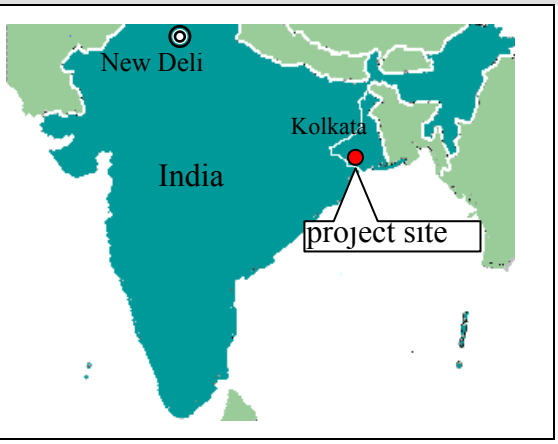
India

Calcutta Transport Infrastructure Development Project

External Evaluator: ISHII Koichi
Pegasus Engineering Corporation
Field Survey: January 2008

1. Project Profile and Japan's ODA Loan



Location of the project

Elevated intersection constructed under the project

1.1 Background

Kolkata[1] is the capital of the Indian state of West Bengal bordering on the states of Orissa, Bihar and Assam and the centre of commerce and industry in eastern India. It has a population of 4.85 million people (15.97 million people in the metropolitan area) (the census by the Kolkata Municipal Corporation in 2004). That is, it is a city that has the third largest population in India following Mumbai and Deli. In addition to the growing population, the number of cars has been rapidly increasing, thereby aggravating traffic congestion. With it, environmental problems including traffic pollution caused by exhaust gas loomed large. The ratio of roads to the entire land of Kolkata is 6.2%, which is far much lower than other large cities, for instance, Deli (22%) and Mumbai (18%). Furthermore, car traffic tended to gravitate to the inside of some important corridor roads, and the traffic of the central area was paralyzed during daytime. For example, the traffic of trucks had to be banned. There were also a great number of pedestrians in the city, and intersections inside the corridor roads were in dreadful confusion caused by cars and pedestrians. Traffic lights were installed at major intersections, but many of them were old and were not properly functioning. Hence, a

[1] The name of the city was changed in 2001 from Calcutta to Kolkata. The area of the state is 87,853 km^2, which is equivalent to that of Hokkaido. The city has an area of 185 km^2.

policeman stood to control traffic. In order to improve traffic order efficiently, it was essential to develop urban transport infrastructure so as to ensure a smooth traffic flow in each direction at major intersections through constructing elevated intersections that would ease traffic congestion at intersections in the central part of Kolkata.

1.2 Objective

The objective of the project is to improve accessibility into central and other parts of Kolkata by building elevated intersections and improvement of several existing road junctions, thereby contributing to the promotion of economic development, efficiency of public transport service and improvement of urban environment in Kolkata.

1.3 Borrower/Executing agency

President of India/Transport Department, State Government of West Bengal

1-4 Outline of the loan agreement (L/A)

Loan Amount/Disbursed Amount	10.679 billion yen / 10.531 billion yen
Date of Exchange of Notes/ Date of Loan Agreement	January 1997 / February 1997
Terms of Conditions - Interest Rate - Repayment Period (Grace Period) - Procurement	 2.1% 30 years (10 years) General Untied
Final Disbursement Date	December 2005
Principal contracts (More than 1 billion yen only is stipulated)	Senbo Engineering Ltd. (India) / Larsen & Toubro Ltd. (India) / Senbo Engineering Ltd. (India) – Skanska Cementation (JV) (India) / Tantia Construction Co., Ltd. (India)
Consultant contract (More than 100 million yen only is stipulated)	Yachiyo Engineering Co., Ltd. (Japan)
Feasibility study, etc.	JICA F/S (Calcutta Urban Transport Infrastructure Development Study: September 1992)

2. Finding (Overall rating: B)

2.1 Relevance (Rating: a)

2.1.1 Relevance of the Project at the time of appraisal

In the public investment program for the transport sector by the Indian government, the amount of investment in the railway sector was high at the time of appraisal. In the Seventh Five-year Plan (April 1985 ~ March 1990), the amount of public investment in the transport sector was 294.6 billion rupees, which accounted for 13.5% of the total public investment. In the transport sector, investments in the railway sector assumed the highest proportion, i.e., 56.2%, being followed by 21.5% in roads, 8.2% in water transportation and 6.6% in air transportation. In the Eighth Five-year Plan (April 1992 ~ March 1997), budgetary allocation to the transport sector amounted to 559.3 billion rupees, which showed an increase over the amount of the previous five-year plan. Also, at the time of appraisal, approximately 30% of the Indian population was concentrated in urban districts. Thus, urban transport chaos posed a serious problem in India. In Kolkata as well, there was a profound need for expanding the road capacity to relieve traffic jams. In particular, required were increases in the road capacity in urban districts, improvements in traffic speed and construction of elevated intersections or improvement of road junctions in urban districts. The following effects were expected; higher efficiency of transportation systems by reducing traffic congestion, greater accessibility, decentralization of residential and commercial areas, and improvements in air and noise pollution.

2.1.2 Relevance of the Project at the time of evaluation

The Tenth Five-year Plan (April 2002 ~ March 2007) included the improvement of public transportation systems as one of focal measures from the perspective of safety, energy efficiency and environmental conservation in addition to the measures to meet demand for transportation that has been increasing in proportion with recent economic growth. The significance of urban transport infrastructure development was pointed out in the existing common strategy (May 2004). Similarly, the Eleventh Five-year Plan (April 2007 ~ March 2012) continues to refer to the importance of the same issue. Thus, a transport sector policy carries considerable weight.

In Kolkata the traffic congestion caused by a growing demand for road transport poses a serious problem in terms of economic losses and aggravating health damage due to car pollution such as air and noise pollution. Hence, it is essential to develop public transportation systems in order to relieve traffic jams and improve the urban environment. Likewise, in order to reduce health damage caused by air and noise pollution, the necessity is recognized to improve

the urban environment through relieving traffic jams.

Therefore, this project is in accord with the national plans in that it contributes to the city's economic growth, increasing the service of public transportation and improving the urban environment. That is, the necessity and relevance of the project are extremely high.

2.2 Efficiency (Rating: c)

2.2.1 Output

The following table 1 demonstrates a comparison of outputs between plan and performance in terms of elevated intersections constructed and the distance of urban roads that have been developed or improved under the project. It also indicates the extension of the plan. There are some differences between plan and performance. One reason was, for instance, that there was an unexpected situation requiring a procedure to move buried objects that had been found upon the implementation of the project at a different location from that shown on the original drawing possessed by related executing agencies. As a result, a part of the plan had to be called off. Similarly, in 2002 and 2004 a change in the plan was proposed to JBIC. Upon its approval, the work to improve a given distance of a major road was added based upon the Additional Wide Area Traffic Management Program[2] (Table 2).

The target area of the project is the city of Kolkata with a population of some 4.85 million people.

Table 1 Comparison of outputs between the plan at the time of appraisal and performance

	Name of intersection (improved type)	Plan (at the time of appraisal)	Actual (at the time of ex-post evaluation)
1	Moulali (elevated intersection)	Length of bridge: 437 m (4-lane)	Cancelled the construction due to impossibility to move buried objects such as water pipes
2	Esplanade (grade crossing improvement)	Improvement of grade crossing	As per the plan
3	Gariahat (elevated intersection)	Length of bridge: 379 m (2-lane)	Length of bridge: 131 m (4-lane) (Reviewed at the detailed design)
4	Shyambazar (grade crossing improvement)	Improvement of grade crossing	Cancelled the construction due to the impossibility of relocating a monument
5/6	Rabindra Sada/Beck Bagan (continual elevated intersection)	Length of bridge: 2007 m (3-lane)	Length of bridge: 3910 m (2-lane) (Reviewed at the detailed design)
7	Maniktala (grade crossing improvement)	Improvement of grade crossing	Cancelled the construction due to the impossibility to move buried objects such as water pipes
8	Park Street (elevated intersection)	Length of bridge: 356 m (4-lane)	Length of bridge: 353 m (4-lane) (Delayed because of the time to acquire military property)

[2] Additional Wide Area Traffic Management Program

9	Lock Gate (elevated intersection)	Length of bridge: 430 m (4-lane)	Length of bridge: 590 m (2-lane) (Delayed because of the time to acquire railway property)
10	Mullikbazar (elevated intersection)	Length of bridge: 277 m (2-lane)	Cancelled the construction due to the impossibility to move buried objects such as water pipes

Source: Project Completion Report (PCR)

The following table indicates an outline of additional development work for improvement of intersections in the areas targeted under the abovementioned Additional Wide Area Traffic Management Program.

Table 2 Additional work: Performance of improvement of crossing points and roads in the vicinity of elevated intersection

No.	Name of the intersection	Type of improvement	Distance
11-1	Ballygunge Phari	Road widening, electric tramway improvement, crossing improvement, installation of traffic lights	0.8 km
11-2	Gariahat Road	Road widening, electric tramway improvement, crossing improvement, installation of traffic lights	2.0 km
11-3	Southern Avenue	Road widening, crossing improvement, installation of traffic lights	0.4 km
11-4	Syed Amir Ali Avenue	Road widening, electric tramway improvement, crossing improvement, installation of traffic lights	2.2 km
11-5	Park Street	Road widening, crossing improvement	0.6 km
11-6	New Park Street	Road widening, crossing improvement	1.6 km
11-7	Acharya Prafulla Chandra Road	Road widening, electric tramway improvement, crossings improvement, installation of traffic lights	2.0 km
11-8	Canal East Road	Road pavement, crossing improvement and installation of traffic lights	2.8 km
11-9	Maniktala Junction	Road repavement, electric tramway improvement, crossing improvement	0.2 km
11-10	Park Circus Gyratory	Road repavement, electric tramway improvement, crossing improvement	0.2 km
11-11	Rashbehari Avenue	Electric tramway improvement, crossing improvement	0.4 km

Source: Consultants' Final Report, 05 on consulting work about the detailed design and implementation supervision

The added work to improve roads in the vicinity was carried out in the areas that led to elevated intersections, which the Additional Wide Area Traffic Management Program discussed with priority. In the process of revising the contents of the project, the consultant had examined the change from a technical point of view and approved its usefulness. Hence, it can be stated that the outputs including the additional work were achieved in compliance to the actual conditions of the local needs.

Flyover

Added work area

2.2.2 Project Period

At the time of appraisal, the implementation period of this project was set for 56 months from May 1997 to December 2001. However, in fact, it was extended to 102 months from May 1997 to October 2005. In other words, there was a delay of 46 months in total and greatly exceeding the duration of the original plan by about 1.8 times (In the contract packages 1 and 2 with constructors, there were 20.5 months' delay and 43 months' delay respectively). The main reason for the delay was that it took time to secure human and material resources in the lack of implementing capacity on the side of the contractor and to acquire land and relocate in buried objects such as water pipes.

2.2.3 Project Cost

The real total cost of the project was 13.066 billion yen vis-à-vis 12.563 billion yen on the plan. That is, it went slightly beyond the estimates of the original plan (104%).[3] The reasons for the excess were, first, that domestic currency was increased due to exchange rate fluctuations during the implementation period of the project and, second, that the cost of additional work to improve roads in the vicinity went over the expenses originally allocated to the construction of elevated intersections that had been cancelled. The project cost of the additional work is 1.69 billion yen, which accounts for 12.3% of the total project cost.

The cost of this project was slightly over the planned cost, and its duration was greatly extended over the planned period. Hence, efficiency is rated low. However, traffic jams are in particular heavy in the city of Kolkata, which is one of the largest cities in India. As a result, to deal with the traffic congestion during construction, sufficient measures were taken (such as specifications of prefabricated building materials, creation of detours and traffic control, etc.). Furthermore, no serious accidents were reported. It indeed deserves special mention that safety was thus secured in the central part of the large city that had heavy traffic.

[3] It includes exchange rate fluctuations. On the Indian rupee base, an amount of 4.001 billion rupees at the time of planning was increased to 4.864 billion rupees, which was a 122% increase.

2.3 Effectiveness (Rating: a)

2.3.1 Time Saving and Average Velocity Increase

The intersections and the roads constructed through the project contributed to smooth traffic of road transport in that the time required to move and the average traffic speed in the city have been improved. According to the speed survey carried out in the city, the average velocity of seven routes[4] in the city increased to 19.6km/h from 12.9km/h (1992). The length of traffic congestion at intersections was approximately 400m in 1992 according to the JICA's study, whereas it was shortened to about some tens of meters at nearly all intersections, to put it another way, about one minute's waiting, when we observed in 2008. This is because the crossing improvements have eased traffic jams.

According to the findings of a beneficiary survey of 252 road users such as drivers, 77% of the respondents replied that time taken in driving was reduced in comparison to the time before the project and 79% replied that traffic was indeed improved primarily due to increased driving speed. Thus, it can be evaluated that the project has produced a good effect in securing an efficient means of transport.

2.3.2 Increase in Traffic Volume

Traffic volume at intersections where flyovers were constructed under this project has been steadily increasing. The traffic volume has actually doubled at maximum at the time of appraisal over the time of ex-post evaluation. Similarly, road traffic volume at intersections where flyovers had been constructed has greatly increased in comparison to those where flyover construction had been cancelled (as indicated by Table 3). What this means is that the traffic flow on a road connecting to an elevated intersection has been smoothed and synchronized, thereby contributing to the improvement of road networks within the entire city.

A rapid increase on Park Street (No. 8) shown in the following table has been due in all likelihood to the newly constructed second Hooghly Bridge ahead of the point of intersection in addition to the construction of an elevated intersection. Table 4 indicates changes in traffic volume at peak times[5] before and after the implementation of the project. The four intersections shown in the table are those where flyovers have been constructed under this project.

[4] Deshapran Sasmal Road – Raja Manindra Road – 15.5km, Diamond Harbour Road – B T Road – 17.0 km, Garihat Road – Part Street – 6.5 km, Howrah Bridge – MG Road – 3.9 km, Lenin Sarani – Convent Lane – 3.8 km, Najrul Islam Ave. – Vivekananda Road – 5.7 km, Circus Avenue – 0.5 km.

[5] The peak times are defined as 09:00 ~ 11:00 and 16:00 ~ 18:00.

Table 3 Traffic volume at each intersection (12 hours, converted into PCU[6], and counted only the moving direction where a larger traffic volume is observed)

No. of intersection	Name of the intersection	JICA survey[7]	Survey by the Transport Dept., West Bengal		
		Nov. 1991 Performance (A)	Mar. 1996 Performance (B)	2006 Performance (D)	Growth rate (%) (D – B)/B
No. 1	Moulali	18,750	19,688	26,947	36.9
No. 2	Esplanade	17,654	21,023	30,305	44.2
No. 3	Gariahat*	13.257	16,230	28,977	78.5
No. 4	Shyambazar	14.102	18,682	20,364	9.0
No. 5	Rabindra Sadan*	14,590	14,842	28,994	95.4
No. 6	Beck Bagan*	15,139	17,866	32,182	80.1
No. 7	Maniktala	11,275	13,456	16,396	21.8
No. 8	Park Street*	22,277	29,442	55,609	88.9
No. 10	Mullikbazar	17,302	18,700	25,453	36.1

Source: Appraisal Report of JBIC (1996), Traffic Volume Survey Data by the Transport Department, Stage Government of West Bengal (2006)
Note: Mark * indicates that it is an intersection where a flyover has been constructed.

Table 4: Change in traffic volume at peak times before and after the project (the number of cars/day)

Intersection	Direction	Before (A)	After Sep. 2006 (B)	Increase rate (%) (B-A)/A	At time of evaluation Feb. 2008 (C)	Increase rate (%) (C-A) / A
AJC BOSE	West→East	400	1,414	253	1,840	360
	East→West	274	1,581	477	2,054	650
GARIAHAT	North→South	950	1,818	91	2,314	144
	South→North	1,090	2,484	128	2,872	163
PARK	South→North	1,976	3,103	57	4,437	125
	North→South	1,746	2,005	15	3,226	85
LOCK GATE	South→North	475	668	41	930	96
	North→South	234	711	203	1,046	347

Source: Project Completion Report (PCR)/ Data at the time of the field survey

The number of registered vehicles[8] in Kolkata has increased to 947,929 in 2006 from

[6] Passenger Car Unit
[7] Calcutta Urban Transport Infrastructure Development Study by JICA (aiming to relieve traffic congestion in the city of Calcutta)

586,576 in 1996, that is, by 62%.[9] It must be taken into account that this increase is one of the reasons for the increases in traffic volume.

2.3.3 Comfort of Driving

At the four points of intersection where flyovers have been constructed (Park Street, Lock Gate, Gariahat and AJC Bose Road), the beneficiary survey of a population of 252 persons including road users and residents along the roads[10], 73% of the users are aware of the improved comfort of driving after the construction of an elevated intersection. The reasons why the comfort of driving has got better lie in time saving and velocity increase. At the same time, 65% of the respondents point out the safety of the elevated intersections. Furthermore, as to the effect of the project, responses were "road transport improvements" from 79% of the respondents, "relief of traffic congestion" from 77%, "shortened commuting time" from 77% and "improvements in the city's environment" from 89%.

2.3.4 Economic Internal Rate of Return (EIRR)

The following Table 5 compares the economic internal rate of return brought about by this project at the time of appraisal with performance. The cost incurred under this project includes construction expenses, operation and maintenance expenses (4% of the construction cost), expenses for consultation service rendered after the revision of the plan, and interests during the duration of construction. A benefit is that an improved traffic flow at intersections will lead to increased velocity, thereby reducing the time required and cutting down the operating cost per mile (fuel cost). These factors have been quantitatively computed. The project life is set for 20 years.

Table 5: Comparison of EIRR

Estimate at time of appraisal	Performance
20.1%	16.1%

One reason for the lowered rate of return in comparison to the estimate is the delay in the construction period of this project. In fact, it is confirmed that the time required is shortened

[8] Based on the data on the number of registered vehicles at the Transport Department of West Bengal

[9] Reasons why or situations in which the number of registered vehicles has increased are a growing number of urban population, rapid economic growth and increased supplies of domestic vehicles.

[10] The respondents are constituted of 35% self-employed, 31% company employees and others including commuters 34%.

and traffic volume is greater than that at the time of appraisal. To put it another way, the delay in completing the project has resulted in deferring the time of manifestation of the benefits of time saving and the vehicle operating cost, thereby lowering the rate of return. Another reason is that an effect of fuel cost saving was reviewed and changed at the time of ex-post evaluation because the rate had been set too high at the time of appraisal. Nonetheless, the numerical value of performance indicates that the investment in this project has indeed led to the appropriate distribution of resources from the viewpoint of national economy, and economic profitability still remains sufficient.

2.3.5 Qualitative Effect (smooth road transport)

Improvements in intersections and traffic lights and also the road widening contributed to relief of traffic congestion, thereby making traffic flow smooth. In order to expect further an all-out effect of the improvements in urban transport, it will be essential to enforce a public transport program and develop overall urban transport infrastructure including traffic safety in parallel with other infrastructure development projects that have been planned, in addition to the infrastructure development done under this project over a long period of time continuously.

Based on the above discussion, it can be concluded that the effectiveness of the project is high in that its expected effects have been manifested as had been planned in general.

A view of road transport

A view of an elevated intersection

2.4 Impact

2.4.1 Economic Growth in Urban Area

2.4.1.1 Transition in the Gross Product of West Bengal

As Table 6 indicates, the economic growth rate in the whole state of West Bengal has been kept continuously high. The expansion of traffic volume as a result of the project has solved the bottleneck of physical distribution,[11] thus contributing to the promotion of commercial

[11] Here it means that smooth flow of passengers and goods is hindered by traffic congestion.

activities in the areas along the roads. Some of the elevated intersections that have been constructed are on major roads which connect with the newly constructed Hooghly Bridge.[12] That is, by increasing accessibility to the central part of Kolkata from the bridge, it is expected to decentralize residential and commercial areas.

Table 6: Transition in gross product of West Bengal (Average growth rate : Real GDP)

(In 100,000 rupees)

FY	1999	2000	2001	2002	2003	2004	2005
GDP	73,527	78,254	83,849	89,792	96,478	103,362	111,704
Index	100.00	106.43	114.04	122.51	131.21	140.58	151.92
Growth rate (%)	8.55	6.43	7.15	8.55	7.10	7.14	8.07

Source: Statistics Department, West Bengal (2007)

2.4.1.2 Impact upon Regional Residents

A survey was conducted on beneficiaries (i.e. residents) as to the impact upon convenience related to the mobility of residents along the roads which were the project's target. It was confirmed that 62% of the respondents used one of the target intersections of the project at least once a week for daily activities including business, shopping, trading at market or going to school. That is, this project has had a great deal of influence on the vitalization of daily activities and commercial activities among regional residents.

2.4.2. Improvements in Public Transport Service and Traffic Safety

The main means of transportation among the majority of residents in the target areas of the project is public transport services such as tram[13] and bus. According to an interview survey carried out among the parties engaged in main public transport services (drivers and bus service corporations, etc.), the time required to arrive at major places on bus routes in each district has been reduced about by half and the frequency of bus service has increased by about 2 ~ 3 times in comparison to the time before the project was implemented. Thus, this project has evidently contributed to the expansion of public transport and the improvement of service.

The expansion and qualitative improvement of the means of public transport have yielded a positive change to the use of roads by residents living in the vicinity. The purposes of use of roads by residents who now enjoy a broader field of mobility include recreation/leisure and

[12] The second Hooghly Bridge has a function as a bypass of the old Hooghly Bridge that connects the road network of Kolkata that is detached by the River Hooghly.

[13] Due to the implementation of the project, the frequency of tram service has increased because of relief of traffic jams, thereby expanding its transporting capacity as public transport service.

trading and shopping in the market. That is, business chances are created. The expansion of the means of public transport helps to realize an increase in such chances.

On the other hand, in India people do not have enough awareness of driving in a car lane in general. That is, a great number of cars run in confusion. Another problem is that drivers tend to have a faint sense of observing traffic rules and regulations in India. The activity for improving traffic safety (educational activities to observe traffic rules, etc.) is not included in this project in general, thus it is recommended that the Transport Department of West Bengal takes measures to improve overall traffic conditions including traffic safety in parallel with infrastructure development. If such measures are pushed forward, it can be expected that urban transport service including subways and tramways will be improved further as well.

2.4.3 Effect to Urban Environment

According to the environmental monitoring of urban transport carried out twice a year by the environment section of Kolkata city government, air pollutants (SO_2, NO_2, CO and SPM) have been on the decrease in general. However, the value of SPM (suspended particulate matter) is higher than the standard value. To address this issue, the city authority has been exploring the possibility of regulating the exhaust gas of diesel cars that are the main source of its emission. Further, the level of noise[14] has been going down in comparison to the time prior to the implementation of the project. This is because the flow of cars has become smoother at intersections despite an increased traffic volume of cars. Although noise pollution has been improved, the level has not yet met the noise standard of India[15]. The survey of beneficiaries finds that 37% of the respondents think that drivers honk meaninglessly and 41% of them point out that the honking is the source of noise pollution. The car operating cost (primarily fuel cost) has gone down by about 10% when it is compared between the time prior to the project and the time after the project by using the fuel consumption coefficient.

There are many historical constructions in Kolkata. It is a matter of importance to protect the buildings and maintain and improve the environment. It is indeed noteworthy that in parallel with the progress of the project, parks and plazas were built and also plants were planted on the medial strip.

2.4.4 Effect to Social Environment (acquisition of land/relocation of residents, etc.)

The executing agency should have carried out a detailed survey of buried objects and secure smooth coordination among related organizations about the acquisition of land before the start of the project. The plan had to be changed because of the fact that the locations of buried

[14] There is no difference between summer and winter.

[15] The environmental quality standard of noise is 65dB in the commercial area and during daytime.

objects were different from the locations that had been initially assumed. Concerning the measures to address such risk factors as to acquire land and relocate facilities, it will be necessary to study the possibility of carrying out a detailed survey of buried objects before the start of the project or to secure coordination among related parties at the time of acquiring land. The possibility of relocating the monument in relation to the acquisition of land was one of the issues that should have been grasped through the environmental and social impact assessment in advance. However, the plan to move the monument had not been formulated. As a result, its relocation ran into opposition from residents, whereby the acquisition of the land around the monument had to be given up.

The two houses owned by the Indian Railway that had stood under a planned elevated intersection No.9 were demolished according to the plan, and new houses were built on another lot. The expenditure incurred in this relocation was paid by the government of West Bengal to the Indian Railway as had been planned.

Vehicles on the flyover

Plants on the marginal strip

2.5 Sustainability (Rating: a)

2.5.1 Executing agency

(1) Organisation

The executing agency of this project is the Transport Department of West Bengal, which assumes the responsibilities of planning and implementing the project and operating and maintaining facilities. The Department has a staff of approximately 45,000 persons including those working for subsidiary organizations. The size of the staff remains the same after the implementation of the project. The Department is fully equipped with experience and techniques concerning the designing/planning of road facilities. It is responsible for acquiring necessary land for the project, securing coordination with related organizations and carrying out major changes of the plan.

The organization that implements the project in the field is the Hooghly River Bridge Commissioners (hereinafter referred to as HRBC) under the supervision of the Transport Department of West Bengal based upon the state government's order. It becomes the party to the contract with constructors and is in charge of formulating, executing and managing an implementation plan jointly with contract awardees. HRBC is responsible for the operation and maintenance of trunk roads including the target roads of this project. That is, it carries out the work relating to operation and maintenance including day-to-day, periodic and special repair works. There is no special problem with the organization to conduct the operation and maintenance of roads.

(2) Technical capacity

In the consulting service under this project, daily training was provided to HRBC. Hence, it has sufficient technology and capacity to coordinate and supervise works and operate and maintain the facilities built under this project. It has set up a system to provide periodical training necessary for the management of works and for operation and maintenance and to cope with an unforeseen situation in the future. With respect to technical skills of staff members who perform operation and maintenance, there is no technical problem in particular in that training is regularly provided to its employees concerning basic techniques for the operation and maintenance of roads (such as repairs of exfoliated parts of pavement, cracks in road surface and subsidence of road surface, etc.) and driving of heavy machines. Thus, HRBC does not have any major problems with its technical capacity.

(3) Financial status

Considering the conditions of operation and maintenance of trunk roads in the city that are under the control of HRBC, a budgetary size of 200 ~ 300 million rupees is appropriate and the financial position has been stable. It is also appropriate that the percentage of budget allocation to the Transport Department is approximately one percent of the total State's budget in that it is equivalent nearly to the percentages of other states. In recent years, the budget of the Department has been on the rise due primarily to the construction of the second Hooghly Bridge. The financial source required for the operation and maintenance of the facilities under the control of HRBC is ensured stable.

Table 7: Budget allocation to the executing agency (in one million rupees)

Fiscal year	96/97	97/98	98/99	99/00	00/01	01/02
(1)HRBC's budget disbursed	90	120	150	140	120	170
Fiscal year	02/03	03/04	04/05	05/06	06/07	07/08
(2)HRBC's budget disbursed	240	160	210	230	270	320
(3)Transport Dept's budget disbursed	3,103	2,638	3,299	4,038	4,272	4,643
(4)State's budget disbursed	267,320	252,947	385,175	429,188	427,008	477,489
(5)Ratio{(3)÷(4)} x 100	1.2%	1.0%	0.9%	1.0%	1.0%	1.0%

Source: Appraisal Report by JBIC Board of Directors (Upper column), Project Completion Report (lower column)

2.5.2 Operations and maintenance

The Operation and Maintenance Division of HRBC is responsible for regular inspections of road facilities and daily, periodic and special works, and the Quality Control Division is responsible for the assurance of the quality of operation and maintenance. On the other hand, the Facilities Division takes care of regular inspections of electric equipment and the safety and management of power and electric systems. According to the HRBC's operation and maintenance plan, important facilities are repainted every four years to prevent metal corrosion, and asphalt pavements are given maintenance work every eight years although the frequency varies according to the traffic volume. The facilities after the end of the project have been kept in conditions. Also, considerations are taken for traffic safety against, for instance, the falling of an object from the flyovers in particular. The staff in charge of operation and maintenance consists of 17 persons out of 47 total technical employees. After the completion of the facilities, the size of the staff was increased by six persons. The staff members follow the facility inspection manual that has been prepared during consulting service and are equipped with sufficient experience and techniques to be engaged in operation and maintenance work involving daily inspection (visual check carried out in regular rounds), periodic inspection (every three years), special inspection and inspection at an unusual time. The basics of the operation and maintenance of road facilities include discovery of an unusual state through periodic or discretionary inspection and measures to address a problem.

As for a budget for the operation and maintenance of roads, the executing agency understands that its financial source is stably secured to conduct properly the operation and maintenance of the facilities built under the project.

At the time of this field study, an investigation (visual) of road surface of the target roads of this project indicated that the conditions of roads (surface and shoulder) and flyovers were maintained in very good conditions on average due partly to the fact that it was rather immediately after improvements or maintenance. The following table shows the total amount

of budget for operation and maintenance for urban trunk roads and a budget for operation and maintenance of the flyovers constructed under this project. At the time of appraisal, it was estimated that a yearly budget for operation and maintenance of the facilities would be 4% or less of the construction cost. However, some flyover facilities were not constructed. Therefore, the actual amount was lower in comparison to the estimated amount.

Table 8 Transition in the budget for operation and maintenance of roads

(In one million rupees)

Fiscal year	09/03	03/04	04/03	05/06	06/07	07/08
Total operation & maintenance	39	40	43	52	57	58
The project	-	4	6	11	12	14

Source: Data submitted by the executing agency (at time of appraisal)

Based upon the above, it can be appraised that problems were found neither with the capacity nor with the operation and maintenance system of the executing agency of this project. High levels of sustainability are anticipated.

3. Conclusion, Lessons learned and Recommendations

3.1 Conclusion

In the light of the above, the overall evaluation of the project is high.

3.2 Lessons learned

(To the executing agency)

In road development under this project, the delay was caused by the problems related to acquiring land and relocating facility and also the lack of capacity of contractors. What should be kept in mind, when a similar project is implemented in the future, is that smooth acquisition of land can be assured by giving due consideration to the opinions of residents and related parties. At the same time, essential is to carry out a survey of buried objects and other necessary surveys required for the acquisition of land at an early stage as has been proposed in the feasibility study by JICA. It is also recommended to establish a system that will properly function so as to secure coordination between the executing agency and other governmental organizations that will be in charge of moving buried objects. Furthermore, in order to avoid delay in a project, it will be vital to strengthen the institutional capacity of the executing agency, examine more carefully the implementing capacity of contractors in the screening process of

contractors and carry out adequate monitoring of the contractors.

Under this project the foundation of the tramway was improved, but the improvement was based upon only a short-term improvement plan. In order to enhance effectiveness of urban transport infrastructure development, what is required is to continue comprehensive urban transport infrastructure development over a long period of time including public transport plan and traffic safety. The Transport Department of the West Bengal, which is the executing agency, plans to construct a west-east metro line with new Japanese ODA loans. Taking these issues into account, it is hoped that a Kolkata metropolitan public transport program based upon a long-term perspective be formulated.

3.3 Recommendations

(To the executing agency)

The need of constructing the elevated intersections that had to be called off under this project still remains acute. Their prompt construction is to be desired, after having studied the possibility of an alternative technical proposal such as the construction of bridge piers with narrow cross-section that will make the relocation of buried objects unnecessary.

There are some cases in which problems arise such as increase in the number of car accidents and raised noise level through increased traffic volume and driving speed after roads have been developed. Hence, in addition to physical infrastructure development, the executing agency will need to give consideration and take measures to address such intangible issues as safety measures (for staying on the car lane) and noise control measures (for not honking meaninglessly) in collaboration with related organizations.

Comparison of original and actual scope

Item		Plan (at the time of appraisal)		Actual (at the time of ex-post evaluation)
(1) Output				
No.	Name of intersection	Type of improvement	Content of improvement	
1	Moulali	Elevated intersection	Bridge length 437m, 4 lanes	Cancelled
2	Esplanade	Improvement of grade crossing	Improvement of level crossing	As planned
3	Gariahat	Elevated intersection	Bridge length 379m, 2 lanes	Bridge length 131m, 4 lanes
4	Shyambazar	Improvement of grade crossing	Improvement of crossing point	Cancelled
5/6	Rabindra Sadan/Beck Bagan	Continual elevated intersection	Bridge length 2,007 m 3 lanes	Bridge length 3,910 m 2 lanes
7	Maniktala	Improvement of grade crossing	Improvement of crossing point	Cancelled
8	Park Street	Elevated intersection	Bridge length 356m, 4 lanes	Bridge length 353m, 4 lanes
9	Lock Gate	Elevated intersection	Bridge length 430m, 4 lanes	Bridge length 590m, 2 lanes
10	Mullikbazar	Elevated intersection	Bridge length 277m, 2 lanes	Cancelled
11-1	Ballygunge Phari	Improvement of roads	Additional work	
11-2	Gariahat Road	Improvement of roads	Additional work	
11-3	Southern Avenue	Improvement of roads	Additional work	
11-4	Syed Amir Ali Avenue	Improvement of roads	Additional work	
11-5	Park Street	Improvement of roads	Additional work	
11-6	New Park Street	Improvement of roads	Additional work	
11-7	Acharya Prafulla Chandra Road	Improvement of the tramway tracks	Additional work	
11-8	Canal East Road	Improvement of roads	Additional work	
11-9	Park Circus Gyratory	Improvement of roads	Additional work	
11-10	Rashbohari Avenue	Improvement of the tramway tracks	Additional work	
11-11	Rashbehari Avenue	Improvement of roads	Additional work	
Consulting service		Review of the existing studies; detailed plan; assist with making tenders for principal work; supervision of construction		As planned
(2) Project period		May 1997 ~ December 2001 (4 years and 8 months)		May 1997 ~ Oct. 2005 (8 years & 6 months)
(3) Project cost				
Foreign Currency		3.240 billion yen		10.530 billion yen
Loan Currency		9.323 billion yen		2.536 billion yen
		(2.969 billion rupees)		(0.944 billion rupees)
Total		12.563 billion yen		13.066 billion yen
ODA Loan Portion		10.679 billion yen		10.531 billion yen
Rate		1 rupee = 3.14 yen		1 rupee = 2.686 yen
		(As of May 1996)		(As of Nov. 2006)