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The World Bank

Report No: ICR0000696

IMPLEMENTATION COMPLETION AND RESULTS REPORT
(IBRD-45020)

ON A

LOAN

IN THE AMOUNT OF US$200 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

SECOND FUJIAN HIGHWAY PROJECT

December 27, 2007

Transport, Energy, and Mining Sector Unit
Sustainable Development Department
East Asia and Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective December 10, 2007)

Currency Unit = Chinese Yuan Renminbi
RMB 1.00 = US$ 0.1349
US$ 1.00 = RMB 7.413

FISCAL YEAR
January 1-December 31

ABBREVIATIONS AND ACRONYMS

CAS	Country Assistance Strategy
CBMS	Chinese Bridge Management System
CPS	Country Partnership Strategy
CPMS	Chinese Pavement Management System
EIA	Environmental Impact Assessment
EIRR	Economic Internal Rate of Return
FPCD	Fujian Provincial Communications Department
FPECD	Fujian Provincial Expressway Construction Directorate
ICR	Implementation Completion Report
MOC	Ministry of Communications
NR	National Road
NTHS	National Trunk Highway System
PAD	Project Appraisal Document
PAP	Project Affected People
PDO	Project Development Objectives
PMS	Pavement Management System
RDB	Road Data Bank
ZEC	Zhangzhao Expressway Company
ZMSC	Zhangzhao Management Sub-company
ZZE	Zhangzhou-Zhao'an Expressway

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CHINA
Second Fujian Highway Project

CONTENTS

A. Basic Information

Country:	China	Project Name:	Second Fujian Highway Project
Project ID:	P051705	L/C/TF Number(s):	IBRD-45020
ICR Date:	12/27/2007	ICR Type:	Core ICR
Lending Instrument:	SIL	Borrower:	MINISTRY OF FINANCE
Original Total Commitment:	USD 200.0M	Disbursed Amount:	USD 196.0M

Environmental Category: A

Implementing Agencies:
Fujian Provincial Communications Department (FPCD)

Cofinanciers and Other External Partners:

B. Key Dates

Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	07/16/1998	Effectiveness:	11/17/1999	11/17/1999
Appraisal:	05/12/1999	Restructuring(s):		
Approval:	06/24/1999	Mid-term Review:	05/01/2003	
		Closing:	06/30/2005	06/30/2007

C. Ratings Summary

C.1 Performance Rating by ICR

Outcomes:	Satisfactory
Risk to Development Outcome:	Moderate
Bank Performance:	Satisfactory
Borrower Performance:	Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance (by ICR)

Bank	Ratings	Borrower	Ratings
Quality at Entry:	Satisfactory	Government:	Satisfactory
Quality of Supervision:	Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance:	Satisfactory	**Overall Borrower Performance:**	Satisfactory

C.3 Quality at Entry and Implementation Performance Indicators

Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project	No	Quality at Entry	None

at any time (Yes/No):		(QEA):	
Problem Project at any time (Yes/No):	No	Quality of Supervision (QSA):	Satisfactory
DO rating before Closing/Inactive status:	Satisfactory		

D. Sector and Theme Codes		
	Original	Actual
Sector Code (as % of total Bank financing)		
Roads and highways	100	100
Theme Code (Primary/Secondary)		
Rural services and infrastructure	Primary	Primary

E. Bank Staff		
Positions	At ICR	At Approval
Vice President:	James W. Adams	Jean-Michel Severino
Country Director:	David R. Dollar	Yukon Huang
Sector Manager:	Junhui Wu	Jitendra N. Bajpai
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F. Results Framework Analysis

Project Development Objectives (from Project Appraisal Document**)**
The project development objective was to increase economic activity along the Fuzhou-Shenzen high-priority transport corridor through relieving congestion, facilitating trade and mobility and helping increase efficiency and traffic safety in Southern Fujian. More specifically, the project aimed to:

a) improve mobility and integration of economic activities between Fujian and Guangdong provinces,
b) strengthen the institutional capacity of the highway sector institutions in Fujian,
c) improve the safety of road transport, and
d) support the development of policies regarding highway maintenance management.

These objectives are those stated in the Loan Agreement. They are substantially the same as those in the PAD, although the objective related to the development of policies is formulated in the PAD as: develop and sustain a policy dialogue.

Revised Project Development Objectives (as approved by original approving authority)
The PDO was not modified.

(a) PDO Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	Average travel speed on roads (N.R. 324) parallel to the proposed highway (km/hr).			
Value quantitative or Qualitative)	Zhangzhou-Zhangpu section 35 Zhangpu-Yunxiao section 40 Yunxiao-Zhao'an section 40	Zhangzhou-Zhangpu section 50 Zhangpu-Yunxiao section 60 Yunxiao-Zhao'an section 60		Zhangzhou-Zhangpu section 51 Zhangpu-Yunxiao section 60 Yunxiao-Zhao'an section 59
Date achieved	12/31/1998	06/30/2005		12/31/2006
Comments (incl. % achievement)	With the diversion of traffic to the new ZZ expressway, travel speeds increased along the parallel highway (N.R. 324) as expected, with values similar to those estimated at appraisal (for end of 2005).			
Indicator 2 :	Average daily traffic (ADT) on corridor (existing and proposed roads).			
Value quantitative or Qualitative)	Zhangzhou-Zhangpu section 22,400 Zhangpu-Yunxiao section 22,500 Yunxiao-Zhao'an section 16,400	Zhangzhou-Zhangpu section 18,500 Zhangpu-Yunxiao section 16,600 Yunxiao-Zhao'an section 15,400		On national highway 324 (absolute number of vehicles per day): Zhangzhou-Zhangpu section 9,427 Zhangpu-Yunxiao section 8,311 Yunxiao-Zhao'an section 7,969. On new Zhangzhou-Zhao'an Xway: 10,956
Date achieved	12/31/1998	06/30/2005		12/31/2006
Comments (incl. % achievement)	The combined ADT for both the existing N.R. 324 and the expressway reflect values about 10% to 23% of those expected at appraisal (for the end of 2005) for the three sections of the corridor.			
Indicator 3 :	Traffic accident rates on ZZ Expressway (per 100 thousand vehicles)			
Value quantitative or Qualitative)	1.3	1.1		0.76
Date achieved	12/31/2003	06/30/2005		12/31/2006
Comments (incl. % achievement)	Traffic accidents on the expressway have been lower than expected by about 30%, reflecting the increasing awareness and commitment to address road safety issues.			

Indicator 4 :	Traffic accident rates on existing roads (per 100 thousand vehicles)			
Value quantitative or Qualitative)	5.4	2.5		2.4
Date achieved	12/31/1998	06/30/2005		12/31/2006
Comments (incl. % achievement)	Similarly, on existing parallel roads, accident rates have been at the levels expected at appraisal, reflecting a proactive stance in addressing road safety issues.			

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1 :	% of civil works completed on ZZE			
Value (quantitative or Qualitative)	0	100%		100%
Date achieved	12/31/1998	05/01/2003		05/01/2003
Comments (incl. % achievement)	Civil works for the construction of the Zhangzhou-Zao'an (ZZ) Expressway fully completed.			
Indicator 2 :	% of E&M works completed on ZZE			
Value (quantitative or Qualitative)	0	100%		100%
Date achieved	12/31/1998	12/31/2003		12/31/2003
Comments (incl. % achievement)	E&M works on the ZZ Expressway fully implemented.			
Indicator 3 :	% of interconnecting roads improved/rehabilitated			
Value (quantitative or Qualitative)	0	100%		100%
Date achieved	12/31/1998	05/10/2003		05/01/2003
Comments (incl. % achievement)	Completed in line with initial targets.			
Indicator 4 :	% of other roads improved/rehabilitated			
Value (quantitative or Qualitative)	0	100%		100%, including additional interconnecting roads and six local roads added to make use of available unallocated funds

Date achieved	12/31/1998	06/30/2007		06/30/2007
Comments (incl. % achievement)	All roads included in the program of additional segments fully implemented.			
Indicator 5 :	% of equipment purchased			
Value (quantitative or Qualitative)	0	100%		100% based on initial plan, 100% after adjustments to additional purchases to make use of additional resources from the unallocated category to purchase additional maintenance and axle-weight control equipment
Date achieved	12/31/1998	06/30/2007		06/30/2007
Comments (incl. % achievement)	Targets for maintenance and axle-weight control equipment fully met.			
Indicator 6 :	Number of person-months of completed training--Domestic			
Value (quantitative or Qualitative)	0	310		652
Date achieved	12/31/1998	06/30/2007		06/30/2007
Comments (incl. % achievement)	The actual value was more than double the initial estimate.			
Indicator 7 :	Number of person-months of completed training--Foreign			
Value (quantitative or Qualitative)	0	90		59
Date achieved	12/31/1998	06/30/2007		06/30/2007
Comments (incl. % achievement)	The number of person-time spent on overseas training was about 66% of the target value. This lower number was a consequence of regulations limiting the maximum length of individual training (to 21 days).			
Indicator 8 :	Road maintenance management technical assistance completed			
Value (quantitative or Qualitative)	Not applicable	Road maintenance management technical assistance completed		Road maintenance management technical assistance completed.
Date achieved	12/31/1998	06/30/2007		06/30/2007
Comments (incl. % achievement)	The study was completed, albeit with delays.			

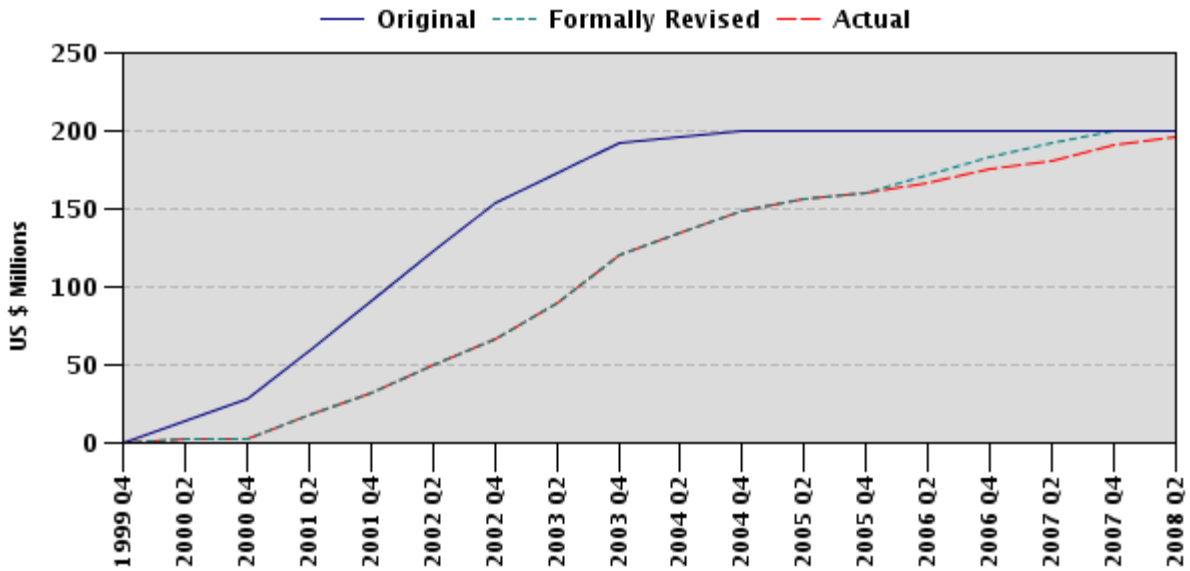
G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	DO	IP	Actual Disbursements (USD millions)
1	06/30/1999	Satisfactory	Satisfactory	0.00
2	12/17/1999	Satisfactory	Satisfactory	2.00
3	02/28/2000	Satisfactory	Satisfactory	2.00
4	09/08/2000	Satisfactory	Satisfactory	2.00
5	04/12/2001	Satisfactory	Satisfactory	24.56
6	12/06/2001	Satisfactory	Satisfactory	43.05
7	06/19/2002	Satisfactory	Satisfactory	66.34
8	12/29/2002	Satisfactory	Satisfactory	89.91
9	06/17/2003	Satisfactory	Satisfactory	120.48
10	12/22/2003	Satisfactory	Satisfactory	134.14
11	06/14/2004	Satisfactory	Satisfactory	148.73
12	12/29/2004	Satisfactory	Satisfactory	156.55
13	06/16/2005	Satisfactory	Satisfactory	160.76
14	02/28/2006	Satisfactory	Satisfactory	172.87
15	12/19/2006	Satisfactory	Satisfactory	181.28
16	06/26/2007	Satisfactory	Satisfactory	190.65

H. Restructuring (if any)

Not Applicable

I. Disbursement Profile



1. Project Context, Development Objectives and Design

1.1 Context at Appraisal

Transport demand and supply. As a result of China's strong economic growth over the decade preceding appraisal of the project, demand for transport services had also grown fast, and had been accompanied by a rapid shift towards road transport. However, China's transport system was little prepared to cope with the substantial increases in demand. China had historically underinvested in transport and its road system, and, furthermore, the existing road network was of low standards and unsafe. Some expressways existed but covered a relatively small part of the country, and about 20 percent of the rural population did not have access to all-weather roads.

Investment strategy. In order to tackle the demand-supply gap, the government had, starting in the 1980s, embarked on a major highway investment and improvement program. This program was dramatically accelerated in the 1990s. At the central level, the strategy consisted of the development of a National Trunk Highway System (NTHS). The system would, at least initially, give priority to two north-south and two east-west corridors, and to corridors serving border areas and cross-border trade. More broadly, the NTHS consisted of 12 inter-provincial expressways spanning China and totaling some 35,000 kilometers. At the provincial and local level, the strategy concentrated on road network maintenance and the expansion and improvement of provincial and rural road networks. For internal policy reasons, little investment in roads had been carried out in Fujian until the late 1990s.

Road transport policy. Several areas preoccupied the road transport policy agenda**.** They can be summarized as follows: (i) removing administrative and physical barriers to inter-provincial trade, (ii) redefining the government role in transport in light of the rapid administrative decentralization and growing non-state sector involvement, especially strengthening the role of the Ministry of Communications (MOC) in the areas of finance, planning, design and operations of the NTHS, (iii) continuing the efforts of the provincial, municipal and county governments to mobilize investment resources, including access to private investment and capital markets and seeking greater expenditure and system efficiency through improved highway management tools, and (iv) furthering the development by the local governments of road user services and road construction industry through deregulation, promotion of competition, access to better technology and better management.

The Bank had been strongly involved with assisting the modernization and development of China's road network. Since the early 1980s, the Country Assistance Strategies (CASs) consistently emphasized the need for the Bank to help alleviate infrastructure bottlenecks, and lending had followed accordingly. Further, a 1994 Bank report: *China-Highway Development and Management, Options and Strategies* (Report No. 11819-CHA, dated February 1994) provided recommendations for action and formed the basis for Bank assistance to the road sector. Discussions between the Bank and the

government at a high-level policy seminar largely structured along the lines of the report's recommendations, confirmed the major policy areas to be addressed by the Bank's future lending in the sector: (a) planning and prioritization of the highway network, (b) highway finance, comprising public and private sources, (c) highway maintenance, (d) highway safety, and (e) operations of the highway system with emphasis on the modern expressways. A report by the Bank's independent evaluation department in 1998 (the Operations Evaluation Department, later renamed the Independent Evaluation Group) also supported the role of the Bank in China's transport system while recommending further emphasis on institutional and policy reform.

1.2 Original Project Development Objectives (PDO) and Key Indicators (*as approved*)

The project's development objective was to increase economic activity along the Fuzhou-Shenzen high-priority transport corridor through relieving congestion, facilitating trade and mobility and helping increase efficiency and traffic safety in Southern Fujian. More specifically, the project aimed to:

a) improve mobility and integration of economic activities between Fujian and Guangdong provinces,
b) strengthen the institutional capacity of the highway sector institutions in Fujian,
c) improve the safety of road transport, and
d) support the development of policies regarding highway maintenance management.

These objectives are those stated in the Loan Agreement. They are substantially the same as those in the PAD, although the objective related to the development of policies is formulated in the PAD as "develop and sustain a policy dialogue."

Key performance indicators were:

- Traffic levels in selected road sections or National Road 324 (NR324) a highly congested highway that the construction of the project-financed Zhangzhou-Zhao'an Expressway (ZZE) would help alleviate, and along the corridor (once the expressway were open to traffic)
- Speed levels on NR234
- Accident rates on the ZZE Expressway
- Accident rates on NR 324

These indicators basically addressed items (a) and (c) above, for which quantifiable indicators were possible. Indicators for (b) and (d) consisted essentially of reports documenting progress.

1.3 Revised PDO (as approved by original approving authority) and Key Indicators, and reasons/justification

The PDO and key indicators were not modified.

1.4 Main Beneficiaries

The main beneficiaries would be the users, both long-distance shippers exporting or importing goods and travelers, of the project-financed ZZE Expressway. Compared with the existing national road (NR324) for which the ZZE will provide a modern alternative, the ZZE would have shorter distance, improved surface and riding comfort and reduced interference since no pedestrians, bicycles or non-motorized vehicles would be permitted to access the expressway. Thus, most of the long-distance traffic and some of the local traffic would be expected to divert from the existing national road to the new expressway, and benefiting through lower vehicle operating costs, shorter time, and safer conditions. At the same time, because of the expected traffic diversion, users remaining on the NR3244 would benefit from lower congestion, resulting in lower operating costs and higher traveling speeds.

In addition, the users of the improved rural and local roads would also benefit from improved road conditions, resulting in lower operating costs, reduced travel time and better safety. More generally, producers and consumers were expected to benefit from the ZZE and the rural and local roads as the lower transport costs were likely to induce increased industrial and agricultural production.

1.5 Original Components (*as approved***)**

The project included the following two components:

(i) **Construction of Zhangzhou-Zhao'an Expressway (ZZE), interconnecting and other roads (US$561.0 million),** including: (a) construction of the ZZE, a 132.5 kilometer divided, four-lane, access-controlled toll highway, (b) improvement of existing and construction of new interconnecting roads, specifically the completion of one class 1 road 5 km long and of a class 2 road 8 km long, (c) improvement of existing and construction of new other roads, specifically three class 2 other roads, (d) equipment for control of construction quality and monitoring of the environment, for the operation and maintenance of the ZZE after its completion and for maintenance of the provincial road network, for the road data bank (RDB) and for the pavement management system (PMS); and (e) construction supervision of the ZZE, its interconnecting roads and other roads.

(ii) Institutional Strengthening/Capacity building (US$1.7 million), including (a) studies and technical assistance in highway maintenance management, toll rates and road safety, and developing an institutional development plan, and (b) staff training program, covering all aspects of highway planning, design , construction, operation, finance and management.

The project cost also included land acquisition and resettlement (US$30.9 million) for component (i) and the front-end fee (US$2.0 million).

1.6 Revised Components

The composition of the project was revised twice. A first loan amendment (August 4, 2004) added eight road sections (Class II roads) to the three local roads originally included in the project. This amendment was due to the fact that the ZZE had been completed and there had been no need to use the allowance for contingencies (physical and price) included in the project's cost estimate. A second loan amendment (June 29, 2005) cancelled two of the additional eight road sections in Jiangle and Shaowu County given that the expected time in surmounting the difficulties of securing the required counterpart resources and implementing the related works was estimated to go beyond the loan closing date (extended under that second loan amendment).

1.7 Other significant changes

The second loan amendment also increased the disbursement percentage under Part 2 of the Project (the road works described under 1(c) above) from 37 percent to 50 percent, and extended the closing date to June 30, 2007, to complete the implementation of the added local roads.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design and Quality at Entry

Lessons taken into account. At the time of project preparation and appraisal, the Bank had already financed 21 highway projects in China, and had therefore substantial experience in the sector. In addition, the project was the successor to the Fujian Provincial Highway Project (Loan 3681-CHA), that was under implementation at the time the Second Fujian Highway Project was being prepared. While overall performance of the highway projects in China, including Loan 3681 had been satisfactory, a number of problems had occurred, which were taken into account in the preparation of the FH2 project. Problems included inadequate engineering designs and bid documents, including the estimation of the costs of civil works; quality control of construction; delays in the start of electrical and mechanical facilities; and slow progress in institutional components. In order to prevent recurrence of such problems, a number of measure were included in the project, such as a strong involvement of international experts in the design, technical bid documents and costs estimates, as well as in the supervision of the works.

Risks. In view of the substantial experience with highway projects in China and the projects' satisfactory performance, no project risks were identified that would merit a rating of high or substantial. Government commitment was very strong as was provincial stakeholders' involvement. However, a number of moderate risks were considered, and risk mitigation measures adopted. Some of the risks have been listed among the problems addressed and described above. Other moderate risks included: (i) delays in preparation and implementation, (ii) training programs that may not prove successful and

managers not applying the new skills, and (iii) selection of incompetent contractors. Risk mitigation measures included, respectively, (i) the MOC and the Bank to follow the project closely and a project-launch workshop to be held right after Board approval of the project, (ii) a well designed training program, strict criteria for the selection of trainees, English language requirement and reports on the effectiveness of training and the opportunities to apply new skills, and (iii) careful pre-qualification of contractors following Bank procedures.

2.2 Implementation

Implementation Schedule and Delays. Thanks to the care taken during preparation to ensure that implementation of the ZZE would proceed on schedule, this actually happened and the expressway opened to traffic in December 2002, or just three years after the project was declared effective.

The six additional roads sections under the local roads programs, not originally included in the project, required preparation of engineering designs and bid documents during project implementation since such roads had not been identified at the PAD stage.

Delays in the design phase and construction of some of the local roads were due to difficulties in the timely availability of counterpart funding by the counties and to slow negotiations and agreements with other agencies affected by the road improvement works. Construction of an overpass bridge in the Tankou-Hua road was delayed as negotiations with the railway department dragged for almost three years. Similarly, delays in the construction of the XiXi bridge were caused by slow decisions regarding existing military communication cables affecting the bridge.

Project Cost and Components. Contract prices for the ZZE expressway turned out to be substantially lower than the design cost estimates. This probably was caused, at least in part, by strong competition from a large number of contractors (with an average of 20 contractors submitting bids for each works contract). On average, contract prices for the ZZE were 39 percent lower than design cost estimates. However, work variations during implementation caused a cost overrun of 27 percent relative to the initial contract prices. Further, overall costs on the ZZE were higher than originally estimated as equipment costs for the expressway had originally been underestimated. At appraisal, a limited number of maintenance and axle-load control equipment were included in the cost estimates, while additional pieces of equipment were actually required, to be used for the ZZE as well as for two other expressways managed by the Zhangzhou Management Sub-company under the Fujian Provincial Expressway Company (FPEC), the entity entrusted with the management of the expressway network in Fujian Province. Unallocated funds set aside for contingencies were not needed for the original components and allowed the addition of more local roads to the project.

Extreme weather conditions

Strong and long-lasting storms and rains in 2006 caused major flooding in the areas of the added local roads and delayed their execution.

Risk status: The project during implementation was not rated as being at risk.

2.3 Monitoring and Evaluation (M&E) Design, Implementation and Utilization

The Project was monitored through a series of output and outcome indicators that could be measured using existing data collection mechanisms in place, such as traffic counts. The outcome indicators were provided by the FPCD during the biannual supervision missions. The output indicators were complemented with the more detailed reports provided by FPCD and FPECD on the progress for each of the components and sub-components of the project. Overall the indicators have allowed the confirmation of the achievement of the PDO. The actual values of the indicators are reported in Part F of the Summary Data Sheet at the beginning of this ICR.

The outcome indicator on *average travel speeds on roads parallel to the ZZE,* has shown the extent to which construction of the ZZE has relieved congestion on the existing road, while the *average daily traffic on existing roads and on the ZZE*, reflected the increase in economic activity and mobility of the population along the corridor connecting the Southern region of Fujian Province with Guangdong Province. Both indicators were collected from traffic surveys. The two indicators on traffic accident rates has shown the extent to which the Project has contributed to improved road safety on both the ZZE and, more generally, on existing roads. These indicators were collected from reports issued by the Traffic Police.

Output indicators were a mixed of numerical indicators and reports. Those related to the ZZE, progress with construction were based on the monthly progress reports by the supervision teams, while those for the interconnecting and other roads constructed or upgraded, progress of work expressed in number of kilometers of roads constructed or upgraded as described in the semi-annual progress reports and annual monitoring reports. FPCD institutional capacity strengthening was measured through the completion of the studies on highway maintenance and toll rates and the number of FPCD staff trained (with the value of person-months—which was not the correct value to measure as often the training was not measured by months but by days, creating some difficulty in comparing the values between appraisal and completion). The development of the road safety program was further measured with the number of black-spots identified and improved.

The choice of indicators was reasonable as they allowed the adequate measurement of the level of achievement of the PDO. In hindsight, however, the project's M&E, could have been improved with the inclusion of other indicators (such as broader measures of variations in transport costs or tariffs along specific corridors) providing a stronger focus on outcomes. The indicators relating to the institutional strengthening actions could also have been enhanced through variables reflecting improvements in specific areas (such as increased allocation of resources to maintenance or reduction of truck overloading). Nonetheless, the Bank supervision missions exchanged views with the provincial highway authorities (and were described in the Aide Memoirs) to provide an assessment

of the enhancements of institutional capacities related to the policies being partially supported under the project (e.g., truck overloading, road safety, and road management).

2.4 Safeguard and Fiduciary Compliance

Environment. The project was category A, since it included construction of a major new expressway. At the start of the project, the Fujian Provincial Expressway Construction Directorate (FPECD), the unit under the Fujian Provincial Communications Department (FPCD) in charge of the construction of new expressway links, set up an Expressway Environmental Protection Office, responsible for environmental protection during the construction and during operations, including the organization of environmental monitoring and the implementation of the environmental protection policies, guidelines and regulations. In parallel, environmental protection offices were established at the Zhangzhou municipal level and each of the counties. In order to prepare for the environmental monitoring work, a training course was held in April 2000, with participants, among others, from the FPCD, FPECD, Fujian Environmental Protection Bureau, the Zhangzhou Expressway Co., General Supervision Office, and the work site supervision office. The Zhangzhou Expressway Co. entrusted the Zhangzhou Environmental Monitoring Station the preparation of an environmental monitoring plan for the ZZE, and starting December 2000 that Station carried out regular monitoring work. By the end of 2003, the following monitoring reports had been produced: eight environmental monitoring reports, six survey reports on environmental protection implementation, one report on public participation in the environmental impact survey for the ZZE during the construction period, and two reports on operation period environmental monitoring. These reports had the following major findings:

- The EMP was implemented satisfactorily and the environmental impacts were adequately mitigated.
- The expressway project had little impact on the surrounding water environment.
- The noise level measured at each of the contract sections was within specified limits.
- Most of the construction site had little impact on the surrounding area ambient air quality.

Since the ZZE opened to traffic, continuous monitoring has been carried out of noise level in acoustic sensitive spots along the expressway in accordance with the environmental protection plan. The EIA Administration Department of the State Environmental Protection Administration, jointly with the MOC, organized the completion inspection and acceptance of the environmental work for the ZZE. The completion inspection reached the conclusion that environmental protection measures such as noise reduction, dust prevention and control, and soil erosion, were correctly implemented for the ZZE project.

The most noteworthy change during implementation relating to environmental design has to do with noise barriers in the ZZE, since 10 out 19 sites with noise barriers in the

original EAP were canceled due to further fine-tuning of the expressway alignment, resettlement, or inaccurate information during the EIA preparation.

A sensitive environmental issue was improper disposal of spoils in the Tan-Hua road along the Jiulong River. The spoils were dumped into the river bed without retaining or protection measures in most of the disposal sections, leading to water pollution and soil erosion. This issue took some time to correct, but it was eventually resolved.

Social. Land acquisition and resettlement for the ZZE was started in June 1999 and completed in March 2000. Land acquisition and practically all the related items exceeded the original estimates, and so was the amounts paid as compensation. Total compensation payment ended up being 25 percent higher than planned at the start of the project. The table below provides more details.

Table 2.1: ZZE Land Acquisition and Resettlement

Item	Quantity (thousand)		Compensation (CNY million)	
	Planned	Actual	Planned*	Actual
Permanent land use	15.4 (mu)	18.0 (mu)	132.0	154.0
Temporary land use	3.0 (mu)	3.0 (mu)	7.0	7.0
House relocated	58.0 sq meter	101.0 sq meters	11.0	19.0
Power/Communications lines	50.3	333.8	6.0	15.0
Fruit trees	341.5	505.4	80.0	118.0
Tombs	4.2	4.7	0.8	0.9
Other compensation	-	-	71.0	70.0
Total	-	-	307.8	383.9

* At the start of the project.

Land acquisition and resettlement for the ZZE was implemented without major issues, and the increases in quantities beyond the originally estimates were appropriately compensated. A similar underestimate of resettlement amounts and compensation happened in the six additional Class II roads, where total compensation ended up being about 15 percent higher than estimated. Part of the underestimation results from the original numbers being estimated on the basis of preliminary engineering and social surveys. The land acquisition and resettlement for the six local road subprojects were implemented by the county and the township level administration department in cooperation with the road project acquisition and resettlement offices under the overall coordination of the FPCD's World Bank Project Office. The living standards of the project affected persons (PAP) were restored and in most cases improved to a level better than before the resettlement. Execution of the ZZE created new employment opportunities that contributed to the raise in living standards.

Fiduciary compliance. The financial management system during implementation had no significant changes from appraisal. The project continued to maintain the financial management system that was acceptable to the Bank and provided reasonable assurance that the proceeds of the loan were used for the purposes for which the loan was granted. Regarding audit compliance, the implementing agency complied with the legal agreement to submit annual audit reports to the Bank before deadlines. All the audit reports were

reviewed by the Bank and considered as acceptable to the Bank. Some financial management and disbursement issues were noted during project implementation, including slow disbursement, delay or lack of counterpart funds, and management fee overruns. The implementing agency took measures to rectify and improve them. The counterpart funding issue was partially resolved with an increase in the disbursement ratio for the local roads component, increase made possible thanks to availability of unallocated funds under the project. By implementing this project, FPCD has strengthened its financial management capacity.

2.5 Post-completion Operation/Next Phase

Since opening to traffic at the end of 2002, the ZZE expressway has been managed by Zhangzhao Expressway Company (ZEC), one of FPEC's 13 companies managing expressways. As a result of a recent reform whereby there will one company per city rather than one company per expressway, the ZEC has been transformed into the Zhangzhao Management Sub-company (ZMSC), with responsibilities extended to three expressways located within the Zhangzhou prefecture. This transformation is expected to increase efficiency in the management of the expressway.

Resources to fund the operations and maintenance of the ZZE are generated by the toll revenues. With traffic volumes largely in accordance with forecasts, the expected revenues will be sufficient to cover the maintenance costs of ZZE. Maintenance activities are being supported with the maintenance equipment purchased under the project. Tolls graduated according to weight—using the axle load equipment acquired under the project—are helping reduce substantially the negative impacts to the pavement that come from truck overloading.

The local roads improved with project funding are the responsibility of the respective county authorities, and are maintained with funding from the provincial highway budget and the county budgets. It is not possible to provide specific information on the extent to which the funding is sufficient for the proper upkeep of the non-expressway network. There are indications that funding is not fully to the level required. Yet, as noted in section 3.5(b), the installation of management systems and the increasing emphasis being given to maintenance activities are expected to enhance the allocation of resources for the adequate upkeep of the provincial road assets. The follow-on project (Fujian Highway Sector Investment Project) pursues further improvements in the maintenance function by piloting enhanced contracting-out mechanisms and targeted training on road asset management.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design and Implementation

The project development objective was consistent with China's transport development strategy and with the Bank's assistance strategy. The project's main component, the ZZE expressway, is part of the National Trunk Highway System (NTHS),

China's modern inter-provincial road system, and the top priority of the Ministry of Communications in the road sector. (The NTHS has recently evolved into the Chinese National Expressway Network, with a larger target of kilometers.) Expansion and improvement of provincial and rural road networks, and improving the management of maintenance, is a priority at the provincial and local levels.

The project objectives were consistent with current strategies delineated in the Country Assistance Strategy for 2003-2005—and remain in line with the more recent Country Partnership Strategy (CPS) for 2006-2010. One of the pillars in both documents seeks, among other objectives, to improve the competitiveness of the various regions of China and the overall investment climate, and address the needs of disadvantaged groups and underdeveloped regions through the financing of infrastructure in key corridors, particularly those serving poorer regions and communities. At the same time, improving maintenance and safety were two areas identified by the OED transport sector evaluation and by an internal Bank review of technical assistance in China carried out in 1998/1999 as priorities issues within the road sector. Such issues, which require a sustained, long-term effort, continue to be priorities in 2007. The new Fujian Highway Sector Investment Project also supports strengthening of road management with specific attention to maintenance. Yet, the formulation in the Second Fujian Highway Project of the objective related to highway maintenance management, defined in the Loan Agreement as 'support the development of policies' and in the PAD as 'develop and sustain a dialogue' was weak. The project included several activities related to maintenance that would have allowed defining this objective in more specific, appropriate and monitorable terms.

Well selected project components. On the physical infrastructure side, the mix of investment comprising the ZZE, a major expressway, and local roads, was well tailored to address, on the one hand, the needs of improving the long-distance transport facilities to facilitate domestic and international trade, and, on the other hand, the needs for mobility of the local population and for facilitating commerce by the small local producers located in the area of influence of the improved roads.

3.2 Achievement of Project Development Objectives

The project development objectives were largely achieved. As shown below, the objectives relating to improving traffic congestion and mobility, and traffic safety, for which there were numerical targets, were achieved or surpassed. Achievement of the other objectives is more difficult to assess. There are strong indications that the strengthening of the strengthening of the FPCD was fully achieved. The weakest achievement relates to the expected improvement in the management of highway maintenance, although even in this area progress was made.

(a) ***Improving mobility and integration*****.** Since opening to traffic in 2002 of the project's main component, the ZZE expressway, it has effectively relieved congestion and improved mobility and facilitated trade flows between Fujian and its neighboring provinces of Guangdong, Zhejiang and beyond. Two key performance indicators of the project confirm this:

On the three highly congested (prior to the project) sections of the National Roads (NR) 324 selected for monitoring with the project's performance indicators there were substantial changes in the traffic levels and in the operating speeds, showing that congestion had substantially decreased.

Table 3.1: Traffic and speed on NR 324: Baseline, Target, and Actual

Monitoring Indicator	Road Section	1998 Baseline	2005 Target	2006 Actual Values
AADT on NR 324 (absolute number of veh/day)	Zhanghou-Zhangpu	22,400	18,500	9,427
	Zhangpu-Yunxiao	22,500	16,600	8,311
	Yunxiao-Zhao'an	16,400	15,400	7,960
Speed on existing NR 324 (km/hr)	Zhanghou-Zhangpu	35	50	55
	Zhangpu-Yunxiao	40	60	65
	Yunxiao-Zhao'an	40	60	65

At the same time, overall traffic in the corridor comprising the existing road NR 324 and the new ZZE expressway has more than doubled during 1998-2006, from close to 14,000 passenger car equivalent (pce) at start of the period to more than 30,000 pce at the end of the period. The traffic increase is a reflection of the increased mobility and trade in the areas served by the ZZE, which is part of the coastal corridor that connects Guangdong with Shanghai, two of the most rapidly developing areas of China.

Strengthening institutional capacity at the Fujian Provincial Communications Department (FPCD). The institutional capacity of the FPCD was strengthened mainly through the conduct of an extensive overseas training program, carried out in 12 different developed countries. Overall, 18 training courses or study tours were carried out, which altogether trained over 100 staff, for a total of about 64 man-months. The program was established following a need analysis, which determined the key areas where FPCD needed to improve the qualifications and training of its staff. Areas covered included managerial, financial and technical, such as project planning, quality control, supervision, road safety, environmental protection, human resource development, maintenance management, post appraisal of projects.

Staff selected for training came from the FPECD (75 percent), FPCD's transport planning and communications department (15 percent), and from FPCD's other departments (10 percent). In order to maximize the impact of the training, trainees upon return to Fujian were encouraged to give workshops and seminars intended to introduce the new methods and technologies learned during the training activity. At the same time, the FPCD collected and widely distributed the summaries of the training courses/study tours.

There are also other indications of progress with institutional capacity. The Provincial Communications Scientific and Research Institute, which was a line unit of the FPCD, has been converted into an independent enterprise, greatly improving its autonomy and managerial functions. A similar conversion process of the Planning and Design Institute is currently underway.

The studies on maintenance management (discussed below) and on toll rates also contributed to improving FPCD's capacity for managing and making key decisions. The toll rate study provided useful analysis based on four different approaches—financial return, benefit to road users, relation of toll rate to GDP/capita, and impact on traffic diversion—to help set the rates on the ZZE.

Improving road safety, the other project objective for which performance indicators were monitored, also was achieved, as shown below:

Table 3.2: Accident rates on ZZE and NH324: Baseline, Target, and Actual

Monitoring Indicator (fatalities/ten million veh-km)	**Road Section**	**1998 Baseline**	**2005 Target**	**2006 Actual**
Accident rates on ZZE	Zhanghou-Zhao'an	-	1.1	0.76
Accident rates on NR 324	Zhanghou-Zhao'an	5.4	2.5	2.4

Source: FPCD

Several actions contributed to the improvement in road safety on the NR 324. The first is the reduction in traffic levels, which automatically reduces the potential for traffic accidents. The second was the identification and implementation of improvements of black-spots (road sections with a high density of traffic accidents) financed under the project. Twenty-four such black-spots were improved, of which six were major (including a variety of interventions such as widening the road in key junctions, canalization islands, and speed reduction measures) and 18 were simplified interventions such as signs and road markings.

While it is difficult to separate the effects of lower traffic levels and improvement of black-spots, the table below shows that black-spots, were very effective, especially the major ones.

Table 3.3: Accidents and fatalities in blackspots, before and after improvements

Type of black-spot	**Accidents**		**Fatalities**	
	Before (2001-2002)	**After (2004-2005)**	**Before (2001-2002)**	**After (2004-2005)**
Major (6)	274	79	38	8
Minor (18)	352	177	82	20

Source: FPCD

Road safety improved not only as a result of the physical improvements. Occasional seminars on traffic safety were carried out and provided a forum for all interested parties to discuss, integrate and improve the implementation of the highway safety program in Fujian. In addition, the black-spot program required holding regular discussions with the traffic police and seeking their assistance in providing information about the priority black-spots and the related accident data and analysis. This type of collaboration also helped identify actions to address the issue of truck overloading. The traffic police became involved in the implementation of those actions and in carrying them out.

Improving highway maintenance management. Assessing achievement of this objective needs to consider the overall progress with improving maintenance management, rather than the objective as defined in the Loan Agreement or the PAD, for the reasons explained in Section 3.1. The project included various subcomponents that were expected to contribute to help FPCD prepare for, or actually implement, improvements in the management of maintenance. The most substantial of such subcomponents was the preparation of a highway maintenance management study. Other activities included installation and use of road and bridge management systems. Overall, the outcome from these activities was modest, although not negligible, as discussed in Section 3.5 (b).

In addition, the FPCD made substantial progress in controlling truck overloading, which is a serious issue in China's roads. The excess weight that a truck carries beyond the truck's nominal load capacity significantly damages the road pavement structure, requiring more frequent and more expensive road maintenance interventions. The company managing the ZZE set up three control points (weighing stations) close to the border between Fujian and Guangdong, preventing overloaded trucks coming from Guangdong to enter Fujian. Strict controls at the three points has led to a reduction in the proportion of overloaded trucking crossing the controls relative to the total trucks crossing, from 80 percent before installation of the controls points to 10 percent afterwards. In addition, at all the exits of the ten toll gates computerized weighing systems have been installed for the purpose of collecting tolls that vary in accordance with to actual load of the truck. Weighing scales have also been installed on another four toll gates which are close to the provincial border or NR 324. The approach consists of two efforts: (a) to prevent overloaded trucks coming from Guangdong from entering the expressway, and (b) for those overloaded trucks that may enter the expressway through other points, to collect higher tolls when those trucks exit the expressway.

3.3 Efficiency

Economic efficiency. The project financed-investments are economically efficient, with an overall Economic Internal Rate of Return (EIRR) of 18.3 percent, which is slightly lower than the 19.6 percent estimated at appraisal. This overall return combines the IERRs of the different project capital investments:

- The Zhangzhou- Zhao'an Expressway (ZZE), including the two roads link to the ZZE, with an EIRR estimated at 14.9 percent. This is satisfactory. The value is lower than the appraisal estimate of 19.4 percent due mainly to more conservative forecasts of traffic growth after 2006 assumed at project completion, taking into account that rates at the high levels since the opening of the expressway would not be sustained over the period of analysis. For similar reasons, the two interconnecting road links have yielded an EIRR of 12.9 percent compared to about 16.7 percent estimated at appraisal.
- The other initial local roads, with an EIRR of 47.5 percent, and six local roads added during project implementation, with an EIRR of 35.1 percent. Both values compared favorably with the EIRR values of between 23.2 percent and 32.5 percent estimated at project appraisal.

Financial rate of return. The construction of the ZZE constitutes about 80% of the project's capital investment. The financial evaluation focuses on the ZZE. Fujian province has formed a financially independent entity, the Zhangzhou Management Sub-Company (ZMSC), responsible for the day-to-day management, operations and maintenance of the ZZE. The main income is the tolls charged to the road users. The toll rates are set by the provincial government. Based on the current toll revenue and operating costs, the entity would be able to generate enough revenue over the loan period to finance operation, maintenance, and debt service (the Bank and domestic loans). Based on the current financial status, the expressway is not expected to require any additional external financial assistance in the foreseeable future. The financial internal rate of return (FIRR) to the capital investments is estimated to be 8.0%, compared to 12.5 percent at appraisal. While traffic on the ZZE since 2004 has been consistently higher than estimated in the PAD, the estimate of financial return is, similarly as the estimate for the economic return, affected by the more conservative forecast of ZZE traffic growth after 2006.

Details of the economic and financial analysis, including estimates of the economic and financial net present values, are in Annex 3.

3.4 Justification of Overall Outcome Rating

Rating: Satisfactory

This rating results from (i) the high relevance of project objectives and design, (ii) more than satisfactory achievement and exceeding appraisal targets in three of the four project development objectives, that is, those related to relieving traffic congestion and improving mobility, improving safety and strengthening institutional capacity, (iii) a modest achievement of the highway maintenance objective, and (iv) a satisfactory economic efficiency of the project-financed investments.

3.5 Overarching Themes, Other Outcomes and Impacts

(a) Poverty Impacts, Gender Aspects, and Social Development

The addition of the six local roads contributed to alleviate poverty, as these roads either facilitated access to a poor county, or were themselves located in a poor county or prefecture, as shown in the table below.

Table 3.4: Contribution of 6 added local roads to alleviation of poverty

County where road located	Contribution to poverty alleviation
Youxi	While this is not a poverty county, the existing road will be under water due construction of a new dam, and the project-financed road will provide access to some poor areas of the county.
Shaxian	The road section is the missing link for provision of access to a county (Shunchang) that is classified as poor at the Provincial level.
Longyan	Longyan is a poor prefecture at the National level.
Pingnan	Pingnan is a poor county at the National level.
Jiaocheng	Jiacheng is not a poor county, but it is part of the Ningde Prefecture which is poor at the Provincial level.
Fuding	The road improvement will provide access to the Zhebong county, classified as poor at the National level.

At the same time, a survey of resettlement carried out by the Fujian Provincial Social Sciences Academy has noted that the majority of the project affected persons (PAP), whether resulting from the ZZE or the other project roads, have better living standards after resettlement than before as the road improvement under the project created more employment opportunities, during construction and during operations as a result of increased economic growth locally.

(b) Institutional Change/Strengthening

The strengthening of the FPCD resulting from the well designed and implemented training program has been described above.

On institutional change, the project's main focus area was on the management of highway maintenance management. The key activity was the preparation of a comprehensive highway maintenance study, expected to generate as outcomes principles of fund allocation, a sustainable system for planning and implementation of maintenance activities, adapted maintenance organization at all administrative levels and increased efficiency by using the Chinese Pavement Management System (CPMS), the Chinese Bridge Management System (CBMS) and the Road Data Bank (RDB).

The expectations of what the study could yield were high but actual achievements were limited. This study enjoyed little ownership by the FCPD during most of the project implementation period, was started late and received little counterpart funding and facilitation support (for instance, in terms of complementary office and travel resources). The fact that the consultant could not estimate the capacity of the workshops for routine maintenance and repair of equipment because he could never visit a workshop or inspect any maintenance equipment during his stay in Fuzhou illustrate the problems with this study.

The final draft report on the study was submitted to the Bank only in December 2006, or 18 months later than the original closing date. This report did receive substantial inputs

from FPCD staff, signaling that towards the end of the project the FPCD gave more importance to the highway maintenance study. The FPCD claims that the study has been useful to enhance the allocation of maintenance resources across the road network, define the strategy to optimize the use of road maintenance equipment and establishing the groundwork for the reform of highway maintenance management. For the latter, a first step has consisted of the establishment of 94 specialized companies set up on the basis of the previous force-account maintenance stations. A subsequent step was to entrust the maintenance of the ZZE with Fujian Expressway Maintenance Company with a performance-based contract, which includes incentives and penalties depending on whether benchmarks are exceeded or not.

The CPMS and the CBMS had been developed by the MOC several years ago. Under the project, FPCD collected data and trained staff to install and operate the two systems. Both systems were actually established, but only partially. This was due to the limited coverage of the network for which data was collected, and the fact that the system only applies to bitumen-surfaced roads, and excludes concrete pavements. At present, it is estimated that the CPMS covers 5,600 kilometers, or 80 percent of the national and provincial road networks in Fujian province. FPCD foresees completing the establishment of the CPMS by 2010, when all 7,000 kilometers of national and provincial roads will be included, as will an additional 7,000 kilometers of county and prefectural roads. n addition to completing data collection, the 2010 target will require FPCD to install complementary software to deal with concrete pavements, software already developed by the MOC.

The FPCD reports that the CBMS has been installed and is operational for over 10,000 bridges, which includes all provincial, national and county level bridges. Of these, 3,666 bridges have been selected for careful attention and allocation of resources under a 'deep maintenance' program, which is carried out under contract rather than force account.

The control of overloading at the ZZE noted earlier is also a noteworthy institutional improvement.

(c) Other Unintended Outcomes and Impacts (positive or negative)

The contribution to poverty alleviation resulting from the six local roads not originally included in the project was an unintended outcome.

3.6 Summary of Findings of Beneficiary Survey and/or Stakeholder Workshops

This is a Core ICR, and therefore a Beneficiary Survey and Stakeholder workshops are not required.

4. Assessment of Risk to Development Outcome

Rating: Moderate

The project's main component, the ZZE, and the benefits it generates, are not subject to any significant risk. Toll revenues are sufficient to fund the maintenance requirements and keep the ZZE in good condition. The capacity of the ZZE is large enough to provide good service for the foreseeable future.

However, allocation of funding for the maintenance of the county roads to ensure that their condition will not deteriorate is more uncertain since overall funding for non-toll roads in China and in Fujian Province in particular is not yet fully at the required levels, with funding for roads in Fujian generally sufficient for routine maintenance only on most of the provincial/national road network. A pilot on maintenance by contract included in the new Fujian Highway Sector Investment Project should help FPCD authorities see the benefit, in terms of quality and costs, of contract maintenance and potentially reduce the cost, and therefore the funding required, to carry out maintenance of the county roads.

Improvements in traffic safety are also likely to remain in place as black-spots are not likely to lose effectiveness, and the reduction in congestion in the NR 324 was substantial and unlikely to be reversed in the foreseeable future given drivers' preference for the ZZE.

On the institutional side, the improvements in staff skills resulting from the strong training program are likely to remain with FPCD since experience in the highway departments in China indicate a low turnover of staff. Less certain is whether the progress made in preparing to carry out actual improvements in the management of highway maintenance will be continued and actual reforms implemented in the coming years.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Satisfactory

The project objectives related to improving traffic congestion, facilitate mobility and integration of inter-provincial trade; improving road safety; and, strengthening the institutional capacity of the FPCD were clear priorities and were correctly formulated. They were highly relevant to priorities both of China's development strategy and of the Bank's assistance to China. The need to improve road maintenance management was also a clear priority, and the project included useful activities related to highway maintenance and management. However, such activities were not put into an integrated concept of what the project intended to achieve. The specific objective, whether as

formulated in the Loan Agreement or in the PAD, was somewhat vague and difficult to monitor appropriately. Further, the objective as defined in the PAD, implicitly suggesting a dialogue between the Bank and the FPCD, does not appear to be appropriate for a Bank project. All Bank projects carry with them opportunities during preparation or implementation for the Bank team to discuss with the relevant government and project authorities issues of sectoral importance.

Aside from that comment, the PAD was highly detailed and provided excellent guidance for monitoring project outputs. By taking into account the lessons from past projects in project design and ensuring good preparation and readiness for implementation made it possible for the Second Fujian Highway Project to launch and complete implementation of the expressway, the project's largest component, in the timeframe foreseen in the PAD.

(b) Quality of Supervision
Rating: Satisfactory

The Bank missions followed the project closely, with an average of two supervision missions per year during project implementation. The missions gave practical and useful advice. A supervision early during ZZE construction insisted that pavement work should not start until settlement was confirmed in sections with soft soil. Missions also insisted that the quality of construction monitoring should be improved. Such type of advice was instrumental in ensuring good quality construction and preventing similar problems that had occurred in some other highway projects in China.

The missions were also concerned with enhancing the impact of institutional development activities. That led to recommend, and achieve, an increase in the number and type of stakeholders represented in the traffic safety seminars. Similarly, much effort was devoted to insisting on the importance of the highway maintenance study and the FPCD allocating sufficient resources to it (as reflected in the time dedicated to this topic during supervision missions, the preparation of their aide memoirs, and extensive comments to the consultants' reports), but this effort was less successful.

The missions also emphasized the importance of ensuring that ZZE traffic developed so that the new capacity is utilized with economic efficiency. In line with this view, the missions sought to ensure that the level of the toll rate would not be overly high thus deterring drivers from using the ZZE. The missions also emphasized the need to control truck overloading.

A potentially troubling aspect of the Bank supervision was the changes in the leadership of the supervision, since during the life of the project there were three different mission leaders. However, these changes appeared not have impacted the quality of supervision, in part because a highly-qualified Beijing-based, local consultant engineer, was part of all the supervision missions, and provided useful continuity to the supervision task.

(c) Justification of Rating for Overall Bank Performance
Rating: Satisfactory

The satisfactory rating for overall Bank performance results from satisfactory ratings for Bank performance ensuring quality at entry and for supervision.

5.2 Borrower Performance

(a) Government Performance
Rating: Satisfactory

Government performance needs to be assessed at two levels, central and provincial. At the central level, the involvement is essentially during project preparation, with technical inputs from the MOC for the technical design and environmental assessment of the ZZE. The latter also involves the State Environmental Protection Agency. The central government agencies provided a highly satisfactory support for the project, allowing good quality and rapid completion of the requirements that depended on them.

At the provincial level, the performance was generally satisfactory, although there were weaknesses. Examples were the significant underestimate made in the preliminary designs of the impact of the ZZE on land acquisition and resettlement, which resulted after the completion of the final designs in a substantial increase in the physical values (such a PAPs and land acquisition areas) as well as in the amount of compensation required.

Funding normally provided by the provincial government for project execution was satisfactory in some areas and less satisfactory in others. Funding for the resettlement compensation was provided promptly and covered the increased needs resulting both from the underestimate of resettlement requirements and the addition to the project of six local roads. On the other hand, counterpart funding for the local roads to be assumed by the counties was more difficult to secure, but this task was facilitated by an increase in the disbursement ratio of the Bank loan. Provincial funding for road maintenance has also not been sufficient to cover the needs of county road networks, and it is a key factor posing a risk for to the project's development outcome. This issue of funding for maintenance does not affect the ZZE, which generates its own resources, and which are adequate for the needs.

(b) Implementing Agency or Agencies Performance
Rating: Satisfactory

The implementing agency was very effective from start of the project regarding the physical components of the project. By the time of the project launch mission in December 1999, when the project had just become effective, contracts for some of the interconnecting and other roads had already been awarded and construction was underway. At that time, procurement for all eight contracts on the ZZE expressway had

reached the evaluation stage. On the institutional side, preparation work for the training program had already been started, as had been for other activities.

On the other hand, the implementing agency showed a halfhearted level of ownership of the highway maintenance study. This resulted in a late start by the consultant and a reduced support and office facilities making it difficult for the consultant to carry out field visits and hampering overall the conduct and elaboration of the study. The sheer magnitude of the physical investments of the project was from the start the main preoccupation of the implementation agency and was likely a major factor in the late start of the maintenance study.

(c) Justification of Rating for Overall Borrower Performance
Rating: Satisfactory

The overall Borrower performance is rated as satisfactory. This is based on the ratings of the government and the implementing agency and also considering the project outcome is satisfactory and is deemed largely to be sustainable.

6. Lessons Learned

Several lessons can be drawn from this project, which likely confirm or complement lessons drawn from other projects.

Taken past lessons into account is essential during project preparation. Measures included in the project to prevent or reduce occurrence of problems, mainly related to engineering designs, bid documents, and quality control during construction were appropriate and did contribute to reducing problems that had happened in past projects. However, more could have been done in further strengthening the detailed designs to allow better estimations of resettlement needs and bid market prices, as well as in undertaking more extensive geological investigations to reduce the amount of variation orders and increases in the initial contractual costs. Added emphasis in these activities is essential to strengthen the quality of the overall preparation of future similar type of projects.

Description of project objectives is always complex, especially for institutional objectives. Since institutional changes and reforms most of the time are long-term endeavors, often it is difficult to define what is possible to be achieved within the timeframe of a project. Project designers need to be careful that objectives are realistic. Yet, the project's formulation of the institutional objective was overly vague and prudent suggesting that from the outset was there was little hope that anything of substance could be achieved. If this was indeed the case, then the lesson is that a project should not contain an objective where strong doubts exist at the appraisal stage that any significant outcome could be achieved. If this was not the case, the objective should have been defined in more significant terms and with measurable targets, which could have been established since the project included several subcomponents related to the maintenance objective.

Further improvements are needed in the estimates of the compensation amounts related to resettlement. The project showed that in the case of the ZZE some items, such as number of houses relocated, turned out to be close to twice as large as the initial estimate. While final compensation payments reflected the more detailed designs and the actual impact of the new construction, a better initial assessment would have permitted a better budgeting of expenses and ensuring that funds were available when needed.

Financial return on toll roads should not be stressed, as it runs counter economic efficiency. The experience in China is that drivers are increasingly understanding the advantages of using the newly built modern roads, and are willing to pay for their use. Yet, as in other countries, drivers do not fully internalize the cost of driving on congested or bad roads, and therefore what they are willing to pay to use a modern expressway is a fraction of the actual savings they achieve when they divert from a free but poorly maintained and congested road to a modern, toll expressway. As a result, the toll rate, at least until the traffic builds up a few years after opening of the expressway, needs to be set a sufficiently low level to avoid deterring many potential users of the expressway from actually using the facility, which could severely lower the economic return of the expressway investment.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/implementing agencies

The comprehensive borrower's own implementation completion report has been summarized in Annex 7. In that report, the borrower acknowledges that the experiences gained from the implementation of the project "will be of great significance as a demonstration project for modern highway development in Fujian province." The borrower further highlighted the following significant issues: (a) the importance of good engineering designs, (b) the risks associated with the criterion that requires the awarding of a contract to the lowest evaluated bidder, and (c) vehicle overloading as a key issue in the management of highway operations. The three issues highlight genuine concerns of the FPCD about three key elements of the preparation, procurement, and operational phases of projects. On (a) the Bank has increasingly emphasized more extensive hydrological and geological investigations that can help underpin better original designs, and has facilitated additional engineering independent reviews as a complement to the work carried out by the Chinese design institutes. (In fact, most recent projects incorporate a foreign engineering firm—financed through trust fund resources—to provide additional insights during the design phase.) On (b) the Bank has provided extensive training to further qualify the concept of "lowest evaluated bid" and the need to strengthen the definition and application of the relevant pre- or post-qualification criteria—which would allow the reduction of construction risks (e.g., delays or variations) that may originate in the application of such criterion. On (c), the comment reflects the increasing concern about the preservation of road assets as well as road safety conditions. Enforcement of vehicle size and weight regulations remains a key issue that should be steadfastly strengthened to address both concerns of road safety and early deterioration of pavements.

(b) Cofinanciers

(c) Other partners and stakeholders

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in USD Million equivalent)

Components	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Construction of Zhangzhou-Zhao'an Expressway	389.42	378.46	97.2%
Improvement/Construction of Interconnecting Roads	8.90	10.48	117.8%
Improvement/Construction of Other Roads *		134.46	
Procurement of Equipment	3.80	16.85	443.42%
Construction Supervision	13.10	12.11	92.4%
Construction Supervision for Additional Roads *		1.68	
Studies on Highway Maintenance, Toll Rates, Highway Safety, and Staff Training	1.36	1.47	108.1%
Land Acquisition and Resettlement (ZZE and initial roads)	30.90	47.99	155.3%
Land Acquisition and Resettlement (additional roads)**		11.09	
Total Baseline Cost	475.08	614.59	129.4%
Contingencies	118.52		
Total Project Costs	593.60	614.59	103.5%
Front-end fee IBRD	2.00	2.00	100.0%
Total Financing Required	595.60	616.59	103.5%

* These activities were not initially planned and were incorporated to the project as they complemented the initial investments in the achievement of the project development objectives. The estimated initial costs for these additional road works were US$107.30 million. The final cost was then 85.5% of that initially estimated cost. For supervision activities, the initial estimated cost amount to US$1.35 million. The final cost was 124.4% of that initial value.

** This corresponds to the cost of the land acquisition and resettlement for the roads added to make use of the unallocated funds under the loan. The initial estimated cost of these activities amounted to US$9.8 million.

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (USD millions)	Actual/Latest Estimate (USD millions)	Percentage of Appraisal
Government		395.60	420.61	106.3%
International Bank for Reconstruction and Development		200.00	195.98	98.0%

Annex 2. Outputs by Component

Component	Output	Comments
Construction of ZZE, Interconnecting and Other Roads		
Physical Components		
• ZZE (Expressway)	132 km	Four lane, access-controlled highway
• ZZE Interconnecting roads		
(i) Interconnecting roads	5 km	Class I, four lane
(ii) Interconnecting roads	8 km	Class II, two lane
• 3 Class II roads		
(i) Huan'an section of Zhanghua road	40.9 km	
(ii) Longhai Xixi Bridge	775 meters	One long bridge and two smaller bridges plus approaches
• Additional 6 roads		
(i) Youxi	72 km	Macadam reconstruction
(ii) Shaxian	9.7 km	Improvement
(iii) Longyan	5.1 km	Improvement
(iv) Pingnan	14.9 km	Reconstruction plus new section
(iv) Jiaocheng	43.7 km	New section
(vi) Fuding	9.8 km	New section
• Blackspots	24	6 major and 18 simple
Equipment		
(i) Road maintenance	6 units	In operation for the ZZE
(ii) Weighing balances	110 units	In operation
Institutional Strengthening/Capacity Building		
Studies		
(i) Toll rates	Done	
(ii) Road Maintenance	Done	
Training		
(i) Trained personnel	103 persons 1,050 person days in training courses 992 person-days in study tours	In 17 training activities, including 11 study tours and 6 training courses

Annex 3. Economic and Financial Analysis

Introduction

At project appraisal, the economic analysis comprised evaluation of the two major components of the project: (a) the Zhangzhou- Zhao'an Expressway (ZZE), including the two interconnecting road links, and (b) the improvement of selected local roads. During the project implementation, the improvements of six additional local roads were added to the project. The economic analysis reflects the final implementation of the project and covers the investment components. Both costs and benefits reflect December 2007 prices.

Traffic on the ZZE

The Zhangzhou – Zho'an expressway opened to public in December 2002. The total corridor traffic and the traffic on the new expressway for 2003 were about 75% of the estimates assumed at appraisal. The expressway diversion ratio (the portion of the road users using the expressway) in 2003 was estimated to be 52% which was better than the forecast of 46% at the time of project appraisal. During 2003-2006, this ratio was further improved and was better than the forecast. This reveals that the road users of the new expressway have accepted the toll road concept faster than the expectation at appraisal.

From a lower traffic demand at the ZZE opening, the traffic growth rate has been growing at higher rates (13.4%) that those estimated at appraisal (8.0%) for the period 2003 to 2006. During this same period, the traffic growth rate for the entire corridor (9.6%) has also been higher than the appraisal estimate (8.0%). However, for the longer–term forecast, it is estimated that the average annual traffic growth rate will varied between 2.3% and 4.7% for the period 2007- 2020, compared to an average growth rate of 5.7% forecasted at appraisal. The expressway corridor traffic and distribution between the old and the new highway are presented in the following table, with the values estimated at appraisal and those assumed for the economic analysis of the ICR.

Table A3.1: Number Of Motorized Vehicle Per Day (2003-2030)

	Appraisal (PAD)				ICR			
	Old Road (1)	New Expressway (2)	Total Corridor (3=1+2)	Traffic Diversion (4=2/3)	Old Road (5)	New Expressway (6)	Total Corridor (7=5+6)	Traffic Diversion (8=6/7)
Zhangzhou - Zhao'an expressway								
2003	9,240	7,960	17,200	46.3%	6,947	7,436	14,383	51.7%
2004	9,980	8,600	18,580	46.3%	7,415	9,449	16,864	56.0%
2005	10,780	9,290	20,070	46.3%	7,572	10,126	17,698	57.2%
2006	11,650	10,030	21,680	46.3%	8,102	10,835	18,937	57.2%
2010	15,840	13,650	29,490	46.3%	9,350	13,080	22,430	58.3%
2015	21,390	18,420	39,810	46.3%	11,200	17,840	29,040	61.4%
2020	25,420	21,910	47,330	46.3%	11,200	20,630	31,830	64.8%
Average growth pa								
2003-2006	8.0%	8.0%	8.0%	--	5.3%	13.4%	9.6%	--
2006-2020	5.7%	5.7%	5.7%	--	2.3%	4.7%	3.8%	--

Sources: FPCD and Bank staff assumptions and calculations.

Results of Economic Analysis

Table A3.2 summarizes the results of the economic analysis. The economic internal rate of return (EIRR) of the ZZE, including the two interconnecting links is estimated at 14.8%; the net present value (NPV), at a discount rate of 12 percent, is estimated at RMB 1,005.9 million. These values are lower that those estimated at appraisal (19.6% and RMB 3,703 million, respectively) given the more conservative assumptions about the future growth of traffic along the ZZE, under the assumption that the recent years high rates of growth cannot be sustained in the medium and longer term. The EIRR and NPV for the local roads improvement component is estimated at 47.5% and RMB 1,144.5 million, compared to EIRR values that ranged from 23.2% and 32.5% at appraisal. For the additional improvement works on the local roads incorporated to the project (to make use of the unallocated funds), the EIRR and NPV are estimated at 35.1% and RMB 625.2 million, respectively.

The combined EIRR and NPV for the entire project is estimated at 18.3% and RMB 2,775.6 million which are slightly lower than the values estimated at appraisal (19.6% and Y 4,036 million, respectively) mainly because of a slightly higher overall economic capital cost (6.7%) combined with lower (and more conservative) corridor traffic estimates for the ZZE.

Table A3.2: Economic and Financial Evaluation Summary

	PAD				ICR			
	EIRR (%)	ENPV (12%, mY)	FIRR (%)	FNPV (7.0%, mY)	EIRR (%)	ENPV (12%, mY)	FIRR (%)	FNPV (4.8%, mY)
Zhangzhou - Zhao'an expressway	19.4	3,644	12.5	4,021	14.9	999.3	8.0	1,838.9
The Two Link Roads	16.6 ~17.0	59	--	--	12.9	6.6	--	--
Total expressway	**19.4**	**3,703**	**--**	**--**	**14.8**	**1,005.9**	--	--
The Other Roads and Bridge	23.2~32.5	333	--	--	47.5	1,144.5	--	--
The Local Roads Improvement	--	--	--	--	35.1	625.2		
Total project	**19.6**	**4,036**	**--**	**--**	**18.3**	**2,775.6**	**--**	**--**

Tables A.3.3.a and b provide further details of the calculations of the economic analysis of the investment components of the project.

Table A3.3 a: Second Fujian Highway Project
(million RMB)

	Zhangzhou- Zhao'an Expressway			The Link Roads			Total Expressway		
	Total costs	Total benefits	Net cash Flow	Total costs	Total benefits	Net cash flow	Total costs	Total benefits	Net cash Flow
1999	198.50		(198.50)				198.50		(198.50)
2000	725.34		(725.34)	25.86		(25.86)	751.20		(751.20)
2001	1050.65		(1050.65)	29.52		(29.52)	1080.17		(1080.17)
2002	1306.75		(1306.75)	13.03		(13.03)	1319.78		(1319.78)
2003	908.38	258.74	(649.64)	22.78	3.02	(19.76)	931.16	261.76	(669.40)
2004	229.93	383.20	153.27	0.00	5.91	5.91	229.93	389.10	159.17
2005	92.11	486.44	394.33	0.66	7.46	6.80	92.77	493.90	401.13
2006	14.75	573.98	559.23	0.66	9.59	8.93	15.41	583.57	568.16
2007	14.75	643.21	628.46	0.66	10.77	10.11	15.41	653.98	638.57
2008	14.75	720.84	706.09	0.66	12.10	11.44	15.41	732.94	717.53
2009	14.75	808.00	793.25	0.66	13.60	12.94	15.41	821.60	806.19
2010	14.75	905.99	891.24	0.66	15.28	14.62	15.41	921.27	905.86
2011	14.75	983.41	968.66	0.66	17.10	16.44	15.41	1000.51	985.10
2012	96.98	1066.41	969.43	8.69	19.13	10.44	105.67	1085.54	979.87
2013	96.98	1155.45	1058.47	8.69	21.39	12.70	105.67	1176.84	1071.17
2014	14.75	1251.05	1236.30	0.66	23.92	23.26	15.41	1274.97	1259.56
2015	14.75	1353.77	1339.02	0.66	26.75	26.09	15.41	1380.52	1365.11
2016	14.75	1464.21	1449.46	0.66	29.92	29.26	15.41	1494.13	1478.72
2017	14.75	1583.05	1568.30	0.66	33.46	32.80	15.41	1616.51	1601.10
2018	14.75	1710.98	1696.23	0.66	37.42	36.76	15.41	1748.40	1732.99
2019	14.75	1848.82	1834.07	0.66	41.86	41.20	15.41	1890.68	1875.27
2020	14.75	1997.35	1982.60	0.66	46.96	46.30	15.41	2044.30	2028.89
2021	14.75	2160.34	2145.59	0.66	52.58	51.92	15.41	2212.92	2197.51
2022	14.75	2339.85	2325.10	0.66	59.34	58.68	15.41	2399.19	2383.78
EIRR =			14.9%			12.9%			14.8%
NPV (12%) =			999.3			6.6			1005.9

Table A3.3 b: Second Fujian Highway Project
(million RMB)

	The Other Roads and Bridges			Local Road Improvement			Total Project		
	Total costs	Total benefits	Net cash Flow	Total costs	Total benefits	Net cash flow	Total costs	Total benefits	Net cash flow
1999							198.50		(198.50)
2000							751.20		(751.20)
2001							1080.17		(1080.17)
2002	26.63		(26.63)				1346.41		(1346.41)
2003	186.81		(186.81)				1117.97	261.76	(856.21)
2004	136.11		(136.11)				366.04	389.10	23.06
2005	77.59		(77.59)	183.05		(183.05)	353.41	493.90	140.49
2006	1.44	352.85	351.41	352.90		(352.90)	369.75	936.42	566.67
2007	1.44	360.21	358.77	158.36	140.66	(17.70)	175.21	1154.85	979.64
2008	1.44	367.74	366.30	2.33	267.49	265.16	19.18	1368.17	1348.99
2009	1.44	375.45	374.01	2.33	278.05	275.72	19.18	1475.10	1455.92
2010	1.44	383.34	381.90	2.33	289.05	286.72	19.18	1593.66	1574.48
2011	1.44	389.34	387.90	2.33	299.03	296.70	19.18	1688.88	1669.70
2012	1.44	395.45	394.01	2.33	309.37	307.04	109.44	1790.36	1680.92
2013	1.44	401.67	400.23	2.33	320.10	317.77	109.44	1898.61	1789.17
2014	1.44	407.99	406.55	2.33	331.22	328.89	19.18	2014.18	1995.00
2015	9.86	422.81	412.95	2.33	342.76	340.43	27.60	2146.09	2118.49
2016	9.86	427.15	417.29	2.33	356.55	354.22	27.60	2277.83	2250.23
2017	1.44	423.10	421.66	15.98	384.14	368.16	32.83	2423.75	2390.92
2018	1.44	427.54	426.10	15.98	397.69	381.71	32.83	2573.63	2540.80
2019	1.44	432.05	430.61	2.33	398.07	395.74	19.18	2720.80	2701.62
2020	1.44	436.60	435.16	2.33	413.93	411.60	19.18	2894.83	2875.65
2021	1.44	441.19	439.75	2.33	429.24	426.91	19.18	3083.35	3064.17
2022	1.44	445.83	444.39	2.33	444.08	441.75	19.18	3289.10	3269.92
EIRR =			47.5%			35.1%			18.3%
NPV (12%) =			1144.5			625.2			2775.6

Financial analysis

The construction of the ZZE constitutes about 80% of the total capital investment and is the only component that generates own revenues. The financial analysis focuses on the evaluation of the financial conditions of the ZZE. The ZZE opened to traffic on December 2002. Fujian province has formed a financially independent entity, responsible for the day-to-day management, operations and maintenance of the ZZE. The main income is the tolls charged to the road users. The toll rates are set by the provincial government. The entity is planning to use the toll revenue to cover amortization charges of the Bank and domestic loans.

Based on the current financial status, the expressway would not need any additional external financial assistance over the life of the project. The financial internal rate of return (FIRR) to the capital investments is estimated to be 8.0% with a NPV (at 4.8% discount rate) of RMB 1,838.9 million. These values are lower than the appraisal estimate of 12.5% and of RMB 4,021 million at 7.5% discount rate, respectively. Nonetheless, based on the current toll revenue and operating costs, the entity would be able to generate enough total revenue over the loan period to finance operation, maintenance, and debt services. The results of the analysis are summarized in Table A3.4 below. Further details of the financial parameters since opening and forecasts are provided in Tables A3.5 a, b, c, and d.

Table A3.4: FIRR (in %) AND NPV (RMB million)

	Appraisal (PAD)		ICR	
	EIRR	NPV (7.0%)	EIRR	NPV (4.8%)
Zhangzhou- Zhao'an Expressway	**12.5**	**4,021.0**	**8.0**	**1,838.9**

There are two special features for the ZZE's accounting practice: (a) exemption of all taxes (operating taxes and income tax), and (b) treating the maintenance expenditures as a replacement for depreciation and having no depreciation reserves for the expressway. Without the depreciation, the profitability of the XXE is overstated. An alternative scenario has been tested on the basis of including the depreciation. Assuming a 30-year depreciation for the ZZE, the FIRR and the NPV will be 5.3% and RMB 250.3 million, respectively.

Table A3.5 a: Income Statement
(million RMB, year ending 31 December)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Traffic (million veh-km)	378.98	481.61	516.11	552.25	578.53	606.17	635.14	665.64	686.50	708.19
Revenue										
Tolls	274.02	398.21	422.00	443.10	455.01	475.23	496.37	596.34	613.81	631.80
Others	5.94	10.69	12.38	13.00	14.46	15.15	15.88	16.64	17.16	17.70
Total	279.96	408.90	434.38	456.10	469.47	490.38	512.25	612.98	630.97	649.50
Operating Costs										
Wages and benefits	31.96	29.78	19.62	22.14	23.14	24.25	25.41	26.63	27.46	28.33
Maintenance	12.78	48.83	51.79	57.57	57.85	60.62	63.51	66.56	68.65	70.82
Fuel & materials	-	-	-	-	-	-	-	-	-	-
Administration	2.04	1.79	2.48	2.89	28.93	30.31	31.76	33.28	34.33	35.41
Others	0.55	13.05	22.16	17.68	24.88	26.07	27.31	28.62	29.52	30.45
Total working costs	47.33	93.45	96.05	100.28	134.80	141.25	147.99	155.09	159.96	165.01
Depreciation	-	-	-	-	-	-	-	-	-	-
Total operating costs	47.33	93.45	96.05	100.28	134.80	141.25	147.99	155.09	159.96	165.01
Operating Profit	232.63	315.45	338.33	355.82	334.67	349.13	364.26	457.89	471.01	484.49
Financial charges:										
IBRD	-	-	64.06	43.98	55.24	52.04	48.70	45.18	41.48	37.59
Local Bank	-	72.11	69.79	62.80	68.82	62.39	54.85	46.76	38.67	30.04
Other income (expenses)	-	-	0.95	6.82	6.81	6.81	6.82	6.81	6.81	6.82
Net Profit	232.63	243.34	205.43	255.86	217.42	241.51	267.53	372.76	397.67	423.68

Sources: FPCD and the Bank staff.

Table A3.5 b: Sources and Applications of Funds
(million RMB, year ending 31 December)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sources:														
Net profits	-	-	-	-	232.63	243.34	205.43	255.86	217.42	241.51	267.53	372.76	397.67	423.68
Depreciation	-	-	-	-	-	-	-	-	-	-	-	-	-	-
State contribution	41.88	157.99	227.37	278.15	199.21	50.56	17.84	-	-	-	-	-	-	-
Provincial contribution	33.02	124.57	179.28	219.32	157.07	39.85	14.06	-	-	-	-	-	-	-
Borrowing:														
IBRD	53.26	200.90	289.13	353.71	253.31	64.29	22.67	-	-	-	-	-	-	-
Local	54.66	206.21	296.78	363.06	260.01	65.99	23.29	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	182.82	689.67	992.56	1214.24	1102.23	464.03	283.29	255.86	217.42	241.51	267.53	372.76	397.67	423.68
Total	-	-	-	-	232.63	243.34	205.43	255.86	217.42	241.51	267.53	372.76	397.67	423.68
Applications:														
Capital expenditure	182.82	689.67	992.56	1214.24	869.60	220.69	77.86	7.03	7.38	7.75	8.14	8.54	8.97	9.42
Other expenditure	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loan repayment:														
IBRD	-	-	-	-	-	-	48.38	72.49	62.99	66.19	69.53	73.05	76.75	80.64
Local	-	-	-	-	-	33.64	37.27	76.36	116.36	136.36	156.36	166.36	166.36	176.36
Change w/ capital	(149.41)	(118.94)	(36.02)	209.29	117.25	335.43	124.06	123.85	17.36	(1.25)	(1.31)	(6.05)	(1.07)	(1.12)
Total	33.41	570.73	956.54	1423.53	986.85	589.76	287.57	279.73	204.09	209.05	232.72	241.90	251.01	265.30
Net Funds Flow	149.41	118.94	36.02	(209.29)	115.38	(125.73)	(4.28)	(23.87)	13.33	32.46	34.81	130.86	146.66	158.38
Open balance	67.50	216.91	335.85	371.87	162.58	277.96	152.23	147.95	124.08	137.41	169.87	204.68	335.54	482.20
Closing balance	216.91	335.85	371.87	162.58	277.96	152.23	147.95	124.08	137.41	169.87	204.68	335.54	482.20	640.58
D/S Cover	--	--	--	--	--	**2.98**	**1.54**	**1.41**	**1.12**	**1.12**	**1.12**	**1.39**	**1.47**	**1.50**

Sources: FPCD and the Bank staff.

Table A3.5 c: Balance Sheet
(million RMB, year ending 31 December)

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Assets:										
Fixed Assets										
At cost	3,956.67	4,230.61	4,189.10	4,196.79	4,037.65	4,037.78	4,037.92	4,040.91	4,044.05	4,047.35
Less: Depreciation	-	-	-	-	-	-	-	-	-	-
Net fixed assets	3,956.67	4,230.61	4,189.10	4,196.79	4,037.65	4,037.78	4,037.92	4,040.91	4,044.05	4,047.35
Current Assets										
Inventory	-	-	-	-	-	-	-	-	-	-
Receivable	114.83	100.49	103.22	50.25	70.42	73.56	76.84	91.95	94.65	97.43
Cash	277.96	152.23	147.95	124.08	137.41	169.87	204.68	335.54	482.20	640.58
Subtotal	392.79	252.72	251.17	174.33	207.83	243.43	281.52	427.49	576.85	738.01
	0.57	2.67	2.67	3.44	4.69	4.90	5.12	6.13	6.31	6.50
Other Assets										
	4,350.03	4,486.00	4,442.94	4,374.56	4,250.17	4,286.11	4,324.56	4,474.53	4,627.21	4,791.86
Total Assets	-	-	-	-	-	-	-	-	-	-
Liabilities & Equity										
State funds- Equity	1,595.58	1,515.34	1,682.77	1,760.76	1,812.92	2,047.02	2,306.77	2,675.00	3,067.02	3,484.78
L/T loans: IBRD	1,031.72	1,216.16	1,167.78	1,095.29	1,032.30	966.11	896.58	823.53	746.78	666.14
Local	1,570.00	1,536.36	1,499.09	1,422.73	1,306.36	1,170.00	1,013.64	847.27	680.91	504.54
Subtotal	2,601.72	2,752.52	2,666.87	2,518.02	2,338.66	2,136.11	1,910.22	1,670.80	1,427.69	1,170.68
Current Liabilities	152.73	218.14	93.30	95.78	98.59	102.98	107.57	128.73	132.50	136.40
Other Liabilities	-	-	-	-	-	-	-	-	-	-
Total Liabilities & Equity	4,350.03	4,486.00	4,442.94	4,374.56	4,250.17	4,286.11	4,324.56	4,474.53	4,627.21	4,791.86
Debt- to- equity ratio	**63/37**	**66/34**	**62/38**	**60/40**	**57/43**	**52/48**	**47/53**	**40/60**	**34/66**	**27/73**
Current ratio	**2.6**	**1.2**	**2.7**	**1.8**	**2.1**	**2.4**	**2.6**	**3.3**	**4.4**	**5.4**

Sources: FPCD and the Bank staff.

Table A3.5 d: Assumptions for Financial Forecasts

1. Toll and Traffic (AADT):

	Small car	Medium bus	Large Bus	Small truck	Medium truck	Large truck	Tractor -Trailer	Total
Toll (Y/v-km) /_a	0.50	1.00	1.40	0.50	1.00	1.40	1.75	
1. Beitou - Xifeng								
2003	2,969	160	457	2,852	714	200	84	7,436
2004	3,635	174	766	3,224	1,199	265	186	9,449
2005	4,057	97	928	2,309	1,451	594	690	10,126
2006	4,341	104	993	2,471	1,553	636	738	10,835
2010	5,480	121	1,162	2,890	1,816	744	864	13,077
2020	8,112	155	1,487	3,699	2,325	952	1,106	17,836
2. Xifeng - Wutian								
2003	2,761	149	425	2,652	664	186	78	6,915
2004	3,381	162	712	2,998	1,115	246	173	8,788
2005	3,773	90	863	2,147	1,349	552	642	9,417
2006	4,037	97	923	2,298	1,444	591	687	10,076
2010	5,097	113	1,080	2,688	1,689	691	803	12,161
2020	7,545	145	1,382	3,441	2,162	885	1,028	16,588
3. Wutian - Zhugang								
2003	2,731	147	420	2,624	657	184	77	6,841
2004	3,344	160	705	2,966	1,103	244	171	8,693
2005	3,732	89	854	2,124	1,335	546	635	9,316
2006	3,994	95	914	2,273	1,428	585	679	9,968
2010	5,042	112	1,069	2,659	1,671	684	795	12,032
2020	7,463	143	1,368	3,404	2,139	876	1,018	16,411
4. Zhugang - Houling								
2003	3,414	184	526	3,280	821	230	97	8,551
2004	4,180	200	881	3,708	1,379	305	214	10,866
2005	4,666	112	1,067	2,655	1,669	683	794	11,645
2006	4,992	119	1,142	2,841	1,785	731	849	12,460
2010	6,302	140	1,336	3,324	2,089	855	993	15,039
2020	9,328	179	1,710	4,255	2,674	1,094	1,271	20,511

/_a: 15 % increase every 5 years.

2. Operating Cost: Increase 5 % pa.
   a. Wages and benefits 4.0% of total revenue
   b. Maintenance 10.0% of total revenue
   c. Administration 5.0% of total revenue
   d. Others 4.3% of total revenue

3. Borrowing: The IBRD 5.0%, 20 year maturities, LIBOR US$ based single currency, 5 years grace period and the foreign exchange risks.
   Local Bank 4.47% average rate, flexible principal payment.

Sources: FPCD and the Bank staff.

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Alfred Nickesen	Principal Transport Specialist	EASTR	Task Team Leader
Alla Weinstein	Operations Consultant	EASTR	Operations
Jean-Marie Braun	Highway Engineering Consultant	EASTR	Engineering
Dick Jonsson	Institutional and Traffic Safety Consultant	EASTR	Institutional Strengthening/ Training
Mitchel Stanfield	Private Infrastructure Consultant	EASTR	Private Infrastructure
Rodrigo Archondo-Callao	Transport Economist	TWUTD	Transport Economics
Anil H. Somani	Senior Environment Specialist	EASES	Environment
Tosun Aricanli	Resettlement Specialist	SASRD	Resettlement
Hoi-Chan Nguyen	Senior Counsel	LEGEA	Legal
R. I. Gopalkrishnan	Consultant	EAPCO	Procurement
Chau-Ching Shen	Financial Management Specialist	LOAFC	Financial Management
Dawei Yang	Procurement Specialist	EACCF	Procurement Assessment
Liu E.	Highway Specialist	EACCF	Highway Engineer
Maria Luisa Juico	Task Assistant	EASTR	Assistant
Antti Talvitie	Transport Economist	OEDST	Peer Reviewer
Stein Lundebye	Institutional Strengthening, Traffic Safety and Training Specialist	SASIN	Peer Reviewer
Joris Van Der Ven	Lead Transport Economist	EASTR	Peer Reviewer
Jose Luis Irigoyen	Highway Specialist	LCSFP	Peer Reviewer
Supervision/ICR			
Alfred Nickesen	Principal Transport Specialist	EASTR	Task Team Leader-to 12/00
Jean-Marie Braun	Highway Engineering Consultant	EASTR	Engineering
Dick Jonsson	Institutional and Traffic Safety Consultant	EASTR	Inst. Strengthening/ Training
Tosun Aricanli	Resettlement Specialist	SASRD	Resettlement
R. I. Gopalkrishnan	Consultant	EAPCO	Procurement
Anil H. Somani	Senior Environment Specialist	EASES	Environment
Setty Pendakur	Consultant	INFTD	Safety/IST
Bertrand Ah-Sue	Procurement Specialist	EACCF	Procurement
Yasuhiro Kawabata	Senior Highway Engineer	EASTR	Highway Engineer
Sivalingam Milton	Procurement Assistant	EASTR	Procurement
Chau-Ching Shen	Financial Management Specialist	LOAFC	Financial Management
Pan Wen	Highway Consultant	EACCF	Highway Engineer
Supee Teravaninthorn	Transport Economist	EACCF	Task Team Leader-to 6/05
Peishen Wang	Environment Specialist	EASES	Environment
Youlan Zou	Social Development Specialist	EASES	Resettlement

Toshiyuki Yokota	Transport Specialist	TWUTR	Highway Engineer
Christopher R. Bennett	Transport Specialist	EASTR	Highway Engineer
Boping Gao	Consultant	EASTE	Transport Specialist
Yi Geng	Financial Management Specialist	EAPCO	Financial Management
Maria Luisa G. Juico	Program Assistant	EASTE	Assistant
Aurelio Menendez	Lead Transport Specialist	EASTE	Task Team Leader
Juan D. Quintero	Senior Environmental Engineer	EASRE	Environmental Engineer
Jacques M. Tollie	Consultant	EASTE	Highway Engineer
Dawei Yang	Procurement Specialist	EAPCO	Procurement
Songling Yao	Social Development Specialist	EASCS	Social Development
Han-Kang Yen	Research Analyst	EASTE	Economist/ Financial Analyst
Haiyan Wang	Finance Officer	EACCF	Finance
Hernan Levy	Consultant	EASTE	Transport Economics

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only)	
	No. of staff weeks	USD Thousands (including travel and consultant costs)
Lending		
FY98		92.17
FY99		133.72
FY00		1.61
FY01		0.00
FY02		0.00
FY03		0.00
FY04		0.00
FY05		0.00
FY06		0.00
FY07		0.00
FY08		0.00
Total:		227.50
Supervision/ICR		
FY98		0.00
FY99		0.09
FY00	9	66.26
FY01	14	63.66
FY02	16	36.87
FY03	18	37.98
FY04	13	38.52
FY05	15	44.46
FY06	7	29.02
FY07	12	54.41
FY08	4	24.94
Total:	108	396.21

Annex 5. Beneficiary Survey Results

Not applicable

Annex 6. Stakeholder Workshop Report and Results

Not applicable

Annex 7. Summary of Borrower's ICR and/or Comments on Draft ICR

Objectives Achieved

Through the implementation and completion of each component of FH2, the objectives for each of the component have been achieved as follows:

- All of the components of FH2 have been completed, including ZZE (141 km), Dongyuan connection road (5 km Class I road) and Huxi connection road (8 km Class II road), the three interconnecting road projects—i.e. the Xixi bridge project including one large bridge (637 m long), one medium sized bridge (138 m long), and the newly built Class II road (2 km) of bridge approach, and the two reconstructed Class II road (total length of 51 km)—and the newly built and reconstructed 134.76 km total length of six road projects financed out of the Bank loan unallocated balance.
- International and domestic competitive biddings have been used for selecting the engineering work contractor, the engineering work supervisor and the equipment supply provider. Effective contract management system has been implemented based on FIDIC requirements for control of work quality, cost and progress. Quality assurance system was implemented based on the principles of lifetime responsibility for quality work and internal total quality control combined with independent supervision and government monitoring. As for the cost control, payment review was strictly carried out to ensure the engineering work progress going on smoothly. Quantitative rating of the quality of the engineering work was 90.6% during the process of the completion inspection and acceptance of ZZE, with good quality component engineering work ratio of 93.4%, and overall rating of the project of 91.4%, and project management rated as good and satisfactory, having passed through the completion inspection and acceptance organized by the Ministry of Communications (MOC).
- Since the end of 2002, when Zhang-Zhao expressway was completed and open to traffic, its traffic volume has been increasing, with AADT increased from 11,460 PCU in 2003 to 19,109 PCU in 2006, with annual average growth rate up to 18.58%. Meanwhile, since the Zhang-Zhao expressway has such advantages as travel time savings, vehicle operation cost reduction, enhanced safety, more comfortable ride for road users, there has been substantial traffic diversion from the parallel national road G324. The traffic volume on Zhang-Zhao expressway accounts for 54.01% of the total road traffic volume of the two paralleled road corridor; and it has increased to 61.95%in 2006, which shows the important function of the expressway, as it greatly expanded the road capacity, mitigated the traffic congestion, increased travel speed, improved the transport efficiency, facilitated road transport service and promoted commercial trade between Fujian and its neighboring provinces.
- Since ZZE opening to traffic, the toll revenue has been increasing steadily, from CNY314.53 million in 2003 to CNY 450.11 million in 2004, increased by 43.1%; to CNY 513.81 million in 2005, an increase of 14.2%; and to CNY578.48 million in 2006, increasing by 12.59%. Earnings before interest tax depreciation apportionment (EBITDA) for ZZE also increased from CNY 25,238.68 in 2003 to CNY 36,932.17 in 2006, with an annual average growth rate of 13.53%. Its loan payback capacity is enhancing year by year due to its good financial condition.
- Road safety has been improved greatly since the completion of FH2. The road traffic accident rate for the national road G324 before FH2 was 5.4 deaths per 10 million vehicle-km in 1998, and that in 2006 after completion of FH2 was reduced to 2.4 deaths per 10 million vehicle-km; and that for ZZE was 0.76 deaths per 10 million vehicle-km.
- Through the implementation of FH2 together with the interconnecting roads and other road construction and reconstruction projects, as well as the institutional strengthening, personnel training and research & development activities, the capacity of FCD and highway

administration agencies has been enhanced greatly. Advanced management experiences from foreign countries were learnt and incorporated in the implementation of FH2, with fruitful achievements, as the result of which a number of professional work teams have been cultivated in expressway design, engineering supervision, and project management. The rich experiences gained from FH2 will be of great significance as a demonstration project for modern highway development in Fujian province.

In more general terms, the completion of ZZE accommodated to the needs of the economic zone development of the western bank of the strait in Fujian province, not only facilitating trade and commerce among the major cities, economic zones and transport hubs in the south-eastern Fujian, but also strengthening an important transport link connecting the western bank of the strait with the Yangtze delta economic zone in the north and the Pearl Delta economic zone in the south. Furthermore, the completion of Second Fujian Highway Project, including the interconnecting roads and the six road projects financed out of the Bank unallocated loan balance also had effects on poverty reduction for the affected rural areas by the improvement of accessibility for local people to various social services and marketing of local farm products. The living standard of the project affected area has been improving since the completion of the projects. For example, Zhangzhou farmer's average net income increased from CNY 3,530 in 2000 to CNY 5,093 in 2006. Through the Resettlement Action Plan, the living standard of the project affected person (PAP) has been improved. According the survey, the annual average family income for the project affected family was CNY 16,714 in 2000 and that in 2003 was CNY 18,721.

Preparation of the Project

The feasibility study and the project proposal were completed in 1996. In the same year the State Planning Commission endorsed the project in the list of the World Bank loan projects for the period 1997 to 1999 by document No.[1996]2966. The World Bank organized the project appraisal mission in October 1996 and March 1997 respectively in China for the preparation of the project appraisal document on a proposed loan for the Second Fujian Highway Project.

In 1998 the State Planning Commission approved the project to be established by document No. (1998)309 (transport & energy project) and the project was endorsed by the World Bank appraisal mission. The project feasibility study report was reviewed and appraised at the provincial level in 1997. In August 1998, the State Planning Commission assigned the design task for the project by issuing the document No. (1998)1596 (infrastructure), which was also endorsed by the World Bank mission.

In September 1998, the preliminary design for the ZZE was completed and reviewed at the provincial level and submitted to the Ministry of Communications (MOC) and the World Bank for approval. The MOC and the World Bank organized field inspection and review mission respectively. In March 1999, the MOC issued document No. (1999)63 (highway) endorsed the preliminary design, which was also endorsed by the World Bank appraisal mission. The construction plan for the first 8km section was completed in 1998 and the construction work was commenced the same year. The construction plans for other sections were to be submitted one after another and were to be completed by the beginning of the year of 2000. The State Planning Commission approved the commencement of the construction work of the project by issuing the document No. (1998)1636 (investment), which was also endorsed by the World Bank mission.

The executive board of directors of the World Bank approved the proposed loan on 24 June, 1999. The loan agreement was signed by the World Bank and the Ministry of Finance on 29 July 1999, which became effective on 17 November 1999.

In early 2004, Fujian Provincial Development Planning Commission submitted to the National Development and Reform Commission (NDRC) a proposed Program for Utilization of FH 2 Project World Bank Loan Unallocated Balance of US$33.96 million, of which US$30 million were to be used for six local road rehabilitation and reconstruction projects. The NDRC approved the proposed Program by issuing the document No. [2004] 1712 in September of 2004. The program and loan allocated was subsequently approved by the Bank.

Implementation of the Project

Design. The preliminary design and the construction plan design for ZZE were undertaken by the Fujian Provincial Planning and Design Institute (FPPDI), mainly including overall scheme design, route design, sub-grade/pavement and protective work design, bridge and culvert design, tunnel design, separated interchange design, environmental protection and landscape design, traffic engineering and road side facilities, building and other engineering design, as well as project cost estimation, etcetera. During the construction period, work site design representative was assigned to work on each of the construction work sites by the design institute, to cooperate with the representative of project owner and the supervision engineer in solving technical issues occurred on the site, particularly those issues relevant to design alteration.

Tendering. There were a total 25 construction contract sections for the expressway project, including 13 for sub-grade, 4 for pavement, 3 for building, 3 for greening works, and 2 for electric-mechanical (E&M) works. The World Bank loan was used for all the contract sections, except for 3 sub-grade sections (A1-1, A1-2, A1-3), 3 greening sections (G1 – G3) and one E&M (D). International competitive bidding was used for 8 sub-grade sections (A2 – A9) and 4 pavement sections (B1 – B4), and domestic competitive bidding was used for the rest of the contract sections.

The procedure of the tendering is as the following: the project owner organizes a tendering committee, bidding evaluation by experts, bidding evaluation report submitted to Fujian Provincial Expressway Construction Directorate (FPECD) and the Fujian Provincial Communication Department (FPCD) for approval, subject to no objection from the World Bank for the contract sections with the Bank loan. The China International Tendering Company was entrusted as procurement agency for FH2. A General Procurement Notice was published in Development Business No.502 on 16 January 1999.

All the tendering processes were carried out strictly in accordance with the World Bank Procurement Guidelines and the relevant provisions set forth by the seven ministries/commission of the People's Republic of China, and monitored by persons from the Ministry of Supervision and public notary to ensure the tendering evaluation work carried out under the principles of open, equity and fair.

Construction work. The State Planning Commission issued the construction work commencement plan for the project in August 1998. In November the construction work for the 8 km section (A1-1, A1-2 and A1-3) with soft ground started. In May 2000, construction for all the rest sections commenced and completed by the end of 2002, with an actual construction period of 32 months. The ZZE Co. Ltd. organized the completion inspection and acceptance of the expressway engineering work, over 25 – 26 December 2002, the quality of which was rated as satisfactory. On 28 December ZZE was open to traffic.

Supervision. A two level supervision system was established for ZZE construction: General Supervision Engineer Office (GSO) and the work site Supervision Engineer Office, for each of the contract sections. The General Supervision Engineer, the Representative of the General Supervision Engineer and the General Supervision Office were organized and nominated by the project owner. Wilbur Smith Associates (WSA) was selected as foreign supervision unit by international competitive tendering according to the provisions under the World Bank Loan Agreement. WSA sent a three persons group, with the group leader nominated as Deputy General Supervisor's Representative, to assist the General Supervisor's and the General Supervisor's representative's work. National public supervision unit was selected based on open tendering to form Work Site Supervision Office of each of the contract sections.

ZZE Engineering Work Supervision Work Procedures (Work Procedures) were developed by the General Supervision Office according to the provisions set forth by the FPECD. The engineering work quality, progress, cost control, as well as the Supervision Office management and monitoring for each of the work site were in accordance with the Work Procedures. Each of the Work Site Supervision Offices compiled the terms of reference for the work site supervision work taking into account of the specific conditions of the work site, and carried out the quality, progress, cost control and contract management work under the leadership and guidelines of the GSO.

Environmental protection training, monitoring, inspection, and acceptance. The project owner attached great importance to the environmental protection work for the project. In accordance with the requirements specified by the relevant provisions concerning highway development related environmental protection and the World Bank policies, an Expressway Environmental Protection Office was set up in the FPECD, responsible for the environmental protection work during the construction period and the operation period. Meanwhile, expressway environmental protection office was also established at Zhangzhou municipal level, and each of the counties, with responsibility to implement the environmental protection measures, such as noise reduction, sewage discharge from the toll collection areas, service areas and parking areas. During the construction period, it was required that an Environmental Protection Working Group should be set up jointly by the work site supervision office and the contractor, with designated full time environmental protection engineer responsible for the implementation of the each of the environmental protection measures for the contracted section. More detailed description of the various actions are listed below:

- *Environmental protection training*. To carry out the environmental monitoring work, the World Bank Loan FH2 Environmental Protection Training Course was jointly held by the FPECD and Fujian Provincial Environmental Protection Bureau over 11 – 13 April 2000 at the Nanqing Dongnanhai Training Center of Zhangzhou, with participants from Fujian Provincial Environmental Protection Bureau, FPECD, Zhangzhou Expressway Construction Directorate, General Supervision Office, Work site Supervision Office, the Project Owner, FPCPDI. During the training course, experts from Fujian Provincial Environmental Protection Research Institute, the Environmental Monitoring Station, and the FPECD gave lectures concerning the expressway related environmental protection knowledge, including expressway environmental protection technology, the environmental protection action plan for FH2, expressway environmental monitoring technology, the environmental protection management and procedures for FH2, and the environmental protection provisions under the contract documents and the technical specifications. A special workshop to understand the World Bank environmental policies and environmental protection requirements was held on 8 April 2002 organized by ZZE Co. Ltd, to clarify the responsibility to mitigate the environmental impact during the construction period, and a training course was held by

inviting the experts from Zhangzhou Environmental Monitoring Station to present lecture.

- *Environmental monitoring*. Zhangzhou Expressway Co. Ltd entrusted Zhangzhou Environmental Monitoring Station to work out an environmental monitoring plan for ZZE and starting from December 2000, regular environmental monitoring work was carried out by the Station, as well as regular supervision and inspection of the environmental monitoring work. By the end of 2003, a total of eight Environmental Monitoring Reports, six Survey Reports on Environmental Protection Implementation, one Report on Public Participation in the Environmental Impact Survey for ZZE during the construction period and two Reports on Operation Period Environmental Monitoring were completed. The field survey of the implementation of the environmental protection activities during the construction period, and the evaluation of the environmental monitoring results for the water resource, ambient air, and acoustic environment, indicated the following facts: (a) due to the environmental protection management work during the construction period, the expressway project has little impact on the surrounding water environment with the original function of the water body of surrounding river maintained; (b) the noise level measured at each of the contract sections was within the limit as specified under the national standard of Noise Limit for Construction Work Site (GB 12523-90) and the construction noise has little impact on the main sensitive pots, where noise level met with the requirement as specified under the said national standard; (c) most of the construction work site had little impact on the surrounding area ambient air quality, with the measured daily average TSP in ambient air in compliance with the class II standard. Since ZZE opened to traffic in 2003, continuous noise level has been monitored for the acoustic sensitive spots along the expressway in accordance with the environmental protection action plan. Meanwhile according to the advice from the noise barrier construction work plan review meeting organized by ZZE Co. Ltd., no more noise level monitoring activity should be conducted for the acoustic sensitive spots provided with noise barriers in the operation period. In fact the survey showed that the noise level at the acoustic sensitive spots was over 54.6 – 59.0 dB(A), not exceeding the class IV standard limit as specified under the national standards.
- *Environmental protection inspection and acceptance*. The EIA Administration Department of the State Environmental Protection Administration jointly with the Environmental Protection Office of the MOC organized the completion inspection and acceptance of the environmental protection work for ZZE, with participants from Fujian Provincial Environmental Protection Bureau, FPCD, FPECD, and the Environmental Protection bureaus of Zhangzhou, Longhai, Zhangpu, Yunxiao, and Zhaoan counties. The completion inspection and acceptance group and all the participants checked the field results, reviewed relevant materials carefully, and after full discussion reached the conclusions as follows: EIA and "Santongshi" ("Three simultaneous" i.e. installations for the prevention and control of pollution at a construction project must be designed, built and commissioned together with the principal part of the project) were carried out and environmental protection measures such as noise reduction, dust prevention and control, and soil erosion reduction, were implemented for ZZE project. Environmental protection information was published to the general public before the commencement of the construction work. Environmental protection office was jointly set up by the contractor and the work site supervision office, with designated environmental protection manager. The expressway engineering was in compliance with the completion inspection and acceptance conditions, so the environmental protection work passed the completion inspection and acceptance.

Equipment procurement. Under the Second Fujian Highway Project, the equipment procurement was mainly for road maintenance work, with a total of 13 procurement contract packages in three batches. The equipment of the third batch with total cost about US$2.1 million shall be financed out of the World Bank loan balance US$3.96 million. The original plan is set at US$2.4 million.

However the US$1.56 million covered by the surplus supposed to be used for the weighing machine used for overweight/size control and enforcement were not available owing to it was not in compliance with the requirement of the Bank reimbursement procedure.

Electric-mechanic (E&M) works. There were two contract sections for ZZE E&M works: (a) the contract section D including monitoring system, tolling system and communications system; and (b) the contract section DS including tunnel ventilation system, lighting system, and power supply system.

- *Monitoring, tolling and communications system (contract section D).* The work for contract section D includes equipment supply and installation of monitoring system, tolling and communications system. The installation work completed is as the following: (1) Monitoring system. One monitoring sub-center equipment; seven field video cameras; 42 vehicle detection devices; 14 single-arm changeable message signs; 12 column information signs; 2 sets of tunnel monitoring system; over 40 km power supply lines; (2) Tolling system. One tolling sub-center computer system; 10 toll station monitoring room equipment; 10 toll plaza video camera; 66 toll lane equipment; 10 toll station CCTV system; 70 toll booth and its auxiliary equipment; (3) Communications system. 199 km optical cable; 180 km power supply cable; 890 km branch pipeline; 300 emergency telephone; One communications sub-center equipment; 16 unmanned communications stations equipment. The work for contract section D started on 28 September 2002, and the work completion inspection and acceptance went through on 18 July 2003 conducted jointly by Provincial Supervision Center, Provincial Quality Inspection Station, ZZE Co. Ltd. and the DJ Resident office. Trial operation was commenced on 18 July 2003. The contract section D was financed with domestic funds. Once all the three systems put into operation, uniform software for toll collection system is adopted across the province and the software functions well in meeting with the requirements. Part of the software functions have been further improved with accurate data transmission and clear graphical out. The monitoring system has functions of information collection, process, control, warning, capable of data statistics, enquiry, and producing back-up copy. The equipment type selection, configuration, and performance indicators are satisfactory and the construction technology is of good quality with wiring in compliance with specifications and clear identification labeling for equipment. Two fire alarming tests were carried out in 2003 and 2004 respectively for the tunnel monitoring system, which indicated that the fire alarming system functions well with linked coordinated system being able to be actuated normally. Operation of the communications system, including the digital program controlled exchange system, SDH optical transmission system, the emergency telephone system, is smooth, capable of real time continuous data and graph transmission.
- *Tunnel ventilation, lighting and power supply (Contract section DS).* There were a total of two tunnels included in the contract section DS of ZZE. One is Dabushan tunnel with its left line tunnel length of 1,985 m and right line tunnel length of 1995 m. Another one is Guzhishan tunnel with its left line length of 2,545 m and right line length of 2,600 m. There were a total of four transformer stations, with one set at for each of the tunnel gates. Tunnel ventilation system, lighting system and power supply system were provided for the tunnels including 8 dry transformers, 15 high voltage boards, 32 low voltage boards, 4 uninterrupted power sources, 3873 tunnel lighting apparatuses, 47 road lighting apparatuses, 12 light projectors, 32 fans, 109 km of power supply cables, 162 km of electric lines, 43 electric boards, 17350 sets of installation bracket. Additional material supply arising from the alterations includes 78 m of bus duct, 4405 m of Pulika tube, 47 road lighting foundations, 43 protective doors. The work for the contract section DS started on 1 July 2002, and completed on 15 December 2003 together with all the additional engineering work, and the trial operation of the tunnel systems started on 10 January 2004. The tunnel ventilation and

lighting systems under DS contract were financed with the World Bank loan and the contract was awarded through national competitive tendering. Since the completion of the contracted work, the tunnel ventilation, lighting and power supply systems are all functionally well without any malfunction or accident happened.

Personnel training. A total of 16 overseas training activities have been carried out under FH2, including 11 study tours and 5 training courses and there is one training course to be implemented this June. The overseas training and study tour are arranged in developed countries, in the north America, Europe, Australia, and etc. The training conducted during the project implementation covered modern management knowledge of highway planning, design, construction, operation and maintenance, engineering supervision, road safety, tunnel engineering, traffic engineering, environmental protection, financing and financial management, human resource development, project post-evaluation and etc. By the end of the project, the actual cost was US$691,547.33. To get more fruitful output from the overseas training, the project executing agencies attached great importance to the training activities and made effort to disseminate and apply in practice the modern and advanced management knowledge and experience learnt from overseas. Special lectures and training courses were held to introduce the new knowledge, new technique, new methods learnt from the overseas study, with papers and study reports compiled and printed out to benefit more people. On the whole, the overseas training achieved good effects to the satisfaction of the World Bank and the personnel training activities contributed a lot to the smooth and successful implementation of the project.

Research and development. During the process of the project implementation, a number of research and development work have been carried out under the FH2 as the following.

- *Design and Application of Fly-ash in Soft-ground Reinforcement*. To solve the problem of differential settlement between the bridge deck and its approach road arising from the soft-ground, so as to make sure quality work of the project, a study project of Design and Application of Fly-ash in Soft-ground Reinforcement was carried out jointly by FPECD, FPCPDI and Fujian Provincial Architecture Science Academy. The study project was completed in January 2007. The use of fly-ash concrete in expressway engineering reinforcement by the cast-in-situ fly-ash concrete sunk-tube pile has the effect of cost reduction as well as the enhancement of the sunk-tube pile strength. It is effective in the road subgrade reinforcement, particularly for bridge approach section. The bridge approach subgrade at Zhao'an of Dongyuan Bridge was selected as test section to use the technology, with the test results to be used to check the theoretical model. The study achievements is of practical value to ZZE engineering construction.
- *Safety study – Expressway Bridge Guardrail Research and Development*. The study project of Expressway Bridge Guardrail Research and Development was conducted jointly by FPECD, Zhangzhao Expressway Co. Ltd., FPCPDI, Beijing Shenhua Traffic Engineering Co. Ltd.. The study project was started in 1999 and completed in March 2001. As the outcome of the study project, a new type of structure has been developed to be used for expressway bridge guardrail based on the characteristics of ZZE bridge structure and its traffic condition. During the study period, great amount of crash accident data collection and analysis were made from 20 expressway routes, about 4000 km, on the basis of which collision test condition and evaluation criteria were proposed with reference to relevant standards and specifications in other countries. The new developed bridge guardrail structure, based on the proposed collision condition and the evaluation criteria, has gone through actual collision tests, which is proved to be more effective and efficient than conventional combined structure, with cost reduction per kilometer up to CNY96128. The study project won the first prize of FPCD's science and technological advancement in 2002.

- *Fujian Provincial Road Maintenance Study*. The study project of Fujian Provincial Road Maintenance Study was carried out by Fujian Provincial Highway Administration Bureau. The study included six contents: maintenance purpose and criteria, maintenance management system, resource evaluation and fund allocation, maintenance equipment and procurement, road maintenance organization and personnel training. The final report of the study project has been submitted to the World Bank for review and comment. A more comprehensive refinement of the study report has been completed.
- *Fujian Province Expressway Toll Charge Rate Study*. The study project of Fujian Province Expressway Toll Charge Rate Study was carried out jointly by FPECD, the Research Institute of Highway (RIOH) and ZZE Co. Ltd., which was started in March 2001 and completed in October 2002. The contents included in the study report are: evaluation of the current status of toll road charge in Fujian province, analysis of the factors in determination of the toll rate, vehicle classification for toll collection, determination of the toll charge coefficient, toll pricing theory and method study, toll rate determination, toll rate adjustment, recommended financial assessment for the recommended toll rate and the toll pricing policy. Advanced, scientific and innovative method was used in the study project, which won the third class award of science and technological advancement of China Highway and Transport Society in 2005. The toll pricing policy recommended in the report is operable and theoretical analysis and conclusions provide basis for the toll rate determination.

Land acquisition and resettlement. A total of five counties (city, district), i.e. Longhai, Zhangpu, Yunxiao, Changshan economic development zone and Zhao'an; 19 townships, 92 administrative villages are involved in the land acquisition and resettlement for ZZE. The land acquisition and resettlement was started in June 1999 and completed in March 2000, with total land acquisition of 17982.2mu, 505395 fruit trees having been cut-off, 4662 tombs relocated, 34923 project affected persons, 17445 affected laborers, in addition, there are a total of 101044 square meters of houses relocated, involving 532 households and 2689 persons, 12 affected enterprises and affected schools. Total compensation actually used for the resettlement is CNY384544.75 thousand, which is CNY77184.3 thousand more than that of the appraised (CNY307360.5 thousand), increased by 25.1%.

The land acquisition and resettlement for ZZE has been implemented and completed smoothly as organized by the land acquisition and resettlement office of FPECD and that in each of the project affected counties and townships, which started with the draft of the Resettlement Action Plan and personnel training of the local staff engaged in the land acquisition and resettlement work, in accordance with the World Bank policy set out in Involuntary Resettlement. The land acquisition and resettlement of the six local road projects were implemented by the county and township level land administration department in cooperation with the road project land acquisition and resettlement offices with overall coordination from the World Bank Project Office of the FPCD. The external monitoring of the land acquisition and resettlement work was undertaken by Fujian Provincial Social Science Academy, meeting with the World Bank's relevant requirements.

The land acquisition and resettlement preparation work, the planned targets, procedures are all in compliance with the requirements under relevant regulations and specifications. Compensations have been made based on reliable information from comprehensive and detailed field survey and in accordance with the standards set by the laws and regulations also in compliance with the World Bank policy Involuntary Resettlement.

The targets set for the land acquisition and resettlement for the ZZE and the six local road projects have been fully achieved satisfactorily. Most of the PAPs' living standards have been restored and improved up to appropriate level better than before the resettlement.

Total fund input for the resettlement is CNY384.54475 million, with more infrastructure development, which have promoted relevant industrial development, agricultural production and local economic growth. The project affected area's people's living standards have been improving due to FH2, which created more employment opportunities.

Interconnected road projects. There are three attached road projects: reconstruction of Hua'an section of Zhanghua road (from Tankou to Chengguan); Longhai Xixi bridge; and reconstruction of the road section from Zhangpu Chengguan to Shiliu.

- Reconstruction of Hua'an section of Zhanghua road. The reconstructed section with total length of 40.91 km is part of the provincial road No.208. The road condition has been improved in terms of technical standards, from Class III or IV up to Class II with design operation speed of 40km per hour, bridge and culvert bearing capacity up to veh. – 20, trailer – 100, subgrade width of 10.5 m. pavement width of 9 m (cement concrete structure). The reconstruction work is divided into five contract sections. The work was started in June 2002 and the whole section was completed and open to traffic in May 2004. After completion of the reconstruction, the road section' traffic volume was growing steadily, with AADT increased from 7674 PCU in 2004 to 17157 PCU in 2006, with annual average growth rate of 28.1%. The original 53.8 km long road section from Tankou to Chengguan is of Class III or Class IV standard. After the reconstruction, the travel distance from Hua'an to Zhangzhou is reduced by 12 km; and the traffic from Sanming, Yongan to north Zhangzhou is reduced by 120 km, comparing with the path via Longyan. Completion of the reconstruction had the effect of producing more induced traffic for ZZE.
- Longhai Xixi Bridge. Longhai Xixi bridge is located at the intersection of the provincial road of Zhang-Yun route with the national road G324. The engineering project is a Class I road bridge with total length of 2820 m, including one 637 m long bridge, and two medium sized bridges (138m) and 2045 meter of bridge approach road with design speed of 60 km per hour, over the river's Class V navigation channel. The engineering work of the bridge project was started in December 2003 and completed in November 2006. Since the bridge was open to traffic on 19 January 2007, the operation of the toll bridge has been fine, and by the 15 April, its accumulated traffic volume is 286569 PCU with accumulated toll revenue of CNY1585.363 thousand. Since the bridge is the key link for the provincial road Zhang-Yun route to be connected with the national road G324 and G319, the completion of the bridge project has solved the traffic bottle neck at the original Xixi bridge, which is at the upstream 800 m away from the newly build Xixi bridge. The bridge will play an important role in facilitating the regional economic development.
- Reconstruction of the road from Zhangpu Chengguan to Shiliu. Total length of the road reconstruction project is 10.56 km, including 9.6 km section from G324 K373+096 at Suian Industrial Development Zone to Xiache village at Shiliu township; and 0.96 km access road, linking with Pinghe bridge head of Suian interchange (old county road). The reconstructed road is of Class II standard, started in August 2004 and was completed in December 2006. The road section from Zhangpu Chengguan to Shiliu is an important link connecting the Pinghe county with ZZE, but also an important connection road section for the one south-north and seven south-north provincial trunk roads. Completion of this important link has improved the local, regional and provincial road network connection.

Six local road projects with the bank loan balance. Total length of the six local road project financed out of the Bank loan balance is 134.7 km, with total costs of CNY751 million, of which CNY626 million are used for construction, land acquisition and resettlement with a total of 17 contract sections and contract sum of CNY493 million.

- *Youxi road project*. Youxi road project is not only an important section in Youxi county road system, but also the only link for Youxi county connecting with Dehua county. This section has been included in the provincial trunk road S206 Xixia route, which is part of the "eight south-north and nine east-west" provincial trunk route system. This section is also the only road for the Jiemian Power Station project and Banmian Power Station project. It starts from Xicheng township of Youxi county at the provincial road Jintai route (S304) and ends at Shanyan village of Banmian township, with total length of 51.52 km, improved up to Class II road standard. With road length reduced by 20.5 km, the road improved transport conditions, which will facilitate the local economic development.
- *Shaxian road project.* Shanxian road project starts at the border area between Shaxian and Shunchang, connecting with the road from Chengguan of Shunchang to Zhengfang, and ends at the Xiahao interchange of Beijing-Fuzhou expressway. Total length of Shanxian road project is 9.7 km, in hilly area Class II standard. Shaxian road project is in a densely distributed village and township area with rich natural, agricultural, forest and tourism resources to be developed. Completion of this project has improved the road transport condition and will promote the local economic development.
- *Longyan road project*. Longyan road project includes reconstruction of the existing national road G319 section and a newly built section after G319 passing through Kengtou village of Caoxi township, via Yueshan village of Caoxi township, by use of the connection road between Zhanglong expressway and Xiniu road when getting at east Xiaozheng village, then ending at Hualian road of Longyan city. The newly built road section is 5.1km long. The original 13 km of national road G319 in Longyan area are in an environment of ribbon development, seriously affected by mixed urban street traffic and transit traffic with frequent traffic accident and congestion and have become a bottleneck. Completion of this project has greatly improved the local transport conditions, facilitating local industrial and agricultural production and people's daily travel.
- *Pingnan road project*. This project is the phase II work of the south section of Ningping road, starting from Shangjian of Jiaocheng and ending at Zhoudi connecting with the first phase work. This road is 14.94 km long. The original road section was of macadam pavement in poor condition with many sharp turnings. Completion of this project has improved local road network layout, which will help bring into full play the local economic resources.
- *Jiaocheng road project*. This road project is a key project of Ningde municipality, as part of 1.5 hours travel network, starting from Qiaotou of Badu in Jiaocheng area and ending at Shangjian of Hongkou the border with Pingnan county. The road is in hilly area built up to Class II standard. This road is the key link connecting Pingnan county with the eastern region of Fujian province, but also another coastal port distribution road linking the eastern Fujian with Zhejiang province, playing an important role in connecting eastern and northern Fujian province. Completion of this road project will facilitate the economic development of Pingnan county, Ningde Jiaocheng area, their surrounding area and the whole northern Fujian province area.

- *Fuding road project*. This road project is part of east and south coastal area road in Fuding municipality area Fujian province. Total length of the road is 9.8 km, built up to Class II standard in hilly area. Completion of this road project has played significant role in improving local traffic condition, the local investment environment and inter-county commodity flow, promoting local mountain area natural resources development and the cooperation between the east coastal area cities and inland hilly areas counties.

Implementing Agencies

The implementing agencies for FH2 were FPECD and Fujian Provincial Expressway Co. Ltd. (FPE Co. Ltd), which are approved by Fujian Provincial People's Government. FPECD is responsible for overall leadership and coordination of the planning, design, standards, construction, quality, operation of the expressway across the province. The FPE Co. Ltd. works as an investment entity of the provincial government for the expressway development across the province, and is commissioned by FPCD to exercise administration function over the expressway operation companies. In fact FPECD and FPE Co. Ltd work under the same roof, with one group of staff working in different names as executive agency responsible for the provincial expressway construction, operation and management.

The expressway construction and operation management system in Fujian province is based on Fujian Provincial government policy principles of "uniform planning, uniform design, uniform quality and uniform operation" and "financing by section, construction by section and getting investment return by section". To implement FH2, a shareholding entity was organized known as Zhangzhao Expressway Co. Ltd. as the project legal man responsible for overall project construction, financing, operation and payback loan. FPE Co. Ltd and Zhangzhou Communications Development Co. Ltd are shareholders of Zhangzhao Expressway Co. Ltd. During the project implementation period, Zhangzhou Municipal government set up a Zhangzhou Municipal Expressway Construction Directorate (ZMECD) under Zhangzhou Municipal Communications Bureau. To strengthen the land acquisition and resettlement work, Zhangzhou Municipal government established a Zhangzhou Expressway Land Acquisition and resettlement Steering Group under Zhangzhou Land Administration Bureau. Corresponding Directorate, Expressway Office, Land Acquisition and Resettlement Office were established at the project affected counties (cities), responsible for coordination and management of FH2 implementation.

After ZZE open to traffic and turned into operation period, FPE Co. Ltd. takes the responsibility to manage the expressway operation, by setting up a number of management departments, including toll collection department, planning and financial division, maintenance division, road administration division under Zhangzhao Expressway Co. Ltd., also included are one Monitoring Center (i.e. Zhangpu Monitoring Sub-center), ten toll collection stations (Zhangzhou port, Zhaojiapu, Zhangpu, Duxun, Yunxiao, Changshan, Dongshandao, Zhaoandong, Zhaoannan, and Minyue Mainline). There are three road administration branch divisions set at Zhangpu, Changshan and South Shaoan respectively. The FPE Co. takes overall responsibility of ZZE's maintenance, toll collection, finance, monitoring, road administration and operation business development management.

From the very beginning to the completion of the project, the implementation of FH2 also got the direction and support from the NDRC, the Ministry of Finance (MOF), and the MOC. The FPCD set up a World Bank Loan Project Executive Office (known as the Work Bank Project Office), responsible for coordination, organization of FH2 related reconstruction project, submit the project progress report and audit report to the World Bank, organize inspection, and supervise the

project implementation in accordance to the requirements as specified under the Loan Agreement and the Project Agreement, including coordination and management of the land acquisition and resettlement. Under each of the local communications bureaus, there is also World Bank Project Office to coordinate and manage the implementation of the project construction or reconstruction.

Lessons learned

Design. For some sections of the expressway, information gained from geological survey is not consistent with actual geological condition, owing to less bored sample during the field survey; so that the actual elevation of the bridge pile is different from the design, with unexpected variation of soil and rock components in some sections.

The design of road subgrade drainage system didn't take into account of the local water irrigation system, so that there were quite a number of variations in the drainage system. For deep cutting and filling section, special attentions should be paid to the field survey of the local hydrological and geological condition, so as to get information necessary for rational design parameters. Steep gradient should be designed in accordance with actual geological and hydrological conditions, rather than based on engineering cost only. The concept of dynamic design should be implemented throughout the whole process of design and construction, to make the design in conformity with the actual condition making sure stability of the side slope during the construction and operation period.

The dense bitumen surfacing is good against water damage, but it is not good for drainage during rainy season, which would result in water film on the pavement surface causing accident, effective measures should be taken in design for road safety.

Tendering. In accordance to the tender procurement guideline of the World Bank, ZZE contractor was selected based on least-cost principle. This may not be appropriate for China's market situation, where the legal system is far from perfect. To get the contract, some bidders reduce their tendering price, during the construction period, however, particularly in the initial period of construction, they do not have enough input, which cause serious delay of the work, creating great difficulties for the project implementation and management.

Operation management. Overloading of trucks has great impact on both road safety and pavement service life. Enforcement of vehicle size and weight regulations should be strengthened to improve road safety and prevent pavement early damage.

The six road projects financed out of the Bank loan balance. Since the commencement of the engineering work, the six road projects financed out of the Bank loan balance have been affected by the bad weather, typhoon and continuous heavy rain, particularly since June 2006, the engineering work has been hit by continuous storm rarely happened in the history. For example, the typhoon "Sangmei" caused serious flood with great impact on the six road projects, which not only left great amount of rehabilitation work but also had certain impact on the resettlement work, so that completion of Youxi road project, Jiaocheng road project and Fuding road project was delayed.

Fujian Provincial Expressway Development Program

According to the Strait West Bank Economic Zone Expressway Network Development Program approved by Fujian Provincial Government in 2006, the layout of the expressway network in the Strait West Bank Economic Zone (Fujian Province) will be "three south-north, eight east-west,

three rim, twenty-five connection routes", with total length of 5300 km. The "three south-north and eight east-west routes" are trunk roads in the province, including all the national expressway, dual national expressway and part of the provincial expressway; the "rims routes" are three urban rim routes; the "twenty-five connection routes" include seven port connecting routes, three airport connecting routes, ten inter-city routes and five other connecting routes.

In accordance with the implementation program, during the 11th Five-year period (2006 – 2010) there are 727km of on-going expressway project, 1214 km of new expressway project, and 88km of expending expressway project. By the end of 2010, 1275 km of expressway will be added to the road network, of which 1126 km are trunk road and "two south-north and four east-west routes" will be completed.

Annex 8. Comments of Cofinanciers and Other Partners/Stakeholders

Not applicable.

Annex 9. List of Supporting Documents

The World Bank, *Second Fujian Highway Project: Project Appraisal Document* (Report No. 19286-CHA), June 3, 1999.

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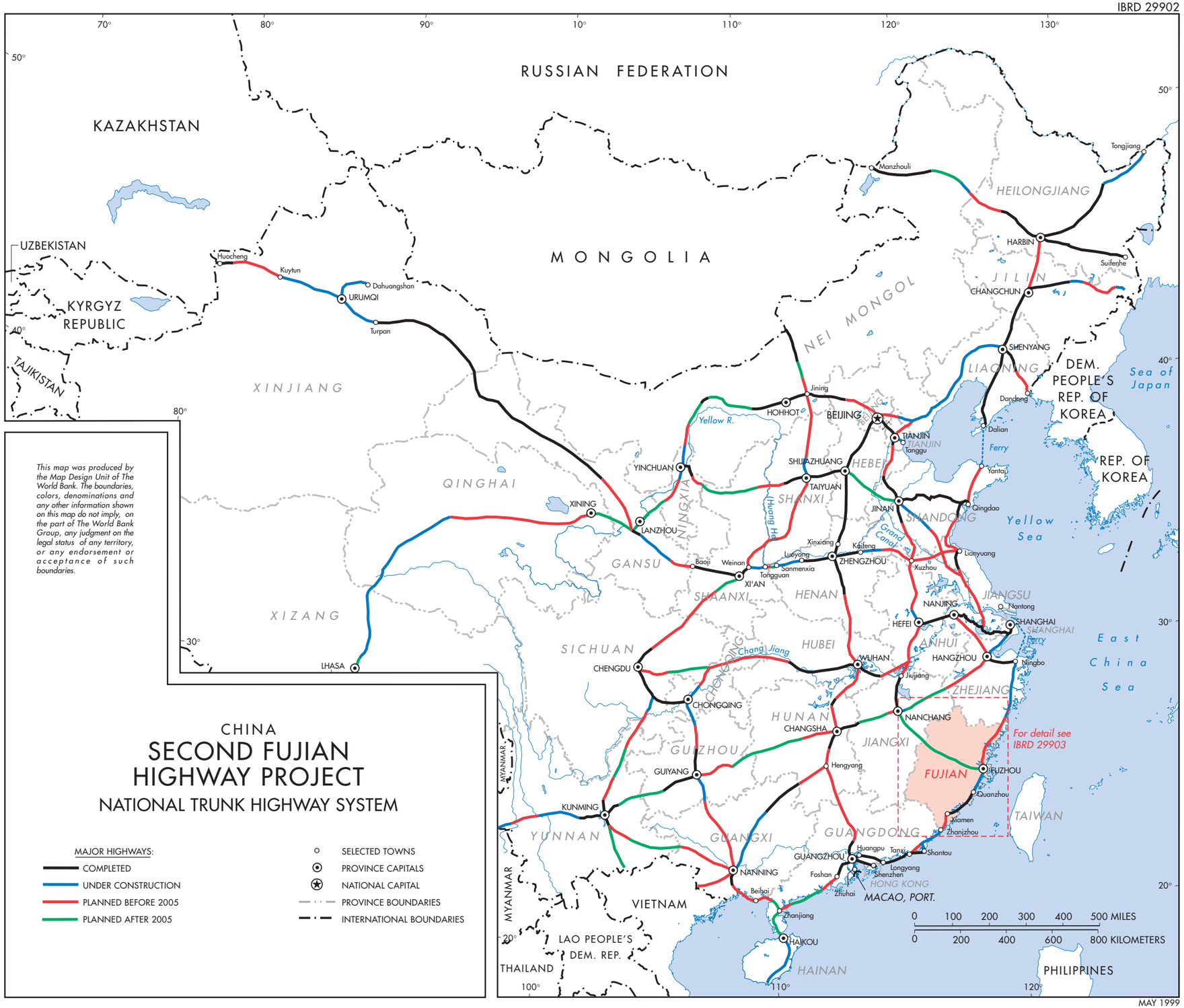
IBRD 29902



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CHINA

SECOND FUJIAN HIGHWAY PROJECT

NATIONAL TRUNK HIGHWAY SYSTEM

MAJOR HIGHWAYS:
- COMPLETED
- UNDER CONSTRUCTION
- PLANNED BEFORE 2005
- PLANNED AFTER 2005

- SELECTED TOWNS
- PROVINCE CAPITALS
- NATIONAL CAPITAL
- PROVINCE BOUNDARIES
- INTERNATIONAL BOUNDARIES

MAY 1999

CHINA
SECOND FUJIAN HIGHWAY PROJECT

0 25 50 75 100
KILOMETERS

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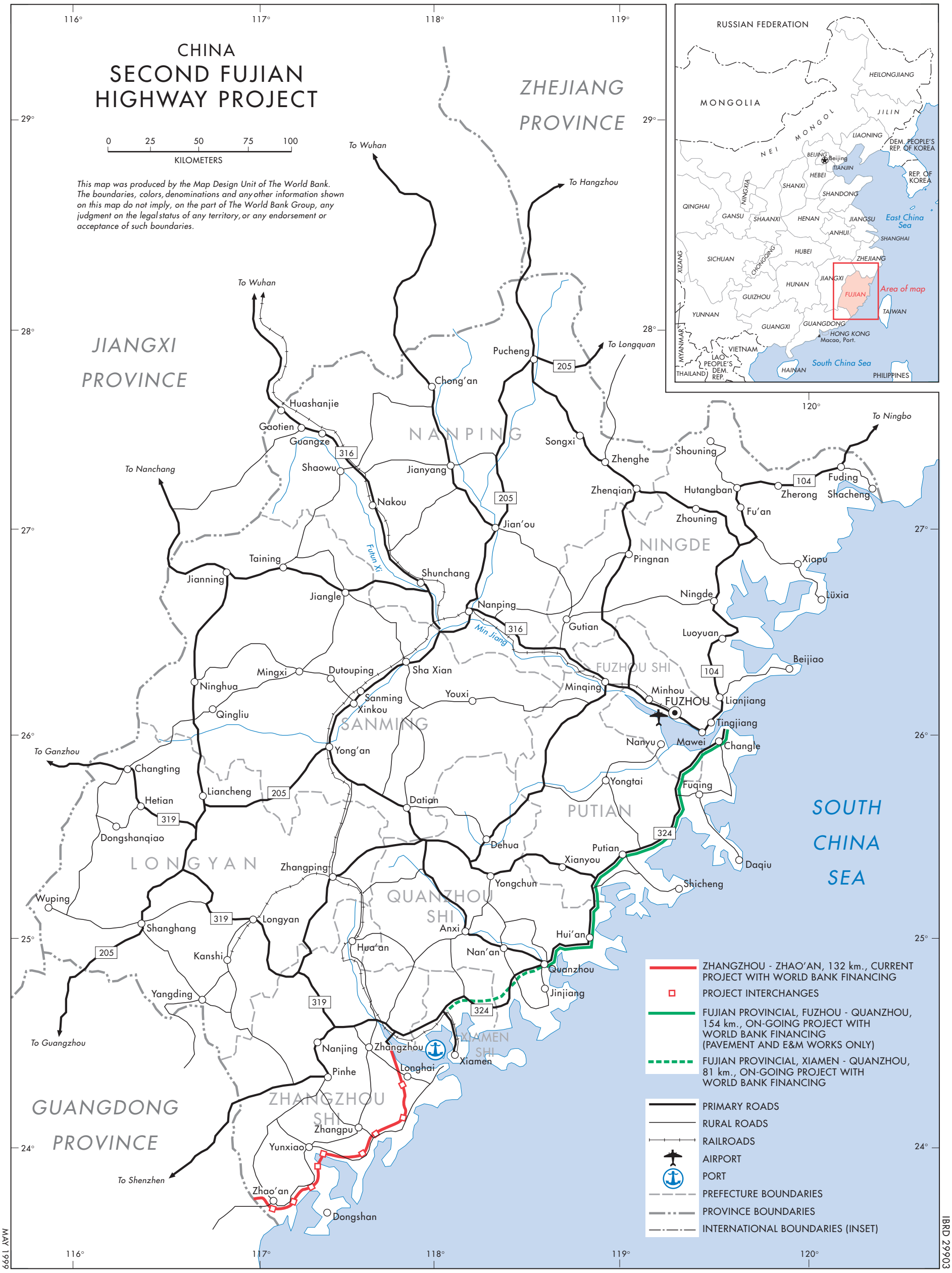

ZHANGZHOU - ZHAO'AN, 132 km., CURRENT PROJECT WITH WORLD BANK FINANCING

PROJECT INTERCHANGES

FUJIAN PROVINCIAL, FUZHOU - QUANZHOU, 154 km., ON-GOING PROJECT WITH WORLD BANK FINANCING (PAVEMENT AND E&M WORKS ONLY)

FUJIAN PROVINCIAL, XIAMEN - QUANZHOU, 81 km., ON-GOING PROJECT WITH WORLD BANK FINANCING

PRIMARY ROADS

RURAL ROADS

RAILROADS

AIRPORT

PORT

PREFECTURE BOUNDARIES

PROVINCE BOUNDARIES

INTERNATIONAL BOUNDARIES (INSET)

MAY 1999

IBRD 29903