

The Federal Democratic Republic of Nepal

Ex-Post Evaluation of Japanese Grant Aid Project

“The Project for the Improvement of the Kathmandu-Bhaktapur Road in Nepal”

External Evaluator: Hirofumi Azeta, Japan Economic Research Institute Inc.

0. Summary

The objective of this project is to reduce the traffic congestion and traffic accidents on the Kathmandu – Bhaktapur Road, and also to reduce the travel time between the capital city of Kathmandu and the tourist city of Bhaktapur, by expanding the existing road to four lanes, thereby contributing to the industrial and economic development of the regions along the Road. This project has been highly relevant to the country’s development plan and development needs, as well as Japan’s ODA policy. Therefore its relevance is high. Although the project cost was within the plan, the project period exceeded the plan, due to uncertainty in the political situation. Therefore efficiency of the project is fair. The targets for traffic volume and the travel time between Kathmandu-Bhaktapur are achieved and the ratios of traffic accidents and casualties to traffic volume do not show increases, so the effectiveness of the project is high. The construction of the Road led to the industrial development of the region along the Road, as well as activation of the regional economy and improvement in the public transport services. Therefore, this project has largely achieved its objectives, and thus the effectiveness and impact of the project are high. The institutional, technical and financial aspects of operation and maintenance do not have any problems, and the sustainability of the effects achieved by this project is high.

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

1. Project Description



Project location



The road developed in this project

1.1 Background

At the time of the project planning, population concentration towards the Kathmandu Valley, the national center of politics, economy and administration, was remarkable. In the Kathmandu Valley, most of the political, administrative and commercial functions are concentrated in Kathmandu City while residential houses and factories were rapidly increasing at the time of the project planning in Madhyapur Thimi City and Bhaktapur City, located at the east of the Valley.

The Kathmandu-Bhaktapur Road, which was constructed under this project, is a national road which connects Kathmandu City, the Capital of Nepal to Bhaktapur City, a tourist city where a world heritage site is located. At the same time, the Road is a part of the Arniko Highway (Asia Highway No. 42) which leads from Kathmandu to China. Before the project, the Road was heavily congested, not only during peak hours but even during non-peak hours, due to the rapid increase in the number of car registrations in the Kathmandu Valley.

Therefore, the Department of Roads (DOR) of the Ministry of Physical Planning and Works (the Ministry of Physical Infrastructure and Transport at present) regarded the expansion of the Road as a priority project in the Master Plan for a Strategic Road Network.

This project is a grant aid project to widen the existing two lane road between Kathmandu (Tinkune Intersection) and Bhaktapur (Suryabinayak Intersection) to four lanes.

A further increase in traffic volume on the Road was expected as the Road would provide links to the eastern Terai Region when the construction of the Sinduli Road was completed.

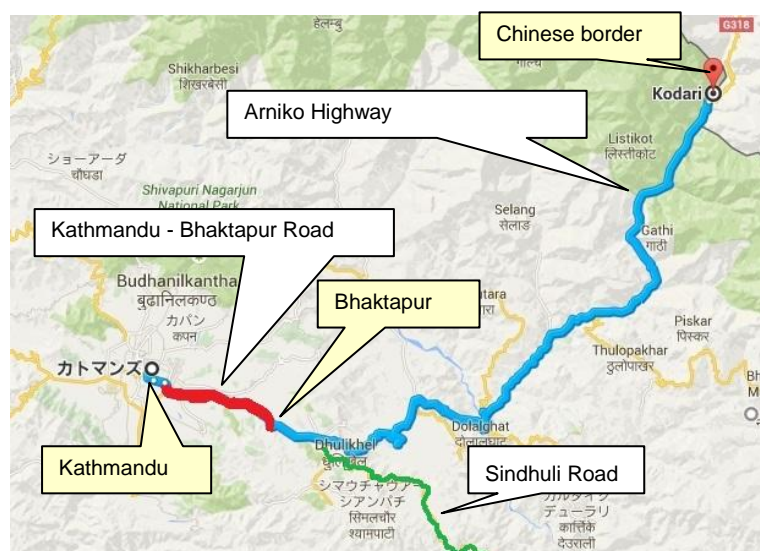


Figure 1. Location of the Arniko Highway and the Road

1.2 Project Outline

The objective of this project is to reduce traffic congestion and traffic accidents on the

Kathmandu – Bhaktapur Road, and also to reduce the travel time between the capital city of Kathmandu and the tourist city Bhaktapur. This was to be done by expanding the existing road to four lanes, thereby contributing to the industrial and economic development of the regions along the Road, improvement in public transport services, and a decrease in the travel time through the Arniko Highway to Kathmandu City.

Grant Limit / Actual Grant Amount	Detailed Design: 48 million yen / 48 million yen Construction: 2,689 million yen / 2,674 million yen
Exchange of Notes Date	Detailed Design: September 2007 Construction: July 2008
Implementing Agency	Ministry of Physical Planning and Works (Ministry of Physical Infrastructure and Transport at present), Department of Roads
Project Completion Date	September, 2011
Main Contractor	Hazama Corporation
Main Consultant	Nippon Koei Co. Ltd.
Basic Design	July, 2007
Detailed Design	March, 2008
Related Projects	<p><u>Technical Cooperation</u></p> <ul style="list-style-type: none"> - The Project for the Operation and Maintenance of Sindhuli Road (2011 –, to be completed in 2015) - Road planning and maintenance adviser (2007-2009, 2009-2011) <p><u>Grant Aid</u></p> <ul style="list-style-type: none"> - Project for construction of the Sindhuli Road Section I (E/N: June 1996) - Project for construction of the Sindhuli Road Section IV (E/N: Phase I: June 1997, Phase II: July 1999) - Project for construction of Sindhuli Road Section II(E/N: Phase I: June 2000, Phase II: August 2001, Phase III: June 2005) - The project for Improvement of Intersections in Kathmandu City (E/N, Detailed design February 2001, Construction: July 2001) - The Project for Emergency Rehabilitation of the Shindhuli Road Section IV (E/N: July 2003)

	<ul style="list-style-type: none"> - Project for construction of the Sindhuli Road Section III (E/N, Phase I: June 2009, Phase II: February 2012) - The Project for Countermeasure Construction against the Landslides on the Sindhuli Road Section II (E/N: June 2012) <p><u>Other international agencies and donors:</u></p> <ul style="list-style-type: none"> - World Bank “Road Sector Development Project” - World Bank “Road Maintenance and Development”
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2. Outline of the Evaluation Study

2.1 External Evaluator

Hirofumi Azeta, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: October 2014 – September 2015

Duration of the Field Study: January 4-16, 2015, April 5-10, 2015

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

3.1 Relevance (Rating : ③²)

3.1.1 Relevance to the Development Plan of Nepal

At the time of project planning, the 11th Five-Year Plan (July 2007 to July 2012) was the basis of the national planning. Based on the 11th Five-Year Plan, the Department of Roads (DOR) of the Ministry of Physical Planning and Works prepared the Master Plan in December 2005 for the Strategic Road Network, which covers the road development in Nepal for the following 20 years. The Master Plan was focusing on inter-connecting effective, efficient, safe and reliable strategic roads in order to achieve better living standards for the people. This project was also listed as one of the priority projects in the Master Plan³.

At the time of the ex-post evaluation, the development plan of Nepal was the 13th Plan (FY 2013/14 - 2015/16). The Plan mentions that the target of the transport sector is “to expand a standard, reliable, affordable and safe transport network to contribute to national integration,

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

² ③: High, ② Fair, ① Low

³ Source: Basic design study report, P1-3

socio-economic development and regional balance”. The strategies for achieving this target are to (i) expand transport access so as to link district headquarters and inter-districts, (ii) expand transport by raising access to agriculture, industries, hydropower, tourism, education and health services, and (iii) prioritize repair and maintenance by safeguarding the network of roads and to assure safe and effective travel⁴.

The transport sector development policy as of the ex-post evaluation is the Priority Investment Plan (2007-2016), which emphasizes the importance of enhancement of road capacity in the Kathmandu Valley in its “Road improvement and new construction” section.⁵

It is therefore concluded that this project is highly consistent with the national development policy and sector development policy.

3.1.2 Relevance to the Development Needs of Nepal

In Nepal, population concentration towards the Kathmandu Valley, which is the national center of politics, economy and administration, was remarkable at the time of the project planning (the population of the Kathmandu Valley was 1.76 million out of a total population of 25.3 million in Nepal). The Kathmandu – Bhaktapur Road, which connects Kathmandu City and Bhaktapur City, was one of the most congested roads among those which were listed in the Master Plan mentioned above. Since the traffic volume on the Road exceeded the road capacity, the Road was chronically congested. In addition, the fact that large-sized vehicles, pedestrians and motorbikes are mixed on the Road was causing not only traffic congestion but traffic accidents as well.

A further increase in traffic volume on the Road was expected because the Kathmandu – Bhaktapur Road is a part of Asian Highway No.42 (Arniko Highway) which connects the capital city of Kathmandu and China, and also because the Road would provide links to the eastern Terai Region when the construction of the Sinduli Road was completed⁶.

By the time of the ex-post evaluation, the population of the Kathmandu Valley increased up to 2.5 million, achieving about a 4% increase per annum⁷. The increase in the population of Kathmandu City and Bhaktapur City was rapid, as the population of Kathmandu City increased from 1.08 million in 2001 to 1.74 million in 2011, and that of Bhaktapur City increased from 0.23 million to 0.30 million during the same period⁸.

Due to the increase in population, the traffic volume of the Kathmandu – Bhaktapur Road jumped by 143% from 2007 to 2013, increasing by 4.56% per annum on average. However, the

⁴ Source: The 13th plan, p104

⁵ Source: Sector wide road program and priority investment plan (2007-2016), p VI-4

⁶ Source: Basic design study report, P4

⁷ Source: World Bank “Urban Growth and Spatial Transition in Nepal”

⁸ Source: National Census 2001 and 2011

road congestion largely decreased and the travel time between the two cities was cut in half after the completion of this project.

As mentioned above, the traffic volume was expected to increase after the completion of the Sindhuli Road, due to incoming transport from eastern Terai region. However, the increase in the incoming transport from Sindhuri Road has not been observed in the ex-post evaluation because the Sindhuli Road is to be completed in 2015 and also because the amount of incoming traffic fluctuates every year as depicted in Table 1.

Table 1 Incoming traffic volume from the Sindhuri Road (traffic volume / day)

2007	2008	2009	2010	2011	2012
1,366	2,338	4,105	2,309	807	1,219

Source: Documents provided by the implementing agency

As mentioned above, the population of the Kathmandu Valley, Kathmandu City and Bhaktapur City is increasing, and the traffic volume of the Kathmadu – Bhaktapur Road is also increasing after the completion of this project. Therefore, it is concluded that this project is consistent with the development needs of Nepal at the time of the project planning and the ex-post evaluation.

3.1.3 Relevance to Japan’s ODA Policy

At the time of the project planning, one of the main agenda items of the Country Assistance Program for Nepal was “Poverty reduction in rural areas”, and “the enhancement of basic infrastructure including roads as a basis for economic development” was one of its action plans. This project was therefore in line with Japan’s ODA policy.

In light of the above, this project has been highly relevant to the country’s development plan and development needs, as well as Japan’s ODA policy. Therefore its relevance is high.

3.2 Efficiency (Rating:②)

3.2.1 Project Outputs

The final outputs and the original plans are compared in Table 2 below.

Table 2 Comparison of Original and Actual Outputs

Item		Planned		Actual	
Road	Widening of existing road	Widen 2 lanes to 4 lanes for the road between Tinkune in Kathmandu City and Suryabinayak in Bhaktapur City for a total distance of 9.142 km.		Widen 2 lanes to 4 lanes for the road between Tinkune in Kathmandu City and Suryabinayak in Bhaktapur City for a total distance of 9.142km.	
	Width	Carriageway: (2 x 3.5m = 7.0m) x 2 directions = 14.0m		Carriageway: (2 x 3.5m = 7.0m) x 2 directions = 14.0m	
		Median: 3.0m for normal section except 0.6m New Jersey within Ring Road		Median: 3.0m for normal section except 0.6m New Jersey within Ring Road	
		Side allowance of median: 2 x 0.5m = 1.0m		Side allowance of median: 2 x 0.5m = 1.0m	
	Pavament	Shoulder: 3.0 m (including traffic barrier)		Shoulder: 3.0 m (including traffic barrier)	
Surface (Asphalt Concrete): 5cm Carriageway & Shoulder Binder (Asphalt Concrete): 6cm Carriageway only		Surface (Asphalt Concrete): 5cm Carriageway & Shoulder Binder (Asphalt Concrete): 6cm Carriageway only			
Bridges	Existing	Further use		Further use	
	New	Manohara Bridge	Length 84.04m, width12.5m, PC girder	Manohara Bridge	Length 84.04m, width12.5m, PC girder
Hanumante Bridge		Hanumante Br: Length 50.44m, width12.5m, PC girder	Hanumante Bridge	Hanumante Br: Length 50.44m, width12.5m, PC girder	
Intersection Improvement		5 intersections: Jadibuti, Ghataghar, Thimi, Sallaghari, Suryabinayak 3 signalized: Jadibuti, Ghataghar, Sallaghari		5 intersections: Jadibuti, Ghataghar, Thimi, Sallaghari, Suryabinayak 3 signalized: Jadibuti, Ghataghar, Sallaghari	
Median strip		3m wide median (from Koteswore to Suryabinayak) 60cm wide New Jersey (from Tinkune to Koteswore)		3m wide median (from Koteswore to Suryabinayak) 3,172m of guard fences 60cm wide New Jersey (from Tinkune to Koteswore)	
Access roads		11 access roads to be connected to the Road other than intersections		11 access roads to be connected to the Road other than intersections	
Bus stops		14 locations		14 locations, four additional access stairs at the Lokanthali bus station	
Road Lighting		At intersections, bridges and bus stops		At intersections, bridges and bus stops	
Drainage	Cross	24 (including 6 involving major drainage)		24 (including 6 involving major drainage)	
	Side	Both sides along the Road		Both sides along the Road	
Traffic barriers		Guardrail type: embankment height of 3m or more Guard-pipe type: embankment height of less than 3m		Guardrail type: embankment height of 3m or more Guard-pipe type: embankment height of less than 3m	

Source: Basic design study report, and documents provided by JICA

The planned project outputs were mostly achieved, although some minor modifications were made.

The major modification made to the project scope of the Japanese side is the construction of guard fences, and the length of such guard fences is 3,127m in total. The construction of guard fences was focusing on preventing pedestrians to cross the Road especially at places where traffic volume was high. The guard fences were constructed at the sections near Kathmandu City (2,243m) and also at 13 sections of median strips near crossroads and bus stations where more pedestrians tried to cross the Road. In addition, based on discussions with residents, four additional access stairs were constructed at the Lokanthali bus station where access from residential areas was not convenient because of the difference in the level⁹.

The project scope of the Nepali side, which includes the construction of service roads and pedestrian roads along the main road, were implemented almost as planned. Because the number of traffic accidents increased after the Road was partially opened, the Nepali side

⁹ Source: Project completion report, P5

constructed guard fences at the median strips (6km) to cover a whole section of the Road in addition to the original project scope. The Nepali side also constructed 11 overhead bridges and three units of traffic signals¹⁰.



Picture 1 Guard fences at the median strip



Picture 2 Overhead bridge
(Constructed by the Nepali side)

The service road (one lane, 14km in total) was planned to be constructed by the Nepali side along the main road, and the construction was planned to be completed one year after concluding a contract with a construction company by 2012. However, as of early April 2015, the pavement of the service road has not been completed for the 1.5km section. According to the implementing agency, this was because the construction companies had contracts greater than their financial capacities, and they delayed the implementation after they were awarded the contracts¹¹. Most of the remaining pavement work was completed from February to March 2015 according to the requests made by the implementing agency. However, because of the lack of an annual budget of the Project Office of the implementing agency, the pavement work was again suspended as of April 2015. The lack of budget of the Project Office was mainly because the implementing agency constructed additional signals or overhead bridges. As mentioned above, although the service roads are not completed for the 1.5km section, the delay in construction does not affect the operation of the main roads.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The planned and actual project cost is compared in Table 3.

As mentioned above, additional work was implemented, such as the construction of guard

¹⁰ Source: Interviews with the implementing agency

¹¹ According to the implementing agency, many contractors tend to do the same thing.

fences, 11 overhead bridges, and three units of traffic signals, which were not included in the original project scope. This was in reaction to the increase in traffic accidents. In principle, the ex-post evaluation should compare the planned and actual outputs, including the additional outputs. However, as such a comparison is not necessarily easy, the ex-post evaluation regards that the additional outputs were carried out at appropriate project costs, and the evaluation is made based on the comparison between ex-ante and ex-post project costs to produce the original outputs.

Table 3 Comparison of Original and Actual Project Costs

(Unit: million yen)

Item	Planned	Actual
Detailed design	48	48
Construction cost	3,021	2,951
Covered by the Japanese side	2,689	2,674
Covered by the Nepali side	332	340
Total	3,069	3,044

Source: Documents provided by JICA, Answers to the Questionnaire by the implementing agency

The construction cost covered by the Japanese side was within the planned project cost, and the actual project cost in total was 0.2% smaller than planned, excluding the additional construction work made by the Nepali side for traffic safety.

The planned and actual project scope and costs were compared as in the following table. The actual project cost in Nepali Rupee (NR) is 44.1% more than the planned project cost, excluding the costs for additional outputs, such as guard fences, overhead bridges and traffic signals¹². However, because of the changes in the exchange rate during the project implementation, the increase in the project cost of the Nepali side in Japanese Yen was limited to 2.4% as depicted in Table 4.

¹² As mentioned above, because a part of the service roads whose costs were supposed to be covered by the Nepali side are not completed, the cost necessary to complete the service roads was estimated from the construction cost for 1km, which was calculated based on the length of the road completed and its actual expenses.

Table 4 Comparison of Original and Actual Project Costs of the Nepali side
(Unit: thousand NR)

Timing	Classification	Planned	Actual
1. Work before the project	Site clearance in ROW	3600	1,200
	Relocation of monuments, temples, shrines, water fountains	800	791
	Relocation of surface/overhead public utilities	40,500	38,755
	Relocation of underground public utilities	2,700	38,260
2. Works during the project	Bank charge	1,695	2,510
	Traffic control and environment monitoring		800
	Planting of trees & flowers in median strip	3,153	700
	Traffic safety awareness training for bus drivers & passengers	1,134	900
3. Works after the project	Development of service road	114,287	196,000
	Development of walkways	42,991	24,000
	Development of guard fences		10,000
	Development of overhead bridges		50,000
	Development of traffic signals		40,000
Total		210,860	403,916
Total (excluding additional outputs)		210,860	303,916
in JPY (million)		332	340

Source: Answers to the Questionnaire by the implementing agency

The increase in the project costs for relocation of underground public utilities is because the number of relocated underground utilities was more than planned, and also because the information on the location of underground water pipes was not available at the time of project planning.

The project cost for the site clearance in ROW (right of way) areas decreased because only one household was actually relocated while ten households were planned to be relocated. This is going to be explained in the “Impact” section¹³.

3.2.2.2 Project Period

The planned project period was 42 months, and the actual project period was 49 months (116% of the planned project period) from September 2007 to September 2011.

¹³ Source: Interviews with the implementing agency

Table 5 Comparison of Original and Actual Project Periods

Item	Planned	Actual
Detailed design	7 months	-
Bidding	5 months	-
Road improvement construction period	30 months	36 months
Total	42 months	49 months

Source: Basic design study report, Documents provided by JICA

The delay in the construction work is mainly because it was difficult to secure necessary material, equipment and workers due to the uncertainty in the political situation during the project implementation. Therefore, the construction period of the road improvement, which was planned to be 30 months, was actually 36 months. Accordingly, the total project period was 49 months, seven months longer than planned.

The construction of the service road, which was implemented by the Nepali side, has not been completed as of April 2015. However, this is not considered in the evaluation of the project period as the operation of main road has already been started, and the delay in the construction of the service road do not affect the effectiveness of the project.

Similarly, the construction of guard fences, 11 overhead bridges and three units of traffic signals, which were completed after 2012 under the budget by the Nepali side, were not considered in the evaluation of the project period. This is because they were additional project outputs which were not included in the initial project scope.

Based on the result above, although the project cost was within the plan, the project period exceeded the plan. Therefore the efficiency of the project is fair.

3.3 Effectiveness¹⁴ (Rating:③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

At the time of the project planning, it was expected that the traffic volume of the Kathmandu – Bhaktapur Road increased and that the travel time and number of traffic accidents decreased. The target year on such indicators was set in 2021, 10 years after the completion of the project. However, because the ex-post evaluation was implemented three years after the project completion, the evaluation judgment on the effectiveness is comprehensively made by comparing the estimated value of 2021 and the actual values as of ex-post evaluation. The following table shows the actual values obtained through the ex-post evaluation, and the level of achievement.

¹⁴ The sub-rating for effectiveness is to be input with consideration of the impact.

The traffic volume between Kathmandu and Bhaktapur has increased by 143% from 2007 to 2013, exceeding the initial target of 100%. Note that the Kathmandu – Bhaktapur Road was partially opened in 2010, and other sections were accordingly opened after the completion.

Table 6 Traffic Volume of the Kathmandu - Bhaktapur Road

	Original 2007	Target 2021	Original 2007	Actual 2010	Actual 2011	Actual 2012	Actual 2013	Estimated 2021
	At the time of project planning	10 years after the completion	(revised)	-	Year of completion	1 year after the completion	2 years after the completion	10 years after the completion
Traffic volume (vehicles / day)	40,000	80,000	21,590	21,060	48,105	49,192	52,595	75,140
% change (from the original)	-	+100%	-	-2%	+123%	+128%	+144%	+248%

Source: Answers to the Questionnaire by the implementing agency

As mentioned in the table above, the “original” traffic volume as of 2007 was revised at the time of ex-post evaluation because the original traffic volume was that of two-way traffic measured between Koteswore and Jaributi, but the information on actual traffic volume at the same section was not available. In the ex-post evaluation, the two-way traffic volume at the Manohara Bridge before and after the project were compared instead. At the time of the project planning, the traffic volume, which was 40,000 vehicles per day (2007) was expected to increase by 100% to 80,000 vehicles per day (2021). In the ex-post evaluation, the targeted and actual percentages of increase (%) in traffic volume are therefore compared.

After the project completion, the traffic volume increased by 4.56% per annum on average from 2011 to 2013. If the traffic volume continues increasing at the same rate, it will reach 75,140 vehicles per day in 2021. Then, the targeted increase rate of traffic volume (100%) is expected to be achieved, as the actual increase rate in traffic volume is estimated to show a 248% from 2007 to 2021.

Table 7 Travel Time between Kathmandu and Bhaktapur

	Original 2006	Target 2021	Original 2007	Actual 2015
	At the time of the project planning	10 years after the completion	Revised	4 years after the completion
Travel Time between Kathmandu and Bhaktapur	48 mins	23 mins		20 mins
(Note) Traffic volume (vehicles / day) ¹⁵	40,000	80,000	21,590	<u>57,498</u>
Increase rate in traffic volume (from original)		+100%		<u>+166%</u>

Source: Basic design study report and answers to the Questionnaire by the Implementing agency

Note: figures underlined are the estimates.

The travel time from the Tinkune intersection (beginning) in Kathmandu to the Suryabinayak intersection (ending point) in Bhaktapur was measured during the field trip survey. The travel time between these intersections was 20 minutes at maximum, which was shorter than the target value of 23 minutes, although the increase rate in the traffic volume was more than the target in 2015.

Table 8 Actual travel time between Kathmandu and Bhaktapur (Measurement results)

	Weekday		Weekend
	Day	Night	Day
Kathmandu to Bhaktapur	14 mins	<u>20 mins</u>	12 mins
(Reference) Bhaktapur to Kathmandu	17 mins	23 mins	14.5 mins

Source: Measurement by the survey team (measured in January 2015)

If the traffic volume keeps on increasing at the same speed, the travel time would exceed the target of 23 minutes. However, because the traffic volume as of 2012 is expected to be much bigger than the target, in this case, the target on the travel time should also be lifted. Then, the travel time as of 2021 is expected to be less than the revised target.

¹⁵ The original traffic volume in 2006 and the target volume in 2021 are the two-way traffic volumes between Jaributi and Koteswore while the revised original traffic volume in 2007 and the actual volume in 2015 are the two-way traffic volumes on the Manohara bridge.

Table 9 Number of traffic accidents and casualties per annum

	Original	Target	Original	Target	Target	Target
	2006	2021	2010	2011	2012	2013
	At the time of the project planning	10 years after completion	-	Year of completion	1 year after completion	2 years after completion
Annual traffic accidents (vehicles)	340	Decrease	995	790	689	775
Annual traffic casualties (persons)	149	Decrease	674	512	351	461
Traffic accidents / traffic volume	0.016		0.055	0.032	0.033	0.016
Traffic casualties / traffic volume	0.007		0.037	0.021	0.017	0.010

Source: Basic design study report, Answers to the Questionnaire by the implementing agency

At the time of project planning, the traffic accidents due to the mixed traffic of large-sized vehicles, motorbikes and auto- tricycles were expected to decrease, by the expansion of the Road, the improvement in the intersections and the development of bus stops. However, bus riders and surrounding residents crossed the Road in places where there are no traffic signals, although the vehicles were travelling much faster on the Road than on other roads at 60 - 80 kmph. As a result, the number of traffic accidents and casualties rapidly increased when the Road was partially opened in 2010.

It seems to have been difficult to forecast the increase in the number of traffic accidents, which might happen due to people crossing the section of the Road without any traffic signals or crossings, as there had not been any roads in Nepal which allowed high speed traffic like the Kathmandu-Bhaktapur Road.

Since then, in reaction to the increase in the traffic accidents, JICA changed the project scope to construct guard fences at the median strips in 2011, and the Nepali side also constructed additional guard fences and 11 overhead bridges until 2013 by its own budget. As a result, the number of traffic accidents has been decreasing since 2010.

In this project, traffic safety campaigns were organized and posters for traffic safety were put in public spaces by university students hired as volunteers or part-time workers. The DOR also took several actions for traffic safety such as hanging banners for traffic safety and establishing notice boards for safe driving in places where there are more traffic accidents.

When traffic accidents and casualties are analyzed as ratios to the traffic volume, the ratio of traffic accidents was high from 2010 to 2012 as mentioned above. As a result of the

countermeasures explained above, the ratio dropped to 0.016 in 2013, which was as low as the pre-project level.

The information on vehicle operating costs and material transportation costs was not available at the implementing agency, and these pieces of information were examined through the beneficiary survey¹⁶. In the interviews with truck, bus and car drivers, all drivers perceived a decrease in the fuel consumption. The average decrease in the fuel costs answered by interviewees was 31%.

Table 10 Vehicle operating costs and material transportation costs

	Original	Target	Actual
	2006	2021	2015
	At the time of the project planning	10 years after completion	Beneficiary survey result
Vehicle operating costs and material transportation costs	N/A	Decrease	Decreased by about 31%

Source: Beneficiary survey

3.3.2 Qualitative Effects

The Kathmandu-Bhaktapur Road is the first high speed road in Nepal which allows vehicles to run at more than 60km per hour.

The rehabilitation of the Ring Road, which is located around Kathmandu City and Patan City, was designed based on the Kathmandu-Bhaktapur Road. This was because the effectiveness of elements of the project, such as the reduction in travel time, was high. According to the implementing agency, the road design elements, such as the design of the road, safety measures, operation and maintenance, were prepared based on the Kathmandu - Bhaktapur Road.

It is therefore concluded that the effectiveness of the project was high because most of the targets for operation and effect indicators, such as traffic volumes, travel time, vehicle operating costs and material transportation costs, have been achieved. Although the number of traffic accidents and casualties increased, the ratio of traffic accidents in comparison to the traffic volume is at the same level as it was before the project.

¹⁶ About 100 persons including residents in Kathmandu and Bhaktapur, bus users, bus drivers, truck drivers and car drivers, were interviewed to obtain opinions about travelling time, traffic safety, travel costs, satisfactions on the road conditions, environmental and social impacts and maintenance conditions.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Industrial development at the roadside and activation of the regional economy

At the time of the project planning, the commercial, industrial and residential sectors were expected to develop, and the regional economy was also expected to be activated by the improvement in the investment efficiency as a result of the progress in urban-type land utilizations¹⁷.

It was not possible to obtain information on the number of business registrations and households in Kathmandu and Bhaktapur. However, as all the interviewees in the beneficiary survey answered that the number of houses, factories and shops increased after the completion of the Road, it is possible to say that the industry on the roadside was developed after the completion of the project. In addition, stakeholders mentioned in the interviews that the development of the residential areas on and near the Road was continuing, and that the population was also increasing. Therefore, it is concluded that the regional economy had been activated since the completion of the project.

3.4.1.2 Improvement in the public transport services

At the time of the project planning, the public transport services was expected to improve through a decrease in the travel time of the users of large, medium and small buses, and also by enabling safe embarkation and disembarkation through the improvement in the Road and intersections, and construction of bus stops¹⁸.

In the ex-post evaluation, the evaluator interviewed bus riders as a part of the beneficiary survey, and the average reduction in the bus travel time answered by bus riders was 29.1 minutes¹⁹.

Bus stations established on the Road are used as expected, and embarkation and disembarkation of passenger outside of bus stations are hardly observed. However, around the Koteswore bus stop which many buses use, passengers are embarking and disembarking on the traffic lanes outside the bus station. Similarly, the embarkation and disembarkation of passengers were observed at five intersections where there were no traffic signals.

In the beneficiary survey, 95% of interviewees answered that the road safety improved.

¹⁷ Source: Basic design study report, P4

¹⁸ Source: Basic design study report, P4

¹⁹ As the starting point and the destination of bus travels answered by passengers in the interview were not necessarily Kathmandu City and Bhaktapur City, only the reduced travel time on the Road was examined.



Photo 3 Small buses using bus stops



Photo 4 Buses parked in the intersections without traffic signals

3.4.1.3 Decrease in vehicle travel time on the Arniko Highway to Kathmandu

At the time of the project planning, the travel time on the Arniko Highway to Kathmandu was expected to decrease²⁰. In the ex-post evaluation, information on the travel time on the Arniko Highway was not obtained. However, because the Kathmandu-Bhaktapur Road is a part of the Arniko Highway, it is possible to say that the decrease in the travel time of the Road is also decreasing the travel time on Arniko Highway.

3.4.2 Unintended Positive and Negative Impacts

3.4.2.1 Impacts on the Natural Environment

This project was subject to Initial Environmental Examination (IEE)²¹, and therefore the DOR Project Office carried out monthly monitoring during the project implementation. When the Project Office identified any issues, it notified them to the project consultant and contractors in writing. Through such monthly monitoring, the Project Office confirmed that there were not any negative impacts on the natural environment.

When the Project Office received complaints or requests from residents, it took quick actions, including organizing consultation meetings with residents. The project contractor avoided causing serious accidents when continuing construction work during the night by preparing enough lighting. The project contractor also avoided causing dust on temporary roads by spraying water on the roads frequently. Waste soils were disposed only at the designated dumping site near Manohara Bridge, and the Project Office confirmed through its environmental monitoring that waste soils were not dumped at any other places.

²⁰ Source: Basic design study report, P4

²¹ IEE is a study that includes an analysis of alternative plans, a prediction and assessment of environmental impacts, and a preparation of mitigation measures and monitoring plans based on easily available information, including existing data and simple field surveys.

3.4.2.2 Land Acquisition and Resettlement

At the time of the project planning, medium or small size involuntary resettlement and land acquisition were assumed while serious negative impacts on the regional environment and social economy were not expected. Therefore the category based on guidelines for environmental and social considerations by JICA was B. The result of the IEE, which was implemented by the DOR based on Environmental Law in Nepal, was also similar to this²².

The number of the resettled households was expected to be 10 at the time of planning, and the DOR concluded basic agreements on the resettlement with these households when the basic design study was conducted. As the land within the ROW (right of way) belongs to the government, compensation was supposed to be paid only for buildings²³.

Out of the 10 households, only one household actually resettled, and the household received 1.2 million NRs as compensation. The amount of the compensation was determined based on the domestic rules in Nepal (Land Acquisition Act) and payment was made based on the agreement between the DOR and the owner of the house.

The remaining nine households were not satisfied with resettlement itself or the compensation amounts, and they did not agree on resettlement. As a result, they were not resettled. As these buildings are occupying only about 1m of ROW, construction of the main road and service roads were not affected by such buildings. Thus, in order to avoid the delay in the project implementation, the DOR decided not to resettle such buildings. If the houses are re-constructed in the future, such new buildings are not allowed to be constructed within the ROW.

There were several more houses in addition to the 10 buildings mentioned above, which were regarded as squatter buildings. When the DOR sent warnings to the owners of such buildings, they voluntarily removed the buildings without any trouble. The government, which did not have any obligation to pay compensation to such buildings based on domestic rules and regulations, did not pay any compensation to the owners of buildings. The guidelines for environmental and social consideration by JICA as of 2004 specifies that the resettlements and land acquisition are conducted following domestic rules and regulations.

3.4.2.3 Other impacts

At the time of the project planning, there were worries that the number of traffic accidents might increase when temporary roads were used. However, because the temporary roads of different sections were only used for about one month and traffic controls were arranged at the

²² Source: Basic design study report, P2-31

²³ Source: Basic design study report, P2-32, 2-34

temporary roads, the traffic accidents did not increase.

The Road is covered with water near Chundivi intersection several times a year after heavy rainfall mainly because the cross drainage near the intersection is choked by garbage disposed by surrounding residents. In order to prevent such dumping at the cross drainage, notice boards and screen grating covers were installed. However, because some residents continue maliciously disposing waste into the drainage, such floods still happen for a few hours after heavy rainfall. In order to prevent this, the enhancement of maintenance by the implementing agency is needed.

At the time of the ex-post evaluation, it is most likely that the increase in traffic volume, one of the operating indicators, will be achieved by 2021. The effect indicators, including decrease in travel time between Kathmandu and Bhaktapur, vehicle operating costs and material transportation costs, were already achieved in 2015. The number of traffic accidents increased, but the ratio of accidents to traffic volume decreased to the same level before the project as a result of the introduction of safety measures, including construction of guard fences and overhead bridges.

The construction of the Road led to the industrial development of the region along it. It also led to activation of the regional economy, improvement in public transport services, and a decrease in the travel time through the Arniko Highway to Kathmandu City. It was also confirmed that there were not any specific negative impacts on the natural environment, and the resettlement and land acquisition was implemented appropriately.

Based on the result above, it is concluded that this project has largely achieved its objectives. Therefore the effectiveness and impact of the project is high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The operation and maintenance (O&M) of the Road was supposed to be carried out by the Kathmandu - 1 Region Division Road Office and the Bhaktapur Region Division Road Office under the Maintenance Management Department of the DOR (Department of Roads of the Ministry of Physical Planning and Works)²⁴. However, because the construction of the service roads has not been completed as of April 2015, the Road has not been transferred from the Project Office to the Division Road Offices, and the Project Office is carrying out maintenance work.

Due to the structural reforms in the DOR, the Division Road Offices are now under the responsibility of Regional Road Directorates. There are 5 Regional Road Directorates in the country, and the Kathmandu - 1 Division Road Office and the Bhaktapur Division Road Office

²⁴ Source: Basic design study report, P2-2

are under the responsibility of the Central Region Road Directorate.

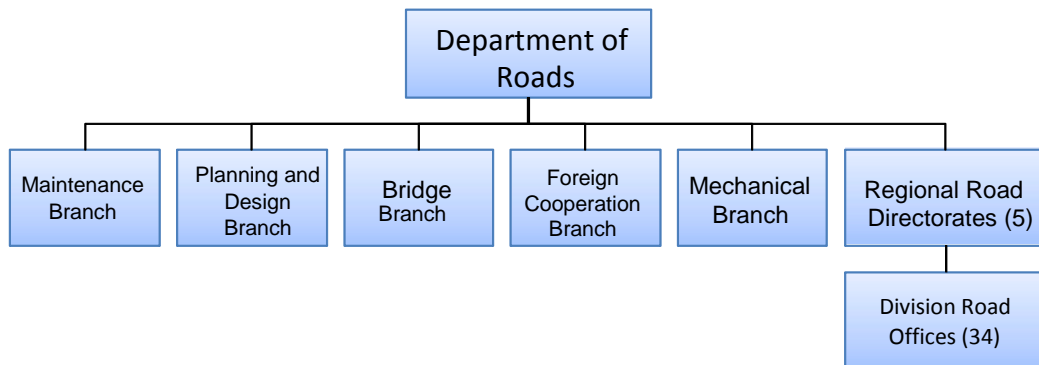


Figure 1 Organization Chart of the DOR

Source: Answers to the Questionnaire by the implementing agency

When the Road is transferred from the Project Office to the Division Road Offices, the Kathmandu - 1 Division Road Office will be responsible for the O&M of the section from Tinkune Intersection to Manohara Bridge while the Bhaktapur Division Road Office will be responsible for the section from Manohara Bridge to Suryabinayak Intersection.

In both the Kathmandu - 1 Region Division Road Office and the Bhaktapur Region Division Road Office, one director, seven engineers and 20 sub-engineers are supposed to be assigned to each office. However, the number of sub-engineers actually assigned as of May 2014 is only six, although seven engineers are fully assigned in both Division Road Offices. This is because all sub-engineers who had been working for a long time were promoted to be engineers in 2013 under instructions by the government. Due to the lack of sub-engineers, the frequency of the monitoring of maintenance work by sub-engineers is getting lower, although there are no delays in the maintenance work.

At the time of ex-post evaluation, the DOR is taking steps for the recruitment of sub-engineers following the regular recruitment schedule. Most of the sub-engineer positions are expected to be filled in July 2015 at the beginning of the fiscal year.

In addition, there are many contract workers for maintenance work at both offices (In urban areas, one worker is hired for one kilometer of road as per the rule).

Based on the above, it is concluded that the institutional aspect of O&M does not have major problems because the lack of sub-engineers observed in the ex-post evaluation are going to be filled soon.

3.5.2 Technical Aspects of Operation and Maintenance

During the ex-post evaluation, it was confirmed that the Project Office, Kathmandu-1

Region Division Road Office, and the Bhaktapur Region Division Road Office received sufficient training and technical instructions, and that technical manuals were placed and utilized by the Project Office. It was also confirmed that there were not any road sections which have not been maintained for a long time due to the lack of technical skills²⁵.

In the DOR, the Road Sector Skill Development Unit (RSSDU) provides regular trainings for maintenance work in order to maintain the current technical level of O&M in the DOR.

The training for recurrent maintenance (annual routine maintenance works) is organized twice a year, in which about 30 trainees participate. The training for periodic maintenance is organized once every other year. Ad-hoc training is also provided, for example when procurement procedures are revised, in which all engineers participate. Newly recruited engineers are supposed to receive orientation trainings for two weeks.

At the time of the ex-post evaluation, it was confirmed that the Project Office, which was responsible for the O&M of the Road, was carrying out recurrent and periodic maintenance work following the O&M manual.

Based on the above, it is concluded that technical aspect of O&M does not have any problems, as the implementing agency organizes training for O&M periodically, and the Project Office which is in charge of O&M is carrying out maintenance work following the manuals provided by the project.

3.5.3 Financial Aspects of Operation and Maintenance

At the time of project planning, the annual average cost for the recurrent maintenance and periodic maintenance (required once every several years) for 20 years after the completion of the project was expected to be 18,841,000 NRs. It was also pointed out that the DOR can cover this cost, as this is equivalent to only 0.5% of the total budget for the O&M at the DOR, which was 3,713,953,000 NRs in FY 2006/2007²⁶.

The total budget and O&M budget of the DOR are as shown in the table below. The proportion of the O&M budget to the total budget of the DOR is gradually increasing from 7.7% in 2007 to 11.3% in 2014.

²⁵ Source: Interviews with the project consultant, project contractor, and the implementing agency

²⁶ Source: Basic design study report, P3-48

Table 11 Yearly changes in the total budget and O&M Budget of the DOR

(Unit: thousand NR)

	Total budget of the DOR	O&M budget of the DOR	Proportion of the O&M budget
2009	16,989,400	1,314,500	7.7%
2010	22,162,500	1,932,400	8.7%
2011	30,884,500	2,868,000	9.3%
2012	33,922,000	3,920,000	11.6%
2013	32,939,400	4,000,000	12.1%
2014	37,419,300	4,238,600	11.3%

Source: Answers to the Questionnaire by the implementing agency

The O&M manual mentions that the necessary cost for O&M for cleaning of road surface, electricity costs for traffic lighting and signals is 27,728,000 NRs, the cost for asphalt overlay is 246,000 NRs for every ten years, the cost for bridge repair is 785,000 NRs for every ten years, the cost for bus station repair is 1,100,000 NRs for every five years, and the cost for the repair of traffic safety equipment is 1,535,000 NRs for every five years²⁷.

The annual average O&M cost, including such costs required for every 5 and 10 years, is 28,358,000 NRs. This is equivalent to 0.67% of the total O&M budget of the DOR as of 2013. As this is almost at the same level as that of the basic design survey, it is possible to say that the DOR can cover the O&M cost for the Road even at the time of the ex-post evaluation.

The maintenance budgets excluding recurrent maintenance (e.g. periodic maintenance) are distributed to Division Road Offices, based on their budget proposals and the priorities set by the DOR. In general, the priority of the budget allocation for the high speed roads, including the Road, is higher than others.

On the other hand, the budget execution of the O&M at the DOR is only 80 – 85%, and therefore all the budget allocations are not executed within a fiscal year due to the delays in the payments to contractors. Payments to contractors are delayed because the contractors do not complete their work as planned. Because the Public Procurement Act in Nepal specifies that the lowest bidder is awarded for a bidding, it is not possible to exclude bidders from it even though they have more contracts than they can handle. It is also pointed out that it is difficult to cancel contracts with contractors who failed to deliver the services on time, as the DOR has to go through lawsuits in order to cancel such contracts. In response to these problems, the DOR started taking actions by requesting bidders to submit lists of all projects that the bidders are implementing so that the DOR can check whether the bidders are implementing more projects

²⁷ Source: Documents provided by JICA

than they can handle.

Based on the above, it is concluded that financial aspect of O&M does not have any problems.

3.5.4 Current Status of Operation and Maintenance

The current status of the O&M of the Road developed by this project is generally good. Out of the necessary maintenance work mentioned in the basic design survey, there are 1) cleaning of road surface, 2) O&M of street lighting and traffic signals (electricity for traffic signals, and replacement of bulbs for street lighting), 3) grass cutting work for median strips have been carried out every year since 2011 while 4) patching work for asphalt pavement has been implemented whenever the problems are identified. Any problems in the maintenance in these aspects were not identified during the field survey.

It was also confirmed during the field survey that grass cutting and cleanings work of the road surface and drainage were carried out by the cleaning staff hired by the implementing agency.

Most of the periodic maintenance work has not been implemented because such maintenance work is not necessary as only a few years have passed since the project completion. Lane marking has been implemented about once a year. Monitoring of distilled water in lead storage batteries for traffic signals has been implemented once every two months by inspection staff hired by the implementing agency. The inspection staff make reports whenever they identify problems in lead storage batteries.

The Project Office, which is in charge of maintenance work at the time of the ex-post evaluation, is carrying out maintenance work following the O&M manual, although it does not have an annual O&M plan.

Although the implementing agency does drainage cleaning periodically, the cross drainage near the Chundivi intersection is choked by the illegal dumping by nearby residents, and the Road is covered with water for a few times a year after heavy rainfall (Such a flood continues for a few hours though vehicles can drive through the section). One of the main reasons is that Bhaktapur City does not collect garbage from citizens properly.

Based on the above, it is concluded that the current status of O&M does not have any serious problems, as the maintenance conditions are generally good. Although a section of the Road is covered with water from time to time, this is an exceptional problem due to illegal dumping from nearby citizens.

Based on the above findings, it is concluded that the institutional, technical and financial aspects of O&M do not have any problems, and the sustainability of the effects achieved by this

project is high.

4 Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The objective of this project is to reduce the traffic congestion and traffic accidents on the Kathmandu – Bhaktapur Road, and also to reduce the travel time between the capital city of Kathmandu and the tourist city of Bhaktapur, by expanding the existing road to four lanes, thereby contributing to the industrial and economic development of the regions along the Road. This project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore its relevance is high. Although the project cost was within the plan, the project period exceeded the plan, due to uncertainty in the political situation. Therefore efficiency of the project is fair. The targets for traffic volume and the travel time between Kathmandu-Bhaktapur are achieved and the ratios of traffic accidents and casualties to traffic volume do not show increases, so the effectiveness of the project is high. The construction of the Road led to the industrial development of the region along the Road, as well as activation of the regional economy and improvement in the public transport services. Therefore, this project has largely achieved its objectives, and thus the effectiveness and impact of the project are high. The institutional, technical and financial aspects of operation and maintenance do not have any problems, and the sustainability of the effects achieved by this project is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

Enhancement of the traffic safety measures

Although bus stations on the Road are properly operated in general, some buses load and unload passengers at intersections without traffic signals, and such embarkation and disembarkation is not necessarily safe. Therefore, it is recommended that the implementing agency enhance collaboration with the Traffic Police to strengthen the traffic safety measures at such intersections. (For example, the Traffic Police is recommended to prohibit buses to load and unload passengers outside bus lanes. The Traffic Police is also recommended to instruct bus passengers to use bus stops).

Enhancement of maintenance work

The maintenance work of the Road is currently under the responsibility of the Project Office, and is going to be transferred to the Division Road Offices, when service roads are

completed. Therefore, the Project Office is recommended to transfer the O&M manuals prepared by the project consultant to the Division Road Offices in a precise manner and also complete technical transfers when the service roads are completed.

The cross drainage near Chundivi intersection is choked by the garbage dumped by nearby residents and the road is covered with water after heavy rainfall. The implementing agency is therefore recommended to take further actions to prevent the cross drainage from being choked by garbage, by cleaning the drainage with high pressure water pumps periodically as depicted in the O&M manuals.

Improvement in contractor selection

The road pavement works commissioned to contractors were delayed in this project, and the road maintenance works commissioned to contractors are delayed in many cases. Therefore, there is some room for improvement in the selection of contractors. In order to address this issue, the DOR is currently requesting bidders to submit lists of all projects the bidders are implementing. It is then recommended that all divisions in the DOR, including Division Road Offices, take the same actions to exclude the contractors which are implementing construction works that are greater than their financial capacities.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Traffic safety measures soon after the road opening

In this project, the number of traffic accidents due to the mixed transport of large sized vehicles, motorbikes and auto- tricycles was expected to decrease by improving intersections and bus stations. However, the number of traffic accidents increased because the bus riders and residents started crossing the Road, although the traffic speed increased when the Road was opened to traffic.

In reaction to this, JICA changed the project design to construct the road fences at median strips, and the implementing agency constructed several overhead bridges and additional road fences. As a result, the number of traffic accidents started decreasing. Therefore, it is recommended to carefully consider road safety issues from the project planning stage, and to take sufficient road safety measures as soon as roads are opened to traffic, especially where there are many residential houses.

It is also recommended to carefully consider road safety measures when constructing high speed roads in countries where such roads are not very common, so that the increase in traffic

accidents after the road opening can be avoided.

(End)