ASIAN DEVELOPMENT BANK

PCR: PRC 32526

PROJECT COMPLETION REPORT

ON THE

CHANGCHUN-HARBIN EXPRESSWAY PROJECT
(CHANGYU EXPRESSWAY)
(Loan 1642-PRC)

IN THE

PEOPLE'S REPUBLIC OF CHINA

October 2004

CURRENCY EQUIVALENTS

Currency Unit – yuan (CNY)

		At Appraisal (3 August 1998)	At Project Completion (27 August 2004)
CNY1.00	=	$0.1208	$0.1208
$1.00	=	CNY8.28	CNY8.28

ABBREVIATIONS

AADT	–	average annual daily traffic
AAOV	–	average annual output value
BOT	–	build-operate-transfer
CEAD	–	Changyu Expressway Administration Division
EA	–	Executing Agency
EIRR	–	economic internal rate of return
FIRR	–	financial internal rate of return
ICB	–	international competitive bidding
JLAB	–	Jilin Land Administration Bureau
JPCD	–	Jilin Provincial Communications Department
JPEC	–	Jilin Provincial Expressway Corporation
JPG	–	Jilin provincial government
JPSB	–	Jilin Public Security Bureau
LARP	–	Land Acquisition and Resettlement Plan
LCB	–	local competitive bidding
MOC	–	Ministry of Communications
NPV	–	net present value
NH	–	national highway
O&M	–	operation and maintenance
PCR	–	project completion report
PPAR	–	project performance audit report
PPTA	–	project preparatory technical assistance
PRC	–	People's Republic of China
TA	–	technical assistance
VOC	–	vehicle operating cost
WACC	–	weighted average cost of capital

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
m	–	meter

NOTE

In this report, "$" refers to US dollars.

CONTENTS

BASIC DATA

A. Loan Identification

1.	Country	People's Republic of China
2.	Loan Number	1642-PRC
3.	Project Title	Changchun-Harbin Expressway Project (Changyu Expressway)
4.	Borrower	People's Republic of China
5.	Executing Agency	Jilin Provincial Expressway Corporation
6.	Amount of Loan	$220 million
7.	Project Completion Report Number	PCR: PRC 856

B. Loan Data

1.	Appraisal	
	– Date Started	20 Jul 1998
	– Date Completed	3 Aug 1998
2.	Loan Negotiations	
	– Date Started	13 Oct 1998
	– Date Completed	15 Oct 1998
3.	Date of Board Approval	27 Nov 1998
4.	Date of Loan Agreement	14 Jan 1999
5.	Date of Loan Effectiveness	
	– In Loan Agreement	13 Apr 1999
	– Actual	16 Aug 1999
	– Number of Extensions	2
6.	Closing Date	
	– In Loan Agreement	31 Dec 2002
	– Actual	5 Mar 2003
	– Number of Extensions	None
7.	Terms of Loan	
	– Interest Rate	Pool-based variable lending rate
	– Maturity (number of years)	24
	– Grace Period (number of years)	4
8.	Terms of Relending (if any)	
	– Interest Rate	Pool-based variable lending rate
	– Maturity (number of years)	24
	– Grace Period (number of years)	4
	– Second-Step Borrowers	Jilin Province and Jilin Provincial Expressway Corporation

9. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
15 Nov 1999	5 Mar 2003	40 months
Effective Date	**Original Closing Date**	**Time Interval**
16 Aug 1999	31 Dec 2002	40 months

b. Amount

Category or Subloan	Original Allocation	Last Revised Allocation	Amount Canceled	Net Amount Available	Amount Disbursed	Undisbursed Balance
Civil Works	154,900,000	83,000,000	(71,900,000)	83,000,000	78,339,497	4,660,503
Equipment and Materials	14,000,000	14,000,000	0	14,000,000	4,022,913	9,977,087
Consulting Services and Training	800,000	900,000	100,000	900,000	901,942	(1,942)
IDC	27,300,000	15,800,000	(11,500,000)	15,800,000	7,905,556	7,894,444
Unallocated	23,000,000	13,300,000	(9,700,000)	13,300,000	0	13,300,000
Total	**220,000,000**	**127,000,000**	**(93,000,000)**	**127,000,000**	**91,169,907**	**35,830,093**

IDC = interest during construction.
Note: A total of $93.0 million was canceled on 31 May 2000. A further amount of $35.8 million was cancelled on 5 March 2003 when the loan was closed.

10. Local Costs (Financed by ADB Loan)
- Amount ($) 0
- Percent of Local Costs 0
- Percent of Total Cost 0

C. Project Data

1. Project Cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign Exchange Cost	230.0	184.5
Local Currency Cost	310.4	285.5
Total	**540.4**	**470.0**

2. Financing Plan ($ million)

Cost	Appraisal Estimate	Actual
Implementation Costs		
Borrower Financed	298.4	324.6
ADB Financed	192.7	83.3
Other External Financing	0.0	0.0
Subtotal	**491.10**	**407.9**
IDC Costs		
Borrower Financed	22.0	54.2
ADB Financed	27.3	7.9
Other External Financing	0.0	0.0
Subtotal	**49.3**	**62.1**
Total	**540.4**	**470.0**

ADB = Asian Development Bank, IDC = interest during construction.

3. Cost Breakdown by Project Component ($ million)

Component	Appraisal Estimate	Actual
A. Base Cost		
1. Civil Works	348.3	363.0
2. Equipment	14.0	5.3
3. Land Acquisition and Resettlement	49.8	19.4
4. Consulting Services and Training	20.4	20.1
Total Base Cost (A)	**432.5**	**407.8**
B. Contingencies		
1. Physical	34.6	0.0
2. Price	24.0	0.0
Subtotal (B)	**58.6**	**0.0**
C. Interest During Construction and other Charges	49.3	62.2
Total	**540.4**	**470.0**

4. Project Schedule

Item	Appraisal Estimate	Actual
Date of Consultants' Contracts:		
International	Mar 1999	17 Aug 1999
Domestic	Oct 1998	25 Apr 1999
Completion of Detailed Designs	Oct 1998	Oct 1998
Date of Civil Works Contracts:		
Expressway	Apr 1999	Dec 1999 and Apr 2000
Traffic Management-Road Safety Facilities	Apr 1999	Oct and Dec 2001
Date of Equipment Contracts:		
Expressway Maintenance	Apr 1999	30 Nov 2001
Tolling, Monitoring, and Communications System	Dec 2001	26 Jul 2002

5. Project Performance Report Ratings

Implementation Period	Ratings	
	Development Objectives	Implementation Progress
From 31 Oct 2002 to 31 Dec 2003	S	HS
From 30 Jun 2001 to 30 Sep 2002	S	S
From 31 Jan 2001 to 13 Jun 2001	S	HS
From 31 Oct 1999 to 31 Dec 2000	S	S
From 31 Aug 1999 to 30 Sep 1999	S	U
From 31 Dec 1998 to 31 Jul 1999	S	S

HS = highly successful, S = successful, U = unsuccessful.

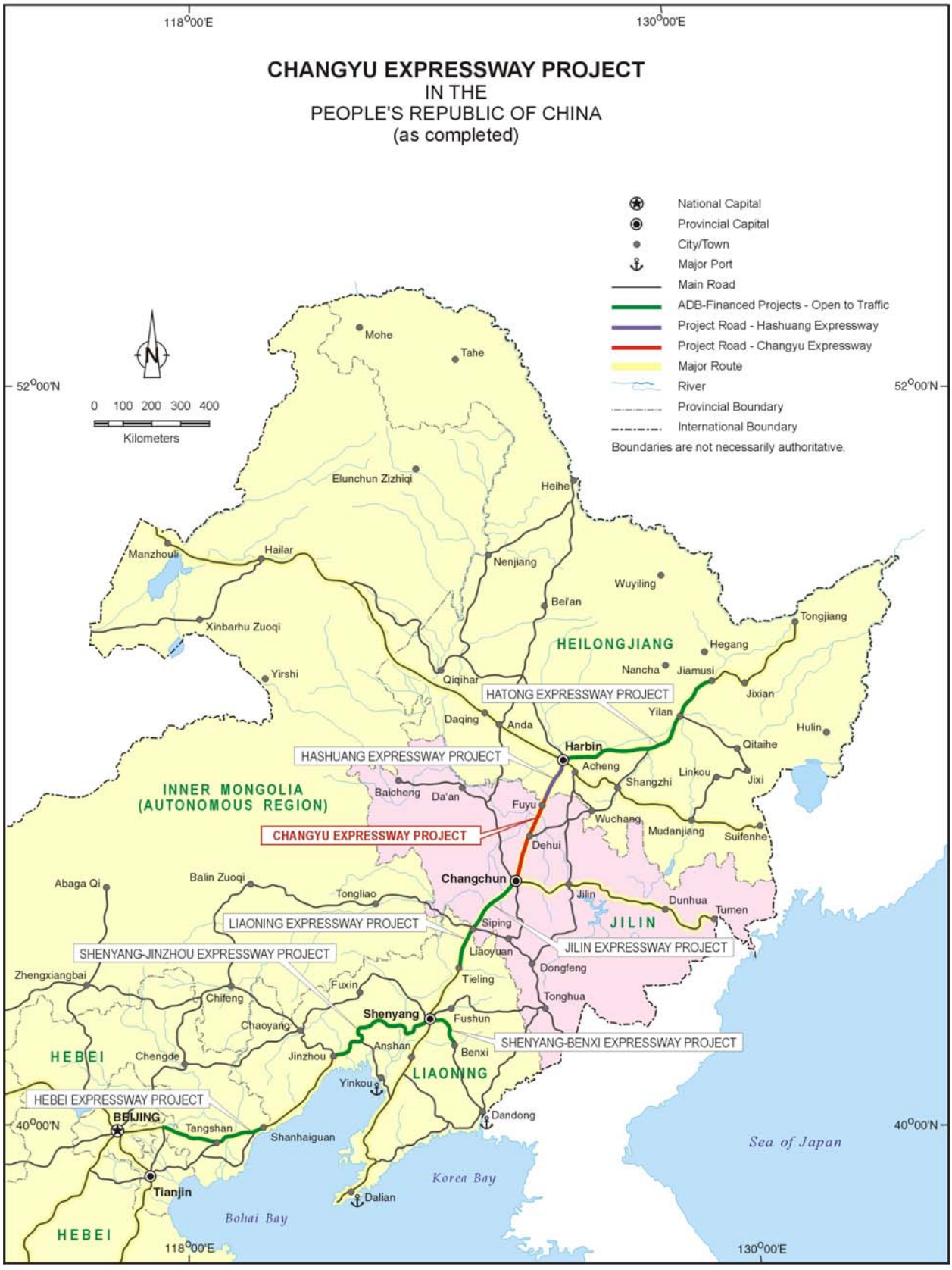
D. Data on Asian Development Bank Missions

Name of Mission[a]	Date	No. of Persons	No. of Person-Days	Specialization of Members[b]
Fact-Finding[a]	13–29 Apr 1998	5	85	a, b, d, g, h
Appraisal[a]	20 Jul–3 Aug 1998	5	75	a, b, c, d, g
Special Loan Administration[a]	23–27 Aug 1999	1	5	a
Review 1	23–27 May 2000	1	5	a
Midterm Review	3–7 Jun 2001	2	10	b, i
Review 2	16–21 Sep 2002	1	6	a
Project Completion Review[c]	22–27 Aug 2004	4	40	a, b, d, i

[a] Fielded concurrently with Loan 1641-PRC: Changchun-Harbin Expressway Project (Hashuang Expressway).

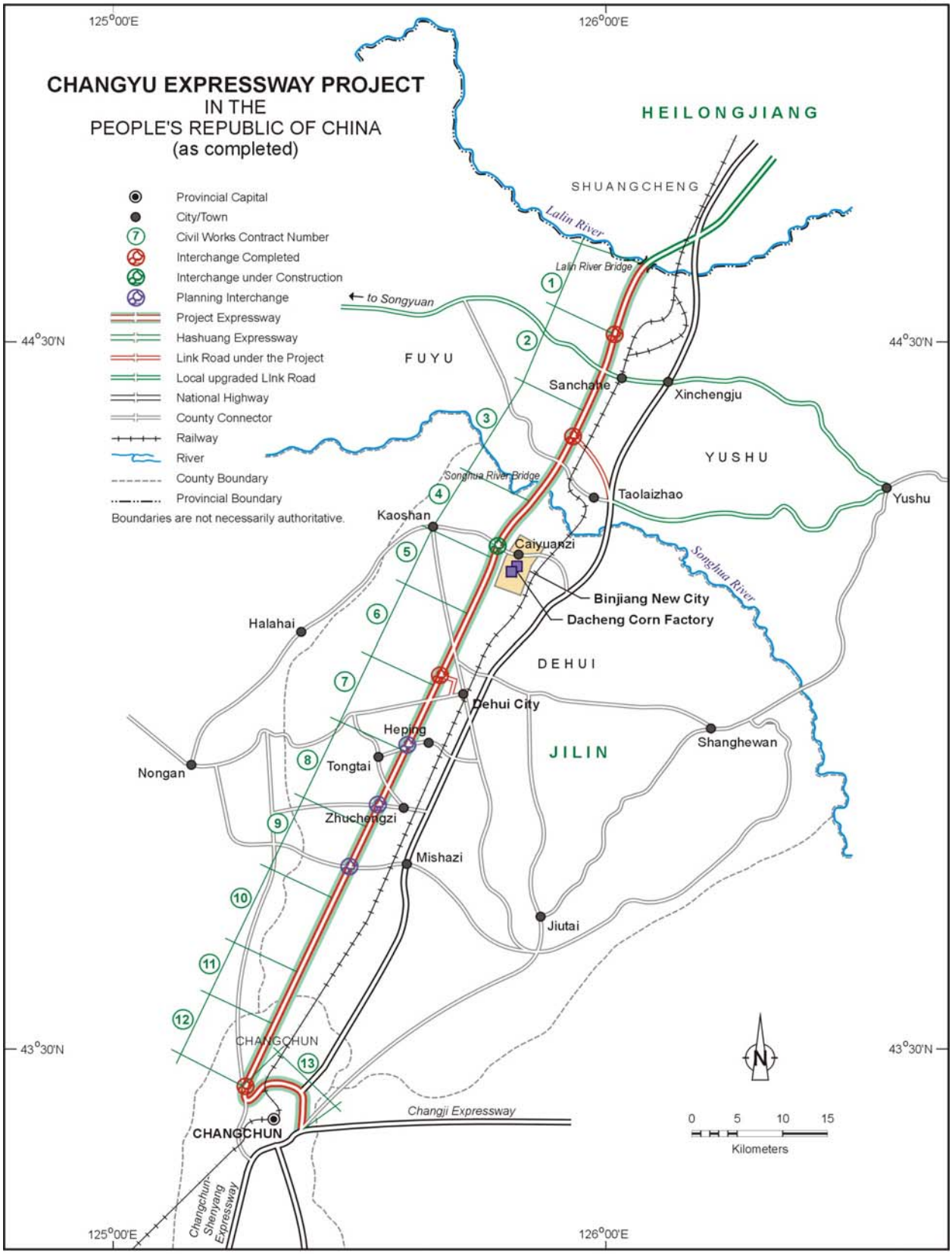
[b] a = engineer, b = financial analyst, c = counsel, d = economist, e = procurement consultant or specialist, f = control officer, g = programs officer, h = environment specialist, i = project analyst.

[c] The project completion report was prepared by Xiaohong Yang, financial specialist/mission leader and Teresita S. Capati, assistant project analyst; assisted by a civil engineer (staff consultant), and a transport economist (staff consultant). Scott Ferguson, resettlement specialist, and Wenlong Zhu, project officer (resettlement) provided desk reviews of the project completion report.


CHANGYU EXPRESSWAY PROJECT
IN THE
PEOPLE'S REPUBLIC OF CHINA
(as completed)
National Capital
Provincial Capital
City/Town
Major Port
Main Road
ADB-Financed Projects - Open to Traffic
Project Road - Hashuang Expressway
Project Road - Changyu Expressway
Major Route
River
Provincial Boundary
International Boundary
Boundaries are not necessarily authoritative.
0 100 200 300 400
Kilometers
118°00'E
130°00'E
52°00'N
40°00'N
Mohe
Tahe
Elunchun Zizhiqi
Heihe
Manzhouli
Hailar
Nenjiang
Wuyiling
Bei'an
Xinbarhu Zuoqi
Tongjiang
HEILONGJIANG
Hegang
Yirshi
Nancha
Jiamusi
Qiqihar
Jixian
HATONG EXPRESSWAY PROJECT
Yilan
Daqing
Anda
Hulin
Harbin
Qitaihe
HASHUANG EXPRESSWAY PROJECT
Acheng
Linkou
Shangzhi
Jixi
INNER MONGOLIA
(AUTONOMOUS REGION)
Baicheng
Da'an
Fuyu
Wuchang
Mudanjiang
Suifenhe
CHANGYU EXPRESSWAY PROJECT
Dehui
Abaga Qi
Balin Zuoqi
Changchun
Tongliao
Jilin
Dunhua
Tumen
LIAONING EXPRESSWAY PROJECT
Siping
JILIN
JILIN EXPRESSWAY PROJECT
SHENYANG-JINZHOU EXPRESSWAY PROJECT
Liaoyuan
Dongfeng
Zhengxiangbai
Fuxin
Tieling
Tonghua
Chifeng
Shenyang
Fushun
Chaoyang
SHENYANG-BENXI EXPRESSWAY PROJECT
HEBEI
Chengde
Jinzhou
Anshan
Benxi
LIAONING
Yinkou
HEBEI EXPRESSWAY PROJECT
BEIJING
Dandong
Tangshan
Shanhaiguan
Sea of Japan
Korea Bay
Tianjin
Dalian
Bohai Bay
HEBEI

04-3238a HR

Map 2



04-3238b HR

I. PROJECT DESCRIPTION

1. The dynamic growth of the economy of the People's Republic of China (PRC) has led to a rapid increase in the demand for transport services. Despite the Government's efforts to increase the country's transport capacity, there are constraints and bottlenecks in all transport modes. Construction of the National Trunk Highway System and removal of the infrastructure bottlenecks have been a cornerstone of the Government's development strategy since 1988. A series of Asian Development Bank (ADB)-financed road projects, approved from 1991, aimed to alleviate constraints in the transport system by supporting construction of the National Trunk Highway System, institutional development, and resolution of key technical and policy issues in the road sector.

2. The Changchun-Harbin Expressway Project,[1] comprising the Jilin component (Changyu Expressway, the subject of this report) and the Heilongjiang component (Hashuang Expressway)[2] was appraised in 1998. It was one of six ADB loans for expressway sections in the northeastern corridor from Beijing through Hebei, Liaoning, Jilin, and Heilongjiang provinces. The Project connects the Changchun-Siping (Changping) Expressway[3] in Jilin province and the Harbin-Jiamusi (Hatong) Expressway [4] in Heilongjiang province (Map 1). Jilin province is landlocked and forms part of the northeastern hinterland of the PRC. At the time of appraisal, the province had lower levels of income, international trade, and foreign direct investment than the coastal areas. The provincial road network had limited coverage and was in poor condition.

3. The main objective of the Changyu Expressway Project was to promote economic and social development in the northeast of the PRC by completing a key section of transport infrastructure. The Project was designed to (i) improve access from parts of Jilin province to the more developed provinces of the east and south, (ii) provide additional transport capacity and reduce transport costs in the project area to enhance business and trade opportunities and attract investment, (iii) alleviate congestion and reduce accidents on existing roads, (iv) improve access for trade between the PRC and the Russian Federation and Mongolia, (v) enhance road safety standards on the Project and related facilities, and (vi) support the corporatization of expressway construction and operations. The Project was classified as an economic growth project. Poverty reduction, though implied, was not listed as a secondary objective. The output and input of Changyu Expressway project framework is presented in Appendix 1.[5]

4. The Changyu Expressway Project was completed and opened to traffic on 18 September 2002, on time vis-à-vis the appraisal schedule. Land acquisition and resettlement were completed satisfactorily in June 1999. The loan was closed on 5 March 2003. Appendix 2 provides a chronology of major events.

---

[1] A single report and recommendation of the President (RRP) was prepared for the Changchun-Harbin Expressway Project, covering two loans (Loan 1641-PRC: Hashuang Expressway Project and Loan 1642-PRC: Changyu Expressway Project). ADB. 1998. *Report and Recommendation of the President to the Board of Directors on Proposed Loans to the People's Republic of China for the Changchun-Harbin Expressway Project.* Manila.

[2] See ADB. 2004. *Project Completion Report on the Changchun-Harbin Expressway Project (Hashuang Expressway) (Loan 1641-PRC) in the People's Republic of China*. Manila.

[3] ADB. 1993. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for Jilin Expressway Project*. Manila.

[4] ADB. 1994. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the* People's Republic of China for Heilongjiang Expressway Project. Manila.

[5] This was one of the early projects when the Project Framework was not so clear on the baseline indicators and target values on the Purpose level which constrained evaluation.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

5. The ADB country assistance strategy for the road sector of the PRC at appraisal supported: (i) construction of the expressways and highways connecting major growth centers and promoting linkages with hinterland economies; (ii) institutional strengthening to increase the commercial orientation and managerial efficiency of expressway organizations; (iii) improvement of highway planning, evaluation techniques, and safety standards; (iv) adoption of appropriate pricing policies to ensure optimum utilization of road transport capacity; (v) utilization of alternative methods of investment financing, including private sector participation to meet the huge financing requirements of the highway development program; (vi) promotion of road traffic safety; and (vii) integration of the network so that the National Trunk Highway System is supported by a system of feeder roads that provides access for the local population to the main economic centers. The Changchun-Harbin Expressway Project was highly relevant to ADB's country assistance strategy and its thematic and sector priorities, and consistent with the Government's plans and priorities for development of the main road transport corridor in northeastern PRC. The Project was designed to connect two large growth centers in the northeast transport corridor,[6] increase the commercial orientation of expressway operations, and promote an integrated approach to road safety.

6. The Changchun-Harbin Expressway Project was formulated under project preparatory technical assistance (PPTA),[7] which refined the domestic feasibility studies for the Project, reviewed the preliminary design, prepared an environmental impact assessment and a social impact assessment, and reviewed the land acquisition and resettlement plan for the Project. The PPTA was completed satisfactorily. Policy dialogue during appraisal covered adopting new highway design standards, developing plans to improve road safety, adopting build-operate-transfer (BOT) and other forms of nongovernment funding, improving institutional governance by taking significant steps in corporatization of expressway operations, and commercializing expressway operations. These elements were reflected in the project design and were closely monitored during implementation. The scope of the Project was well defined. The original project objectives and overall design remained unchanged during implementation.

B. Project Outputs

1. Changyu Expressway Construction, Design, and Maintenance

7. At appraisal, it was envisaged that about 161 kilometers (km) of four-lane, controlled-access toll expressway would be constructed under the Changyu Expressway Project from the provincial capital of Changchun to the Lalinhe river; two Changchun ring road sections; eight interchanges; three service areas; and link roads. The actual completed length of expressway was 159.8 km, including the two Changchun ring road sections.[8] Four interchanges were constructed and four were deferred, to be constructed at a later stage as traffic grows.[9] It was a reasonable decision to postpone construction of the four interchanges. The domestic feasibility study and PPTA consultant should have more carefully examined the need for the interchanges

[6] Changchun, the capital of Jilin Province, and Harbin, the capital of Heilongjiang province.
[7] ADB. 1997. *Technical Assistance to the People's Republic of China for Changchun-Harbin Expressway Project*. Manila.
[8] The two Changchun ring road sections (16 km) were constructed as an integral part of the project road.
[9] One of the four postponed interchanges connecting Binjiang new city is now under construction, and will be open to traffic by the end of 2004 (Map 2).

during project preparation. The contract packaging during implementation followed that envisaged at appraisal. However, more contracts were financed from the Borrower's own resources than expected at appraisal. The technical standards of the project facilities and the main work quantities are provided in Appendix 3.

8. Prior to 1998, highway design standards used in the PRC were inadequate for the changing vehicle mix and road conditions. In June 1998, new design standards[10] were adopted. These standards were used for the design of the project expressway. The ADB-supported new design standards were appropriate and beneficial in many aspects, particularly on environmental protection, road safety, and integrated development of highways. In accordance with the Loan Agreement and with the assistance of international consultants, trial pavement sections were built in an effort to reduce pavement cracking.[11] The final pavement structure was designed and laid out on the basis of those trial sections. Numerous cracks had occurred in Hatong Expressway. The Ministry of Communications (MOC); Jilin Provincial Expressway Corporation (JPEC), the Executing Agency (EA); and ADB learned from this experience. Technical steps taken included better design of the subbase, and use of advanced paving machines, asphalt mix especially designed for cold weather, and road construction contract packages based on vertical slicing to ensure clear accountability for contractors. To reduce the shrinkage of the pavement layers, an SBS modifier was used in the asphalt concrete, which proved to be quite effective. The improved pavement design has reduced the cracking, but not eliminated it, mainly because of the harsh winter weather conditions and severe temperature differences between summer and winter. To ensure adequate maintenance of the pavement, cracks are being effectively sealed using two crack-sealing machines procured under the Project.

9. The expressway is of very good quality with surface roughness within the international roughness index (IRI for the expressway is 0.71) for a comfortable ride. Safety facilities and equipment were included in the Project, including a continuous median barrier with landscaping or antiglare shields, reflective regulation and information signs to encourage safe driving, a hard shoulder, and overpasses and underpasses for pedestrians and farm traffic. The expressway and its drainage system are well maintained. The slopes are protected by a combination of reinforced concrete retaining walls, open lattice blocks, netting, concrete spreads, anchorage, and grass turfing. Planting and measures for environmental protection are integrated with the natural terrain.

2. Equipment

10. The Project provided for the procurement of equipment for toll collection, traffic management and safety, communications, highway maintenance, weighing vehicle axle loads,[12] testing, and office activities. The traffic management and safety facilities included guardrails, antiglare screens, median barrier, traffic signs, and road markings. The maintenance equipment included survey and testing equipment, rollers, milling machines, crack sealing machines, loaders, and a crane. The traffic control system is operational in all toll stations. The telecommunications and surveillance systems monitor and provide information on traffic conditions, vehicle speeds, and input to changeable speed-limit signs and message boards. The

[10] ADB assisted in the development of the new design standards. ADB. 1996. *Technical Assistance to the People's Republic of China for Review of Highway Design Standards.* Manila.

[11] Pavement cracking was a problem with the first ADB-financed road project in Heilongjiang, the Heilongjiang Expressway Project (refer to the PCR and PPAR). The EA took special measures to improve the design and to use special asphalt designed for extreme temperatures to ensure that similar problems did not occur in this Project.

[12] The weigh-in-motion units were procured with the EA's own resources after completion of the Project.

actual amount of equipment procured under the loan was less than envisaged at appraisal ($5.3 million vs $14 million) due to JPEC's decision not to procure some items;[13] actual costs were much lower than estimated. JPEC decided to defer the installment of the emergency telephone system, which at appraisal was expected to cost about $1.3 million. This decision was based on the EA's opinion that with the widespread availability and use of cellular telephones, and the increased frequency of patrolling and accident-response measures, the planned emergency phone system would be redundant. The Project Completion Review Mission advised the EA that it was not a good decision. While the EA is now committed to installing it later, ADB should have followed up more closely on this issue during project implementation. All equipment procured is functioning well and is being used for its intended purpose.

3. Access Roads

11. One project loan covenant[14] required Jilin provincial government (JPG) and Jilin Provincial Expressway Corporation (JPEC) to connect the project expressway to the adjacent road network[15] through the construction of appropriate link roads and interchanges. This was to ensure that the economic and social benefits of the Project were spread widely in the project-influenced area. At appraisal,[16] specific local roads were not identified, however, during project implementation, access roads were upgraded in that area (Map 2). In addition to the 16 km of the Changchun ring road constructed, the rest of the ring road was completed in 1996 as an integral part of the Changchun-Siping Expressway Project. JPG undertook a program to develop link and feeder roads to the project expressway and other expressways within the province, including: (i) a 5 km Class II link road linking national highway (NH) 102 to Dehui interchange was built; (ii) a 104 km Class III county road to link Shongyuan to the Shanchahe interchange was upgraded to Class II in 1999; (iii) a 50 km Class I road linking Yushu county to Taolaizhao interchange is being constructed and will be completed by the end of 2004; and (iv) the construction of Shanchahe-Yushu county road (60 km) is ongoing, with expected completion in 2005.

12. Jilin Province has financed a steady program of investment to improve and upgrade the entire road network, which directly and indirectly provides access to the project expressway. The following table shows the lengths of road developed for various classes during 1998–2003.

Table: Jilin Provincial Road Development, 1998–2003
(kilometers)

Year	Expressway	Class I	Class II	Class III	Class IV	<Class IV	Total
1998	312	199	2,625	8,967	20,030	1,679	33,812
2002	542	1,120	4,918	11,279	20,548	2,687	41,094
2003	542	1,258	5,625	12,024	21,913	2,417	43,779

Source: Jilin Provincial Communications Department.

[13] Maintenance equipment purchased under the Changchun-Siping expressway projects and other expressways was considered by the EA to be adequate for current and projected maintenance requirements.
[14] See loan covenant number 18 in Appendix 9.
[15] ADB helped develop the planning for the Jilin province highway network. ADB. 1992. *Technical Assistance to the People's Republic of China for the Jilin Province Highway Network Study.* Manila.
[16] See RRP of Changchun-Harbin Expressway Project.

4. Institutional Capacity Building

13. JPEC is responsible for operating Changyu Expressway as well as the Changping, Changji, Changying, and Yanji to Tumen expressways, a total length of about 500 km. Following completion of the Changyu Expressway Project, primary management of the expressway was turned over to the Changyu Expressway Administration Division (CEAD) under JPEC. CEAD is responsible for toll collection and operation and maintenance (O&M) of the expressway. While the operations are considered adequate, more attention is needed to upgrade and modernize toll collection methods and to establish a computerized database of statistical information of the vehicle types passing the toll stations.

14. The training conducted during project implementation (para. 17) provided staff with modern management knowledge of design, construction, environment, and O&M for highways. Most of the staff trained by Changping project have been retained, which contributed to the smooth implementation of the Changyu Project. There are also ongoing training programs on road safety and new MOC highway technical standards.

15. An ADB-financed TA[17] set out a framework for moving toward corporatization, leasing, and securitization in the road sector. JPEC has sought to attract nongovernment funding.[18] Three service areas were built under BOT, attracting a total investment of CNY27 million from the private sector. Some maintenance activities such as snow removal were outsourced through competitive bidding in 2003. With current traffic levels and current toll levels, the financial performance appears to be somewhat low to attract private investment to the expressway at this time. JPEC indicated to the Project Completion Review Mission that they will continue to investigate sources of nongovernment financing.

5. Consulting Services and Training

16. As set out at appraisal, international consultants were engaged to provide advisory services related to road safety, review of pavement design and construction methods, human resource development and training, implementation of a contract management system, and establishment of a monitoring and evaluation system. Detailed design, financed by JPG, was undertaken by the Jilin Provincial Highway and Design Institute and completed in advance of tendering. Domestic consultants were engaged for construction supervision and for quality control for all 13 civil works packages.

17. The international consultants conducted a total of 26 person-months of overseas training for JPEC staff. The training subjects focused on pavement design, road safety, long-span bridge construction and maintenance, environmental protection, and expressway operation and management. JPEC also organized domestic training workshops by the staff trained overseas covering the same topics during project implementation. The consultants also set up a detailed training system and schedule for domestic training. This resulted in the training of about 300 staff, including some employees of the civil works contractors.

[17] ADB. 1997. *Technical Assistance to the People's Republic of China for Corporatization, Securitization, and Leasing in the PRC Road Sector*. Manila.

[18] ADB. 1993*. Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for Hunan and Jilin Expressway Projects*. Manila. The Jilin expressway's future toll revenue was securitized through an initial public offering in January 1999.

C. Project Costs

18. The actual project cost was $470 million compared with $540.4 million estimated at appraisal. The actual cost of civil works amounted to $363 million compared with the appraisal estimate of $348.3 million. The increase in civil works cost was due to contract variations and additional quantities. The actual cost of equipment was $5.3 million compared with $14.0 million estimated at appraisal. Less equipment was procured (para. 10) and prices were lower than estimated at appraisal. The actual cost of consulting services and training was $20.1 million, which is about the same as the appraisal estimate of $20.4 million. A detailed comparison of the appraisal estimates and actual costs is found in Appendix 4.

19. The financing plan envisaged at appraisal included $220 million from ADB (40.7% of the total project cost) to finance about 95.6% of the foreign exchange costs. The remaining 4.4% of the foreign exchange costs was to be financed by JPCD/JPG. The entire local currency requirement of $310.4 million was to be covered by JPCD/JPG ($91.5 million), grants from MOC ($96.4 million), and domestic bank loans ($132.5 million). The actual utilization of the ADB loan was $91.2 million, accounting for 19.4% of the total project cost and 49.4% of the foreign exchange costs. The remaining foreign exchange costs of $93.3 million was financed by loans from domestic banks. The actual local currency cost of $285.5 million equivalent was financed by: (i) grants from MOC for $128.6 million, (ii) grants from JPG for $86.8 million, and (iii) loans from domestic banks for $70.1 million. The underutilization of the ADB loan was because less equipment procured than expected at appraisal, ADB declining to finance six civil works contracts because of procurement issues (paras 29–30), less interest during construction than was estimated at appraisal because of cancellation of loan proceeds, and an overestimation of contingencies. A detailed comparison of the appraised and actual financing is presented in Appendix 4.

D. Disbursements

20. The ADB loan proceeds were re-lent by the Borrower (the PRC Government) to the JPG on the same terms and conditions as the ADB loan. JPG then onlent the loan proceeds to JPEC through an onlending loan agreement on the same terms and conditions as the ADB loan. The revised loan amount was $127 million because $93 million of the loan was canceled on 31 May 2000 (para. 30). Of the $127 million in loan proceeds, $91.2 million was disbursed during 1999–2003 and $35.8 million was canceled on 5 March 2003 when the loan was closed. In October 2003, the EA substituted a cheaper domestic loan for the expensive ADB pool-based loan and prepaid the principal and interest of the ADB loan. Appendix 5 compares projected and actual disbursements. Disbursements generally were made through reimbursement and direct payment procedures.

E. Project Schedule

21. The loan was approved on 27 November 1998 and became effective on 16 August 1999. Civil works construction was originally scheduled to start in May 1999. Work on three civil works contracts commenced in April 1999 and work on the other 10 civil works contracts commenced in April 2000. All expressway civil works were substantially completed by July 2002, ahead the originally anticipated schedule by 2 months. Appendix 6 provides a comparison of the implementation schedule prepared at appraisal and the actual work program.

22. Because weather conditions in the northeastern PRC preclude year-round construction activities, on 19 June 1998 ADB approved advance procurement action for the recruitment of

consultants, prequalification of civil works contractors, and civil works tendering. The advance action for prequalification proceeded smoothly with the EA's recommendation approved by ADB in February 1999. However, ADB did not approve the EA's initial evaluation and recommendations for award of the first six civil works contracts. The lengthy discussions between ADB and the EA led to a delay of about 6 months in the start of some civil works packages (paras. 29–30). To make up the lost time, night shifts were adopted for some activities, such as the extra long bridge over the Songhuajiang river, and the contractors were instructed to stockpile paving materials during the winter months so that pavement works could be accelerated during the summer months.

F. Implementation Arrangements

23. The EA for the Project was JPEC (see Appendix 7 for the organization chart). A project implementation unit was established under the construction management office of JPEC and the general manager of JPEC was assigned as project director and was responsible for approval of contracts and payments. A project manager was designated and made responsible for the day-to-day implementation of the Project. For Section C of the Changchun City Ring Road, western section (5.4 km), the Changchun City Transport Bureau acted as the construction office under JPEC project management. Surveys and detailed design were completed prior to tendering by the Jilin Provincial Highway Survey and Design Institute. Domestic consultants were engaged under the project implementation unit to carry out the day-to-day supervision and quality control of the construction activities. The implementation arrangements, generally in accordance with those envisaged at appraisal, proved to be satisfactory and resulted in overall smooth implementation.

24. As envisaged at appraisal, the expressway traffic police, a division of Jilin Public Security Bureau and assigned to all expressways in Jilin province, is responsible for policing the expressways as an integral part of overall expressway management operations. The Project Completion Review Mission found that the expressway police are well equipped with radio communications, high-speed patrol cars, hand-held and vehicle-mounted speed detectors, and other appropriate equipment. The arrangement has proved effective and is appropriate.

25. The Land Acquisition and Resettlement Plan (LARP) implemented under the coordination of the Land Acquisition and Resettlement Committee was completed at a cost of $19.4 million. The land acquisition and resettlement of affected households were completed in September 1998 and June 1999, respectively, well ahead of major construction works. Only 468 people (about 100 households) were relocated. A total of 1,416.9 hectares of land was acquired, affecting about 5,468 individuals. Affected people were compensated and relocated in accordance with the Land Administration Law[19] and the Land Administration Regulation of Jilin province. Adequate internal monitoring and reporting were carried out by JPEC but reporting to ADB was limited. For example, ADB was not informed that compensation rates were changed from those in the draft LARP. There was little supervision of resettlement activities by ADB; only one supervision mission was undertaken by a staff consultant in March 2000. The concerned ADB division did not have a resettlement officer during the period of project implementation[20] Throughout the implementation of LARP, affected people were consulted and assisted by the county resettlement office including representatives from the Jilin Land Administration Bureau (JLAB), housing department, and pricing agencies. Generally, the implementation of resettlement was satisfactory to the affected population despite the fact that the actual average

[19] The Land Administration Law of the PRC dated 25 June 1986 effective 1 January 1987.
[20] The creation of a national resettlement officer position in ADB Resident Mission in the PRC in 2004 and the mainstreaming of resettlement officers into the regional departments better equip ADB to undertake this task.

annual output value (AAOV) compensated for different types of cultivated lands under the project was lower than the rates stipulated in the LARP but within the rates mandated by the Land Administration Law. Appendix 8 provides a detailed analysis of LARP implementation.

G. Conditions and Covenants

26. There were four conditions for loan effectiveness: (i) State Council approval of the Loan Agreement, (ii) signing of subsidiary loan agreements between the Borrower and JPG, (iii) signing of the onlending agreement between JPG and JPEC, and (iv) the Hashuang Expressway Loan Agreement was to have been executed and would become fully effective. The loan was declared effective 7 months after the Loan Agreement was signed, about 4 months longer than the target 90 days after loan signing. No covenants were modified, suspended, or waived during implementation. Compliance with major loan covenants is set out in Appendix 9. Most major covenants were generally complied with, particularly those related to implementation arrangements, environmental protection, access roads, design review, and monitoring and evaluation. However, the EA contravened ADB's *Guidelines for Procurement* for some of the initial civil works contracts, despite the provisions in the Loan Agreement (para. 30). One covenanted financial ratio was not achieved during the initial years of expressway operation due to lower than expected traffic and toll charges. Further reporting with respect to some financial covenants is expected. All audited accounts and audited financial statements were submitted. The quality of audits was good. Audit opinions covered issues relating to internal controls and resettlement activities. There were no qualified audit opinions. Although there was internal resettlement monitoring, ADB was not kept regularly informed of the resettlement activities.

H. Consultant Recruitment and Procurement

27. The international consultants were engaged in accordance with ADB's *Guidelines on the Use of Consultants.* The international consulting services included: (i) design review of the road safety components, (ii) review of the pavement design and pavement construction methods and quality control procedures, (iii) human resource development including in-country training, (iv) contract management, (v) benefit monitoring and evaluation, (vi) construction supervision, and (vii) about 26 person-months of overseas training for about 31 JPEC staff. The international consultants' contract was signed in August 1999, about 5 months later than envisaged at appraisal.

28. Domestic consultants were engaged in accordance with domestic procedures that were acceptable to ADB. The domestic consultants' responsibilities included contract management assistance to JPEC, all aspects of supervising the civil works contractors, and quality control.

29. The expected contract packaging at appraisal and actual packaging are shown in Appendix 10 and details of the actual contract packages are shown at Appendix 11. All procurement financed by ADB loans was to be undertaken in accordance with the *Guidelines for Procurement under Asian Development Bank Loans*. One civil works contract for soil stabilization was undertaken under LCB procedures which were acceptable to the ADB with construction commencing in April 1999. The other 12 packages were to be procured using ICB procedures. Prior to the receipt of the bid evaluation report (BER) for the first twelve civil works contracts, ADB received two representations alleging irregularities in the bidding process. After receiving the BER, ADB requested further clarifications and sought the help of the Ministry of Communications (MOC) and the Ministry of Finance (MOF) to address the issue. The MOC submitted a report summarizing the results of its investigations into the procurement issue and ADB fielded a special loan administration mission. Two Procurement Committee Meetings were

held to discuss the allegations and findings. After investigation by the ADB and MOC, such allegations were found to be unfounded.

30. The Procurement Committee addressed two issues: (i) for four contract packages in which the EA rejected bids due to minor deviations from the bidding documents. ADB advised the EA of deficiencies in its evaluation and requested EA to revise its BER and recommendation for award of contracts for these four packages. Rather than revising its BER, the EA decided to finance the four contracts in question with its own funds in order to begin the construction before the end of the construction season and (ii) for two contracts in which the EA decided to use LCB procedures instead of ICB procedures without prior ADB approval thereby contravening the Loan Agreement and the *ADB's Guideline's for Procurement,* ADB declined to finance these two contracts. In total, $93 million for the six contract packages of the loan was canceled. The remaining six civil work contracts financed under the loan for road maintenance, traffic safety and road management were awarded following ADB's Procurement Guidelines.

I. Performance of Consultants, Contractors, and Suppliers

31. The domestic and international consultants engaged on the Project had good working relationships with the EA, and JPEC was satisfied with their performance. The domestic firm responsible for construction supervision and quality control performed quite well. The short-term advisory responsibilities of the international consultants were satisfactorily completed. The short-term experts were well organized and developed excellent relationships with the contractors, supervisory engineers, and JPEC staff. The international consultants were requested to provide additional inputs with respect to safety following the first submission of their road safety report. The overseas training under the responsibility of the international consultants was carried out in a timely and highly professional manner. JPEC was satisfied with the results of the overseas training. The JPEC staff completing the overseas training subsequently acted as trainers to conduct workshops for other staff, covering the same subjects included in the overseas training, including some employees of the civil works construction contractors. The civil works contractors all performed satisfactorily without any major problems and successfully completed all contracts within the anticipated schedule. Similarly, the performance of the construction materials and equipment suppliers was satisfactory. Materials and equipment were provided in accordance with the terms and conditions of the applicable contracts.

J. Performance of the Borrower and the Executing Agency

32. The Borrower, represented by the People's Bank of China, Ministry of Finance, MOC, and the EA, i.e. JPEC, performed satisfactorily. MOC provided appropriate guidance and financial support to JPEC as envisaged at appraisal. JPEC had previous experience on the ADB-financed Changchun-Siping Expressway. JPEC was well staffed and implemented the Project diligently and efficiently resulting in completion of the civil works ahead of schedule, despite the procurement issues. Land acquisition and resettlement actions were completed on time and to the satisfaction of those affected. Environmental protection measures were appropriate to ensure compliance with the requirements. Given the smooth and effective implementation of the Project, JPEC's performance was satisfactory. The one shortcoming on JPEC's performance related to the procurement issue is described in para. 30. The Borrower's performance in helping to resolve that issue was good.

K. Performance of the Asian Development Bank

33. The performance of ADB was satisfactory. ADB carried out one special loan administration mission to address the procurement issue and three review missions to monitor project progress and to resolve implementation issues. Through policy dialogue, ADB supported the development of a corporate plan for expressway operation unit, environment protection, road safety management, and enhanced institutional capacity for JPEC. ADB should have been more active in monitoring the implementation of the resettlement activities. However, at that time, the operational departments did not have resettlement specialists. [21]

III. EVALUATION OF PERFORMANCE

A. Relevance

34. The rationale of the Changyu Expressway Project was sound, in view of the priority given to development of the northeast transport corridor to improve road transport services, so as to facilitate efficient access to and from the remote hinterland to major seaports and bordering countries. Policy reforms in the areas of strengthening corporate management and governance, developing a road design standard, mobilizing nongovernment financing, enhancing road safety, and environmental protection were supported under the Project. Key elements of road sector policies that were further developed with the Project include measures to reduce the high accident rate, improvement of pavement design, development of corporate plan, environmental protection, and commercialization of service areas and other businesses. Without the Changyu Expressway Project, traffic congestion along the existing corridor would have impeded access between the cities of Changchun and Harbin and would have made access of the northeast ports (Dalian[22] and Dandong) to Tongjiang, Japan, Republic of Korea, and Russian Federation, as well as to the southeast, more costly and time consuming.[23] Economic development would have been stifled and traffic accident and deaths on the road would have increased. The Changyu Expressway Project is assessed as highly relevant.

B. Efficacy in Achievement of Purpose

35. Regarding the increasing transport capacity, traffic in the corridor (Changyu Expressway and NH102 combined) increased substantially after project completion. Actual traffic growth in the corridor has increased with the total actual average annual daily traffic (AADT) in medium truck equivalent (MTE) in 2003 (the first full year that the expressway was open to traffic) 50% more than the actual traffic on NH102 in 2002. The actual traffic on Changyu Expressway was 6,961 AADT (in MTE) in 2003, about 27.7% lower than forecast at appraisal. However, actual traffic growth on Changyu Expressway has increased rapidly since its opening. The actual traffic increased at a rate of 11% in first half of 2004. The increasing growth of the traffic using the expressway and declining traffic growth rate on the parallel NH102 confirms that traffic has diverted from the old highway to the expressway. Expressway traffic diversion and generation were significant. In 2003, 50% of expressway traffic was diverted from NH102, and 50% was diverted from other roads or was generated traffic due to improved road conditions. The traffic comprised a large proportion of long-distance trucks (more than 80% of the traffic on the expressway is interprovincial transit traffic). Appendix 13 provides a detailed discussion of the traffic analysis.

[21] There are now resettlement specialists in the concerned division and in ADB Resident Mission in the PRC.
[22] Dalian is the main commercial port serving northeastern PRC.
[23] Contributing to the more efficient movement of freight is the recent upgrading from four lanes to eight lanes of the expressway from the port at Dalian to Shenyang, which links to the project expressway.

36. The Project not only resolved the road capacity issue but also enabled efficient, safe, and comfortable transport. As a result of the increased transport capacity, improved geometric design and better pavement condition of the project expressway than those for NH102, the primary purposes of the Project have been achieved, such as lower transport costs, enhanced road safety, more efficient movement of goods and passengers, and increased economic activity long the transport corridor. The average journey time for passenger cars from Harbin to Changchun is now 2.5 to 3 hours. Before the Project, this journey took at least 4.5 to 5 hours. The reduction in travel time was estimated at about 45% once the Changchun-Harbin expressway opened to traffic. Average vehicle operating cost (VOC) savings are around 65%. The supply of road passenger services increased, especially short- and middle-distance expressway buses offering frequent services. Before the Project there were 14 buses per day operating between Changchun and Harbin on NH102. Now 40 buses are operating daily on the expressway in addition to nine buses operating on NH102**.** Freight and passenger charges on NH102 have remained unchanged since appraisal, a decrease in real terms. Some large-scale agro-processing plants have been developed since completion of the expressway. One is the recent construction of the Dacheng corn processing facility near Dehui which, when completed before the end of 2004, will be the fourth largest facility of its type in the world (Appendix 15). The Dacheng corn plant is located in the Caiyuanzi interchange of the expressway (Map 2) relying on the expressway not only for supply of raw materials and products, but also for staff movements to and from the work place. The Binjiang new city, near the corn processing facility, will have a population of 80,000 by 2010. With the new corn processing facility, farmers will obtain a higher selling price for their crop, directly contributing to poverty reduction.

37. Sixty-five percent of the traffic in the corridor is now using the expressway. This has significantly eased the congestion on NH102, and accidents on that road have fallen since the expressway opened. Road accident data have been compiled since 1998 as part of the monitoring and evaluation process. However, systematic compilation and computerization of the statistics have not occurred. Sufficient data were available to ascertain that the accident rate per 100 million vehicle-km has steadily decreased from around 104 in 1998 on NH102 to about 86 in the corridor (30 on the expressway and 56 on the NH102) in 2003. The number of accidents and fatalities have also decreased. The accident rate is lower on expressways than on secondary and tertiary roads.

38. Jilin Public Security Bureau (JPSB) and JPEC made concerted efforts, including an information campaign, to improve road safety. The most significant causes of accidents on the expressways are overloaded trucks, driver fatigue, speeding, and drunk driving. To deal with overloading, two fixed weigh stations are in operation, one at the Lalin river and another one at the junction of Changchun Ring Road and Changyu Expressway. Two portable weigh-in-motion units are in use on a random basis. With effect from 22 June 2004, 2003 Road Safety Law requires overloaded trucks to offload excess freight before entering the expressway. Prior to enactment of these new regulations, about 75% of the trucks on the expressways were overloaded. Now it is estimated that only 3–5% are overloaded. This is expected to help reduce accidents and fatalities on the project expressway. To help eliminate accidents resulting from driver fatigue, special signs have been erected reminding drivers to not drive when tired and a continuous “rumble strip” has been incorporated on the hard shoulder to alert drivers who might have strayed from the main carriageway. An expressway traffic patrol unit comprising 107 police officers equipped with 16 patrol cars has been established. The frequency of patrolling along the expressway was increased once every 30 minutes. Traffic safety signboards along the expressway provide safety guidance to road users including encouraging the use of seat belts and to warn against drunk or dangerous driving. Road safety facilities and equipment are

appropriate to minimize road accidents and an emergency response plan has been established to deal with traffic accidents.

39. Given that the Project has (i) increased road transport capacity, lowered transport costs, enhanced road safety, reduced accident rates, and made possible more efficient movement of goods and passengers in the transport corridor, (ii) enhanced institutional capacity and induced increased economic activity along the transport corridor, and (iii) lowered traffic noise and vehicle emissions, the Changyu Expressway Project is rated efficacious.

C. Efficiency in Achievement of Outputs and Purpose

40. The Borrower and the EA were effective in ensuring efficient project implementation as well as timely and adequate availability of counterpart funding. The planned outputs were achieved on schedule, despite the initial delay. The Changyu Expressway Project has achieved its primary purpose of improving road transport capacity, reducing transport costs, and enhancing road safety. All the physical project facilities were completed before loan closing and are in operation. Staff from JPEC received training that improved their skills in design, construction, environmental management, O&M, and road safety.

41. The Project Completion Review Mission reestimated EIRR following the same methodology used at appraisal, based on actual data and including benefits resulting from generated traffic. There will be environmental benefits from reduced vehicle emissions and noise, and indirect economic benefits resulting from the increases in economic growth in the corridor generated by the expressway and benefits resulting from the improved access roads. However, these have not been included in the analysis for lack of data for evaluation. The recalculated EIRR for the entire Changchun-Harbin Expressway was 16.3% compared with 18.9% at appraisal.[24] The EIRR of the Changyu Expressway Project was recalculated at 17.1%, compared with 21.5% at appraisal. The lower project completion review mission reestimated EIRR reflects the lower traffic volumes in the initial years, and potential diversion from rail traffic has not materialized. Appendix 13 presents the economic reevaluation.

42. The toll on the expressway is charged on the basis of vehicle type (small passenger car, medium truck, bus, large truck, extra large truck, and trailer/container) and distance traveled. The toll structure was adjusted after 1 year of expressway operation. The current toll charges for the different types of vehicles are listed in Table A14.1 of Appendix 14. The same toll charges are also applied to other expressways in Jilin province. About 80% of traffic is long-distance, through traffic in the corridor and is less sensitive to changes in tolls than local traffic on NH102. The toll on NH102 is charged on the basis of vehicle size (small, medium, large, and extra large). A base toll rate for a small car is CNY10. Corresponding tolls for other vehicle sizes are CNY20 for medium, CNY30 for large, and CNY40 for extra large. The toll on NH102 is the same since it opened to traffic in 1997; in real terms it has declined.

43. The financial internal rate of return (FIRR) for Changyu Expressway was recalculated using the major assumptions given in Appendix 14. The recalculated FIRR, in constant prices, is 7.5% compared with the 7.6% estimated at appraisal. The recalculated weighted average cost of capital, in constant prices, is 3.4%.[25] The Project Completion Review Mission confirmed that JPEC could provide quality services and maintain the roads in good condition. This reevaluation shows the Project is financially viable and cost effective. Sensitivity tests with respect to a lower

[24] The Project Completion Review Mission followed the methodology used at appraisal, an EIRR was recalculated for the Changchun-Harbin Expressway as a whole (both sections together).
[25] The weighted average cost of capital was not calculated in the report and recommendation of the President.

traffic growth rate and higher O&M costs on the new expressway confirm this position. Based on this analysis, the Changyu Expressway Project is rated efficient.

D. Preliminary Assessment of Sustainability

44. The Changyu Expressway Project is technically and commercially sound. There is strong ownership and commitment of the provincial and local governments to the Changyu Expressway Project. Appropriate training has been carried out under the Changyu Expressway Project to ensure that current staff can carry out effective O&M of the project facilities. The necessary traffic management, toll, and maintenance equipment has been procured under the Changyu Expressway Project to enhance the equipment already available in the province.

45. Financial sustainability is ensured by setting toll levels aimed to achieve full cost recovery. The actual and projected financial statements (Appendix 14) indicate that toll revenues will be sufficient to cover operating and maintenance costs, income taxes, and debt service, and to provide a reasonable rate of return. Strong support from JPG helped to ensure the timely implementation of the necessary toll increases. Appropriate environmental protection measures have been incorporated in the design and operation of the expressway. The three service areas with parking areas were developed under BOT procedures, attracting total private sector investment of more than CNY27 million with operational authority for 15 years**.** The sustainability of the Changyu Expressway Project is rated most likely.

E. Environmental, Sociocultural, and Other Impacts

46. An environmental impact assessment was prepared for the Changyu Expressway Project and its recommendations and requirements were incorporated in the project design and implemented during construction to mitigate adverse environmental impacts. Environmental impacts are being monitored by the Environmental Monitoring Central Station of Jilin province and are reported on an annual basis. During construction, environmental monitoring and mitigation measures included the following: (i) restoration of borrow pits to farm land; (ii) landscaping along the expressway, at interchanges and service areas and in conjunction with restoration of borrow pits; (iii) erosion control measures; (iv) service area wastewater treatment; (v) noise control signs; and (vi) control of night operations. About $16.3 million was spent on environment-related works including landscaping and beautification works. More than 3 million trees, shrubs, and other plants were planted in conjunction with the Project. Proper culverts, bridges, and channel treatments also contributed to the improvement of the environment in the project area. The State Environmental Protection Administration undertook an independent evaluation of environmental measures and their impacts at the project completion stage in August 2003 and found the measures taken to be successful.

47. Positive social impacts under the Project included (i) agro-processing development; (ii) employment during construction and operation (Appendix 15); (iii) expanded service and parking areas for use of nearby communities (although these areas face capacity constraints during winter); and (iv) traffic improvement along NH102.

48. All resettlement activities and payment of compensation for the Project were completed by June 1999. Implementation of the resettlement plan was well managed and the affected people were satisfied with their new dwellings or the housing compensation they received. Land acquisition and resettlement were completed well in advance of major civil works construction activities (para. 25). The land compensation rates were rather low but the impact of land loss was not significant because the average landholding in the project area is relatively large (0.2

ha per capita). At the time, the affected people were satisfied with the compensation rates. Affected people were able to invest cash compensation in more productive activities, so their incomes were not adversely affected. A survey conducted by local officials confirmed that the affected people were satisfied with resettlement measures.

49. During the PPTA stage, the social impact assessment analyzed the likely impact of the Project on ethnicity. The number of the non-Han population in Jilin province is very low. Also, there was a low poverty incidence in the project area. The main adverse social impact caused by the Project was resettlement, but almost all affected people were Han. Consequently, there was no need for special measures as there was no significant impact on ethnic minorities. The number of households relocated was quite small, so no communities were significantly affected.

50. The average annual GDP growth rate for the whole of Jilin province during 2000–2003 was 11%, compared with 16% and 15% in Changchun and Dehui (Table A15 in Appendix 15). In the absence of the expressway, such high growth rates may not have been possible. To enhance the poverty reduction impact of the expressways, associated access roads were constructed (paras. 11–12). The upgraded roads reduce transport time and the costs of reaching schools, hospitals, and other social services. They make market and skills development opportunities more accessible to the poor, improving their chances of finding employment in nearby industries. Overall, the impacts under this heading are rated significant.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

51. The Project has been implemented as planned with some changes in scope related to the decision to defer construction of four interchanges until traffic increases to the level requiring the interchanges and an emergency phone system. The main objectives of the Project—to (i) improve access from Heilongjiang province and parts of Jilin province to the more developed provinces of the east and south; (ii) provide additional transport capacity and reduce transport costs to enhance business and trade opportunities and attract investment; (iii) alleviate congestion and reduce accidents on existing roads; (iv) enhance road safety standards on the Project and related facilities; and (v) support the corporatization of expressway construction and operations—have been achieved. The quality of the completed works is very good. Changyu Expressway has been in operation since September 2002 and there have been no significant operational, structural, or maintenance problems since opening. The economic reevaluation by the Project Completion Review Mission shows that the Changyu Expressway Project remains economically viable with an EIRR of 17.1%. The financial reevaluation of the Changyu Expressway Project shows that that Project is financially viable and cost effective with an FIRR of 7.5%. Overall the Changyu Expressway Project is rated successful.

B. Lessons Learned

52. Lessons learned include the need for: (i) closer supervision by ADB on resettlement issues (para. 25), and (ii) including specific local road component in the project scope (para. 11).

53. During land acquisition and resettlement, both ADB and the EA need to play a more active role in the supervision and monitoring activities (Appendix 8). Although the land acquisition and resettlement activities seem to have been carried out with few problems, closer monitoring and better reporting would ensure that the resettlement plan is implemented as

agreed between government agencies and ADB, and that actions can be formulated and implemented to address the concerns of the affected people. For example, there was a significant cost saving due to reduction of local taxes; however, such savings were not passed on to the affected people. Also, it is essential to ensure independent agencies monitor the social impact of the resettlement activities during implementation and evaluate the results for at least 2 years after. Such monitoring would have assisted the EA and ADB to prepare a comprehensive resettlement completion report.

54. While specific access roads were not identified at appraisal, local roads were constructed and upgraded, which helped ensure all-weather road access for social services and markets (paras. 11–12). This lesson has been learned, in subsequent road projects, ADB has consistently included a local road component to ensure maximum access to the expressway by the rural population and thus maximize poverty reduction and regional economic development.

C. Recommendations

55. The parking areas at the service areas have proved inadequate to accommodate large numbers of vehicles during bad weather, such as heavy snowstorms. The EA should enlarge the parking areas.

56. The full benefit monitoring and evaluation report should be submitted to ADB 5 years after the opening of the expressway to allow ADB to evaluate the improvement in social and economic conditions in the project area. Review of the toll structure and levels are to be submitted to ADB on an annual basis up to 5 years following project completion, as required in the Loan Agreement. The EA should keep the ADB advised of the plans and implementation of the three deferred interchanges and the emergency phone system.

57. JPEC and JPSB should continue its efforts to reduce accidents, including the introduction of more stringent road and vehicle safety regulations. More effort aimed at educating drivers and pedestrians should be initiated. A computerized statistical database of accidents, fatalities, etc. should be established for analysis and road safety planning.

58. JPEC should continue to pursue private sector participation for the expressway at a later stage, when traffic growth and financial performance were sufficient to attract private sectors.

59. The project performance audit report should be prepared in 2006, by which time the Project will have been fully operational for more than 3 years and its traffic, maintenance, and physical condition and the attainment of benefits may be better assessed.

PROJECT FRAMEWORK: OUTPUT AND INPUT
CHANGYU EXPRESSWAY

Design Summary	Appraisal	Actual	Remarks
Output			
1. Main Works			
(i) 161 km of expressway, 2 ring roads, 8 interchanges, 3 service areas, underpasses, overpasses, and link roads	Length: 161 km Completion: Sep 2002 Cost: $348.3 million	Length: 159.838 km CW Completion: Jul 2002 Cost: $363 million 4 interchanges deferred until traffic increases	Opened to traffic in Sep 2002
(ii) Procurement and installation, safety, communications, weigh stations, emergency and maintenance equipment	Completion: Sept 2002 Cost: $14.0 million	Completion: Aug 2002 Cost: $5.3 million	
(iii) Land acquisition and resettlement	Completion: Not indicated Cost: $49.8 million	Completion: June 1999 Cost: 19.4 million	
2. Consulting Services and Training			
Advisory inputs and training for road safety, design, maintenance, business planning and operations, pavement design and construction, environmental protection, and benefit monitoring and evaluation	• Completion of 10 person-months of international advisory services and 5,700 person-months of domestic supervision consulting services • Completion of 28 person-months of overseas training for about 33 persons	• Achieved. International consultants 55 person-months and domestic consultants 6,720 person-months • 31 staff trained overseas for 26 person-months	International consultants increased to provide supervision input during construction
3. Corporatization			
Continued operations by corporate EA	• Consolidated accounting for corporate profit and cost centers	• Being implemented	
	• Demonstrated financial sustainability and creditworthiness of corporate entities	• Achieved	
	• Securitization of existing revenue streams	• Being considered as one of the options	
4. Environmental Protection			
Implementation of mitigation and monitoring activities	• Mitigation measures identified in construction and operations plans	• Achieved	

Design Summary	Appraisal	Actual	Remarks
	• Monitoring plan agreed	• Achieved	
	• Number of trees planted adjacent to project expressway	• More than 3 million trees, shrubs and other plants were planted	
	• Air pollution measures, 50 meters from centerline	• Achieved	
5. Inputs			
• Provision of adequate counterpart funds	• April 1999–Sep 2002 $310.4 million	• April 2000–Sep 2002 • $378.8 million, accounting for 80.6% of total investment	
• Recruiting supervision consultants	• International: March 1999 • Domestic: Oct 1998	• International: August 1999 • Domestic: 25 April 1999	
• Carrying out survey and detailed design	• May–Oct 1998	• Oct 1996–Oct 1998	
• Award of CW contracts	• April 1999	• December 1999	
• Expressway construction	• Sep 2002	• September 2002	
• Construction supervision and installation	• Completed by Sep 2002	• 18 Sep 2002	
• Resettlement and compensation	• Not estimated at appraisal	• Completed: June 1999	
• Land acquisition and relocation	• Minimized relocation through proper alignment selection and interchange design	• Achieved	
• Safe operation of expressway and parallel highway	• Lower rate of accidents and severity	• Achieved	
• Human resource development	• Training completed: Sep 2002	• Completed: Dec 2002	
• Incorporate appropriate environmental mitigation measures in design	• Adverse environmental impact mitigation and environmental enhancement measures	• Achieved	
• Monitoring and evaluation	• EA conducting monitoring and evaluation 2002–2010	• Being carried out	

CW = civil works, EA = Executing Agency, km = kilometer, NH = national highway.
Source: Asian Development Bank estimates.

MAJOR EVENTS IN PROJECT IMPLEMENTATION
CHANGYU EXPRESSWAY

Year	Date	Events
1997	22 August	Approval of project preparatory technical assistance.
1998	1 April	Project brief meeting.
	13–29 April	Fact-finding mission.
	19 June	Management review meeting. Approval of advance action for civil works, equipment, and international consulting services.
	20 July–3 August	Appraisal mission.
	28 August	Prequalification documents for ICB civil works were approved.
	15 September	Signing of civil works LCB contract 01.
	16 September	Prequalification documents for ICB civil works were issued.
	24 September	Staff review committee meeting.
	16 November	Deadline for submission of prequalification documents for ICB civil works.
	13–15 October	Loan negotiations.
	27 November	Loan approval.
1999	4 January	Prequalification Evaluation Report for ICB civil works was received.
	14 January	Loan and Project Agreements were signed.
	12 February	Prequalification of civil works contractors and shortening of the bidding period from 90 to 60 days was approved.
	5 February	Bidding documents for ICB civil works were issued to the prequalified contractors.
	5 April	Deadline for submission of bids and bid opening for ICB civil works contracts.
	7 April	ADB approved the first extension of loan effectiveness by 3 months from 14 April 1999 to 13 July 1999.
	12 April	ADB received a representation (dated 10 April 1999) alleging irregularities in the bidding process.
	4 May	ADB received a second representation (dated 30 April 1999) complaining of irregularities in the bidding process.
	17 May	ADB received the bid evaluation report for civil works.
	8 June	ADB requested clarifications on the bid evaluation report.
	6 July	Approval of the ranking of international consultants and contract negotiations with the first-ranked firm.
	20 July	ADB approved the second extension of loan effectiveness by 3 months from 13 July 1999 to 13 October 1999.
	30 July	ADB received the results of the investigation by the Ministry of Communications of the procurement issue in the evaluation of bids.
	16 August	Loan effectiveness.
	17 August	Approval of the draft negotiated contract of the international consultants.
	23–27 August	Special loan administration mission to review the bids for ICB civil works contracts.
	1 October	First procurement committee meeting for civil works.
	29 October	Second procurement committee meeting for civil works.
	9 November	ADB approved the award of three civil works contracts 03, 07, and 11 and requested reevaluation of contracts 02, 04, 08, 09, 10, 12, and 13.
	15 November	First disbursement.
	24 November	ADB received the revised evaluation for packages 02, 04, 08, 09, 10, 12, and 13.
	9 December	Signing of civil works contacts 03, 07, and 11.

Year	Date	Events
	15 December	Approval of another three civil works contracts (Packages 09, 10, and 13).
	22 December	Signing of civil works contract 10.
	23 December	Signing of civil works contracts 9 and 13.
2000	2 March	ADB rejected EA's recommendations for the award of contracts 02, 04, 08, and 12 due to lack of valid bids (all bids expired on 1 January 2000) and approved the rebidding of the four ICB contracts.
	5 April	EA advised that contracts 02, 04, 08, and 12 would be financed from their own resources and requested partial cancellation of loan proceeds allocated to these contracts.
	23–27 May	Review mission 1.
	31 May	ADB received Ministry of Finance official request to cancel $93 million loan proceeds.
	23 June	ADB approved the cancellation of $93 million effective 31 May 2000, thereby reducing the loan amount to $127.0 million.
2001	3–7 June	Midterm review mission.
	4 October	Approval of contracts IFB-3 and IFB-4 for traffic management-road safety facilities.
	16 October	Signing of contracts IFB-3 and IFB-4 for traffic management-road safety facilities.
	16 November	Approval of six contracts for road maintenance equipment.
	30 November	Signing of six contracts for road maintenance equipment.
	19 December	Approval of contracts IFB-1 and IFB-2 for traffic management-road safety facilities.
	26 December	Signing of contracts IFB-1 and IFB-2 for traffic management-road safety facilities.
2002	24 July	Approval of the award of traffic management, monitoring system, communications system and tolling system contract.
	26 July	Contract signing for traffic management, monitoring system, communications system, and tolling system.
	July	Substantial completion of the civil works contracts for the main expressway.
	August	Substantial completion of the (i) traffic management-road safety facilities contracts and (ii) traffic management monitoring system, communications system, and tolling system. Delivery of road maintenance equipment.
	16–21 September	Review mission 2.
	18 September	Project expressway was opened to traffic.
	September	Completion of services of both international and domestic consultants.
	31 December	Scheduled loan closing date. Delivery of road maintenance equipment financed by the EA.
2003	5 March	Loan closing and cancellation of unutilized loan proceeds of $35.8 million.
	16 October	Prepayment of the loan.
2004	22–27 August	Project Completion Review Mission.

ADB = Asian Development Bank, EA = Executing Agency, ICB = international competitive bidding, LCB = local competitive bidding.
Source: Asian Development Bank and Jilin Provincial Expressway Corporation.

TECHNICAL STANDARDS OF THE PROJECT FACILITIES
CHANGYU EXPRESSWAY

Table A3.1: Standards and Main Technical Parameters

Item	Unit	Section A K0+00–K143+613	Section B Ring Road-East K0+00–K10+840	Section C Ring Road-West K143+613–K148+998
Length	km	143.6	10.8	5.4
Design Speed	km/h	120	100	80
Subgrade Width	m	28.0	26.0	24.5
Carriageway Width	m	2x2x3.75	2x2x3.75	2x2x3.75
Median Width	m	3.0	3.0	2.0
Median Shoulder Width	m	2x0.75	2x0.75	2x0.50
Hard Shoulder Width	m	2x3.50	2x2.50	2x2.50
Soft Shoulder Width	m	2x0.75	2x0.75	2x0.75
Pavement Design Life	Year	15	15	15

h = hour, km = kilometer, m = meter.
Source: Jilin Provincial Communications Department.

Table A3.2: Main Work Quantities

Item	Unit	Quantity		
		Section A	Section B	Section C
Earthwork	10,000 m^3	2,017.5	188.5	79.5
Asphalt Concrete Pavement	10,000 m^2	464.32	23.79	10.88
Extra-large Bridge	m (Number)	1,597 (1)	—	—
Large Bridge	m (Number)	411.48 (2)	—	251.04 (1)
Medium Bridge	m (Number)	224.12 (3)	24.84 (1)	—
Small Bridge	m (Number)	395.70 (15)	17.54 (1)	—
Culvert	Number	92	10	3
Interchange	Number	4	—	—
Intersection	Number	14	4	1
Grade Separation	Number	56	4	2
Underpass	Number	100	7	3

— = not available, m = meter, m^2 = square meter, m^3 = cubic meter.
Source: Jilin Provincial Communications Department.

PROJECT COSTS AND FINANCING
CHANGYU EXPRESSWAY

Table A4.1: Appraised and Actual Project Costs
($ million)

Components	Appraised			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
A. Base Cost						
1. Civil Works	163.7	184.6	348.3	169.0	194.0	363.0
2. Equipment	14.0	0.0	14.0	4.0	1.3	5.3
3. Land Acquisition and Resettlement	0.0	49.8	49.8	0.0	19.4	19.4
4. Consulting Services and Training	0.8	19.6	20.4	0.9	19.2	20.1
Total Base Cost	**178.5**	**254.0**	**432.5**	**173.9**	**233.9**	**407.8**
B. Contingencies						
1. Physical	14.3	20.3	34.6	0.0	0.0	0.0
2. Price	9.9	14.1	24.0	0.0	0.0	0.0
Subtotal	24.2	34.4	58.6	0.0	0.0	0.0
C. IDC and Other Charges	**27.3**	**22.0**	**49.3**	**10.6**	**51.6**	**62.2**
Total Project Cost	**230.0**	**310.4**	**540.4**	**184.5**	**285.5**	**470.0**

IDC = interest during construction.
Source: Asian Development Bank and Jilin Provincial Communications Department.

Table A4.2: Appraised and Actual Financing
($million)

Source	Appraised			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
ADB	220.0	0.0	220.0	91.2	0.0	91.2
Ministry of Communications	0.0	96.4	96.4	0.0	128.6	128.6
Domestic Bank	0.0	132.5	132.5	93.3	70.1	163.4
JPG/JPCD	10.0	81.5	91.5	0.0	86.8	86.8
Total	**230.0**	**310.4**	**540.4**	**184.5**	**285.5**	**470.0**

ADB = Asian Development Bank, JPG = Jilin Provincial Government, JPCD = Jilin Provincial Communications Dept.
Source: Asian Development Bank and Jilin Provincial Communications Department.

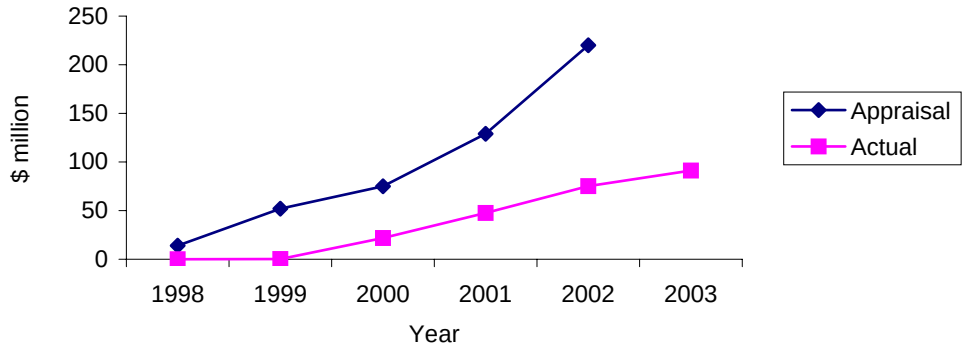
PROJECTED AND ACTUAL DISBURSEMENTS
CHANGYU EXPRESSWAY

Table A5: Projected and Actual Disbursements
($ million)

Year	Appraisal	Actual	Cumulative Appraisal	Cumulative Actual
1999	13.9	0.2	14.0	0.2
2000	37.8	21.7	52.0	21.8
2001	22.8	25.7	75.0	47.6
2002	54.5	27.6	129.0	75.2
2003	91.0	16.0	220.0	91.2
Total	**220.0**	**91.2**		

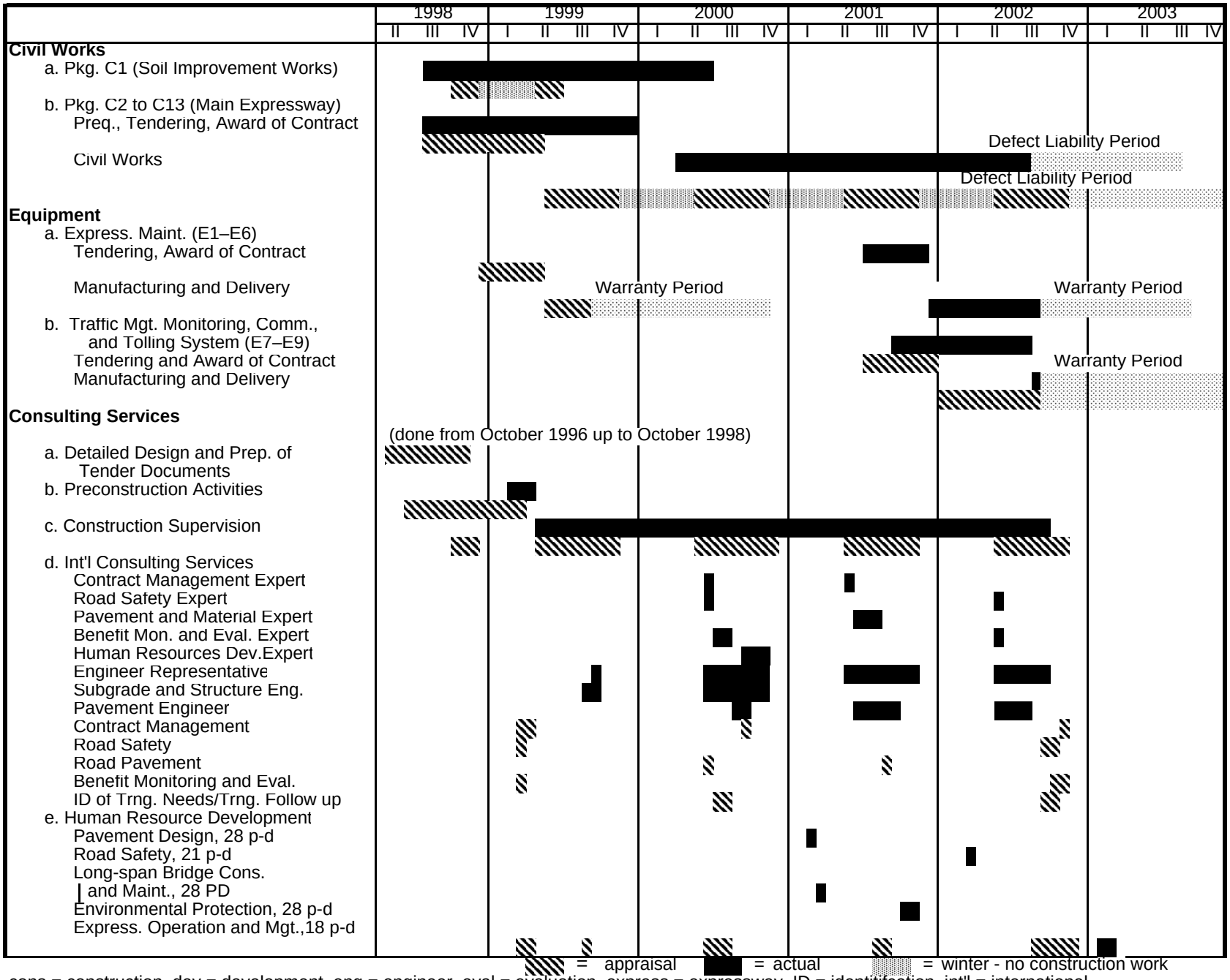
Source: Asian Development Bank and Jilin Provincial Expressway Corporation.

Figure A5: Cumulative Disbursement



Source: Asian Development Bank and Jilin Provincial Expressway Corporation.

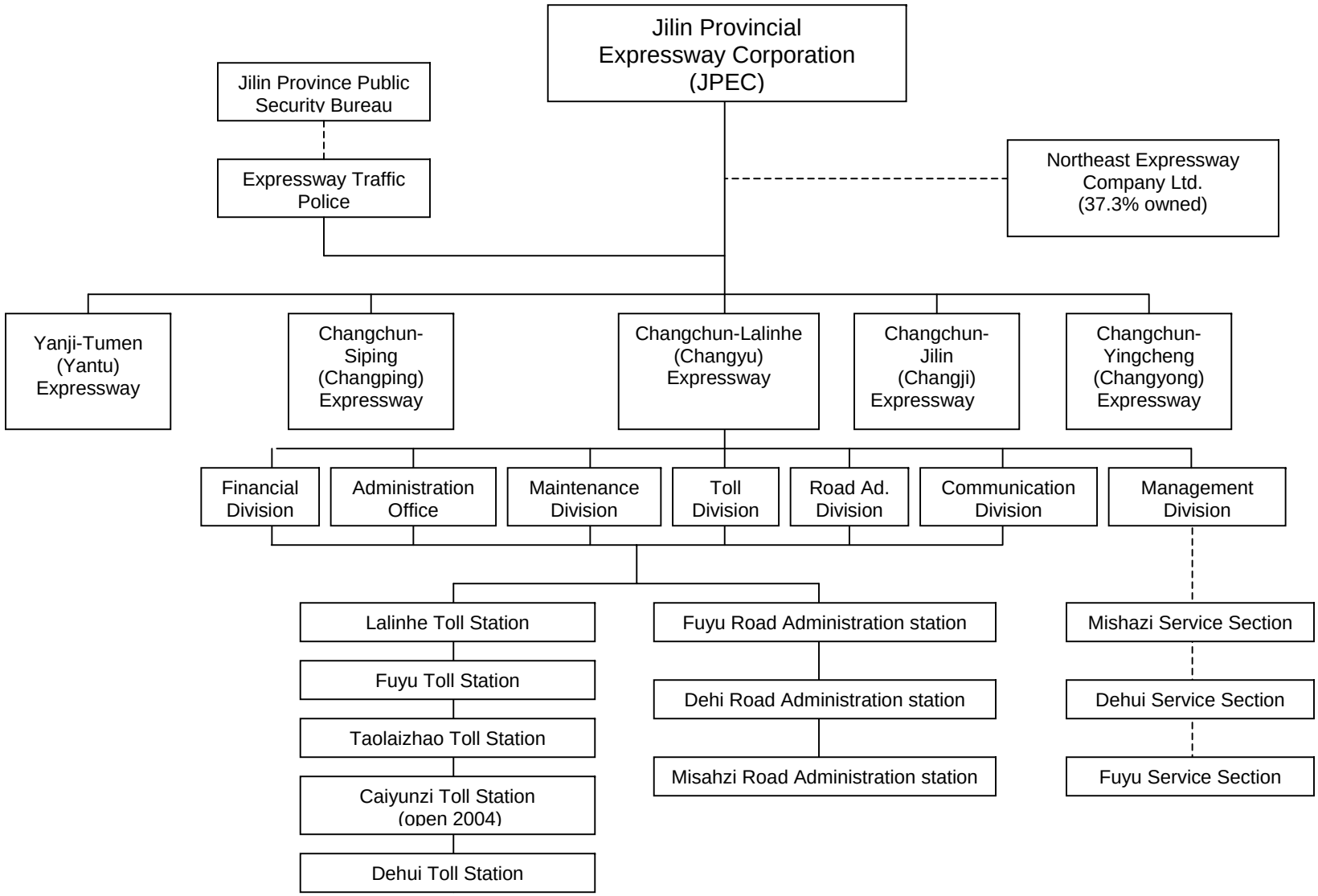
IMPLEMENTATION SCHEDULE: CHANGYU EXPRESSWAY



cons = construction, dev = development, eng = engineer, eval = evaluation, express = expressway, ID = identitifcation, int'l = international, maint = maintenance, mgt = management, mon = monitoring, p-d = person days, pkg = packages, prep=preparation, preq =prequalification, trng=training.

Source: Jilin Provincial Expressway Corporation.

ORGANIZATION CHART: JILIN PROVINCIAL EXPRESSWAY CORPORATION



Source: Jilin Provincial Expressway Corporation.

EVALUATION OF LAND ACQUISITION AND RESETTLEMENT ACTIVITIES CHANGYU EXPRESSWAY

A. Scope of Resettlement

1. In June 1998, a draft Land Acquisition and Resettlement Plan (LARP) was prepared under Asian Development Bank (ADB) technical assistance (TA) 2468-PRC.[1] LARP provided a basis of resettlement activities, monitoring, and evaluation. The scope of resettlement impact for the Changyu Expressway Project in Jilin province included land acquisition, building demolition, and resettlement. The land acquisition could be further divided into two parts: permanent land acquisition for both the main alignment and subsidiary components, such as interchanges, service areas, and toll areas; and temporary land acquisition for borrow pits and stock pits.

2. At appraisal, LARP envisaged that 1,395 hectares (ha) of land would be required permanently, 152 ha would be required temporarily, and 693 people would need to be resettled. By project completion, the actual permanent land acquisition of the Project was 1,167 ha, a decrease of 16.37% from LARP. The reason for the decrease was the four deferred interchanges to be built later depending on traffic growth. The total demolished dwellings were 17,715 square meters, an increase of 13% compared with 15,675 square meters estimated in LARP. About 5,468 persons were affected by both land acquisition and house demolition. The number of people relocated was reduced from 693 to 468. Table A8.1 shows the variations of resettlement impacts between the draft LARP and actual.

Table A8.1: Resettlement Impacts: Land Acquisition and Resettlement Plan and Actual

Impacts	Unit	LARP	Actual
Land Acquisition	ha	1,547	1,417
Permanent	ha	1,395	1,167
Temporary	ha	152	250
Building Demolition	sq. m.	15,675	17,715
Population Affected	Person	—	5,468
By Land Acquisition		—	5,000
By House Demolition		693	468

— = not available.
ha = hectare, LARP = Land Acquisition and Resettlement Plan, sq. m. = square meter.
Source: Jilin Provincial Expressway Corporation.

B. Resettlement Compensation

3. The land acquisition and resettlement of the Project was implemented based on the Land Administration Law (LAL)[2] and rules and regulations of the provincial government (No. 8 circular issued by Jilin Land Administration Bureau [JLAB] applicable for 1993–1998). The actual average annual output value (AAOV) compensated for different types of cultivated lands under the Project compared with the draft LARP and the circular is given below in Table A8.2. For dry land and paddy, the Project implemented rates that were higher than average rates calculated by JLAB. The actual AAOV for vegetable land applied under the Project was higher than in the draft LARP. However, the rates for dry land and paddy land applied under the Project were much lower than those in the draft LARP.

[1] There was no final LARP prepared under the Project.
[2] The Land Administration Law of PRC dated 25 June 1986, effective 1 January 1987.

Table A8.2: Average Annual Output Value
(CNY/mu)

Items	AAOV in Draft LARP	AAOV of JLAB (CNY/mu)		Adopted Rates (CNY/mu)
		Range	Average	
Dry land	650	300–450	375	420
Paddy	1,000	450–650	550	600
Vegetable Land	1,160	1,000–1,700	1,350	1,300

AAOV = average annual output value, JLAB = Jilin Land Administration Bureau, LARP = Land Acquisition and Resettlement Plan.
mu = 666.67 square meters.
Source: Jilin Land Administration Bureau and Jilin Provincial Expressway Corporation.

4. As envisaged at appraisal, the land compensation rates were three times the AAOV for dry land, four times the AAOV for paddy land, and five times the AAOV for vegetable land. The actual land compensation rates were within the range stipulated in the applicable Land Administration Law, which is three to six times the AAOV. See Table A8.3 for details.

5. In addition to land compensation, there were differences observed in the resettlement subsidies adopted for land acquisition. The draft LARP indicates four times of AAOV would be applied for Fuyu county, Dehui county, and Kuan Cheng (district of Changchun), respectively. However, the prevailing Land Administration Law set forth that the resettlement subsidies should be two or three times of AAOV, and then divided by the average amount of original cultivated land per person (of the unit being acquired). The actual resettlement subsidies applied by Jilin Provincial Expressway Corporation (JPEC) were three times the AAOV, and then divided by average amount of original cultivated land per person, which was in accordance with the Law.

6. For the land area occupied temporarily by the Project, the compensation rate was set at three times the AAOV to cover the losses for individual farmers during project construction, which lasted for 2 years on average.

7. The compensation for a house earmarked for demolition was evaluated by an independent real estate agency. The average house compensation was about CNY400 per square meter. However, different rates were applied for the Changchun and Songyuan sections. The draft LARP did not provide detailed budget information for the house compensation rates. Table A8.4 presents the compensation rates for different types of newly built houses. In addition to building compensation, the relocated households were also given transfer assistance, including a moving allowance of CNY50 per person, and transfer accommodation allowance of CNY60 per person.

Table A8.3: Land Compensation Rates and Resettlement Subsidies
(multiples of AAOV)

County/ District	Land Originally Cultivated, per Person (mu)	Land Types	Land Compensation Rate			Resettlement Subsidies				
			LARP (a)	LAL	Act. (b)	LARP (c)	LAL	Actual (d)*=3/(a)	LARP (a)+(c)	Actual (b)+(d)
Fuyu	2.8	Dry	3	3–6	3	2	2 (or 3) divide by original cultivated land per person	1.07	5	4.07
		Paddy	4	3–6	4			1.07	6	5.07
		Vegetable	5	3–6	5			1.07	7	6.07
Dehui	2.6	Dry	3	3–6	3	3	2 (or 3) divide by original cultivated land per person	1.15	6	4.15
		Paddy	4	3–6	4			1.15	7	5.15
		Vegetable	5	3–6	5			1.15	8	6.15
Kuan Cheng	1.47	Dry	3	3–6	3	4	2 (or 3) divide by original cultivated land per person	2.04	7	5.04
		Paddy	4	3–6	4			2.04	8	6.04
		Vegetable	5	3–6	5			2.04	9	7.04

LAL = Land Administration Law, LARP = Land Acquisition and Resettlement Plan.
Source: Land Administration Law effective 1 January 1987, draft Land Acquisition and Resettlement Plan, Jilin Land Administration Bureau Circular No. 8, and actual compensation made by Jilin Provincial Expressway Corporation.

Table A8.4: Building Compensation Comparison
Draft Land Acquisition and Resettlement Plan vs Actual

Types	City	LARP (CNY/sq.m.)	Actual (CNY/sq.m.)
Brick-concrete House	Changchun	Market Price	450
	Songyuan		610
Brick-timber House	Changchun		330
	Songyuan		540
Brick-timber House	Changchun		250
	Songyuan		470

LARP = Land Acquisition and Resettlement Plan, sq.m. = square meter.
Source: Land Acquisition and Resettlement Plan; Jilin Provincial Expressway Corporation.

C. Resettlement Measures and Income Restoration

8. The compensation was delivered to the affected people, with the relevant villages and individuals fully aware of the adopted compensation rates. The land compensation was directly paid to the affected people in Dehui county and Kuan Cheng district of Changchun. Given the relatively high farmland ratio and more nonfarm opportunities in those villages, affected people preferred direct cash payment. They used the cash as “seed money” to start a business, which brought them additional cash income. In Dehui, most affected people used the compensation to start chicken-raising businesses. The chicken businesses were linked to a large chicken farm in the area, which encouraged individual households to raise chickens for them. In Kuan Cheng district, a large number of affected people used land compensation to build greenhouses for

growing vegetables year round. In Fuyu county, the affected farmers were provided with replacement farmland near the villages concerned. As a result, land compensation was kept in the affected villages for public welfare and production improvements.

9. For the relocated households, the building and attached property compensation was paid directly to them by the county resettlement office. In addition to cash compensation for lost property, they were provided with new housing plots in the same village. Each new housing plot was about 300 square meters, following local regulations. With the compensation, most relocated households were able to rebuild larger houses of better quality.

10. During the project construction period, about 80% of the local population from the villages were employed as laborers, being paid about CNY15–25 per day, which supplemented their family income. Each household was employed for a minimum of 2 person-months during construction.

11. The final project completion report prepared by the Executing Agency (EA) confirmed that an income survey was done. Local officials and village leaders interviewed stated that incomes were restored. A sample household survey of affected people conducted by the Project Completion Review Mission verified this.

D. Resettlement Cost

12. Because of the variations in resettlement impacts, compensation rates, and project design, the total actual cost of the compensation for land acquisition, house relocation, and affected electric and telecommunications facilities was CNY160.4 million ($19.4 million equivalent). The main reasons for the decrease are the four deferred interchanges to be built later when traffic grows, fewer taxes and fees reflecting the reduction of the land reclamation tax, and waiver of the water recourse fee and soil conversation fee.

E. Resettlement Schedule

13. JPEC submitted its land acquisition plan to Jilin Land Administration Bureau (JLAB) in August 1998. On 23 September 1998, JLAD approved the land acquisition. Consultation and disclosure were carried out in September 1998. A detailed survey of the land area to be acquired and a determination of land types were carried out and completed by the Provincial Land Survey and Planning Institute in September 1998. Between 5 and 20 October 1998, JLAD signed compensation contracts with all affected villages in the three counties. All compensation was paid to the affected villages and individuals between 20 October and 10 December 1998, prior to the new ADB-supported LAL[3] becoming effective.

F. Institutional Arrangements

14. A provincial leading group chaired by a provincial vice governor coordinated the land acquisition and resettlement process through groups at the village, township, county, and municipal levels. The actual land acquisition and resettlement activity was implemented by JPEC, the EA for the Project. A resettlement office, with staff from two city communications bureaus, land administration bureaus, and other relevant agencies, was established in JPEC to ensure timely and effective implementation of the land acquisition and resettlement. Resettlement offices were also established in Changchun and Songyuan cities and all the counties, districts, and townships. The overall process of preparing and implementing the land acquisition and resettlement was transparent to affected people and other local people. A number of interactive consultation and discussion meetings were held for all affected

[3] The new LAL became effective on 1 January 1999. But provincial regulations were approved several months later so there was no means to implement the new LAL.

communities with various government agencies. Resettlement-related information was made public in each affected village. In general, the entire process of planning and implementation was consultative and participatory.

G. Monitoring and Evaluation

15. Adequate internal monitoring and reporting were carried out by JPEC, but reporting to ADB was limited. For example, ADB was not informed that compensation rates were changed from those in the draft LARP. There was little supervision of resettlement activities by ADB; only one supervision mission was undertaken by a staff consultant in March 2000. The provincial audit office identified some resettlement issues, such as delays in the compensation payments during implementation, though the necessary mitigation measures were adopted on a timely basis.

H. Conclusions

16. In general, the implementation of the resettlement plan was satisfactory to the affected population. This was partly because the affected people had relatively large farms and the output value was low, so the impact of land loss was not severe. Also, the number of relocated households was small, so there was no need for reconstructing village infrastructure. This satisfaction is also reflected in the fact that the rural populations are investing in nonfarm or other alternative income-generating activities. Project annual audit reports confirmed that compensation funds were used for their intended purpose.

I. Recommendations

17. In the future the following matters should be given more attention: (i) ADB's approach on the resettlement plan should be accepted by the EA and should be compatible with national laws; (ii) better procedures and regular monitoring to ensure resettlement compliance should be adopted; (iii) ensuring external monitoring and evaluation as well as regular supervision by ADB staff, particularly prior to (to establish the baseline) and during resettlement implementation; and (iv) a resettlement completion report should be prepared prior to the midterm review to ensure good documentation and to take follow-up action, if required. For transport projects, conducting a resettlement assessment after the loan is closed is very difficult and not very effective.

COMPLIANCE WITH MAJOR LOAN COVENANTS
CHANGYU EXPRESSWAY

Covenant	Reference to Loan Documents	Status of Compliance
1. **Procurement.** All procurement to be subject to the provisions of the *Guidelines for Procurement under Asian Development Bank Loans*.	Loan Agreement (LA), Schedule 4, para. 2	Partly complied with. For some civil works contracts to be procured under international competitive bidding procedures, the Executing Agency contravened the *Guidelines* (paras. 29–30).
2. **Counterpart Financing.** JPEC will obtain, on a timely basis, all funds and resources necessary for project implementation and operation and management of the project facilities.	LA, Schedule 6, para. 2	Complied with.
3. **Construction Quality**. JPEC will ensure that the project expressway and link roads are constructed in accordance with MOC's Technical Standards of Highway Engineering. JPEC will also ensure that construction supervision, quality control, and contract management are performed in accordance with internationally accepted practices.	LA, Schedule 6, para. 3	Complied with.
4. **Road Safety**. To ensure a reduction in road accidents and a safe road network in the project area, JPEC will, in consultation with ADB, implement the road safety signage, communication, hazard barriers, traffic monitoring, and other design features of the project facilities recommended by the consultant conducting the road design safety audit of the Project. JPEC will submit to ADB for review a report on its emergency response system prior to opening of the project facilities.	LA, Schedule 6, para. 4	Complied with. Road safety signage, communication, guardrails, and traffic monitoring were implemented according to consultants' recommendations. Road safety audit was conducted prior to expressway opening to traffic. No major deficiencies were identified. A traffic police unit with 107 policemen and 16 patrol cars has been established to enforce traffic regulations on the expressway.
5. **Human Resource Development and Training.** JPEC will develop human resource development plans, including recruitment and training needs, based on their future requirements and corporate strategy. Prior to undertaking overseas training, JPEC, with the assistance of the international consultants, will prepare a training plan and program for the overseas training, a program of workshops to be delivered at JPEC by those trained overseas, and a list of training equipment and training aids required to strengthen and implement the training program.	LA, Schedule 6, para. 5	Complied with. Training evaluation reports have been submitted to ADB.

Covenant	Reference to Loan Documents	Status of Compliance
6. **Tolls.** The toll for the project expressway will be set at a level sufficient to fully satisfy debt service obligations, operating and maintenance costs, and depreciation in excess of debt service, and to generate a reasonable return on investment as adjusted for inflation from time to time. For the first 5 years of operations, JPEC will review the toll structure and levels annually and submit a report to ADB.	LA, Schedule 6, para. 7	Being complied with. Review of toll structure and levels submitted to ADB in October 2002. Review of tolls completed in October 2003 was provided to the Project Completion Review Mission. Toll structure was adjusted after 1 year of expressway operation. JPEC was reminded of its obligation to review the structure and level of tolls on an annual basis and submit a report to ADB.
7. **Nongovernment Financing**. Six months prior to the opening of the project facilities, JPEC will analyze the feasibility of attracting nongovernment investment funds on the basis of the project facilities, and report their conclusions to ADB.	LA, Schedule 6, para. 10	Complied with. Three service areas with parking areas were built under build-operate-transfer (BOT), attracting a total investment of CNY27 million. The BOT investors will operate the area for 15 years before transferring the operational authority to JPEC. JPEC will continue to investigate other sources of nongovernment financing.
8. **Corporate Governance**. At the midterm review and at project completion, JPEC will submit to ADB a report on measures taken and a plan of actions proposed to strengthen corporate governance in areas including: board composition, for example, the proportion and profile of outside directors, board committees, for example, for audit and executive compensation; the composition of these committees; and the preparation and disclosure of financial and corporate information.	LA, Schedule 6, para. 8	Complied with. JPEC is a limited liability company established by JPCD and registered in Jilin Province. JPEC is operating five expressway sections, including the project expressway. It has a seven-member board of directors. An outline corporate plan has been submitted to ADB.
9. **Strategic and Financial Planning**. At the midterm review and project completion, JPEC will submit to ADB a report on measures taken and a plan of actions proposed to strengthen strategic and financial planning. Such reports will include a set of physical and financial criteria for JPEC to continually assess its corporate performance.	LA, Schedule 6, para. 9	Complied with. As noted above, strengthening corporate management is one of the key objectives of JPEC. A plan has been submitted to ADB. However, further strengthening is necessary.
10. **Working and Debt Service Ratios**. To ensure financial sustainability of the project facilities, and of themselves, JPEC will maintain a working ratio for the project facilities of not more than 15% and a debt service ratio for the project facilities and themselves of not less than 1.2.	Project Agreement (PA), Sections 2.16 (a) and 2.18 (a)	Partly complied with. Working ratio met the requirement since the expressway opened to traffic. Debt service ratio is expected to meet the minimum requirements from 2004 onwards.

Covenant	Reference to Loan Documents	Status of Compliance
11. **Audited Accounts**. JPEC shall (i) maintain separate accounts for the Project and its overall operations; (ii) have such accounts and related financial statements audited annually, in accordance with appropriate auditing standards; and (iii) furnish to ADB, promptly after their preparation but in any event not later than 9 months after the close of the fiscal year to which they relate, certified copies of such audited accounts and financial statements, and the report of the auditors.	PA Section 2.09	Complied with. Audited project accounts and audited corporate financial statements have been submitted to ADB. The quality of audits is good and audit opinion covered issues relating to internal controls and resettlement activities. There were no qualified audit opinions issued during implementation.
12. **Environment**. JPEC will ensure that any adverse environmental impacts arising from the construction and operation of the project facilities will be minimized by implementing the mitigation measures, environmental monitoring program, and other recommendations presented in the EIA. JPEC shall submit to ADB annual reports on mitigation measures undertaken and on the results of environmental monitoring program.	LA, Schedule 6, para. 11	Complied with. Reporting on the environmental protection implementation has been submitted to ADB on a regular basis with the most recent report dated May 2003. An independent review of the environmental impacts was conducted in August 2003 by the Sino/Japanese Environmental Protection Center, which found that appropriate measures had been taken to protect the environment.
13. **Land Acquisition and Resettlement**. JPG and JPEC will ensure that all land and rights-of-way required for the Project are made available in a timely manner. JPG and JPEC will ensure that the resettlement plan agreed with ADB is carried out promptly and efficiently in line with ADB's Policy on Involuntary Resettlement. JPEC will keep ADB informed of the progress of implementation of the resettlement plans through quarterly progress reports and through reports to be submitted on completion of the resettlement plan and 1 year thereafter.	LA, Schedule 6, paras. 12–14	Partly complied with. Land acquisition and resettlement has been carried out in accordance with the resettlement plan and the laws and regulations of the PRC and Jilin province. ADB was not kept regularly informed of the resettlement activities. ADB did not give sufficient supervision in this area.
14. **Gender and Development.** JPG and JPEC will follow the principles of ADB's *Policy on Gender and Development* during implementation of the Project.	LA, Schedule 6, para. 15	Complied with. Women were employed in the implementation of the civil works and a significant number of women have been employed in the toll collection stations and service areas.
15. **Health Risks**. JPG and JPEC, together with the appropriate authorities, will ensure that contractors disseminate information on the risks of socially transmitted diseases to those employed during project implementation. JPG and JPEC, together with the appropriate authorities, will also ensure that similar	LA, Schedule 6, para. 16	Complied with. Information was disseminated during project implementation on the risks of socially transmitted diseases. Similar information is disseminated to transport operators during operation of the expressway.

Covenant	Reference to Loan Documents	Status of Compliance
information is disseminated to transport operators during operation of the expressway.		
16. **Monitoring and Evaluation**. JPEC will monitor and evaluate project effects to ensure that the project facilities are managed effectively and the benefits are maximized. JPEC will collect data agreed with ADB prior to the commencement of project implementation, at project completion, and then 5 years later.	LA, Schedule 6, para. 17	Being complied with. JPEC contracted with a domestic consulting company to carry out a comprehensive benefit monitoring and evaluation of the Project.
17. **Axle Loads**. JPEC will take appropriate measures to prevent overloading on the project expressway by installing vehicle axle weighing equipment at stations at selected entry points, and by making suitable arrangements for their operation in conjunction with the provincial public security bureaus.	LA, Schedule 6, para. 18	Complied with. Weigh-in-motion weighing stations, both fixed and portable, have been established under the Project and are in operation. As of June 2004, new regulations have been enacted requiring overloaded trucks to offload excess freight, before entering the expressway. This has had the effect of reducing the incidence of overloading from over 80% to less than 5%.
18. **Access Roads**. To ensure that the economic and social benefits of the Project are adequately extended to those in the project-influenced area, the Government will ensure that JPG and JPEC connect the project expressway to the adjacent road network through the construction of appropriate link roads and interchanges.	LA, Schedule 6, para. 19	Complied with. JPCD is implementing a comprehensive road rehabilitation and improvement program in Jilin province and the Project area.
19. **Design Review.** JPEC will ensure that the project expressway pavement is designed and constructed to withstand extreme climatic differences. JPEC will (i) submit pavement designs to ADB for review prior to ADB's approval of bid documents; (ii) submit a statement of alternative designs for pavement structures to be assessed; (iii) based on the assessment, amend the pavement designs prior to commencement of pavement works in 2000; and (iv) take into account advice received from the pavement design and construction consultants.	LA, Schedule 6, para. 20	Complied with. Pavement trial sections were built under the supervision of the international consultants. The pavement structure was designed and built based on the outcomes of the trial sections. The improved pavement design has reduced pavement cracking, but some cracking will continue as a result of harsh climatic conditions. This is expected and is not considered a significant problem. Two crack sealing machines have been procured under the project to ensure adequate pavement maintenance.

ADB = Asian Development Bank, EIA = environmental impact assessment, JPCD = Jilin Provincial Communications Department, JPEC = Jilin Provincial Expressway Corporation, MOC = Ministry of Communications.
Source: Asian Development Bank, Jilin Provincial Government, and Jilin Provincial Communications Department.

CONTRACT PACKAGING: APPRAISAL VS ACTUAL
CHANGYU EXPRESSWAY

Table A10.1: Contract Packaging at Appraisal

Project Component	Number of Contracts	Method of Procurement
Civil Works		
	1[a]	LCB
Roadworks	12	ICB
Equipment		
Maintenance, Toll, Communications, Safety, Office Equipment, and Vehicles	6	ICB
Consulting Services		
International	1	ICB
Domestic	1[a]	LCB

ICB = international competitive bidding, LCB = local competitive bidding.
[a] Expected to be financed from the Executing Agency's own resources.
Source: Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for Changchun-Harbin Expressway Project.

Table A10.2: Actual Contract Packages

Project Component	Number of Contracts	Method of Procurement
Civil Works		
	7[a]	LCB
Roadworks	6	ICB
Traffic Management and Road Safety Facilities	4	ICB
Equipment		
Road Maintenance and Vehicles	6	ICB
Traffic Management Monitoring System, Communications System, and Tolling System	1	ICB
Consulting Services		
International	1	ICB
Domestic	1[a]	LCB

ICB = international competitive bidding, LCB = local competitive bidding.
[a] Financed from the Executing Agency's own resources.
Source: Jilin Provincial Communications Department.

CONTRACT DETAILS FOR CIVIL WORKS, EQUIPMENT, AND CONSULTANTS
CHANGYU EXPRESSWAY

Contract No.	Description	Mode of Proc.	Contract Signing	Completion Date	Name of Contractor/ Supplier/Consultant	Curr.	Final Contract Amount	Dollar Equivalent	ADB Financing	
									Contract Curr.	$ Equiv.
Civil Works										
1. Main Expressway (ADB-financed)										
03	K21+000–K40+900	ICB	9 Dec 99	Jul 02	Baicheng City Highway Eng. Dept, PRC	CNY	223,770,576	27,033,498	105,173,429	12,705,896
07	K68+500–K81+000	ICB	9 Dec 99	Jul 02	Jilin Provincial Highway Eng. Bu., PRC	CNY	222,985,782	26,938,379	104,633,789	12,640,558
11	K123+100–K136+340	ICB	9 Dec 99	Jul 02	Jilin Expressway Dev. Co. Ltd., PRC	CNY	199,418,473	24,091,228	93,726,787	11,322,890
09	K94+000–K109+000	ICB	23 Dec 99	Jul 02	Jilin Provincial Great Wall Eng Corp. of the Third Construction Dept., PRC	CNY	218,330,010	26,375,981	102,615,735	12,396,787
10	K109+000–K123+100	ICB	22 Dec 99	Jul 02	Highway Proj. Co. Daqing Pet. Adm. Bu., PRC	CNY	219,952,361	26,571,674	95,074,227	11,485,584
13	K143+538–K148+923 and K0+000–K11+905	ICB	23 Dec 99	Jul 02	Liaoning Prov. Road and Pet. Adm. Bu., PRC	CNY	238,688,361	28,835,051	108,072,909	13,055,885
	Subtotal						**1,323,145,563**	**159,845,810**	**609,296,876**	**73,607,600**
2. Main Expressway (EA-financed)										
01	Soil Improvement Works	LCB	15 Sep 98	Jun 00	Jilin Prov. Highway Eng. Bu., PRC	CNY	286,965,199	34,667,531	0	0
02	K0+000–K21+000	ICB	25 Apr 00	Jul 02	Jilin Prov. Highway Eng. Bu., PRC	CNY	217,597,725	26,287,424	0	0
04	K40+900–K44+300	ICB	25 Apr 00	Jul 02	Jilin Prov. Highway Eng. Bu., PRC	CNY	234,323,572	28,308,030	0	0
05	K44+300–K56+900	LCB	25 Dec 99	Jul 02	Jilin Prov. Highway Eng. Bu., PRC	CNY	232,062,807	28,034,913	0	0
06	K56+900–K68+500	LCB	25 Dec 99	Jul 02	Jilin Prov. Highway Eng. Bu., PRC	CNY	242,366,953	29,279,731	0	0
08	K81+000–K94+000	ICB	25 Apr 00	Jul 02	Siping Road Bridge Gen. Corp., PRC	CNY	210,464,846	25,425,719	0	0
12	K136+340–K143+538	ICB	25 Apr 00	Jul 02	Jilin Prov. Highway Eng. Bu., PRC	CNY	174,013,783	21,022,159	0	0
	Subtotal						**1,597,794,885**	**193,025,507**	**0**	**0**
3. Traffic Management-Road Safety Facilities										
IFB-1	Corrugated Beam Steel Guardrail, Anti-dazzle Panel Contour Sign and Separating Fence (K0+000–K81+000)	ICB	26 Dec 01	Aug 02	Changchun City Ex. Guardrail Factory, PRC	CNY	46,103,761	5,570,070	21,265,592	2,569,223
IFB-2	-ditto- (K0+000–K10+840)	ICB	26 Dec 01	Aug 02	Jilin Yongda Group Co., Ltd., PRC	CNY	26,003,304	3,141,619	12,333,938	1,490,139
IFB-3	Marking	ICB	16 Oct 01	Aug 02	Jilin Jichang Comm. Dev. and Cons.Co. Ltd., PRC	CNY	4,653,074	562,158	2,330,980	281,616
IFB-4	Signs	ICB	16 Oct 01	Aug 02	Jilin Jichang Comm. Dev. and Cons. Co. Ltd., PRC	CNY	7,797,192	942,015	3,235,692	390,919
	Subtotal						**84,557,331**	**10,215,863**	**39,166,202**	**4,731,897**
	Total Civil Works						**3,005,497,779**	**363,087,180**	**648,463,078**	**78,339,497**

continued next page

Contract Package Details — *continued*

Contract No.	Description	Mode of Proc.	Contract Signing	Completion Date	Name of Contractor/ Supplier/Consultant	Curr.	Final Amount	$ Equiv.	ADB Financing Contract Curr.	ADB Financing $ Equiv.
Equipment										
1. Road Maintenance and Vehicles										
IFB-1	Survey and Test Equipment	ICB	30 Nov 01	Aug 02	Systeq Instruments Canada, Inc., CAN	$	398,927	398,927	398,927	398,927
IFB-2	Roller	ICB	30 Nov 01	Aug 02	Ingersoll-Rand Int'l. Sales, Inc., USA	$	167,198	167,198	167,198	167,198
IFB-3	Milling Machine	ICB	30 Nov 01	Aug 02	Wirtgen Hong Kong Ltd. HKG	Euro	165,000	162,579	165,000	162,579
IFB-4	Pavement Crack Sealing Machine	ICB	30 Nov 01	Aug 02	Huas International Holding Ltd., CAN	$	88,800	88,800	88,800	88,800
IFB-5	Multi-function Loader	ICB	30 Nov 01	Aug 02	China Comm Import and Export Corp., PRC	$	38,771	38,771	38,771	38,771
IFB-6	Obstacle Clearing Crane	ICB	30 Nov 01	Aug 02	Koto Works Co., Ltd., JPN	Yen	29,879,054	244,084	29,879,054	244,084
	Subtotal							**1,100,359**		**1,100,359**
	Long Truck	LCB	Dec 2002	31 Dec 02	First Automobile Works, PRC	CNY	450,000	54,217	0	0
	Grader	LCB	Dec 2002	31 Dec 02	Harbin Shihai Co., PRC	CNY	**2,400,000**	**289,157**	**0**	**0**
	Multi-function Dumper	LCB	Dec 2002	31 Dec 02	Beijing Crane Plant, PRC	CNY	1,500,000	180,723	0	0
	Water Spray Truck	LCB	Dec 2002	31 Dec 02	Beijing Car Factory, PRC	CNY	600,000	72,289	0	0
	Obstacle Clear Vehicle	LCB	Dec 2002	31 Dec 02	First Automobile Works, PRC	CNY	1,500,000	180,723	0	0
	Small Maintenance Devices	LCB	Dec 2002	31 Dec 02	Anshan Machinery Device Factory, PRC	CNY	420,000	50,602	0	0
	Operation and Admin. Development	LCB	Dec 2002	31 Dec 02	First Automobile Works, PRC	CNY	590,000	71,084	0	0
	Power Supply Facilities	LCB	Apr 2002	Aug 04	Changchun Huaneng Power Supply Co., PRC	CNY	2,930,000	353,012	0	0
	Subtotal						**10,390,000**	**1,251,807**	**0**	**0**
2. Traffic Management Monitoring System, Comm., and Tolling System		ICB	26 Jul 02	Aug 2002	Bright Oceans Corp., PRC	$	108,226	108,226	108,226	108,226
						CNY	23,294,189	2,814,328	23,294,189	2,814,328
	Subtotal							**2,922,554**		**2,922,554**
	Total Equipment							**5,274,721**		**4,022,913**
Consultants										
International (43 person-months)		ICB	26 Jul 99	Sep 2002	ITALCONSULT, S.p.a., ITAL	$	901,942	901,942	901,942	901,942
Domestic								19,262,371	0	0
	Construction Supervision (6,720 person-months)	LCB	25 Apr 99	Sep 2002	Jilin Prov. Highway Eng. Supervision Co. Ltd., PRC	CNY	59,624,479	7,204,417		

continued next page

Contract Package Details—*continued*

Contract No.	Description	Mode of Proc.	Contract Signing	Completion Date	Name of Contractor/ Supplier/Consultant	Curr.	Final Amount	$ Equiv.	ADB Financing Contract Curr.	ADB Financing $ Equiv.
	Quality Monitoring	LCB	May 1999	Aug 2002	Jilin Prov. Highway Quality Monitoring Station, PRC	CNY	5,738,494	693,381	0	0
	Survey and Design	LCB	May 1997	Aug 2002	Jilin Prov. Highway Survey and Design Institute, PRC	CNY	47,272,856	5,711,973	0	0
	Research and Test	LCB	May 1998	Aug 2002	Jilin Prov. Traffic Science Research Institute, PRC	CNY	16,165,970	1,953,332	**0**	**0**
	JPEC Administration Exp.	LCB	Oct 1998	Sep 2002	Jilin Provincial Expressway Corp, PRC	CNY	19,127,191	2,311,136	0	0
	Drawing up exp. for quotas	LCB	Oct 1998	Sep 2002	Jilin Prov. Traffic Eng Cost Adm. Station PRC	CNY	3,260,000	393,905	0	0
	Design Review Expenses	LCB	Oct 1998	Oct 1999	Beijing Huatainhong Consulting Co., PRC	CNY	320,000	38,666	0	0
	Power Supply Facilities	LCB	Apr 2002	Aug 2002	Dehui City Power Supply Bu, PRC	CNY	7,908,320	955,561	0	0
	Total Consultants							**20,164,313**	**901,942**	**901,942**
	Total Contracts							**388,526,213**		**83,264,352**

bu = bureau, co = company, comm = communications, cons = construction, corp = corporation, curr = currency, dev = development, eng = engineering, equiv = equivalent, gen = general, ICB = international competitive bidding, int'l = international, LCB = local competitive bidding, proc = procurement, prov = provincial.
Source: Asian Development Bank records.

TRAFFIC FORECASTS
CHANGYU EXPRESSWAY

A. General

1. The traffic forecast has been updated taking into account actual traffic on the project expressway and national highway (NH) 102. The assumptions underlying the traffic forecast made at the time of appraisal have been reviewed and updated based on the prevailing economic conditions at the time of the Project Completion Review Mission and information collected from Jilin Provincial Expressway Corporation (JPEC).

B. Traffic Flow, Composition, Growth Rate, and Diversion from NH102

2. At appraisal, average annual daily traffic (AADT) for Changyu Expressway was estimated at 9,524 medium truck equivalent (MTE) for 2003, the first year the expressway was expected to open to traffic and to grow to 16,832 MTE in 2010 and 34,678 MTE in 2022, which represented annual average growth rates of 8.5% during 2002–2010 and 6.2% during 2011–2022 (Table A12.1). The actual traffic on the expressway was 6,961 MTE in 2003, about 27% lower than that forecast at appraisal. However, the actual traffic increased at the rate of 11% in first half of 2004 higher than appraisal projection at 8.5%[1] (Table A12.2). Since the opening of the expressway, traffic has been rapidly diverted from the parallel existing local road NH102. The AADT of NH102 declined from 5,603 MTE in 1998 to 3,713 MTE in 2003 (Table A12.3).

3. Based on data collected and observations, the traffic composition for the expressway varied from appraisal projections. At appraisal, the freight and passenger (in MTE) mix on the project expressway was expected to be 47:53. The actual ratio (in MTE) was 86:14 on the expressway. The higher than anticipated freight traffic occurs because province-wide through traffic is concentrated in the project expressway, which provides the major link to the more developed provinces in the south and east and Dalian port. This mix will change over time with a higher proportion of passenger traffic in conjunction with further economic development.

4. The new Dacheng corn processing facility near Dehui will begin production in October 2004 and will reach production of 4 million tons per year in 2005. A significant amount of generated traffic is expected from late 2004 and continued growth is expected as the facility increases production up to full capacity of 10 million tons per year in 2010. Other industrial development is expected as a result of the Dacheng facility. In conjunction with the new corn processing facility, Dehui city government will create Binjiang new city, which will have a population of 20,000 in 2005 and 80,000 by 2010. The new industrial development and increased population in the area will generate 885 AADT (in MTE) from 2005 to 2010, and 1,982 AADT (in MTE) from 2011 to 2022.

5. Total traffic was 10,674 AADT (in MTE) in the corridor (project expressway and NH102 combined) in 2003, which was 50% higher than the actual traffic on NH102 in 2002. More than 80% of the traffic on the expressway is through traffic. The expressway accounted for 65% of the total traffic in the corridor in 2003. Project Completion Review Mission estimates of the traffic growth rates for Changyu Expressway are 12.3% for 2004–2009, 8.3% for 2010-2015, and

[1] Based on the Project Completion Review Mission analysis, traffic grows faster in the second half of the year (harvesting season) than the first half of the year (the coldest months of the year).

6.2% for 2016–2022. The growth rates are higher than forecast at appraisal due to actual and anticipated economic growth rates,[2] vehicle ownership in the project area, and expected generated traffic from Binjiang new city. The revised traffic forecast for the project expressway is 15,974 MTE in 2010 and 33,572 MTE in 2022, which are lower than forecast at appraisal mainly due to lower than expected traffic diversions from the NH102. Also, the potential diversion from rail traffic has not materialized. The revised traffic forecast is given in Table A12.2 and is compared to the appraisal forecast in Table A12.1. Traffic on NH102 is shown in Table A12.3.

Table A12.1: Expressway Traffic Forecast at Appraisal for Changyu Expressway

Year	Freight (in MTE)	Passengers (in MTE)	Total (in MTE)	Growth Rate (%)	Parallel NH102 (in MTE)
1995					5,923
2003	4,476	5,048	9,524		2,187
2005	5,267	5,939	11,206	8.5	2,254
2010	8,163	8,668	16,832	8.5	2,362
2015	11,033	11,715	22,747	6.2	2,419
2020	15,371	15,832	30,742	6.2	2,475
2022	17,339	17,339	34,678	6.2	2,781

MTE = medium truck equivalent.
Source: Asian Development Bank estimates.

Table A12.2: Actual Traffic and Revised Traffic Forecast for Changyu Expressway

	Freight (in MTE)					**Passengers** (in MTE)			
Year	Small Truck	Medium Truck	Large Truck	Trailer	Total	Car	Bus	Total	AADT (in MTE)
2003	1,263	1,989	2,447	261	5,960	657	344	1,001	6,961
2005	1,535	2,719	3,737	337	8,328	849	453	1,302	9,630
2010	2,081	4,234	6,638	614	13,567	1,551	856	2,407	15,974
2015	2,556	5,316	9,429	1,013	18,314	2,549	1,389	3,938	22,252
2020	2,974	6,046	13,082	1,585	23,687	3,976	2,155	6,131	29,818
2022	3,159	6,224	14,974	1,895	26,252	4,748	2,572	7,320	33,572

AADT = average annual daily traffic, MTE = medium truck equivalent.
Note: Conversion factor: 1 MTE = 2 passenger car units; 1 trailer = 1.5 MTE.
Source: Jilin Provincial Expressway Corporation and Asian Development Bank estimates.

[2] Table A15 of Appendix 15 shows a comparison of socioeconomic indicators of the project area and Jilin province.

Table A12.3: Actual Traffic and Revised Traffic Forecast on NH102 (Changchun-Lalinhe Section)

	Freight (in MTE)					**Passengers** (in MTE)			
Year	**Small Truck**	**Medium Truck**	**Large Truck**	**Trailer**	**Total**	**Car**	**Bus**	**Total**	**AADT** (in MTE)
1995	793	1,460	513	604	3,370	693	289	981	4,351
1996	990	1,237	786	717	3,730	691	412	1,103	4,832
1997	1,153	1,593	763	567	4,075	917	453	1,370	5,446
1998	1,134	1,429	883	637	4,084	1,018	501	1,519	5,603
1999	1,116	1,265	1,004	707	4,092	1,120	548	1,668	5,760
2000	1,066	1,131	1,630	587	4,414	1,187	372	1,559	5,973
2001	1,191	815	2,687	598	5,292	1,427	448	1,876	7,167
2002	858	597	2,831	692	4,978	1,170	520	1,689	6,667
2003	629	438	981	293	2,341	935	437	1,372	3,713
2005	489	724	666	352	2,408	1,187	529	1,716	4,124
2010	726	1,076	753	511	3,321	1,155	753	1,908	5,229
2015	991	1,453	925	462	4,062	1,560	991	2,550	6,613
2020	1,286	1,891	983	303	4,614	1,783	1,210	2,994	7,608
2022	1,349	1,984	1,031	317	4,840	1,748	1,270	3,017	7,857

AADT = average annual daily traffic, MTE = medium truck equivalent.
Note: Conversion factor: 1 MTE = 2 passenger car units; 1 trailer = 1.5 MTE.
Source: *National Highway Traffic Counting Manual* (1995–2003), Ministry of Communications and Asian Development Bank estimates.

ECONOMIC EVALUATION OF CHANGCHUN-HARBIN EXPRESSWAY

A. Project Cost and Benefits

1. The economic evaluation of Changchu-Harbin Expressway followed the methodology used at appraisal, which compares the with-project and without-project situations.[1] Without the Project, traffic in the project area will continue to use the existing national highway (NH) 102. The without-project case consists of minimum improvements to existing parallel road (NH102) to maintain a volume-to-capacity ratio of 1.0. The economic analysis covers 24 years, 1998–2022, comprising 4 years of construction and 20 years of expressway operation.

2. The project costs include capital, and operation and maintenance (O&M) costs. Based on actual traffic performance, between 50% and 60% of NH102 traffic has diverted to the expressway. Traffic is now lower on NH102, reducing congestion and vehicle operating costs (VOCs). The reduced transfer costs with the Project have stimulated investment and agro-processing production in the project area, and some additional travel by passengers. For example, there is now significantly more traffic between Harbin and Shuangcheng, a satellite city of Harbin. The recent construction of the Dacheng corn processing facility in Dehui will generate some additional traffic along the project expressway. The diversion of freight and passengers from rail services in the transport corridor was not realized. The recent electrification of the railway has increased the capacity and quality of service of the railway.

3. As envisaged at appraisal, the Harbin Ring Road section of the Project acts as a bypass for the city, between the main alignments of the project expressway and the Hatong expressway. The ring road does not carry much intracity traffic because it is 13 km from the city center and the whole ring road is yet to be completed. The Ring Road will attract some intracity traffic after 2007 when the whole ring road is completed and as the city grows. The two ring road sections for Changchun serve a bypass function for through traffic and carry intracity traffic that prefers speed to distance. The resulting benefits from reduced congestion and accidents for both cities have not been included in the economic analysis.

B. Value of Costs and Benefits

4. Financial costs were converted to economic costs by applying shadow prices for each of the input item. Project costs and benefits were evaluated based on constant 2003 economic prices expressed in CNY. The overall economic cost is about 95% of the financial cost. The total economic cost of the Project at the end of project implementation in constant 2003 prices was 5% less than estimated at appraisal.

5. Benefits derived from the Project include (i) VOC savings for both diverted and generated traffic on the expressway, (ii) VOC savings on the remaining vehicles using NH102 due to reduced traffic congestion, (iii) avoided maintenance and investment expenditure on NH102, (iv) savings in passenger time costs on the expressway, (v) savings in time costs for the remaining passengers using NH102, and (v) avoided accident costs on the expressway and NH102 (Table A13.1).

[1] At appraisal, the economic evaluation for the Changchu-Harbin Expressway was presented in the RRP as a whole (both sections together) because it is an integrated project.

Table A13.1: Type of Benefit as Proportion of Total Benefits

Type of Benefit	% of Total Benefits
VOC Savings	64.7
Travel Time Savings	29.2
Accident Savings	1.9
Benefit from Generated Traffic	2.4
Savings in Capital and O&M Costs for NH102	1.8
Total	**100.0**

NH = national highway, O&M = operation and maintenance, VOC = vehicle operating costs.
Source: Asian Development Bank estimates.

6. The calculation of VOC and time costs was based on discussions with transport engineers and data available in Heilongjiang and Jilin provinces. Major VOC savings are due to improved road conditions and vehicle speeds. VOC savings applied in the calculation are shown in Table A13.2. Passenger time savings have been realized from higher vehicle speed for different types of vehicles. The time value for nonwork-related trips is 10% of that for the work-related trips in 2003, 15% in 2010, 20% in 2020 and 25% in 2022. There is considerable evidence that passengers now pay more attention to time savings and treasure leisure time as quality of life improves.

Table A13.2: Value of VOC and Average Speed

Item	Car	Bus	Light	Heavy	Trailer
VOC Value (CNY/km)					
NH102	1.13	1.76	1.55	2.04	2.84
Expressway	0.92	1.63	1.28	1.73	2.63
Average Speed (km/h)					
NH102	50	40	40	30	30
Expressway	100	80	80	70	70

km/h = kilometers per hour, NH = national highway, VOC = vehicle operating cost.
Source: Asian Development Bank estimates.

7. Reducing in the number of traffic accidents is an important social objective. In terms of benefits, though, it accounts for less than 2% of the total. This is because only direct property damages are considered. The project expressway will reduce accidents in the corridor over the Project's life and this will have a substantial positive social impact.

C. Economic Internal Rate of Return

8. The recalculated economic internal rate of return (EIRR) of the Changchun-Harbin expressway was 16.3%, compared with 18.9% at appraisal, due mainly to lower traffic during the first few years that the expressway is open to traffic (Table A13.4). The EIRR of the Changyu Expressway Project was recalculated at 17.1% compared with 21.5% at appraisal (Table A13.5). The EIRR calculation was conservative, as the project costs and benefits of improved access roads were not included due to unavailability of evaluation data. The calculated EIRR is higher than the social discount rate of 12%; the Project can be considered economically viable.

9. A sensitivity analysis to assess the risk level is shown in Table A13.3. The Project is more sensitive to a change in benefits than in costs. The results of the sensitivity test show that

a decrease in benefits by 30% is needed before the Project reaches an EIRR of 12%. The analysis indicates that the combination of circumstances to make the Project economically unviable is unlikely.

Table A13.3: Sensitivity Analysis

Item	Change (%)	EIRR (%)	NPV (CNY million)	Switching Value (%)
1. Base Case		16.3	2,731	
2. Operation and Maintenance Cost	10	16.3	2,706	1,087
3. Benefits	(10)	15.0	1,760	32
4. Combination of 2 and 3		14.9	1,734	31

EIRR = economic internal rate of return, NPV = net present value.
Source: Asian Development Bank estimates.

Table A13.4: Economic Internal Rate of Return, 1998–2022 (Changchun-Harbin Expressway)
(constant 2003 prices, domestic price numeraire, CNY million)

	Project Costs			Project Benefits					Project
Year	Capital	O&M	Total	VOC Savings	Time Savings	Accidents Savings	Generated Traffic	Total Benefits	Net Benefit
1998	276.5	0.0	276.5	0.0	0.0	0.0	0.0	0.0	(276.5)
1999	1,507.4	0.0	1,507.4	0.0	0.0	0.0	0.0	0.0	(1,507.4)
2000	1,512.0	0.0	1,512.0	0.0	0.0	0.0	0.0	0.0	(1,512.0)
2001	1,506.8	5.8	1,512.6	0.0	0.0	0.0	0.0	0.0	(1,512.6
2002	1,602.0	28.5	1,630.5	115.1	97.8	10.2	3.4	226.5	(1,404.0)
2003	(10.7)	47.8	37.2	192.9	112.5	14.2	4.1	323.7	286.5
2004	(55.7)	50.4	(5.3)	258.1	133.1	16.3	5.4	412.8	418.1
2005	18.3	51.7	70.0	344.0	158.3	18.7	14.4	535.3	465.3
2006	20.3	53.5	73.8	486.7	184.4	20.7	19.0	710.8	637.0
2007	23.4	55.9	79.3	661.5	214.0	23.1	23.9	922.4	843.1
2008	(13.7)	58.2	44.5	910.9	267.8	27.6	31.2	1,237.6	1,193.1
2009	(13.7)	58.4	44.7	1,181.5	326.3	30.7	37.8	1,576.4	1,531.6
2010	(127.9)	59.2	(68.7)	1,471.0	373.5	33.1	68.6	1,946.2	2,014.9
2011	(18.3)	59.3	41.0	1,575.8	446.6	35.6	69.4	2,127.5	2,086.5
2012	498.5	59.8	558.3	1,691.2	531.2	38.5	70.4	2,331.2	1,773.0
2013	(18.3)	60.2	42.0	1,815.2	632.4	41.5	71.4	2,560.5	2,518.5
2014	(18.3)	60.7	42.4	2,005.4	770.2	47.4	74.6	2,897.5	2,855.1
2015	(18.3)	61.2	42.9	2,118.6	904.3	50.2	75.3	3,148.4	3,105.5
2016	(18.3)	61.6	43.3	2,236.1	1,068.6	52.9	77.4	3,435.0	3,391.7
2017	(18.3)	62.1	43.9	2,362.7	1,256.3	55.9	79.7	3,754.5	3,710.7
2018	(18.3)	62.5	44.2	2,496.5	1,476.2	59.0	82.8	4,114.5	4,070.2
2019	(18.3)	63.1	44.8	2,638.0	1,739.0	62.2	86.4	4,525.5	4,480.7
2020	(132.4)	63.6	(68.8)	2,787.5	1,860.2	65.5	87.1	4,800.4	4,869.2
2021	(22.8)	64.1	41.3	3,113.1	2,220.3	68.9	95.8	5,498.2	5,456.9
2022	(3,229.2)	64.8	(3,164.4)	3,468.1	2,831.8	68.3	108.3	6,476.5	9,640.9
								Net Present Value at 12%	2,731.2
								Economic Internal Rate of Return	16.3%

O&M = operation and maintenance, VOC = vehicle operating cost.
Source: Asian Development Bank estimates.

Table A13.5: Economic Internal Rate of Return, 1998–2022
Changyu Expressway
(Constant 2003 economic prices, domestic price numeraire, CNY million)

	Project Economic Cost			Project Economic Benefits					Project
Year	Capital	O&M	Total	VOC Saving	Time Savings	Accident Savings	Generated Traffic	Total Benefits	Net Benefits
1998	207.4	–	207.4	–	–	–	–	–	(207.4)
1999	922.3	–	922.3	–	–	–	–	–	(922.3)
2000	802.8	–	802.8	–	–	–	–	–	(802.8)
2001	707.2	–	707.2	–	–	–	–	–	(707.2)
2002	1,044.8	5.5	1,050.3	70.6	77.7	5.7	–	154.0	(896.3)
2003	(7.3)	22.0	14.7	137.4	85.8	10.1	–	233.3	218.6
2004	(28.3)	22.8	(5.5)	178.1	98.3	11.0	–	287.4	292.9
2005	22.6	24.1	46.7	235.7	113.7	12.6	7.5	369.5	322.8
2006	24.6	25.7	50.3	328.9	129.2	13.9	9.8	481.8	431.5
2007	27.8	27.8	55.6	441.9	145.4	15.4	12.3	614.9	559.3
2008	(9.4)	30.0	20.6	578.4	173.1	17.0	14.6	783.1	762.5
2009	(9.4)	30.2	20.8	742.9	206.1	18.8	17.1	984.9	964.0
2010	(87.5)	30.7	(56.8)	920.1	237.6	20.2	44.3	1,222.2	1,279.0
2011	(12.5)	30.7	18.2	983.7	280.3	21.7	44.3	1,330.0	1,311.8
2012	319.6	31.0	350.6	1,054.9	327.7	23.3	44.4	1,450.2	1,099.6
2013	(12.5)	31.3	18.8	1,131.2	383.3	25.1	44.4	1,583.9	1,565.1
2014	(12.5)	31.5	19.0	1,213.0	448.6	26.9	44.5	1,733.0	1,713.9
2015	(12.5)	31.8	19.3	1,284.0	518.6	28.4	44.5	1,875.6	1,856.2
2016	(12.5)	32.1	19.6	1,357.0	606.1	29.9	44.5	2,037.5	2,017.9
2017	(12.5)	32.4	19.9	1,436.6	701.6	31.5	44.6	2,214.2	2,194.3
2018	(12.5)	32.7	20.2	1,520.9	788.5	33.1	44.6	2,387.1	2,367.0
2019	(12.5)	33.0	20.5	1,610.2	886.9	34.8	44.6	2,576.6	2,556.1
2020	(90.6)	33.3	(57.3)	1,704.8	970.5	36.5	44.7	2,756.5	2,813.8
2021	(15.6)	33.6	18.0	1,906.3	1,104.3	38.2	47.5	3,096.4	3,078.4
2022	(1,865.5)	33.9	(1,831.6)	2,126.4	1,290.7	35.8	50.3	3,503.2	5,334.8
							Net Present Value @ 12 percent		1,851.2
							Economic Internal Rate of Return		17.1%

O&M = operation and maintenance, VOC = vehicle operating cost.
Source: Asian Development Bank estimates.

FINANCIAL EVALUATION
CHANGYU EXPRESSWAY

A. General

1. The projected financial statements of the Changyu Expressway Project were prepared in current terms for the period 1998–2022.[1] Construction was completed in 2002, and the first full year of operation was 2003. The assumed local inflation rates are 3% for 2004–2022. The original exchange rate between US dollar and CNY was CNY8.28 per dollar at appraisal and the same rate was used in the project completion review evaluation.

B. Financial Projections

2. Operating revenues from tolls are projected based on revised traffic forecast and a base toll rate of CNY0.40 per passenger car per kilometer. Corresponding tolls for other vehicle types are CNY0.60 for a medium truck, CNY0.80 for a bus and a large truck, CNY1.20 for an extra large truck, and CNY2.00 for a trailer[2] (Table A14.1). The toll charges are assumed to increase in current terms once every 5 years to keep up with about two thirds of inflation (10% increase in 5 years).

Table A14.1: Toll Levels for Changyu Expressway

(CNY/vehicle-km)

Effective Date	Small Car/Bus	Medium Truck	Bus	Large Truck	Extra Large Truck	Trailer/ Container
Oct 2002–Oct 2003	0.35	0.50	0.50	0.60	0.60	1.20
Nov 2003–Present	0.40	0.60	0.80	0.80	1.20	2.00

Source: Jilin Provincial Expressway Corporation.

3. Annual incremental operating and maintenance (O&M) costs are calculated based on 2003 prices as follows: (i) salaries and other administration costs totaled CNY8.3 million in 2003. The number of staff is expected to increase as traffic grows and additional interchanges open to traffic during 2004–2007, (ii) materials and utilities at an average cost of CNY1.8 million per year, and (iii) routine and spot maintenance costs are estimated at CNY50,000 and CNY30,000 per km per year, respectively. From 2007 onward, operation costs are projected to increase in accordance with inflation. Maintenance costs are projected to increase at 5% annually in line with growth of traffic, reflecting additional expenses required rather than the impact of inflation. In current prices, the annual operating and maintenance costs are projected to rise from CNY24.8 million in 2004 to CNY42.7 million in 2012 and CNY62.8 million by 2022. In addition, periodic maintenance would be required after 10 years of operation at a unit cost of CNY2.27 million per km in 2003 prices and CNY2.96 million in 2012 prices.

4. Depreciation is calculated on a declining balance depreciation method with an average life of about 40 years of the main expressway component, 20 years of pavement component, and 10 years for equipment.

5. Two types of taxes are considered in the financial evaluation: business taxes of 5.5% on gross revenue and corporate income tax at 33% of net profit.

[1] A full set of financial statements (1998–2022) for the Changyu Expressway was prepared and is available upon request.

[2] The toll structure was adjusted after 1 year of expressway operation. The Jilin provincial government approved the toll rate increase proposal of Jilin Provincial Expressway Corporation on 11 November 2003.

6. The Project was funded 46% by equity or grants and 54% by long-term loans. In October 2003, Jilin Provincial Expressway Corporation prepaid the principal and interest of the ADB loan. At present, two outstanding loans come from the China Development Bank (CDB), including a US dollar loan borrowed for prepayment of the ADB loan and a local currency loan borrowed during construction. The local currency loan from CDB has a term of 17 years with a fixed interest rate of 5.76%, including a 5-year grace period repayable from 2003. In November 2003, to prepay the ADB loan, a US dollar loan was obtained from CDB with a term of 20 years repayable from 2004, at 6-month London interbank offered rate and a fixed spread of 0.8% per annum. The two CDB loans are included in the financial statement shown in Table A14.2 (pages 48–49).

7. The main conclusions from the financial statement are as follows: (i) the projected financial statement indicates that the forecast revenues under the base assumptions are sufficient to cover annual recurrent costs, depreciation, and debt service, and to generate reasonable profits from expressway operation; (ii) the working ratio remains below 12% from the first year of full operation (2003); (iii) the debt service coverage ratio is expected to remain above 1.2 from the second year of the expressway opening to traffic (2004); and (iv) the debt-to-equity ratio decreases steadily from 55:45 in 2002 to 41:59 by 2007 and 32:68 by 2009, which indicates an acceptable financial position for the expressway under the proposed financing plan and toll structure.

C. Financial Analysis

8. The financial internal rate of return (FIRR) was evaluated using with- and without-project comparison. The major assumptions used for calculation of the FIRR are: (i) all projections were expressed in constant 2003 prices and covered the period 1998–2022; (ii) capital costs reflected the actual capital expenditures incurred during 1998–2002 but exclude interest during construction (capital expenditures of four deferred interchange costs during 2004–2007 were also included); (iii) O&M was based on annual incremental expenses up to 2003 (from 2004 onward, all incremental O&M costs are adjusted to 2003 prices); (iv) operating revenues beyond 2003 were based on the revised traffic forecast and adjusted to 2003 prices, while toll rates were assumed to decline in real terms (para. 2), and the actual toll rate for medium truck equivalent-kilometer (CNY0.60), effective since November 2003, was higher than projected at appraisal (CNY0.55); and (v) the residual value of the expressway was estimated based on a weighted depreciation of 2.92% per year.

9. The estimated weighted average cost of capital (WACC), after tax, in real terms was calculated using the actual capital mix and costs of funds. Costs have been considered as follows: (i) the applicable 10-year fixed swap rate plus a provision for CDB's spread of 0.8% is used for US dollar debt, (ii) the estimated fixed interest costs of 5.76% per annum is used for the domestic loan funds, and (iii) the cost of equity was assumed to be 8%. The cost of debt is also adjusted to reflect the impact of income tax of 33%. The nominal cost of debt is converted to the real cost of debt by applying the domestic average inflation rate for domestic currency-denominated debt.

10. The recalculated FIRR in 2003 constant prices, computed on an after-tax basis, is 7.5%, compared with 7.6% at the time of appraisal (Table A14.3) due mainly to lower initial traffic than estimated at appraisal. This compares favorably with real WACC, also computed on an after-tax basis, of 3.4%[3] (Table A14.3). The Project is considered both financially viable and sustainable. Sensitivity tests indicate that the conditions causing the Project's viability to fall below WACC are unlikely to occur. The sensitivity of the Project's financial indicators to cost and revenue variations is shown in Table A14.4.

[3] Information on WACC was not available at appraisal.

Table A14.3: Financial Internal Rate of Return
(CNY million)

Year	Capital Investment	Project Revenues	Total O & M costs	Total Income and Business Tax	Net Cash Flow After Tax
1998	(227.3)	0.0	0.0	0.0	(227.3)
1999	(831.0)	0.0	0.0	0.0	(831.0)
2000	(632.7)	0.0	0.0	0.0	(632.7)
2001	(771.7)	0.0	0.0	0.0	(771.7)
2002	(913.9)	38.3	(5.8)	(2.1)	(883.5)
2003	0.0	192.0	(23.2)	(10.6)	158.2
2004	(32.8)	280.2	(24.1)	(29.9)	193.5
2005	(33.8)	342.1	(25.4)	(58.7)	224.2
2006	(35.8)	364.9	(27.1)	(72.5)	229.4
2007	(39.2)	389.5	(29.4)	(86.5)	234.4
2008	0.0	416.0	(31.7)	(101.1)	283.3
2009	0.0	490.9	(31.9)	(134.6)	324.5
2010	0.0	552.6	(32.4)	(162.5)	357.7
2011	0.0	576.5	(32.4)	(175.8)	368.2
2012	(350.7)	601.9	(32.7)	(189.3)	29.2
2013	0.0	628.6	(33.0)	(191.9)	403.7
2014	0.0	725.5	(33.3)	(232.9)	459.3
2015	0.0	749.5	(33.6)	(246.2)	469.7
2016	0.0	774.8	(33.9)	(257.9)	483.0
2017	0.0	801.0	(34.2)	(269.9)	496.9
2018	0.0	828.5	(34.5)	(281.1)	512.8
2019	0.0	946.2	(34.8)	(352.4)	558.9
2020	0.0	979.1	(35.2)	(342.2)	601.8
2021	0.0	1013.5	(35.5)	(357.1)	621.0
2022	1,944.9	1049.2	(35.8)	(372.6)	2,585.7
			FIRR (after corporate tax)		7.5%
			WACC		3.4%

FIRR = financial internal rate of return, O&M = operation and maintenance, WACC = weighted average cost of capital.
Source: Asian Development Bank estimates.

Table A14.4: Sensitivity Analysis

Item	WACC (%)	FIRR (%)	Minimum DSCR[a]	Average Net Income (CNY million)	Minimum Annual Cash Flow (CNY million)
Base Case	3.4	7.5	1.2	471	19
1. Revenues decrease by 10%	3.4	6.8	1.1	411	5
2. O & M increase by 10%	3.4	7.4	1.2	468	16
3. Worst scenario (1+2)	3.4	6.7	1.1	408	2

DSCR = debt service coverage ratio, FIRR = financial internal rate of return, WACC = weighted average cost of capital.
[a] Minimum debt service coverage ratio after 2003.
Source: Asian Development Bank estimates.

Table A14.2 Financial Statements For the Year Ending 31 Dec 1998 Through 31 December 2009 (in CNY millions)

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
A. Projected Income Statement												
Operating Revenues												
Toll Revenues					38.3	193.0	305.4	384.0	421.9	463.9	510.4	620.3
Less Business Taxes					2.1	10.6	16.8	21.1	23.2	25.5	28.1	34.1
Net Operating Revenue					36.2	182.4	288.6	362.9	398.7	438.4	482.3	586.2
Operating Expenses												
Operation & Maintenance					0.0	23.2	24.8	26.9	29.6	33.1	36.7	38.1
Major Maintenance-Capitalized												
Total Operating Expenses					0.0	23.2	24.8	26.9	29.6	33.1	36.7	38.1
Operating EBDIT					36.2	159.2	263.8	336.0	369.1	405.3	445.6	548.1
Less Depreciation					0.0	113.6	110.3	107.1	103.9	100.9	98.0	95.1
Operating EBIT					36.2	45.6	153.5	228.9	265.2	304.4	347.6	453.0
Less Interest Expense - ADB					0.0	40.5	39.2	37.9	36.5	35.1	33.6	32.0
Interest Expense - Local					0.0	76.0	72.0	66.2	58.9	51.5	43.9	37.5
Operating EBT					36.2	(70.9)	42.3	124.8	169.8	217.8	270.1	383.5
Income Taxes							14.0	41.2	56.0	71.9	89.1	126.5
Net Income					**36.2**	**(70.9)**	**28.3**	**83.6**	**113.8**	**145.9**	**181.0**	**256.9**
B. Projected Cash Flow Statement												
Cash Flows from Operating Activities												
Net Income					36.2	(70.9)	28.3	83.6	113.8	145.9	181.0	256.9
Add (deduct) items not requiring cash:												
Depreciation						113.6	110.3	107.1	103.9	100.9	98.0	95.1
Amortization of deferred assets												
Non-cash charges (credits) to income					36.2	42.7	138.6	190.7	217.7	246.8	279.0	352.0
Changes in accounts payable and receivables	65.4	137.0	(244.2)	210.0	(65.2)	(99.5)	0.2	0.3	0.4	0.6	0.5	0.2
Net Cash provided by Operating Activities	65.4	137.0	(244.2)	210.0	(29.0)	(56.8)	138.8	191.0	218.1	247.4	279.5	352.2
Cash flow from investing activities												
Construction costs	(261.9)	(957.5)	(729.0)	(889.2)	(1,053.1)	0.0	(33.8)	(35.8)	(39.2)	(44.1)	0.0	0.0
Major repairs and replacements												
Net Cash provided by Investment Activities	(261.9)	(957.5)	(729.0)	(889.2)	(1,053.1)	0.0	(33.8)	(35.8)	(39.2)	(44.1)	0.0	0.0
Cash flows from financing activities												
Proceeds from MOC grant	0.0	330.0	133.0	430.0	172.0							
Proceeds from Provincial Grant	0.0	0.0	189.0	8.7	6.0							
Proceeds from Bonds	75.0	30.0	110.0	300.0	0.0							
Proceeds from domestic bank loan	144.0	613.9	239.4	12.0	549.8							
Proceeds from withdrawals of ADB loan			176.3	202.7	375.5							
Total Cash Inflow	219.0	973.9	847.7	953.4	1,103.3							
Payment of long-term debt-ADB						21.6	23.2	24.0	25.6	26.4	28.2	29.8
Payment of long-term debt-Domestic banks				206.6		41.4	81.2	107.6	130.8	130.8	130.8	104.4
Total Cash Outflow				206.6	0.0	63.0	104.4	131.6	156.4	157.2	159.0	134.2
Net Cash flow from financing activities	219.0	973.9	847.7	746.8	1,103.3	(63.0)	(104.4)	(131.6)	(156.4)	(157.2)	(159.0)	(134.2)
Net Increase (decrease) in Cash	22.5	153.4	(125.5)	67.6	21.2	(119.8)	0.6	23.6	22.5	46.1	120.5	218.0
Cash at the beginning of the year	0.0	22.5	175.9	50.4	118.0	139.2	19.4	20.0	43.6	66.1	112.2	232.7
Cash at the end of year	**22.5**	**175.9**	**50.4**	**118.0**	**139.2**	**19.4**	**20.0**	**43.6**	**66.1**	**112.2**	**232.7**	**450.7**

continued next page

Table A14.2—*continued*

Item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
C. Projected Balance Sheet												
Current Assets												
Cash	22.5	175.9	50.4	118.0	139.2	19.4	20.0	43.6	66.1	112.2	232.7	450.7
Accounts Receivable	193.7	926.6	61.6	66.7	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Current Assets	216.2	1,102.5	112.0	184.7	145.1	19.4	20.0	43.6	66.1	112.2	232.7	450.7
Long-Term Assets												
Fixed Assets						3,890.7	3,924.5	3,960.3	3,999.5	4,043.6	4,043.6	4,043.6
Less Accumulated Depreciation						113.6	223.9	331.0	434.9	535.8	633.8	728.9
Net Fixed Assets						3,777.1	3,700.6	3,629.3	3,564.6	3,507.8	3,409.8	3,314.7
Work in Progress	261.9	1,219.4	1,948.4	2,837.6	3,890.7							
Deferred Assets												
Total Assets	**478.1**	**2,321.9**	**2,060.4**	**3,022.3**	**4,035.8**	**3,796.5**	**3,720.6**	**3,672.9**	**3,630.7**	**3,620.0**	**3,642.5**	**3,765.4**
Current Liabilities												
Accounts Payable	259.1	1,129.0	19.8	234.9	108.9	3.5	3.7	4.0	4.4	5.0	5.5	5.7
Wages/Welfare payable						0.0	0.0	0.0	0.0	0.0	0.0	0.0
Current Portion of ADB Loan						23.2	24.0	25.6	26.4	28.2	29.8	31.4
Current Portion of Domestic Loan						81.2	107.6	130.8	130.8	130.8	104.4	104.4
Total Current Liabilities	259.1	1,129.0	19.8	234.9	108.9	107.9	135.3	160.4	161.6	164.0	139.7	141.5
Long-Term Liabilities												
Long-Term Loans												
Domestic Bank loans	144.0	757.9	997.3	802.7	1,352.5	1,229.9	1,122.3	991.5	860.7	729.9	625.5	521.1
ADB loan	0.0	0.0	176.3	379.0	754.5	709.7	685.7	660.1	633.7	605.5	575.7	544.3
Total Long-Term Liabilities	144.0	757.9	1,173.6	1,181.7	2,107.0	1,939.6	1,808.0	1,651.6	1,494.4	1,335.4	1,201.2	1,065.4
Shareholders' Equity												
Paid-in Capital	75.0	435.0	867.0	1,605.7	1,783.7	1,783.7	1,783.7	1,783.7	1,783.7	1,783.7	1,783.7	1,783.7
Retained Earnings	0.0	0.0	0.0	0.0	36.2	(34.7)	(6.4)	77.2	191.0	336.9	517.9	774.8
Total Shareholders' equity	75.0	435.0	867.0	1,605.7	1,819.9	1,749.0	1,777.3	1,860.9	1,974.7	2,120.6	2,301.6	2,558.5
Total Liabilities and Shareholders' Equity	**478.1**	**2,321.9**	**2,060.4**	**3,022.3**	**4,035.8**	**3,796.5**	**3,720.6**	**3,672.9**	**3,630.7**	**3,620.0**	**3,642.5**	**3,765.4**
D. Ratios												
Working Ratio (%)	0.0	0.0	0.0	0.0	0.0	12.0	8.0	7.0	7.0	7.0	7.0	6.0
Debt-to-Equity Ratio	84.0	81.0	58.0	47.0	55.0	54.0	52.0	49.0	46.0	41.0	37.0	32.0
Debt Service Coverage Ratio	0.0	0.0	0.0	0.0	0.0	0.9	1.2	1.4	1.5	1.7	1.9	2.7

EBDIT = earning before debt, interest, and tax; EBIT = earning before interest and tax, EBT = earning before tax.
Source: Asian Development Bank estimates.

ENVIRONMENTAL AND SOCIAL IMPACT ANALYSIS
CHANGYU EXPRESSWAY

A. Environmental Impacts

1. Seven impact areas were identified during the feasibility study and the preparation of the environmental impact assessment (EIA): (i) destruction of ground vegetation, (ii) land acquisition and resettlement, (iii) soil erosion, (iv) noise and vibration, (v) dust pollution, (vi) sewage from service areas, and (vii) separation of communities by the expressway.

2. Actions and measures, in accordance with the EIA, as well as with national and local environmental protection laws and regulations, that were taken to protect the environment and mitigate adverse impacts included:

(i) restoration of 232,797 square kilometers (km^2), 1,640 km^2, and 2,330 km^2 of arable, forest, and grass land, respectively;
(ii) creation and maintenance of 24,646 km^2 of landscape area (grass and trees), and control of 26,067 km^2 of erosion-prone areas;
(iii) investment of over CNY13.22 million on environmental measures for resettlement, with installation of 10 waste water facilities and seven smoke-control facilities at the service areas of Dehui and Fuyu;
(iv) construction of 296 crossings and culverts and noise warning signs, and control of night-time operations at sensitive locations;
(v) supervision of the implementation of a resettlement plan by the local people's congress and people's political consultation conference; and
(vi) provision of employment to the affected population during expressway construction and for expressway operations.

3. Environmental protection measures and their effects were considered highly satisfactory by the final independent review[1] of the State Environmental Protection Administration at the project completion stage in August 2003.

B. Social Impacts

1. Land Acquisition and Resettlement

4. About 1,417 hectares (ha) of land were permanently acquisitioned and 150 households were resettled, which were, respectively, 8.4% and 7% less than the resettlement plan estimates. The reasons for reduced permanent land acquisition and relocation are appropriate alignment revisions and fewer interchanges. Land compensation rates were lower than estimated in the resettlement plan. Compensation rates for houses are considered fair and sufficient, particularly for Dehui. See Appendix 9 for details.

5. Implementation of the resettlement plan was satisfactory to the affected population because the relatively large lump-sum compensation enabled them to invest in alternative and better income-generating activities.

2. Employment During Construction

6. The construction of Changyu Expressway provided some 28,000 person-months employment for unskilled laborers. About 80% of unskilled labor employment came from the local population in Dehui and Fuyu counties. Each household received employment of about 6–

[1] Members included experts from state, provincial, and municipal environmental protection administration communications departments. On-site investigation and measurements were carried out by the Sino-Japan Environmental Protection Center.

12 person-months during expressway construction. This resulted in around CNY2,700–5,400 for each household, or 25–50% of a normal household's annual income at that time.

3. Employment During Operation

7. About 181 staff or 1.13 staff per km are employed by the Changyu Expressway Administration Division in Dehui and its four toll stations. Of the total, 89 (49%) are from Changchun and 92 (51%) from Dehui, Fuyu, Yushui, and Songyuan cities or counties. Women account for 47% of the total employees.

8. About 700 people, or 4.75 people per kilometer, about one half of them young women, are employed by the three service and parking areas.[2] They are mostly from the nearby rural communities of Dehui and Fuyu counties. In the case of the Dehui service area, 265 people are employed, of whom 12 (or 5%) are management staff from urban Changchun; 185 (or 70%) are from rural Dehui; and the remaining 68 (or 25%) are from the neighboring counties of Nong'an and Fuyu. The average salary in the Dehui service area is over CNY550 per person per month,[3] more than three times the average per capita monthly income of the rural population in the area.

9. Service providers have been employed, through competitive bidding, to undertake daily, labor-intensive, maintenance activities for the expressway, including grass cutting and cleaning drains. Thirty such providers have been employed, each responsible for 50 km.

10. Overall, the operation of the expressway is providing some 920 positions or 5.75 positions per kilometer. Rural residents hold three quarters of the total positions.

4. Support to Nearby Communities by Service and Parking Areas

11. All three service areas provide vehicle repair and petrol/diesel filling services to nearby communities that are connected to the service areas by paved roads. They also provide emergency assistance to nearby communities.

5. Promotion of Agro-Processing Industrial Development

12. The project area, as well as its neighboring areas, is the country's largest production base of maize, soybean, and sorghum. Railway and highway transportation bottlenecks have been a long-term problem in the project area for direct export and local processing. The establishment of the expressway has removed this bottleneck for local processing. As a result, there is booming development and agro-processing industrials along the expressway. In the case of Dehui county, Dacheng Group is a typical case.

13. Dacheng Group is a leading maize-processing enterprise, currently based in Changchun, and ranks fourth in the world and first in the PRC in terms of production capacity. Currently, Dacheng processes 2 million tons of grain at its Changchun base. The group encountered transportation, land availability, and water supply problems for further scaling up its processing capacity. With the opening of Changyu expressway, Yaojia village from Caiyuanzi township of Dehui county was chosen to be its new processing base. Construction of the new facility started in October 2003 and its full processing capacity is expected to reach 10 million tons of maize by 2010. The first phase, with a capacity of 4 million tons, will go into operation in October 2004. Once the operation reaches full capacity, it will turn to all neighboring counties for maize supply, affecting over 1 million rural households. The new base will directly provide 500 employment opportunities for Yaojia village and Dehui county.

---

[2] These areas, originally planned as parking areas, are now fully functioning service areas.
[3] Compared with the service areas of Hashuang Expressway, the salary rate is higher due to better business resulting from higher traffic volumes.

14. In conjunction with the Dacheng facility, the Dehui government has initiated the creation of Binjiang new city to accommodate future workers and to facilitate the development of service and other industries. Binjiang new city is expected to reach a population of 80,000 by 2010. Traffic wise, the new factory is expected to initially generate 885 average annual daily traffic (in medium truck equivalent) from Changchun to Caiyuanzi where a new interchange, to serve the factory, is currently under construction.

6. Traffic Improvement on Parallel Highway NH102

15. Observations on the expressway and the parallel NH102 indicate that about 80% of the through traffic, especially heavy trucks, are now using the expressway, resulting in a significant reduction in congestion on NH102.

7. Participation

16. Details of participation for the formulation and implementation of the resettlement plan are in Appendix 8. The process was highly participatory and was appreciated by farmers and local governments.

8. Insufficient Parking Space during Snowy Days

17. Jilin is within the northern or cold temperate zone and has a long cold winter (late October to early April) and frequent snows. The three service and parking areas have insufficient parking area to accommodate the large numbers of vehicles wanting to get off the expressway during snowstorms.

C. Conclusions and Recommendations

1. Conclusions

18. Environmental issues were well managed during expressway construction and established facilities are well maintained and up to date. Protection and mitigation measures are in accordance with the EIA, as well as with national and local environmental protection laws and regulations.

19. Positive growth in the project area is already significant as evidenced by the large increase in gross domestic product per capita in the period 1998–2003 (Table A15).

20. There are positive social impacts in employment and facilitation of agro-processing industrial development. The participatory approach for formulation and implementation of the Land Acquisition and Resettlement Plan were satisfactory, and local governments enthusiastically adopted it.

21. Social impact monitoring is ongoing, although reporting to the ADB has not been regular.

2. Recommendations

22. Service area design needs to be carefully considered for future expressways to provide larger parking areas so as to better accommodate drivers when it snows.

23. Jilin Provincial Expressway Corporation should develop an action plan to further assess the social impacts of the project so as to fill the gaps that have resulted from the lack of impact monitoring. ADB needs to strengthen social impact monitoring during and after construction.

Table A15: Socioeconomic Indicators of the Project Area and Jilin

Indicators	Year	Changchun	Dehui	Fuyu	Jilin
Population ('000s)	1998	8,689	900	729	26,032
	2000	6,996	906	742	26,270
	2001	7,057	910	747	26,910
	2002	7,125	913	753	26,994
	2003	7,182	913	760	27,037
GDP (CNY million)	1998	60,905	5,013	2,735	155,780
	2000	86,100	6,230	3,132	182,120
	2001	100,301	7,062	3,150	203,248
	2002	115,020	8,001	3,582	224,610
	2003	133,800	9,401	4,071	252,260
GDP per capita (CNY)	1998	8,887	5,583	3,768	5,984
	2000	12,381	6,887	4,238	6,847
	2001	14,274	7,786	4,231	7,640
	2002	16,220	8,783	4,774	8,334
	2003	18,704	10,308	5,381	9,338
Industrial Output (CNY million)	1998	25,582	1,243	236	59,730
	2000	31,800	1,802	268	80,030
	2001	38,100	2,020	134	88,084
	2002	45,030	2,455	162	97,840
	2003	54,229	2,607	254	114,340
Agricultural Output (CNY million)	1998	12,322	2,473	1,943	42,950
	2000	12,300	2,540	1,843	39,870
	2001	13,590	2,923	1,886	40,910
	2002	14,690	3,020	2,125	44,620
	2003	15,733	3,599	2,312	48,690
Urban Income (CNY /capita)	1998	4,751	2,778	2,778	4,207
	2000	5,830	4,160	4,160	4,913
	2001	6,339	4,521	4,521	5,340
	2002	6,963	5,423	5,423	6,260
	2003	7,790	6,060	6,060	7,005
Rural Net Income (CNY /capita)	1998	3,800	2,875	2,140	2,384
	2000	3,432	2,590	1,930	2,148
	2001	3,788	2,635	1,960	2,182
	2002	4,387	3,080	2,660	2,361
	2003	4,708	2,820	2,430	2,161

GDP = gross domestic product.
Source: *Jilin Statistical Yearbooks*.