China

Qingdao Development Program (Highway)

Report Date : September 2002
Field Survey : July 2001

1. Project Profile and Japan's ODA loan

Site Map: Coastal Area of Jiaozhou Bay


Site Photo: Guanjialou Tollgate of Jiaozhou Bay Expressway

1.1. Background

Since 1984, Qingdao had become one of the 14 Special Economic Planning Cities, one of the 14 Opened Coastal Cities and also one of the key cities with an annual industrial output exceeding 10 billion RMB. Meanwhile, its industrial output had also made up one fifth of that of the Shandong Province. Consequently, Qingdao had grown into one of the key cities that occupied an important position in the country's development strategy.

Nevertheless, in the year of 1991, due to lack of a highway in the coastal area surrounding Jiaozhou Bay, connection with major arteries was poor in Qingdao, which constituted one of the restrictions that were retarding development of the city and the coastal area of Jiaozhou Bay in particular. Besides, the fact that there was only No.308 National Road and two prefecture roads as gateways of the city as a whole had been the major cause of chronic traffic congestion and the bottleneck of the city's economic development. Moreover, it was estimated that this problem would be growing more and more serious with the sharp traffic increase. For this reason, the construction of a new gateway was put forth as a key project in Qingdao's development progam.

On the other hand, implementation of a development program in Huangdao Region began in March, 1985 after its authorization by China's State Council in October 1984, which aimed at the making of an economic & technological development zone by the end of the 20th century with a total area of 15 square kilometers, 500 firms moving in, an annual industrial output reaching the level between 10 billion and 15 billion RMB achieved by using internationally advanced technologies. Establishing this economic & technological development zone with favorable treatments like tax-reduction and so on stimulated the willingness of firms domestic and foreign to move in. By the year of 1990, a total amount of 378 million RMB had been invested here, and it was estimated that investments during the period from 1991 to1995 and that from 1996 to 2000 would respectively amount to 198 million RMB and 232 million RMB. However, although the municipal government had given priority to the improvement of infrastructures including fields like power, water supply and drainage, telecommunication, highway, ferry, heat supply and so on, the speed of improvement had failed to catch up with increasing demand, especially in the fields of transportation and telecommunication network.

At that time, transportation between the city of Qingdao and Huangdao Region was mainly by ferryboats shuttling across the Jiaozhou Bay separating Huangdao from the downtown area. Since the transporting capacity of the existing 3 ferryboats (each accommodating 500 passengers at most) had been in full use, with the continuous increase of passengers, vehicles and cargoes, it appeared that a single journey from the city of Qingdao to Huangdao Region by ferryboat would take 2 hours on average including waiting time, whereas in the case excluding waiting time, it took only 30 minutes. Moreover, there were 30 days in a year on average when ferry transportation between the city of Qingdao and Huangdao Region was stopped by unseasonable weathers. Accordingly, further widening of the gap between demand and supply in ferryboat service was predicted in view of the prospect of further development in Huangdao Region.

1.2. Objectives

To construct an expressway along the coastal line of Jiaozhou Bay, which would connect the City of Qingdao and Huangdao region separated by the Bay, so as to promote development of Huangdao Region (hence the improvement of environment for investment), and to relieve the chronic traffic congestion in the gateways of the city.

1.3. Project Scope

Japan's ODA loan was provided to cover the total amount of foreign currency required for the construction of the following components of the project:

1) A 67.7 kilometers long expressway (four-lane) extending from Qingdao's No.8 Wharf to Guanjialou of Huangdao Region along the coastal line of the Jiaozhou Bay
2) 21 bridges, 7 interchanges and 10 tollgates attached to the expressway

1.4. Borrower/Executing Agency

Ministry of Foreign Trade and Economic Cooperation of the People's Republic of China/Qingdao City of the People's Republic of China

1.5. Outline of Loan Agreement

Loan Amount Loan Disbursed Amount	8,800 million yen 8,800 million yen
Date of Exchange of Notes Date of Loan Agreement	March, 1991 March, 1991
Terms and Conditions Interest Rate Repayment Period (Grace Period) Procurement	 2.5 % p.a. 30 years (10 years) General Untied
Final Disbursement Date	April, 1996

2. Results and Evaluation

2.1. Relevance

The objective of this project at the time of the appraisal was to construct an expressway along the coastal line of Jiaozhou Bay, which would connect the City of Qingdao and Huangdao region being separated by the Bay, and to relieve the chronic traffic congestion in the gateways of the city, thus, to promote development of both Qingdao City and Huangdao Region and to create a better environment for investment. This objective still conforms to the development program and policy of the whole country as well as Qingdao.

The basis for this statement can be found in China's 10th 5-year Development Program (2001-2005), where "further improvement of infrastructure" is cited as one of the 6 priorities of the country's development strategy. Additionally, in Chapter 7 entitled "Promoting the betterment of infrastructure "of this document, specific targets are set up as shown in the following statement, "by the year of 2005, the total length of highway for the country as a whole will have reached around 1.6 million kilometers, among which expressway will be 25 thousand kilometers."

It can be concluded that the implementation of this project conforms to the need of the intended beneficiaries, who are supposed to be the whole of Qingdao's residents. As seen in Table 1, the population of Qingdao had grown from 6.785 million before the completion of the project to 7.2 million by 2000 with an increase of 6%, while annual average volume of traffic per day occurring in the area between the city of Qingdao and Huangdao Region had a 164% increase during the same period. What's more, annual average volume of traffic per day increased 60.18% from 7,522 vehicles in the year before the project's completion to 12,049 in the year after, showing evidently that the users were increasing tremendously.

Table 1： Changes of Traffic Volume in the Area between Qingdao City & Huangdao Region and Qingdao's Population

Year	Annual average traffic volume per day (veicle/day)	Growth rate (%)	Population of Qingdao (thousand)	Growth rate (%)
1990	4,291	—	6,666	—
1991	5,269	22.79	6,709	0.65
1992	6,534	24.01	6,731	0.33
1993	9,351	43.11	6,753	0.33
1994	7,522	-19.56	6,785	0.47
1995 (completion)	12,049	60.18	6,846	0.90
1996	14,425	19.72	6,900	0.79
1997	14,540	0.80	6,954	0.78
1998	19,874	36.69	6,996	0.60
1999	16,578	-16.58	7,068	1.03
2000	19,877	19.90	7,200	1.87
Growth rate (1994 to 1990, %)	75	—	2	—
Growth rate (2000 to 1994, %)	164	—	6	—

Source： Implementation agency

2.2 Efficiency

2.2.1 Project Scope

Table 2：Comparison of Original and Actual Scope

	Original scope	Actual scope	difference
Civil work (road): No.8 Wharf to Shuangfucun Shuangfucun to Guanjialou Liuting-Shuangfu Expressway	 15.4km×24.5m 52.3km×23m exclusion	 15.4km×24.5m 52.3km×23m 7km, width unknown (original 24.5m)	 None None 7km, width unknown (original 24.5m)
Civil work (bridge)	21（bridge）	24（bridge）	＋3（bridge）
Civil work (others): interchange tollgate monitoring & controlling center	 7 10 1	 7 9 1	 None
Consulting service learning mission abroad sent by implementation agency	7.5M/M	7.5M/M	None

Source： Implementation agency

As shown in Table 2, Liuting-Shuangfu Expressway was newly constructed and, as a result, Jiaozhou Bay Expressway, Liuting Airport, Jinan -Qingdao Expressway were mutually connected and the linkage of road network was promoted. The Liuting-Shuangfu Expressway was also beneficial for the development of economy in Huangdao Region and therefore could be regarded as a part of Jiaozhou Bay Expressway. In addition, the number of bridges actually constructed increased by 3, while the number of toll gate actually constructed reduced by 1.

Since there had existed many salt mills and prawn-cultivating sites along the conceived Jiaozhou Bay Expressway by the time of the start of the project, the implementation agency, through consultation with the local firms, Salt Agency of local government and waterworks circles, adjusted the original plan and added 2 bridges of medium size and 1 bridge of large size (400 m) to secure flood drainage (in rainy season) and draining facilities.

2.2.2 Schedule

Table 3：Comparison of Original Schedule and Actual Schedule

Items	Original schedule	Actual Schedule
design	Dec.1989～Dec.1990	The same
Acquisition of land	Jul.1990～Mar.1991	Jul.1990～Mar.1993
Civil work of roadbed	Oct.1990～Sep.1993	The same
Civil work of bridges	Jan.1991～Dec.1994	The same
Pavement	Jul.1992～Oct.1992 Apr.1993～Oct.1993 May.1994～Dec.1994	Apr.1993～Dec.1995
Civil work of interchanges	Apr.1991～Nov.1994	Apr.1991～Aug.1995
Embankment	Oct.1990～Aug.1994	Oct.1990～Aug.1992
The others	Oct.1990～Dec.1994	Oct.1994～Nov.1995

Source： Implementation agency

As shown in Table 3, the actual progress of this project fell behind the original schedule in terms of land acquisition, pavement, civil work of interchanges and the others, though the completion of embankment was ahead of the original schedule. The slower progress in the above-mentioned items can be attributed to the following reasons:

1) The fact that the acquisition of land was realized 2 years behind the original schedule was due to the disagreement between the local residents and the implementation agency on how to execute the excavation work in the Shanjiaocun Section of the expressway, the settlement of which was time-consuming.

2) As for the slower progress in pavement and interchange construction, the following explanations are reasonable:

(a) The procurement cost of construction equipments and materials increased as a result of inflation, while the raise of RMB interest rate resulted in the domestic capital shortage.

(b) The amount of capital needed for the construction of Jinan~Qingdao Expressway started prior to this project exceeded greatly the estimated figure, making it all the more difficult for this project to secure domestic capital.

2.2.3 Project Cost

A comparison between originally estimated project cost and actual cost is rendered as follows:

Table 4：Comparison between Estimated Project Cost and Actual Cost

	Foreign currency		local currency		Total amount	
	Sum（million¥）	JBIC（million¥）	Sum（10 thousand RMB）	JBIC (million¥)	Sum（million¥）	JBIC（million¥）
Estimated cost	8,800	8,800	57,142	—	28,457	8,800
Actual cost	8,800	8,800	171,560	—	34,019	8,800

Source: Implementation agency

Note: 1）Exchange rate for estimated cost: 1 RMB¥=34.4 J¥ (Base year used: 1990)

2）Exchange rate for estimated cost: 1 RMB¥=14.7 J¥ (Base year used: 1990～1995 average rate)

According to Table 4, actual cost of this project amounted to 8.8 billion yen for the foreign currency portion, the same as originally estimated cost, while for the local currency portion, actual cost ballooned to the amount 3 times as large as the estimated cost, which was attributed to factors of inflation and change of schedule, scope, budget of the project as well as exchange rate.

One example of the inflation effect was the rising price of macadam of road-surface used in the pavement work in that 1 cubic meter of macadam selling 20 RMB at the time of appraisal (the end of 1980s) rose to 70 or 80 RMB in 1994, nearly 4 times the former level.

2.3 Effectiveness

The effectiveness of 'relieving the chronic traffic congestion in the gateways of the city', which was set up as the objective of the project, can be measured mainly by the volume of traffic, the degree of congestion and the saving of travel time. Although the volume of traffic had increased sharply by the year of 2000 since the time of the project's completion, the travel time had been shorten drastically. This fact leads to the conclusion that the effectiveness of 'relieving the chronic traffic congestion' has been great.

2.3.1 Change of Traffic Volume

Table 5： Changes of Traffic Volume in the Jiaozhou Bay Expressway

		1990	1991	1992	1993	1994	1995 completion	1996	1997	1998	1999	2000	2001
Traffic volume (vehicle /day)	P	N.A.	N.A.	N.A.	N.A.	N.A.	8,085	8,610	9,180	9,798	10,851	11,610	12,423
	A	4,291	5,269	6,534	9,351	7,522	12,049	14,425	14,540	19,874	16,578	19,877	22,778

Source: Implementation agency

Note: 1) "P" stands for "projected figures", and "A" stands for "actual figures".

2) This project adopted the Designing Standards for Expressway, in which the designed traffic volume was set in the level between 15,000 and 35,000 vehicles per day.

3) Actual traffic volume by types of vehicle in 2001 is given below.

----Type 1 (50.1%): Trucks with loading capacity not more than 1 ton and sedans and buses with not more than 11 seats.

----Type 2 (15.9%): Trucks with loading capacity ranging from over 1 ton to not more than 3 ton, and buses with seats ranging from over 11 to not more than 30.

----Type 3 (13.2%): Trucks with loading capacity ranging from over 3 ton to not more than 7 ton, and buses with more than 30 seats.

----Type 4 (16.0%): Trucks with loading capacity ranging from over 7 ton to not more than 14 ton

----Type 5 (4.5%) : Trucks with loading capacity ranging from over 14 ton to not more than 25 ton

----Type 6 (0.2%): Trucks with loading capacity ranging from over 25 ton to not more than 50 ton

The above Table 5 shows changes of traffic volume in the area between the city of Qingdao and Huangdao Region in the Jiaozhou Bay Expressway. The annual average volume of traffic per day occurring in the area increased approximately 3 times from 7,522 vehicles in 1994 to 22,778 vehicles in 2001. As shown in Table 5 (See above Note 3 with respect to type of vehicle), after project completion in 1995, traffic volume continuously increased from the previous year but that of 1999 decreased from the level of 1998. This seemed to be attributed to the rise of expressway toll in 1997 and 1998 consecutively. Against the background of the expansion in automobiles holding volume resulting from the economic growth and the users gradual acceptance of the new tolling system, the traffic volume began to turn up again in 2000 onward.

Table 6： Changes of Tolling System for Jiaozhou Bay Expressway (Unit: RMB yuan/km)

Types of Vehicle	1996	1997	1998
Type 1	0.20	0.32	0.40
Type 2	0.26	0.40	0.60
Type 3	0.32	0.48	0.75
Type 4	0.48	0.72	1.00
Type 5	0.76	1.12	1.30
Type 6	—	—	1.60

Source: Implementation agency

2.3.2 Saving of Travel Time

Before completion of the project, land transportation between the city of Qingdao and Huangdao Region had been through the way of No.308 National Road, No.204 National Road and Wanghuang Road, and the total distance of this route had been approximately 100 km with total travel time of approximately 2.5 hours. Following the completion of this project, it needs only approximately 45 minutes, which is approximately 1 hour 15 minutes less than that by ferry transportation taking 2 hours from Quindao to Huangdao.

2.3.3 Transportation Volume of Ferry and Handling Volume of the Port of Qingdao

Data like ferry transportation volume of passengers and vehicles and Handling volume of the Port of Qingdao are also important indicators to measure the effectiveness of this project.

As what is indicated in Table 7, the number of passengers transported by ferryboats was showing an annual increase of 19% on average from the year of 1989 to 1995. But after it reached the peak in 1995, increase rate fell into negative level in 1996 and 1997 successively. Though it turned up again in 1998, it had not reached the level of 1995 up to the year of 2000. This is due to the diversion effect on the ferry transportation brought about by the completion of this project.

Ferry transportation volume of vehicles showed the trend similar to that of the passengers in that it reached the peak in 1995 and then slipped for the next 3 years owing to the above-mentioned diversion effect. Nevertheless, this figure appeared to be going up again starting from the year of 1999 with the sharp increase of vehicle holders as well as traffic volume as a result of the flourishing of economic activities.

The handling volume of the Port of Qingdao increased from 306.8 thousand ton to 734 thousand ton during the period between 1990 and 1999. When this is divided into two periods with the completion of the project in 1995 as the point of division, it appears that the annual average rate of increase in latter period would be 13.9% in comparison to 10.3% in the former one.

Table 7：Transportation Volume of Ferry and Handling Volume of the Port of Qingdao

	1989	1990	1991	1992	1993	1994	1995 comp-letion	1996	1997	1998	1999	2000
Ferry transportation of Passengers (10 thou. Persons)	277.3	292.6	339.4	403.9	475.2	518.3	600.6	512.6	479.0	484.4	541.5	563.0
Ferry transportation of vehicles (10 thou. vehicles)	23.77	26.12	30.54	40.15	43.53	44.01	57.79	44.17	50.15	48.89	57.10	59.00
Handling Volume of the Port of Qingdao (10 thou. Ton)	31.45	30.68	31.94	32.40	36.50	43.31	51.65	60.56	69.44	70.44	73.40	N.A.

Source: Implementation agency

2.3.4 Economic Internal Rate of Return (EIRR)

According to the result of recalculation of EIRR based on actual data of traffic volume and saving of transportation time given by the implementation agency, under the condition of project life as 25 years, EIRR of this project will be 12.4%, lower than the estimated figure of 16.7% calculated at the time of appraisal. The reason for this is that the actual cost of operation and maintenance will exceed the previously projected figures.

The method of recalculation is as follows:

As what was done at the time of appraisal, reduction of transportation cost and value of saved transportation time were regarded as items of benefit, while initial investment, operation and management, and major repair as items of cost, and then cash flows were calculated once again on this basis. To be more specific, in the process of recalculation, the above-mentioned items were respectively adjusted as follows:

1) Reduction of transportation cost was acquired through multiplying the previously estimated figures of cost reduction by the magnifications between the actual traffic volume, result of current forecast of the

future traffic volume and that of the previous one.

2) Value of saved transportation time was acquired through multiplying the previously estimated figures of this value by the above-mentioned magnifications as well as the average magnification between actual figures of transportation time and the previously estimated ones.

3) As for the items of initial investment, operation and maintenance, and major repair cost, the respective coefficients of conversion between FIRR and EIRR (0.89, 1.11, 1.21) adopted at the time of appraisal were used without change.

2.3.5 Financial Internal Rate of Return (FIRR)

According to the result of recalculation about FIRR based on actual data, under the condition of project life as 25 years, FIRR of this project will be 4.1%, lower than the estimated figure of 5.7% calculated at the time of appraisal. The reason for this is that the maintenance cost will be rising as a result of the raised standard of operation and maintenance, in spite of the increase of traffic volume and toll.

As shown in Table 8, actual revenue of this project has surpassed the estimated one since 1999, though it had never reached the level of the latter before 1999. On the other hand, actual cost of operation and maintenance has been exceeding the estimated figures and it appears that the margin is enlarging. The reason of this is that the possibility for the standard of operation and maintenance to be raised was not taken into consideration at the time of appraisal. Especially, the cost of operation and maintenance soared steeply in 2000 as a result of the facts that the quality standard of infrastructure construction had been revised since 1999, that the effect of erosion by sea breeze on the expressway along the coastal line had become evident, and that the install of ITS in 2000 gave rise to additional cost of maintenance.

Projected figures of revenue and cost of operation and maintenance in the near future are indicated in Table 8. The basis for revenue projection is the estimation that the traffic volume will maintain an average annual increase rate of 15% from 2001 through to 2005, but it will fall into 5% after the year of 2006, in contrast to the more optimistic forecast by the implementation agency of 15% increase rate over the whole period between 2001 and 2010. As for the cost of operation and maintenance, an average annual increase rate of 2% is projected, and an amount of 55.08 million RMB yuan used for regular checkup and repair (every 8 years) is included in the figure of 93.67 million RMB yuan of 2001 and 100.29 million RMB yuan of 2009 respectively.

Table 8：Changes of Revenue and O&M Cost（1996～2009）

（Unit：million RMB yuan）

		1994	1995 comp-letion	1996	1997	1998	1999	2000	2001
Revenue	Projected	N.A.	N.A.	104.28	113.18	118.64	123.76	130.23	137.01
	Actual	N.A.	N.A.	4.27	65.59	78.13	128.64	148.32	170.57
O&M cost	Projected	N.A.	N.A.	1.54	1.58	1.57	1.54	1.55	1.55
	Actual	N.A.	N.A.	10.91	25.4	21.65	25.52	37.83	93.67
		2002	2003	2004	2005	2006	2007	2008	2009
Revenue		196.15	225.58	259.41	298.32	313.24	328.90	345.35	362.62
O&M cost		39.6	40.15	40.95	41.7	42.60	43.45	44.32	100.29

Source: Implementation agency

2.4 Impact

The goal of this project is "to promote development of Huangdao Region of Qingdao City and to improve the environment for investment" through the realization of the objective of this project "to relieve the chronic traffic congestion in the gateways of the city". This section is to review how the completion of this project has contributed to the development of Qingdao City as a whole and the Huangdao Region in particular and to the improvement of the results in encouraging foreign capital investment.

2.4.1 Industrial Output

Table 9 shows the changes of industrial output in Qingdao City and the Huangdao Region from the year of 1989 through to 2000.

Table 9：Changes of Industrial Output in Qingdao City and the Huangdao Region

(Unit：billion yuan)

		1989	1990	1991	1992	1993	1994	1995 Comp-letion	1996	1997	1998	1999	2000
Qingdao	P	N.A.	N.A	N.A	N.A	N.A.	N.A	N.A	N.A	N.A.	N.A	N.A	N.A
	A	31.9	35.7	39.9	49.1	72.9	110.9	9.1	113.3	137.0	157.9	N.A.	N.A.
Huang-dao	P	N.A.	N.A.	N.A	N.A	N.A	N.A.	N.A	N.A.	N.A	N.A	N.A	10~15
	A	N.A.	0.35	0.42	1.16	1..3	4.2	6.63	6.68	9.18	11.06	1.34	18.04

Source: Implementation agency

Note: "P" stands for "projected figures", and "A" stands for "actual figures".

Compared with the level of 1994 just before the completion of this project, Qingdao"s industrial output in 1998 was 1.42 times higher, while that of the Huangdao Region was 2.63 times higher in 1998, and 4.3 times higher in 2000. Besides, the actual amount of 18.04 billion RMB yuan in the year of 2000 exceeded by a great margin the figure of 10~15 billion RMB yuan put forward as the target of the Huangdao Region at the time of appraisal. Although completion of the expressway construction project may not necessarily be the only factor in the rapid growth of industrial output, it is sure that this project has been intended to bring in this region the biggest benefit from the very beginning, and the data above has to some extent given the truth.

2.4.2 Flow-in of Foreign Capital

As shown in table 10, regarding the targets and results of encouraging foreign capital investment in the Economic & Technological Development Zone (ETDZ) of Huangdao Region, it is clear that the actual numbers of foreign firms moving into the ETDZ annually after the completion of this project have surpassed those in the years before the project"s completion, though data of previous projection are not available. As for the figures of investment, actual results have surpassed the projected figures consistently since the year of 1993.

It is worth pointing out that the amount of investment in 1994 slipped sharply because this figure had reached the peak in 1993 throughout the country including Hangdao Region, owing to a nationwide boom of investment fanned by the publication of the famous speech made by the late Mr. Deng Xiao-ping during his inspection tour to the Southern China. Nevertheless, the fact that figures of investment and the included foreign capital investment have been improved since the completion of this project evidences the impact of it to a certain degree.

Table 10：Changes of Investment Performance in the ETDZ

		1989	1990	1991	1992	1993	1994	1995 comp-letion	1996	1997	1998	1999	2000
Firms moved in(firm)	P	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	A	1819	1998	2198	2310	2445	2595	2701	2892	3109	3489	3721	3995
Foreign firms amid the above(firm)	P	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	A	21	58	72	122	201	242	295	321	367	431	502	585
Investment amount (billion yuan)	P	N.A.	5.8	7.7	9.7	11.7	13.7	15.7	18	20.3	22.6	24.9	27.3
	A	3.8	N.A.	N.A.	N.A.	395	93	124	156	185	214	246	302
Foreign capital amid the above (billion yuan)	P	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	A	N.A.	N.A.	N.A.	N.A.	8	16	29.	47	63	80	100	125

Source：Financial Agency of Huangdao ETDZ

2.4.3 Environmental Impacts

The implementation agency has planted dense trees on two sides of the expressway as well as grasses on the slopes, and thus it has been paying much attention to environmental impact. The Qingdao Communication Bureau made observations of the air at several sites of this project such as Nvgushan Great Bridge, Hetao, etc.

in 1997, and acquired results showing that the observed values of major indicators were right within the restriction values stipulated by the state, as indicated in Table 11. Therefore, at the point of 1997, negative environmental effects on air pollution by this project were not found. However, since further observed values have not been available, it is hard to judge whether there have been negative environmental effects or not so far.

Table 11： Observed Values Indicating the Density of Emission along the Expressway

（Unit：ppm）

	Restriction Values	Observed Values in 1997
CO_2	10.0	6.4
Nox	0.15	0.125
CnHm	1.50	1.50

Source: Implementation agency

Note: Restriction values were stipulated by China's standard.

On the other hand, negative effect of noise resulted from the completion of this project is basically considered very small. This is because residential areas in 3 villages of Shuangfucun, Xiaojiacun and Shanjiaocun relatively near the expressway are located more than 30 meters away from the expressway.

2.5 Sustainability

2.5.1 Operation and Maintenance Institution

The operation and maintenance institution (O&M institution) of this project had been Qingdao Highway Bureau (QHB)[1] until the month of July, 2001, which was subordinate to the Quingdao Communication Bureau(QCB). Presently, Qingdao Expressway Operation Division (QEOD)[2] independent of QHB is in charge of O&M.

2.5.2 Organization Structure of O&M

The organization chart of QEOD is attached as Appendix 1 at the end of the report.

QEOD has a staff of 195, including 1 director and 2 deputy directors, who directly supervise 10 administrative departments with 39 administrative staff members, who again control 13 operation departments with 153 operation staff members.

Regarding this project, data of all the tollgates are sent to the Administration Center through the online information network. In view of the operation performance in the past 5years since the Jiaozhou Bay Expressway was opened to traffic, especially of the fact that the operational cooperation and communication between the 9 tollgates and 1 Administrative Center has been carried on smoothly, it is reasonable to consider that the structure of the organization and the disposition of the staff members are rational.

2.5.3 Technical Capacity

To review the technical capacity of the O&M institution, it is necessary to look at the managers" operational skill and quality of management, as well as the way of supervision and control by the Administration Center over toll collection and telecommunication.

Recent year, the Administration Center has been reinforced by many new staff members, all of whom are college graduates majoring in Communication Engineering, Computer Science, Economic Administration, and Business Administration. As a result, the level of administration of the center has improved greatly. In addition, in order to improve its technical capacity, QEOD has constantly dispatched missions with managers and technicians as members to visit other expressway operational institutions with higher level of administrative expertise, and at the same time, it has invited experts from outside to give lectures and technical instructions to the managers and technicians.

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1 QHB is the same organization as had been expected at the time of appraisal.

2 Since July 2001, QEOD has been promoted to an organization under direct control of QCB from a department of QHB.

2.5.4 Financial Condition

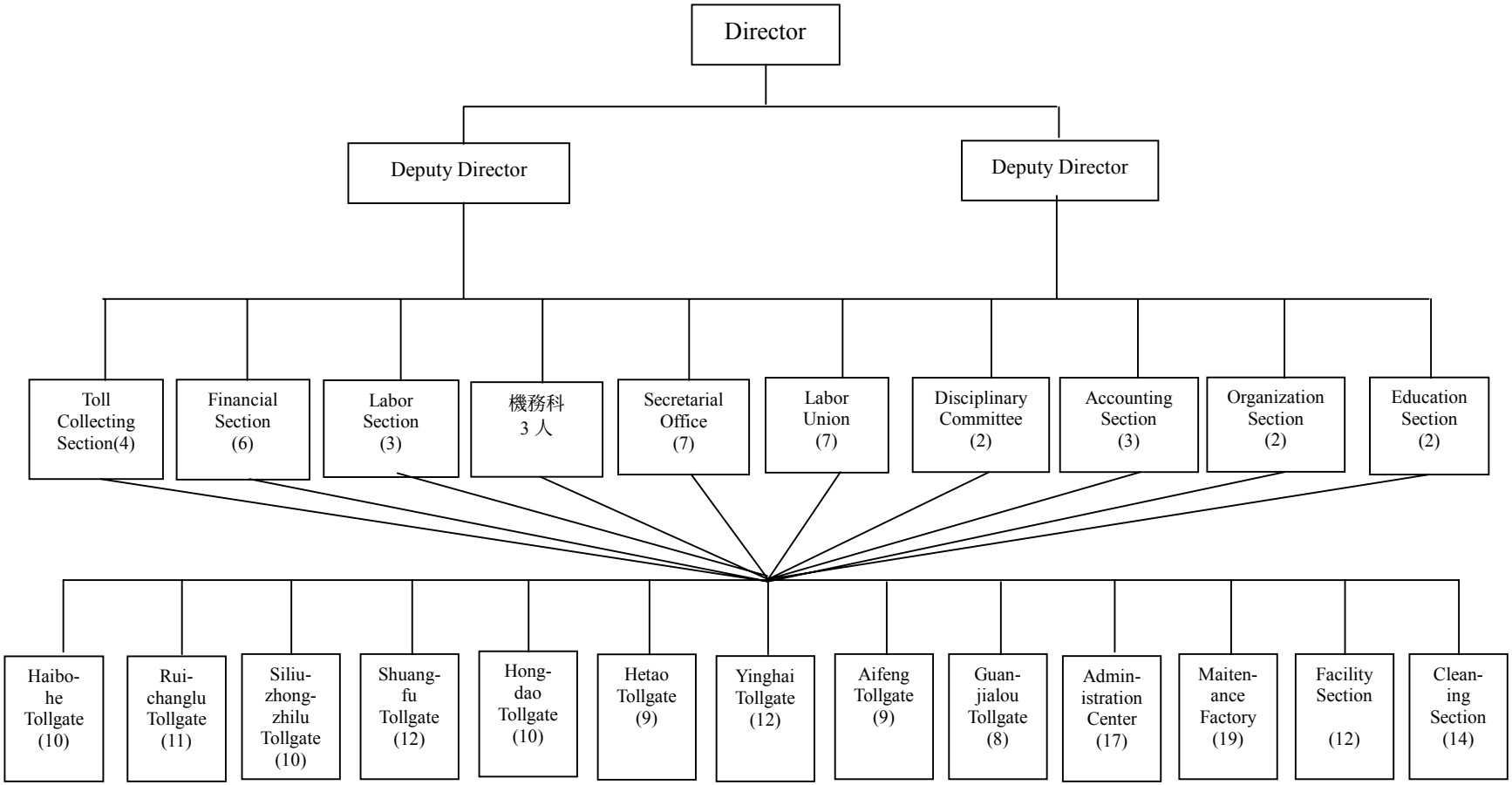
In China's construction projects, it is normal that construction work and the consequent O&M are undertaken respectively by different organizations. This project is not an exception in that, while the construction work was assumed by Qingdao Highway Construction Steering Office, the consequent O&M has been taken charge of by QEOD. Accordingly, though it is necessary to analyze the financial data of QEOD so as to evaluate the sustainability of this project because the financial data are not available from this institution, it is impossible to carry out the work of evaluation.

Comparison of Original and Actual Scope

Item	Plan	Actual
1. Project Scope		
1.1 Civil work (road):		
No.8 Wharf to Shuangfucun	15.4km×24.5m	15.4km×24.5m
Shuangfucun to Guanjialou	52.3km×23m	52.3km×23m
Liuting-Shuangfu Expressway	exclusion	7km, width unknown (original 24.5m)
1.2 Civil work (bridge)	21（bridge）	24（bridge）
1.3 Civil work (others):		
interchange	7	7
tollgate	9	9
monitoring & controlling center	1	1
1.4 Consulting service		
learning mission abroad sent by implementation agency	7.5M/M	7.5M/M
2. Implementation Schedule	Dec. 1989-Dec. 1994	Dec. 1989-Dec. 1995
3. Project Cost		
Foreign currency	8,800million yen	8,800million yen
Local currency	19,657 million yen（571.42million RMB）	25,270 million yen（1,715.6million RMB）
Total	28,457 million yen	34,019million yen
ODA loan portion	8,800 million yen	8,800 million yen
Exchange Rate	1RMB=34.4yen（Rate of 1990）	1RMB=14.7yen（Average rate in 1990~1995）

Appendix 1

Chart： Organization Structure of QEOD（July 2000）



Source: Implementation agency