

People's Republic of China

Ex-Post Evaluation of Japanese ODA Loan Project
Gansu Province Road Construction Project

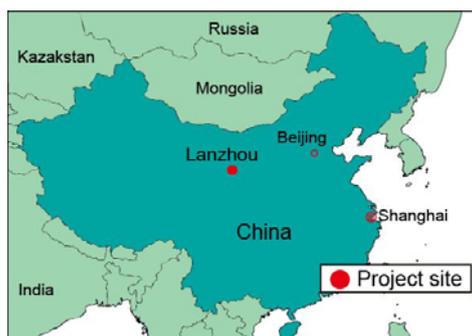
External Evaluator: Yasuhiro Kawabata, Sanshu Engineering Consultant

0. Summary

The objective of this project was to improve the accessibility to markets and promote the regional development by constructing an expressway and improving a rural road in Gansu Province, thereby contributing to the people's living environment and poverty alleviation in the inland region. The project has been highly relevant with the Chinese development plan and needs, as well as Japan's ODA policies. Since the project cost and period were within the plan, the efficiency of the project is therefore considered high. The project's effectiveness is also considered high because it has largely achieved its development objective - improvement of the accessibility to markets and promotion of regional development - and it has contributed to the people's living environment and poverty alleviation in the inland region. Furthermore, since there were no major problems observed in the operation and maintenance system, sustainability of the project is also considered high.

In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Location of Project Site



Liuzhaike-Baiyin Expressway at Baiyin

1.1 Background

The Chinese government has promoted the transport infrastructure development, including railway, port and highway sectors, which has been considered an obstacle in the country's economic growth according to the development plans since the reform and open-door policies commenced in early 1980's. Particularly in the highway sector, the total length of the highway

network has reached 1.4 million km in 2000, which is about 1.6 times of that in 1980 (880,000 km). The share of transport by roads/highways among all the transport modes has become larger. In the 1980s, 32% of passenger transport was highway transport. Highway transport has become the highest mode, overtaking railway transport in 1990's, and has reached more than half (54.3%) in 2000.

However, the highway network in inland regions, which geographically occupies about 90% of the whole nation, has been underdeveloped. The highway density in inland regions as of 2000 was 0.11 km/km², which was about one fourth of that in the coastal regions. The discrepancy in the highway network development between regions was substantial. Thus, problems, including constraints in access to markets and worsening of the transport efficiency, have been noted.

Gansu is located in the region surrounded by three plateaus (Loess Plateau, Mongolia, and Qinghai-Tibet plateaus), and its population was about 26.35 million as of 2009. Although Gansu's economy has been growing, the GDP per capita as of 2009 was 12,856 yuan, about half the national average (25,511 yuan). The transport sector development in Gansu has lagged behind because of the harsh natural environment and financial constraints and it has been an obstacle for the Province. The highway density as of 2000 was only 0.09km/km², and the share of high-grade highways among the highway network was about 9%, which was considered low. It was expected that the traffic demand along the project corridor would further expand due to the economic growth and development of motorization. Thus, the highway development, which would contribute to the increase in income for the poor, was urgently needed.

1.2 Project Outline

The objective of this project was to improve the accessibility to markets and promote the regional development by constructing an expressway and improving a rural road in Gansu Province, thereby contributing to the people's living environment and poverty alleviation in the inland region. The location of the project site is shown in Figure 1.

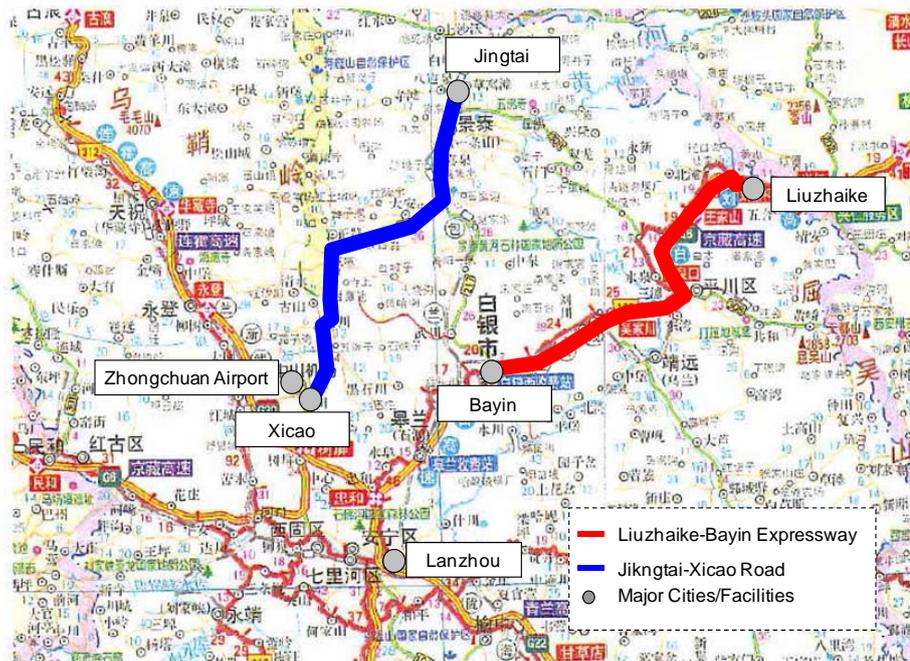


Figure 1 Location of the Project Site

Approved Amount/Disbursed Amount	20,013 million yen/ 18,419million yen
Exchange of Notes Date/ Loan Agreement Signing Date	March 2002/ March 2002
Terms and Conditions	Interest rate 2.20%; Repayment period 30 years (Grace period 10 years) ; Conditions of procurement: General Untied, Consultant: Interest rate: 0.75%; Repayment period 40 years (Grace period 10 years) , Conditions of procurement: Bilateral tied
Borrower/Executing Agency	Government of People's Republic of China/ Gansu Provincial Government (Gansu Changda Highway Company Ltd.)
Final Disbursement Date	July 2008
Main Contractor (over 1 billion yen)	1st Engineering Co. of 1st Highway Engineering Bureau of China (China) / Gansu Provincial Highway Engineering General Co. (China) / Gansu Tiandi Road & Bridge Engineering Co. Ltd (China) / Gansu Wuhuan Highway Engineering Co. Ltd (China) / Gansu Wuhuan Highway Engineering Co. Ltd (China) / Longjian Road & Bridge Ltd. Co. (China) / RBG 1st Engineering Sub of 2nd Highway Engineering Bureau (China) / Shengyang High Road Building Co. (China) / The 2nd Engineering Co. Ltd. of China Tiesiju Civil Engineering(China) / The 3rd Engineering Co. Ltd. of the 12th Group pf CRCC(China) / Yueyan Road & Bridge Construction Co. (China)
Main Consultant (over 100 million yen)	Pacific Consultants International (Japan)

Feasibility Studies and etc.	F/S of Liuzhaike-Baiyin Expressway Construction Project (Gansu Provincial Transport Planning, Supervision and Design Institute, June 2000) , F/S of Jingtai-Xicao Rural Road Construction Project (Gansu Provincial Transport Planning, Supervision and Design Institute, February 2001)
Relevant Projects	Training on the Gansu Road Maintenance (Training by Subject under Loan Account Technical Assistance, implemented in 2009) Tri-Provincial Highway Project by the World Bank, 1998

2. Outline of the Evaluation Study

2.1 External Evaluator

Yasuhiro Kawabata, Sanshu Engineering Consultant

2.2 Duration of Evaluation Study

The subject ex-post evaluation assignment was implemented as follows:

Duration of the Study : October 2010 to October 2011

Duration of the Field Study : January 9-21, 2010 and April 3-15, 2011

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan

China's 10th Five-Year Plan (2001-2005) states that the government would address the following three agenda in the highway transport sector: 1) development of the National Trunk Highway System (comprising 12 major highways spread out all over the country with a total length of 35,000 km); 2) development of the highway network (expand the country's network from 1.4 million km with the highway density of 0.15km/km² in 2000 to 1.6 million km with the highway density of 0.17 km/km² in 2005); and 3) establishment of the road transport service network. In December 2000, the Chinese government announced a "Note on policy measures regarding the Great Western Region Development by the State Council", in which four agenda, including the acceleration of the infrastructure construction, were recognized as priority agendas: 1) development of trunk highways; 2) improvement of rural roads; 3) development of linking road network; and 4) strengthening the fund raising mechanism.

Under Gansu's 10th Five-Year Plan, construction of major trunk highways comprising 12 routes is classified as a priority project. Improvement of rural and farm roads, that will provide benefits to poorer areas, would also be addressed as a part of the poverty alleviation

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③ : High, ② : Fair, ① : Low

program according to the “Rural Roads and Road Poverty Alleviation Project”. Both Liuzhaike-Baiyin Expressway and Jingtai-Xicao Highway were included in the project that was classified as priority in the 10th Five-Year Plan and its implementation was consistent with the national and provincial policies and strategies.

China’s 11th Five-Year Plan (2006-2010) states that the government would address the following agenda regarding the highway transport sector: 1) further development of the expressway network; 2) establishment of the highway network; 3) development of the highway network involving national and provincial highways; 4) completion of inter -provincial highways; and 5) enhancement of the highway network efficiency.

Under Gansu’s 11th Five-Year Plan, the transport network development strategy was established to compete with the eastern regions. The short-term targets (by 2010) of the development strategy were to connect the provincial capital city and provincial cities with the expressway’s major interchanges, and to delete the missing links along the inter-provincial highways.

During appraisal and post evaluation, the development of the expressway network and improvement of the national and provincial highways were the priority agenda in the national and provincial development plans. Thus, the project is consistent with the national and provincial development plans.

3.1.2 Relevance with the Development Needs

The share of workers engaged in the first level industry at appraisal (2002) was high (60%) in northeastern Gansu, where the project is located and the main source of income were agricultural products. Although the second- and third- level industries existed mainly in Baiyin and Pinchuan districts in the same region, the level of income in the project corridor was low and the poor condition of infrastructure was an obstacle in its economic development. Under these circumstances, it was considered an essential and priority agenda to connect with the neighboring larger cities and arterial highways along the coast by developing the expressway network (improvement of accessibility) in order to promote the economic activities in inland regions. Thus, the project targeting to strengthen and improve the highway network in the northeastern region of the province was in accordance with its development needs.

Liuzhaike-Baiyin Expressway and Jingtai-Xicao Highway under the project are connected with Yinchuan of the Ninxia Hui Autonomous Region to the north and with Lanzhou of the provincial capital to the south. The project’s objective is consistent with the development needs of Gansu Province at post evaluation, aimed to speed up travel on highways toward other provinces, promote the development of prefectural/town roads and improve the farm roads.

The needs of the road/highway project in the target area were/are high at appraisal and at post evaluation.

3.1.3 Relevance with Japan's ODA Policy

In the Annual Report on the Implementation of Japan's ODA (1999), the aid policy towards China was to resolve the lagging infrastructure development, which includes transport, communications and power sectors, which was an obstacle in China's economic development, thus making it one of the priority sectors. Particularly in the transport sector, it was proposed to provide aid to projects that would increase transporting capacity by constructing transportation facilities and enhance the maintenance and management technology that would raise transportation efficiency.

According to the Overseas Economic Cooperation Implementation Policy (issued on December 1, 1999 and valid up to March 2002), the Japanese aid policy towards China focused on alleviation of disparity between regions, particularly giving priority to inland regions and to the development of the economic and social infrastructure that would promote self-motivating economic development to encourage the development of the private sector and democratic markets, and urge a well-balanced development to promote a market-oriented economy.

Accordingly, the project has been highly relevant with the Chinese development plan and needs, as well as Japan's ODA policies. Its relevance is therefore considered high.

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

The project outputs (original and actual) are summarized in Table 1.

Table 1 Comparison of project outputs (Original and actual)

Item	Original	Actual
① Expressway Liuzhaike-Baiyin Expressway	<ul style="list-style-type: none"> Length: 110km Lanes: 4-lane both direction Pavement: asphalt concrete Bridges: about 40 units Interchanges: 6 locations Service areas: 2 locations Toll stations: 7 locations Electrical/Mechanical facilities (toll collection, communications, monitoring) 	<ul style="list-style-type: none"> Length: as planned Lanes: as planned Pavement: as planned Bridges: 34 units Interchanges: as planned Service areas: as planned Toll stations: 6 locations Electrical/Mechanical facilities: as planned
② Rural Road Jingtai-Xicao Highway	<ul style="list-style-type: none"> Length: 100km Lanes: 2-lane both direction Pavement: asphalt concrete Bridges: about 14 units Service areas: 2 locations 	<ul style="list-style-type: none"> Length: 102km Lanes: as planned Pavement: as planned Bridges: as planned Service areas: 1 locations
③ Consulting services	<ul style="list-style-type: none"> Supervision 50 M/M Overseas training 20 M/M 	<ul style="list-style-type: none"> Supervision: 36.6 M/M Overseas training: as planned

Source: Replies to the Questionnaire

The number of toll stations on the Expressway has been changed from 7 to 6 because the Baiyin-Lanzhou section of the Expressway had been completed prior to the Liuzhaike-Baiyin Expressway, and since the subject expressway was directly connected with the Baiyin- Lanzhou section, hence the toll station at the starting point has been cancelled.

Among the originally planned two road-side stations (Michinoeki)³ along Jingtai-Xicao Highway, a station (in Yongdeng county) was cancelled because it was determined that the demand would be low. The road side station in Jingtai was constructed, but it is used only as a depot since the concept of “Michinoeki” could not be applied to the subject project. The Executing Agency has been planning to utilize the facility more effectively.

Man-month (M/M) for construction supervision has been reduced due to short construction period and break in implementation during winter.



Liuzhaike-Baiyin Expressway
Baiyin East Service Area



Liuzhaike-Baiyin Expressway
Crossing over Yellow River

3.2.2 Project Inputs

3.2.2.1 Project Cost

The total project cost estimated at appraisal was 45.627 billion yen (of which the Japanese ODA loan amount was 20.013 billion yen and used for the foreign currency portion, and the rest were funded by the central government and Gansu Province). The actual total project cost was 38.926 billion yen (of which the Japanese ODA loan amount was 18.419 billion yen and the rest were locally funded), which was within the planned cost, or equivalent to 85% of the planned project cost. In terms of local currency (Chinese yuan), the actual cost was 87% of the planned

³ A rest area installed along the ordinary highway corridor is the facility which provides information on culture, history, tourist spots, and souvenirs along the corridor, and intends to serve as the core of the surrounding vicinity and activate the local community and promote the regional linkage through a road.

cost. The main reasons for the discrepancy were: 1) the Japanese yen appreciated by 9% against the Chinese yuan; 2) lower expressway construction cost was caused by high bidding competition and the contract price was lowered by 40%. However, after commencement of work, the construction cost was raised because high quality materials were for asphalt and crushed stones instead of earth for base materials, and provision of side ditches along the corridor (both sides). As a result, the construction cost was reduced by 10%; 3) increase in rural road civil work was caused by design variations, which were needed to cope with the topography and demand along the corridor; 4) the cost of electrical and mechanical facilities was reduced because the number of the toll booths at toll stations was reduced by half due to less than projected traffic volume. In addition, although the cost of imported facilities were estimated at the planning stage, less expensive local products were used at the implementation stage; 5) lower foreign currency portion for consulting services due to shorter construction period and break of implementation during winter. Employment of a local consultant was not initially considered. However, due to the mandate of Communications Department, a local consultant was hired and the cost was added; 6) taxes and management costs were over-estimated at the planning stage; and 7) cost increase in land acquisition (for an expressway) occurred because the payment was made based on the national and provincial standards and rules after a detailed investigation (items and quantity) was conducted in the field.



Liuzhaike-Baiyin Expressway
Liuzhaike Toll Station



Jingtai-Xicao Highway
Beginning Point (Xicao)

3.2.2.2 Project Period

The project period was shorter than planned. The planned project period was from March 2000 (L/A signing month) to May 2006 (project completion) for a total period of 51 months. While the actual project period was from March 2002 (L/A signing month) to December 2005 (opening of the expressway) for a total period of 46 months, or equivalent to 90% of the planned period. Construction of the rural road main carriageway was completed in December 2003. However, a road side station (*Michinoeki*) was completed in 2007.

The Expressway was open to traffic on December 16, 2005, three months earlier than planned. However, if compared with the originally defined project completion date (all works, including electrical and mechanical facilities), the completion date of electrical and mechanical facilities was June 2007, thus the implementation was delayed by about one year. Improvement work of the rural road commenced one year earlier than planned. Procurement of maintenance equipment was delayed by two years; it commenced after the condition of the existing equipment was checked and the demand was clarified upon completion of an expressway. However, no major issue has been observed.

Accordingly, both the project cost and period were within the plan. Hence, efficiency of the project is considered high.

3.3 Effectiveness⁴ (Rating: ③)

3.3.1 Quantitative Impacts

3.3.1.1 Results from Operation and Effected Indicators

(1) Expressway

① Average Daily Traffic

The Average Daily Traffic (ADT) of Liuzhaike-Baiyin Expressway is shown in Table 2.

Table 2 Average Daily Traffic

	2000 Base year	2006	2007	2008 2 years after completion	2009
Projected		11,400	12,400	13,300	14,400
Actual	9,100	4,600	5,800	7,100	10,000

unit: vehicle/day

Source: Appraisal documents and Replies to the Questionnaire

The Average Daily Traffic (ADT) of National Highway 109, which is parallel to Liuzhaike-Baiyin Expressway, is shown in Table 3.

Table 3 Average Daily Traffic on National Highway 109

	2000 Base year	2006	2007	2008 2 years after completion	2009
Actual	5,000	6,000	4,600	4,200	3,500

unit: vehicle/day

Source: Replies to the Questionnaire

Currently, the actual traffic volume on the expressway is not high as expected. However, the traffic growth rate of the expressway for the past three years is about 30% and the

⁴ The rating of the project's effectiveness takes into account the evaluation of the project's impact.

traffic volume has been largely increasing. On the other hand, the traffic volume on the existing parallel road has been decreasing since the opening of the expressway, and thus it is considered that diversion from the existing road to the expressway has been progressing. The projected traffic volume at the opening of the expressway in the feasibility study was about 11,000 vehicles /day and thus, it was considered that the financial viability of the expressway would be low as a toll highway. The development objective of the proposed expressway was to contribute to the poverty alleviation through promoting the regional development by improving the accessibility in the inland poor areas and consequently enhancing the expressway network. Thus, the comparison between the projected traffic volume and the actual traffic volume does not make a sense so much. However, with the further enhancement of the expressway network and the development of the regional economy, it is expected that the traffic volume would reach the traffic volume projected at the feasibility stage within a few years.

② Travel Time (whole stretch)

The travel time along the subject expressway is shown in Table 4.

Table 4 Travel Time (Liuzhaike-Baiyin)

	2000 Base Year	2006	2007	2008 2 years after completion	2009
Projected				81	
Actual	174	81	81	81	81

unit: minutes

Source: Appraisal documents and Replies to the Questionnaire

Upon completion of the expressway, the travel time between Liuzhaike and Baiyin was reduced by half, contributing to the improvement in accessibility to markets and promoting the regional development.

③ Traffic Accidents (number)

The traffic accidents on the expressway are shown in Table 5.

Table 5 Traffic Accidents

	2000 Base Year	2006	2007	2008 2 years after completion	2009
Projected		140	154	167	179
Actual	293	132	121	131	124

unit: number/year

Source: Appraisal documents and Replies to the Questionnaire

Note: The actual number in 2009 is the number of traffic accidents on the existing National

Highway 109, while those after the opening of the expressway are the actual number of traffic accidents on the expressway.

Although the traffic volume has doubled since the opening of the expressway, the number of traffic accidents has decreased by about 60%, indicating that the expressway is safer.

3.3.1.2 Results from Operation and Effectuated Indicators

(1) Rural Road

① Average Daily Traffic

The Average Daily Traffic on Jingtai-Xicao Highway is shown in Table 6.

Table 6 Average Daily Traffic

unit: vehicle/day

	2000 Base Year	2005	2006	2007	2008 2 years after completion	2009
Projected			5,100	5,450	5,800	6,200
Actual	4,750	4,800	3,700	3,700	3,800	4,500

Source: Appraisal documents and Replies to the Questionnaire

Although the actual traffic volume has not reached the level projected at the planning stage, the traffic growth rate from 2008 to 2009 is 18%, indicating that traffic is increasing.

② Travel Time

The travel time between Jingtai and Xicao is shown in Table 7.

Table 7 Travel Time

unit: minutes

	2000 Base year	2004 Completion Year	2006	2007	2008	2009
Projected		95				
Actual	166	60	60	60	60	60

Source: Appraisal documents and Replies to the Questionnaire

With improvements (i.e., paving and reconstruction of bridges) in the existing road, driving speed has increased, resulting in substantially shorter travel time by about one third.

③ Traffic Accidents (number)

The traffic accidents on rural road are shown in Table 8.

Table 8 Traffic Accidents

unit: number/year

	2000 Base Year	2006	2007	2008 2 years after completion	2009
Projected		87	109	114	128
Actual	133	68	82	76	58

Source: Appraisal documents and Replies to the Questionnaire



Jingtai-Xicao Highway
Rolling Region



Jingtai-Xicao Highway
Project Ending Point (Jingtai)

Improvements in road surface have reduced traffic accidents, as well as damage to vehicles. As a result, accessibility to markets has improved.

3.3.1.2 Results of Calculations on Internal Rates of Return (IRR)

(1) Financial Internal Rate of Return (FIRR)

Since data on the toll revenue and operation/maintenance costs for the past five years was provided, the FIRR at post evaluation was calculated based on several assumptions on future revenue and costs made by the evaluator. FIRRs at appraisal and at post evaluation are shown in Table 9.

Table 9 FIRR at Appraisal and Post Evaluation

	At appraisal	At post evaluation
FIRR	6.2%	4.8%

Since the actual traffic volume is less than projected, the FIRR at post evaluation is lower than expected.

(2) Economic Internal Rate of Return (EIRR)

Since the data needed to calculate the EIRR at post evaluation for the Liuzhaike-Baiyin Expressway was not available, it was difficult to calculate the EIRR. Only EIRR for

Jingtai-Xicao Highway was calculated with the following assumptions: 1) construction and maintenance costs were considered as “cost”; 2) savings in vehicle operating costs and travel time, and reduction in traffic accidents were considered “benefits”; and 3) project life was twenty years. The EIRR at post evaluation (19.4%) was slightly lower than at appraisal (22.3%). The reasons for lower EIRR were due to increase in the construction cost (2,885 million yen) compared to planned cost (2,577 million yen); and the actual traffic volume was lower than planned.

3.3.2 Qualitative Effects

Regarding qualitative effects, the promotion of regional development and poverty alleviation were considered.

(1) Promotion of Regional Development

Accessibility to markets has improved due to substantial reduction in travel time on the expressway and the rural road. Consequently, the development zones, including “China Science Institute High-tech Industrial Park”, “Western District”, “Pinchuan Central District” and “Liuchuan Industrial Zone” have been constructed along the expressway corridor. Moreover, since the driving time to the provincial capital, Lanzhou, became less than an hour, the area surrounding Lanzhou has been developed into an economic zone. The circumferential economic industrial zone along the rural road has also been developed around Xicao, and the factory of Geely Motors and Qinwangchuan Agricultural High-tech Model Base has been established. Thus, it was concluded that the project has contributed to the promotion of the regional economy.

(2) Poverty Alleviation

According to the Executing Agency, since the opening of the Expressway to the public, the migration of population along the corridor has been increasing, whereas the supply of agricultural and husbandry products has become insufficient. Consequently, the prices of these products went up which encouraged farmers to be more involved in the farming and plantation business. As a result, the income of farmers increased. Furthermore, the increasing consumer demand, development of the regional economy, as well as enhancement in living standards, the commercial business has become more active by increasing the number of supermarkets from one to seven, with a total sale of more than one million yuan.

The project has largely achieved its development objective, therefore its effectiveness is considered high.

3.4 Impact

3.4.1 Intended Impacts

Since the opening of the expressway, accessibility to urban cities, including Lanzhou has substantially improved, and the industries along the corridor have been developed further. The farming and commercial business have been further promoted and the income of residents and farmers along the corridor has gone up. These facts are supported by figures (GDP/capita/year). The GDP/capita in 2009 for Jingyuan county near Lanzhou was about six times more than in the base year 2000, about three times the projected figure. The GDP/capita in 2009 for Pinghe prefecture, located at the project ending point, was about double of that in the base year 2000, close to the projected figure. The growth rate of GDP/capita of the Chinese average (from 2000 to 2009) was about 3.5 times. The inflation rate during the same period was about 2%/year.

Table 10 GDP/capita/year along the Expressway Corridor

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected JingyuanPinghe		2,070 8,658	2,215 9,458	2,399 10,258	2,590 11,206
Actual JingyuanPinghe	1,331 5,198	5,445 8,868	6,080 9,643	6,753 10,346	7,628 11,786
Population Jingyuan Pinghe (in 0,000)		461 194	462 194	465 195	467 196

unit: yuan

Source: Appraisal documents and Replies to the Questionnaire

The actual shipping volume of agricultural products, three years after the opening of the expressway, is much larger than the projected volume. (See Table 11)

Table 11 Agricultural Products along the Expressway Corridor

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected Jingyuan Pinghe		9.41 5.80	10.22 6.29	11.03 6.77	11.99 7.33
Actual Jingyuan Pinghe	5.84 3.65	5.03 3.35	8.37 5.58	10.28 6.85	14.40 9.60

unit: 0,000 tons/year

Source: Appraisal documents and Replies to the Questionnaire

Since the completion of the improvement work for Jingtai-Xicao Highway, the number of traffic accidents has decreased. Because of the improvement in accessibility for the residents along the corridor and expansion of business activities, the impact on the regional economy by the project became visible. The GDP/capita in 2009 for Yongdeng county near Lanzhou was about 3.5 times of that in the base year 2000, about double the projected figure. The GDP/capita in 2009 for Jingtai prefecture, located at the project ending point, was about six times of that in the base year 2000, about 3.5 times the projected figure.

Table 12 GDP/capita/year along the Jingtai-Xicao Highway Corridor

unit: yuan

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected					
Yongden		4,792	5,158	5,523	5,945
Jingtai		2,581	2,766	2,950	3,161
Actual					
Yongden	3,191	7,730	7,973	10,236	11,582
Jingtai	1,750	7,716	7,890	8,230	10,924
Population					
Yongdeng		530	531	533	540
Jintai		231	234	235	238

Source: Appraisal documents and Replies to the Questionnaire

Upon completion of the improvement work, the actual shipping volume of agricultural products is larger than the projected volume.

Table 13 Agricultural Products along the Jingtai-Xicao Highway Corridor

unit: 0,000 tons/year

	2000 Base Year	2006	2007	2008 2 years after Completion	2009
Projected					
Yongdeng		6.86	7.38	7.89	8.49
Jingtai		8.10	8.72	9.33	10.04
Actual					
Yongdeg	4.38	7.21	8.20	7.99	9.32
Jingtai	5.11	8.54	9.21	9.87	11.32

Source: Appraisal documents and Replies to the Questionnaire

3.4.2 Other Impacts

(1) Impacts on the natural environment

According to the Executing Agency, about three fourth of trucks hauling coals on the existing road (National Highway 109) and two third of long-distance cargo trucks traveling between Lanzhou, provincial capital of Gansu and Yinchuan of Ningxia, have diverted to the expressway, and thus reduced traffic noise and air/water pollution. Given that the

roadway is far from residential areas, traffic noise has declined, and traffic laws have been strictly enforced on vehicle violations (i.e., overloading, oversized and other illegal vehicles) at toll stations, there have been no major environmental issues observed.

On the rural roads, the environmental protection and management were implemented as planned during the implementation and dialogue with local citizens was maintained. Furthermore, speed bumps and traffic signs were installed, hence no major issues have been observed.

(2) Land Acquisition and Resettlement

Since the beneficiary survey was not conducted by the evaluation team, all the data and information on the land acquisition and resettlement was collected through the interviews with the Executing Agency. The actual land area acquired for the expressway construction was a total of about 423 ha, including 189 ha rice paddies, 205 ha fields, and 29 ha other use. The number of resettled houses and habitants was 99 households, with 542 persons. The actual figures of land area and resettled houses/people were less than the planned. However, the cost for land acquisition and resettlement compensation has increased (152.67 million yuan). The reason for the increase was that the estimated cost was the same as the preliminary cost used for the feasibility study at the planning stage.

The actual land area acquired for the rural highway was a total of about 135 ha, about the same as planned. The number of resettled houses and habitants was 68 households, with 414 persons, less than planned. Regarding the land acquisition cost for the rural highway, the budget estimated at the planning stage was paid to the local governments along the corridor at the commencement of the project, while the land acquisition and compensation business was entrusted to the local governments. Thus, there were no discrepancy between the estimate and the actual payment amount (21.67 million yuan).

(3) Other Impacts (Positive or negative impacts)

The opening of the expressway made the travel time between towns/regions shorter, thus it strengthened the linkage between regions and promoted exchanges of people. At the Wangjiashang town, which is located close to the border with Ningxia, and where the weather condition is harsh, there was only one regular bus operation per day before the project. However, upon completion of the project, the number of bus operations increased to 10 or more operations per day, making accessibility to Baiyin, the major city around the region and Pinchuan, to substantially improve. The job employment created for the poor within one year after the project completion is about 80 posts. In addition, about 100 staff has been employed in charge of maintenance work and about 190 staff as toll attendants.

Therefore, it was likely that the project has contributed to the people's living environment and in poverty alleviation in the inland region.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

At the opening of the expressway (December 2005), Gansu Changda Highway Company Ltd. was responsible for operation and maintenance of the expressway, as originally planned. However, in January 2007 the institutional reform on the operation and management system for high-grade highways in Gansu was carried out. Since then, the High-Grade Highway Operation and Management Center of the Gansu Communications and Transport Department (about 3,300 staff) has been in charge of operations of Liuzhaike-Baiyin Expressway and Baiyin Road Maintenance Office (about 1,000 staff) under the Department's Highway Bureau (about 16,000 staff) in charge of maintenance. The operation and maintenance work for the expressway has been implemented according to the "Gansu Province Expressway Management Code", which was enacted on July 1, 2008.

The Department's Highway Bureau is responsible for the maintenance work for Jingtai-Xicao Highway as well. However, the actual work in the field has been undertaken by its district offices (Baiyin Road Maintenance Office and Lanzhou Road Maintenance Office (about 1,400 staff).

3.5.2 Technical Aspects of Operation and Maintenance

Among the staff working at the Highway Bureau (about 200 staff), 49 are technical staff. By category of the professional title, 35 are Senior Engineers, and 14 Engineers. By category of the educational background, 7 are Master's degree holders, 30 Bachelor's degree holders and 12 are non-degree holders. In order to enhance the professional and technical capacity of staff in charge of maintenance work, various training programs on modules, including bridge maintenance/management, road surface repair, and slope protection have been regularly implemented. In 2010, 13 training programs were conducted. Required training programs have also been regularly provided to technicians who are in charge of the field maintenance work, assigned to the District Road Maintenance Office. Regarding the operation and maintenance of the expressway, under the principle that once a highway was completed, the network function would be further enhanced; the renewal of technology to introduce effective traffic operation, including installation of the electronic toll collection system, has been continuously made.

3.5.3 Financial Aspects of Operation and Maintenance

(1) Liuzhaike-Baiyin Expressway

The revenue and expenditures of Liuzhaike-Baiyin Expressway for the past five years is shown in Table 14.

Table 14 Revenue and Expenditures of Liuzhaike-Baiyin Expressway
unit: million yuan

	Net income	Operation expenses	Maintenance expenses	Profit
2006	65.2	4.2	9.9	51.1
2007	81.9	4.5	8.7	68.7
2008	100.5	4.8	10.8	84.9
2009	140.9	5.0	17.6	118.3
2010	170.8	5.5	22.6	142.7

Source: Replies to the Questionnaire

The above table does not include other cost items such as administration, financing, and taxes, therefore the profit does not necessarily reflect the balance status by operation of the expressway. Since the High-Grade Highway Operation and Management Center is currently operating expressways in Gansu Province, including Liuzhaike-Baiyin Expressway, the Center monitors the revenue and expenditures of the total expressway network. Currently, the system has been established, whereas the toll revenue has been pooled, so that once toll revenue is insufficient, they receive subsidy from the Province.

As four years have passed since the expressway was open to traffic in December 2005, rutting and sagging have been observed. The Highway Bureau has budgeted 115.59 million yuan for maintenance work and has been implementing the repair work during 2010 and 2011.

(2) Jingtai-Xicao Highway

The budget for road maintenance for Jingtai-Xicao Highway for the past three years is shown in Table 15. The data on the budget by road was not available.

Table 15 Budget for Road Maintenance of Jingtai-Xicao Highway (Spent)
unit: million yuan

Year	Expenditure
2008	99.79
2009	159.61
2010	174.48

Source: Replies to the Questionnaire

The standard budget allocations for maintenance work of rural roads are 1,500 yuan/km/year for routine maintenance work (for national and provincial roads) and 7,000

yuan/km/year for repair work (large and medium size repair and rehabilitation). During the visual inspection in the field, there were no cracks on the pavement surface and deposit/debris in the side ditches were observed, and thus it was considered that the maintenance budget has been properly distributed.

3.5.4 Current Status of Operation and Maintenance

Regarding the maintenance of the expressway, since 2008 the High-Grade Highway Repair and Management Center of the Baiyin Road Maintenance Office has purchased maintenance equipment, including an asphalt mix plant, road sweepers, and road rollers; and has organized task teams who would be responsible for daily patrol, surface repair, bridge rehabilitation and repair of traffic safety facilities (signs, guard-rails, and others). The repair work has been specialized and mechanized and more efforts have been made on the maintenance of surface and slopes. As a result, the expressway has remained in a good shape.

Baiyin Road Maintenance Office and Lanzhou Road Maintenance Office are responsible for maintenance of Jingtai-Xicao Highway. The highway is in good shape because routine maintenance work, including removal of obstacles on the road surface, simple repair of road surface, and rehabilitation of side ditches are regularly undertaken. The well-maintained road surface was observed during the field inspection. Regarding the repair work, with the estimated contract price exceeding one million yuan, contractors have been selected through the competitive bidding procedure according to the “Guidelines for Procurement of Road Repair Civil Work”.

Since no major problems have been observed in the operation and maintenance system, sustainability of the project is considered high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project has been highly relevant with the Chinese development plan and needs, as well as Japan’s ODA policies. Since the project cost and period were within the plan, its efficiency is considered high. Regarding its effectiveness, the project has largely achieved its development objective - improvement of the accessibility to markets and promotion of regional development - and it has contributed to the people’s living environment and poverty alleviation in the inland region. Thus, its effectiveness is considered high. Furthermore, since there were no major problems observed in the operation and maintenance system (organizational setup, technical capacity and financial status), sustainability of the project is also considered high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

The road side station (Michinoeki) installed at Jingtai prefecture is currently used as “a depot”. In order to fully utilize the facility, it is recommended to build a gas station, with a lavatory, and a shop adjacent to the Michinoeki. Excess agricultural products could be sold to gas station customers during the summer harvest season, as well as promote exchange with the local community.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

The effective indicator to assess the effectiveness of the project with road development being its main component is basically the passing traffic volume (comparison between the projected and actual traffic volume). However, since the site of this project is located in the remote inland region, its development objective is definitely to improve accessibility and expand the road network under the National Arterial Highway Network Development Plan, rather than to contribute to the development of the regional economy. Depending on the project, the targeted development objective needs to be fully considered, and the suitable indicators to assess the level of achievement made against the objective should be selected. Indicators to assess to what extent the network development has been achieved could be: 1) the number of the long-distance inter-urban bus operations; 2) the number of cargo vehicles traveling the long-distance; 3) the shipping volume of agricultural products to major cities; 4) the number of shops opened by the major nationwide supermarket chains; and 5) the number of days when the parallel existing road (national/provincial roads) was closed due to heavy rain or snow.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
<p>① Project Output</p> <p>i) Expressway Liuzhaike-Baiyin Expressway</p> <p>ii) Rural Road Jingtai-Xicao Highway</p> <p>iii) Consulting services</p>	<ul style="list-style-type: none"> • Length: 110km • Lanes: 4-lane both direction • Pavement: asphalt concrete • Bridges: about 40 units • Interchanges: 6 locations • Service areas: 2 locations • Toll stations: 7 locations • Electrical/Mechanical facilities (toll collection, communications, monitoring) <ul style="list-style-type: none"> • Length: 100km • Lanes: 2-lane both direction • Pavement: asphalt concrete • Bridges: about 14 units • Service areas: 2 locations <ul style="list-style-type: none"> • Supervision 50 M/M • Overseas training 20 M/M 	<ul style="list-style-type: none"> • Length : as planned • Lanes: as planned • Pavement: as planned • Bridges: 34 units • Interchanges: as planned • Service areas: as planned • Toll stations: 6 locations • Electrical/Mechanical facilities: as planned <ul style="list-style-type: none"> • Length: 102km • Lanes: as planned • Pavement: as planned • Bridges: as planned • Service areas: 1 locations <ul style="list-style-type: none"> • Supervision: 36.6 M/M • Overseas training: as planned
<p>② Project Period</p>	<p>March 2002 (L/A) ~ May 2006 (Project completion) (51 months)</p>	<p>March 2002 (L/A) ~ December 2005 (Opening of Expressway) (46 months)</p>
<p>③ Project Cost</p> <p>Foreign currency</p> <p>Local currency</p> <p>Total</p> <p>Yen Loan Portion</p> <p>Exchange rate</p>	<p>20,013 million yen</p> <p>25,614 million yen</p> <p>1,708 million yuan</p> <p>45,627 million yen</p> <p>20,013 million yen</p> <p>1 yuan = 15 yen (as of September 2001)</p>	<p>18,419 million yen</p> <p>20,507 million yen</p> <p>1,342 million yuan</p> <p>38,926 million yen</p> <p>18,419 million yen</p> <p>1 yuan =14.24 yen (Simple average between September 2003 and September 2008)</p>