The People's Republic of China

Liangping-Changshou Highway Construction Project

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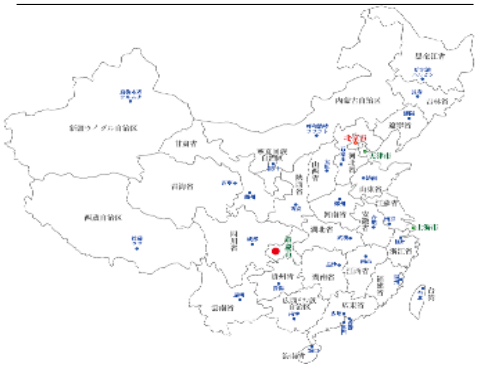
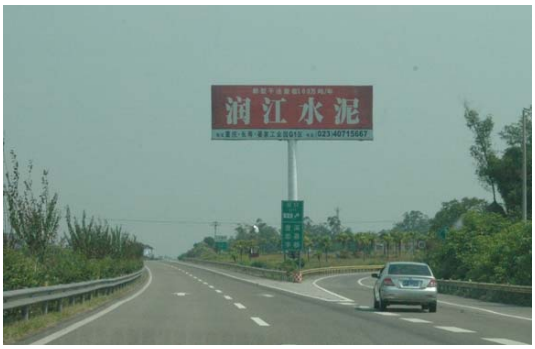
Site investigations: August 2007, March 2008

1. Project Summary and Cooperation Through Japanese ODA Loans



Project region location map



Liangping-Changshou Highway
Near the Runjiang Interchange

1.1 Background:

Located in southwest China on the upper reaches of the Yangtze River, Chongqing Municipality is a centrally-administered municipality with a population of 30 million people. Covering 82,400 square kilometers, or an area equivalent to about one-fifth of Japan, the city lies adjacent to Hubei Province, Hunan Province, Guizhou Province, Sichuan Province and Shaanxi Province. Transportation is centered on water transport along the Yangtze, which is served by dozens of ports and traveler and freight wharves, and interline transport from Chongqing to other countries is possible by way of Shanghai. Moreover, with completion of the Three Gorges Dam, 10,000-ton class ships can sail directly to Chongqing year-round. Chongqing is served by main rail trunk lines (Chengdu – Chongqing, Changsha – Chongqing, Chengdu – Guizhou) and five branch lines, as well as an international airport.

At the Fifth Session of the Eighth National People's Congress in March 1997, Chongqing was elevated to the status of China's fourth directly-administered city after Beijing, Shanghai and Tianjin. Since then, China has utilized favorable policies similar to those for the Pudong District in Shanghai to aggressively attract investment by foreign firms, using this as a driving force to promote Chongqing as a model district showcasing China's policy of reform and liberalization for growth and development. There is a long

list of development projects stretching across the entire metropolitan area for this purpose, including infrastructure construction projects centered on roads, resource development projects including coal and natural gas, agricultural development projects aimed at exports to earn foreign currency, improvements to quality in the existing machinery, metallurgy, electronics, instruments, chemicals, foods, beverages and construction materials industries, market expansion projects, and tourism resources development projects. Chongqing also has aggressively rolled out favorable tax treatment and other measures to attract foreign capital. Consequently there are broad expectations that Chongqing Municipality will become the center of development for China's inland regions, and the government has executed various measures in this regard.

1.2 Objective

The objective of this project is to improve the efficiency of transportation among Chongqing Municipality and neighboring cities by constructing an expressway between Changshou and Liangping in Chongqing Municipality (about 110 km), and contribute to the economic development of the regions along the expressway route.

1.3 Borrower/Implementing Entity

Government of the People's Republic of China /The Ministry of Transportation of the People's Republic of China

1.4 Loan Agreement Summary

Table 1 Outline of the ODA Loan Agreement

Yen Loan approval amount/Execution amount	24,000 million yen/19,293 million yen
Conclusion of official document exchange /Signing of Loan Agreement	March 2000/March 2000
Loan Agreement terms	Construction: Interest rate 2.2%, Repayment period: 30 years (Interest-only 10 years), general untied loan Consulting services: Interest rate 0.75%, Repayment period: 40 years (Interest-only 10 years), bilateral tied loan
Completion of loan advances	October 2005

Construction Agreements (For amounts of one billion yen or more only)	SHANGHAI JINGTONG HIGHWAY AND BRIDGE CONSTRUCTION COMPANY (China), others (6 companies)
Consultant Agreements (For amounts of one billion yen or more only)	HALCROW CHINA LTD. (China), Katahira & Engineers International (Japan) (JV)
Feasibility study (F/S) etc.	1998 – Ministry of Communication, Second Highway Survey and Design Institute

2. Evaluation Results (Rating: A)

2.1 Appropriateness (Rating: a)

2.1.1 Appropriateness of the Project at Time of Appraisal

This project is for construction of an expressway forming part of the highway between "Shanghai-Chengdu", one of the "two north-south and two east-west highways" that have especially high priority in the "five north-south and seven east-west highways" construction plan for an expressway network for the purpose of promoting economic development of the interior under China's Ninth Five-Year Plan (1994-1999). At completion, this project would connect with the "Wanxian-Changshou" section of the highway, which was a project in FY1998, and was expected to significantly shorten transportation time from Wanxian and Changshou to Chongqing and the surrounding region by re-routing traffic from routes that until then relied on mountain roads. This was expected to have a positive effect on the environment by increasing transportation efficiency and reducing fuel waste in the region, and improve the investment environment, therefore contribute to the economic development of not only Chongqing but also regions along the highway.

2.1.2 Appropriateness of Plan at Time of Evaluation

In its Tenth Five-Year Plan (2000-2005), the Chinese government cited expansion of the economic network, promotion of structural reforms and construction of an uncongested, safe, convenient and comprehensive and modern transportation system as critical issues. In particular, the plan called for making Chongqing the economic center of the upper reaches of the Yangtze River and China's southwestern region, and increasing the gross product of all cities in the region to four times the 1995 level by 2010, by developing the upper reaches of the Yangtze as a new industrial region based on this key role. As a result, the Plan set the objectives of raising the integrated economic capabilities of Chongqing Municipality to the upper tier amongst all Chinese provinces and cities, and improving the economic and cultural levels of rural towns and villages in the surrounding region.

On the other hand after the city's status was elevated to directly-administered city, the Chongqing City Council drafted the "Chongqing Eight-hour Plan" in August 2000 to enable travel from any region of China to Chongqing Municipality in 8 hours. Based on this plan achievement of economic balance between Chongqing Municipality and other parts of the region became more urgent.

This project fulfills a key role in the achievement of the above mentioned plans. Thus, implementation of this project was consistent with the Nation Plan and other development

plans both at the time of appraisal and ex-post evaluation, and the appropriateness of the project is evaluated to be extremely high.

2.2 Efficiency (Rating: a)

2.2.1 Output

This project covered approximately 110km of highway construction between Changshou and Liangping in Chongqing Municipality, but was extended a total distance of 4km because of ground conditions. Other than this exception, however, work was implemented according to the planned schedule. Service stations were established at 50km intervals, and equipped with rest facilities for drivers. Highway surveillance is provided by 80 patrol officers.

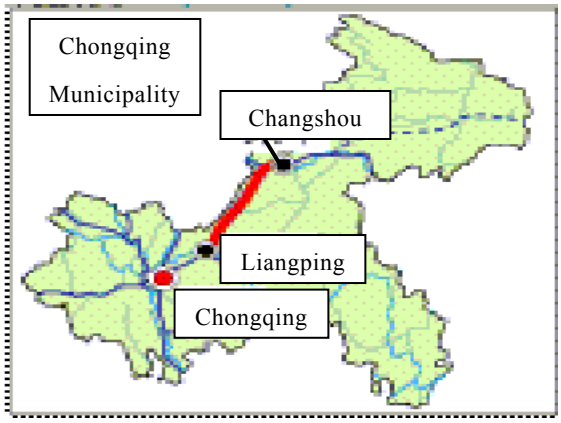


Table 2 Planned and Results for Project Items

Item	Plan	Result
Expressway (Changshou-Liangping)	110 km	114 km
Lanes	Four lanes for the entire length	As planned
Bridges	Approximately 60	56
Interchanges	6	As planned
Service stations	1	As planned
Maintenance vehicles	1	As planned
Consulting service	80 M/M	As planned

2.2.2 Project Period

2.2.2.1 Project period at time of appraisal and actual results

Table 3 Project plan period and actual results

Planned	Actual
March 2000 – September 2004 (4 years and 6 months)	March 2000 – December 2003 (3 years, 9 months) (period reduced by about 9 months (83% compared with plan))

Note: Definition of project completion: Day when opened to traffic

Although application of the plan period for this project was submitted and authorized in accordance with Chinese government provisions, the construction techniques were revised in response to the "Chonqing Eight-hour Plan" approved by the Chongqing City Council. Due to the implementation of the Eight-hour Plan, construction of transportation infrastructure to allow travel from any city in the region to Chongqing within 8 hours became top priority. This highway project was part of this plan, and high priority was given to complete construction urgently.

Consequently, attention was given to the SMA road paving method, which provides long-life and strong resistance to wear. This method was introduced in China for the first time. In addition to the pavement, the road slope surfaces were also changed from concrete wall surfaces set perpendicular to the road surface to gently-graded green wall surfaces. This was a new technology introduced because it was easier than the original plan. Therefore although the start of construction was postponed by the delay in the initial central government authorization, the construction period was shortened considerably by the introduction of such simplified construction techniques. The ease of excavation and tunnel works as well as the ease of procurement of materials (domestically or from nearby countries) also added to the reduction of project period.

As a result, the actual construction period was shortened by nine months and reduced substantially to about 83% of the plan.

2.2.3 Project Cost

2.2.3.1 Planned project cost and actual results

As shown in the table below, the project cost was reduced substantially. The main reasons were the following changes: (1) Ability to obtain aggregate and stone powder materials to add to the asphalt at a low price as a result of converting to SMA pavement construction; (2) Sharply reduced costs because the road slope was changed from perpendicular concrete wall surfaces to gentle gradient green wall surfaces; (3) Fewer

land acquisitions, building demolitions and evictions than planned; (4) Simpler civil engineering works than planned; (5) Lower equipment purchase expenses than planned; (6) Greatly lowered maintenance cost because of significantly shortened construction period; (7) Reduced purchase expenditures because of measures such as accelerating works to complete construction by December 2003 and use of domestic bidding.

Table 4 Planned project cost and actual results

Plan	Results (About 82% of plan)
Total: 46,980 million yen	Total: 38,771 million yen
Foreign currency: 24,000 million yen	Foreign currency: 19,293 million yen

(1 yuan =15 yen)

As indicated above, the project period and project cost were shortened and reduced compared to the original plan. Therefore the project was implemented efficiently.

2.3 Effectiveness (Rating: b)

2.3.1 Average Daily Traffic Volume by Year

Regarding traffic volume there was substantial divergence as of 2005 between the actual results and the plan. During the study, it was clarified that the values set as the planned traffic volume was calculated in the following way: mid-size vehicles were converted to 1.5 compact vehicle units and full-size vehicles were converted to 2.0 compact vehicle units.

In a fixed-point study conducted by the external evaluator in October 2007, traffic volume was 8,320 units/day (11,648 units/day based on the compact vehicle conversion ratio above), a level substantially below the originally planned value. (The planned value was calculated by adding 7% of the traffic volume as the estimated annual rate of increase in traffic volume). The largest factor affecting the actual result was that adjacent highway was still incomplete at the time of evaluation.

Table 5 Chongqing Municipality highway (Changshou - Liangping): Projected traffic volume (unit: Number of compact car equivalents/day)

2004	2005	2010	2015	2020
14,178	15,346	22,798	31,058	39,196

Source: Chongqing Expressway Co., Ltd.

Table 6 Actual traffic volume (Vehicles/day)

	2004	2005	2006	2007 (October)
Expressway (Changshou-Liangping)	4,155 (5,817)	4,055 (5,679)	4,213 (5,900)	8,320 (11,648)
Existing roads (Dianjiang-Liangping)	1,410 (1,974)	1,806 (2,529)	1,745 (2,449)	—

Note: The survey was conducted in Liangping; traffic volume survey results are for the expressway to Changshou and existing roads to Dianjiang.

Note: Figures in parentheses () are the number of compact car equivalents

Source: Chongqing Expressway Co., Ltd.

2.3.2 Number of Days of Closing

There have been no notable road closures so far at the time of evaluation. Although the expressway is closed to traffic occasionally for 2 or 3 hours in the early morning because of heavy snow or fog, until now there have not been any all-day closures.

The main reason for closures of existing roads has been restoration work.

Table 7 Number of closure days (Unit: Days)

	Section	2004	2005	2006
Expressway	Changshou-Dianjiang	0	0	0
	Dianjiang-Liangping	0	0	0
Existing roads	Changshou-Dianjiang	0.5	0.65	3.25
	Dianjiang-Liangping	1	0.33	4.29

Source: Chongqing Expressway Co., Ltd.

2.3.3 Travel Time

The travel time between the major cities along the highway are as below. Travel time was reduced by 50-60 minutes in each section, a reduction of 60% (107 minutes) as a whole.

Table 8 Travel times (Unit: Minutes)

Section	Before project (existing roads)	After project (expressway)
Changshou-Dianjiang	90 minutes	30 minutes
Dianjiang-Liangping	87 minutes	40 minutes

Source: Chongqing Expressway Co., Ltd.

2.3.4 Internal Rate of Return

At the time of appraisal, the FIRR was calculated to be 12.5% and the EIRR 10.8%. This assumes the projected traffic volume after completion of the whole expressway. For the calculation, the different car sizes (compact, mid-size, full-size and bus vehicle) traffic volumes, compact vehicles were set as the standard "1", and the volume of mid-sized vehicles as 1.5 and full-sized vehicles as 2.0, based on academic concepts of economics of transportation.

To make the same compact vehicle conversion as used at the time of appraisal, based on the data obtained from the October 2007 survey, we assumed "mid-sized = compact cargo" and "full-sized = full-sized cargo and bus" and the traffic volume breakdown by type of vehicle as 50% compact vehicles, 20% mid-sized cargo and 30% full-size cargo and bus. We then calculated the compact vehicle-equivalent traffic volume by assuming the compact vehicle conversion coefficient for compact cargo to be 1.5 units and the coefficient for full-size freight and buses to be 2.0 units. The FIRR result calculated after determining projected earnings by applying an average vehicle toll of 50 yuan per compact car unit and average corporation tax rate of 30% for 30 years to these figures was 12.2%.

The EIRR could not be calculated. The reason is that although total transit times are clearly understood to have been shortened by about 50-60 minutes, the entire expressway has not been completed.

Column 1 **The Great Sichuan Earthquake and Role of the Liangping-Changshou Highway**

The damage suffered in Changshou Prefecture from the Great Sichuan Earthquake that occurred on May 12, 2008 was especially heavy; the collapse of an elementary school in Wenhua resulted in 40 children being buried alive, four of whom died. The Chongqing-Liangping and Liangping-Changshou expressways suffered little damage from the earthquake and demonstrated their role as emergency transport routes for urgently needed relief materials, and proved extremely useful for the government's response to the rescue and emergency conditions. As a result, the expressways were the subject of positive evaluations from government officials and local communities.

Immediately following the earthquake, the Chongqing Expressway Co., Ltd. prohibited general traffic from using the highway and cooperated with rescue and emergency vehicle traffic at the central government's request, and reported the status of the traffic regulations to general users. The company also quickly assessed conditions among the general public, which it conveyed promptly to related organizations. In addition, the company cooperated

with victim rescue, relief and safety operations based on the mobilization efforts and cooperation requests. Finally, the company performed emergency inspections of road and building damage conditions in the Changshou area, where extensive damage occurred, and undertook emergency restoration works where necessary.

2.4 Impact

2.4.1 Economic Development of the Chongqing Region

Chongqing Municipality, which was elevated to the status of a directly-administered city in 1997, is undergoing development as one of China's model reform and development districts, under the same priority policies applied in the Shanghai Pudong District. As can be seen from the table below, the reduction of traffic time among the various cities and regions along the route as a result of the expressway construction is contributing to higher incomes for residents and changing the industrial and manufacturing structure in the region.

In addition to the increase in the number of domestic and foreign manufacturing plants being established in the region, because of the reduced time and distance to the city a shift is underway in agriculture from rice-centered farming to production of high value-added crops that can be sold in markets. Vegetable farming and breeding of pigs and ducks have increased remarkably. As a result, the incomes of residents living along the highway including farmers have been improving.

Annual income per capita in each region doubled from 1998 to 2005. The economic growth rate has also been high in the 10-12% range.

Table 11 Average annual per capita income in each region (Unit: Yuan)

	1998	2000	2002	2004	2005
Chongqing Municipality	5,828	6,572	8,094	10,244	11,210
Changshou Prefecture	4,231	4,952	6,758	8,735	9,272
Dianjiang Prefecture	5,614	6,368	7,397	8,997	9,852

Source: Chongqing Expressway Development Co., Ltd.

Table 12 Real economic growth rates (Unit: %)

	1998	2000	2002	2004	2005
Chongqing Municipality	7.6	9.0	11.5	11.5	12.2
Changshou Prefecture	7.4	10.1	12.7	12.5	11.8
Dianjiang Prefecture	9.1	11.0	12.0	13.0	12.0

Source: Chongqing Expressway Development Co., Ltd.

2.4. Percentage of Students Advancing to Higher Education

Because of the increase in incomes and large improvement in public transportation in each region, the percentage of students advancing to higher education is rising rapidly. In particular, construction of the expressway has let to the construction of roads connecting to the expressway in each region, which has vastly improved the transportation network and immensely improved convenience for students going to school. As a result it has become possible for many students to commute to school from home.

Table 13 Percentage of students advancing to high school (Unit: %)

	1998	2000	2002	2004	2005
Changshou Prefecture	37.5	48.5	77.5	85.0	87.3
Dianjiang Prefecture	41.4	72.0	88.9	71.4	79.8

Source: Chongqing Expressway Development Co., Ltd.

2.4.3 Results of the Survey of the Highway's Beneficiaries

The presumed beneficiaries of the expressway are the 30 million residents of Chongqing Municipality. A random survey conducted among the beneficiaries produced the following results. These results also confirm the positive evaluation that the project has received from the residents and users living and working in locations along the highway.

- Individuals who indicated that the opening of the expressway has helped them obtain business information and contributed to the expansion of economic opportunities accounted for 89%, 86% and 95% of the respondents in Changshou Prefecture, Dianjiang Prefecture and Liangping Prefecture, respectively.
- Survey respondents who indicated that the highway helped expand their opportunities for obtaining information to improve their life represented 86%, 86% and 95% of the respondents in Changshou Prefecture, Dianjiang Prefecture and Liangping Prefecture, respectively.
- The percentage of respondents who answered that the expressway contributed greatly to shortening travel time to public facilities such as schools and hospitals was 97% in Changshou Prefecture, 95% in Dianjiang Prefecture and 84% in Liangping Prefecture. The major reason the percentage in Liangping Prefecture was lower than in the other prefectures is that the expressway exits are in Chongqing Municipality.

Note: Resident questionnaire distribution methodology and collection results

The survey was conducted from October through November 2007 among 150 beneficiaries (50 in Changshou Prefecture, 38 responses; 50 in Dianjiang Prefecture, 22 responses; 50 in Liangping Prefecture, 16 responses) who were chosen randomly in the areas along the project route. The results are shown below, and indicate the project highway is generally evaluated positively.

Collected results:

Changshou Prefecture: 50 distributed, 38 responses, 12 not returned
Age: 21-30: 8 (21%), 31-40: 28 (74%), 41-50: 1 (3%)
Gender: Male: 20 (53%), female: 5 (13%), not identified: 13 (34%)

Dianjiang Prefecture: 50 distributed, 22 responses, 28 not returned
Age: 21-30: 6 (27%), 31-40: 13 (59%), 41-50: 1 (5%),
51-60: 0 (0%), 61 or older: 2 (9%)
Gender: Male: 15 (68%), female: 1 (5%), not identified: 6 (27%)

Liangping Prefecture: 50 distributed, 16 responses, 34 not returned
Age: 21-30: 42%, 31-40: 42%, 41-50: 11%, 51-60: 5%
Gender: Male: 4 (21%), female: 7 (37%), not identified: 8 (42%)

2.4.4 Impact on the Natural Environment

2.4.4.1 Environmental Measures

The environmental measures for the project were carried out under the control of central government Environmental Protection Agency. During construction, soil erosion countermeasures, noise mitigation measures and adjustment of construction hours particularly for construction work in the vicinity of schools, and air and water pollution countermeasures including dust control and waste plants were implemented. Soundproof glass and noise dampening walls were also installed to mitigate automobile noise in residential areas near the project. Consideration was given especially to greening and transplanting (instead of cutting) the trees along the construction path. Full greening was implemented along the entire highway. Also, as mentioned in section 2.2.2.1, the walls along the highway were covered with greenery instead of concrete.

Column 2 Best Greening Commendation from Chongqing Municipality

By creating a green belt on the center divider and creating an environmentally friendly road by planting shrubs on the sloped walls, the Changshou - Liangping Highway was awarded a “Best Greening Commendation” from Chongqing Municipality.

By changing the original plan and introducing different construction works, this wall greening enabled the construction cost and work period to be reduced. This result, together with the award mentioned above, should be actively promoted as an example of the project's success.

2.4.4.2 Relocation of Residents and Site Acquisition

For this project, site acquisition (740 ha) and relocation of residents (about 900 families encompassing roughly 3,700 people) were implemented according to the initial plan. Public hearings were conducted and basic consent to the site acquisition and resident relocation, including assent from residents along the highway's route, was obtained beforehand. The resident relocations were carried out based on the Chongqing Municipality Land Security, Safety and Resettlement Law, and the local government also enacted preferential measures, exempted relocated residents from various taxes and costs for housing construction, built condominiums for residents who lost farmland (or were moved), recommended relocations to condominiums with better amenities than other alternatives, and helped resolve lifestyle issues faced by the relocated individuals such as water service, electricity and telecommunications. The government also implemented various types of measures such as constructing areas in Chongqing Municipality for residents of the same village and developing collective housing measures for residents of the same village.

The results demonstrated by this project are generally as planned, and the effectiveness of the project is evaluated as very good.

2.5 Sustainability (Rating: a)

2.5.1 Implementing Entity

2.5.1.1 Operating and maintenance management systems

Although the Chongqing Municipal Traffic Department was assumed to be the implementing entity for the project, Chongqing Yudong Expressway Co., Ltd., a company under the umbrella of the Chongqing Municipal Traffic Department (100% investment by the Chongqing Municipality government) is responsible for the specific project implementation and management. Established by ratification by the Chongqing Municipal People's Government, this company is a wholly-owned subsidiary of Chongqing Expressway Development Co., Ltd., which is under the management of the Chongqing Municipal Traffic Department. The company was established in May 1997 with paid-in capital of 200 million yuan. It was confirmed that both the Chongqing Municipal People's Government and the Traffic Department will back up this company if a capital increase is

necessary due to any shortfalls in operating funds.

The company's organization and functions include:

Administration Office:	General affairs and receipt of petitions
Marketing Department:	Toll collection and management of each section
Works and Repairs Department:	Road maintenance
Finance Department:	Management of company finances
Government Activities:	Corporate cultural training and publicity
Asset Management Department:	Management of company assets
Equipment and Facilities Management Department:	Services, technological development and maintenance for toll collection and highway management
Safety Office:	Management of company-owned vehicles and safety education and training
Management Center:	Toll gate guidance, execution of repair works, management and inspection of machinery, equipment and electric facilities

As of December 2007, the company employs 276 individuals, including 36 managers and 240 general employees. The company owns 27 vehicles and is responsible for operating and managing roads covering a distance of 114km.

2.5.1.2 Operating and Maintenance Management Technology

For road maintenance management, the first highway patrol division in China was set up within the company, and the road is continually patrolled by seven to eight individuals. The road's designers also continually patrol the roads.

In addition, when hiring engineers the city uses public advertising to recruit throughout China from among individuals who have earned a doctorate degree, and endeavors to improve employees' skills by holding technical training workshops once every two months and a general training course every six months.

As a result of the above measures, no particular problems were noted concerning the highway operation and maintenance management organization and technology.

2.5.1.3 Operating and Maintenance Management Finances

The only source of income for Chongqing Yudong Expressway Co., Ltd. is the tolls collected from the expressway. In FY2004 revenue was 135.96 million yuan, while operating expense was 12.19 million yuan and maintenance expense was 2.5 million yuan. In 2007, revenue was 161.54 million yuan, operating expense was 72.21 million yuan and

maintenance expense was 55.76 million yuan. The company appears to have adopted sound financial management based on these income and expenses.

Table 14 Chongqing Yudong Expressway Co., Ltd. revenues, operating expenses and maintenance management expenses (Unit: Thousand yuan)

Year	Revenue (traffic tolls)	Operating expenses	Maintenance management expenses
2004	135,969	12,192	2,500
2005	133,913	17,716	4,977
2006	165,944	65,337	6,394
2007	161,543	72,217	5,576

The project was evaluated to have no problems in terms of either the capabilities of the organization of the implementing entity or its maintenance management organization, and is expected to be highly sustainable.

3. Conclusion, Lessons and Proposals

3.1 Conclusion

Based on the above report, the evaluation of this project can be said to be extremely positive.

3.2 Lessons

None.

3.3 Proposals

None.

Comparison of Main Plans/Actual Results

Item	Plan	Actual Results
(1) Output	1) Four-lane expressway: 110km 2) Bridges (about 60 locations) 3) Interchanges (6 locations) 4) Service area (1 location) 5) Maintenance vehicles (1)	1) Four-lane expressway: 114km 2) Bridges (56 locations) 3) As planned 4) As planned 5) As planned
(2) Construction period	March 2000 - September 2004 (54 months)	March 2000 - December 2003 (45 months)
(3) Project cost		
Foreign currency	24,000 million yen	19,294 million yen
Domestic currency	22,980 million yen (Local currency)	18,315 million yen (Local currency)
Total	46,980 million yen	37,609 million yen
Yen Loan	24,000 million yen	19,294 million yen
Conversion rate	1 Yuan = 15 yen (As of December 2003)	1 Yuan = 15 yen (As of December 2003)