ADB

Completion Report

Project Number: 42018-013
Loan Number: 2600
August 2017

People's Republic of China: Anhui Integrated Transport Sector Improvement Project

Asian Development Bank

CURRENCY EQUIVALENTS

Currency Unit – yuan (CNY)

		At Appraisal	At Project Completion
		30 Oct 2009	31 December 2015
CNY1.00	=	$0.146	$0.154
$1.00	=	CNY6.82	CNY6.49

ABBREVIATIONS

ACIG	–	Anhui Communications Investment Group Co. Ltd.
ADB	–	Asian Development Bank
APDOT	–	Anhui Provincial Department of Transport
APG	–	Anhui Provincial Government
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
FIRR	–	financial internal rate of return
GDP	–	gross domestic product
O&M	–	operation and maintenance
PMO	–	project management office
PPMS	–	project performance management system
PRC	–	People's Republic of China
SDAP	–	social development action plan
XME	–	Xuming Expressway

WEIGHTS AND MEASURES

km	–	kilometer
km/hour	–	kilometer per hour
m^2	–	square meter
mu	–	Chinese unit of area (15 mu = 1 hectare)
pcu-km	–	passenger car unit per kilometer
pcu/day	–	passenger car unit per day

NOTE

In this report, "$" refers to United States dollars.

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CONTENTS

BASIC DATA

A. Loan Identification

1.	Country	People's Republic of China
2.	Loan Number	2600-PRC
3.	Project Title	Anhui Integrated Transport Sector Improvement Project
4.	Borrower	People's Republic of China
5.	Executing Agency	Anhui Provincial Department of Transport
6.	Amount of Loan	$ 200 million
7.	Project Completion Report Number	1645

B. Loan Data

1.	Appraisal	
	– Date Started	27 July 2009
	– Date Completed	5 August 2009
2.	Loan Negotiations	
	– Date Started	12 November 2009
	– Date Completed	13 November 2009
3.	Date of Board Approval	10 December 2009
4.	Date of Loan Agreement	30 March 2010
5.	Date of Loan Effectiveness	
	– In Loan Agreement	28 June 2010
	– Actual	16 July 2010
	– Number of Extensions	One
6.	Closing Date	
	– In Loan Agreement	31 December 2015
	– Actual	31 December 2015
	– Number of Extensions	None
7.	Terms of Loan	
	– Interest Rate	ADB's London interbank offered rate (LIBOR) + 0.6%
	– Maturity (number of years)	25
	– Grace Period (number of years)	5
8.	Terms of Relending (if any)	
	– Interest Rate	ADB's London interbank offered rate (LIBOR) + 0.6%
	– Maturity (number of years)	25
	– Grace Period (number of years)	5
	– Second-Step Borrower	Anhui Provincial Government

9. Disbursements

a. Dates

Initial Disbursement	Final Disbursement	Time Interval
6July 2011	21 June 2016	59 months
Effective Date	**Original Closing Date**	**Time Interval**
16 July 2010	31 December 2015	65.5 months

b. Amount ($ million)

Category	Original Allocation	Last Revised Allocation	Amount Disbursed	Undisbursed Balance
1. Works	**198.50**	**199.58**	**199.58**	0.00
01A. XME	118.50	125.82	125.82	0.00
01B. Local Roads and Safety Enhancement	79.80	73.75	73.75	0.00
01C Rural Bus Services Demonstration	0.20	0.01	0.01	0.00
2. Consulting Services and Training	**1.50**	**0.42**	**0.42**	0.00
Total	**200.00**	**200.00**	**200.00**	**0.00**

C. Project Data

1. Project Cost ($ million)

Cost	Appraisal Estimate	Actual
Foreign Exchange Cost	121.6	200.0
Local Currency Cost	1,233.4	951.3
Total	**1,355.0**	**1,151.3**

2. Financing Plan ($ million)

Cost	Appraisal Estimate	Actual
Implementation Costs		
ADB Financed	200.0	200.0
Domestic Bank Loans	598.8	622.5
Ministry of Transport	119.1	58.8
ACIG	245.4	24.8
APG	91.6	126.3
Total	**1,254.9**	**1,032.4**
IDC Costs		
ADB Financed	0.0	0.0
Domestic Bank Loans	0.0	0.0
Ministry of Transport	0.0	0.0
ACIG	75.5	118.9
APG	24.6	0.0
Total	**100.1**	**118.9**

ACIG = Anhui Communications Investment Group Co. Ltd, ADB = Asian Development Bank, APG = Anhui Provincial Government, IDC = interest during construction.

3. Cost Breakdown by Project Component ($ million)

Component	Appraisal Estimate	Actual
A. Investment Costs		
1. Civil Works	939.7	841.9
2. Mechanical and Equipment	19.4	19.0
3. Environment and Social	21.3	8.8
4. Land Acquisition and Resettlement	61.6	140.8
5. Project Management	64.5	14.8
6. Capacity Development	1.5	0.4
7. Taxes and Duties	45.7	6.7
Total Base Cost	**1,153.7**	**1,032.4**
B. Contingencies		
1. Physical	57.6	0.0
2. Price	43.6	0.0
Total Contingencies	**101.2**	**0.0**
C. Financing Charges		
1. Interest During Construction	99.6	118.5
2. Commitment Charges	0.5	0.4
3. Front-End Fee	0.0	0.0
Total Charges	**100.1**	**118.9**
Total (A+B+C)	**1,355.0**	**1,151.3**

4. Project Schedule

Item	Appraisal Estimate	Actual
Date of Contract with Consultants	15 September 2009	30 September 2012
Completion of Engineering Designs	3 December 2009	30 October 2009
Civil Works Contract		
Date of Award	31 December 2010	13 January 2011
Completion of Work	30 September 2013	26 December 2014
Equipment and Supplies		
Dates		
First Procurement	31 May 2013	6 May 2014
Last Procurement	31 August 2013	10 August 2014
Completion of Equipment Installation	31 December 2013	30 November 2014
Start of Operations		
Completion of Tests and Commissioning	31 December 2013	26 December 2014
Beginning of Start-Up	31 December 2013	26 December 2014

5. Project Performance Report Ratings

	Ratings	
Implementation Period	**Development Objectives**	**Implementation Progress**
From 10 December 2009 to 31 December 2009	Satisfactory	Satisfactory
From 01 January 2010 to 31 December 2010	Satisfactory	Satisfactory

D. Data on Asian Development Bank Missions

Name of Mission	Date	No. of Persons	No. of Person-Days	Specialization of Members
Fact-finding Mission	21-27 May 2009	6	42	a, b, d, e, h,
Appraisal Mission	27 Jul-5 Aug 2009	4	22	b, d, j
Inception Mission	16-21 December 2010	4	15	b, d, e, g
1st Loan Review Mission and Hand-over Mission	14-20 October 2011	5	29	a, c, d, g
2nd Loan Review Mission	15-22 October 2012	4	32	a, b, d, g
Mid-term Review Mission	16-24 December 2013	4	36	b, c, d, g
4th Loan Review Mission	8-11 December 2014	3	12	b, d, g
5th Loan Review Mission	26-29 October and 11-12 November 2015	3	8	b, d, g
6th Loan Review Mission	26-30 September 2016	4	20	b, c, d, g
Project Completion Review	13-17 March 2017	5	25	b, c, d, g, i

a = engineer, b = economist, c = environment specialist, d = resettlement specialist/consultant, e = procurement specialist, f = control officer, g = analyst, h = counsel, i = financial management specialist, j = young professional

I. PROJECT DESCRIPTION

1. On 10 December 2009, the Asian Development Bank (ADB) approved a loan of $200 million from its ordinary capital resources for the Anhui Integrated Transport Sector Improvement Project.[1] The loan and project agreements were signed on 30 March 2010, and the loan became effective on 16 July 2010. The loan account was closed on 21 June 2016.

2. Anhui, with a land area of 139,400 square kilometers, is a landlocked province in central People's Republic of China (PRC). In 2015, the annual per capita net income of rural households was CNY13,752, while the annual per capita disposable income of urban households was CNY29,156, twice that of rural households. In 2016, Anhui's population was about 69.49 million with 50.5% classified as rural, which was higher than the national average of 42.65%. With per capita gross domestic product (GDP) at 72% of the national average in 2016, Anhui ranked 25th among the country's 31 administrative areas. Currently, it has 19 officially designated national poverty counties and 10 provincial poverty counties, accounting for 47.5% of all the counties in the province. Anhui is still one of the least developed provinces in central PRC.

3. The PRC government's long-term vision is to reduce the regional development disparities and improve economic harmonization between eastern, central and western provinces. This vision was confirmed by the issuance of the Opinion to Accelerate the Central Region Development Strategy[2] in 2004, and the Yangtze River Economic Belt Development Outline[3] and 13th Five-Year Plan on Promoting the Rise of Central China[4] in 2016.

4. An enhanced inter- and intra-provincial transport system was considered crucial to improve accessibility and connectivity, lower transportation costs, and help Anhui catalyze its strategic location for promoting economic development. In addition, enhanced transport sector management would promote regional trade, encourage investments, create jobs, and increase economic competitiveness. The demand for transportation infrastructure and improvement in local road networks continues to rise, as reflected in Anhui Province's 13th Five-Year Plan, in which the newly planned expressway will increase by 800 kilometers (km) by 2020.[5] Anhui will also construct 2,500 km of first class local roads and upgrade 5,000 km of second class local roads by 2020.

5. The project outcome was an efficient, safe, and sustainable transport system that supported the Central Region Development Strategy. The project had four components: (i) improve road infrastructure in the Xuzhou-Mingguang corridor, (ii) improve local roads and traffic safety practices, (iii) improve rural village bus services, and (iv) strengthen institutional capacity. The project, which included outstanding technological innovations and extensive resource conservation, received a series of awards. It was awarded the first-class science and technology achievement by the China Highway and Transport Society, and the top prize of Anhui Provincial Transport Science and Technology Innovation by the provincial government. The design and monitoring framework in Appendix 1 compares development targets at appraisal with the revisions throughout implementation and the achievements at project completion.

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[1] ADB. 2009. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Anhui Integrated Transport Sector Improvement Project*. Manila.
[2] State Council of the PRC. 2004. The Opinion to Accelerate the Central Region Development Strategy.
[3] State Council of the PRC. 2016. The Yangtze River Economic Belt Development Outline.
[4] State Council of the PRC. 2016. 13th Five Year Plan on Promoting the Rise of Central China.
[5] Anhui Provincial Government, PRC. 2016. Anhui Provincial 13th Five Year Plan.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

6. The project is highly relevant, and fully aligned with the government's development strategy and ADB's country partnership strategy and thematic priorities, both at appraisal and completion. ADB's country strategy for the PRC's transport sector at the time of appraisal focused on (i) financing new roads that connect major growth centers, supported by a system of local roads; (ii) developing and improving urban transport and rural roads; (iii) promoting road safety, cutting vehicle emissions, and raising energy efficiency; (iv) improving the commercial orientation and efficiency of expressway organizations; and (v) strengthening regional cooperation through expanded transport infrastructure. The project would contribute to an integrated road transport system to support the government's Central Region Development Strategy and was accorded priority in the PRC's 11th Five-Year Plan. It was consistent with the PRC's development priorities to reduce regional disparities between inland and coastal regions, and between rural and urban areas.

7. The transport infrastructure expansion, local road improvement, safety enhancement, and technology advancement for increasing connectivity and transport efficiency were the priorities specified in Anhui Province's 11th Five-Year Plan Transport Sector Development Strategy. All four components of the project were designed to contribute to Anhui's provincial transport development strategy. The project supported construction of the Xuzhou-Mingguang Expressway (XME), which is a key element of the central region transport network. This has provided a shorter route between Xuzhou and Nanjing—two important transport hubs in the PRC—and reduced travel time by at least 30 minutes, thus offering a considerably faster and safer alternative. The upgrading of local roads contributed to a reduction of accident rates and improvement of living conditions across the province, particularly in poor areas. The project mainstreamed effective environmental management measures, road safety practices, and awareness raising activities across all the construction sites and local communities. It achieved resource optimization through utilization of new construction materials and technologies.

8. The project design prepared under the project preparatory technical assistance (TA) was based on extensive dialogue with the Anhui Provincial Government (APG), leading to a well-balanced transport infrastructure configuration with comprehensive planning that included route selection, land acquisition, and a strategy for scaling up the project. In addition to project design, the project preparatory TA supported some initial implementation activities for road safety and institutional capacity strengthening in the areas of local road planning, resource optimization, and safety enhancement. The recommendations of several ADB TA projects were also integrated into the project design; specifically: (i) the Sustainable Rural Transport Services TA provided the model for the village bus transport service reform and pilot projects; (ii) resource optimization TA was provided to the Anhui Provincial Department of Transport (APDOT – the executing agency) and to the project's implementing agency (AHAB – Anhui Highway Admin Bureau) for road capacity optimization and natural resource preservation; and (iii) the Resource Manual for Health and Safety in Infrastructure developed under an ADB TA project[6] was distributed to APDOT for integration with the project's environmental safeguards measures and work safety practices.

[6] ADB. 2003. *Technical Assistance for HIV/AIDS on Road Projects in Yunnan Province*. Manila.

B. Project Outputs

9. The project had four components:

1. Improve Road Infrastructure in the Xuzhou-Mingguang Corridor

10. This component included construction of 139 km of a four-lane access controlled expressway between Xuzhou and Mingguang. The XME starts at the provincial border with Jiangsu Province in the north, with a 4 km extension to connect Xuzhou via the Xuzhou-Huai'an Expressway, and ends at an interchange in Mingguang on the Bengbu-Nanjing Expressway in the south. Based on the agreement reached between the Jiangsu and Anhui governments on 4 May 2009, Jiangsu would finance and complete the 4 km link road by 2013.

11. Output was completed as planned and all the deliverables were achieved. The expressway obtained acceptance on 20 December 2014 and opened to traffic on a trial basis on 26 December 2014, 6 months ahead of the project completion date of 30 June 2015. The expressway was built in accordance with established standards for a design speed of 120 km/hour and an overall formation width of 27 meters at the subgrade of the XME. The toll fees were approved in December 2014 by the APG for both vehicle type and weight-based tolls, which would be implemented for freight traffic on XME from 2014-2019. The vehicle axle-weighing equipment was installed and operated at all entrances and exits, and the service areas were also constructed and well maintained. The XME provides a more direct route between Xuzhou, Mingguang, Nanjing, and beyond, shortening the travel distance by 50 km from the Xuzhou-Nanjing route via Bengbu, 28 km from Xusuning via Suqian, and 30 km compared with the existing national highway (NH104).

2. Improve Local Roads and Traffic Safety Practices

12. This component included (i) upgrading and rehabilitation of 452 km of local roads, and (ii) traffic safety design, operation, and management practices on these roads. Some local roads (including S105, S312 and X056) were upgraded, while others (including S209, S304, S309 and S318) were rehabilitated. In addition, safety improvements were made to two other roads (G206 and X044) to enhance traffic flow, junction design, channelization at intersections, road signs and markings, and traffic congestion.

13. Output was completed as planned and all the deliverables were achieved. In total, 452 km of local roads were upgraded or rehabilitated, and all the nine local roads had obtained final acceptance by October 2015. Traffic accidents were reduced: (i) for S105, the accident rate decreased from 163 accidents/million vehicle km in 2010 to 141 in 2015; and (ii) for S312, the accident rate decreased from 151 accidents/million vehicle km in 2010 to 110 in 2015. The safety audits for the roads were completed as follows: (i) X056-section 2, S304, S309, S312 and S105 in September 2014; (ii) S318, S209, G206, X044 in December 2014; and (iii) X056-section 1, 3 and 4 and S105 in October 2015. The completed safety enhancement work for the nine local roads included building 106 side slope protections, 3,628 meters of guardrail, 1,693 meters of stack type guardrail, 219 warning piers, 354 warning piles, 214 traffic signs, 37,737 square meters of grid lines, 39,391 meters of drainage, 2,474 cubic meters of roadbed retaining wall, 162 crossings, widening of 3 small bridges, improvements to 89 slide slopes, and 7,847 square meters of grass planting. In addition, traffic-decongestion measures were implemented across the nine local roads. The final draft of highway safety guidelines, including a road safety design toolkit and a five-year action plan, was delivered to APDOT in October 2016. Road safety

awareness programs were implemented in roadside communities, and the participants provided feedback on road and traffic design and operation of the nine local roads.

3. Improve Rural Village Bus Services

14. This component included (i) local bus operator development in three townships (Shipai, Ducun, and Xiaowei) to provide a coordinated network of bus services to the surrounding villages; (ii) amendment of the licensing regulations applicable to bus services between townships and villages, and between villages; and (iii) setting up of small-scale bus stations, bus shelters, and bus stops in the three selected project townships.

15. Output was completed except for a reduction in the three pilot townships to just one.[7] Shipai and Xiaowei were no longer included because they already had fairly well-established transportation routes within their areas. Qingyang county in Ducun township remained as the sole location for the village bus pilot project, as it contributed better to the priorities set out in Anhui Province's 12th Five-Year Plan since it involved a comprehensive rural-urban transport reform, including local bus operational reform. The identified operator was Chizhou Jieda Tsingyang Bus Company, a licensed state-owned bus operator to support the implementation of local bus operational reform. Under the Ducun pilot, 15 bus stops were constructed by December 2015, and three main bus lines with 15 buses operated between the city and villages. The buses had double doors and a capacity of 33 passengers. Among the three bus lines, the one from Xingqiao to Duncun operated every 15 to 20 minutes, while the other two (Ducun-Xihe and Ducun-Changlong) operated at least 2-3 times per day, based on the demand in Ducun. The bus fares were set by the local government at the market prevailing rate to provide better affordability. The average cost is about CNY0.66/km, and it costs CNY5 to travel the 28 km from Ducun to the center of Qingyang. The number of trips per day per bus increased by about 10%-30% approximately for each of the three lines between January 2016 to December 2016.

4. Strengthens Institutional Capacity

16. This component included: (i) conducting a financing framework study for local roads management; and (ii) strengthening institutional capacity by providing international and on-the-job training to APDOT and its related agencies. The budget for capacity building was $800,000 to cover 100 person-months of domestic and international training activities.

17. Almost all output was completed except for a minor change (footnote 7) to (i) cancel the financing framework study because of a major policy change (Circular 22, the new policy), and (ii) reduce the person-months allocated to international training. The construction workforce received training on environmental management, health and safety practices. Through about 145 high-quality workshops for 1,743 workers, the local institutional capacity was strengthened. The financing framework study was cancelled because Circular No. 22 issued by the State Council in 2011 moved the financing and investment of local roads from the EA to the local government. APDOT and the Anhui Highway Administration Bureau would only be responsible for reviewing the application procedures for government subsidies. Circular 22 was adopted by APG and became effective on 20 April 2012.

18. For capacity building, only 18% of the original 100 person-months was used. This was a result of the central government's increasingly tighter control of international training, particularly for government officials' overseas study programs. International training was therefore limited to

[7] Minor change was approved on 6 August 2015.

the following: (i) 1.67 person-months in Germany and Switzerland for financial management training; (ii) 7 person-months for project management training and 5.6 person-months for maintenance management training in the USA; (iii) 2 person-months in Germany and Spain for road safety training; and (iv) 2 person-months in Australia and New Zealand for construction safety management training.

C. Project Costs

19. At appraisal, the project was estimated to cost CNY9,241 million or $1,355 million equivalent, with ADB financing of $200 million (14.8% of the total project cost).[8] The remaining $1,155 million (85.2%) was to come from counterpart funding. At project completion, the total cost was CNY7,940 million or $1,151 million equivalent, with ADB's share increasing to 17.3%.[9] ADB's $200 million was fully utilized, and counterpart funding was $954.1 million.

20. The 14.8% decrease in the project cost was primarily due to lower project expenditures than originally planned. This more than offset the higher costs of land acquisition and resettlement, which increased from $61 million to $141 million as a result of the central government's new policy effective from 2010. The overall cost reduction of $201 million was mainly due to (i) the lower cost of civil works[10] ($98 million), (ii) fluctuations in the currency exchange rate, which affected the construction cost and overall project cost, and led to lower taxes and duties ($38.6 million), (iii) overall cost savings from project management ($49.2 million), and (iv) lower than planned social and environmental costs because of better planning in greening and environmental surveillance ($12.2 million). The comparison of project costs and the financing plan at appraisal and completion is in Appendix 2.

D. Disbursements

21. Loan proceeds were disbursed in accordance with ADB's Loan Disbursement Handbook (2007, as amended from time to time), using the imprest account facility. The statement of expenditures procedure was used for reimbursement of eligible expenditures and to liquidate advances to the imprest account for individual payments not exceeding the equivalent of $200,000, in accordance with ADB's Loan Disbursement Handbook and detailed arrangements agreed by the government and ADB. The imprest account helped to reduce cash flow difficulties and all the withdrawal applications were submitted in a timely manner, which increased disbursement efficiency and facilitated the overall project implementation. The $200 million ADB loan was fully disbursed after reallocation of the loan proceeds. To effectively utilize the loan proceeds, in August 2015 ADB approved reallocation of the savings from the categories of local road and safety enhancement, rural bus services, consulting services, and training to the category of civil works of the XME. The first disbursement took place in July 2011 and the account was financially closed in June 2016. Projected and actual contract awards and disbursements for the ADB-financed portions of the project are in Appendix 3.

E. Project Schedule

22. The project was to be implemented over a period of 5 years from mid-2010 to mid-2015, and implementation was in line with that schedule. The XME was completed on 20 December 2014, well before the planned completion date of 30 June 2015. The actual physical completion

[8] Exchange rate used was CNY6.82 = $1.00.
[9] Exchange rate used was CNY6.90 = $1.00.
[10] Lower cost was contributed by the EA for controlling the unit price of expenditures within the market prevailing rates.

of local roads was delayed to October 2015, due to slower than expected mobilization of local counterpart financing in 2013. The loan was closed on 31 December 2015 as originally planned. Appendix 4 indicates the planned and actual implementation schedule.

F. Implementation Arrangements

23. APDOT was the executing agency, and the Foreign Fund Project Management Office (PMO) within APDOT was responsible for overall project implementation. Within APDOT, the project activities were coordinated by three implementing agencies—Anhui Communications Investment Group Co. Ltd (ACIG) (component 1), Anhui Highway Administration Bureau (component 2), and Anhui Transportation Administration Bureau (component 3)—under the overall direction of the PMO. APDOT, through the PMO, was responsible for direct implementation of component 4. The PMO was also responsible for management of the project's day-to-day activities. The organizational chart is in Appendix 5.

24. The implementation arrangements were satisfactory and consistent with the design envisaged at project appraisal. The PMO, led by APDOT and including the Anhui Provincial Finance Department as a member, played an effective role in coordinating with key government agencies, reporting to ADB, guiding the implementing agencies, and organizing relevant capacity building activities. The implementing agencies, with assistance from the consultants, design institutes, and supervision engineers, enhanced their project management capacity and implemented the project in a responsive and efficient manner.

G. Conditions and Covenants

25. The loan covenants were generally complied with, except for the construction of the 4 km link road to connect the XME to the Xuzhou and Huai'an expressway in Jiangsu province and one financial ratio. The negotiations between the Anhui and Jiangsu provincial governments regarding financing commitments had been lengthy and complicated. However, it was officially agreed in April 2017 between the Anhui and Jiangsu working groups that the 4 km road would be completed by the end of May 2017 and be opened to traffic in September 2017. It was also noted that the actual debt-equity ratio of 71:29 at completion was slightly higher than the defined "no more than 65:35 for the project expressway".[11] However, given that ACIG had completed internal restructuring in December 2014 with registered capital of CNY16 billion and access to a credit line of CNY100 billion, the slightly higher debt-equity ratio of the XME does not affect the ACIG's capacity to mobilize or deploy capital. The 4 km link road will soon be opened to traffic, improving traffic flow in the region and strengthening ACIG's financial capacity. These two issues are therefore considered minor and will not affect project performance or impact. No conditions or covenants were modified, suspended, or waived. The environmental and resettlement external monitoring reports, the social development action plan (SDAP), and the borrower's project completion report were submitted on time. Appendix 6 presents the status of compliance with loan covenants at completion.

H. Consultant Recruitment and Procurement

26. The PMO recruited two national consulting firms in accordance with ADB Guidelines on the Use of Consultants (2006, as amended from time to time) through single-source selection. Anhui Hongtai Traffic Engineering Design Institute (Hongtai) was engaged in October 2012 for 20 person-months and Anhui Jiaotong Vocational College (AJVC) in May 2013, also for 20

[11] Refer to Appendix 6 (Project Agreement [PA] para 8) and Appendix 9.

person-months. In addition, the PMO recruited two individual international consultants for road safety and environmental management in September 2012.

27. The government financed an independent environmental, health, and safety supervision national consultant. The consultant conducted 176 person-months of work on environmental and safety enhancement, accomplishing all tasks to a high standard.

28. A procurement agent was recruited using domestic funds to assist the PMO in the procurement of goods and works. Procurement modalities included international competitive bidding, national competitive bidding, and shopping, in accordance with the procurement plan and ADB's procurement guidelines. For international training activities, single-source selection was adopted for packages of $100,000 or less and shopping for packages over $100,000. All the 36 civil works packages (15 for XME, component 1 and 21 for local roads, component 2) were awarded in 2011. One shopping contract for Ducun village bus stops (component 3) was awarded in November 2015. A summary of the procurement undertaken is in Appendix 7.

I. Performance of Consultants, Contractors, and Suppliers

29. The overall performance of the consultants was *highly satisfactory*. They were mobilized promptly, and provided useful technical inputs and timely assistance to APDOT, the PMO, and the implementing agencies to support project implementation. The international and national consultants provided the required services in accordance with their respective terms of reference. The staff consultant recruited to conduct the project's financial and economic evaluations during the midterm and completion reviews and provided accurate and solid analysis. All the consultants' assignments were completed in a timely manner and to a high quality.

30. The performance of the government-financed independent environmental, health, and safety supervision national consultant was exceptional. The consultant's detailed environmental monitoring practices and comprehensive external monitoring reports were appreciated by ADB, and the best practices and know-how generated were shared with other projects through ADB's country portfolio review mission (CPRM) in 2015.

31. The performance of design institutes, contractors, and suppliers was satisfactory. The domestic design institutes designed the XME in line with international best practices. Civil works of the project expressway and local roads, mainly comprising bridges and pavements, were well implemented and of satisfactory quality. The equipment for operations and maintenance (O&M) was supplied, installed, and commissioned according to schedule. The implementing agencies engaged supervision institutes to ensure that quality control mechanisms were in place. All contractors followed (i) the safeguard requirements regarding mitigation measures included in the environmental management plan (EMP), (ii) measures to ensure compliance with the provisions of the resettlement plans for temporary and permanent impacts to affected persons, and (iii) the requirements regarding employment, gender, child labor, and health, as outlined in the covenants of the loan and project agreements (Appendix 6).

J. Performance of the Borrower and the Executing Agency

32. The performance of the borrower, APDOT, the PMO, and the implementing agencies was *highly satisfactory*. Project management during the preparation and construction phases was highly effective. As a result of APDOT's strong capacity in procurement, all procurement and consultant selections were carried out efficiently and effectively. It justified the assessment

made at appraisal that APDOT was a low-risk executing agency. The XME was completed ahead of the original schedule by adopting sound engineering and technical measures. The expressway construction and maintenance met international standards, demonstrated technical innovations, and served as a flagship construction in Anhui province. The PMO and implementing agencies had sufficient capacity to manage large-scale works contracts. The required land acquisition and resettlement were completed on time and to the satisfaction of the affected people.

33. The Anhui Provincial Finance Department managed the imprest account and processed fund withdrawal and reimbursement applications in a timely and effective manner. The project was well managed by the PMO and the Anhui Provincial Finance Department, and the loan was closed as scheduled. With the joint efforts of APDOT, the PMO, and the implementing agencies, the project received an award as one of the eight “best performing projects” in 2014.

K. Performance of the Asian Development Bank

34. ADB’s performance during project implementation was *highly satisfactory*. ADB conducted regular loan review missions during project implementation and provided effective advice to APDOT, the PMO, the implementing agencies, and the consultants on project implementation, monitoring, and procurement matters. ADB also responded efficiently and promptly to all requests. Procurement reviews and approvals and contract variations were processed promptly and efficiently, while withdrawal applications were processed and disbursed on time. The guidance from ADB for relevant scope changes in the last one and a half years of project implementation ensured effective use of the loan proceeds; as a result, the ADB loan was fully utilized. APTOD and the PMO expressed satisfaction with the delegation of project administration to the ADB resident mission in PRC, which ensured closer and more efficient communication.

III. EVALUATION OF PERFORMANCE

A. Relevance

35. The project was *highly relevant* to the government’s development strategy, and ADB’s country partnership strategy and thematic priorities, both at appraisal and at completion. The XME is located in the northeast of Anhui province, close to the border with Jiangsu province. The XME was a priority project of Anhui Province’s 11th Five-Year Plan. The project formed an integral part of the planned network in the Central Region Development Plan, which encompassed a growth strategy for the six central region provinces—Anhui, Henan, Hubei, Hunan, Jiangxi, and Shanxi. Same direction slewing saddle tower anchorage system was used for the construction of Wuhehuaihe Bridge of the XME and was proven to be the first successful application in the PRC for wider duplication. New materials such as polyurethane ultrathin layer was used for the pavement, so it is the low height and dense rib type small "T" beam was used for the mainframe of the bridge. The innovation in technology and adaptation of new materials saved land usage of about 1,180 mu, reduced CO_2 emissions from the cement usage, and contributed to more than CNY 100 million of direct economic benefits. The above-mentioned features received the first-class national award by the China Highway and Transport Society. The major deliverables of this project resonate well with the expected project impact for establishing an integrated road transport system in support of the central regional development strategy. The upgrading and rehabilitation of local roads enabled this poor area to reap the benefits much sooner than without the project. By the end of the 11th Five-Year Plan, provincial expressways were linked to all counties, and local roads to administrative level villages within

Anhui province. Road traffic in Anhui increased about 15% on average from 2010 to 2014 for both passenger and freight traffic. Through improved transport infrastructure and local road safety enhancement, the project benefited 4 million people in 14 counties, over 90% of whom were from rural areas. As a result of the project transport corridor improvement, three feeder sections of the nine local roads in relatively poor agricultural districts gained access to the XME. The two poorest counties in the northeast of the province gained improved transport accessibility, with better connections to major market centers and development opportunities in neighboring Jiangsu province.

B. Effectiveness in Achieving Outcome

36. The project developed an efficient, safe, and sustainable transport system in the project area and is therefore rated *highly effective* in achieving its expected outcome. This achievement was supported by the following: (i) traffic on the XME corridor increased by about 7.32% annually from 2008 to 2014; (ii) travel time reduced by at least 30 minutes between Xuzhou and Mingguang; (iii) vehicle operating costs reduced to about 2.14 per pcu (passenger car unit) km by 2015; (iv) fuel per 100 km declined from 24.4 liters in 2008 to 18.6 liters in 2015 on the XME corridor; (v) carbon dioxide emissions per unit of GDP reduced by more than 20% from 2005 to 2015; (vi) road maintenance and rehabilitation expenditures by the Anhui government increased by 27.04% from 2010 to 2015; and (vii) the traffic fatality rate decreased by 11% from 2009 to 2015. However, the 4 km road linking the XME to Jiangsu province was delayed and its opening to traffic was officially extended to September 2017, due to factors that could not be controlled by APG. This has affected traffic volume projections, with the traffic on the XME expected to increase to about 11,850 pcu/day in 2017 following the opening of this linking section. The revised traffic volume forecast to 2021 will be 15,823 pcu/day instead of the original estimate of 27,663 pcu/day. Regardless of the delays in the 4 km link road, the long-term social and economic benefits are sustained by the project. Compared with the existing national highway (NH104), the XME shortened the distance between Xuzhou and Nanjing (capital of Jiangsu) by 50 km via Bengbu. The capitals are the key transport hubs and economic centers of the two provinces. The XME will therefore not only contribute to better transportation conditions with lower vehicle operating costs, but also facilitate trade and investment between the two provinces. All resettlement and environmental safeguards activities complied with ADB ppolicies, and gender promotion was implemented during project implementation.

C. Efficiency in Achieving Outcome and Outputs

37. The project is rated *effecient* in achieving outcome and outputs. The project completed all the four components on time without any loan extension—(i) 139 km of the XME opened to traffic by 2014, (ii) 452 km of local roads upgraded by 2015, (iii) rural village bus service piloted and operated in Ducun; and (iv) capacity building activities implemented during the project cycle. As a result of changes in local policy and circumstances, the rural village bus service was piloted only in Ducun, and the financing framework study was canceled.[12] However, these adjustments did not affect the attainment of planned outputs or outcome, and reallocation of the corresponding loan savings ensured full utilization of ADB financing for resource optimization.

38. **Economic Reevaluation.** Economic and financial reevaluation rated the project efficient. The essential benefits from the XME and local roads included savings in vehicle operating costs and reduced passenger time, as well as fewer accidents and traffic benefits. The reevaluated economic internal rate of return (EIRR) for the project is 11.9%, slightly lower than the original

[12] Details are in para 14 and 16.

estimate of 15.8%. The lower EIRR was caused by the delay in the opening of the 4 km linking section between the XME and Jiangsu. The reevaluated financial internal rate of return (FIRR) is 4.0% (after tax), which is slightly lower than the original estimate of 6.6% because of the lower traffic volume in the initial years of operation. However, both the reevaluated EIRR and FIRR are considered economically and financially viable given that (i) the EIRR is higher than the benchmark social discount rate of 9%, and (ii) the FIRR is higher than the revised weighted average cost of capital (WACC) of 3.5%. The detailed economic and financial reevaluations are in Appendix 8 and 9.

D. Preliminary Assessment of Sustainability

39. The project is rated *likely sustainable*. The completion of the XME and the local roads rehabilitation and safety enhancement improved the efficiency of road transportation services in the corridor and the project area. The rural village bus service piloted in Ducun provided more convenient and affordable "village to town to county" transport services and ensured 100% transport access within all the 11 villages in Ducun township. It is expected that the Ducun pilot will be used as a reference for "the urban-rural bus integrated development," which is to be issued at the end of 2017. The project expressway and the improved local road network contributed to higher GDP growth and poverty reduction through robust economic growth and an integrated transport network, with increased freight boosting local garment, agriculture, and aquatic industries in the project corridor. Continued economic growth in the project area, assisted by the soon-to-be-opened 4 km linking section between the XME and Jiangsu, will ensure a steady toll revenue and promote trade and investment in the project area. The allocation of O&M budget for the expressway and local roads is adequate. The project is financially viable as the FIRR is higher than the WACC as indicated in para 38. The engineering designs, new materials and new technologies used in the construction of the XME and rehabilitation of local roads followed the principle of "safe, long lasting, resource conservation, and harmony with nature," which ensured the project's high-quality standards and long-term environmental and social benefits.

E. Impact

40. The project impact is rated as *highly satisfactory* as the safeguards practices were implemented with high standards and the environmental monitoring served as best practice for wider duplication for ADB projects in the PRC. The following summarizes the details of the project's safeguards and social contribution:

41. **Environment (category A).** A summary environmental impact assessment, including the EMP, was circulated to ADB's Board of Directors in June 2009. Adjustments were made to the expressway and local roads to avoid impacts at the three ecologically sensitive regions and protection areas of, Tuohu Lake nature reserve, Chaohu Lake scenic area, and Chaohu Pingding mountain geological relics reserve. The mitigation measures and public consultation program were implemented in accordance with the EMP. The PMO, implementing agencies, external monitoring consultant for the environment, and ADB undertook regular field inspections and public consultations. The potential adverse environmental impacts were either prevented or minimized to insignificant levels. No formal complaint was received from the public on environmental issues. The semiannual environmental management report for the expressway and nine local roads was submitted by the PMO to ADB and uploaded on the ADB website. A detailed environmental performance analysis is in Appendix 10.

42. **Land Acquisition and Resettlement (category A).** During project preparation in 2009, ADB approved a resettlement plan for the expressway component and three resettlement plans for the local roads including S312, S105, and X056. All the resettlement plans were subsequently updated on the basis of detailed designs and submitted to ADB for concurrence in 2010. The XME component permanently acquired 11,035 mu (735.6 hectares) of land, 3.6% more than that stated in the updated resettlement plan, which was 10,665 mu (710.3 hectares).[13] A total of 71,617 square meters (m^2) of buildings were demolished, slightly less than estimated (71,644 m^2). A total of 10,114 households or 38,444 people were affected by land acquisition and 495 households or 1,865 people were affected by house demolition, which was similar to the updated resettlement plan. For the local roads component, (i) S312 permanently acquired 270 mu of land and relocated 267 households, (ii) S105 permanently acquired 1,719.3 mu of land and relocated 783 households, and (iii) X056 permanently acquired 737.5 mu of land and relocated 134 households. The total actual disbursed cost for land acquisition, building relocation, and affected facilities for the expressway was CNY821.32 million, which was 20.6% more than the estimate of CNY681.12 million in the updated resettlement plan. The increased resettlement cost was mainly due to higher compensation for prolonged temporary land use, increased compensation for rural houses based on asset valuation, and incremental land acquisition taxes.

43. A total of 1,679 households or 5,909 persons were relocated due to house demolition, of which 507 households were resettled in concentrated resettlement sites, while the others were relocated to new houses close to their original homes. The land acquisition agreements with the affected households were reached based on consultations. All of them were aware of the compensation rates and received compensation according to the agreement. The relocated households received full compensation for buildings and attached properties from the resettlement offices under the local governments. For income restoration, the affected households received cash compensation for land loss and utilized the land compensation fund for income generation. The percentage of affected households with an annual income of more than CNY28,000 increased to 32% in 2016 as compared with 0% in 2010.

44. Anhui Jiaotong Vocational College was engaged for external monitoring and evaluation (M&E) of land acquisition and resettlement implementation. The external resettlement M&E for the expressway and local roads was conducted regularly. ADB received five resettlement M&E reports from 2011 to 2014 and a resettlement monitoring completion report in 2017 for the expressway. In addition, ADB received four resettlement M&E reports from 2012 to 2016 and a resettlement monitoring completion report in 2017 for the local roads component. The external monitoring reports indicated that income restoration was achieved in the affected villages. A detailed land acquisition and resettlement analysis is in Appendix 11.

45. **Social Impact and Poverty Reduction.** Expressway investments of CNY6.27 billion in the project area contributed to local economic development. Statistics show that socioeconomic conditions in the project area have improved rapidly in recent years. From 2007 to 2015, the average annual GDP growth rates in the project areas reached 13.2%, while the annual growth of farmers' per capita incomes ranged from 13.9% to 15.7%. For poverty reduction, although the PRC government has increased the poverty line from CNY1,274/year/person to CNY2,300/year/person since 2011, the size of the poverty population declined by 42% from 2006 to 2015 in the project area.

[13] A *mu* is a Chinese unit of measurement (1 mu = 666.67 m^2).

46. Local employment was promoted during project construction and operation. Based on the project performance management system report, each package section employed around 500 workers during construction, with 26% of jobs being done by local laborers. After the expressway opened to traffic, the local workforce had access to many unskilled jobs such as toll collectors, logistical personnel, and safety assistants. Of the 500 local laborers recruited to work for the expressway, 45% went to women. In addition, local residents obtained additional income through provision of accommodation and food for contractors and workers. A total of 638 local houses were rented during construction. About 24% of workers' expenditures, such as food and daily necessities, was supplied by local markets, which created temporary jobs and increased local income during construction. A total of 528,000 tons of gravel, 312,200 tons of stones, and 167,200 tons of yellow sand were procured from local suppliers. The project promoted regional socioeconomic growth in the project area by increasing effective transport access through the XME, and particularly the linkage between Anhui and Nanjing, Anhui and Suzhou, and potentially Anhui and Shanghai. This will facilitate rural and urban movement of goods and people, shorten transport distance, and enhance regional trade. A detailed social and poverty reduction analysis is in Appendix 12.

47. **Gender Development.** The construction and operation of the expressway and local roads promoted gender development in the project area. During project construction, 1,300 women worked on construction of the roads, representing 10% of total laborers. During the operation of the XME, 225 permanent jobs went to women, accounting for 45% of total permanent jobs. A total of 1,200 rural women were employed for local roads, including road maintenance, cleaning, and planting trees. Women received vocational training and micro financing from local governments. As a result of enhanced skills and access to financing with improved transport accessibility in the project corridor, more women were able to engage as migrant laborers outside the region, which increased their incomes. Details on gender development are in Appendix 12.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

48. Overall, the project is rated *highly successful*. The project was (i) highly relevant to the government's and ADB's development strategies, (ii) highly effective in achieving outcomes, (iii) effective in achieving outcomes and outputs, and (iv) highly sustainable. The timely completion of the XME constituted the major pillar in supporting Anhui's central region transport network, poverty reduction, and promotion of integrated rural and urban development. The project has (i) enhanced economic efficiency and doubled the trade volume in Anhui from 2010 to 2015;[14] (ii) facilitated interregional integration by constructing a link between central (Anhui) and eastern provinces (Jiangsu); (iii) improved traffic safety and transportation accessibility between rural and urban areas; and (iv) increased the income of the rural poor in 14 counties. The XME and the nine upgraded and rehabilitated local roads have strategically placed Anhui as a transportation nexus in the central region of PRC and paved the way for the province to expand its role by extending its transportation network to new locations during the 13th Five-Year Plan. The project was completed on time and the quality of the expressway and local roads was satisfactory. The Huaihe bridge of the XME pioneered the same direction rotation saddle anchorage system, which was adopted for the first time both domestically and internationally and received the top national award for technical breakthrough. For resource conservation, the

[14] Trade volume in Anhui increased from $ 24.2 billion in 2010 to $48.8 billion in 2015 according to Anhui provincial statistics year book.

XME saved 1.5 million square meters of earthwork and 282,000 square meters of concrete through utilization of a new technique and new material, namely low height ribbed small T-beam and polyurethane ultrathin coating. Environmental impacts were mitigated to the maximum extent feasible and resettlement practices were complied with according to ADB's safeguards policy. The reevaluated EIRR and FIRR confirmed the project's economic and financial viability.

B. Lessons

49. Lessons from the preparation and implementation of the project are:

(i) Care should be taken to endure that research topics are in line with the government's macro level priorities. As discussed in paragraph 17, the financing framework study had to be cancelled because the financing responsibility was moved from the EA to the local government.

(ii) Identification of the locations for rural village bus service pilots should be demand-driven and consistent with the development priorities of county level governments. As stated in paragraph 15, two pilot sites (Shipai and Xiaowei) were cancelled because there were already established bus routes within their areas with committed resources.

(iii) Risk management should consider major factors beyond the control of the executing agency, such as the 4 km road link to the XME that required the agreement of the Jiangsu provincial government, and thus was outside the control of the APG (see paragraph 25 and 36).

(iv) The traffic forecast should have been more realistic and considered low traffic volume in the initial years of operation. It should have excluded the uncontrollable factors such as the traffic volume of the 4 km linking section (see paragraph 36 and paragraph 5 and 6 in Appendix 8).

C. Recommendations

1. Project Related

50. **Future monitoring**. The PMO and implementing agencies should continue to monitor the outcome indicators for 2017 and 2018, particularly the increased traffic flow in the XME corridor once the 4km link is opened to traffic. The PMO and implementing agencies should also monitor the annual CO_2 emissions, noise, and implementation of mitigation measures, and submit a report to ADB.

51. **Timing of the project performance evaluation report**. The project performance evaluation should be conducted in 2021. By that time, the project expressway and roads will have been in operation for five years, and overall sustainability and impacts on interregional connectivity will be more visible and quantifiable.

2. General

52. For project appraisal, capacity building should encourage more experience and knowledge sharing within the PRC rather than placing too much emphasis on international

expertise. This is particularly applicable for this project, as its major focus was to promote inter-connectivity between central, western and eastern provinces within the PRC.

53. For project implementation, ADB should have a special mechanism that focuses on acknowledging or rewarding advanced technology and the use of new materials, especially for projects with outstanding achievement in these areas. Such new technologies and materials should be shared not only within the PRC but also through South-South cooperation.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Indicators/Targets			Monitoring Mechanisms	Assumptions and Risks
	At Appraisal	Revised	Actual		
Impact Integrated road transport system that supports the central region development strategy	Road traffic in Anhui increased during 2015–2020 at 6%–7% per annum for passenger traffic and 5%–6% per annum for freight traffic.		Road traffic in Anhui increased during 2015–2020 at 6%–7% per annum for passenger traffic and 5%–6% per annum for freight traffic	Provincial and county statistical data	**Assumption** Government investment projects are implemented as planned.
	Rural poverty incidence (purchasing power parity at $1.25) reduced from 19.6% in 2007 in Lingbi and from 18.0% in 2007 in Sixian to 10% by 2020		Rural poverty incidence (purchasing power parity at $1.25) reduced from 19.6% in 2007 in Lingbi and from 18.0% in 2007 in Sixian to 10% by 2020	Provincial and county statistical data	**Assumption** The Government is committed to reducing poverty in the central region, according to the central region development strategy.
	CO_2 emissions per unit of gross domestic product reduced by at least 20% by the end of 2015 from 2005, and further reduced by 2020		CO_2 emissions per unit of gross domestic product reduced by at least 20% by the end of 2015 from 2005, and further reduced by 2020	Country statistical yearbooks	**Assumption** The Government maintains its commitment to energy efficiency.
Outcome An efficient, safe, and sustainable transport system developed in the project area	Traffic on the XME corridor increased by 7% per year during 2008–2014, 8% per year during 2014–2021, and 5% per year during 2021–2029.		Traffic on the XME corridor increased by 7% per year during 2008–2014, 8% per year during 2014–2021, and 5% per year during 2021–2029	Travel time survey for the expressway and local roads	**Assumptions** Passengers and freight operators realize the benefits of using the project roads.
	By 2014, travel time by road reduced by at least 30 minutes between Xuzhou and Mingguang		By 2014, travel time by road reduced by at least 30 minutes between Xuzhou and Mingguang	PCR	The Jiangsu section (4 km), linking XME to the Xuzhou–Huai'an expressway, is completed by Jiangsu Province.
	By 2014, vehicle operating costs reduced to CNY2.18 per pcu-km		By 2014, vehicle operating costs reduced to CNY2.18 per pcu-km with the Project from CNY2.52 pcu-km without the Project		

	with the Project from CNY2.52 pcu-km without the Project Traffic accident rate, measured by road accident fatalities per 10,000 vehicles in Anhui, reduced by 10% in 2015 Road maintenance and rehabilitation expenditures as percentage of annual needs estimated by AHAB road asset management system increased Fuel savings of 10,500 toe in 2014 and 1.3 million toe over 20 years in the project corridor; CO_2 emissions reduced by 4.2 million toe over 20 years in the project corridor		Traffic accident rate, measured by road accident fatalities per 10,000 vehicles in Anhui, reduced by 10% in 2015 Road maintenance and rehabilitation expenditures as percentage of annual needs estimated by AHAB road asset management system increased Fuel savings of 10,500 toe in 2014 and 1.3 million toe over 20 years in the project corridor; CO_2 emissions reduced by 4.2 million toe over 20 years in the project corridor	Accident statistics from Public Security Department APDOT Anhui Provincial Environmental Protection Bureau	**Assumptions** Traffic law enforcement is effective. Public awareness increases. Road user behavior is good. **Assumption** APDOT is committed to road maintenance. **Assumptions** Traffic forecasts for the XME are realized. Vehicle emissions standards are enforced on Anhui roads.

Outputs 1. Improved road infrastructure in the Xuzhou–Mingguang corridor	1.1 139 km of XME opened to traffic and effectively operated by 2014		139 km of XME opened to traffic and effectively operated by 2014 (opened to traffic on trial basis on 24 December 2014)	ACIG, PAM, and PCR	**Assumptions** Axle-load standards are enforced. Quality and safety assurance is adequate.
	1.2 Road safety enhanced through improved road safety facilities by 2014		Road safety enhanced through improved road safety facilities by 2014	ACIG, PAM, and PCR	
2. Improved local roads and traffic safety practices	2.1 452 km of local roads upgraded by 2015		452 km of local roads upgraded by 2015	PAM and PCR	**Assumption** Counterpart resources are made available on time.
	2.2 Percentage of traffic accidents causing fatalities and serious injuries reduced on project roads		For S105, the accident rate decreased from 163 accidents/million vehicle kilometers in 2010 to 141 accidents/million vehicle kilometers in 2015; and for S312, the accident rate decreased from 151 accidents/million vehicle kilometers in 2010 to 110 accidents/million vehicle kilometers in 2015	APSD	**Assumption** APDOT demonstrates strong ownership and APSD cooperates to promote road traffic safety.
	2.3 Road safety audit recommendations incorporated in road design		Road safety audit recommendations incorporated in road design	PAM, progress reports, and PCR	**Assumption** APDOT and local governments commit to implement new regulations.
3. Improved rural village bus services	3.1 Rural township bus stations built and rehabilitated	Passenger bus route licensing and operation reforms implemented in only one pilot township, namely Ducun and surrounding villages	Rural township bus stations built and rehabilitated	PAM, progress reports, and PCR Length of licensed bus route from APDOT Bus operator and records from APDOT	**Risk** APG approval of the required regulatory changes of the village bus licensing system is not timely.
	3.2 Passenger bus route licensing and operation reforms implemented in three pilot townships (Shipai,		Passenger bus route licensing and operation reforms implemented in only one pilot township,		

	Ducun, and Xiaowei) and surrounding villages		namely Ducun and surrounding villages.		**Assumptions** Independent environment, health, and safety team is established.
	3.3 The number of trips per day per bus in each direction increased on selected routes		The number of trips per day per bus in each direction increased on selected routes	PAM, progress reports, and PCR	
4. Strengthened institutional development and capacity building of APDOT, its related agencies, and ACIG	4.1 ACIG's independent environment, health, and safety team provided training to construction workforce, and monitored reports submitted to ADB and APDOT	Canceled	ACIG's independent environment, health, and safety team provided training to construction workforce, and monitored reports submitted to ADB and APDOT		Operations staff at provincial and lower levels are assigned and available for the training.
	4.2 APDOT submitted the road maintenance financing framework recommendations to APG for consideration		Canceled		
	4.3 3 Survey techniques are adopted to assess changes in work practices and behavior to measure the effectiveness of the capacity building component		3 Survey techniques are adopted to assess changes in work practices and behavior to measure the effectiveness of the capacity building component		Trainees have opportunity to apply what they have learned in their daily work.

Activities	1. XME works 2. Local road and safety component 3. Rural bus services demonstration 4. Institutional strengthening 5. Environmental mitigation 6. Resettlement Social Development		1. XME works 2. Local road and safety component 3. Rural bus services demonstration 4. Institutional strengthening 5. Environmental mitigation 6. Resettlement 7. Social Development		**Inputs** Asian Development Bank: $200 million Domestic Bank Loans: $598.8 million Ministry of Transport: $119.1 million ACIG: $320.9 million APG: $116.2 million

ACIG = Anhui Communications Investment Group Company Limited, AHAB = Anhui Highway Administration Bureau, APDOT = Anhui Provincial Department of Transport, APG = Anhui Provincial People's Government, APSD = Anhui Public Security Department, CO_2 = carbon dioxide, km = kilometer, PAM = project administration manual, PCR = project completion report, pcu = passenger car unit, toe = ton of oil equivalent, XME = Xuzhou–Mingguang Expressway.
Source: Asian Development Bank

PROJECT COST AND FINANCING PLAN

Table A2.1: Appraised and Actual Project Costs

($ million)

Component	Appraisal Estimate			Actual		
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost
A. Investment Costs						
1. Civil Works	94.0	845.7	939.7	199.6	642.3	841.9
2. Mechanical and Equipment	1.9	17.5	19.4	0.0	19.0	19.0
3. Environment and Social	2.1	19.2	21.3	0.0	8.8	8.8
4. Land Acquisition and Resettlement	0.0	61.6	61.6	0.0	140.8	140.8
5. Project Management	0.0	64.5	64.5	0.0	14.8	14.8
6. Capacity Development	1.5	0.0	1.5	0.4	0.0	0.4
7. Tax and Duties	0.0	45.7	45.7	0.0	6.7	6.7
Total Base Cost	**99.5**	**1,054.2**	**1,153.7**	**200.0**	**832.4**	**1,032.4**
B. Contingencies						
1. Physical	4.9	52.7	57.6	0.0	0.0	0.0
2. Price	3.1	40.5	43.6	0.0	0.0	0.0
Total Contingencies	**8.0**	**93.2**	**101.2**	**0.0**	**0.0**	**0.0**
C. Financing Charges						
1. Interest During Construction	13.6	86.0	99.6	0.0	118.5	118.5
2. Commitment Charges	0.5	0.0	0.5	0.0	0.4	0.4
3. Front-End Fee	0.0	0.0	0.0	0.0	0.0	0.0
Total Charges	**14.1**	**86.0**	**100.1**	**0.0**	**118.9**	**118.9**
Total (A+B+C)	**121.6**	**1,233.4**	**1,355.0**	**200.0**	**951.3**	**1,151.3**

Sources: Asian Development Bank and Anhui Provincial Department of Transport.

Table A2.2: Financing Plan

($ million)

Cost	Appraisal Estimate	Actual
Implementation Costs		
ADB Financed	200.0	200.0
Domestic Bank Loans	598.8	622.5
Ministry of Transport	119.1	58.8
ACIG	245.4	24.8
APG	91.6	126.3
Total	**1,254.9**	**1,032.4**
IDC Costs		
ADB Financed	0.0	0.0
Domestic Bank Loans	0.0	0.0
Ministry of Transport	0.0	0.0
ACIG	75.5	118.9
APG	24.6	0.0
Total	**100.1**	**118.9**

ADB=Asian Development Bank, ACIG=Anhui Communications Investment Group Co., Ltd., APG=Anhui Provincial Government, IDC=interests during construction

Sources: Asian Development Bank and Anhui Provincial Department of Transport.

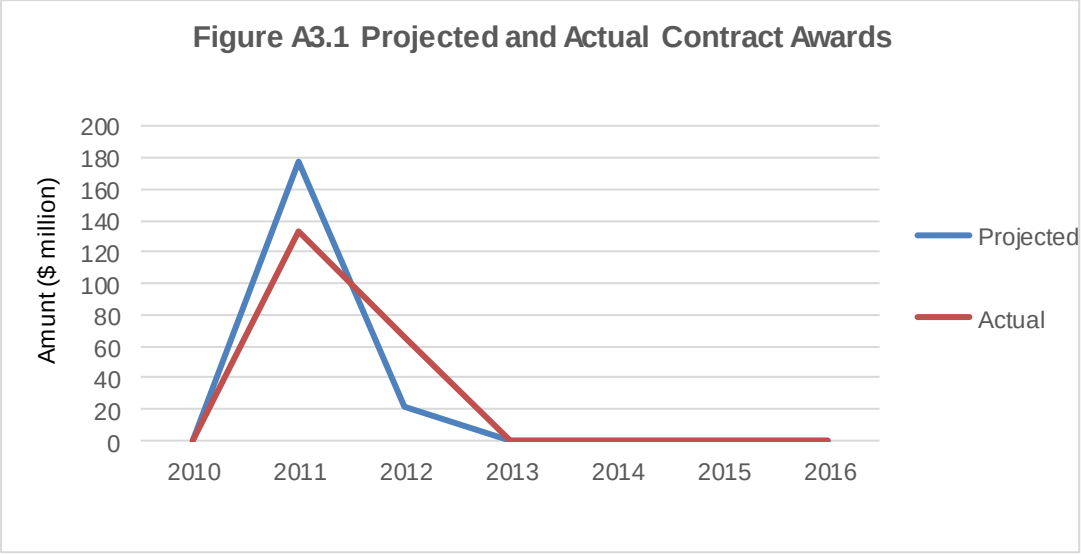
CONTRACT AWARDS AND DISBURSEMENTS

Table A3.1: Projected and Actual Contract Awards and Disbursements

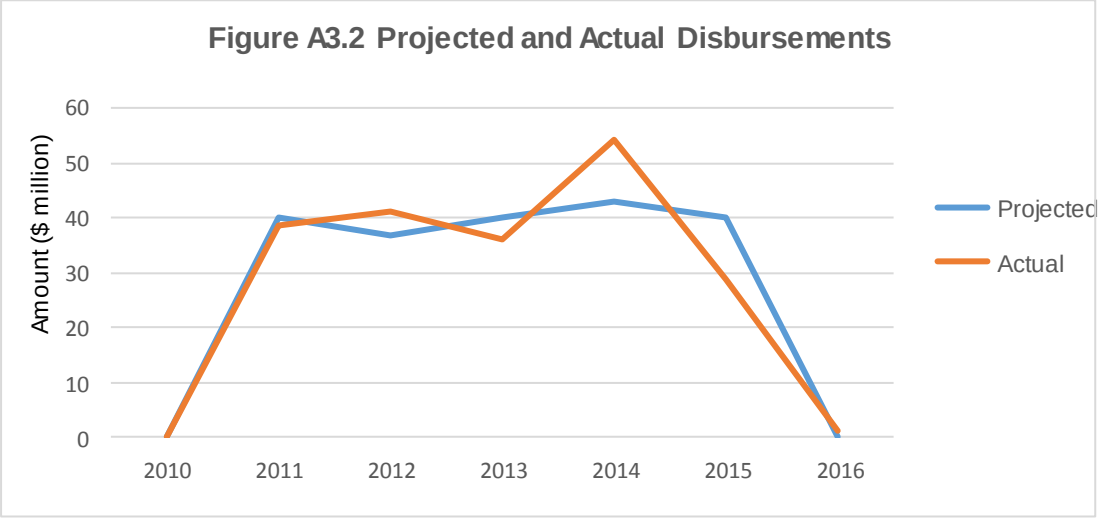
($million)

Year	Contract Awards		Disbursements	
	Projected	Actual	Projected	Actual
2010	0.00	0.00	0.00	0.00
2011	178.00	133.14	40.00	38.53
2012	22.00	66.43	37.00	41.07
2013	0.00	0.42	40.00	36.29
2014	0.00	0.00	43.00	54.15
2015	0.00	0.01	40.00	28.87
2016	0.00	0.00	0.00	1.09
Total	**200.00**	**200.00**	**200.00**	**200.00**

Sources: Loan Financial Information System.



Source: Loan Financial Information System.



Source: Loan Financial Information System.

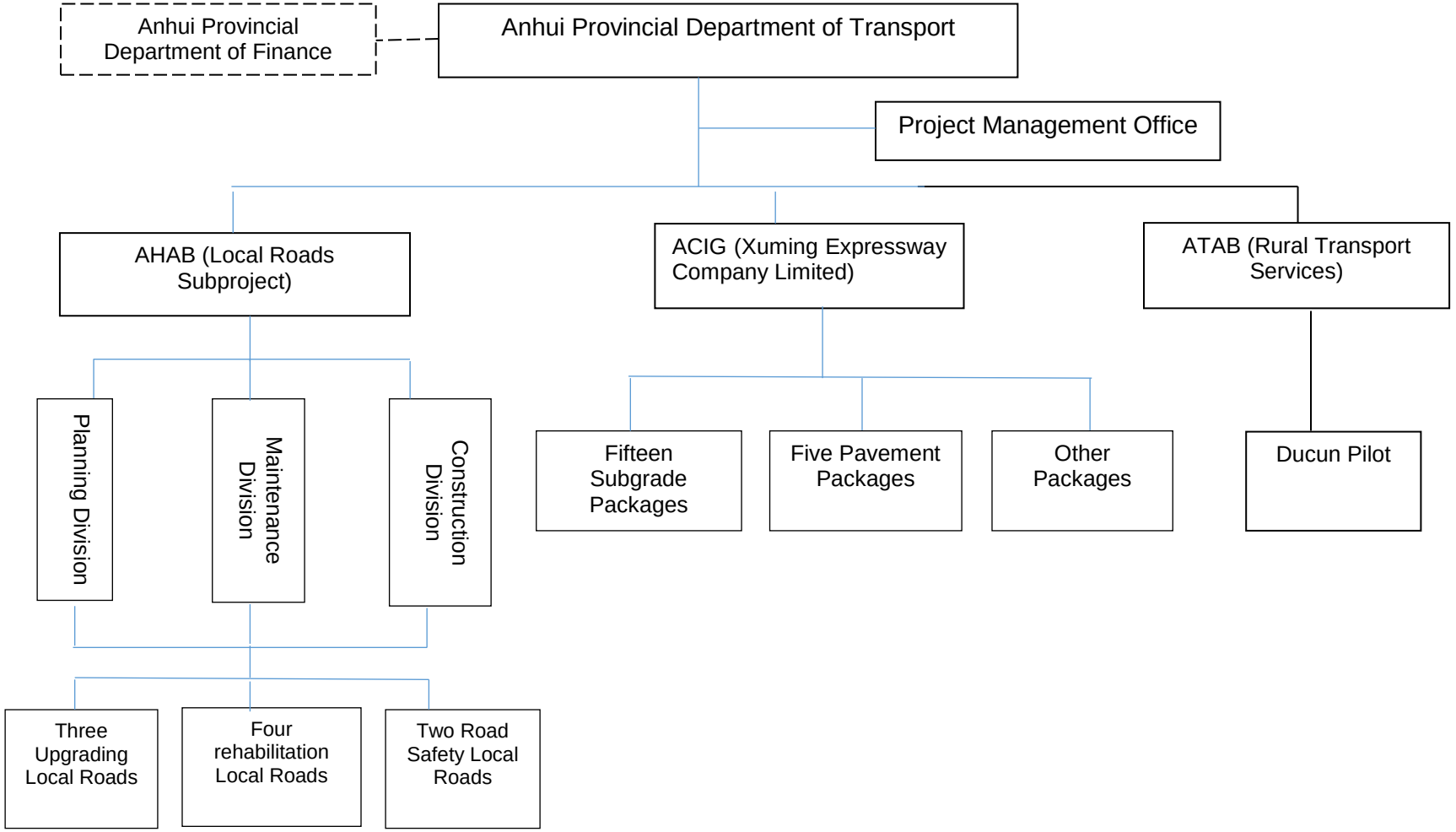
PROJECT IMPLEMENTATION SCHEDULE

Content	2009				2010				2011				2012				2013				2014				2015			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
A. Project Processing																												
1. Feasibility Study Approval			x																									
2. Advance Action Approval			x																									
3. Loan Approval				x																								
4. Loan Effectiveness							x																					
B. Land Acquisition and Resettlement																												
1. RP Preparation and ADB Approval																												
2. Land Acquisition and Resettlement																												
C. ADB-Financed Consultants																												
1. Recruitment																												
2. Consulting Services																												
D. Institutional Capacity Building																												
1. Overseas Training																												
2. Domestic Training																												
E. XME Subgrade Contracts																												
1. Bidding																												
2. Mobilization and Construction																												
F. Pavement, Safety, Greening, and Building																												
1. Bidding																												
2. Mobilization and Construction																												
G. Local Roads and Safety Improvement																												
1. Accident Analysis and Road Safety Audit																												
2. Site Implementation																												
3. Training and Evaluation																												
H. Rural Transport Services Demonstration																												
1. Select Suitable Counties and set up PDGs																												
2. Formulation of Village Bus Operators																												
3. Introduce new licensing systems																												
4. Bus Terminals and Shelters.																												
5. Training and Evaluation																												

APPRAISAL ACTUAL

ADB=Asian Development Bank, PDG=project development group, RP=resettlement plan, XME=Xuming Expressway
Source: ADB and Anhui Provincial Department of Transport.

ORGANIZATION CHART



AHAB=Anhui Highway Administration Bureau, ACIG=Anhui Communications Investment Group Co., Ltd., ATAB=Anhui Transportation Administration Bureau

STATUS OF COMPLIANCE WITH LOAN COVENANTS

Covenant	Reference in Loan Agreement	Status of Compliance
Established, Staffed, and Operating PMU/PIU	PA, para. 1	Complied with.
Project Executing Agency. APDOT, acting through the PMO, shall be the EA responsible for the overall implementation of the Project.	PA, LA 5, para. 1	Complied with.
Project Implementation Agencies. ACIG, AHAB, ATAB, and APDOT shall be the IAs for the Project. Under the overall direction of the PMO, (i) ACIG, through XMEC, shall be responsible for implementation, including the O&M of Output 1 of the Project as described in paragraph 2 of Schedule 1 to this Loan Agreement; (ii) AHAB shall be responsible for implementation, including the O&M, of Output 2 of the Project as described in paragraph 2 of Schedule 1 to this Loan Agreement; (iii) ATAB shall be responsible for implementation of Output 3 of the Project as described in paragraph 2 of Schedule 1 to this Loan Agreement; and (iv) APDOT, through the PMO, shall be responsible for implementation of Output 4 of the Project as described in paragraph 2 of Schedule 1 to this Loan Agreement. The PMO shall (i) oversee Project implementation; (ii) submit progress, audit and other reports to ADB; (iii) undertake procurement for the Project; and (iv) manage the day-to-day activities in connection with the Project.	LA 5, PA para. 2	Complied with. Progress reports, audit and other reports were submitted to ADB on time.
Coordination Arrangement. The Borrower shall ensure that (i) prior to the opening of the XME, the Borrower's Jiangsu government constructs the section of the expressway in Jiangsu province (about 4 km) linking the XME to the Xuzhou-Huai'an expressway in Borrower's Jiangsu province, to maximize the benefits of the XME; and (ii) such section is constructed to at least the same technical standards as those of the XME.	LA 5 para. 3	Not yet due. The linking section in Jiangsu province commenced construction in late 2013 and is expected to opened to traffic by September 2017.
Counterpart Financing. The Borrower shall ensure that counterpart funds, necessary for the Project, are provided in time, and that APG, through APDOT and ACIG, make available all funds and resources necessary for construction, O&M, and management of the Project on a timely basis.	LA 5, para. 4	Complied with. Counterpart funds were provided in a timely manner and all construction was completed.
Project Review. ADB and the Borrower shall jointly conduct Project reviews, including the detailed midterm review of the Project two (2) years after the commencement of Project implementation. The midterm review shall cover	LA 5, para. 5	Complied with. An ADB mission was conducted each year to review the overall

Covenant	Reference in Loan Agreement	Status of Compliance
all institutional, administrative, organizational, technical, environmental, social, economic, financial, and other relevant aspects that may have an impact on Project's performance and its continuing viability. It shall identify any problems or weakness in implementation arrangements, and agree on any changes needed to achieve the Project outcomes.		performance of the project. The midterm review mission was conducted in 2013.
Asset Management. APG shall ensure that (i) adequate resources for the maintenance of the Project roads are provided in a timely manner; and (ii) Project roads are operated in good condition and the benefits of the Project roads are realized over their expected lifetimes.	PA para. 3	Complied with: (i) the expressway is under ACIG's administration and proper resources are allocated for daily maintenance and operation; (ii) up to now, all roads are in good condition and the assumed benefits are still valid.
APDOT and IAs shall make available, promptly as needed, the funds, facilities, services, equipment, land and other resources which are required, in addition to the proceeds of the Loan, for the carrying out of the Project.	PA para. 4	Complied with.
Sustainability and Resource Efficiency. APG shall ensure that (i) resource efficiency procedures are used in Project designing and construction including: (a) procurement and manufacturing of materials locally; (b) use of existing materials including existing paving and road base materials; and (c) development of Waste Management Plan to be included in the EMP; and (ii) an independent environment, health and safety supervisory team has been appointed within 3 months from the Effective Date consisting of consultants having qualifications and experience in engineering, environment and health and safety.	PA para. 5	Complied with. The environment, health, and safety team was appointed in June 2011.

Covenant	Reference in Loan Agreement	Status of Compliance
Road Safety. APG shall ensure that (i) design guidelines on road safety provided during Project preparation are incorporated into the Project bidding documents; (ii) road safety audits are carried out and recommendations of these audits are taken into account during Project detailed design, prior to opening for traffic and after opening of the roads to traffic(monitoring and evaluation); (iii) Highway Safety Guidelines of Anhui are promulgated within two (2) years from the Effective Date; and (iv) road safety awareness program is implemented in roadside communities and communities are encouraged to participate and provide their feedback on road and traffic safety design and operation of the Project roads.	PA para. 6	Being complied with. Road safety audits were carried out on all project roads at the design stage in 2010 and their findings were incorporated into the final design. Item (iii): the final report has been completed and the PMO will promulgate the plan by September 2017.
Village Bus Licensing Reforms. APG shall ensure that (i) village bus regulatory and licensing reforms are implemented in the Project townships to improve road transport efficiency; (ii) while proposing the maximum limit of permissible fares, the Pricing Bureaus in Anhui considers the cost of providing the service, including the cost of maintaining and replacing the vehicles plus an appropriate return on the capital invested in the vehicle; (iii) discretion is given to the bus operator companies to vary the fares below the maximum limit; (iv) all traffic regulations are enforced by the traffic police in the Project townships, in particular strict restraint on running unlicensed vehicles; and (v) the Guidelines for Village bus Services Best Practice are promulgated within 2 years after the Effective Date.	PA para. 7	Being complied with. The final guidelines for village bus services best practice have been completed by the domestic consulting firm. The PMO advised ADB that the detailed promulgation plan for Ducun, Qingyang county has started and will be completed by the end of 2017.
Financial Ratios. APG shall ensure that ACIG maintains (i) a debt-equity ratio of not more than 65:35 for the XME; (ii) a working ratio (annual (O&M cost, but excluding periodic maintenance cost, to revenue) of not more than 15% from the first year of full operation of the XME; and (ii) a debt service coverage ratio of not less than 1.2 from the third year of the XME's full operation	PA para. 8	Currently, the debt-equity ratio is 71:29 (see main text para 25). The working ratio is about 13% and the debt service coverage ratio is less than 1.0.
Tolling Plan. APG shall ensure that (i) at least 6 months prior to the opening of the XME, APDOT, with ADB's concurrence, prepares a tolling plan and submits it for the approval of APG; (ii) vehicle axle-weighing equipment are installed on XME; and (iii) weight-based tolls are implemented for freight traffic on XME.	PA para. 9	Complied with. The tolling plan was submitted to ADB in January 2015.

Covenant	Reference in Loan Agreement	Status of Compliance
Private Sector Development. APG shall ensure that (i) ACIG explores the possibility of attracting private sector investment by potential investors in close consultation with ADB; and (ii) six (6) months prior to the opening of the XME, APDOT through ACIG analyzes the feasibility of tapping the financial markets for operating and financing road sector investments, including company listing, bond issues, securitization, as well as possible private sector participation in O&M of the XME, and send the report on its conclusions to ADB.	PA para. 10	Being complied with. Two versions of the feasibility study on private sector development were submitted to ADB. The mission commented on the revised report and the final report was submitted to ADB in April 2017.
Establishment of XMEC. APG shall ensure that (i) by 28 February 2010, ACIG establishes a company, under the Company Laws of the Borrower, as its wholly owned subsidiary company by the name of XMEC, to implement output 1 of the Project as described in paragraph 2 of Schedule 1 to the Loan Agreement; and (ii) ACIG sends XMEC's certificate of incorporation and shareholders directory to ADB upon its incorporation.	PA para. 11	Complied with. XMEC was established in 2010.
Accounting, Auditing, and Reporting. Without limitation to the overall application of Section2.9 of this Project Agreement, APG shall ensure that APDOT (i) maintains separate accounts and records for the Project and related financial statements in accordance with sound accounting principles and practices as prescribed by the Accounting Law of the PRC; (ii) gets such accounts and related financial statements audited annually by independent external auditors whose qualifications, experience, and terms of reference are acceptable to ADB, and in accordance with auditing standards that are acceptable to ADB, including: (a) an assessment of the adequacy of accounting and internal control systems with respect to Project expenditures and other financial transactions; and (b) an assessment of compliance with covenants of the Loan Agreement, and ADB's requirements on Project Management; (iii) submits to ADB within six (6) months of the end of each related fiscal year the audited and consolidated Project's financial statements and accounts, audit reports, management letters in both English and Chinese, and a separate audit opinion on the use of the statement of expenditures and the imprest account.	PA para.12	Being complied with. All audited financial statements were submitted on time each year and no audit issues were identified. The audit report for fiscal year 2016 has been received on 30 June 2017.

Covenant	Reference in Loan Agreement	Status of Compliance
Internal Control. APG shall ensure that APDOT (i) uses its internal audit unit to carry out independent audits during Project Implementation to check the effectiveness of the Project construction (ii) independently tests, through its internal costs and operation; audit unit, the financial transactions of the PMO to ensure the safe custody of the Project-financed assets and shall report directly to the internal and external auditors; and (iii) makes satisfactory arrangements for submitting quarterly progress reports on Project Implementation to ADB as well as a completion report within three (3) months of the end of the Project.	PA para. 13	Being complied with. The PCR was revised several times based on ADB's comments, and the final version was submitted to ADB on 1 April 2017.
Anticorruption. APG shall, and shall cause APDOT and ACIG to ensure, that during the Project Implementation, (i) relevant provisions of ADB's Anticorruption Policy(1998), as amended to date are included in all bidding documents for the Project; (ii) officials from the Discipline and Inspection Bureau in Anhui monitor Project bidding, construction, and operations; (iii) the internal audit unit of ACIG is strengthened with additional staff and resources; (iv) a two (2)-contract system is adopted whereby the winner of a Works contract shall also sign an anticorruption contract with the employer; (v) periodic inspection of contractors is undertaken to ensure that fund withdrawal and settlement procedures are followed; (vi) the status of procurement and awards of contracts is published on APDOT's website; and (vii) liaison meetings are initiated with the Prosecutor's Office in Anhui, as needed, to discuss any warnings about, or information on, any corrupt, fraudulent, collusive or coercive practices relating to the Project.	PA para. 14	Complied with. Relevant provisions have been included in all bidding documents, and internal controls on anti-corruption have been implemented.
Grievance and Redress Mechanism. APG shall ensure that within 60 days from the Effective Date, APDOT develops complaint and problem management mechanisms acceptable to ADB, and establishes a task force at APDOT functioning effectively to (i) review and document eligible complaints of Project stakeholders; (ii) proactively address grievances; (iii) provide the complainants with notice of the chosen mechanism/action; and (iv) prepare periodic reports to summarize the final outcomes of the grievances and chosen actions and make these reports available to ADB upon request. Eligible complaints include those	PA para.15	Complied with. Resettlement complaints were resolved to the satisfaction of complainants. The mechanism was established in each contract package and related information was disclosed to the public.

Covenant	Reference in Loan Agreement	Status of Compliance
related to the Project, any of the service providers, or any person responsible for carrying out the Project including complaints on misuse of funds and other irregularities, including grievances due to resettlement.		
Resettlement. APG shall, and shall cause APDOT and IAs to ensure, that (i) the RPs for the Project are implemented in accordance with their terms; (ii) all land and rights-of- way required by the Project is made available in a timely manner; (iii) the provisions of the RPs, including compensation and entitlements for APs, are implemented in accordance with all the Borrower's applicable laws and regulations and ADB's Involuntary Resettlement Policy (1995); (iv) compensation and resettlement assistance is given to the APs prior to dispossession and displacement; (v) the timely provision of counterpart funds is made for land acquisition and resettlement activities; (vi) any obligations in excess of the RPs budget estimates are met; (vii) the APs are compensated in a manner that they are at least as well off as they would have been in the absence of the Project; (viii) the RPs are updated upon completion of the detailed design and detailed measurement survey and submitted to ADB for approval prior to commencement of land acquisition and/or house demolition; (ix) ADB's concurrence is sought if there are any significant material changes in the Project design; (x) Works contracts include requirements to comply with the RPs and entitlements for permanent and temporary impacts to APs; (xi) the Works contractors are supervised to ensure compliance with requirements of the RPs; (xii) adequate staff and resources are committed for supervising and monitoring implementation of the RPs and satisfaction of ADB's reporting requirements; and (xiii) an independent agency acceptable to ADB is engaged by APDOT to monitor and evaluate results of implementation of RPs and reports are sent to ADB and APDOT as required.	PA para. 17	Complied with. The RPs for the project were originally posted in September 2009. They were updated in January and May 2011 and disclosed on ADB's website in July and August 2012, respectively.
APG shall, and shall cause APDOT, ACIG and AHAB to ensure, that (i) the RPs are updated upon the completion of the Project detailed design and detailed measurement survey and ADB's concurrence is obtained on the updated RPs prior to the commencement of Works; (ii) significant material changes, as necessary, in the Project scope or other causes are reflected	PA para. 18	Complied with. ADB approved the updated RPs in 2012.

Covenant	Reference in Loan Agreement	Status of Compliance
in the RPs, and submitted to ADB for its concurrence; (iii) specific provisions are included in the Works contracts to ensure compliance with the RPs and entitlements of APs for compensation due to permanent and temporary impacts; and (iv) the contractors are supervised to ensure compliance with requirements of the RPs.		
APG shall, and shall cause APDOT, ACIG and AHAB to ensure, that (i) adequate staff and resources are committed for supervision and internal monitoring of the RPs' implementation, key information, relating to the RPs, is included in the quarterly progress reports during resettlement implementation, and a resettlement completion report, and such reports are provided to ADB; (ii) an independent institute acceptable to ADB is contracted to carry out monitoring and evaluation, and forwarding reports to ADB as specified in the RPs; and (iii) ADB is promptly advised of any substantial changes in the resettlement impacts and, if necessary, a revised RP is submitted to ADB for its approval.	PA para. 19	Complied with. Anhui Jiaotong Vocational College (AJVC) was engaged in mid-2011 for external monitoring and evaluation of resettlement implementation, and provided regular reports to ADB. Adequate staff and resources were allocated for the supervision and internal monitoring of the RPs by APDOT, ACIG and AHAB. Reports were disclosed on ADB's website.
Environment. APG shall, and shall cause APDOT, ACIG and AHAB to ensure, that (i) the Project is designed, constructed and operated in accordance with the environmental laws and regulations of the Borrower, ADB's Environment Policy (2002), the EIAs and EMP; (ii) the mitigation measures as specified in the ElAs and EMP, are properly and fully implemented; (iii) the EMP and mitigation measures included therein are updated at the engineering design stage and incorporated into the bidding documents and Works contracts; (iv) any adverse impact on the environment that may arise from Project implementation activities is promptly mitigated or minimized; (v) EMP is implemented in full to address the environmental aspects during the construction under the Project including actions to be taken for auditing, measuring and monitoring the environment and safety conditions of the work and responding to breach in environmental or safety requirements; and (vi) environmental and safety aspects are reported on a semiannual basis to ADB.	PA para. 20	Complied with. Five semi-annual environmental monitoring reports were submitted during project implementation.

Covenant	Reference in Loan Agreement	Status of Compliance
Social and Gender Development. APG shall, and shall cause APDOT and IAs to ensure, that (i) the SDAP, which includes specific gender and development actions, is implemented and the results of these actions are monitored and reported to ADB annually until the completion of the Project through collection and compilation of gender, disaggregated data, where relevant; (ii) women living in the Project area are encouraged to participate in planning and implementation of the Project, as set out in the SDAP; and (iii) the SDAP is reviewed during the Loan inception mission and updated if necessary.	PA para. 21	Complied with. The SDAP was monitored and relevant details were updated on an annual basis. Women participated in community consultations during the planning and implementation of the project.
Labor Standards: APG shall, and shall cause APDOT and IAs to respectfully ensure, that the construction contractors (i) provide timely payment of wages and safe working conditions to all workers and monitored by the PMO; (ii) employ women, where appropriate, and pay equal wages to the female and male employees for similar work; (iii) do not employ child labor as required by the relevant laws and regulations of the Borrower; (iv) maximize the employment of local poor people who meet the job and efficiency requirements for construction and maintenance of the Project roads; and (v) provide adequate on-the-job training to such local workers.	PA para. 22	Complied with. Wages were paid on time and appropriate safety practices ensured a decent work environment. No child labor was employed. Local women were employed and equal wages were paid. On-the-job training was provided adequately to the local workers.
Health Risks. APG shall, and shall cause APDOT and IAs to ensure, that (i) in coordination with the local health bureaus, the contractors are made to disseminate information on the risks of socially and sexually transmitted diseases, including HIV/AIDS, to their employees, temporary laborers and their family members, and subcontractors during Project implementation; and (ii) specific provisions to this effect are included in the Works contracts and are monitored and reported semiannually to ADB.	PA para. 23	Complied with During review missions, ADB checked the information disclosure on the health risks, and specific provisions were included in all works contracts. Four semi-annual reports were submitted.

ACIG = Anhui Communications Investment Group Co. Ltd., ADB = Asian Development Bank, AHAB = Anhui Highway Administration Bureau, AP = affected person, APDOT = Anhui Provincial Department of Transport, APG = Anhui provincial government, ATAB = Anhui Transportation Administration Bureau, EA = executing agency, EIA = environmental impact assessment, EMP = environmental management plan, O&M = operation and maintenance, PMO = project management office, PMU/PIU = project management unit/project implementing unit, RP = resettlement plan, SDAP = social development action plan, XME = Xuming expressway, XMEC = Xuming Expressway Company Limited

SUMMARY OF CONTRACT PACKAGES

Table A7.1: Expressway Civil Works

No.	Contractor	Mode of Procurement	Contract Date	Country	Contract Amount (CNY)	Contract Amount ($ Equivalent)
XMLJ-01	Jiangsu Hengji Road & Bridge Engineering Co., Ltd.	ICB	8 Mar. 2011	PRC	106,853,670	15,493,898
XMLJ-02	Chongqing Fuling Road & Bridge Engineering Co., Ltd.	ICB	21 Mar. 2011	PRC	148,928,017	21,594,724
XMLJ-03	Xuchang Guangli Highway Engineering Construction Company	ICB	21 Mar. 2011	PRC	130,103,398	18,865,134
XMLJ-04	Anhui Highway & Bridge Engineering Group Co., Ltd.	ICB	01 Mar. 2011	PRC	196,222,241	28,452,438
XMLJ-05	Anhui Road and Port Engineering Co., Ltd.	ICB	18 Mar. 2011	PRC	129,899,997	18,835,641
XMLJ-06	Shaoyang Road & Bridge engineering Group Co., Ltd.	ICB	22 Mar. 2011	PRC	178,034,155	25,815,146
XMLJ-07	China Railway 24th Bureau Group Co., Ltd.	ICB	11 Oct. 2011	PRC	168,162,337	24,383,722
XMLJ-08	Sinohydro Group Engineering Bureau Group 15	ICB	25 Jan. 2011	PRC	157,399,993	22,823,170
XMLJ-09	Chaohu City Road & Bridge Engineering Company	ICB	25 Jan. 2011	PRC	185,233,696	26,859,087
XMLJ-10	Chaoyang Construction Group Co., Ltd.	ICB	25 Jan. 2011	PRC	167,869,368	24,341,241
XMLJ-11	Anhui Provincial Road & Bridge Engineering Co., Ltd.	ICB	25 Jan. 2011	PRC	151,681,993	21,994,054
XMLJ-12	Shanghai No.1 Municipal Engineering Co., Ltd.	ICB	07 Mar. 2011	PRC	244,941,258	35,516,749
XMLJ-13	CCCC Third Highway Engineering Corp. Ltd.	ICB	25 Jan. 2011	PRC	444,534,746	64,458,022
XMLJ-14	Wuxi Communication Engineering Co., Ltd.	ICB	25 Jan. 2011	PRC	158,039,524	22,915,903
XMLJ-15	Second Engineering Ltd. Co. of China Railway	ICB	08 Mar. 2011	PRC	122,467,423	17,757,910
	Total				**2,690,371,816**	**390,106,839**

ADB = Asian Development Bank, CNY = yuan, Co. = company, ICB = international competitive bidding, Ltd = limited, No. = number, PRC = People's Republic of China.
Source: Xuming Expressway Company Limited

ECONOMIC REEVALUATION

A. General

1. The project comprises a 139 kilometers (km) four-lane expressway in the Xuzhou–Mingguang corridor (XME) and the upgrading and rehabilitation of 452 km of local rural roads. The project expressway is access-controlled with a design speed of 120 km/hour. The economic reevaluation has been conducted for the XME, the local road component, and the project as a whole. The reevaluation has been undertaken using with- and without-project scenarios in accordance with Asian Development Bank's (ADB) Guidelines for the Economic Analysis of Projects. Compared with the existing national highway (NH104), the XME provides a shorter route between Xuzhou, Mingguang, and Nanjing and beyond. Without the project, corridor traffic would have used the longer existing routes, where vehicle speeds are much lower. This would have resulted in increased vehicle operating costs (VOC), longer travel time, and more road accidents. With the project, the corridor transport capacity has increased, allowing vehicles on the project expressway to drive at faster speeds, over a shorter distance, and at a lower operating cost. Congestion on neighboring roads was fixed, resulting in benefits of shorter travel time and lower VOC. More traffic is generated because of better transport conditions and lower operating costs in the corridor. The evaluation period covers the implementation period from 2010 to 2014 and the operation period from 2015 to 2034. The analysis is undertaken using 2016 constant prices.

2. The economic evaluation uses 2016 prices, expressed in Chinese yuan (CNY) using the domestic price numeraire with a shadow exchange rate factor of 1.03 for foreign exchange effects. Taxes and duties and financing charges were excluded and a shadow wage rate of 0.67 on unskilled labor was applied, which is consistent with the factors adopted at appraisal.

B. Revised Traffic Forecast

3. The start point of the XME is the provincial border with Jiangsu Province in the north, with its 4 km extension to the Xuzhou–Suqian–Huai'an–Nanjing Expressway (Xusuning), and ends at an interchange in Mingguang on the Bengbu–Nanjing Expressway in the south. The XME provides a shorter route between Xuzhou and Nanjing, two important transport hubs in the People's Republic of China (PRC). By integrating Anhui Province with more prosperous neighboring provinces, it strategically supported the growth of the six central region provinces—Anhui, Henan, Hubei, Hunan, Jiangxi, and Shanxi.

4. The XME, NH104, and sections of several expressways constitute the transport corridor in the project area. Upon completion of the project and the additional 4 km road within Jiangsu Province that connects with the Xuzhou–Huai'an Expressway, the distance savings are 50 km from Xuzhou to Nanjing via Bengbu, 28 km from Xusuning via Suqian, and 30 km compared with NH104. Within the project area, the distance is shortened by 26 km for the traffic traveling between Xuzhou and Nanjing, and 18 km for the traffic traveling between Xuzhou and Hefei, which enables time savings of up to 35 minutes for traffic diverting from existing expressways, and by up to 45 minutes for traffic diverting from the local road network.

5. The XME was partially open to traffic in December 2014 with about 120 km operational, leaving the north section of the XME unused as of the time of the completion review mission. The actual traffic on the expressway was 3,783 passenger car unit per day (pcu/day) in 2015 and 5,578 pcu/day in 2016. This is much lower than the appraisal estimates and the main reason is because the 4 km route within the Jiangsu Province is still being constructed, making

the shortest route between Xuzhou and Nanjing via the XME incomplete. Based on the latest update on construction progress, this section is expected to open to traffic in September 2017.

6. The traffic forecast was revised based on actual performance in the initial operating years. Attracted by the improved condition, higher speed, and shorter distance, traffic diverted from adjacent roads, as indicated by the traffic on NH104, which decreased from the 10,413 pcu/day in 2014 to 5,624 pcu/day in 2015 when the XME was partially opened. The traffic on the XME is expected to increase to about 11,850 pcu/day in 2017 with the completion of the linking section in Jiangsu Province, which enables the corridor from Xuzhou to Nanjing to be fully operational. Based on the impact of other expressways that are connected to the XME, composition of the traffic, socioeconomic development in the project area, and overall future transport demand along the corridor, the traffic growth rates for the expressway are estimated to be 8% (2018-2020), 6% (2021-2026), and 4% (beyond 2026). Traffic growth on NH104 is estimated to be 2% during the same period. The updated traffic forecast as compared with the appraisal estimates is provided in Table A8.1.

Table A8.1: Updated Traffic Forecast
(Average Annual Daily Traffic)

	Appraisal Estimates (pcu/day)			Updated Forecast (pcu/day)		
Year	**Expressway**	**NH104**	**Total**	**Expressway**	**NH104**	**Total**
2015	12,647	7,379	20,025	3,783	5,624	9,407
2021	27,633	5,766	33,399	15,823	6,334	22,157
2026	38,428	7,288	45,716	20,776	6,993	27,769
2033	49,142	9,622	58,764	27,339	8,032	35,371

pcu = passenger car unit.
Sources: Asian Development Bank and Anhui Provincial Department of Transport.

C. Benefits

7. The reevaluation noted the same economic benefits that were quantified for the expressway component at appraisal, including: (i) savings in VOC, (ii) savings in the value of passenger time, (iii) savings resulting from fewer accidents, (iv) benefits to generated traffic, and (v) benefits from the reduction of carbon dioxide (CO_2) emissions. The CO_2 emission benefits turned out to be insignificant, so they were not quantified in the reevaluation. VOC savings and time savings are the main sources of economic benefits. Unit VOC data for different types of vehicles under different road and traffic conditions has been used in the calculation. VOC savings were calculated based on fuel and lubricating oil consumption, tires and spare parts, vehicle maintenance labor costs, vehicle crew wages, vehicle depreciation, and average travel speed as a function of the geometry and the condition of the road. VOC savings from the reduced travel distance was calculated. VOC for the traffic on the NH104 is also reduced as a result of the reduced congestion. For generated traffic, half of the VOC savings are considered as the benefits.

8. Passenger travel time savings are estimated for different types of passenger vehicles. The average passenger time value is derived from the per capita urban income of Anhui Province in 2016, and assumed to increase by 7% annually from 2015-2020 and 5% from 2021-2025, consistent with the anticipated gross domestic product (GDP) growth rates. Other factors considered in recalculating travel time savings include average vehicle load, percentage of working trips, travel distance, and speeds for “with” and “without” the project scenarios. The benefits related to the reduction in road accidents were evaluated based on the national statistics for the road accident incidence ratio and the cost of road accidents for expressways

and national roads. Under the local road component, nine local roads with a total length of 452 km were upgraded or rehabilitated to the proposed standard, as envisaged at appraisal. The principal benefits of the local road improvement are identified as (i) VOC savings, (ii) benefits to generated traffic, and (iii) savings in operation and maintenance (O&M) costs.

D. Economic Internal Rate of Return Reevaluation

9. The reevaluated economic internal rate of return (EIRR) for the project as a whole is 11.9%, as compared to 15.8% estimated at appraisal. The EIRR is 11.1% for the project expressway and 14.8% for the project local roads. The lower EIRR was mainly due to the delayed full operation of the XME, caused by the delay in completing the section in Jiangsu Province despite the favorable effect of reduced capital cost. It was noted that the cost-benefit analysis at appraisal assumed prorated costs and benefits for the additional 4 km expressway in Jiangsu Province; however, this was not included in the reevaluation due to lack of information regarding the construction conducted in Jiangsu Province. The reevaluated EIRR is higher than the benchmark social discount rate of 9% and the project is considered economically viable. The economic reevaluation is provided in Table A8.2. A sensitivity analysis was carried out to test the impacts of (i) an increase in O&M costs, (ii) a decrease in benefits, and (iii) a combination of these two scenarios. The analysis shows that the project is highly sensitive to benefit changes but remains above the cutoff rate in tested scenarios. The sensitivity analysis is provided in Table A8.3.

Table A8.2: Economic Internal Rate of Return

(CNY million)

	Costs			Benefits				
Year	Capital	O&M	VOC	Time Savings	Accident	Generated Traffic	Local Roads	Net Benefit
2010	520.5	0.0					(179.5)	(700.0)
2011	699.9	0.0					(299.3)	(999.1)
2012	1,312.4	0.0					(515.4)	(1,827.8)
2013	1,422.7	0.0					(548.7)	(1,971.3)
2014	1,297.9	0.0					(116.4)	(1,414.3)
2015	6.8	34.9	64.3	23.0	42.8	32.5	267.4	388.4
2016		36.2	94.8	27.2	63.2	46.3	293.1	488.4
2017		37.5	203.5	119.6	139.0	115.5	305.0	845.1
2018		38.8	219.8	138.3	150.1	127.0	317.4	913.6
2019		40.3	237.4	159.8	162.1	139.8	330.2	989.0
2020		41.7	256.3	184.6	175.0	154.0	343.7	1,071.9
2021		43.3	271.7	209.4	185.5	166.7	355.5	1,145.5
2022		44.9	288.0	233.1	196.7	179.4	367.7	1,220.0
2023		46.5	305.3	259.4	208.5	193.3	380.4	1,300.3
2024	297.3	48.3	323.6	288.7	221.0	208.3	393.5	1,089.6
2025		50.1	343.0	321.3	234.2	224.7	407.0	1,480.3
2026		52.0	356.8	357.7	243.6	239.5	418.6	1,564.2
2027		53.9	371.0	390.6	253.4	253.7	430.6	1,645.3
2028		56.0	385.9	426.5	263.5	269.0	442.9	1,731.7
2029		58.1	401.3	465.7	274.0	285.3	455.6	1,823.8
2030		60.4	401.3	508.6	285.0	298.7	468.7	1,902.0
2031		62.7	434.1	555.4	296.4	321.5	482.3	2,026.9
2032		65.1	451.4	606.5	308.2	341.5	496.3	2,138.8
2033	387.9	67.7	469.5	662.2	320.6	363.1	510.8	1,870.6
2034	(2,626.7)	70.3	488.3	723.2	333.4	386.2	525.7	5,013.1
							EIRR	**11.9%**
					NPV at 9%			**1,933.4**

EIRR = economic internal rate of return, NPV = net present value, O&M = operation and maintenance, VOC = vehicle operating cost.

Source: Asian Development Bank estimates.

Table A8.3: Sensitivity Analysis

	Changes		EIRR
	O&M Cost	Benefits	
Base Case			**11.9%**
Changes (+/-)			
	+20%		**11.8%**
		-10%	**11.1%**
		-20%	**10.3%**
	+20%	-20%	**10.2%**

EIRR = economic internal rate of return, O&M = operation and maintenance
Source: Asian Development Bank.

FINANCIAL REEVALUATION

A. Introduction

1. The financial reevaluation was undertaken in accordance with the Asian Development Bank's Guidelines for the Financial Management and Analysis of Projects (2005). The project had both revenue and nonrevenue components. The financial reevaluation was conducted on the 139 kilometer (km) four-lane expressway of the Xuzhou–Mingguang corridor (XME), which is the only revenue generating component under the project. The reevaluation period covers the implementation period of 2010-2014 and the operation period of 2015-2034.

B. Basic Assumptions

2. For financial internal rate of return (FIRR) calculation, the capital cost is based on actual expenditures incurred for the expressway, excluding the cost for interest during construction. The actual capital cost denominated in local currency was about 16% lower than the appraisal estimates.

3. Anhui Province uses the standard system, which sets the same toll on all expressways. The current toll rates are provided in Table A9.1. Anhui Province has been implementing weight-based tolls for freight vehicles since 2005. The current rate applied to freight traffic is CNY0.09 per ton-km. Vehicles carrying fresh agricultural produce or livestock and passenger vehicles during national holidays are exempted from tolls. The toll rates will remain constant in real terms until 2025, when an increase of 10% is assumed, followed by a similar increase in 2035.

Table A9.1: Base Year Tolls for Vehicles in 2016 Prices
(CNY per vehicle-km)

Vehicle Class	**1**	**2**	**3**	**4**	**5**
Passenger vehicles	≤7 seats	8–19 seats	20–39 seats	>=40 seats	
Freight vehicles	≤ 2 tons	2-5 tons	5-10 tons	10-15 tons	>=15 tons
Toll rate	**0.45**	**0.8**	**1.1**	**1.3**	**1.5**

Source: Anhui Provincial Department of Transport.

4. The operation and maintenance (O&M) expenses were estimated based on the actual O&M expenses of the project expressway in past years and an estimate of the number of operation and administration staff, average salary level, and unit rates for maintenance activities provided by the Anhui Provincial Communications Department. Annual incremental O&M costs were calculated at 2016 prices as follows: (i) toll operation cost was estimated at CNY1 million per toll plaza; (ii) routine maintenance costs were estimated at CNY16,000 per km for roads; CNY300,000 per km for long and medium tunnels; CNY200,000 per km for short tunnels; and CNY15,000 per km for traffic control and management equipment; and (iii) environmental monitoring costs were estimated at CNY500,000 per annum. In addition, periodic maintenance costs will be required after 10 years of operation at a cost of CNY1.5 million per km. These costs are assumed to increase by 3% in real terms every year to ensure adequate inputs for maintenance and the anticipated salary increase of staff. Applicable business taxes at a rate of 3.3% are charged on revenues. Corporate income tax at 17% is paid on income after deducting business taxes, depreciation and interest charges, operating expenses, and prior year losses carried forward within five years.

C. Financial Internal Rate of Return

5. The FIRR calculated on an after-tax basis was 4.0% (Table A9.2), which is lower than the appraisal estimate of 6.6%. The difference was mainly due to low traffic in the initial years of operation, despite the impact of reduced capital costs and higher tariffs compared with appraisal estimates. The weighted average cost of capital (WACC) in real terms was calculated using the actual capital mix and cost of the various financing sources, i.e., ADB loan interest rate based on a 10-year fixed swap rate, domestic loans at an interest rate of 6.5%, and the grant cost of 8% (Table A9.3). The revised WACC is 3.5%, slightly lower than the appraisal estimate of 3.7%. The project's recalculated FIRR is higher than the revised WACC, and the project is considered financially viable.

6. A sensitivity analysis was conducted to test the impacts of variations in O&M costs and revenues. A 10% or more decrease in revenues will bring the FIRR lower than the WACC. The result of the sensitivity analysis is shown in Table A9.4.

Table A9.2: Financial Internal Rate of Return
(CNY million)

Year	Capital Investment	O&M Cost	Total cost	Project Revenues	Business Tax	Cash Flow Before Tax	Corporate Income Tax	Cash Flow After Tax
2010	530.3	0.0	530.3	0.0		(530.3)		(530.3)
2011	713.1	0.0	713.1	0.0		(713.1)		(713.1)
2012	1,337.2	0.0	1,337.2	0.0		(1,337.2)		(1,337.2)
2013	1,449.5	0.0	1,449.5	0.0		(1,449.5)		(1,449.5)
2014	1,322.4	0.0	1,322.4	0.0		(1,322.4)		(1,322.4)
2015	6.9	34.9	41.8	101.9	3.1	57.0	0.0	57.0
2016		36.2	36.2	154.4	4.6	113.5	0.0	113.5
2017		37.5	37.5	280.2	8.4	234.3	0.0	234.3
2018		38.8	38.8	302.6	9.1	254.7	0.0	254.7
2019		40.3	40.3	326.8	9.8	276.8	0.0	276.8
2020		41.7	41.7	353.0	10.6	300.7	0.0	300.7
2021		43.3	43.3	374.2	11.2	319.7	0.0	319.7
2022		44.9	44.9	396.6	11.9	339.8	0.0	339.8
2023		46.5	46.5	420.4	12.6	361.3	0.0	361.3
2024	297.3	48.3	345.5	445.6	13.4	86.7	0.0	86.7
2025		50.1	50.1	529.7	15.9	463.8	0.0	463.8
2026		52.0	52.0	550.9	16.5	482.4	0.0	482.4
2027		53.9	53.9	573.0	17.2	501.8	0.0	501.8
2028		56.0	56.0	595.9	17.9	522.0	0.0	522.0
2029		58.1	58.1	619.7	18.6	543.0	0.0	543.0
2030		60.4	60.4	644.5	19.3	564.8	35.9	529.0
2031		62.7	62.7	670.3	20.1	587.5	43.5	544.0
2032		65.1	65.1	697.1	20.9	611.1	51.6	559.5
2033	387.9	67.7	455.5	725.0	21.7	247.7	10.3	237.4
2034	(2,676.3)	70.3	(2,605.9)	754.0	45.2	3,114.5	205.9	3,108.8
						FIRR before corporate tax		**4.2%**
						FIRR after corporate tax		**4.0%**

()=negative, FIRR=financial internal rate of return, O&M=operation and maintenance.
Source: Asian Development Bank estimates.

Table A9.3: Weighted Average Cost of Capital

	ADB Loan	Domestic Loans	Grant and Equity	Total
a. Weighting	16.5%	54.1%	29.4%	100%
b. Nominal cost	3.1%	6.5%	8.0%	
c. Income tax rate	17.0%	17.0%	0.0%	
d. Tax-adjusted nominal cost [D x (1 - E)]	2.6%	5.4%	8.0%	
e. Inflation rate	1.5%	2.3%	2.3%	
f. Real cost [(1+F) / (1+G) - 1]	1.1%	3.0%	5.6%	
g. Weighted component of WACC	0.2%	1.6%	1.6%	
Weighted average cost of capital				**3.5%**

Source: Asian Development Bank estimates.

Table A9.4: Sensitivity Analysis

Scenario	FIRR
Base Case	4.2%
Revenues decrease by 10%	3.3%
Revenues decrease by 15%	2.9%
O&M costs increase by 20%	3.9%
20% increase in O&M costs, 10% decrease in revenues	3.1%

FIRR = financial internal rate of return, O&M = operations and maintenance.
Source: Asian Development Bank estimates.

D. Operation and Management of Project Expressway

7. Anhui Communications Investment Group Company Limited (ACIG) is responsible for the construction, operation, and maintenance of all toll expressways in Anhui Province, including the XME. According to the loan covenant, ACIG should maintain (i) a debt–equity ratio of not more than 65:35 for the project expressway; (ii) a working ratio (annual O&M cost, but excluding periodic maintenance cost, to revenue) of not more than 15% from the first year of full operation of the project expressway; and (iii) a debt service coverage ratio of not less than 1.2 from the third year of the project expressway's full operation. Due to the regional-based operational arrangement as described above, there have been no separate financial statements to reflect the financial performance of the project expressway since it opened. Financial projections on a pro forma basis were conducted to indicate the likelihood of the achievement of these financial covenants.

8. The actual debt-equity ratio at completion for the XME was 71:29 and the debt service coverage ratio will be less than 1.0 until 2025. The working ratio in the first year of full operation, which is anticipated in 2017, was about 13% and the ratio can be complied with during the rest of the operational period. ACIG has committed that it will ensure repayment of the debt, and will closely monitor the financial performance of the project expressway and take actions, including adjustment of the toll level, when necessary.

ENVIRONMENTAL IMPACT ANALYSIS

A. Introduction

1. The project was classified as category A for environmental safeguards, based on ADB's Environmental Policy (2002)[1] and Environmental Assessment Guidelines (1998).[2] It comprised 10 subprojects: (i) construction of a 139 kilometer (km) four-lane expressway from Xuzhou to Mingguang, (ii) reconstruction of three local roads (172.648 km), (iii) safety protection for two roads (79.251 km), and (iv) rehabilitation of four provincial roads (192.144 km).

2. The domestic environmental impact assessment (EIA) reports for the project's expressway and local roads were prepared by the China Shipping Environment Technology (Shanghai) Co., Ltd (formerly Shanghai Ship and Shipping Research Institute) and the Environmental Science Research Institute in Anhui Province on behalf of Anhui Provincial Department of Transport (APDOT). The EIAs were prepared using methodologies and standards consistent with relevant guidelines established by the State Environmental Protection Administration (SEPA, formerly Ministry of Environmental Protection) and Ministry of Communication (MOC) of the People's Republic of China (PRC), as well as in compliance with applicable laws and regulations. The Anhui Provincial Environmental Protection Bureau (APEPB) approved the expressway and nine local roads' EIA reports in 2009.[3] The summary environmental impact assessment (SEIA) report, circulated to ADB in June 2009, was prepared based on information contained in the approved domestic EIA reports. The SEIA concluded that the anticipated adverse environmental impacts of the project would be minimized to acceptable levels by implementing credible and timely environmental mitigation and monitoring programs as stipulated in the environmental management plan (EMP).

3. In accordance with national regulations, a completion and acceptance review of environmental protection measures will be undertaken by APEPB in 2017. The technical reviews of environmental protection for local roads will be completed by February 2018, even though the reviews for several roads were conducted before March 2017.

B. Environmental Protection and Management

4. As the executing agency, APDOT was responsible for establishing the environmental management system. The two implementing agencies—Anhui Communication Investment Group Company Limited and Anhui Highway Administration Bureau—were responsible for coordinating environmental management. APDOT established the environmental protection and soil erosion control leading group and an environmental protection and soil erosion control office (the office) to oversee the EMP implementation with the consultant's assistance and to deal with environmental issues involving contractors and local communities. Each contractor's office had a designated environment engineer responsible for verifying the effects on the environment during construction and the defect liability period, and taking effective measures to mitigate adverse impacts on the environment. Training on environmental management was conducted for project management staff, contractors, and engineers.

5. Environmental and soil erosion control specification clauses were prepared in the contract signed between the implementing agencies and contractors during construction.

[1] ADB. 2002. *Environmental Policy of Asian Development Bank.* Manila.
[2] MOC. 1998. *Environmental Protection of Roads*. Beijing.
[3] *huanpinghan [2009] 102*、*huanpinghan [2009] 492*、*huanpinghan [2009] 526*、*huanpinghan [2009] 538 huanpinghan [2009] 509*

Guidelines were set on acquisition of temporary occupied land, and transportation and storage of waste material. During project preparation, including preliminary preparation and detailed design, the alignment of the project expressway was carefully screened, taking into account the ecological and socioeconomic environment. The engineering design was improved to minimize the environmental impacts, particularly on the protected areas.

C. Environmental Monitoring

6. Daily environmental monitoring activities were conducted by contractors and construction supervision companies on site, and periodic environmental monitoring tasks were conducted by the environment monitoring specialist, who took samples for analysis in accordance with the EMP monitoring procedures and guidelines.

7. During project implementation, the China Shipping Environment Technology (Shanghai) Co, Ltd and the Anhui Highway Construction Supervision Company were engaged by the PMO to verify the environmental impacts of the construction. The noise, air and surface quality were monitored in designated sites according to the EMP in the SEIA, particularly for the construction sites near the three nature reserve zones, such as Tuohu Lake. Six semiannual environmental monitoring report (EMR) of the expressway and nine local roads were reported by the PMO to ADB and uploaded on ADB's website. The EMP was implemented effectively, with the monitoring results showing no significant environmental damage during either project construction or operation. After construction, revegetation of construction sites, reinstatement of pathways, and other similar measures were carried out.

D. Implementation of Mitigation Measures

8. During implementation, environmental monitoring and mitigation measures were carried out in accordance with the EMP. The following measures minimized adverse environmental effects: (i) reusing soil from excavations for embankment filling; (ii) minimizing excavation and potential erosion by optimizing the design of bridge substructures; (iii) applying integrated revegetation and structural methods to recover cutting slopes and embankments; (iv) rehabilitating 61 borrow pits and 10 spoil dumps by using excavated topsoil; and (v) installing wastewater collection and treatment facilities in three service areas to reduce water pollution.

9. At appraisal, it was estimated that the environmental management cost would be CNY335.86 million. According to the approved project environmental completion and acceptance review report, the actual investment for environmental protection was CNY305.90 million (3.58 % of total investment), including slope stabilization, ecological rehabilitation, spoil sites re-vegetation, and soil and water conservation measures.

1. Soil Erosion

10. During construction, the excavated materials were disposed of at 10 disposal sites and 61 refilled borrow pits. Some of the borrow pits and disposal sites were carefully re-assessed reduce the number of sites, thus minimizing land disturbance. Thus the actual number of borrow sites was reduced to 61 from 70. All disposal sites and borrow pits have been restored and rehabilitated using retaining structures, drainage systems, and revegetation. During operation, solid waste production was minor. Cleaners appointed by APDOT are responsible for its collection and disposal per local regulations.

2. Ambient Air Quality

11. During construction, the major air pollution was from dust due to cement mixing and transportation. Mitigation measures were fully implemented as required in the EMP, which included water spraying, covering of transported materials, and good machinery maintenance. During operation, the negative impacts on air quality were very minor and limited to vehicle emissions. Monitoring activities were conducted, in particular at the sensitive points identified in the SEIA such as noisy receptors. The monitoring results for vehicle emissions show that the level of nitrogen dioxide was below the grade II limits of the national ambient air quality standards (GB3095–2012), IV of GB18352-3-2005 and GB17691-2005. No service areas were equipped with a coal-fired boiler. Oil smoke cleaning systems were also used in the kitchens of the service areas.

3. Water Quality

12. During construction, adverse impacts on surface water were limited, caused mainly by siltation and waste from construction sites and workers' camps. All proposed mitigation measures were undertaken appropriately. During operation, roadway runoff was diverted to the drainage system. Wastewater from toll and monitoring stations was collected and treated before discharge. Soil protection works were inspected regularly to ensure the network's good condition and effective functioning. Taking into account the three tap-water intakes, the alignment of the expressway and local roads was adjusted to avoid impacts at the drinking water sources in Chengguan in Wuhe County, Lusi River, and Nenjiang. No construction activities, disposal sites and borrow pits were close to the protected areas. For the bridge cross rivers, runoff collection pipes and water storage tanks were designed and installed.

4. Noise

13. During construction, contractors used low-noise equipment and adopted mitigation measures to reduce noise at the sensitive locations mentioned in the EIA. According to the EIA 36 sites were identified as having potential noise problems during operation due to realignment. To mitigate the impacts, sound abatement barriers (e.g. sound barriers, noise barriers, soundproof windows) were installed at 46 sites. According to the last environmental monitoring results, the measured noise levels at 375 sensitive points were in compliance with the relevant standards, such as class 2 of Standard of Environmental Noise of Urban Areas (GB 3096-2008). As traffic volume increases, APDOT will conduct a further assessment to ensure that appropriate measures will be adopted to mitigate impacts and keep noise at an acceptable level.

5. Ecological Environment

14. The alignment of the expressway and local roads was adjusted to avoid impacts at the three ecologically sensitive protection areas of Tuohu Lake provincial nature reserve, Chaohu Lake scenic area, and Pingding mountain and Majia mountain geological relics in Chaohu. The expressway alignment was selected to avoid crossing the nature reserve, and keep the road at least 50 m from the edge of the nearest experimental zone and 1.7 km from the core zone. No construction activities, disposal sites or borrow sites were located in or close to the protected areas. No effects on natural habitats were observed during project construction and operation. During construction, contractors carried out environmental protection in accordance with environmental protection clauses stipulated in their contracts. All sites temporarily occupied

during construction were restored. Cutting surfaces, subgrades, and embankment slopes were generally stabilized using appropriate vegetative and structural measures, and spoil banks were covered with vegetation to control erosion. All access roads were rehabilitated and handed over to the local government as local roads. Revegetation along the access road was completed before handover. All land was restored or compensated for. All targets for soil and water conservation were met in accordance with national regulations.

E. Environmental Benefits

15. After the expressway commenced operation, the travel distance from Xuzhou to Nanjing was shortened by around 50 km. The estimated fuel savings for the 20-year operating period are 908 million gasoline liters. The estimated carbon dioxide (CO_2) emission reductions for the first 20 years are 5,480 thousand tons. As a result, estimated emissions of CO_2 will be reduced by 96,400 tons carbon equivalent in the first year of operation.

F. Conclusion

16. Some environmental benefits from the project are as follows:
    (i) an improved living environment for inhabitants, a reduction in dust and air pollution resulting in positive effects for public health, and increased road safety;
    (ii) fuel savings for passenger vehicles and trucks resulting from the distance savings;
    (iii) a reduction in CO_2 emissions of a million tons over 20 years resulting from the fuel savings; and
    (iv) the promotion of economic development and poverty reduction, as well as environmental benefits.

17. During construction, all contractors fulfilled their obligations to protect the environment and implement mitigation in their construction schemes. The adverse effects of project construction in the surrounding environment, including rare natural resources, were thus minimized, and impacts on the ecologically sensitive protection areas were avoided. During operation, impacts on the ambient environment were minor, and no complaints were received during project implementation.

18. It is recommended that the PMO and implementing agencies continue to monitor ambient environmental impacts during operation and implement appropriate mitigation measures.

LAND ACQUISITION AND RESETTLEMENT ACTIVITIES

A. Background

1. The Asian Development Bank (ADB) approved resettlement plans for the expressway component and three local roads, namely S312, S105, and X056, during project preparation in 2009. All these resettlement plans were updated on the basis of detailed designs and submitted to ADB for concurrence in 2010. According to the updated resettlement plan for the expressway, 10,655 *mu* (710.3 hectares [ha]) of land would be acquired permanently under the project and 38,561 people would be affected by permanent land acquisition.[1] A total of 71,644 square meters (m^2) of houses or buildings would be demolished, causing the relocation of 532 households with 2,011 people. In addition, the project would acquire 9,299 *mu* of temporarily borrowed land for construction purposes. The resettlement cost estimate of CNY681.12 million was included in the expressway project costs.

B. Scope of Land Acquisition and Resettlement

2. According to the resettlement completion report, the expressway project permanently acquired 11,035 *mu* (735.6 ha) of land, 3.6% more than that stated in the updated resettlement plan. A total of 71,617 m^2 of buildings were demolished, slightly less than estimated. A total of 10,114 households or 38,444 people were affected by land acquisition and 495 households or 1,865 people were affected by house demolition, which was similar to the figures in the updated resettlement plan. Table A11.1 presents the actual project impacts versus those estimated in the updated resettlement plan. The changes in resettlement impacts during implementation were reported in the monitoring reports.

Table A11.1: Land Acquisition and Resettlement Impacts of the Expressway Project

Item	Unit	Impacts		Variation	
		Updated RP	Actual	Quantity	Percentage
A. Permanent Land Acquisition	mu	10,655	11,035	380	3.6%
B. Temporary Land Use	mu	9,299	10,135	837	9.0%
C. Building Demolition	m^2	71,644	71,617	-28	0.1%
D. Population Affected					
D1. By land acquisition	HH	10,148	10,114	-34	-0.3%
	Person	38,561	38,444	-117	-0.3%
D2. By building demolition	HH	532	495	-37	-7.0%
	Person	2,011	1,865	-146	-7.3%

HH = households, m^2 = square meter, *mu* = 666.67 m^2, RP = resettlement plan
Sources: Updated resettlement plan and resettlement completion report for expressway.

3. For the local roads component, land acquisition and resettlement were as follows (Table A11.2):

(i) **S312.** Land acquisition and house demolition commenced in April 2011 and was almost completed in 2012. A total of 270 *mu* was permanently acquired, and 267 households were relocated. Compared with the updated resettlement plan, the amount of land acquired decreased by 203 *mu* due to optimized alignment and use of Right of Way of original road in some sections;

(ii) **S105.** Land acquisition and house demolition commenced in June 2010 and was

[1] A *mu* is a Chinese unit of measurement (1 *mu* = 666.67 m^2).

completed in 2014. A total of 1788.49 *mu* was permanently acquired, and 783 households were relocated. Compared with the updated resettlement plan, the amount of land acquired increased by 501 *mu* due to incremental land use for widening the road subgrade, three resettlement sites, and realignment in some sections; and

(iii) **X056.** Land acquisition and house demolition commenced in 2011 and was completed in 2015. A total of 533.06 *mu* was permanently acquired, and 134 households were relocated. The actual amount of land acquisition is similar to that stated in the updated resettlement plan.

Table A11.2: Land Acquisition and Resettlement Impacts of Local Roads Component

Item	Unit	S312	S105	X056	Total
A. Permanent Land Acquisition	mu	270.0	1788.49	533.06	2591.5
B. Temporary Land Use	mu	157.0	394.3	382.0	933.3
C. Building Demolition	m^2	98,000.0	99,069.96	9,203.16	206,273.1
D. Affected Population					
D1. By land acquisition	HH	828	1,408	1,091	3,327
	Person	3,407	5,224	3,813	12,444
D2. By building demolition	HH	267	783	134	1,184
	Person	1,206	2,344	494	4,044

HH = household, m^2 = square meter, *mu* = 666.67 m^2.
Sources: Resettlement completion report for local roads.

C. Resettlement Policy and Compensation Rates

4. Land acquisition and resettlement were implemented based on the Land Administration Law (2004) of the People's Republic of China (PRC), ADB's Involuntary Resettlement Policy (1995), the Implementation Measures for the Land Administration Law of the PRC in Anhui Province (2004), and the following government rules, regulations, and circulars: (i) circular no. 155 for compensation standards of houses, ground attachment, and young crops due to acquisition of collective land, issued by Chuzhou municipal government in 2010; (ii) circular no. 222 for compensation standards of houses, ground attachment, and young crops, issued by Shuzhou municipal government in 2010; (iii) circular no. 162 for approval on compensation standards of houses, ground attachment, and young crops in Wuhe county section of Xuming expressway, issued by Benbu municipal government in 2010, and (iv) circular no.31 issued by Lingbi county government in 2010, circular no. 32 by Mingguang county government in 2010, and circular no. 2 by Sixian county government in 2011.

5. The actual compensation rates for land acquisition and house demolition under the project expressway are compared with the updated resettlement plan in Table A11.3 and Table A11.4. The implemented compensation rates were similar to those in the updated resettlement plan. The external resettlement reports on local roads also indicated that the actual compensation rates were the same as those in the updated resettlement plans for S105, S312, and X056. The compensation for each affected house was determined by a professional asset valuation agency and agreed with the affected household through a signed agreement. The house compensation rates in Table A11.4 served as a benchmark for the valuation.

Table A11.3: Compensation Rates for Permanent Land Acquisition
(CNY/*mu*)

Item	Updated RP	Actual
A. Permanent Land Acquisition		
Farmland	28,000—33,360	28,000—33,360
Housing Plots or Undeveloped Land	13,600—16,280	13,600—16,280
B. Compensation for Temporary Land Use		
Farmland	12,000	12,000
Non-farmland	4,000	4,000
B. Young Crop Compensation		
Farmland	600—850	600—850

mu = 666.67 m^2,
Sources: Updated resettlement plan and resettlement monitoring reports for expressway.

Table A11.4: Compensation Rates for House Demolition

Item	Unit	Updated RP	Actual
A. House/Building Compensation			
Multi-storied house (masonry concrete)	CNY/m^2	580—750	580—790
Brick and tile single-storied house	CNY/m^2	450—650	450—650
Brick and thatch single-storied house	CNY/m^2	450—530	450—530
Semi-brick-tile single-storied house	CNY/m^2	440—530	440—530
Earth wall tile roof single-storied house	CNY/m^2	350—450	350—450
Earth wall thatch roof single-storied house	CNY/m^2	280—450	280—450
Simple single-storied house	CNY/m^2	180—380	160—380
B. Relocation Subsidy	CNY/m^2	3	3—4 or CNY500/person
C. Living allowance for transition period	CNY/m^2/ month	3	3—6 or CNY400/month

m^2 = square meter.
Sources: Updated resettlement plan and resettlement monitoring reports for the expressway.

D. Resettlement and Income Restoration

6. According to village representatives' meetings, the affected households were provided with cash compensation for land loss and utilized the land compensation fund to participate in income generation programs. The programs that they could choose included housekeeping, maternity nursing, food and beverage services, cooking, shoemaking, aquatic product processing, food processing, sewing, fish breeding, and property management. However, the affected households normally invested the compensation fund in modern agriculture development, such as planting high-yield wheat and bean, grapes, and vegetables. Many young people worked in booming small and medium-size enterprises along the expressway. In addition, a land leasing program enabled some affected people to lease out their land for annual rent and at the same time they could work in agricultural enterprises. According to external resettlement monitoring and evaluation reports, the percentage of affected households with an annual income of more than CNY28,000 increased to 32% in 2016 as compared with 0% in 2010. Table A11.5 provides the details.

Table A11.5: Income Restoration of Affected Sample Households

Household income(CNY/year)	2010		2011		2012		2013		2014		2015		2016	
	HHs	%)	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
＜15,000	9	24%	12	32%	0	0%	0	0%	0	0%	0	0%	0	0%
15,000-20,000	8	21%	7	18%	15	39%	8	21%	5	13%	2	5%	2	5%
20,000-25,000	12	32%	15	39%	5	13%	12	32%	17	45%	9	24%	13	34%
25,000-28,000	9	24%	4	11%	9	24%	10	26%	9	24%	17	45%	11	29%
>=28,000	0	0%	0	0%	9	24%	8	21%	7	18%	10	26%	12	32%
Total	38	100%	38	100%	38	100%	38	100%	38	100%	38	100%	38	100%
Average		20,701		20,316		22,152		23,382		24,037		25,549		26,265

Source: resettlement monitoring completion report for expressway.

7. A total of 1,679 households or 5,909 persons were relocated due to house demolition. Of these, 507 households were resettled in concentrated resettlement sites, while other 1,172 households were relocated to new houses close to their original homes. The households relocated to resettlement sites received full compensation for buildings and attached properties from the resettlement offices under the local government. The affected households relocated individually were provided with a housing plot (220 m2) on which to build. The local government took various measures to help vulnerable groups construct their new houses, including cash subsidies, additional allowances, and providing new houses. In addition, a new technology was used by some affected households to simply relocate their original houses to a new location without demolition and rebuilding. The affected households were satisfied with the house compensation policy as well as their new houses. Table A11.6 provides detailed information for each concentrated resettlement site.

Table A11.6: Concentrated Resettlement Sites

Province	County/District	Concentrated Resettlement Sites			
		Location	Affected households	Resettled households	Date of Completion
Expressway	Wuhe	Toupu	66	66	2014.01
	Lingbi	Chaoyang	28	28	2014.01
	Lingbi	Gaolou	2	2	2014.12
	Mingguang	Qiaotou	16	16	2014.01
	Sixian	Dinghu	7	7	2014.01
	Sixian	Chaogou	6	6	2014.12
S312	Tianchang	Zhanggu	17	17	2011.11
	Tianchang	Zhanggou	14	14	2011.11
S105	Feidong	Cuozheng	102	102	2014.01
	Feidong	Qiaotouji	68	68	2014.07
	Chaohu	Zhonghanjianhua	16	16	2012.06
	Chaohu	Zhonghanhengda	10	10	2012.06
	Chaohu	Juchao	155	155	2012.06
Total			**507**	**507**	

Source: resettlement monitoring completion report.

E. Land Acquisition and Resettlement Cost

8. The total actual disbursed costs for land acquisition, building relocation, and affected facilities for the expressway was CNY821.32 million, which was 20.6% more than the

CNY681.12 million in the updated resettlement plan. The increased resettlement cost was mainly due to higher compensation for temporary land use for soil-borrow areas, increased compensation for rural houses based on asset valuation, and incremental land acquisition taxes (Table A11.7).

Table A11.7: Land Acquisition and Resettlement Cost for Expressway
(CNY million)

No.	Item	Updated RP	Actual
1	Collective land	312.90	380.07
2	Forest land	-	8.62
3	Temporarily occupied land	125.73	177.11
4	Rural residential houses	44.62	74.04
5	Infrastructure and ground annexes	30.87	38.32
6	Land acquisition management fee	12.55	2.45
7	Surveying, design and research expenses	13.98	2.09
8	Administrative expenses	23.29	15.53
9	Technical training expenses	4.66	0.49
10	External monitoring & evaluation expenses	2.33	0.45
11	Subsidy for vulnerable groups	1.40	55.37
12	Cultural relic protection	-	4.79
13	Contingency expenses	57.61	0.00
14	Land acquisition taxes	51.18	62.00
	Total cost	**681.12**	**821.32**

Source: resettlement monitoring completion report.

F. Information Disclosure, Consultation, and Participation

9. Resettlement management offices of project-affected counties along the expressway alignment made public announcements about the resettlement policies, as well as land acquisition and relocation, before land acquisition and resettlement started. Based on the information disclosure, consultations on land acquisition, house demolition, compensation, relocation, and rehabilitation were widely conducted with the affected communities and people, and participation was high. The executing agency and implementing agency worked closely with the county resettlement management offices, township governments, as well as village communities, and organized many open consultative meetings to make sure the voices and opinions from affected communities and people were heard.

10. A complaint handling mechanism was established under the project. Project affected people could appeal to local officials, contractors, or resettlement management offices when they encountered any problems. In this way, some resettlement issues during project implementation were identified and resolved in a timely manner, such as water leaks in Toupu resettlement site, and power supply in Gaozhai village of Lingbi County. The resettlement monitoring reports indicated that the resettlement related issues raised by affected people were resolved during project implementation.

G. Monitoring and Evaluation

11. Anhui Jiaotong Vocational College was engaged for external monitoring and evaluation (M&E) of land acquisition and resettlement implementation. The external resettlement M&E for

the expressway and local roads was conducted regularly. For the expressway, ADB received five resettlement M&E reports from 2011 to 2014 and a resettlement monitoring completion report in 2017. For the local roads component, ADB received four resettlement M&E reports from 2012 to 2016 and a resettlement monitoring completion report in 2017. The external monitoring reports indicated that adequate municipal services were being provided in concentrated resettlement sites and the income restoration had been well achieved in those affected villages.

H. Lessons

12. The lessons learned from the resettlement implementation include the following:

(i) The strong capacity of the local resettlement management office and the presence of experienced staff were essential for smooth implementation of land acquisition and resettlement.

(ii) The fair compensation policy and effective delivery of the compensation fund were implemented in a transparent manner.

(iii) The provincial PMO paid close attention to the preparation and implementation of land acquisition and resettlement, and completed the timely recruitment of a company with the necessary experience in external resettlement M&E.

SOCIAL IMPACT AND POVERTY REDUCTION IN THE PROJECT AREA

A. Introduction

1. The social impact and poverty reduction analysis conducted during project preparation indicated that the project would significantly help local people and governments overcome the existing transport limitations and improve transport services and road safety. Consequently, it would directly and indirectly contribute to poverty reduction. The highway sections crossing the township centers along the poverty roads would be properly designed with safety and other necessary facilities to enable better and safer operations of local markets. A social development action plan (SDAP) including complementary poverty reduction measures was formulated and implemented to enhance the project benefits to local communities and people in the project area.

B. Socioeconomic Growth in the Project Area

2. The project construction contributed to regional socioeconomic development in the project area. Expressway project investments of CNY6.27 billion within 4 years from April 2011 to November 2014 contributed to local economic development, particularly in construction materials, suppliers, as well as the services sector. The statistical data shows that socioeconomic conditions in the project area have improved rapidly in recent years. From 2007 (baseline) to 2015, the average annual growth rates of gross domestic product in the project area reached 13.2% (Table A12.1).

Table A12.1: Gross Domestic Product Growth in the Project Area
(CNY billion)

County	2007	2008	2009	2010	2013	2014	2015	Growth	Annual
Sixian	5.69	6.85	7.35	8.78	13.00	14.58	15.80	178%	13.6%
Lingbi	6.58	7.16	7.86	8.94	13.80	15.75	17.24	162%	12.8%
Wuhe	6.06	6.83	7.79	8.94	12.44	14.11	16.26	168%	13.1%
Total	**18.33**	**20.84**	**23.00**	**26.66**	**39.24**	**44.44**	**49.30**	**169%**	**13.2%**

Source: The PPMS Report, 2017.

C. Increased Rural Income

3. According to the statistics of the county governments, the annual growth of farmers' per capita incomes ranged from 13.9% to 15.7% in the project area from 2007 to 2015 (Table A12.2).

Table A12.2: Rural Per Capita Income in Project Area
(CNY/person)

County	2007	2008	2009	2010	2014	2015	Growth	Annual
Sixian	3,085	3,780	4,145	4,715	7,949	8,752	184%	13.9%
Lingbi	2,950	3,650	4,001	4,576	8,399	9,191	212%	15.3%
Wuhe	3,616	4,299	4,727	5,565	10,659	11,594	221%	15.7%

Source: The PPMS Report, 2017.

D. Poverty Reduction Achievement

4. Although the PRC government has sharply increased the poverty line from CNY1,274/year/person to CNY2,300/year/person since 2011, the poverty population in the project area has declined by 42% between 2006 and 2015 (Table A12.3). Compared with the poverty population and poverty incidence from 2006 to 2010, the poverty population and poverty incidence from 2011 to 2015 experienced a more rapid decline (Tables A12.4-A12.7).

Table A12.3: Poverty Population in Project Area
(2006-2015)

County	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Decline
Sixian	79,618	76,291	67,943	64,775	62,153	128,900	109,200	100,000	65,400	51,061	-36%
Lingbi	88,376	85,132	80,512	78,420	75,303	187,400	143,800	123,000	78,111	61,854	-30%
Wuhe	68,132	65,363	62,108	59,326	55,371	64,600	56,100	49,000	34,900	24,736	-64%
Total	**236,126**	**226,786**	**210,563**	**202,521**	**192,827**	**380,900**	**309,100**	**272,000**	**178,411**	**137,651**	**-42%**

Note: the national poverty line been increased from CNY 1,274/year/person to CNY2,300/year/person since 2011.
Source: The PPMS Report, 2017.

Table A12.4: Poverty Population in Project Area
(2006-2010)

County	2006	2007	2008	2009	2010	Decline	Annual
Sixian	79,618	76,291	67,943	64,775	62,153	-22%	-6.0%
Lingbi	88,376	85,132	80,512	78,420	75,303	-15%	-3.9%
Wuhe	68,132	65,363	62,108	59,326	55,371	-19%	-5.1%
Total	**236,126**	**226,786**	**210,563**	**202,521**	**192,827**	**-18%**	**-4.9%**

Source: The PPMS Report, 2017.

Table A12.5: Poverty Population in Project Area
(2011-2015)

County	2011	2012	2013	2014	2015	Decline	Annual
Sixian	128,900	109,200	100,000	65,400	51,061	-60%	-20.7%
Lingbi	187,400	143,800	123,000	78,111	61,854	-67%	-24.2%
Wuhe	64,600	56,100	49,000	34,900	24,736	-62%	-21.3%
Total	**380,900**	**309,100**	**272,000**	**178,411**	**137,651**	**-64%**	**-22.5%**

Source: The PPMS Report, 2017.

Table A12.6: Poverty Incidence in Project Area
(2006-2010)

County	2006	2007	2008	2009	2010	Decline
Sixian	6.15%	5.93%	5.68%	5.51%	5.45%	-0.70%
Lingbi	9.56%	9.13%	8.83%	8.60%	8.17%	-1.39%
Wuhe	6.81%	6.75%	6.62%	6.41%	6.03%	-0.78%

Source: The PPMS Report, 2017.

Table A12.7: Poverty Incidence in Project Area
(2011-2015)

County	2011	2012	2013	2014	2015	Decline
Sixian	15.10%	12.80%	12.60%	8.30%	6.54%	-8.56%
Lingbi	17.10%	12.80%	11.20%	7.10%	5.44%	-11.66%
Wuhe	9.70%	8.30%	7.30%	5.80%	4.05%	-5.65%

Source: The PPMS Report, 2017.

E. Job Creation

5. Local employment was promoted by the project management office during project construction. According to the project performance management system (PPMS) report, each bidding section recruited around 500 workers during construction, with only 26% of jobs going to local laborers, given their limited skills in road construction. After the expressway opened to traffic, many unskilled jobs including toll collectors, logistical personnel, and safety assistants were provided to local laborers. A total of 284 local laborers were recruited to work for the expressway once it was in operation, with 45% of jobs going to women.

6. Accommodation and food supply for contractors and workers provided additional income for local residents. The PPMS report indicates that 638 local houses were rented during construction, and 24% of workers' expenditures such as food and daily necessities went to local markets, which accordingly created temporary jobs and increased local income.

7. Procurement of construction materials such as stone and sand from local suppliers, as well as local transportation services, also brought temporary jobs for local communities. The PPMS report shows that 528,000 tons of gravel, 321,200 tons of stone, and 167,200 tons of yellow sand were procured from local suppliers. The expressway greening component also used a large amount of local plant species. In addition, many villagers along the road alignment were engaged in transportation of construction materials. Huaming village, one of the affected villages due to project land acquisition, had more than 10 trucks, and used them for construction of the expressway, thereby increasing the income of local villagers.

F. Travel Time-Savings and Mobility Improvement

8. The improved transport service saved travel time and improved the mobility of the local people. The PPMS report indicates that the average travel time from Xuzhou to Mingguang declined by 45% from 192 minutes in 2006 to 105 minutes in 2015 (Table A12.8). Accordingly, the average car speed increased by 83% after the opening of the expressway. For the local roads component, the average travel time declined by 35% on S105 (from 51 minutes in 2010 to 33 minutes in 2015), and by 25% on S312.

Table A12.8: Time Savings and Speed Improvement

Year		2006	2007	2008	2009	2010	2014	2015	variation	percentage
Time	minutes	192	198	204	210	210	230	105	-87	-45%
Speed	kilometer/hour	64	64	62	60	60	54	117	53	83%

Source: The PPMS Report, 2017.

9. Implementation of the rural transport services component supported the provision of sustainable, safe, reliable, adequate, and affordable public transport services in rural areas. Currently, 15 buses belonging to the county transport company provide services between Ducun town and downtown Qingyang county, and the bus frequency has increased from twice a

day in 2010 to 42 trips a day in 2014. Local residents living in the 8 villages have found that the bus service is a more convenient means of transportation compared to other modes of transportation before the project.

G. Complementary Poverty Reduction Measures

10. Implementation of several SDAP complementary poverty reduction measures benefited the poor in the project area:

(i) The subsidy for the construction of biogas digesters for affected farmer households and poor households was increased from CNY500 per household to CNY700 or CNY900. The PPMS report noted that 17 households have constructed biogas digesters in Huaming village.

(ii) Local governments provided a subsidy for farmers to purchase agricultural implements. A total of 700 rural households in Sixian county received subsidies of CNY10.6 million in 2011.

(iii) Implementation of the “Rain and Dew” program benefited more than 2,200 local people for each phase, and improved their skills in mushroom planting, freshwater aquaculture, housekeeping, and agricultural machinery driving and repairing.

(iv) The project construction headquarters set up a school for migrant laborers to provide training in technical skills, safety, and laws and regulations. A total of 9,500 person-times were trained by the school.

(v) The Anhui provincial government (APG) initiated a province-wide program to accredit poverty reduction working groups in 3,000 poverty villages in 20 poverty counties, including three counties in the project area.

(vi) APG established medical and social insurance for poor people. In 2014, CNY51.3 million was used to secure the minimum living standards of poor people in Wuhe county.

H. Gender Development

11. Construction and operation of the expressway and local roads promoted gender development in the project area. During project construction, 1,300 women worked on road construction, accounting for 10% of total laborers. They were mainly engaged in logistics, office work, and reinforced banding. Female employees enjoyed wages equivalent to those of male employees for similar jobs. Other women indirectly worked for the project by supplying food and vegetables to contractors and workers, which also increased the income of local women. During expressway operation, 128 permanent jobs were provided to women, accounting for 45% of total permanent jobs. A total of 1,200 rural women worked on the local roads component, including road maintenance, cleaning, and planting trees. The expressway also facilitated external investment, and an increasing number of girls and women worked in tourism and in the enterprises that had been established nearby. The improvement in traffic connections also enabled women to be engaged as migrant laborers to work outside the region, which increased their income.

12. Vocational training and micro financing was provided for women by local governments along the expressway. Interviews with local agriculture bureaus and women federations indicate that local governments organized a series of training workshops, including housekeeping, maternity nursing, food and beverage services, cooking, shoemaking, aquatic product processing, food processing, sewing, fish breeding, and property management. In 2011, Wuhe county conducted 35 skills training courses, with 3,800 women participating and receiving certificates. After expressway completion in 2015, Wuhe county women's federation also conducted 28 training courses on rural financial support policies, agriculture skills, management of rural professional corporations, and rural markets, with 2,960 rural women participating. Some women became leaders in various fields or female village heads. In addition, local governments also provided micro financing support for women. Tianchang county government along S312 provided around CNY2 million in micro loans for 40 rural women to engage in toys production, electronics (e.g., LED), and animal husbandry. Chaohu city along S105 provided CNY1 million for 30 women to work in agricultural product processing, animal husbandry, sales, and food and beverage services. Those measures greatly increased the income and livelihoods for local women and accordingly improved their economic status in the family.

I. Monitoring and Evaluation

13. Hohai University was engaged as the external agency to prepare PPMS reports and monitor the implementation of the SDAP. The external monitor prepared and submitted three PPMS reports to ADB in 2010, 2013, and 2017. Those reports concluded that the construction and operation of the expressway had contributed to regional socioeconomic development, poverty reduction, gender development, as well as ethnic minority development.

J. Conclusions

14. The project had a positive impact on regional socioeconomic development and poverty reduction, including (i) contribution to the growth of gross domestic product, increased rural income, and poverty reduction in project area, (ii) direct and indirect job creation during the construction and operation of the expressway and local roads, (iii) reduced travel time and improved mobility of local people, and (iv) improved gender development through direct recruitment of female laborers, vocational training, and micro-financing.