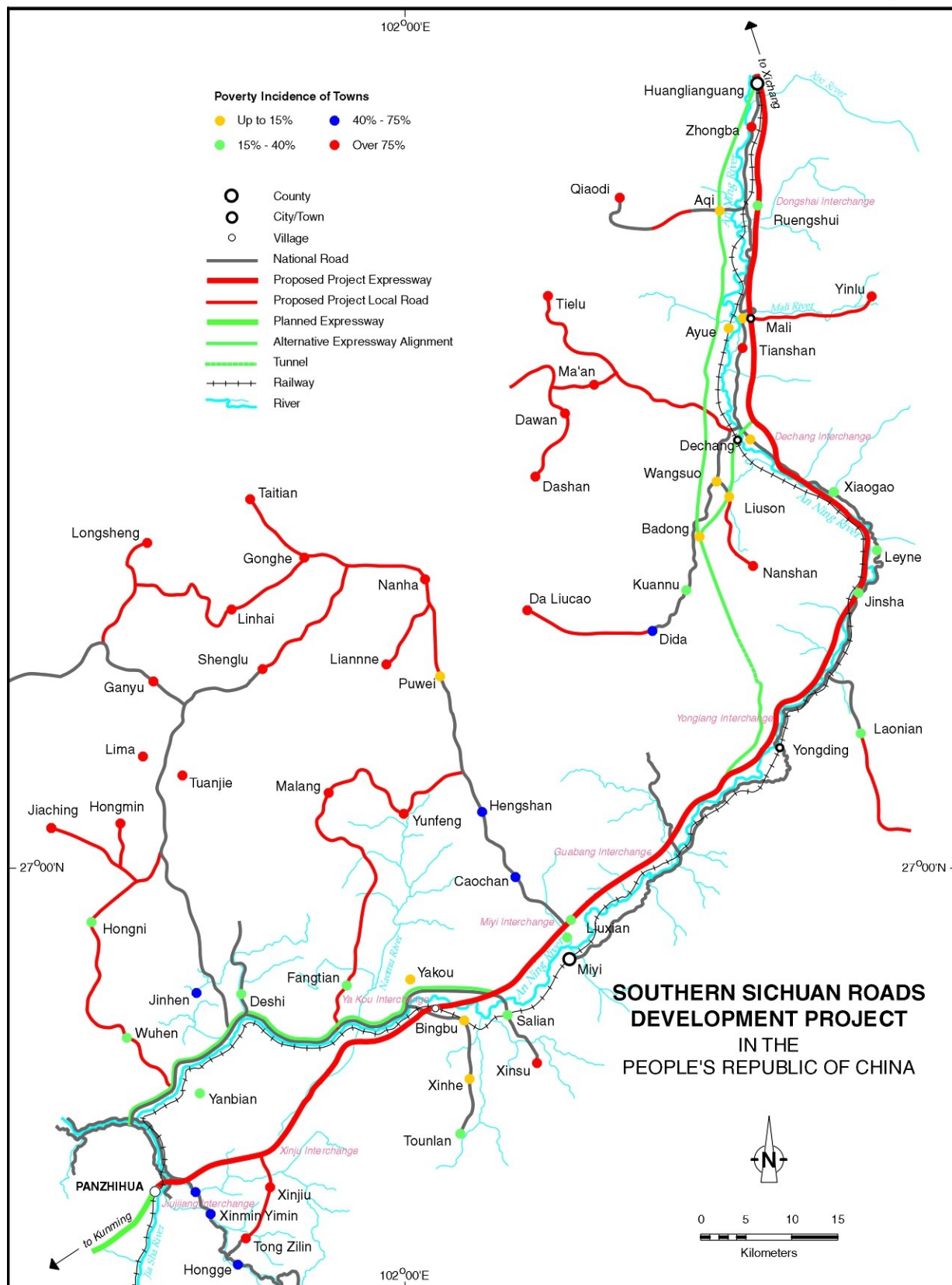
Risks and Assumptions

The Project was formulated to reduce potential risks. The main technical risks are associated with the extensive tunnel and bridge structures. To mitigate the risks, international consultants reviewed the proposed design and construction methods. Prequalification of contractors focuses on their financial and technical capability in handling complex works. During the construction period, monitoring and contract management information systems will be set up and implemented, with the assistance of the international consultants, for timely identification

of technical problems and implementation of corrective measures. Economic performance in the project influence area would have to deteriorate substantially for the Project to lose economic viability. The financial risk associated with construction and operation of the expressway will depend on the actual construction costs when contracts are awarded and the subsequent implementation. To mitigate this risk, SPECL is consciously oriented to building up a commercial business environment for expressway operations, and the project expressway will receive substantial equity from the central and provincial governments.



Map 2



I. THE PROPOSAL

1. I submit for your approval the following report and recommendation (RRP)¹ on a proposed loan to the People's Republic of China (PRC) for the Southern Sichuan Roads Development Project (The project framework is in Appendix 1).

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Performance Indicators and Analysis

2. Despite the Government's efforts to increase the country's transport capacity, serious constraints and bottlenecks remain, especially in the road sector. Between 1990 and 2000, when economic growth averaged 10.2% per annum, road traffic grew at 9.7% per annum for passenger traffic, reaching 660 billion passenger-kilometer (km) and 5.9% per annum for freight, reaching 597 billion ton-km. Road traffic accounts for 54.2% of total passenger traffic and 13.7% of total freight traffic (Supplementary Appendix A). The movement of goods and passengers will increasingly be by road, as road transport is more flexible and responsive to needs in a market economy than other modes. In addition, car ownership is growing, and an increasing proportion of passengers are traveling by road.

3. The road network grew from 1.16 million km in 1995 to 1.68 million km in 2001 equivalent to an annual increase of 86,700 km. Of this, the expressway length increased from 2,141 km to 19,437 km during the same period.² But the road network is still underdeveloped in both quality and extent. High standard roads, i.e., above class II, account for only about 13% of the total road network, and the remaining 87% (class III road and below) are medium- to low-grade paved roads and gravel roads. With only 1,100 km of roads per million inhabitants, the density of the PRC's road network is low.³ Road density relative to the area increased from 12.1 km per 100 square km (km²) in 1995 to 14.6 km per 100 km² in 2000. Of the 92,000 km of roads in Sichuan Province in 2001, 1,152 km were expressways. Roads are generally of low standard. The 78% in class IV or lower in Sichuan is a higher share of low-quality roads than that for the PRC as a whole. Sichuan has about 1,091 km of classified roads per million inhabitants, slightly below the national average.

4. The significant road sector development during the 9th Five-Year Plan (FYP) (1996–2000) reflected the Government's commitment to stimulate the economy through public investment in the road sector. Because of the need to remove transport bottlenecks to facilitate efficient, sustained economic growth and reduce poverty, the Government implemented a large investment program in the road sector during this period, totaling CNY924 billion, or CNY185 billion per year, up from CNY242 billion, or CNY48 billion per year, during the 8th FYP (1991–1995). The road sector investment grew at an average annual rate of 16% during this period. The Government will have difficulty sustaining this level of investment even with official development assistance. An increasing proportion of financing will have to come from private sector sources. A road sector analysis is included in Appendix 2. The road sector revenue and expenditures in Sichuan Province is given in Supplementary Appendix B.

¹ This report was prepared by the project team, comprising M. Ojiro, Principal Project Economist/Project Team Leader; L. Blanchetti-Revelli, Resettlement Specialist; K. Emzita, Counsel; Y. L. Feng, Sr. Environment Specialist; T. Hayakawa, Financial Analyst; K. Jraiwi, Transport Specialist; E. Kwon, Project Economist; P. Seneviratne, Transport Specialist; D. Sobel, Sr. Programs Officer; and N. Tas-Anvaripour, Financial Management Specialist.

² The PRC's expressway length is second in the world after the United States.

³ Comparative figures for km of road per million inhabitants in other geographically large countries are about 25,300 km for the United States and 1,800 km for India.

B. Analysis of Key Problems and Opportunities

5. Sichuan Province is a poor interior area in western PRC. In 2001 the per capita gross domestic product (GDP) of the province was about two thirds of the national average. The key problem in Sichuan Province is poverty: the per capita GDP was CNY5,118 in 2001, or 68% of the national average. The per capita rural income was CNY1,987, or 84% of the national average. About one third of the counties in Sichuan are officially designated poor counties. In the project area, 197,000 poor project beneficiaries, or 20%, are living below the income levels of CNY1,000 in rural areas and CNY3,000 in urban areas. An overview of the poverty reduction and the government's social strategy is given in Appendix 3. One of the reasons for high poverty incidence is slow economic growth, partly because of inadequate infrastructure. Despite the considerable investments, the road network is still inadequate, and does not provide efficient transport access to large parts of the country. Better transport links are necessary to improve economic efficiency, foster domestic and international trade, facilitate interregional integration, and reduce poverty.

6. The traffic volume on the existing roads in the project area has been increasing at about 11% per annum in the last few years, reaching 2,350 vehicles per day to 9,700 vehicles per day depending on sections in 2001. The roads are already at capacity in certain sections. If the new road is not constructed, traffic will be suppressed and transport costs will increase. The restricted traffic movements will slow economic growth of the project area. Based on the Asian Development Bank (ADB)-financed technical assistance (TA),⁴ the forecast traffic volume on the expressway is expected to grow from 6,300 medium truck equivalents (MTEs) in 2008 to 11,900 MTEs in 2018, a 6.6% average annual growth rate. It will grow more slowly at 5.6% per annum thereafter to reach 20,400 MTEs in 2028 (Appendix 4 and Supplementary Appendix C). The projected volumes justify the construction of an expressway.

7. The impact of transport infrastructure investments on poverty reduction is demonstrated by recent studies using an econometric model, which examined the effectiveness of government expenditure in various sectors in contributing to growth and poverty reduction in the PRC and Indonesia.⁵ The studies concluded that investments in road infrastructure have the largest impact on poverty reduction, productivity, and growth. The importance of road infrastructure in improving quality of life is highlighted in the ADB-financed Rural Asia Study.⁶ The link between transport development and poverty reduction is also supported by studies and evaluation of several completed transport projects, financed by ADB⁷ and the World Bank.⁸ A regional TA⁹ is being implemented to examine the poverty reduction impact of infrastructure projects.

⁴ ADB. 2000. *TA to the PRC for Preparing the Southern Sichuan Roads Development Project*. Manila.

⁵ Fan, S., Zhang, L., and Zhang, X. 2000. *Growth and Poverty in Rural China: The Role of Public Investments*. Washington, DC: International Food Policy Research Institute; and Kwon, E. 2000. *A Link between Infrastructure, Growth, and Poverty in Indonesia*. The Economics and Development Resource Center, ADB, Manila.

⁶ Bloom, David E., Craig, Patricia H., and Malaney, Pia N. 2001. *The Quality of Life in Rural Asia*. New York: Oxford University Press.

⁷ An ADB-financed study in Shaanxi Province found a correlation between road density and rural incomes from 1990 to 1999: the higher the road development stage, the higher was per capita rural incomes. In Liaoning Province and Yunnan Province, construction of expressways complemented by local road upgrading was associated with a significant increase in rural incomes in the project area.

⁸ Hajj, Hatim, and Pendakure, V. Setty. 2000. *Roads Improvement for Poverty Alleviation in China*. Working Paper No. 1. Transport Sector Unit. East Asia and Pacific Region, World Bank. Washington, D.C., and World Bank. 1996. *Kingdom of Morocco—Impact Evaluation Report: Socioeconomic Influence of Rural Roads*. Washington, D.C.

⁹ ADB. 2000. *TA for Assessing the Impact of Transport and Energy Infrastructure on Poverty Reduction*. Manila.

8. The private sector will be the PRC's engine of employment generation and a main mechanism to increase productivity—two essential instruments to reduce poverty. According to the ADB surveys¹⁰ infrastructure constraints are among the impediments faced by private companies operating in the PRC. Of 756 firms interviewed, 21% cited poor roads as a major constraint, which is the second most frequently cited infrastructure constraint after land and buildings. If private investment is to be attracted to the poor interior provinces by creating an enabling framework, road infrastructure, among other things, needs to be improved.

9. The Government adopted the long-term Western Region Development Strategy, which is the key theme of the 10th FYP (2001–2005) to enhance economic development and reduce poverty in the western part of the country, where most poor reside. The strategy aims to reduce development disparities between the western region and the coastal region. The proposed Project will support the strategy by building one of the eight western region routes¹¹ and improve the access of Chengdu and other cities in the poor western region.

10. To help the Government develop and implement its road sector strategy, external assistance has been provided mainly from ADB, the Japan Bank for International Cooperation (JBIC), and the World Bank (Appendix 5). Since 1991, ADB has provided 22 loans totaling nearly \$3.6 billion to finance 3,000 km of road development, together with the associated 4,484 km local road network. Local roads have been included in the project scope since 1995 to make ADB's interventions in the road sector more pro-poor. ADB's assistance to the road subsector has been effective and successful in achieving the project objectives. Among the projects financed by ADB, 12 have been completed and are open to traffic. The project completion reports (PCRs) prepared for 7 road projects concluded that six projects were generally successful,¹² and one was partly successful.¹³ The project performance audit reports¹⁴ for three road projects concluded that the projects were either highly successful or successful. A development impact study¹⁵ of the 1,867 km Beijing-Tongjiang expressway route, for which ADB provided loans totaling \$1.2 billion, showed that the improved road network significantly contributed to the development of the northeastern part of the PRC. A midterm review and procurement review of the ongoing road project¹⁶ being implemented by the same executing agency were undertaken in 2001 and concluded that the project is being implemented satisfactorily in principle. Lessons learned from these reviews cover implementation-related matters, including (i) ADB procurement guidelines and requirements were not always followed;

¹⁰ ADB. 2002. *Private Sector Assessment and Strategy in the PRC* (draft). Manila.

¹¹ These include Altai–Hongqilafu, Xi'ning–Korla, Yinchuan–Wuhan, Arongqi–Behai, Lanzhou–Mohan, Xi'an–Hefei, Chongqing–Changsha, and Chengdu–Zhangmu.

¹² ADB. 1998. *PCR on the Shenyang-Benxi Highway Project in the PRC*. Manila; ADB. 1998. *PCR on the Jilin Expressway Project in the PRC*. Manila; ADB. 2000. *PCR on the Hunan Expressway Project in the PRC*. Manila; ADB. 2000. *PCR on the Liaoning Expressway Project in the PRC*. Manila; ADB. 2001. *PCR on the Yunnan Expressway Project in the PRC*. Manila; and ADB. 2002. *PCR on the Shenyang-Jinzhou Expressway Project in the PRC*. Manila.

¹³ ADB. 1999. *PCR on the Heilongjiang Expressway Project in the PRC*. Manila. This is mainly due to inadequate safety facilities and enforcement, as well as partial compliance with environmental mitigation measures. Remedial actions have been subsequently taken by the executing agency through rectifying the infrastructure deficiencies, enforcing harsher penalties for traffic violations, and implementing the environmental mitigation measures recommended in the environmental impact assessment.

¹⁴ ADB. 2000. *Project Performance Audit Report on the Shenyang-Benxi Highway and Jilin Expressway Projects in the PRC*. Manila; and ADB. 2001. *Project Performance Audit Report on the Heilongjiang Expressway Project in the PRC*. Manila. One of the key lessons identified in the report is that corporatization of the expressway in Jilin Province was an effective option for resolving funding shortfalls and ultimately contributed to financing for future expressway development.

¹⁵ ADB. 2002. *Road Sector Impact Study*. Manila.

¹⁶ ADB. 1998. *RRP on a Proposed Loan to the PRC for the Chengdu-Nanchong Expressway Project*. Manila.

(ii) a detailed procurement plan and schedule should be developed during project preparation; (iii) the actual awarded price and appraisal estimates varied widely; and (v) a long time was needed to obtain the government approvals for bidding documents and bid evaluation reports. These issues have been dealt with under the proposed Project. ADB has also provided the road sector with 41 TAs totaling \$21.5 million. The advisory TAs have supported the development of road infrastructure by addressing policy and institutional issues, including highway planning, road safety,¹⁷ human resource development, transport pricing, commercialization and corporatization, and mobilization of nongovernment financial resources. ADB's assistance has been complemented by the World Bank and JBIC, which have provided about \$5.3 billion and \$990 million to finance road infrastructure investments. ADB's policy dialogue in the road sector and identification of projects are coordinated with the World Bank and JBIC.

11. ADB's operational strategy¹⁸ in the PRC's road sector supports (i) construction of roads that connect major growth centers and promote linkages with hinterland economies; (ii) integration of the network so that the national trunk highway system is supported by a system of local roads, particularly those that provide access to poor areas; (iii) promotion of road safety and vehicle emission reduction; (iv) institutional strengthening to increase the commercial orientation and efficiency of expressway organizations; (v) improvement of highway planning and evaluation techniques; (vi) adoption of appropriate pricing policies to ensure optimum use of road transport capacity; and (vii) use of alternative methods of investment financing, including private sector participation. Consistent with this strategy, the policy dialogue with the Government focused on key issues, including enhancing poverty impact and monitoring of road projects, improving road safety, reducing vehicle emissions, strengthening corporate governance, facilitating private sector development. These constitute special features of the Project (paras. 15–22) and are detailed in Appendix 2.

12. During the 2002 Country Programming Mission, the Government reconfirmed its request for assistance for the Project. A feasibility study¹⁹ and a resettlement plan were prepared by the Sichuan Highway Design Institute. The Highway Research Institute of the Ministry of Communications undertook an environmental impact assessment (EIA).²⁰ ADB provided TA (footnote 4) to supplement the Government studies. Fact-finding for the Project was undertaken from 22 November to 5 December 2001 and appraisal from 12 to 22 March 2002. Loan negotiations with authorized representatives of the Government were conducted in Manila from 5 to 7 August 2002. The Project was formulated based on the findings of the ADB missions, information provided by the Government, beneficiary consultations, discussions with other funding agencies, and recommendations of the feasibility study and TA consultants. The Project is consistent with ADB's country operational strategy.

¹⁷ In January 2001, ADB's Operations Evaluation Department completed a performance audit report on traffic safety TAs. The two road safety TAs involving the PRC were rated highly successful.

¹⁸ ADB. 1997. *Country Operational Strategy Study: PRC*. Manila; and ADB. 2001. *Country Strategy and Program Update (2002-2004): PRC*. Manila.

¹⁹ The feasibility study was approved by the State Council in April 2002.

²⁰ The environmental impact assessment was approved by the State Environmental Protection Administration on 25 February 2002.

III. THE PROPOSED PROJECT

A. Objectives

13. The principal objectives of the Project are to promote economic growth and reduce poverty in the southern part of Sichuan Province by lowering the cost of transport, relieving traffic congestion, and improving access in the project area (Map 1). The Project will (i) alleviate congestion and reduce traffic accidents and vehicle operating costs; (ii) improve access between Chengdu and Kunming, two major centers in western PRC; (iii) provide additional transport capacity to accommodate traffic growth due to economic growth and the shift to more flexible road based transportation; and (iv) provide improved access for the poor rural population in the transport corridor. The Project will also support reforms relating to poverty reduction, road safety and vehicle emissions, and corporate governance.

B. Components and Outputs

14. The Project comprises the following: (i) construction of a 160 km, four-lane access-controlled toll expressway from Xichang to Panzhihua, including access roads, interchanges with toll stations, tunnels, bridges, administrative stations, and service areas; (ii) upgrading of 558 km of county and township roads to improve access to poor and minority areas (Map 2); (iii) procurement of equipment for road maintenance, toll collection, surveillance and communications, vehicle weigh stations, road safety, and office administration; (iv) land acquisition and resettlement; and (v) consulting services for construction supervision, safety audits, monitoring and evaluation, and capacity building. The key inputs needed to implement the Project include civil works, consultants, equipment, and staff of the Sichuan Provincial Communications Department (SPCD) and the Sichuan Panxi Expressway Company Limited (SPECL).

C. Special Features

1. Targeting Poor Beneficiaries

15. ADB and the Government have had extensive discussions on how to enhance the poverty reduction impact of road investments. The policy dialogue focused on three main issues. First, the location of ADB-financed road sector projects has shifted from the northeast and coastal areas to the poorer central and southwest regions. This shift to poorer interior provinces is in line with the 10th FYP. Second, the dialogue focused on the inclusion of local roads under ADB-financed road projects. Since 1995, the scope of ADB-financed road projects²¹ has included improvements to local roads connecting to the expressway interchanges to facilitate access of rural communities to county centers and to the expressway facilities. The scope of the Project includes upgrading 558 km of local roads that will connect poor areas to the expressway interchanges. This local road component was added to the project scope at ADB's initiative and was formulated by prioritizing road sections that serve areas where most poor people live and where the most beneficial impact can be made on poverty reduction. Third,

²¹ Chengdu-Nanchong Expressway Project, Chongqing-Guizhou Roads Development Projects (Leichong Expressway/Chongzun Expressway), Guangxi Roads Development Project, Hebei Expressway Project, Hebei Roads Development Project, Jiangxi Expressway Project, Liaoning Expressway Project, Shaanxi Roads Development Project, Shanxi Road Development Project, Shenyang-Jinzhou Expressway Project, and Southern Yunnan Road Development Project. The local road components of these projects are being implemented or have been completed successfully, helping improve living conditions of the poor people in the project area.

ADB's agenda for policy dialogue included maximizing employment of poor people during road construction. Specific measures have been formulated in the Project to support these objectives.

16. The project area is very diverse in terms of climate, topography, ecology, economy, and social structure. The project area covers poor counties of Dechang, Miyi, and Yanbian; small parts of Huili, Renhe, and Xichang counties, and the urban district of Panzhihua. The total population living in the project area is 1.2 million, of which about 1.0 million are project beneficiaries. About 137,000 rural residents, or about 34% of rural beneficiaries (406,000), have annual incomes of less than CNY1,000 while 60,000 urban residents, or about 11% of urban beneficiaries (563,000), have annual incomes of less than CNY3,000.

17. The local road component directly targeting poor and minority villages in the mountains will be implemented in parallel with the construction of the expressway. While the poor themselves may not directly use the expressway, they will make use of the local roads to sell their produce to others who will use the expressway to transport the goods to markets in Panzhihua, Xichang, and beyond, or to supply agricultural inputs, such as fertilizer, pesticides, and seeds. The poor could pool resources in the future to purchase vehicles that could use the expressway to access major markets.

18. To ensure that the project benefits accrue to poor people as intended, a set of monitorable poverty impact indicators was developed in consultation with the SPCD based on findings of ongoing TA, which supports the rural poverty reduction projects in the PRC. The main indicators will include poverty incidence, rural incomes, production of grain crops, housing conditions, productive assets, access to markets, access to basic infrastructure, access to health and education services, and off-farm economic activities. Baseline indicators and targets will be worked out at the beginning of project implementation. The poverty monitoring will be carried out as part of the project performance monitoring and evaluation (para. 40 and Supplementary Appendix D) with the support of 26 person-months of consulting assistance. A TA, Socioeconomic Assessment of Road Projects, which is under processing, will strengthen poverty monitoring by providing advice and assistance to SPCD.

2. Road Safety and Vehicle Emissions

19. Road safety is a serious issue in the PRC and in Sichuan province. The 2001 accident statistics for the PRC were 755,000 accidents, 106,000 fatalities, and 536,000 injuries. Sichuan Province had 39,090 reported accidents, 5,727 fatalities, and 31,972 injuries. To address this issue, the Ministry of Public Security has prepared the 2002 Road Safety Action Plan, which aims to (i) reduce serious accidents, involving more than 10 fatalities, by 10% compared with 2001; and (ii) eliminate major accidents, involving 30 or more fatalities.²² This would be achieved through improved safety of vehicles, driver training, and improved traffic management. In Sichuan, the Road Safety Council was established to investigate road accidents, and prepare codes and standards for accident prevention. To enforce traffic regulations for a completed 70 km section adjoining the project expressway, a highway patrol team was organized by the Public Security Bureau. It will be expanded to work on the project expressway. To strengthen the capacity of the Road Safety Council and the highway patrol team, assistance will be provided to the public security bureau under the international consulting services through in-country training for concerned staff. Assistance will also be provided, in light of the findings of

²² In 2000, 39 accidents involved 10 or more fatalities and 4 accidents involved 30 or more fatalities.

the ongoing ADB TA²³ on road safety, to review and improve (i) provincial road safety guidelines for the interdepartmental road safety initiatives; and (ii) road safety action plans for Liangshan and Panzhihua prior to opening of the project expressway (Appendix 6).

20. With a rapid increase in vehicle ownership, vehicle emissions have also become a serious issue in the PRC. Vehicle emissions will have an adverse impact on the environment if no mitigation measures are taken. Fragmented responsibility, lack of interdepartmental coordination, and an inadequate database and monitoring system prevent the formulation of specific targets for a reduction in vehicle emissions. Sichuan Province has an annual program for testing vehicle emissions. Road-side testing is carried out in Panzhihua city where the project alignment passes. To address the motor vehicle emissions issue, international consultants will provide training to staff of the environmental protection bureau involved with vehicle emissions inspection and testing. Assistance will also be provided, in light of the findings of the recently completed ADB TA²⁴ on vehicle emissions, to review and improve (i) general provincial guidelines for vehicle emissions reduction, and (ii) action plans for Liangshan and Panzhihua prior to opening of the project expressway (Appendix 6).

3. Corporate Governance

21. An expressway company, SPECL, was established in September 1998 as a joint stock, limited liability company to construct and operate expressway sections, including the proposed project expressway. However, it still operates as an implementing department of SPCD, rather than as an autonomous corporate entity. SPECL's initial objective is to build the project expressway as efficiently and cost effectively as possible. Its management team and staff will primarily be involved in project construction management. The company must have the professional resources and experience, and the management, accounting, and reporting systems required for the efficient and safe operation of its existing and future expressways. SPECL needs to be managed independently by its board, reporting its financial performance to its shareholders. SPECL should develop its management, corporate, and financial reporting procedures in compliance with government and international practices to satisfy the requirements of private investors. SPECL's ultimate objective should be to operate as a private commercial road management company. SPCD and SPECL agreed to enter into a concession framework agreement (Supplementary Appendix E) by 30 June 2004, which will ensure autonomy of operations, encourage the establishment of road facility performance indicators, and facilitate future refinancing of road sector assets. SPCD and SPECL agreed to implement the corporate development plan (Supplementary Appendix F) by 31 December 2004 to demonstrate that the standard of its corporate governance, management procedures, and financial reporting satisfies the requirements of international investors.

4. Private Sector Development

22. In line with ADB's Private Sector Development Strategy, consideration was given to alternative approaches to highway financing recommended under a recently completed ADB

²³ ADB. 1999. *TA to the PRC for Capacity Building in Traffic Safety, Planning, and Management*. Manila.

²⁴ ADB. 2000. *TA for Action Plans for Reducing Vehicle Emissions*. Manila. Under this TA, the Action Plan for Strengthening Vehicle Inspection and Maintenance for Chongqing Municipality was developed. Available: http://www.adb.org/Documents/Events/2002/RETA5973/Manila/downloads/cw_24A_xushubi_english.ppt.

TA,²⁵ including securitization of ADB-financed projects.²⁶ The potential for pursuing these options for financing the project expressway were examined. Capacity to attract nongovernment financing, particularly equity capital, for road projects such as the project expressway with low initial demand and low financial returns, but with high long-term economic returns, is limited. Therefore, the construction of the Project will be financed from public sources with funds modified from a variety of sources including national financial bonds, development banks, public equity contributions, and ADB. Nevertheless, establishing a sound administrative structure using modern business principles at the outset may make it possible for the operator to secure nongovernment financing at a later stage, depending on traffic buildup and financial performance. Nongovernment financing options will be examined before operations start. ADB will favorably consider such refinancing for the Project, provided that advance notice is received and the proposal meets ADB's standards of good governance, transparency, and project viability. An overview of private sector involvement in the PRC road sector is given in Supplementary Appendix G.

5. Environmental Assessment

23. The Project is classified as environment category A. The EIA concluded that no major adverse environmental impacts will result provided the recommended mitigation measures²⁷ are implemented. The TA consultants (footnote 4) and field visits by ADB staff confirmed the EIA conclusion. The summary EIA²⁸ for the Project was uploaded on ADB's web site on 5 March 2002. In addition to following ADB's *Environmental Guidelines for Selected Infrastructure Development Projects*, all applicable PRC laws and regulations will be complied with during implementation and operation. To ensure that potential adverse environmental impacts of project construction and operation are minimized, the environmental monitoring program and mitigation measures, as specified in the EIA, will be implemented.

6. Land Acquisition and Resettlement Plan

24. The land acquisition for the construction of the project expressway will result in some loss of land, houses, and other assets. A resettlement plan was prepared for the affected people based on the 1998 Land Administration Law²⁹ and provincial guidelines. It was reviewed by the TA consultants and the Mission and confirmed by the detailed measurement survey based on the detail design alignment in accordance with ADB's requirements for involuntary resettlement. About 11,000 people (2,400 households) will be affected. Among these, 6,040 people (1,290 households) will be affected by either house or building losses and will be relocated. Those losing land will be compensated through their economic collectives, according to the 1998 Land Administration Law and the provincial guidelines. The Project will permanently acquire about 825 hectares (ha), plus about 117 ha of temporarily borrowed land for construction purposes.

²⁵ ADB. 1997. *TA to the PRC for Corporatization, Leasing, and Securitization in the Road Sector*. Manila.

²⁶ ADB. 1993. *RRP on Proposed Loans to the PRC for the Hunan and Jilin Expressways Projects*. Manila. Under the two projects, the expressways' future toll revenue was securitized through an initial public offering in August 1999 and January 1999.

²⁷ They include (i) countermeasures to reduce noise for the residents near the alignment; (ii) preventive measures such as planting of trees and grasses, and construction of side ditches, torrent chutes, slope walls, and retaining walls to prevent soil erosion; and (iii) measures to prevent adverse impacts at borrow and spoil sites through contracts containing environmental covenants and by supervising consultants during implementation. During expressway operation, SPECL will help monitor vehicle emissions on the expressway in cooperation with the local environmental protection bureau, traffic police, and other related organizations.

²⁸ Available: http://www.adb.org/Documents/Environment/PRC/roads_devt.pdf

²⁹ The law was drafted with assistance provided under ADB. 1996. *TA to the PRC for Capacity Building for Natural Resources Legislation*. Manila.

The resettlement budget estimate of CNY541 million is included in the project cost estimates. No houses are expected to be affected and no relocation necessary for the local road component as the work will be done mostly on the existing alignment. If any resettlement effects are associated with the local roads, the same resettlement policy will apply. The resettlement plan meets ADB's requirements for involuntary resettlement.

25. SPCD will fund the resettlement costs according to the standards set out in the resettlement plan in accordance with the government regulations, and ADB's policy on resettlement. Compensation will be paid for housing, and new housing will be made available before relocation takes place. In line with the relevant law, the resettlement information booklet was released to affected people through county and township offices and local media on 6 February 2002, and the summary resettlement plan³⁰ (Appendix 7) was disclosed to the public through ADB's web site on 5 March 2002. The full resettlement plan³¹ (Supplementary Appendix H) was also posted on ADB's web site on 8 May 2002. The resettlement booklet contains resettlement impacts, the resettlement policy, compensation rates and policies, organizational arrangements, consultation and participation, and grievance procedures. SPCD will be responsible for internally monitoring the resettlement implementation and for submitting reports to ADB. A regular reporting system was established to ensure key resettlement activities are implemented on time. SPCD will engage a local institute to carry out independent monitoring of the resettlement implementation. Further surveys will be done on completion of the resettlement and 1 year later, and the findings reported to SPCD and ADB.

7. Stakeholder Participation and Consultations

26. Stakeholder participation and consultations have been an important element in the development and design of the Project. They have involved over 900 people, since beginning in March 1997 (i) during the preparation of the feasibility study, EIA, and resettlement plan; (ii) to inform the people affected about the project objectives and to understand their priorities, needs, and concerns; (iii) to dialogue with the county and township representatives in the project area to ensure that local concerns are adequately addressed in the project design; and (iv) through discussions with NGOs. A number of surveys, consultations, and discussions were held with the minority population of the project area. These surveys and discussions provided much of the quantitative and qualitative information, which has been used as the basis for identifying the potential project impacts and assessing their significance. Surveys in communities served by these roads revealed a high degree of support for the Project (Appendix 8).

D. Cost Estimates

27. The total cost of the Project is estimated at \$1,019 million equivalent, with a foreign exchange cost of \$464 million (46%) and a local currency cost of \$555 million (54%) equivalent as shown in Table 1 and detailed in Appendix 9.

³⁰ This is included in the summary EIA (on-line) (footnote 28).

³¹ Available: http://www.adb.org/Documents/Resettlement_Plans/southern_sichuan_roads.pdf

Table 1: Cost Estimates
(\$ million)

Item	Foreign Exchange	Local Currency	Total Cost
A. Base Cost			
1. Expressway Civil Works	347.0	373.3	720.3
2. Equipment	15.0	1.0	16.0
3. Land Acquisition and Resettlement	0.0	65.3	65.3
4. Consulting Services and Training	2.3	11.0	13.3
5. Local Roads	4.7	18.8	23.5
Subtotal (A)	369.0	469.4	838.4
B. Contingencies			
1. Physical Contingencies	18.5	23.4	41.9
2. Price Contingencies	34.2	28.2	62.4
Subtotal (B)	52.7	51.6	104.3
C. Front-End Fee	3.0	0.0	3.0
D. Interest and Commitment Charges			
During Construction	39.3	34.0	73.3
Total	464.0	555.0	1,019.0

Source: Asian Development Bank estimates.

E. Financing Plan

28. The Government has requested a loan of \$300 million from ADB's ordinary capital resources to help finance the Project. The loan will have a 25-year term including a grace period of 5 years, an interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.75% per annum, a front-end fee of 1.0% (the fee will be capitalized in the loan), and such other terms and conditions set forth in the draft Loan and Project Agreements. The Government has provided ADB with (i) the reasons for its decision to borrow under ADB's LIBOR-based lending facility on the basis of these terms and conditions, and (ii) an undertaking that these choices were its own independent decision and not made in reliance on any communication or advice from ADB. A financing plan for the Project is presented in Table 2.

Table 2: Financing Plan
(\$ million)

Source	Foreign Exchange	Local Currency	Total Cost	%
Asian Development Bank	300.0	0.0	300.0	29.5
Ministry of Communications	0.0	145.0	145.0	14.2
Sichuan Provincial Government	164.0	144.0	308.0	30.2
China Development Bank	0.0	266.0	266.0	26.1
Total	464.0	555.0	1,019.0	100.0

Source: Asian Development Bank estimates.

29. The loan will finance about 65% of the foreign exchange cost of the Project and 30% of the total project cost. The remaining foreign exchange cost of \$164 million will be financed by the Sichuan Provincial Government (SPG). The local currency cost will be financed by SPG, Ministry of Communications, and cofinancing through a loan from the China Development Bank. The China Development Bank loan, which is already effective, is repayable over 18 years, including a grace period of 5 years, and at a variable lending rate, currently at 5.76% per annum.

30. The ADB loan proceeds will be made available to Sichuan Province, which will onlend to SPECL with the same financial terms and conditions as those of the ADB loan. SPECL will bear the interest rate variation and foreign exchange risks.

F. Implementation Arrangements

1. Project Management

31. SPCD will be the Executing Agency responsible for overall implementation of the Project. Part of SPCD was corporatized to form SPECL to be the Implementing Agency for the project expressway. SPECL has a board of directors and will have sufficient technical, financial, and administrative staff (Supplementary Appendix I). Most of the staff have experience in implementing internationally financed road projects. Sichuan Province will implement the local road component through local governments. The project director, general manager of the SPECL, will be responsible for overall project management, approval of contracts, and payments. A project implementation unit established within SPECL will monitor and follow up implementation. The unit is headed by a project manager responsible for physical implementation activities on a day-to-day basis and the preparation of progress reports. The project manager is assisted by a team of qualified engineering, financial, and administrative staff. SPECL has sufficient technical capability to handle the Project as their engineers have experience in implementing internationally financed road projects. However, its institutional capacity needs to be developed. Assistance will be provided under the consulting services in this respect. A land acquisition and resettlement committee was established under SPG to ensure the appropriate agencies and authorities coordinate land acquisition and resettlement activities.

2. Period of Implementation

32. The Project will be implemented over about 5 years from December 2002 to September 2007 (Appendix 10). The local road component will be implemented concurrently with expressway construction.

3. Procurement

33. All ADB-financed procurement will follow ADB's *Guidelines for Procurement*. The civil works for the expressway will be divided into 19 packages to be procured under international competitive bidding procedures. Equipment will be divided into 8 packages and procured under international competitive bidding or international shopping. Ancillary facilities including the administration building and service areas under domestic financing will be procured in 16 packages using local competitive bidding. Procurement for the local roads under government financing will follow Government procedures acceptable to ADB (Appendix 11). International bidding will be handled by the China International Tendering Company, selected by SPECL on a competitive basis. It is well qualified to perform these tasks and has previous experience in other externally funded projects. Prequalified contractors with adequate technical and financial capacities will be allowed to bid for several packages and, if successful, may be awarded more than one contract based on least-cost combination of contracts. SPECL has agreed to include the relevant sections of ADB's anticorruption policy in all documents and contracts during bidding for and implementation of the Project.

4. Consulting Services

34. Construction supervision activities, involving 4,350 person-months of consulting services, will be undertaken by domestic consulting teams under government financing, headed by a chief supervision engineer. SPCD will use the regulations and guidelines prepared under an ADB TA³² for selecting and engaging consultants. Each contract package will be supervised by a site resident engineer assisted by a deputy resident engineer and supported by technical and administrative personnel. The site resident engineer will report to the chief resident engineer. The chief supervision engineer will report to the project manager of SPECL.

35. The Project will provide 64 person-months of international consulting services to (i) help with project management during the construction period; (ii) provide expertise in tunnel and bridge construction; (iii) conduct a safety audit of the project design, and make safety recommendations on the completed construction works; (iv) help set up and implement quality control procedures; (v) help develop capacity in road safety and vehicle emissions, and improve guidelines and action plans in this regard; (vi) prepare a procedural manual for good management of SPECL; (vii) assist in formulating a human resource development and training program; and (viii) help establish and implement a project performance management system, including assessing the impact on poverty reduction (Supplementary Appendix J). The team leader will be in the field during the entire construction period and will act as assistant chief supervision engineer: helping the chief supervision engineer certify variation orders, contractor payments, and subcontracting documents, and establishing a contracts management system. All consultants to be financed under the ADB loan will be selected and engaged based on the quality- and cost-based selection method in accordance with ADB's *Guidelines on the Use of Consultants*. Domestic consultants experienced in implementing similar road projects will be financed by SPECL, and will be recruited in accordance with government procedures acceptable to ADB.

5. Advance Action

36. Because of the high priority accorded to the Project and the need to commence works in December 2002, on 7 March 2002 ADB approved advance procurement action for civil works and advance recruitment action for international consultants.³³ Advance actions up to the evaluation of bids and proposals, but not including award of contracts, covers (i) the prequalification of contractors, bidding, and bid evaluation for the civil works contract packages; and (ii) recruitment of international consultants to help implement the Project. The advance actions are being undertaken in accordance with ADB's *Guidelines for Procurement* and *Guidelines on the Use of Consultants*. The Government and SPCD have been advised that approval of the advance actions does not commit ADB to financing the Project.

6. Disbursement Arrangements

37. All disbursements under the ADB loan will be carried out in accordance with the ADB's *Loan Disbursement Handbook*. The disbursement procedures will include (i) a direct payment procedure, (ii) a commitment procedure, or (iii) a reimbursement procedure.

³² ADB. 1998. *TA to the PRC for Regulatory Framework for the Engagement of Consultants*. Manila.

³³ The advance action was reported in the April 2002 edition of *ADB Business Opportunities*.

7. Accounting, Auditing, and Reporting

38. SPECL will maintain separate accounts for the Project, and have such accounts and related financial statements (balance sheet, income statements, and cash-flow statements) audited annually in accordance with national auditing standards consistently applied by external auditors whose qualifications, experience, and terms of reference are acceptable to the Government and ADB. In addition, it will submit to ADB within 9 months of the end of each related fiscal year, certified copies of such audited project accounts and financial statements, and the report of the auditors of the Project as acceptable to ADB, all in the English language. SPECL will follow the audit report formats adopted for all ADB-financed projects in the PRC. The formats provide an example of the auditor's certificate in accordance with the Government requirement as well as a model auditor's report to ensure compliance with the Loan Agreement and internal control on financial reporting. To ensure that internal controls and checks on the expressway construction costs and operations are effective, SPECL has established, at ADB's suggestion, an internal audit unit and will maintain it during project implementation and operation. The unit will undertake independent tests on day-to-day transactions, prior to reference to external auditors.

39. SPECL will make satisfactory arrangements for reporting the progress of project implementation by submitting quarterly progress reports and brief monthly updates. Within 3 months of completion, SPECL will submit a project completion report to ADB.

8. Project Performance Monitoring and Evaluation

40. A set of indicators for evaluating project performance in relation to its goals, purposes, outputs, and conditions was discussed and agreed upon with SPECL (Supplementary Appendix D). The indicators will be reviewed at the start of project implementation and will include (i) economic development and poverty indicators for Sichuan Province and the project area, (ii) transport costs and time for specific types of vehicles and trips, (iii) transport services and transport charges, (iv) accident rates, (v) financial sustainability, (vi) county and township incomes per capita, (vii) access to social services, and (viii) jobs created in construction and maintenance. Employment impact indicators will include information about unskilled laborers, poor laborers, and women laborers, and will be monitored through an annual report. At the beginning of project implementation, SPECL will establish baseline and target values for the indicators. The indicators will be measured at project completion and 3 years later, and compared with the baseline. Where relevant, indicators will be disaggregated by gender. SPECL will recruit a qualified consultant for monitoring and evaluation to help establish the monitoring and evaluation system, and train the staff of SPECL and implementing agencies in its use. The main sources of data used include (i) a review of secondary data from government sources, (ii) a household socioeconomic sample survey, and (iii) participatory rural appraisal with the help of nongovernment organizations in communities affected by the expressway and local roads. A report summarizing the key findings of monitoring at inception, completion, and 3 years later will be submitted to ADB.

9. Project Review

41. In 2005, ADB, SPCD, and SPECL will carry out a midterm review of the Project, covering all institutional, administrative, organizational, technical, environmental, social, poverty reduction, economic, financial, and other relevant aspects that may have an impact on the performance of the Project and its continuing viability. The review will examine progress in

sector reforms, policy development, progress in resettlement, and compliance with assurances in the loan agreement.

10. Anticorruption Measures

42. During project processing, ADB's anticorruption policy was explained to central and local government officials. Attention was drawn to the section on fraud and corruption that was added to ADB's *Guidelines on Procurement* and *Guidelines on the Use of Consultants*. ADB's program for the PRC includes assistance that will improve governance and provide incentives to reduce the incidence of corruption in the longer term.

43. Based on SPCD's experience in fighting corruption, the following actions have been taken to prevent corruption: (i) a leading group of officials from the Provincial Discipline Unit and Supervision Department will be resident in project offices for bidding, construction, and operations; (ii) a supervisory "watchdog" body has been established to prevent interference in the processes; (iii) a two-contract system has been established where the winner of a civil works contract must also sign an anticorruption contract with the employer; (iv) liaison meetings between SPCD and the Provincial Prosecutor's Office are held on a regular basis where warnings about or information on corrupt practices can be discussed; and (v) midyear and end-of-year inspections of contractors have been instituted to ensure procedures related to fund withdrawals and settlements are being followed.

11. Capacity Building and Human Resource Development

44. To cope with its increased expressway construction and management activities, SPECL needs to develop a corporate strategy and outline its managerial, staffing, and investment requirements. A human resource development plan will be drawn up with the help of the international and domestic consultants. The plan will consider the needs, and the recruitment and training requirements identified. One element of the plan will be an international training program financed under the loan. It will cover expressway operations, commercial development of expressways and business planning, expressway maintenance, road safety, vehicle emissions, project management, highway development planning, monitoring and evaluation, environmental management, bridge and tunnel design, traffic engineering, toll management, and pavement design. SPECL staff will undertake about 60 person-months of international training. With the assistance of the consultants, SPECL will prepare for ADB's concurrence a program of training activities, their location, and a list of candidates. Findings from the training will be disseminated in Sichuan Province through an appropriate institute.

IV. PROJECT BENEFITS, IMPACTS, AND RISKS

45. The project benefits and impacts were assessed along with the potential risks associated with the Project. The integrated benefits and impacts will outweigh the costs and the Project will bring net benefits in the project area.

A. Economic Benefits and Distribution Analysis

46. The economic internal rate of return (EIRR) was calculated by comparing the with- and without-project situations. Without the Project, the traffic volume would exceed the capacity of the existing national highway 108, which would become congested, increasing travel time, vehicle operating costs (VOCs), and the number of accidents. With the Project, travel time on the road will be reduced because of higher speeds and shorter distance; VOCs will be reduced

because of faster and smoother travel on the expressway; and the accident rate will be reduced by eliminating congestion, providing safety features, and separating fast- and slow-moving traffic. Similar benefits also accrue to the traffic on the existing road. If local roads are not upgraded, people in the remote parts of the project area will have less mobility and the mainly poor inhabitants will not be able to participate in the mainstream of economic activity.

47. The economic costs of the expressway reflect the resource costs for construction, operation and maintenance (O&M), and the value of agricultural production from land lost permanently. The economic benefits generated by the expressway include (i) savings in VOCs as a result of reduced road length and improved traffic conditions, (ii) time savings for road users, (iii) savings from avoided physical damage as a result of fewer accidents, and (iv) benefits to generated traffic. Environmental benefits will come from avoided vehicular emissions as a result of the reduced level of congestion on national highway 108. However, these benefits were not included in the economic analysis because an established methodology for their valuation is not available.

48. The EIRR for the Project, including the expressway and local roads, is 16.2%, indicating that the Project is economically viable (Appendix 4). Results of sensitivity analysis confirm the robustness of the Project's economic viability. Changes in the key variables, such as a 10% reduction in benefits do not significantly impact the economic viability. The capital cost would have to increase by 85% over the estimate for the EIRR to fall below the cutoff rate of 12%. The benefit level would have to decrease by 43% to achieve the same effect. In light of previous experience in the PRC's road sector, variations of such magnitude are unlikely. The EIRR was also calculated separately for the expressway and local road components. The EIRR was 16.1% for the expressway component and 20.3% for the local road component.

49. The economic analysis of the Project was extended to quantify the direct poverty impact by examining the distribution of project net benefits by determining the project effects for various beneficiaries, including road users, local economy, labor, and government. The impact on the poor was assessed by quantifying the direct benefits that would accrue to poor people under the Project. The proportion of net benefits passed on to poor people, or the poverty impact ratio, was calculated as 24% (Appendix 4). This ratio is higher than the country's poverty incidence and the income share of the poor.

B. Financial Benefits

50. Toll setting is the responsibility of the provincial government. Within Sichuan Province, applications to set and adjust toll levels are proposed by expressway corporations for consideration by SPCD and the provincial price bureau and approval by SPG. SPECL will undertake a toll analysis before opening the expressway, and each year for 5 years thereafter, to confirm the appropriate level of toll, and will submit the results for ADB's concurrence. ADB provided TA³⁴ to carry out a toll diversion study and the manual has been distributed to provincial communications departments. Findings from these studies will help SPECL determine the toll levels for the Project.

³⁴ Toll Diversion Model: Application Manual (September 2000) developed under ADB. 1998. *TA to the PRC for Preparing the Chongqing-Guizhou Expressway Project*. Manila.

51. The proposed toll rates³⁵ are considered reasonable to attract sufficient traffic to meet economic and financial rate of return criteria. The effects of alternative toll rates on the EIRR and financial internal rate of return (FIRR) were assessed. Reduction in the EIRR for the toll rates of up to double the base rate are minor, but beyond this point, a more pronounced impact is likely, and the EIRR will be below 12%. At this toll rate, the FIRR rises by about 2 percentage points. Based on these findings, the toll rate could be increased if required to ensure SPECL's financial viability. In practice, however, this may be difficult because (i) the proposed toll rates are already high compared with other expressways in Sichuan Province, and (ii) social concerns are considered when toll rates are determined, particularly when expressways pass through poor areas. Toll levels will be reviewed annually in relation to operating costs, toll levels on other toll facilities, and affordability. The level and structure of the tolls will be such as to ensure that the expressway's toll revenue will cover O&M costs, debt servicing, and depreciation in excess of debt servicing, and generate a reasonable rate of return on the investment as adjusted for inflation from time to time. If an adjustment of the toll levels is required based on this principle, SPECL will submit its toll adjustment plans for ADB's concurrence before finalizing and submitting it to SPG for approval.

52. The financial performance of the project expressway was forecast, taking into account the anticipated traffic, the projected operating costs, and the proposed toll rates. The working ratio is expected to be below 12% over the project life. The debt service coverage ratio of more than 1.2 is achievable from the second year of full operation. The debt-to-equity ratio will remain below 60:40 throughout the Project's life. SPECL, as a corporation independent of the provincial government, will be financially autonomous. Projections based on currently available information and investment plans show that SPECL will be able to generate sufficient income. The financial internal rate of return for the project expressway is 5.5%, which is greater than the real weighted average cost of capital of 4% (Appendix 4).

C. Impact on Poverty

53. The root causes of poverty in the project area are the poor productive conditions and difficult topography—a situation exacerbated by general remoteness and inadequate road access. Although all townships are accessible by vehicle, no mountain township is served by a paved road. Roads are mostly rock and earth, narrow, and subject to frequent rock-falls, which make them impassable. Medium-sized trucks are the prime means of road transport. Passenger fares are more than double those on good roads. As a consequence, many people walk, for up to 7 hours, to get to market, and up to 5 hours to get fuelwood. Horses and donkeys are a vital element of the transportation system in the mountains for heavy loads. Because of the poor roads and high cost of transport, the cost of construction materials and fertilizer are also considerably higher. In some areas, farmers feed their fruit to pigs as the transport cost makes it prohibitive to take the fruit to market. Poor access also limits the ability of residents to take advantage of increased employment opportunities in the urban areas, and makes it difficult for local officials and agricultural extension officers to visit the part of the project area suffering most from poverty.

54. The Project will have a substantial beneficial socioeconomic impact on the majority of the population, urban and rural, living in the project area. An initial poverty and social analysis

³⁵ The opening toll rates per vehicle-km are CNY0.52 for cars, CNY1.00 for light trucks, CNY1.89 for medium-sized trucks, and CNY2.68 for heavy trucks. This will be reviewed every 5 years and adjusted as necessary. These rates are slightly higher than currently charged tolls in Sichuan Province but are within a range of tolls applicable for similar expressways in the region.

(Appendix 3) undertaken during TA fact-finding and a full poverty and social analysis carried out during the TA indicate that farmers and urban residents will be the largest beneficiary groups, although the majority of the easily quantifiable benefits will accrue to road users, especially expressway users. Many farmers living in townships located on the local road network will increase their agricultural production through improved access to markets, and lower transport costs for both agricultural produce and agricultural inputs. These farmers will also benefit from reduced travel time to markets and for routine activities such as water and fuelwood, much easier access to emergency health care, and increased information flows and access to the outside world. Rural residents in and on the hillsides overlooking the Anning Valley will also benefit indirectly from improved transport conditions on the existing main roads and the impetus to economic growth resulting from a better road network. The construction of the expressway will provide significant benefits, especially to townships along the project alignment, through employment during construction and the provision of services to labor construction sites. Interchanges will provide opportunities for trading and service activities. The only adverse consequences are those arising from loss of land or property because of the land acquisition for the Project. Any resulting adverse effects will be mitigated by compensation payments and replacement houses as per the resettlement plan.

55. Direct benefits accruing to the poor from the local road component will be more significant than those accruing from the expressway component. The local road improvements will provide a greater relative improvement in accessibility to poor communities, and will cater directly to the transportation needs of farmers in general and poor farmers in particular. In contrast, benefits from the expressway component will mostly be longer term and indirect in nature, resulting from the general increase in economic activity in the Anning Valley made possible by the expressway. The transportation needs of farmers, and especially poor farmers, primarily involve local, as opposed to interurban, roads.

D. Risks

56. The Project was formulated to reduce potential technical, economic, financial, and social risks. The main technical risks, which could result in implementation delays and cost overruns, are associated with the tunnel and bridge structures. To mitigate the risks, international consultants reviewed the proposed design and construction methods. Prequalification of contractors focuses on their financial and technical capability in handling complex works. During construction, monitoring and contract management information systems will be set up and implemented, with the assistance of the international consultants, for timely identification of technical problems and implementation of corrective measures. Given the safety hazards associated with bridge works, the contractors will be required to strictly enforce working safety rules and measures. SPCD has proven experience and has shown satisfactory performance in implementing internationally financed projects. Appropriate coordination and monitoring mechanisms will be put in place to mitigate resettlement risks. There is a risk that the opportunities for anticipated development in social services and income generation may not be accessible to the poor. This risk is mitigated by the strong commitment of the Government and Sichuan Province to poverty reduction as part of the Western Region Development Strategy and the monitoring system to ensure that benefits accrue to the poor.

57. Economic performance in the project influence area would have to deteriorate substantially for the Project to lose economic viability. The financial risk associated with construction and operation of the expressway will depend on the actual construction costs, commercial management and appropriate tolls. To mitigate the financial risks, SPECL is building a commercial business environment for expressway operations, the project expressway

will receive substantial equity from the central and provincial governments, and an appropriate toll structure will be adopted. For a project generating revenue in domestic currency, a risk is related to exchange rate changes, and is partly accounted for in the base case calculations. Sensitivity tests indicate that an adverse exchange rate change of 30% would have only a small effect on the FIRR. A 30% one-off adverse change in the exchange rate in the first operating year would also have little impact on the debt service coverage ratio.

V. ASSURANCES

A. Specific Assurances

58. In addition to the standard assurances, the Government and SPCD have given the following assurances, which are incorporated in the legal documents:

59. **Counterpart Financing.** SPCD and SPECL will obtain, on a timely basis, all funds and resources necessary for project implementation. The Government will take, and will cause SPG, through SPCD, to take all necessary measures to ensure that SPCD and SPECL can successfully implement the Project, and operate and manage it after completion.

60. **Construction Quality.** SPCD and SPECL will ensure that the Project is constructed in accordance with technical standards of the Ministry of Communications for highway engineering and with reference to the highway design manual developed under ADB-financed TA for Review of Highway Design Standards.³⁶ The international consultant designated as the team leader and assistant chief supervision engineer will review and certify variation orders and contractors' monthly payments, before the chief supervision engineer approves them.

61. **Road Safety.** SPCD and SPECL will implement the road safety signage, communication, hazard barriers, traffic monitoring, and vehicle weighing; and will cooperate closely with the public security bureau to implement necessary road safety measures. The public security bureau will prepare and implement the provincial road safety guidelines and action plans for road safety in Liangshan and Panzhihua prior to opening of the expressway. Before opening the expressway, SPCD in consultation with the public security bureau will submit a report on the emergency response plan to ADB for review. Recommendations of the road safety audit will be considered prior to the expressway construction and operations.

62. **Tolls.** In determining toll level, SPG will take into consideration levels sufficient to satisfy the SPECL's debt service coverage ratio of minimum 1.2 times from the second year of full operation. Six months before the expressway is opened, SPCD through SPECL will seek ADB's concurrence on the proposed toll structure and levels prior to SPG's approval. For the first 5 years of operation, SPCD through SPECL will review the toll structure and levels annually, and submit a report to ADB. SPCD through SPECL will seek ADB's concurrence on toll levels adjustment before SPG approval is sought.

63. **Corporate Governance.** SPECL will implement the corporate development plan to strengthen its corporate governance by 31 December 2004.

64. **Financial Ratios.** To ensure financial sustainability, SPECL will maintain (i) a debt-to-equity ratio of not more than 60:40; (ii) a working ratio (annual O&M cost, but excluding periodic maintenance cost, to revenue) of not more than 12% during expressway operation; and (iii) a

³⁶ ADB. 1996. *TA to the PRC for Review of Highway Design Standards*. Manila

debt service coverage ratio of not less than 1.2 during expressway operation from the second year of full operation.

65. **Human Resource Development and Training.** SPECL in consultation with SPCD will prepare a human resource development plan. Before undertaking international training, SPECL will prepare, for ADB's concurrence, (i) a training plan and, separately, a list of nominated candidates, (ii) a program of workshops to be delivered at SPECL by those trained internationally, and (iii) a list of training equipment and aids required to strengthen SPECL's domestic training programs. Upon completion of each workshop, SPECL will submit to ADB an evaluation of the international training and the workshop.

66. **Private Sector Development.** SPCD will enter into a concession framework agreement with SPECL by 30 June 2004. Six months before the opening of the project facilities, SPCD through SPECL will analyze the feasibility of attracting private sector investment funds for future road sector investment, including private sector participation in O&M of the project expressway, and report its conclusions to ADB.

67. **Environment.** SPCD and SPECL will ensure that the Project is constructed and operated in accordance with Government's rules and regulations and ADB's *Environmental Guidelines for Selected Infrastructure Development Projects*. SPCD and SPECL will implement the mitigation measures and environmental monitoring program set out in the EIA to mitigate any adverse environmental impacts arising from the Project.

68. **Vehicle Emissions.** SPECL will cooperate with and assist the Environmental Protection Bureau of Sichuan in controlling vehicle emissions on the project expressway. Before opening the project expressway, SPECL will submit to ADB the emission regulation limits prescribed by the Government, penalties for their infringement, and the plan for enforcing vehicle emission control for the expressway. The Provincial Environmental Protection Bureau will prepare and implement the provincial guidelines for vehicle emissions reduction and the action plans for Liangshan and Panzhuhua prior to opening of the expressway.

69. **Land Acquisition and Resettlement.** SPCD and SPECL will ensure that the resettlement plan, including land acquisition, is carried out promptly and efficiently, in line with the Government's Land Administration Law and ADB's policy on involuntary resettlement. SPCD and SPECL will ensure that implementation of the resettlement plan is monitored and evaluated by a local institute and reported to ADB, and that a baseline survey is carried out as required in the plan.

70. **Poverty Reduction.** SPECL will cause the contractors to maximize the employment of local poor persons who meet the job and efficiency requirements for construction of the project roads. Such workers will be provided on-the-job training. The Government will cause SPG to extend the coverage and quality of public utilities, basic health, and basic education in the project area to enhance the poverty reduction impacts. The Poverty Alleviation Office, in consultation with SPECL, will monitor the impacts on poverty with the assistance of a designated local institute based on a set of indicators and will submit annual monitoring reports to ADB.

71. **Gender and Development.** SPCD and SPECL will follow ADB's policy on gender and development during project implementation, and will take all necessary actions to encourage women to participate in planning and implementing the Project. SPCD and SPECL will monitor

the effects on women during project implementation through gender-disaggregated data where relevant in the resettlement plan and the monitoring and evaluation system.

72. **Health Risks.** The Department of Health and SPECL, together with the appropriate authorities, will ensure that contractors disseminate information on the risks of socially transmitted diseases to those employed during project implementation. The Department of Health, SPCD, and SPECL will also ensure that similar information is disseminated to transport operators during operation of the project facilities.

73. **Women and Child Labor.** SPECL will include a specific clause in bidding documents requiring that the civil works contractors (i) do not differentiate payment between men and women for work of equal value, and (ii) do not employ child labor in the construction and maintenance activities.

74. **Axle Loads.** SPCD, through SPECL, will install vehicle axle-weighing equipment at selected entry points. SPCD through SPECL will make suitable arrangements for operation of such equipment. Before opening the project expressway, SPECL will submit to ADB the plan for operation of the vehicle weigh stations, including the prescribed axle-load limits and penalties for infringement.

75. **Change in Ownership.** If (i) any change in ownership of the project facilities, or (ii) any sale, transfer, or assignment of SPCD's interest in the project expressway is anticipated, the Government, SPG, and SPECL will consult ADB at least 6 months before the change. The Government, SPG, and SPECL, will ensure that any proposed change in ownership of the project facilities is carried out in a legal and transparent manner.

B. Condition for Loan Effectiveness

76. The loan agreement will take effect subject to the following condition: an onlending agreement between SPG and SPECL will have been executed on the same terms and conditions as those of the ADB loan.

VI. RECOMMENDATION

77. I am satisfied that the proposed loan would comply with the Articles of Agreement of ADB and acting in the absence of the President, under the provisions of Article 35.1 of the Articles of Agreement of ADB. I recommend that the Board approve the loan of \$300,000,000 to the People's Republic of China for the Southern Sichuan Roads Development Project from ADB's ordinary capital resources with interest to be determined in accordance with ADB's LIBOR-based lending facility; an amortization period of 25 years, including a grace period of 5 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan and Project Agreements presented to the Board.

MYOUNG-HO SHIN
Vice-President

12 August 2002

PROJECT FRAMEWORK

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
Goal 1. Promote economic growth in Sichuan Province and the project area.	Economic growth targets for impacted towns/cities/counties during 2007–2027 forecast without project versus actual percentage change in gross domestic product (GDP), unemployment rate Increase per capita incomes in the project area	Annual economic reporting at the local, provincial, regional and national levels Sichuan Provincial Communications Department (SPCD) conducts project performance management system (PPMS) at inception, completion, and 3 years thereafter with emphasis on socioeconomic improvement impacts and environmental protection measures	Assume that change is positive and realistic. Estimates are available for the without project scenario. Economic growth continues in the People's Republic of China (PRC), particularly in the western provinces
	Change in output of cash crops and livestock Change in output marketed outside of project area or local markets	Participatory rural appraisal (PRA) monitoring and evaluation and data from other expressway projects as well as without-project estimates from local and provincial sources	Change will be positive
	Increased trip frequency and trip distances of rural communities and minorities	Transport statistics at local government	Improved access will increase traffic volume.
2. Reduce poverty in project area.	Change in poverty incidence in project area: 34% in rural area and 11% in urban area in 2001 Increased access to social services. Social indicators in the project area in 2001 were: village without access roads (10%), village without electricity (13%), village without telephone (62%), village without tap water (44%)	PPMS and PRA results PPMS and PRA results	Complementary social services are in place. Social services are available.

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
	Reduced price of key goods and services in the market	Direct measures of costs of goods and services	Reduction in vehicle operating costs and time are passed on to consumers.
Purpose 1. Increase trade and investment in the project area. 2. Increase transport capacity and efficiency of freight and passengers movement. 3. Improve road safety in the project area.	Expenditure levels Rate of growth in freight and passenger flows Change in tonnage of inter- and intraprovincial trade by road Increased domestic and foreign investment Increase in intercity road capacity to 32,000 MTEs per day by 2008 Reduce travel time for local and inter-city trips Change in transport costs; freight charges, passenger fare charges Reduced accident rate (no. of accident, no. of injuries, and economic costs)	Sichuan statistics yearbooks, and county statistics PRA results, PPMS, and project completion report (PCR) Traffic counts Government statistics Traffic counts on expressway and other roads in corridor (including existing NR108 and S312) Traffic counts and travel time surveys between selected origin-destination pairs Annual reports of transport sector enterprises and user surveys as part of the PPMS Accident statistics from public security bureau and hospitals	Strong economic performance of the PRC and Sichuan continues. Traffic surveys undertaken. Transport costs are reduced to facilitate investment. Access is improved to promote investment. Traffic surveys undertaken. Positive changes in travel time are statistically significant. Positive changes in travel costs are statistically significant. Positive changes in principal accident data are statistically significant. Road safety audit is implemented. The road safety action plan is implemented in Liangshan and Panzhihua by 2007.
Outputs 1. Civil Works Improve road infrastructure between Xichang and Panzhihua.	Construct 160 kilometer (km) 4-lane controlled access expressway, 12 extra large bridges, 6 tunnels>1km	Project administration missions (PAMs), midterm review (MTR), PCR	Local government below municipality and provincial level may not be able to mobilize adequate resources to secure the full impact of improved transportation.

Design Summary	Performance Indicators/Targets	Monitoring Mechanisms	Assumptions and Risks
	Construct 8 interchanges. 15 km Class I & II connecting roads to main towns	PAMs, MTR, PCR	Reduce travel time for intercity and local trips.
	558 km of local roads upgraded	PAMs, MTR, PCR	Access improved to townships and villages through the local road component
2. Resettlement and Compensation Acquire 825 hectares of land (Minimize relocation in final alignment selection and interchange design).	Resettlement plan and detailed measurement survey completed	PPMS and PRA	Adequate land for new house sites is available within village for resettlement
Compensate the affected people.	Compensation levels for permanent loss of farmland, housing, and other assets, as agreed	Independent consultants monitor entitlements and make periodic reports during resettlement implementation, and evaluate achievement of objectives at completion and 1 year later	Implementation of agreed compensation rates
Resettle about 6,040 people.	Welfare of those resettled, reestablished at least to level prevailing before acquisition	Independent consultants monitor entitlements and make periodic reports during resettlement implementation, and evaluate achievement of objectives at completion and 1 year later	Timely compensation and resettlement and off-farm income opportunities for those with insufficient farm sizes will be rewarded as anticipated
3. Corporatization Expressway project company (SPECL) prepares a corporate development plan.	Change in board of directors and staff composition Staff training and updating	Annual updates of corporate plans and financial projections for project expressways as part of the PPMS	Continuing commitment to improve corporate governance by SPCD. Implementation of the corporate development plan by 31 December 2004.
Concession framework agreement	Financial performance, return on equity and investment	Business development plan	Concession framework agreement signed by 30 June 2004.
4.Environment Environmental mitigation measures are taken.	No major adverse effects provided that mitigation measures are implemented	Compliance monitoring reports prepared by contractor and approved by the Sichuan Panxi Expressway Company Limited	Unexpected environmental effects related to construction practices and geological instability

ROAD SECTOR ANALYSIS

1. **Vehicle Fleet and Traffic.** In 2000, vehicle fleet of the People's Republic of China (PRC) totaled 15.5 million trucks, cars, and buses, and 46.5 million other motorized vehicles (motorcycles and agricultural vehicles). The total number of trucks, cars, and buses increased by about 1.3 million in 2000, with the market share for trucks dropping to 45.0%, down from 66.8% in 1990. Despite the rapid increase in total vehicles, every 100 persons had only about 1.3 vehicles (truck, car, or bus). This figure is low relative to other countries in the Asia and Pacific region.¹ Not until the early 1980s were modern vehicles imported and joint ventures formed with foreign automobile manufacturers to introduce modern technology. Over the next 5 years, plans are to invest up to \$7 billion in automotive manufacturing. The PRC's accession to the World Trade Organization in December 2001 should increase investment in automobile production. The modernization of the vehicle fleet will improve vehicle safety, and reduce fuel consumption and vehicle emissions. In 2000 there were 438,000 passenger vehicles and 319,000 trucks and passenger vehicles in Sichuan, equal to 4.8% of the national fleet. This is lower in proportion to both population and length of road by comparison with the PRC as a whole. For example, in 2000, Sichuan had about 0.9 vehicles for 100 persons, only two thirds of the national average. Growth in the number of vehicles in Sichuan between 1990 and 2000 was 10.1% per annum, slightly lower than the national average of 11.1% per annum.

2. The privately owned fleet of motor vehicles in the PRC increased more than 20 times during 1985–2000, from 0.3 million vehicles to 6.3 million. Trucks accounted for 41% of the total privately owned vehicles; cars and buses, 58%; and other specialized vehicles, 1%. In Sichuan, privately owned motor vehicles in 1999 totaled about 117,800. Given the PRC's rapid economic growth and low vehicle ownership, both the public and private vehicle fleets are expected to continue to grow rapidly in the coming years. This will result in substantial increases in the volume of road traffic and mounting congestion. The high share of slow-moving traffic, mainly tractors, bicycles, and nonmotorized agricultural vehicles, aggravates road congestion, and is a major cause of traffic accidents.

3. **The Road Transport Industry.** The provincial communications departments (PCDs) are responsible for regulating the road transport industry by licensing drivers, vehicles, and intercity bus services. Road transport tariffs are subject to controls in the range of plus or minus 20% of locally established advisory tariffs. The relaxation of trucking regulations in the 1980s allowed privately owned trucks to haul cargo for state-owned factories and cooperatives. Privately owned trucks absorbed most of the traffic growth in the 1990s with the market share of state-owned transportation companies declining. The resulting competition is improving road transport efficiency and the quality of services. ADB supported this process through technical assistance (TA).² The Ministry of Communications (MOC) is encouraging the private sector to augment the overall capacity of the road transport industry. The annual passenger handling capacity increased from 12.0 billion passengers in 1997 to 14.5 billion in 2000. About 900,000 buses were in operation in 2000 compared with 764,000 in 1994. The number of bus routes reached about 85,000 to serve more than 94% of the villages accessible by road.

4. **Road Administration.** Road administration in the PRC is decentralized. At the provincial level, the PCDs are responsible for the highway networks, and plan, budget, and finance road projects. Generally the PCDs are financially independent of the Government, except with large projects of national significance. MOC provides policy guidance and technical

¹ Figures for other countries are 2.5 for India, 5.0 for Indonesia, 14.3 for Thailand, 59.6 for Australia, and 65.3 for Japan.

² ADB. 1993. *Technical Assistance to the People's Republic of China for Efficiency Improvements in Road Transport*. Manila.

support to the PCDs through national policies, regulations, and design and construction standards. Provincial planning commissions approve development plans and projects. The PCDs, through their city, prefecture, and county-level units, are responsible for planning and administering the road sector, including constructing and maintaining the road network. Road safety and annual vehicle testing are the responsibility of the Ministry of Public Security at the national and local government levels. Inspection of vehicle emissions is the responsibility of local environmental protection bureaus in conjunction with provincial public security bureaus. The road sector agencies are generally well staffed with trained technical personnel, particularly at the central and provincial levels. Human resource development systems provide regular training for technical staff, operators, and various technicians. The Asian Development Bank (ADB) has supported human resource development in sector institutions under loans and TAs. ADB's country assistance program evaluation for the PRC concluded that, in the transport sector, executing agencies have been making good use of the knowledge transfer, and in-country and external training opportunities provided under ADB projects.

5. Road Sector Revenues and Expenditures. Expenditures in highway infrastructure are financed from dedicated user charges, Government grants, domestic bank loans and bonds, and foreign loans and investments. Two dedicated user charges, the road maintenance fee and the vehicle purchase fee, have provided much of the financing for the road sector. During the 9th Five-Year Plan (FYP, 1996–2000), the road maintenance fee, levied on the revenue of freight and passenger transport companies and on the load capacity of private vehicles, provided about 53% of the total financing requirements of road investments. Revenues from the vehicle purchase fee, levied on the retail price of vehicles, financed about 13%, mostly in poorer provinces as government policy. MOC provided supplementary financing of about 2% of the requirements to construct or rehabilitate rural roads in poverty areas. Domestic loans and bond financing, generally with short maturities, were still relatively low, and accounted for 9% of all highway investments. Other domestic financing, including from local governments and state-owned enterprises, accounted for 12% of the requirements. Foreign loans covered 8% of the investment in highway construction, and foreign direct investment the remaining 3%. During the 1980s and 1990s, the PRC increased its foreign borrowing for infrastructure, mainly from ADB, the Japan Bank for International Cooperation (JBIC), and the World Bank.

6. In Sichuan, road maintenance fees and domestic borrowings are major financing sources for its budget. During the 9th FYP, the road maintenance fee, levied on the revenue of freight and passenger transport companies and on the load capacity of private vehicles, provided about 20% of the total financing requirements of road investments, and the domestic borrowings provided about 37%. The provincial road budgets during the 9th FYP increased from CNY6,065 million in 1996 to CNY11,220 million in 2000. However, an increasing proportion of provincial road budgets is being used to meet the national priority for expressway and highway construction. The proportion of funding for new construction of expressways increased from 64% to 75% in the last 5 years, while the proportion for county and township roads declined from 11% to 5%. In addition, the proportion of funding for road maintenance decreased from 17% in 1996 to 13% in 2000. The proposed Project, however, includes not only the construction of new expressway but also the upgrading of high-priority local roads, so that the Project will help ensure that expenditures for expressways and local roads are reasonably balanced during the 10th FYP. According to the forecasted 10th FYP, the proportion of funding for rehabilitation and new construction of county and township roads will increase from 5% in 2000 to 20% in 2005.

7. Road Engineering and Construction. Road and bridge projects are designed by the planning and design institutes at the provincial, prefecture, and county levels. MOC reviews the designs of expressways, class I highways, and associated structures. In general, the institutes are

staffed with experienced, well-qualified personnel. Construction is supervised by personnel from county, city, and prefecture highway units. The city and county highway bureaus have their own construction units to carry out minor projects within their administrative districts. Drawing on the experience gained under ADB- and World Bank-financed projects, competitive bidding practices were mandated by the 1999 Tendering and Bidding Law. Many of the larger provincial and urban construction bureaus are being reorganized into financially independent companies and have been awarded contracts individually or as partners in joint ventures on several ADB- and World Bank-financed highway projects.

8. In 1999, MOC implemented a series of measures to enhance quality control in highway construction and carried out two nationwide quality audits of the construction of national highways and major trunk roads. As required by MOC, all PCDs, including the Sichuan Provincial Communications Department (SPCD), have been inspecting the quality of their ongoing road construction works from 1999. Taking into account findings of the audits, MOC will adopt more stringent regulations to ensure that roads are constructed to national standards. Investment will be increased in regions, including Sichuan Province, that have completed good quality roads that are well-managed and well-maintained. Investment will be decreased in regions with projects of substandard quality due to inappropriate technical design or poor implementation.

9. **Policy Dialogue.** ADB has been actively undertaking policy dialogue on the PRC road sector since 1991. The principal issues addressed include the poverty impact of road projects, highway design standards and construction quality, road safety, vehicle emissions, pricing policies, commercialization and corporatization, and nongovernment financial resources. The status and achievements to date are summarized in the Road Sector Policy Reform Plan.

ROAD SECTOR POLICY REFORM PLAN

Initiative	Current Status	Actions	Target Date
1. Poverty impact	All projects financed by the Asian Development Bank (ADB) in the People's Republic of China (PRC) country assistance plan are now located in poorer central and southwest regions. Project design will include local roads.	Project identification and design assisted through Technical Assistance (TA) 3086-PRC: Regional Road Sector Study	Recommended investment packages will be considered for 10 th Five-Year Plan (FYP) period. Feeder road components are now included in all ADB-financed road projects.
		Project assistance to improve and finance provincial and county roads	For application to road projects from 2001 onward
		Poverty impact of transport projects assessed through TA 5947-REG: Assessing the Impact of Transport and Energy Infrastructure on Poverty Reduction	Being implemented in 2001–2002
		Assessing the impact of local road construction on poverty reduction through TA 3150-PRC: Study on Ways to Support Rural Poverty Reduction Projects	Being implemented in 1999–2002
		Including village access to roads as a poverty reduction indicator under TA 3610-PRC: Poverty Planning Methodology	Being implemented in 2001–2002
2. Road safety	Very high accident and fatality rate, more than 93,853 deaths per annum Lack of attention to safe design and safe road environment	Consulting with the poor in designing projects under TA 5894-REG: Voices of the Poor	Completed in 2002
		Road safety program for Heilongjiang Province prepared under TA 2177-translated and disseminated	Recommendations reviewed and disseminated in 1999–2000
		Recommendations of TA 5620 on road safety adopted by the PRC	To be implemented in the 10 th FYP
3. Vehicle emissions	Increasing vehicle pollution, especially in large cities	Public awareness in road safety raised and the Ministry of Public Security's capacity strengthened in traffic safety, planning, and management under TA 3341-PRC: Capacity Building in Traffic Safety, Planning, and Management	Results for implementation from 2001 onward
		Sichuan provincial road safety guidelines prepared and relevant action plans developed for Liangshan and Panzhihua	September 2007
		Leaded fuel phased out	July 2000
		European vehicle emissions standards to be adopted for all new vehicles:	
		Phase I	
		Small vehicles	2001
		Large vehicles	2002
		Phase II	
		Small vehicles	2004
		Large vehicles	2005

Initiative	Current Status	Actions	Target Date
	Vehicle testing and monitoring program	Expanded on self-financed basis Recommendations of TA 2951-PRC: Promotion of Market-Based Instruments for Environmental Management People's health promoted by controlling and reducing vehicle emissions under TA 5937-REG: Action Plans for Reducing Vehicle Emissions Action Plan for Strengthening Vehicle Inspection and Maintenance in Chongqing, PRC, developed Sichuan provincial vehicle emission reduction guidelines prepared and the relevant action plans developed for Liangshan and Panzhihua.	To be considered for implementation from 2002 onward Implementation in 2001–2002 For implementation during 2001–2005 September 2007
4. Road pricing	Principle of user pays and cost recovery for toll roads under implementation in most provinces	Toll levels reviewed for ADB projects to ensure cost recovery Government to replace road maintenance fee with fuel tax in 2001 to enhance the user-pays principle Toll diversion study completed	Annual review of tolls Results for application from 2001 onward
5. Corporatization	Several provincial communications departments set up corporate structures during the 8 th FYP and 9 th FYP, especially to facilitate refinancing and leasing arrangements. Lack of a legal agreement between provincial communications department and expressway companies	Assistance provided through TA 1724-PRC: Institutional and Policy Support in the Road Sector Further assistance provided through TA 2592-PRC: Corporatization, Leasing, and Securitization in the Road Sector Corporate Development Plan developed to strengthen corporatization of the Sichuan Panxi Expressway Company Limited A model concession agreement prepared under TA 2592-PRC to ensure autonomy of operation, encourage the establishment of road performance indicators, and facilitate future refinancing of road sector assets	For implementation during 2001–2005 Implementation of recommendations from 2002 onward For implementation by December 2004 Concession framework agreement adopted by June 2004.
6. Financial resource mobilization	The financing requirements for road infrastructure are expected to grow. Refinancing or leasing arrangements for selected road sections in place in several provinces	Results of TA 2409: Appraisal Methodologies and Restructuring Highway Financing in Hebei Province under consideration Build-operate-transfer (BOT) guidelines drafted and feasibility study for pilot project prepared under TA 2649-PRC: Facilitating the BOT Modality in the Highway Sector Further assistance provided through TA 2592-PRC BOT law awaiting approval ADB-financed Jilin expressway and Hunnan expressway securitized as part of stock listing	Implementation of recommendations to begin during the 10 th FYP Implementation of a pilot BOT road project is being considered by the Government. Stocks listed in 1999

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

1. An initial poverty and social analysis was undertaken during technical assistance fact-finding, identifying key poverty and social issues to be analysed during project preparation. Based on its findings, a poverty and social analysis (Table A3.1) was carried out to ensure that the Project meet ADB's safeguard policy requirements for involuntary and indigenous peoples.

2. In 1994, Sichuan Province drew up the provincial poverty reduction plan and social strategy in line with the national poverty reduction plan. Physical achievements of the provincial action plan included improved water supply (10 million people), land development (380,000 hectares [ha]), provision of irrigation (167,000 ha), afforestation and grassland development (500,000 ha), road construction (38,000 kilometers [km]), and new housing separating minority people from their livestock (250,000 households). Vehicular access to most townships is now possible and the great majority of villages receive electricity. Some voluntary resettlement schemes have been carried out by relocating high mountain communities to areas with greater production potential.

A. The Project Area

3. The project area is centered on the Anning River valley in the southwest of Sichuan. The project area is diverse in terms of climate, topography, ecology, economy, and ethnic minorities. It includes Dechang, Miyi, and Yanbian counties; the urban district of Panzhihua; and small parts of Huili, Renhe, and Xichang counties. About 1.2 million people live in the project area. Over 80% of the rural population live in Dechang, Miyi, and Yanbian counties. The economy of the project area has grown at an average annual rate of 10% since 1990. The soil is fertile and climactic conditions in the valleys are favorable. Although agriculture contributes 16% of gross domestic product (GDP), almost 60% of the total labor force in the project area work in agriculture. Major agricultural products include grain and cash crops such as sugar, fruit, meat production, and tobacco, much of which is sold in other parts of the country. In the mountainous areas, where irrigation is limited, cash cropping is limited and grain yields are lower.

4. Minority groups account for about 12% of the population in the project area, principally the Yi minority (90%), who mostly live in poor mountainous villages. Twenty-four of the 101 townships in the project area have a minority population exceeding 75%. Relative to the poor Han, poor minority families tend to have a lower level of cultivation expertise, experience a higher level of absolute poverty, have larger families, are in poorer health, especially women and children, and have lower school attendance and adult literacy rates.

5. Despite declines in poverty in the project area, the poverty incidence is still high. Out of a total rural population of 611,900, 194,190 (32%) have annual incomes of less than CNY1,000 compared with 12% nationally. Of the 544 rural villages in the project area, 282 are classified as poor. Around 40% of the total rural population live in poor villages. The incidence of poverty is unevenly distributed in the project area: under 20% in the Anning valley, around 80% in the mountainous areas. Yanbian is the poorest county—53% of the rural poor population are classified as poor compared with 22% in Renhe and Xichang counties.

6. During the participatory rural appraisal undertaken as part of the project processing activities, several types of information were collected for each village and township: the rural population and average income per capita (Table A3.2), road access, and access to basic facilities such power, telephone, water, health, and education (Table A3.3).

Table A3.1: Summary Poverty and Social Analysis**A. Linkages to the Country Poverty Analysis**

Sector Identified as a National Priority in Country Poverty Analysis?	Yes	Sector Identified as a National Priority in Country Poverty Partnership Agreement (draft)?	Yes
Contribution of the road sector to reduce poverty in the People's Republic of China (PRC): Road sector contributes to poverty reduction directly through improved access to markets, employment opportunities, and social services; and indirectly through stimulating economic development.			

B. Poverty Analysis**Poverty Classification: Other**

Poverty analysis was carried out to identify the causes of poverty in the project area and demonstrate how the Project would help reduce poverty by including the 558 kilometer (km) local road component in poor and remote areas, and by giving priority to local poor laborers for unskilled jobs. The distribution analysis was carried out and the poverty impact ratio was calculated. The poverty impact ratio (24%) is higher than the national poverty incidence (12%) and the income share of the poor (4%).
--

C. Participation Process

Stakeholder participation and consultations have been an important element in the development and design of the Project. They have occurred, involving over 900 people, since March 1997 during the preparation of the social analysis, feasibility study, environmental impact assessment, and the resettlement plan; to inform the people affected about the project objectives and to understand their priorities, needs, and concerns; through dialogue with the county and township representatives in the project area, to ensure that local concerns are adequately addressed in the project design and thereby gain their support and cooperation during implementation; and through discussions with nongovernment organizations that represent the poor.
Participation strategy required: Yes

D. Social Issues

Subject	Significant, Not Significant, None	Strategy to Address Issues	Output Prepared
Resettlement	Significant	A resettlement plan was prepared following the Land Administration Law and ADB policy. The plan was disclosed to the public and affected people. Monitoring will be in place.	Full
Gender	Not Significant	The Project is gender neutral. Asian Development Bank policy on Gender and Development will be followed by the Sichuan Provincial Communications Department (SPCD) during project preparation and implementation.	None
Affordability	Not Significant	The Project is affordable to SPCD, and its services will also be affordable to users, given the level of user charges.	None
Labor	Not Significant	Priority will be given to local poor laborers for unskilled jobs arising from the road construction.	None
Indigenous People	Not Significant	Rehabilitation of ethnic minorities affected by land acquisition is specifically addressed by the resettlement plan.	None
Other Risks/Vulnerabilities	Not Significant	Implementation of safeguard policies will be monitored as part of the project performance monitoring system to minimize risks.	None

Table A3.2: Rural Population Distribution by Income in the Project Area

Country ^a	Below CNY625	CNY625- CNY1,000	CNY1,000- CNY1,300	CNY1,300- CNY2,000	Above CNY2,000	Total
Xichang	2,730	4,970	3,270	8,700	13,430	33,100
Dechang	13,980	25,230	16,170	42,440	64,880	162,700
Huili	3,900	7,100	4,670	12,440	19,190	47,300
Miyi	14,930	26,770	16,780	43,460	65,760	167,700
Yanbian	33,080	53,160	20,160	31,870	23,730	162,000
Renhe	2,920	5,420	9,220	10,430	16,530	39,100
TOTAL	71,540	122,650	64,850	149,340	203,520	611,900
	12%	20%	11%	24%	33%	100%

^a Panzhihua City, which is an urban area, is not included.

Source: ADB. 2000. *Technical Assistance to the People's Republic of China for Preparing the Southern Sichuan Roads Development Project*. Manila.

Table A3.3: Social Indicators in the Project Area

County	Total number of villages	Villages without road access (%)	Villages without electricity (%)	Villages without telephones (%)	Villages without tap water (%)	No. of doctors (per 1,000 people)	No. of primary schools (per village)
Xichang	231	6	16	58	55	2.8	0.9
Dechang	137	10	44	45	60	1.5	1.0
Huili	304	6	2	85	40	1.3	1.3
Miyi	132	11	5	60	27	1.6	1.0
Yanbian	172	12	30	88	47	1.3	1.3
Renhe	105	0	1	58	16	1.6	1.6
Panzhihua	19	0	0	32	27		
TOTAL	796	10	13	62	44	1.5	0.9

Source: ADB. 2000. *Technical Assistance to the People's Republic of China for Preparing the Southern Sichuan Roads Development Project*. Manila.

7. The root causes of poverty in the project area (particularly in the mountainous areas) are the poor productive conditions and difficult topography—a situation exacerbated by general remoteness and inadequate road access. Although all townships are accessible by vehicle, no mountain township is served by a paved road. Roads are mostly rock and earth, narrow, and subject to frequent rockfalls, which make them impassable. Few are accessible by a normal car, pickup, or minibus; the risk of accidents is high in bad weather. Medium-sized trucks are the prime means of vehicular transport. Passenger fares are more than double those on good roads—CNY0.35 compared with CNY0.15 per km. Consequently, many people walk, for up to 7 hours to get to market, and up to 5 hours to get fuelwood. Horses and donkeys are an important element of the transportation system in the mountains for heavy loads; they are rarely ridden. The cost of construction materials and fertilizer are considerably higher in areas with poor road access. In some areas, farmers feed their fruit to pigs as they cannot market it. Poor access also limits the ability of residents to take advantage of increased employment opportunities in the urban areas and makes it difficult for local officials and agricultural extension officers to visit the poorest areas.

8. Urban incomes in the project area are on average, higher than in the province as a whole. One reason is that the Pangang, a state-owned enterprise providing over 25% of total urban employment in the project area, pays above average salaries as well as numerous ancillary benefits. Of the total urban population in the project area, 10.6% have annual incomes of less than CNY3,000, compared with around 10% of a national average for urban.

9. Various nongovernment organizations (NGOs) contribute to poverty reduction in Sichuan, including the Sichuan Foundation for Aiding Poverty-Stricken Areas, Development of Rural Sichuan, Ford Foundation of the United States, Aierbert Foundation of Germany, and Kaier of Japan. The Sichuan Foundation is a prominent NGO in Sichuan (the local office of the China Foundation for Poverty Alleviation). One of their main priorities is environmental protection in poor areas, especially along the upper reaches of the Yangtze River. The foundation has helped the Yi minority in Liangshan in renovating houses and moving from felling trees to reclaiming wasteland so that farmers can be engaged in planting and livestock.

B. Social and Poverty-Related Project Features

10. To strengthen the poverty reduction impact of the Project, three main features received particular attention: (i) the expressway was designed with attention to social and poverty issues; (ii) the local road component was selected mainly using poverty criteria; and (iii) the Project will maximize the use of poor people for the unskilled labor jobs created during project construction.

11. The selected alignments of the project road are the least disruptive of alternative alignments. The design incorporates the following features: (i) bypassing heavily populated areas as evidenced by the relatively small number of households to be relocated, (ii) constructing 35 underpasses in urban and rural locations for people and animals, and (iii) installing 311 culverts to accommodate surface runoff and to augment water flow to irrigation canals.

12. The Project, with a local road component of 558 km (Table A3.4) improving access to poor and minority areas, will provide the poor rural population the needed transport link to new and larger markets. The existing county, township, and village roads in the project area were mapped during project preparation to identify the most effective local road component to be included in the Project. The local road component was designed using the following criteria: (i) connecting poverty townships to the expressway's interchanges, (ii) connecting poverty townships to each other, and (iii) impact on economic and social development of the local areas. Experience has shown that to raise communities and households above the poverty level, alternative sources of incomes in addition to farming are required. An important factor in providing such off-farm income sources is all-weather access roads for migrant labor, village enterprises, or small family businesses.

13. To enhance the direct impact of the Project on poverty reduction, priority in unskilled labor jobs will be given to poor people. The Sichuan Panxi Expressway Company Limited (SPECL) will ensure through contractors to maximize the employment of local poor persons who meet the job and efficiency requirements for construction of the project roads. Such workers will be given on-the-job training. The Sichuan Provincial Government will extend the coverage and quality of public utilities, basic health, and basic education in the project area to enhance the poverty reduction impacts. SPECL will monitor the impacts on poverty with the assistance of a designated local institute and will submit annual monitoring reports to the Asian Development Bank (ADB).

C. Poverty Impact Assessment

14. The Project will have a substantial beneficial socioeconomic impact on the majority of the population, urban and rural, of the project area in general, and the poor population in particular. Farmers and urban residents will be the largest beneficiary groups. Farmers will benefit through increases in agricultural output arising from improved access to markets, lower transport and travel costs, reduced travel times for routine activities (going to market, carrying water and fuel wood), easier access to emergency health care, increased interaction with the outside world, more visits from local officials involved in development activities and increased nonagricultural employment

Table A3.4: Local Road Component

Road	Start	Finish	Length (km)	Population Served	Other Townships Served	Population/ km
X1	A'Ci	Qiaodi	5	5,000		1,000
D1	Dechang	Ma'an	35	18,050	Tielu, Rehe, Dawan, Dashan, Dezhou	520
D2	Ma'an-Dechang road	Tielu	24	5,400		230
D3	Ma'an	Yalong river	17	4,750	Rehe	280
D4	Ma'an-Dechang road	Dashan	30	5,100	Dawan	170
D5	Yalong River	Rehe	17	4,750		280
D6	Ci Da	Daliucao	21	2,100		100
D7	G108	Yinlu	13	2,800		220
D8	Linsuo	Nanshan	7	5,000	Liusuo (part)	710
D9	Laonian	Cangtian	15	7,100		470
H1	Xiacun	Tiechang	6	12,550	Liumin, Liuhaa, Sandi	2,090
H2	Tiechang	Liumin	10	7,550	Liuhaa, Sandi	760
H3	Liumin	Liuhaa	15	3,800		250
H4	Liumin	Sandi	17	1,650		100
M1	Puwei	Nanba	11	10,100	Shengli, Lianghe	920
M2	Nanba	Yalong river	15	2,800	Shengli	190
M3	Yalong river	Shengli	19	2,800		150
M4	Nanba	Lianhe	12	2,800		230
M5	Miyi-Puwei road	Yunfeng	15	6,900	Malong	460
M6	Yunfeng	Malong	28	4,200		150
M7	Malong	S214	36	7,500	Fangtian	210
M8	Pingshan	Xin shan	15	4,300	Pingshan (part)	290
Y1	Yumen-Ertan road	Longshen	25	5,400	Longsheng	150
Y2	Longsheng spur	Linhai	20	3,200		400
Y3	Linhai	Gonghe	33	5,300	Linhai	160
Y4	Gong He	Yalong river	13	9,000	Taitien, Linhai	690
Y5	Gonghe	Tai tian	16	3,700		230
Y6	Hongguo	Hongming	9	1,500		170
Y7	Hongguo	Huajiaoqing	14	1,700		120
Y8	Hongguo	Wuben	31	13,900	Hongni	450
Y9	Hongge	Xinjiu	14	17,000	Hongge (part)	1,210
Total			558	187,700	(average)	336

Source: ADB. 2000. *Technical Assistance to the People's Republic of China for Preparing the Southern Sichuan Roads Development Project*. Manila.

opportunities. Urban residents will benefit from additional economic growth resulting from a more efficient and higher capacity transport network. Farmers along the expressway alignment will gain temporary employment during its construction. These benefits will affect poor and nonpoor populations alike. The only significant disbenefits are those arising from loss of land and/or property. Compensation payments and replacement houses as per the Resettlement Plan will mitigate these.

15. The Project is expected to generate a sustainable poverty reduction impact in both the long and short term. The short-term improvements will come primarily as a result of the local road improvements, while the impact of the expressway will be mainly felt in the longer term. The number of poor beneficiaries will be around 244,000, of which almost 100,000 will benefit from the local roads component (Table A3.5). Around three quarters of the poor population of the project area will derive some benefit from the Project.

Table A3.5: Project Beneficiaries Classified by Income and Sub-Group

	Population ('000) by income					Total
	Below CNY625	CNY625-1,000	CNY1,000-1,300	CNY1,300-2,000	Over CNY2000	
Rural						
Residents of townships served by local road improvements	32	50	16	19	3	120
Residents of poor villages in townships in Anning valley	13	20	7	8	1	49
Poor residents of nonpoor Anning valley villages	6	15	20	70	126	237
Rural beneficiaries	51	86	43	97	130	406
% of rural beneficiaries	12.6%	21.2%	10.6%	23.9%	32.0%	100.0%
Urban	Below CNY2,000	CNY2,000-3,000	CNY3,000-4,000	CNY4,000-5,000	Over CNY5,000	Total
Urban residents	17	43	81	84	338	563
% of urban beneficiaries	3.0%	7.6%	14.4%	14.9%	60.0%	100.0%
Total beneficiary population	68	129	124	181	468	969
% of all beneficiaries	7.0%	13.3%	12.8%	18.7%	48.3%	100.0%
Population not affected	21	38	22	51	73	206
Total	89	143	93	225	625	1,175

Source: ADB. 2000. *Technical Assistance to the People's Republic of China for Preparing the Southern Sichuan Roads Development Project*. Manila.

16. About 60% of the minorities in the project area (52,000) are expected to benefit from the project. The minorities will benefit particularly from the local road improvements as minorities account for over 40% of the beneficiaries from this component. The resettlement impact on the minority households, who live in a substantial number of villages mostly along the feeder roads, will be small. Compensation and other measures included in the Resettlement Plan will ensure that the living standards of these households are maintained. No adverse impacts are anticipated from the local road component. Positive discrimination toward minorities will continue as exemplified by national fiscal and development policies, given the explicit targeting of this group in the new National Poverty Reduction Strategy. On the basis of this analysis, a minority peoples'

development plan is not required for this Project, given that the minorities in the project area will not be adversely affected and ongoing development programs will target this group while ensuring that their cultural identity is maintained. The resettlement impact on the minority people will be dealt with as part of the resettlement plan.

17. The impact of the Project will be gender neutral—women will benefit as much as men, and few will experience adverse impacts. In one respect, women, and especially minority women, are expected to benefit more than men. The division of labor in minority areas is more marked than in Han areas. Women perform a large proportion of farming activities. In addition, they frequently undertake the marketing of the small surplus produce produced by the family. They also have the prime responsibility for fetching water and fuelwood. All these tasks require much walking with heavy loads, often accompanied by young children. Reduced travel costs, greater availability of transport, and improved road surfaces will all lead to a decrease in the burden of these daily activities. In addition, improved transport will result in better access to health clinics in an area where gynecological problems are common.

D. Monitoring and Evaluation

18. The immediate socioeconomic effects will start to be monitored during the construction phase. Construction on several locations along the route will begin simultaneously under different contractors. Given the number of contractors involved, the direct short-term effects will be monitored semiannually. Any favorable practices or policies by one of them will be used as a model for the others. Among the indicators to be collected for short-term effects are (i) labor force employed on expressway construction, (ii) number of unskilled laborers, (iii) percentage of poor laborers in the labor force, (iv) percentage of local laborers in the labor force, (v) percentage of women in the total labor force, and (vi) wage level of laborers on the local road component. Poverty monitoring will be carried out independently as part of the project performance management system with the help of the consultants and a local institute. Monitoring will involve a baseline survey at the start of construction and updates as stated in the project performance monitoring system schedule. The baseline data will be collected from a sample of the affected beneficiaries and a control group before construction starts. Consultants and an institute will conduct surveys as necessary.

ECONOMIC AND FINANCIAL ANALYSIS

A. Economic Analysis

1. Project Costs and Benefits

1. The Project comprises the expressway that traverses the southern part of Sichuan Province and local roads connected to the expressway through the road network system. The Project will be implemented in about 5 years, and economic analysis covers the following 20 years of full operation. Without the Project, traffic will use the existing road network, which will soon be congested and expensive to maintain because of the rapidly increasing traffic. Some travel may not take place because of the congestion. With the Project, congestion on the existing roads will be reduced, and traffic on the expressway and the existing roads will benefit from faster, cheaper, and safer travel. Some additional trips will be generated.

2. Local roads in six counties will be improved concurrently with the expressway component. The costs of this component include capital costs and operation and maintenance (O&M) costs. The estimated benefits are reduced vehicle operating costs (VOCs), travel time savings for freight and passengers, reduced accidents, and additional economic activities generated from improved accessibility of the project area.

2. Valuation of Costs and Benefits

3. **General Parameters.** Economic evaluation was undertaken using constant 2002 economic prices. The prices are expressed in yuan using the domestic price numeraire with a shadow exchange rate factor of 1.08 for foreign exchange effects. A shadow price is used to place an economic value on the wages paid to unskilled labor, while skilled labor is not shadow priced since there is no surplus of skilled workers. A shadow wage rate factor (SWRF) of 0.67 was used to convert the financial wage rate to an economic opportunity cost of labor as 70% of employees on highway construction projects are unskilled.

4. **Costs.** The capital costs and physical contingencies for the Project are revalued at economic prices by separating the cost items into tradable materials and equipment, nontradable materials, labor, and land. The project equipment is generally tax exempt. A composite conversion factor of 0.964 was used.

5. **Traffic Forecasts.** During the feasibility study prepared by the provincial design institute, two types of traffic surveys were carried out for traffic analysis, pavement design, and economic and financial evaluation: (i) manual classified counts, which provided base data for calculating the base year average annual daily traffic (AADT) in medium truck equivalents (MTE); and (ii) origin-destination surveys to obtain information about traffic movement. The traffic surveys undertaken on 12 April 2000 were verified by the technical assistance consultants in 2001, at 15 key locations along national highway 108 and provincial highway 214. The manual traffic surveys involved 12- to 24-hour counts that lasted for 7 days, and classified traffic into six vehicle categories (car, bus, small truck, medium truck, large truck, and tractor-trailer). The surveys collected data on the number of vehicles by type, trip distribution, type and weight of the freight loaded on vehicles, number of passengers, and transport capacity of vehicles. The result of the traffic forecasts is given in Table A4.1 and a methodology and assumptions used are detailed in Supplementary Appendix C.

Table A4.1: Average Annual Daily Traffic (medium truck equivalents)

Expressway Section	2008	2018	Growth Rate	2028	Growth Rate
Xichang-Dechang	4,161	9,139	8.2%	16,179	5.9%
Dechang-Guabang	6,240	11,403	6.2%	20,526	6.1%
Guabang-Miyi	4,018	9,289	8.7%	17,360	6.5%
Miyi-Yakou	7,214	13,534	6.5%	21,866	4.9%
Yakou-Xinjiu	6,921	13,073	6.6%	21,649	5.2%
Xinjiu-Jinjiang	10,896	17,985	5.1%	28,068	4.6%
Weighted Average	6,281	11,874	6.6%	20,389	5.6%

Source: Asian Development Bank estimates.

6. **Benefits.** The main source of economic benefits of new or improved roads is a reduction in VOCs. VOCs vary by vehicle type (car, bus, truck), road characteristics (pavement width and roughness, and horizontal and vertical alignment). The economic costs of the vehicles are derived from international prices, with a quality adjustment for domestically produced vehicles. Domestically produced trucks and buses are valued at 75% of internationally traded trucks and buses, and cars at 90% of the internationally traded cars. Parts, fuel, and oil were also calculated based on current international prices. The benefits from VOC savings, which will initially accrue to vehicle owners and operators, will in the long term be passed on to users of transport services through reduced transport rates and fares, given the increasingly competitive nature of the road transport industry in the project area.

7. The benefits from a reduction in number and severity of accidents constitute an important part of economic benefits. Accident reductions were estimated based on the findings of a study on accidents carried out by the Highway Planning and Design Institute of the Ministry of Communications. Although the economic cost of accidents is higher on the expressway than on the existing roads, with the Project the number of accidents per vehicle-kilometer in the project corridor will be reduced substantially, resulting in net cost savings derived from avoided accident costs. The reduction in lives lost was not quantified in the analysis.

8. Travel time savings will be enjoyed by traffic both on the project expressway and the existing roads. VOCs embody the value of the time saved by vehicle drivers and crews, but not the value of time saved by passengers. The value of time saved by passengers traveling in work time was calculated from that person's wage rate. For people traveling in leisure time, the preferred method of valuation is willingness-to-pay for time saved. However, in the absence of local information on willingness-to-pay, this study bases its choice of values on annual income. The value of time for work or business trips is assumed to be related more to urban incomes for cars, and more to average regional incomes for buses. Nonwork trips were given no value. The value of passenger travel time will increase as income rises. The economic model increases the value of personal travel time at 4% per annum.

9. For the 558 km local road component, providing access for mountain communities that are transport-disadvantaged and poor, the benefits are computed by identifying producer surplus and consumer surplus. The producer surplus benefit is a consequence of reducing the cost of transport to markets. Producer surplus comes mainly from farming, and is the value of the additional production less production costs. Increased producer surplus eventually shows up as increased household income. In the mountains, income is limited by access and land productivity. Improving access in the mountains will bridge part of the income gap between the mountains and the valleys. This income increase is tallied as a producer surplus benefit. The producer surplus benefit is based on a 15% bridging of the income gap, which would realistically

be achievable.¹ Consumer surplus from access improvements is usually estimated by forecasting generated traffic. Consumer surplus is therefore estimated based on forecasted passenger traffic increase that amounts, on most of these local roads, to between 10 and 30 vehicles a day.² The road improvements will reduce VOCs and raise travel speeds from around 20 km/h to around 40 km/h.

10. **Results and Conclusion.** The economic internal rate of return (EIRR) for the Project, including the expressway component and local road component, is 16.2% (Table A4.2). The EIRR for the expressway component alone is 16.1% and that for the local road component, 20.3%. VOC savings are the major economic benefit (78%), followed by travel time savings (14%), accident cost savings (5%), and local road component (2%).

11. The EIRR was calculated separately for the local roads. The Project includes 31 sections of local roads that carry mainly local traffic including motorized traffic, such as local bus service. With all of the local roads connected to the trunk highway system through the road network, improvement of the local roads is expected to stimulate the rural economy in the project area. The costs of improvement vary, depending on the type of work required. Economic benefits for motorized traffic are reductions in VOCs and time, and generated economic activities as a result of improved access. An EIRR of 16.2% is relatively low compared with other recent projects in the People's Republic of China (PRC) of a similar type. This is mainly due to the high construction unit cost and low traffic.

12. Sensitivity analysis tested six scenarios to assess the robustness of the results of the economic analysis (Table A4.3). The capital cost would have to be more than 85% higher than estimated in every case for the EIRR to fall below the cutoff rate of 12%. Considering the past experience of the Asian Development Bank (ADB) in the PRC road sector, this switching value is unlikely to occur. ADB-financed road projects in the PRC have not encountered major cost overruns, and the contract prices tend to be lower than estimated because the contracting process is becoming increasingly competitive. The benefits level would have to decrease more than 43% to make the Project economically nonviable. A 2-year delay in completion causes the net present value to decrease by 62%. A 20% reduction of the major factors determining economic benefits—VOC savings, growth rate of normal traffic, and traffic generation rate—does not affect the economic viability of the Project.

13. The economic analysis of the Project was extended to quantify the direct poverty impact by examining distribution of project net benefits by determining the project effects for various beneficiaries, including road users, expressway company, local economy, labor, and government. The impact on the poor was assessed by quantifying the direct benefits that would accrue to poor people under the Project. The proportion of net benefits passed on to poor people, or the poverty impact ratio, was calculated as 24% (Table A4.4). This ratio is higher than the country's poverty incidence and the income share of the poor.

¹ To achieve this, per household income needs to increase by CNY1,000 per year. CNY1,000 can be earned from 50 days of unskilled labor at CNY20/day. One mu (667 square meters) of fruit trees produces a profit of at least CNY1,000/year. Livestock projects in the area, promoting free-range grazing of cattle and goats, are generating average net incomes of about CNY500/year and animal. Pigs earn a net CNY100 to CNY400 each.

² The estimate is likely to be less than the true value since the increase in passenger traffic is unlikely to reflect the full benefit of increased personal mobility.

B. Financial Analysis

14. **General.** Proforma financial statements including income statement, cash flows, and balance sheet for the project expressway are based on the following assumptions and were prepared for 26 years from 2002 to 2027. All projections are in nominal (inflation adjusted) terms. Throughout the project life, annual inflation rates are assumed to be 2.4%.

15. **Financial Statements.** The financial projections are based on the following assumptions:

- (i) Business tax is assessed at 5.75% on the gross operating revenues.
- (ii) Corporate tax is assessed at 33% of net profit per year.
- (iii) Based on the toll rates³ and the forecast traffic mix, the weighted average expressway toll rate is assumed to be CNY1.38 per MTE-km in the opening year (2007). The toll rate is assumed to increase in real terms every 5 years.
- (iv) The depreciation is based on the economic life of project components.
- (v) Total operation and maintenance costs are CNY287.3 million in 2008 and are escalated at an average rate of 5% per annum, based on a staff of 317 people employed at toll stations, on maintenance teams, and at administrative offices. Annual salaries and benefits amount to an average 2002 cost of CNY15,000 per employee, and the total payroll is CNY14.5 million. Maintenance expenses are estimated to be CNY27 million annually. Operation and maintenance costs are assumed to increase in line with traffic growth and domestic inflation.
- (vi) After 10 years of full operation, the expressway will need to be repaved. The repaving cost of CNY60 million in the years 2018–2020 was adjusted by a price escalation factor of 2.4%.

16. Conclusions of financial statements are summarized as follows: (i) The projected financial statements indicate that the expected revenues under the base assumptions are sufficient to cover operating costs, business tax, debt repayments on the ADB loan and the domestic loan, and reasonable profits from the expressway operation (Table A4.5); and (ii) the debt-to-equity ratio, which decreases steadily from 50:50 in the first year of full operation, indicates a sound financial condition for the expressway under the proposed financing plan and toll structure. The debt service coverage ratio reaches 1.2 during the second year of full operation.

17. **Financial Evaluation.** The financial internal rate of return (FIRR) for the project expressway is based on estimated incremental revenues and costs resulting from the operation of the expressway. The assumptions in calculating the FIRR are as follows:

- (i) The cash flows and financing plan are in real 2002 prices, covering 25 years comprising 4.75 years of construction and 20 years of full operation.

³ The opening toll rates per vehicle-km are CNY0.52 for cars, CNY1.00 for light trucks, CNY1.89 for medium trucks, and CNY2.68 for heavy trucks.

- (ii) The FIRR was calculated after corporate tax, which is expected to be payable in the sixth year of full operation.
- (iii) Capital costs include all incremental capital expenditures related to the construction and equipment of the project expressway as well as periodic maintenance costs, but price contingency provisions and interest during construction are excluded.
- (iv) Operation and maintenance costs include all incremental costs in operating the project expressway, but exclude depreciation provisions.
- (v) Major maintenance (periodic maintenance such as pavement resurfacing) is assumed to take place in years 11–13 of operation, at a cost of CNY60 million.
- (vi) Projected annual operating revenues are estimated in real terms based on the discounted weighted-average toll rate and the traffic forecast.

18. The results of the financial evaluation show an FIRR in real terms of 5.5% after corporate income tax (Table A4.6). This is higher than the 4.0% real weighted average cost of capital (WACC). Moreover, the financial net present value at the WACC is CNY1,354 million. Sensitivity of the FIRR was tested under several scenarios on key parameters and combinations of parameters that determine costs and revenues. As shown in Table A4.6, the FIRR remains above the WACC even under the worst scenario. When the capital cost increases by 10%, the FIRR decreases to 4.1%. Increases in operating costs and traffic volume were found to have marginal effects on the FIRR.

Table A4.2: Economic Internal Rate of Return of the Project
(Constant 2002 economic prices, domestic price numeraire, CNY million)

Year	Costs			Benefits						
	Capital	Operation and Maintenance	Total	VOC Savings	Time Savings	Accident Savings	Generated Traffic	Local Road Component	Total	Net Benefit
2003	672		672							(672)
2004	1,684		1,684							(1,684)
2005	2,024		2,024							(2,024)
2006	1,439		1,439							(1,439)
2007	1,099	6	1,105	102	10	11			123	(982)
2008		23	23	503	52	55	27	40	676	659
2009		24	24	572	61	60	31	41	765	748
2010		24	24	649	73	65	35	41	864	847
2011		25	25	737	86	72	40	41	976	960
2012		25	25	836	101	78	46	42	1,104	1,088
2013		26	26	948	120	86	53	42	1,249	1,232
2014		27	27	1,074	141	94	61	43	1,413	1,397
2015		27	27	1,215	167	103	69	43	1,598	1,582
2016		28	28	1,374	196	112	80	44	1,806	1,791
2017		29	29	1,554	231	123	91	44	2,044	2,028
2018	52	29	81	1,755	272	135	104	45	2,311	2,286
2019		30	30	1,987	323	146	121	45	2,622	2,649
2020		31	31	2,246	383	158	140	46	2,973	3,001
2021		32	32	2,534	453	170	163	46	3,366	3,395
2022		32	32	2,853	535	184	189	46	3,807	3,837
2023		33	33	3,209	630	199	219	47	4,304	4,335
2024		34	34	3,604	741	216	254	47	4,861	4,893
2025		35	35	4,043	870	233	294	48	5,488	5,521
2026		36	36	4,528	1,021	252	341	48	6,190	6,224
2027	(3,459)	36	(3,423)	5,065	1,196	273	395	49	6,978	10,401
Economic Net Present Value at 12% =										2,844
Economic Internal Rate of Return =										16.2%

VOC = vehicle operating cost.

Source: Asian Development Bank estimates.

Table A4.3: Sensitivity Analysis

Scenario	Change (%)	Economic Net		Sensitivity Indicator ^a	Switching Value ^b (%)
		EIRR (%)	Present Value (CNY million)		
Base Case		16.2%	2,844		
1. Cost	+ 10	15.2%	2,511	1.17	85.4
2. Cost	+ 20	14.4%	2,179	1.17	85.4
3. Benefit	- 10	14.9%	2,184	2.32	(43.0)
4. Benefit	- 20	14.1%	1,524	2.32	(43.0)
5. Implementation Delay	1 year	14.4%	1,991	NPV declines by 30%.	
6. Implementation Delay	2 years	12.7%	1,081	NPV declines by 62%.	

EIRR = economic internal rate of return, NPV = net present value.

^a Sensitivity indicator = % change in NPV / % change in variable tested.

^b Switching value indicates the % increase in a cost item (or decline in a benefit item) required for the NPV to become zero.

Source = Asian Development Bank estimates.

Table A4.4: Distribution of Project Benefits and Poverty Impact Ratio
(Present values at 12%, CNY million)

Item	Financial Present Value	Economic Present Value	Difference	Express- way Users	Vehicle Operators	Accident- involved	Labor	Govern- ment	Local Economy	Total
Benefits										
Toll Revenue	2,980		(2,980)	(2,980)						
VOC Savings		5,485	5,485	4,728	757					
Time Savings		914	914	914						
Accident savings		445	445			445				
Benefits from Local Roads		204	204						204	
Total Benefits	2,980	7,048	4,068	2,662	757	445			204	
Costs										
Capital and O&M	4,956	4,461	495					495		
Labor	518	347	171				171			
Tax	270		270					270		
Total Costs	5,744	4,808	936				171	765		
Net Benefits	(2,764)	2,240	5,004	2,662	757	445	171	765	204	
		Gains and losses		2,662	757	445	171	765	204	2,240
		Net Financial Benefits						(2,764)		
		Total Benefits						(1,999)		
		Proportion to poverty		16%	0%	50%	50%	12%	20%	
		Benefit to poverty		426		223	86	(240)	41	535
Poverty impact ratio =										24%

O&M = operation and maintenance, VOC = vehicle operating cost.

Note:

Project net benefits to the poor are distributed in the following proportions: (i) Government: national poverty incidence (12%); (ii) local economy: poverty incidence in the project area (20%); (iii) labor: the Project requires to give priority to the poor people for unskilled labor jobs (50%); (iv) the accidents often involve vulnerable road users whose income is usually very low (50%); (v) expressway users: same as (ii) except that it was reduced by 20% due to the through traffic; and (vi) vehicle operators: their income levels are above poverty line (0%).

Source: Asian Development Bank estimates.

Table A4.5: Projected Financial Statements of the Sichuan Panxi Expressway Company Limited
(CNY million)

Item	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Income Statement																	
Operating Revenues																	
PanXi Tolls									124.6	533.2	562.2	593.7	626.4	660.9	836.6	882.4	931.1
Lugu Tolls			10.0	11.0	12.1	13.3	14.6	16.1	17.7	19.5	21.4	23.6	25.9	28.5	31.4	34.5	38.0
Other Revenue (Advertising)									1.3	5.6	5.9	6.2	6.6	6.9	8.8	9.3	9.5
Total Operating Revenues			10.0	11.0	12.1	13.3	14.6	16.1	143.6	558.3	589.6	623.5	658.9	696.4	876.8	926.2	978.5
Less: Business Tax (5.75%)			0.6	0.6	0.7	0.8	0.8	0.9	8.3	32.1	33.9	35.9	37.9	40.0	50.4	53.3	56.3
Net Operating Revenue After Business Tax			9.4	10.4	11.4	12.5	13.8	15.2	135.3	526.2	555.7	587.7	621.0	656.3	826.4	872.9	922.3
Operating Expenses																	
Lugu Toll Collect., Admin. & Traff. Mangmnt.			4.2	4.3	4.4	4.5	4.6	4.7	4.8	5.0	5.1	5.2	5.3	5.5	5.6	5.7	5.9
PanXi Toll Collect., Admin. & Traff. Mangmnt.									2.3	9.5	9.9	10.3	10.7	11.1	11.6	12.1	12.6
Lugu Routine Maintenance			1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.4	1.5	1.5	1.5
PanXi Routine Maintenance									2.7	11.2	12.0	12.8	13.6	14.6	15.5	16.6	17.7
Total Maintenance Expenses			5.3	5.4	5.6	5.7	5.8	6.0	11.1	27.0	28.3	29.7	31.0	32.6	34.1	35.9	37.7
Lugu Depreciation									29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0	29.0
PanXi Depreciation									57.8	231.3	231.3	231.3	231.3	231.3	231.3	231.3	231.3
Total Operating Expenses			5.3	5.4	5.6	5.7	5.8	6.0	98.0	287.3	288.7	290.0	291.4	292.9	294.5	296.3	298.1
Other Expenses																	
Interest Payable										292.5	283.5	274.0	264.0	253.5	242.3	230.5	218.0
Net Revenue (Loss) Before Corporate Tax			4.1	4.9	5.8	6.9	8.0	9.2	37.4	(53.6)	(16.5)	23.6	65.6	109.9	289.6	346.2	406.2
Corporate Tax (33%)															95.6	114.2	134.0
Profit (Loss) After Tax			4.1	4.9	5.8	6.9	8.0	9.2	37.4	-53.6	-16.5	23.6	65.6	109.9	194.0	231.9	272.2
Cash Flow Statement																	
Cash Inflows																	
Net Revenue (Loss) from Operations			4.1	4.9	5.8	6.9	8.0	9.2	37.4	(53.6)	(16.5)	23.6	65.6	109.9	194.0	231.9	272.2
Add Depreciation									86.9	260.4	260.4	260.4	260.4	260.4	260.4	260.4	260.4
Net Cash Flow from Operating Activities			4.1	4.9	5.8	6.9	8.0	9.2	124.3	206.8	243.9	284.0	326.0	370.3	454.4	492.3	532.5
Drawdown from ADB					284.3	627.5	775.7	570.4	473.4								
Drawdown from Domestic Banks					218.3	558.1	697.8	516.1	431.4								
Provincial and State Government Equity	263.0	209.0	63.2	80.0	410.0	1024.9	1229.9	820.0	615.0								
Total Cash Inflows	263.0	209.0	67.3	84.9	918.5	2217.4	2711.4	1915.7	1644.1	206.8	243.9	284.0	326.0	370.3	454.4	492.3	532.5
Cash Outflows																	
Principal Repayment (ADB Loan)										77.5	81.8	86.4	91.3	96.4	101.8	107.5	113.5
Principal Repayment (Domestic Bank Loan)										80.2	84.8	89.7	94.8	100.3	106.1	112.2	118.6
IDC and Other Charges on ADB Loan					49.7	41.0	71.8	101.2	121.5								
IDC and Other Charges on CDB Loan					6.1	27.5	61.1	91.7	113.1								
Construction Cost	263.0	209.0	63.2	80.0	856.8	2142.0	2570.4	1713.6	1285.2								
Total Cash Outflows	263.0	209.0	63.2	80.0	912.6	2210.5	2703.4	1906.5	1519.8	157.7	166.6	176.1	186.1	196.7	207.8	219.6	232.1
Net Cash Flows	0.0	0.0	4.1	4.9	5.8	6.9	8.0	9.2	124.3	49.1	77.3	107.9	139.9	173.6	246.6	272.7	300.4
Opening Balance	0.0	0.0	0.0	4.1	9.1	14.9	21.8	29.7	38.9	163.2	212.3	289.6	397.5	537.4	711.0	957.6	1230.2
Closing Balance	0.0	0.0	4.1	9.1	14.9	21.8	29.7	38.9	163.2	212.3	289.6	397.5	537.4	711.0	957.6	1230.2	1530.6
Balance Sheet																	
Assets																	
Cash			4.1	9.1	14.9	21.8	29.7	38.9	163.2	212.3	289.6	397.5	537.4	711.0	957.6	1230.2	1530.6
Tunnel, Bridge, Equipment and Machinery	528.0	737.0	800.2	880.2	1792.8	4003.4	6706.8	8613.3	10133.1	10133.1	10133.1	10133.1	10133.1	10133.1	10133.1	10133.1	10133.1
Less: Accumulated Depreciation									86.9	347.2	607.6	868.0	1128.4	1388.7	1649.1	1909.5	2169.8
Total Assets	528.0	737.0	804.3	889.3	1807.8	4025.2	6736.5	8652.2	10209.5	9998.2	9815.1	9662.6	9542.1	9455.4	9441.6	9453.9	9493.9
Equity and Liabilities																	
ADB Loan					284.3	911.9	1687.5	2257.9	2731.4	2653.9	2572.0	2485.6	2394.3	2298.0	2196.2	2088.7	1975.2
Domestic Bank Loan					218.3	776.4	1474.2	1990.4	2421.8	2341.6	2256.9	2167.2	2072.4	1972.1	1866.0	1753.9	1635.2
Total Debt					502.7	1688.3	3161.8	4248.3	5153.2	4995.5	4828.9	4652.8	4466.7	4270.1	4062.2	3842.6	3610.4
Paid-in Capital	528.0	737.0	800.2	880.2	1290.2	2315.1	3545.0	4365.0	4980.0	4980.0	4980.0	4980.0	4980.0	4980.0	4980.0	4980.0	4980.0
Retained Earnings/Losses			4.1	9.1	14.9	21.8	29.7	38.9	76.3	22.7	6.2	29.9	95.5	205.4	399.4	631.4	903.5
Total Equity	528.0	737.0	804.3	889.3	1305.1	2336.9	3574.8	4403.9	5056.3	5002.7	4986.2	5009.8	5075.4	5185.3	5379.4	5611.3	5883.5
Total Equity and Liabilities	528.0	737.0	804.3	889.3	1807.8	4025.2	6736.5	8652.2	10209.5	9998.2	9815.1	9662.6	9542.1	9455.4	9441.6	9453.9	9493.9
Financial Performance Indicators																	
Debt to Equity Ratio ^a					28:72	42:58	47:53	49:51	50:50	50:50	49:51	48:52	47:53	45:55	43:57	41:59	38:62
Debt Service Coverage Ratio ^b									n/a	1.1	1.2	1.2	1.3	1.4	1.8	1.9	2.0
Working Ratio ^c									n/a	10.6%	10.6%	10.5%	10.5%	10.4%	9.6%	9.6%	9.6%

^a Total debt divided by total debt plus total equity.

^b Net operating income excluding depreciation divided by principal plus interest payments.

^c Total operating expenses excluding depreciation divided by total operating revenue before business tax.

Source: Sichuan Panxi Expressway Company Limited

Table A4.6: Financial Internal Rate of Return
(CNY million)

Year	Capital Costs	O&M Cost	Gross Revenue	Business Tax	Corporate Tax	Net Cash Flow
2003	696					(696)
2004	1,740					(1,740)
2005	2,088					(2,088)
2006	1,392					(1,392)
2007	1,044	4	109	6		(945)
2008		18	456	26		413
2009		18	470	27		425
2010		19	485	28		438
2011		19	499	29		451
2012		20	514	30		465
2013		20	636	37	101	478
2014		21	655	38	111	485
2015		22	675	39	121	493
2016		22	696	40	131	503
2017		23	717	41	142	511
2018	20	24	885	51	197	593
2019	20	25	922	53	213	612
2020	20	26	961	55	228	632
2021		27	1,002	58	244	673
2022		27	1,044	60	261	695
2023		28	1,304	75	346	855
2024		29	1,359	78	366	885
2025		31	1,416	81	388	916
2026		32	1,476	85	410	950
2027	(2,460)	33	1,539	88	431	3,447

FIRR = 5.5%
WACC = 4.0%

FIRR = financial internal rate of return, O&M = operation and maintenance, WACC = weighted average cost of capital.

Sensitivity of FIRR

Base Case	5.5%
Scenarios:	
1. 10% Decrease in Traffic Volume	4.9%
2. 10% Increase in Working Expenses	5.4%
3. Combined Downside : Combination of 1 + 2 Above	4.9%
4. 10% Increase in Capital Cost	4.1%
5. 10% Devaluation of yuan	4.8%

Source = Asian Development Bank estimates.

EXTERNAL ASSISTANCE

A. Asian Development Bank

Loan Number	Project Name	Expressway Length (km)	Local Road (km)	Loan Amount (\$ million)	Date Approved
1082-PRC	Shanghai-Nanpu Bridge			70	28 May 91
1168-PRC	Shenyang-Benxi Highway	75		50	02 Jul 92
1188-PRC	Shanghai Yangpu Bridge			85	17 Nov 92
1261-PRC	Hunan Expressway	52		74	09 Nov 93
1262-PRC	Jilin Expressway	133		126	09 Nov 93
1324-PRC	Heilongjiang Expressway	350		142	29 Sep 94
1325-PRC	Yunnan Expressway	200		150	29 Sep 94
1387-PRC	Hebei Expressway	200	179	220	28 Sep 95
1388-PRC	Liaoning Expressway	110	203	100	28 Sep 95
1470-PRC	Chongqing Expressway	89		150	27 Sep 96
1483-PRC	Shenyang Jinzhou Expressway	192	291	200	19 Nov 96
1483-PRC	Jiangxi Expressway	134	253	150	19 Nov 96
1617-PRC	Hebei Roads Development Project	140	340	180	18 Jun 97
1638-PRC	Chengdu-Nanchong Expressway	208	300	250	10 Nov 98
1641-PRC	Changchun-Harbin Expressway: Changyu Expressway	161		220	27 Nov 98
1642-PRC	Changchun-Harbin Expressway: Hashuang Expressway	101		170	27 Nov 98
1691-PRC	Southern Yunnan Road Development Project	147	540	250	24 Jun 99
1701-PRC	Shanxi Road Development Project	176	418	250	30 Sep 99
1783-PRC	Chongqing-Guizhou Roads: Leichong Expressway	50	122	120	21 Nov 00
1784-PRC	Chongqing-Guizhou Roads: Chongzun Expressway	127	704	200	21 Nov 00
1838-PRC	Shaanxi Roads Development Project	176	627	250	30 Aug 01
1851-PRC	Guangxi Roads Development Project	179	507	150	30 Oct 01
Total		3,000	4,484	3,557	

Source: Asian Development Bank estimates.

TA Number	Technical Assistance Name	Type	TA Amount (\$)	Date Approved
1049-PRC	Huangpu Bridge	PP	95,000	24 Oct 88
1152-PRC	Design Review of the Nanpu Bridge	PP	100,000	26 Apr 89
1509-PRC	Ningguolu Bridge	PP	100,000	18 Apr 91
1517-PRC	Toll Bridge Operations and Management	AD	760,000	28 May 91
1533-PRC	Design Review of the Yangpu Bridge	AD	100,000	10 Jul 91
1664-PRC	Shenyang-Benxi Highway	PP	100,000	22 Jan 92
1533-PRC	Design Review of the Yangpu Bridge (Supplementary)	AD	416,000	28 Apr 92
1724-PRC	Institutional Strengthening for Highway Operation and Management Improvement	AD	500,000	02 Jul 92
1725-PRC	Jilin Province Highway Network Study	PP	600,000	02 Jul 92
1728-PRC	Changsha-Xiangtan Expressway	PP	100,000	09 Jul 92
1785-PRC	Comprehensive Toxic and Hazardous Chemicals Transpc Management Plan in the Huangpu River Basin	AD	600,000	17 Nov 92
1940-PRC	Efficiency Improvements in Road Transportation	AD	550,000	25 Aug 93
1972-PRC	Institutional and Policy Support in the Road Sector	AD	1,200,000	09 Nov 93
1975-PRC	Policies for Strategic Development of Transport and Communications Infrastructure	AD	100,000	11 Nov 93
1981-PRC	Heilongjiang and Yunnan Expressways	PP	320,000	16 Nov 93
2155-PRC	Sichuan Expressway	PP	350,000	16 Sep 94
2177-PRC	Preparation of a Road Safety Program	AD	600,000	29 Sep 94
2178-PRC	Provincial Highway Network Planning	AD	600,000	29 Sep 94
2195-PRC	Hebei and Liaoning Expressways	PP	560,000	31 Oct 94
2212-PRC	Beijing Urban Transport	AD	715,000	28 Nov 94
2302-PRC	Symposium on Urban Transport	AD	100,000	22 Feb 95
2409-PRC	Appraisal Methodologies and Restructuring Highway Financing in Hebei Province	AD	740,000	28 Sep 95
2482-PRC	Liaoning and Jilin Expressways	PP	400,000	18 Dec 95
2486-PRC	Jiangxi Highway	PP	250,000	20 Dec 95
2573-PRC	Review of Highway Design Standards	AD	420,000	24 May 96
2649-PRC	Facilitating the Build-Operate-Transfer Modality in the Highway Sector	AD	1,100,000	27 Sep 96
2663-PRC	Hebei Roads Development	PP	600,000	16 Oct 96
2777-PRC	Chengdu to Nanchong Expressway	PP	600,000	07 Apr 97
2846-PRC	Changchun-Harbin Expressway	PP	600,000	22 Aug 97
2952-PRC	Corporatization, Leasing, and Securitization in the Road Sector	AD	1,000,000	17 Dec 97
3033-PRC	Shanxi Expressway	PP	570,000	24 Jun 98
3039-PRC	Yunnan Road Environmental and Social Analysis	PP	150,000	07 Jul 98
3086-PRC	Regional Road Sector Study	AD	1,185,000	13 Oct 98
3102-PRC	Preparing the Chongqing-Guizhou Expressway	PP	900,000	26 Nov 98
3220-PRC	Preparing the Guanxi Highway	PP	540,000	07 Jul 99
3248-PRC	Preparing the Shanxi and Shaanxi Roads	PP	640,000	30 Aug 99
3341-PRC	Capacity Building in Traffic Safety, Planning, and Management	AD	600,000	14 Dec 99
3546-PRC	Preparing the Southern Sichuan Roads Development	PP	800,000	16 Nov 00
3569-PRC	Jiangsu Highway BOT Project	AD	555,000	12 Dec 00
3642-PRC	Preparing the Western Yunnan Roads Development	PP	770,000	20 Mar 01
3776-PRC	Preparing the Nigxia Roads Development	PP	600,000	16 Nov 01
Total			21,586,000	

AD = advisory, PP = project preparatory.

Source: Asian Development Bank estimates.

B. Other Funding Sources

1. World Bank Group

Region	Project Name	Road Length (km)	Loan Amount (\$ million)		Total	Date Approved
			IBRD	IDA		
Countrywide	Highway I	226	29.6	30.0	59.6	14 May 85
Coastal	Beijing-Tianjin-Tanggu Expressway	340	25.0	125.0	150.0	12 May 87
Southwest	Sichuan Highway	88	75.0	50.0	125.0	09 Jun 88
Northcentral	Shaanxi Highway	118	50.0		50.0	09 Jun 88
Central	Highway VI (Jiangxi Provincial Highway)	340		61.0	61.0	07 Feb 89
Coastal	Shandong Provincial Highway	319	60.0	50.0	110.0	25 May 89
Coastal	Jiangsu Provincial Transport	180	100.0	53.6	153.6	06 Sep 91
Coastal	Zhejiang Provincial Highway	138	220.0		220.0	19 May 92
Coastal	Guangdong Provincial Highway	226	240.0		240.0	17 Nov 92
Central	Henan Highway	120	120.0		120.0	17 Nov 92
Coastal	Fujian Provincial Highway	88	140.0		140.0	14 Dec 93
Central	National Highway	340	380.0		380.0	07 Jun 94
West	Xinjiang Highways	280	150.0		150.0	30 Aug 94
Coastal	Shanghai-Zhejiang Highway	130	260.0		260.0	01 Aug 95
Northcentral	Second Shaanxi Provincial Highway	184	210.0		210.0	21 Mar 96
Central	Second Henan Provincial Highway	142	210.0		210.0	30 May 96
West	Second Xinjiang Highway	283	300.0		300.0	10 Oct 96
Central/Coastal	Hunan-Guangdong Highway	317	400.0		400.0	17 Dec 96
Central	National Highways III	143	250.0		250.0	29 May 98
Coastal	Guangzhou City Center Transport		200.0		200.0	29 May 98
West	Tri-Provincial Highway	228	230.0		230.0	23 Jun 98
Central	Anhui Provincial Highway	152	200.0		200.0	15 Dec 98
Central	Fourth National Highway Project	300	350.0		350.0	19-May-99
Coastal	Second Fijian Highway Project	140	200.0		200.0	24-Jun-99
Central/Coastal	Guangxi Highway Project	238	200.0		200.0	28-Mar-00
Central	Henan Highway III	100	150.0		150.0	16-May-00
West	Urumqui Urban Transport Improvement		100.0		100.0	19-Dec-00
Coastal	Shijiazhuang Urban Transport Project		100.0		100.0	27-Mar-01
Total		5,159	4,950	369.6	5,319	

IBRD = International Bank for Reconstruction and Development, IDA = International Development Agency.

2. Japan Bank for International Cooperation

Region	Project Name	Loan Amount (¥ million)
Coastal	Hainan Development Project (Highway)	12,955
Coastal	Qingdao Development Project (Highway)	8,800
Central	Second Wuhan Yangtze River Bridge Construction Project	4,760
Central	Huangshi Yangtze River Bridge Construction Project	3,700
Central	Hefei-Tongling Highway and Tongling Yangtze River Highway Bridge Construction Project	8,603
Southwest	Second Chongqing Yangtze River Bridge Construction Project	4,764
Northeast	Qiqihar Nenjiang River Highway Bridge Construction Project	2,100
Southwest	Guiyang-Xinzhai Highway Construction Project	14,968
Coastal	Hangzhou-Quzhou Expressway Construction Project	30,000
Southwest	Wangxian-Liangping Highway Construction Project	20,000
Total		90,650

ROAD SAFETY AND VEHICLE EMISSIONS

A. Road Safety

1. Traffic and Road Design Standards

1. Safety is one of the major factors that should be taken into consideration in conjunction with others such as mobility, economy, and environmental impact, in order to achieve balanced design standards.¹ The geometric design of the expressway should be chosen carefully to ensure that speed limits are chosen to suit the geometric design rather than the design speed. The signs, marking, interchange structure, and crash barriers must be selected adequately. The service/rest areas, if they are close to significant crossroads and towns, should also be used as long distance bus stops to provide convenient services for the passengers. Monitoring of overloaded vehicles will help reduce traffic accident risk, pavement damage and maintenance cost. Tunnel safety should be incorporated as an integral design component. Road safety audits will be undertaken during the design and construction.

2. Organizational Structure

2. The two organizations concerned with road safety and enforcement on the existing expressways in Sichuan are the Expressway Subdivision of the Traffic Police of the Sichuan Public Security Bureau (SPSB) and the Enforcement and Emergency Division of the Expressway Companies. Sichuan's Road Safety Council investigates all types of accidents and produces draft provincial codes and standards for accident prevention. While establishing the council is a significant step, the authority of this council needs to be enhanced to play a more proactive role in coordinating road safety across the province.

3. Interdepartmental Coordination and Action Plan

3. **Coordination.** An interdepartmental framework is needed to enhance road safety in the province. While the Sichuan Provincial Communications Department (SPCD) will concentrate on the engineering, road safety audit, blackspot, and operation issues of the expressway, involvement of the SPSB is essential. SPCD will establish a working relationship strategy with SPSB to enforce safer and better expressway operations. The strategy will seek to promote innovative ways to improve road by following a broad-based approach (i) institutional strengthening: strengthen the provincial road safety council by establishing interdepartmental executive group; develop comprehensive action programs, technical studies, and modalities for greater leadership and awareness; improve the policy and regulatory framework; and ensure effective monitoring; (ii) capacity building and human resources development: set up an effective and uniform database, upgrade skills and knowledge, and provide options for institutionalizing road safety research; (iii) provincial cooperation: develop potential common projects and activities, conduct regional workshops, foster knowledge and dissemination of best practice, strengthen the linkage with the national program, and set road safety targets and time frame; and (iv) create effective coordination approach through government and nongovernment organizations, private sector, and community groups. This will be achieved through (i) computerized accident and enforcement reporting and monitoring system, (iii) development of a strategy framework and performance indicators, (iv) staff training, and (v) strengthening the role of the province road safety council, e.g., establishing an executive management group comprising directors of SPSB, SPCD, and Municipal Commission, to identify the role of each stakeholder, coordinate the interdepartmental road safety programs, optimize the use of resources, manage road safety budget, promote road safety awareness, define

¹ ADB. 1996. *Technical Assistance to the People's Republic of China for Review of Highway Design Standards*. Manila.

performance indicators, disseminate data, and endorse yearly action plans and strategy across the province.

4. **Action Plans.** An action plan is required to promote an efficient road safety strategy in the province, and for the expressway. An integrated approach may be adopted to facilitate implementation of the action plan by involving SPCD and SPSB. Insurance companies, the private sector, and NGO groups can also be involved. This will result in (i) reduction of accidents; (ii) reduced demand for emergency and hospital services; and (iii) improved productivity. Formulation of a better fine system and other measures will generate revenues to support the program. Modification of the vehicle-testing center will also provide some funds to support the proposed program. Implementation of the program will fulfil requirements of current Asian Development Bank (ADB) and Government initiatives.²

5. A road safety specialist in safety strategy development, enforcement management, prevention measures, socioeconomic cost, and critical issues of successful road safety programs is required for 2 person-months. The specialist will (i) develop general provincial road safety guidelines covering all key issues; and (ii) develop an action plan and procedures in the project area, e.g., Liangshan and Panzhihua. Coordination between SPCD and SPSB is important to facilitate development and implementation of the action plan. The existing highway patrol team will be expanded and strengthened through capacity development efforts to provide traffic policing services for the project expressway. SPSB will implement the action plan, provide the necessary services, and assign senior officials to ensure smooth implementation and coordination with all parties.

B. Vehicle Emissions

1. Background

6. Motor vehicle emissions are a significant contributor to air pollution problem. With rapid growth in the population and vehicle ownership, and slow action by authorities, air pollution conditions will deteriorate if no mitigation measures are taken. At present Chengdu ranks among the 10 most polluted cities in the country.

7. Fragmentation of responsibility, lack of interdepartmental coordination, together with inadequate base data and monitoring system prevent the formulation of any specific targets for reducing key pollutants such as carbon monoxide, nitrogen oxides, particulate matter, and non-methane hydrocarbons. Given these conditions, SPCD and related bodies should proceed with planning a vehicle emission action plan. They should cooperatively (i) undertake a pilot motor vehicle emission inspection and maintenance program in the province, laying out the targets, the organization, and the budget with a time-bound implementation timetable; (ii) tailor the 2000 National Vehicle Emission Control Regulations to Sichuan conditions (such as the requirement for emission testing stickers to be placed in every vehicle meeting the standard); an environmental tax could be applied to any vehicles entering a tollway in the Chengdu area without a valid and compliant sticker; (iii) undertake a baseline air quality study; (iv) design a plan for the installation of liquefied petroleum gas and compressed natural gas filling sites,³ and for a faster conversion (from petrol) of buses, taxis, and government motor vehicles; (v) fund emission testing equipment to establish the SPCD testing facility, which should be replicated at various locations;⁴ (vi) legalize the requirements for new engine technologies such as fuel injection and catalytic converters; and

² ADB. 1999. *Technical Assistance to the People's Republic of China for Capacity Building in Traffic Safety, Planning and Management*. Manila.

³ There are 18 compressed natural gas fuelling stations in Chengdu and plans call for all petrol stations in Chengdu to have compressed natural gas capabilities by 2005.

⁴ One testing facility with four bays can inspect about 34,500 vehicles per year.

(vii) agree on an action plan to undertake travel demand management measures, and an integrated transport and land use planning approach; (viii) modify the vehicle testing center, or create inspection stations along the expressway to provide advice to the road users to facilitate implementation of the program and create some funds.

8. Implementing such a program will require a cooperative effort among a number of agencies, jurisdictions, and community, as well as Government commitment and leadership. The recommended approach is to implement a pilot vehicle emission testing and certification program, focusing initially on diesel trucks, 2 or 3 wheelers, buses, taxis, and all government vehicles; the program then could be assessed and adapted for areawide implementation. The pilot program could include (i) identification of vehicle type, (ii) establishment of vehicle inspection sites; (iii) construction of more compressed natural gas filling stations; (iv) public awareness campaign regarding the inspection timetable for vehicles, based on license plate numbers and widely indicate economic incentives, e.g. toll reductions for certified vehicles; (v) intensive training program and capacity building focusing on emission testing, data analysis, and reporting; (vi) an annual air quality monitoring program; (vi) media, NGO, and community involvement; and (vi) establishment of an integrated province emission council.

2. Coordination Approach and Action Plan

9. An action plan is required to promote an efficient vehicle emission reduction measures in the province and in the project area. An integrated approach may be adopted to facilitate the implementation of the action plan. Various departments such as SPCD, environment bureau, and SPSB should participate in implementation of the plan. Fuel companies, the private sector, and NGO groups can be involved. Modification of current programs of the environment bureau and optimization of resources is necessary to enhance emissions reduction in the project area. Formulation of a better fine system and other measures will generate some revenue to support the program. Modification of the vehicle-testing centers and inspection will also provide some funds to support the proposed program.

10. A vehicle emissions specialist will be provided under the consulting services, covering emissions strategy development, enforcement management, prevention measures, socioeconomic cost, and critical issues of successful emission control programs. This assistance will (i) develop general provincial vehicle emissions guidelines, covering all key issues; and (ii) develop a time-bound action plan in Liangshan and Panzhuhua.

11. Coordination between SPCD, environment bureau, and SPSB, is essential. The environmental protection bureau will take the lead in implementing the action plan, provide the necessary services, and assign senior officials to ensure smooth implementation and coordination with all parties. Fuel companies, the private sector, and NGO groups may also be involved. Implementation of the program will fulfil requirements of current ADB and Government initiatives to enhance air quality and minimize greenhouse and global effects. Development of the current vehicle testing centers to create an integrated vehicle testing system (both safety and vehicle emissions) will be a cost-effective method to support the program.

SUMMARY RESETTLEMENT PLAN

1. **Background.** The feasibility study and the detailed measurement survey for the Project and stakeholders consultation form the basis for preparing a resettlement plan (RP). The expressway component is expected to cause extensive impacts on land and buildings, while the local road component is expected to have little impact as works will be on the existing alignment. The approach adopted to satisfy the Asian Development Bank (ADB) policy on involuntary resettlement (ADB's policy) will thus be different for each component. For the expressway component, a full RP has been prepared. The RP is based on a compensation strategy following the 1998 Land Administration Law of the People's Republic of China (PRC), relevant provincial regulations, and the policy of ADB.
2. An RP will not be prepared for the local road upgrading component. However, to guarantee that unforeseen impacts are treated in accordance with ADB's policy, the same compensation framework for expressway impacts will be applied to the local roads. To effectively inform the village of this provision and document eventual impacts of any resettlement effects arising from this component, the following provisions have been established: (i) a shorter version of the RP detailing compensation policy and procedures will be made available to all villages along the targeted local roads; (ii) if impacts occur, an impact data sheet detailing quantity, area, and compensation will be sent to ADB as soon as the impact is known; and (iii) independent monitoring activities will also cover local roads.
3. **Policy Framework.** The RP outlines basic policy principles: (i) negative impacts will be minimized as much as possible, (ii) resettlement/compensation will be carried out to improve or at least restore the affected people to preproject living standards, (iii) affected people will be thoroughly informed and consulted on compensation options and the RP's design, (iv) affected assets will be compensated at replacement cost, and (v) compensation and resettlement subsidies will be provided in full prior to ground leveling and demolition.
4. The RP also stipulates generic eligibility/entitlement provisions for people losing land, houses, and income, and provides rehabilitation subsidies. Permanent land losses are dealt with through land reallocation within village domains and through cash payments at rates 6–10 times the average annual output value (AAOV) as per the 1998 Land Administration Law. Temporary land losses will be directly paid to the affected people at a rate corresponding to the AAOV. House losses will be directly paid to the affected people in cash at replacement cost free of demolition expenses and salvaged materials. Crop losses will be directly paid to the affected people in cash at rates corresponding to 1 time the AAOV. Affected people will also receive various subsidies, including a land relocation subsidy of 4–6 times the AAOV; a resettlement subsidy to be directly paid to each resettled household for transport costs, work loss, transfer costs, medical expenses, and temporary housing; and a business loss allowance based on tax declarations to be paid to each person so affected for each month of interruption of business activities.
5. The RP indicates detailed compensation provisions for each affected village. These include the definition of AAOVs, relative land compensation and resettlement subsidies multipliers, and entitlement options to be selected on the basis of village consultation among various alternatives allowed by the law.
6. **Impact Assessment.** According to the detailed measurement survey based on the detailed design alignment, the project expressway will involve permanent acquisition of 825 hectares (ha) of land, including 372 ha of irrigated farmland, 195 ha of dry farmland, 34 ha of

residential/service land, and 224 ha of others. Temporary land impacts amount to 117 ha. The Project will also require the demolition of 1,257 ha of houses and several public buildings for a total of 429,481 square meters of building floor space. Approximately 11,000 people (2,400 households) will be affected. Among these, 5,657 (1,208 households) and 383 (82 households) will be affected by house and public building losses, respectively, and will be relocated.

7. **Resettlement Planning Process.** The RP impact data and costs have a high level of reliability as they were prepared based on the detailed design alignment through a detailed measurement survey. The survey was accompanied by a review of the village compensation rates and options, a productive improvement plan for each village, and a rehabilitation plan for irrigation schemes. The results of the survey and the review was included in a resettlement plan addendum.

8. **Institutional Responsibilities.** The Sichuan Provincial Communications Department (SPCD) through the Sichuan Panxi Expressway Company Limited (SPECL) has overall responsibility for resettlement planning and design tasks. Resettlement implementation and financing responsibilities will rest on SPECL through the local governments. Prefectures and counties will be responsible for land management tasks, asset valuation, consultation, and delivery of entitlements. Field tasks such as actual payment of entitlements, replacement land selection, and provision of livelihood support will be the responsibility of townships and villages.

9. **Vulnerable Groups.** Vulnerable households, defined for the Project as the "welfare poor" will receive special assistance for house relocation/reconstruction, and will be given particular attention for postproject rehabilitation. Specific livelihood improvement strategies for their benefit are currently under study. These strategies may include provision of employment in project activities and training will be provided.

10. **Disclosure and Public Consultation.** RP preparation was based on an intensive public consultation process carried out through questionnaires and community meetings, and involving implementing agencies, local governments, and affected people. An information booklet summarizing the resettlement plan entitlements policy provisions was released to all affected people through local government offices on 6 February 2002. A summary resettlement plan and a full resettlement plan were disclosed to the public through ADB's web site on 5 March 2002 and 8 May 2002, respectively.

11. **Grievance Procedures.** Complaints and grievance procedures are established in the resettlement plan. Grievances will be first lodged with the village committee. If no agreement is reached within 2 weeks, the complainant will have 1 month to raise the case with the county land administration bureau or building demolition office. If still unresolved within 2 weeks, the case can be sent to the subproject office. Final appeal will be available in civil courts.

12. **Monitoring and Evaluation.** SPECL will establish, in collaboration with local governments, a monthly reporting system involving resettlement staff at the county and township level. External monitoring will be assigned to an independent agency. Quarterly internal monitoring reports will be sent to ADB. External monitoring reports will be submitted to ADB twice a year and will include a final evaluation report.

STAKEHOLDER PARTICIPATION AND CONSULTATIONS

Agency	Date	Participants	Number of People	Responses
Design Institute	March 1997	Farmers, local government/ agency representatives	12	<ol style="list-style-type: none"> 1. Support the Project. 2. Avoid villages and townships, whenever possible, in alignment selection to minimize resettlement. 3. Minimize, whenever possible, the acquisition of cultivated land. 4. Construct adequate crossings and interchanges to facilitate the circulation of agricultural and sideline products. 5. Farmers may provide local building materials to the project construction at a low price.
	April 1997	Farmers, local government/ agency representatives	15	<ol style="list-style-type: none"> 1. Modify county and rural roads that link to the interchanges to promote the development of the local economy. 2. Speed up the Project to make full use of the abundant cultural and historical resources in the area and promote local tourism. 3. Avoid the road section with poor geology. 4. Minimize, whenever possible, the acquisition of cultivated land and resettlement. 5. Construct adequate crossings and interchanges to facilitate the circulation of agricultural and sideline products.
	May 1997	Farmers, local government/ agency representatives	20	<ol style="list-style-type: none"> 1. Speed up the Project to make full use of the abundant cultural and historical resources in the area and promote local tourism. 2. Minimize, whenever possible, the acquisition of cultivated land and resettlement. 3. Construct adequate crossings and interchanges to facilitate the circulation of agricultural and sideline products. 4. Efforts must be made to avoid, to the extent possible, interfering with local development. 5. Minimize, whenever possible, the removal of power and communication line facilities.
	April 1998	Farmers	63	<ol style="list-style-type: none"> 1. Support the Project and agree with the proposed alignment. 2. Minimize, whenever possible, noise near school and residential areas during construction. 3. Construct adequate interchanges to allow the use of farmers.
	July-September 1998	Farmers, local residents	330	<ol style="list-style-type: none"> 1. Support the Project. The construction of the Project is beneficial to local economic development. 2. Minimize, whenever possible, the acquisition of cultivated land and resettlement. 3. The resettlement work will be done rationally. The living conditions should be improved by the Project.
Environmental Impact Assessment Team	April 1998	Farmers, workers, teachers, local government and local residents' representatives	70 attendants, 63 respondents to questionnaire	<ol style="list-style-type: none"> 1. Support the Project. 2. The Project brings benefit to the economy. 3. Agree with the proposed alignment 4. Comply with the acquisition and resettlement compensation policy. 5. Consider that the project implementation will positively affect the living conditions of the affected households. 6. Measures should be taken to mitigate the effect on the environment, such as afforestation; 93.6% of the participants agree on this point. 7. Consider that the proposed alignment is beneficial to local tourism and does not damage historical relics.

Agency	Date	Participants	Number of People	Responses
Technical assistance consultants	July 2001	Farmers, village officials	46	<ol style="list-style-type: none"> 1. Fully understand the effect of the Project on the local economy. 2. Concern about the acquisition and resettlement compensation policy. 3. Wish to be relocated within their own villages 4. Avoid damage to the existing roads and water conservancy facilities during construction.
	Oct. 2001	Farmers, village officials	32	<ol style="list-style-type: none"> 1. Understand the affect of the Project to the local economy. 2. Concern about the acquisition and resettlement compensation policy. 3. Wish to be relocated within their own villages 4. Avoid damage to the existing roads and water conservancy facilities during construction. 5. Express concern about the resettlement subsidy distribution process.
	30 Nov.-8 Dec. 2001	Farmers, local residents, women representatives, part of officials from all the villages	More than 200	<ol style="list-style-type: none"> 1. Express concern about the alignment, and proposed schedule for the Project. 2. Express concern about the acquisition and resettlement compensation policy. 3. Discuss again the project importance and compensation means. Consider that the Project is significant to local poverty reduction and the economy. 4. Discuss the compensation means preferred and their attitude to land adjustment. 5. Determine the average annual output value (AAOVs) of recent 3 years. 6. Agree that the Project has great potential for improving the livelihood and well-being of women. Also, the Project has positive effects on improving women's health and employment opportunities.
	3-7 Dec 2001	County & village officials, farmers, affected enterprise representatives	38	<ol style="list-style-type: none"> 1. Discuss compensation means and recovery measures. 2. Agreed compensation amount. 3. Agreed recovery strategy including the choice of a resettlement location.
	Dec 2001 Jan. 2002	Officials from county land administration bureau	25	<ol style="list-style-type: none"> 1. Agree with the AAOVs determined above. 2. The AAOVs will be maintained after project completion.

COST ESTIMATES AND FINANCING PLAN

(\$ million)

Item	Foreign Exchange	Local Currency	Total Cost	ADB Financing
A. Base Cost^a				
1. Expressway Civil Works	317.2	343.6	660.8	225.4
2. Buildings and Ancillary Facilities	29.8	29.7	59.5	0.0
3. Equipment	15.0	1.0	16.0	15.0
4. Land Acquisition and Resettlement	0.0	65.3	65.3	0.0
5. Consulting and Training Services	2.3	11.0	13.3	2.3
6. Local Roads	4.7	18.8	23.5	0.0
Subtotal (A)	369.0	469.4	838.4	242.7
B. Contingencies				
1. Physical Contingencies ^b	18.5	23.4	41.9	15.0
2. Price Contingencies ^c	34.2	28.2	62.4	0.0
Subtotal (B)	52.7	51.6	104.3	15.0
C. Front-End Fee	3.0	0.0	3.0	3.0
D. Interest and Commitment Charges During Construction	39.3	34.0	73.3	39.3
Total	464.0	555.0	1,019.0	300.0

^a At 2002 prices.

^b At 5% of base cost.

^c At 2.4% per annum for the foreign exchange cost. For the local currency cost, the following rates were used: 2% in 2003, 3% in 2004, and 4% in 2004 onward.

Source: Asian Development Bank estimates.

IMPLEMENTATION SCHEDULE

Item	2001			2002							2003							2004							2005							2006							2007																
	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D			
A. Loan Processing																																																							
1.				x																																																			
2.						x																																																	
3.						x																																																	
4.																x																																							
5.																																																							
B. Land Acquisition and Resettlement																																																							
C. Civil Works																																																							
1.																																																							
a.																																																							
b.																																																							
c.																																																							
d.																																																							
2.																																																							
a.																																																							
b.																																																							
c.																																																							
3.																																																							
a.																																																							
b.																																																							
c.																																																							
D. Equipment																																																							
1.																																																							
2.																																																							
3.																																																							
E. Consulting Services and Training																																																							
1.																																																							
2.																																																							
3.																																																							
4.																																																							

CONTRACT PACKAGES

Description	Mode of Procurement	Number of Contracts	Total Value (\$ million)
A. Civil Works			
1. Expressway Earthworks, Pavement, Bridges, and Tunnels	ICB	19	660.8
2. Buildings and Ancillary Facilities ^a	LCB	16	59.5
3. Local Roads ^a	LCB/FA	Various	23.5
B. Equipment and Supply Contracts	ICB	4	14.5
	IS	4	1.5

FA = force account, ICB = international competitive bidding, IS = international shopping, and LCB = local competitive bidding.

^a These packages will be financed by the Government.

Source: Asian Development Bank estimates.