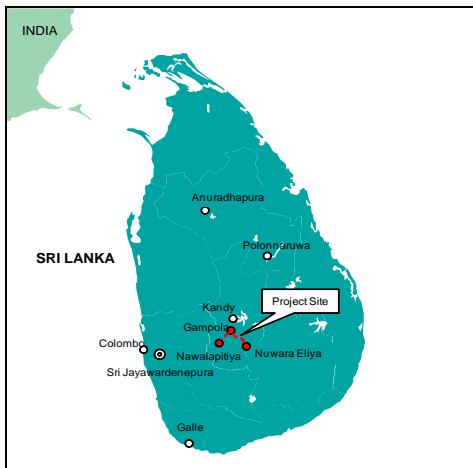


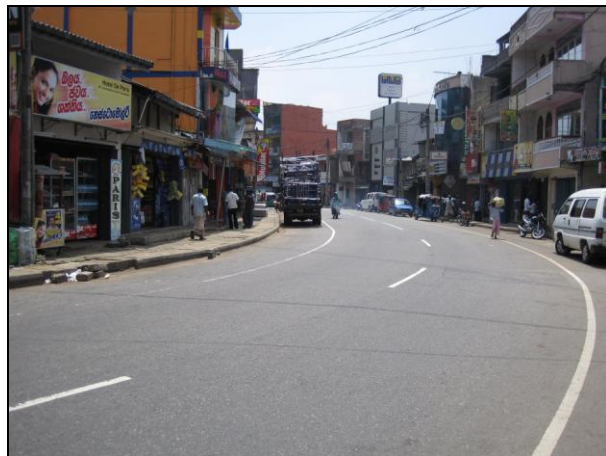
Ex-Post Evaluation of Japanese ODA Loan Project  
“Road Network Improvement Project”

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Ernst & Young Advisory Co., Ltd.

**1. Project Description**



Project Location



Widened Road (Route AA005)

**1.1 Background**

In Sri Lanka, the transportation sector, with a contribution of 10% to the GDP in the late 1990s, played an important role as part of the economic and social infrastructure. The country had a 20,000-km road network, representing a rather higher road density to the land area than in the rest of South Asia.

On the other hand, most of the roads were constructed before Sri Lanka’s independence in 1948, which has resulted in poor road alignments becoming a hindrance to the smooth traffic. As many of the roads also had unpaved shoulders, and/or lanes that failed to satisfy the width specified in the current design criteria, pedestrians and slower cars were preventing other cars from running at high speed. Moreover, the volume of traffic far exceeded the volume expected when they were originally designed. Nonetheless, a limited national budget has made it difficult to make sufficient investment in maintenance and rehabilitation of the roads, which, with a rapidly growing traffic volume, resulted in a vicious cycle of road deterioration. This situation led to the increase in time and costs for logistics and users and also to the hindrance of farming and manufacturing growth.

This project, designed to improve and rehabilitate the decrepit major road networks in the country, was therefore regarded critical for promoting its economic activities, and was put

into implementation.

This project was a project co-financed with the Asian Development Bank (ADB), and JICA financed two routes among the 17 planned routes that had been surveyed by ADB.

## 1.2 Project Outline

The objective of this project is to secure smooth traffic on the road network by improving and rehabilitating the decrepit road network in the Central Province of Sri Lanka, , thereby contributing to the vitalization of economic activities in the country.

Approved Amount / Disbursed Amount	3,078 million yen / 3,075 million yen
Exchange of Notes Date / Loan Agreement Signing Date	July, 1999 / August, 1999
Terms and Conditions	Interest Rate: 1.8% Repayment Period: 30 years (Grace Period: 10 years) (Consultant Portion - Interest Rate: 0.75%, Repayment Period: 40 years (Grace Period: 10 years)) Conditions for Procurement: General Untied (Consultant Portion: Bilateral Tied)
Borrower / Executing Agency	Democratic Socialist Republic of Sri Lanka / Road Development Authority
Final Disbursement Date	July, 2007
Main Contractor (Over 1 billion yen)	China Harbour Engineering Company (People's Republic of China)
Main Consultant (Over 100 million yen)	Pacific Consultants International
Related Projects	Feasibility Study by ADB (1997)

## 2. Outline of the Evaluation Study

### 2.1 External Evaluator

Keisuke Nishikawa, Ernst & Young Advisory Co., Ltd.

### 2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted during the following period.

Duration of the Study: December, 2009 – November 2010

Duration of the Field Study: March 3 – 16, 2010 and June 2 – 10, 2010

### **3. Results of the Evaluation (Overall Rating: B)**

#### **3.1 Relevance (Rating: a)**

##### 3.1.1 Relevance with the Development Policy of Sri Lanka

At the time of the project appraisal, Sri Lanka had set out its National Road Policy. It was a road policy prepared based on the Transport Sector Strategy Study, which emphasized the importance of road networks for the development of its economy. It defined the objectives of road network improvement specifically as:

- To promote economic development activities;
- To realize shorter travel time in a way that also takes account of safety;
- To make adequate arrangements to accommodate the current and future volume of domestic passenger and freight traffic; and
- To introduce effective and innovative methods of road design, construction, and operation and maintenance.

In the Five Year Development Plan (1997-2001), an importance was placed on the road sector, which was represented by the fact that half of the investment allocated to the transport sector was secured for road improvements.

The current development plan, Mahinda Chintana (2006-2016), states the necessity for sustaining economic development in a well-balanced manner across regions, to provide people all around the country with access to transport and to develop high-quality road networks conducive to passenger and freight transport. The National Road Master Plan (2007-2017), formulated in 2007, pointed out the widening of national roads as one of the priorities, by recognizing the importance of developing road networks to link economic growth centers around the country for future economic development. The national budget also reflects the recent recognition of the importance of the road sector. Between 2003 and 2008, the budget allocated to the road sector increased at an annual rate of 36%.

As described above, the development plans formulated after the project appraisal consistently put forward the importance of road improvements for economic and social development, with steady appropriations made for road improvements to support this important task. In terms of the policy measures, the enhancement of arterial national roads has been consistently emphasized as an objective since the pre-project period. This project conforms to the National Road Master Plan, which emphasizes the improvement of road networks between economic centers and the widening of national roads.

##### 3.1.2 Relevance with the Development Needs of Sri Lanka

Since its independence, maintenance and repair of the roads have not been adequate in Sri Lanka, becoming a hindrance to the smooth traffic flows. As a result of the decline in investment for road improvements since the 1980s, many routes were left in poor conditions, and more than half of the roads needed rehabilitating. In particular, many of the arterial roads connecting provincial cities were forced to handle the large traffic volume beyond their capacities due to insufficient investments to accommodate the increased traffic volume brought about by economic development. In addition, the road surface was often damaged by overloaded vehicles and the reduction in effective road width due to many stores and other buildings encroaching into the road. Both of these factors reduced the capacity of the roads. Moreover, narrow roads were thronged with vehicles of different modes of transport (some at low speed and others at high speed), which significantly lowered traffic speeds on the road system as a whole. Thus, road transport had issues especially in terms of economic development and safety.

Road traffic, a mode of transport that still accounts for 90% or more of the entire transport in the country, has a critical role to play for national development. In order to handle the continuing growth in traffic volume, demonstrated by the increase in the number of registered automobiles from 1.78 million in 2001 to 3.39 million in 2008, the improvement and maintenance of the road network has become all the more important.

### 3.1.3 Relevance with Japan's ODA Policy

At the time of project appraisal, Japan had a basic recognition that Sri Lanka's road sector, which handled approximately 90% of the total transport demand, was an important mode of transport, and declared that "in terms of road improvement, Japan has a policy of providing assistance to the projects with higher priorities, with sufficient consideration given to the alleviation of traffic congestion in cities and the development of transport systems between them." This project, therefore, was relevant with Japan's ODA policy that stipulated the need for support to road improvements including the development of transport systems between cities.

This project was a large-scale project planned on the basis of the feasibility study conducted by ADB, and a part of the project was carried out as a co-financed project with the Bank. This is a feature relevant with Japan's assistance policy, and the implementation of this co-financed project is highly significant in light of such policy.

This project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy; therefore its relevance is high.

### 3.2 Efficiency (Rating: b)

#### 3.2.1 Project Outputs

In this project, a co-financed project between JICA and ADB, 17 routes among Class A and Class B national roads were improved and/or rehabilitated, and consulting services were provided. Among the 17 routes, JICA was in charge of civil engineering works and related consulting services (construction oversight, support for tendering, etc.) for Route AA005 and Route AB013. A comparison between the actual outputs and the original plan at the time of the appraisal is shown in Table 1 below.

Table 1: Comparison of Original and Actual Outputs (Components financed by JICA)

Item	Original	Actual
Civil Engineering Work	a. Improvement of geometric alignment of Route Class A and B (by ensuring the road design standard of Road Development Authority (RDA)) and pavement strengthening [Option 1 work (provision of 7.4 m carriageway and 1.8 m paved shoulders)] - Approximately 20 km on Route AA005 (Gampola – Pussellawa) - Approximately 20 km on Route AB013 (Gampola – Nawalapitiya)	All the components in a., b., and c. in the original scope were implemented and the following components were added as a result of the design review. - 10 bridges, not to be widened in the original design, were widened to 2-lane standards - Shoulders were paved with asphalt concrete which were proposed to do with SBST/DBST - A concrete-lined vehicle tunnel, 220 m long, 6.0-7.2 m wide with 4.2 m clearance was constructed - A utility corridor of minimum 0.5 m width was provided for future improvements - A weighbridge was installed in Gampola to prevent overloading - Built-up drains were provided on one side of the road to facilitate drainage
	b. Pavement Strengthening of Route Class A and B [Option 2 work (provision of 6.0 m carriageway and 1.2 m paved shoulders)] - Approximately 40 km on Route AA005 (Pussellawa – Nuwara Eliya)	
	c. Rehabilitation and widening of bridges - Route AA005 (No. of bridges: 2) - Route AB013 (No. of bridges: 3)	
Consulting Services	a. Pre-contract assistance b. Construction supervision c. Assistance to RDA in Operation and Maintenance d. Environmental Protection Planning of environmental protection method during construction Environmental monitoring during construction <u>Total of 544 MM</u>	a. Pre-contract assistance, Pre-qualification assessment of contractors b. Design review c. Construction supervision d. Preparation of Operation & Maintenance manual e. Planning and supervision of environmental protection work <u>Total of 772 MM</u>

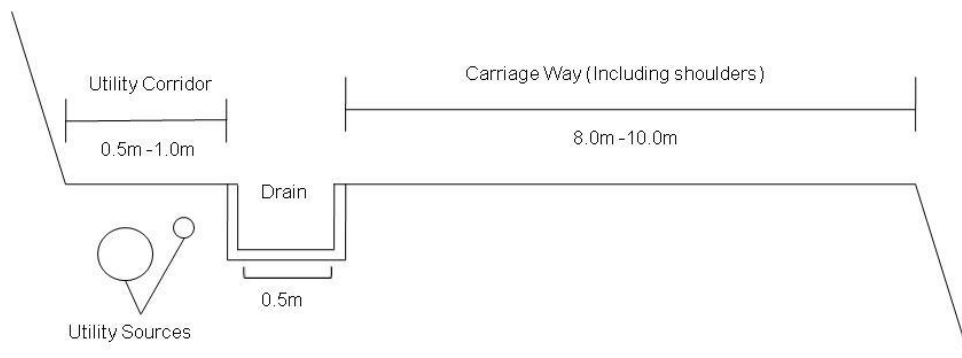


Figure 1: Cross Section of Road

The road sections included in this project were originally designed by ADB. After the loan agreement was signed, however, the Road Development Authority (RDA) and JICA reviewed the design, and added several sub-components to the original design. It was decided, as a result, to construct drains and utility corridors as wide as possible for wiring and piping purposes all along the sections. On-site surveys of the roads, including the test-runs on them, have suggested that the widened bridges and tunnels constructed on the sections were quite effective in enabling the smoother traffic flows.

During the construction work, measures were taken to ensure safety and durability of the roads by building safety walls, protecting the slopes, and adopting u-shaped gutters for drainage. However, during the construction period, there were several cases of collapses of slopes due to heavy rains. In November 2006, a large-scale landslide occurred in Paradeka, along the Route AA005, in which six onlookers were killed. A dispute over compensation between the victims' families and RDA is still pending in the court.

With regard to the consulting services, an additional review of the road design was conducted after the loan agreement was signed, since the bridges were not designed with sufficient widths in the plan prepared by ADB due to the shortage of project budget. Also, the workload of the consultants increased, as the assistance for the pre-qualification assessment of contractors and the care of roadside residents during the construction work were added to the original plan. As a result, the total person-months required increased by 42%, though the rise in personnel expenditures was limited to the increase of 13%.

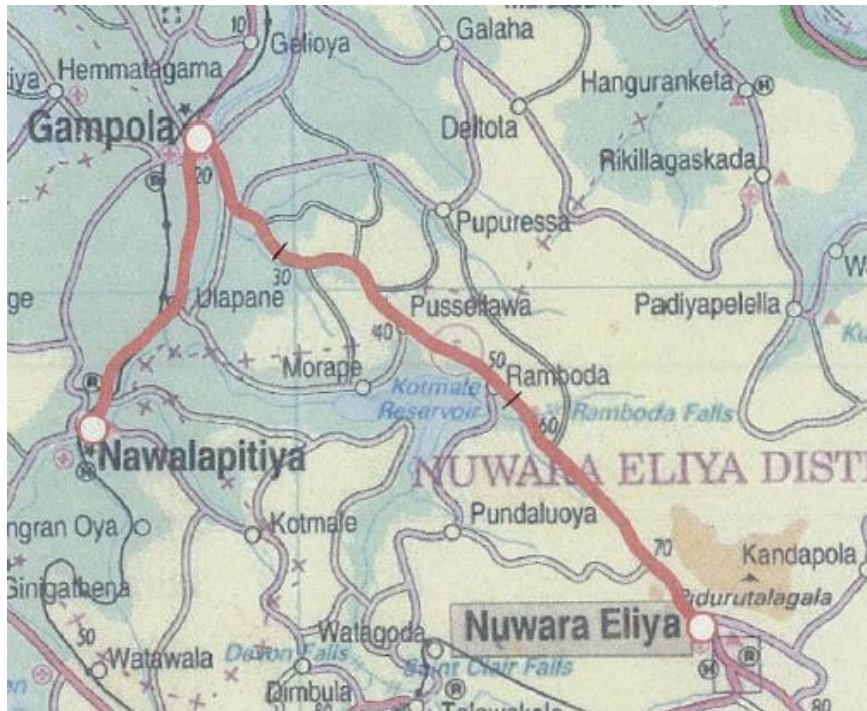


Figure 2: Regions and Roads Covered by the Project

### 3.2.2 Project Inputs

#### 3.2.2.1 Project Period

According to the original plan, the project was to start in August 1999 and to be completed in March 2005 (in 68 months). Actually it started in August 1999 and was completed in March 2007 (in 92 months), 35% longer than the originally planned period. The delay was caused mainly by: (1) the difficulty in land acquisition; (2) a longer period of time spent to confirm the information to be used for pre-qualification assessment; (3) residents' protests against blasting at quarries and along roadsides; and (4) unusually unfavorable weather conditions. However, considering the project sub-components added after the design was reviewed, the substantive delay should be regarded much less than what it was.

#### 3.2.2.2 Project Cost

The project cost, ¥4,009 million in the plan (of which ¥3,078 million was a yen loan), actually totaled ¥4,843 million (of which ¥3,075 million was a yen loan), resulting in a ratio of 121% to the plan (of which 99.9% was a yen loan), which was slightly higher than the planned amount. However, the excess was due mainly to the components added to the project after the design was reviewed. The additional component was fully financed by the Government of Sri Lanka under the agreement between RDA and JICA. Considering the alterations made to the design, the additional cost should be considered

reasonable.

Both project period and project cost exceeded the plan, therefore efficiency of the project is fair.

### 3.3 Effectiveness (Rating: a)

#### 3.3.1 Quantitative Effects

##### 3.3.1.1 Results from Operation and Effect Indicators

###### (1) Average Daily Traffic<sup>1</sup>

On the sections included in this project, the average daily traffic changed as shown in Table 2 below. Although it cannot be said that sufficient data on the traffic volume have been collected, the volume of traffic generally increased compared with the volume before the project was completed. This fact suggests that the improved roads have eased the movement of people and goods produced along them. In particular, on the arterial road of Route AA005, there has been a substantial increase in the number of vehicles.

Table 2: Average Daily Traffic

(Unit: No. of vehicles)

	1995	2003	2007 (Completed)	2009
Route AA005 (Origin: Gampola)				
14 km point	1,620	2,431	3,239	
28 km point		1,656	2,495	3,357
Route AB013 (Origin: Gampola)				
3 km point		5,055	6,807	5,877
11 km point			2,920	

Source: RDA

###### (2) Increase in Average Speed of Vehicles, and Reduction in Travel Time

As RDA does not collect data on the average speed of vehicles or the travel time required, a beneficiary survey<sup>2</sup> was conducted in the ex-post evaluation to measure the level of improvement in regard to these indicators.

The average speeds of vehicles going along the sections have changed significantly after the project, from 21.1 km/hour to 36.6 km/hour on Route AA005, and from 18.4 km/hour to 32.3 km/hour on Route AB013, which are the increases by 73% and 76%, respectively. The survey also showed that 76% of the residents who responded to the

<sup>1</sup> Average volume of traffic during the period of the seven-day survey (168 hours)

<sup>2</sup> The beneficiary survey on this project is based on interviews with a total of 122 respondents (62 along Route AA005 and 60 along Route AB013), which included people living along the road sections in this project, owners of stores, and bus drivers.



survey felt that the traffic had become smoother after the completion of the project. This is a finding demonstrating that the roads have been improved in terms of the level of ease for travelling vehicles.

Along with the increase in the average speed of vehicles, the time required for travelling between places was largely shortened, down 61% on Route AA005 and 57% on Route AB013, which suggests considerable effectiveness in reducing travel time. In the beneficiary survey, 94% of the respondents commented that access between places had “considerably improved” or “slightly improved,” showing the effectiveness in shortening the travel time felt by the road users.



Photo 1: The Only Tunnel on National Highways in the Country (Constructed in This Project)



Photo 2: Improved Road Alignment (Route AA005)

### 3.3.1.2 Results of Calculations of the Internal Rates of Return (IRR)

#### Economic Internal Rate of Return (EIRR)

When this project was appraised, the figures calculated by ADB, which was the coordinating organization of the entire project, were used as the estimated EIRRs for planning. Since 2006, RDA has employed HDM4, a computer program developed by the World Bank for measuring the effects of road construction projects, and the software was used to calculate the actual EIRRs.

While the caution is needed in simply comparing the actual EIRR with the planned figures as the EIRR calculated by HDM4 is based on a lot more data, the actual EIRR fell below the planned figure on Route AA005. On the other hand, the actual value significantly exceeded the planned one on Route AB013. The actual EIRR was less

Table 3 EIRRs of the Project

(Unit: %)

	Original	Actual
Route AA005	21.4	16.6
Route AB013	19.2	42.9

Note: Cost is assumed as the project costs and operation & maintenance expenses. Benefit is assumed as time & traveling benefits, and reductions in transporting expenses.

Source: Project Appraisal Report, and the data provided by RDA

than the planned figure on Route AA005 mainly because the construction costs exceeded the original estimates as a result of the changes in the road design. On Route AB013, on the other hand, EIRR became much higher than the original forecast due to the substantial improvement in ease of driving and to far greater road use with increased economic activities along the road.

### 3.3.2 Qualitative Effects

At the time of project appraisal, the following qualitative effects were pointed out:

- (1) Efficient transportation achieved by a reduction in transportation costs; and
- (2) Longer structural life of the roads

On the basis of the beneficiary survey and the site survey conducted in the ex-post evaluation, the extent to which the effects expected in the appraisal have been realized is examined below.

#### (1) Efficient Transportation Achieved by Reduction in Transportation Costs

According to the beneficiary survey, 57% of the respondents say that the cost for vehicle maintenance has substantially decreased and 34% of them refer to the slight decline, amounting to more than 90% of the total responses in the affirmative. How much the decline in vehicle maintenance costs contributed to the decrease in transport expenses and efficiency in transport was not measured quantitatively, but the enhanced ease of driving vehicles on the roads has improved the efficiency of transport and this was obvious in the interviews with the people living or doing business along the routes. It can easily be imagined that the shorter travel time and the decreased maintenance costs have stimulated transport activities. According to the survey report prepared by ADB, the project has achieved a 25-35% reduction in the driving costs as a whole.

#### (2) Longer Structural Life of the Roads

The roads improved in this project have a strong structure durable for 15 years after being brought into service only with the regular operation and maintenance work. In Sri Lanka, most roads are paved only on the carriageway, and the shoulders are usually left unpaved. This project is the first one to have firmly paved the shoulders in addition to the carriageways.

The index internationally used in assessing the flatness of road surfaces is called the International Roughness Index (IRI), where a smaller figure represents greater flatness. The indices have shown a significant improvement from around 10 to 3 or so, as shown below.

Table 4: Changes in International Roughness Index

Highway	Section	International Roughness Index	
		Before the Project	After the Project
AA005	Gampola – Paradeka	8.93	2.79
	Paradeka – Pussellawa	10.16	3.82
	Pussellawa – Ramboda	9.13	3.00
	Ramboda – Nuwara Eliya	9.54	3.24
AB013	Gampola – Ulapane	10.18	2.38
	Ulapane – Nawalapitiya	10.33	2.34

Source: RDA

This project has largely achieved its objectives; therefore its effectiveness is high.

### 3.4 Impact

#### 3.4.1 Intended Impacts

The impact intended at the time of appraisal was the promotion of economic activities supported by the improvements of the roads developed in this project.

In the ex-post evaluation, it was very difficult to obtain the macro data by district. Therefore, the beneficiary survey was conducted mainly to see whether the business income had increased and what had been recognized by the people living in the project area as the changes in economic activities, in order to examine whether and how the intended impacts have been achieved.

Table 5: Income of People from Doing Business along the Routes after the Project

Do you think that your (or business people's) income has increased after the Project?	Increased a lot	Increased	Same	Decreased	Decreased a lot	Other / No reply
	53%	21%	7%	3%	0%	15%

Note: Business people were asked about the actual increases in their income, while the residents were asked for their opinions about the changes in business people's income. Their responses were compiled in the table above.

Table 6: Changes in the Local Society and Economy after the Project

After the improvement of the road, have you experienced or seen any changes in the local society and economy?	Yes	No
	89%	11%

↓ Major changes

Employment creation	Land value increase	More commercial activities
3%	58%	41%

As for the changes in incomes earned by the business people along the road, almost three quarters of the respondents answered that the incomes “Increased a lot” or “Increased”. This is an indication that a lot of residents opined that the economic activities have become more vibrant after the road improvement. In fact, nearly 90% of the residents have felt



Photo 3: Bus Stop and Commercial Facilities Newly Established After the Project (along Route AB013)

some changes in the local society and economy. The on-site survey has also revealed that several new stores opened and a number of new commercial facilities had started businesses after the road improvement. RDA and the local police commented that Nuwara Eliya, a famous tourist town on Route AA005, have attracted a larger number of visitors after the road improvement, though no specific figures are available. As stated above, the roadside residents are feeling that the economic activities have become more active than before, which demonstrates that this project has made a certain level of contribution to the local development.

### 3.4.2 Other Impacts

#### (1) Impacts on the Natural Environment

At the time of project planning, the Central Environmental Authority (CEA) stated that this project, which was to improve existing roads, could be carried out without any Initial Environmental Evaluation (IEE), but required instead that the attention be paid to the following points:

- Surface water should be effectively drained
- All excavated spoil material should be properly stored and disposed of
- All debris/excavated materials should be transported in covered vehicles
- The noise levels at the boundaries of the project site should be controlled
- Resettlement and compensation for damaged properties should be effected

Following these requirements, RDA states that it generally implemented the project by securing the disposal stations for the waste and soil to prevent the streams around the project sites from silting up. During the on-site survey, no cases were found where the negative environmental impact was suspected as a result of road construction. With regard to the noise levels around the quarry, since some of the neighboring residents made complaints during the project implementation, the construction work was carried out between 6 a.m. and 6 p.m. Thirty two families living adjacent to the quarry were asked to move and rent a house in other places for two years, and were offered a monthly

rent of 3,000 rupees as the compensation. Interviews with the residents around the former quarry have revealed that no major cases of complaints were made after the compensation negotiations were concluded and some of the residents even cooperated in the quarrying work.

## (2) Land Acquisition and Resettlement

At the time of project planning, the land area to be acquired in the entire project was estimated to be 20 hectares. 12.25 hectares of land was actually acquired. It was also expected that 77 families would have to resettle, but it turned out to be only 17 families along the Route AA005 and 16 families along the Route AB013 (33 families in total). This is mainly because the retailers, especially in Pussellawa, a town along the Route AA005, continued their businesses in their original locations without relocating. Another major reason for the smaller land area acquired is that some of the sites that were believed to belong to the private owners and were expected to be used to widen the roads turned out to be the government land reserved for road construction.

In order to carry out this project, RDA laid down the high-level compensation criteria<sup>3</sup>, which included incentives provided for the people who would lose their land sections, houses and/or jobs in order to encourage them to move within a specific period of time. Interviews conducted during the on-site survey have suggested that although some of them wanted a larger amount of compensation, the majority were generally satisfied with the amount they received. Many of the retailers and other business owners who transferred some of the land they had along the routes spent the compensation to renovate their stores and stayed at their locations to continue their businesses, even though with a little smaller floor spaces. No specific cases of major complaints were found in the interview survey.

## (3) Unintended Positive/Negative Impact

As another major impact of improvements to the roads, a higher level of comfort when driving on the roads with the expanded width, better-coordinated alignment, and smoother surfaces, seems to be highly welcomed by the people in the project area. According to the beneficiary survey, 97% of the respondents commented that the bus and other road transport services have improved, and the same percentage answered that driving has become more comfortable. In addition, 63% of them feel that the safety of the roads has generally improved. The survey has revealed that, as a result, 96% of the respondents are satisfied with the current state of the roads. On the other hand, some

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<sup>3</sup> Later, RDA laid down “Ex-Gratia Package for the People Affected by Highway Projects,” which sets out compensation standards applicable to any types of highway projects.

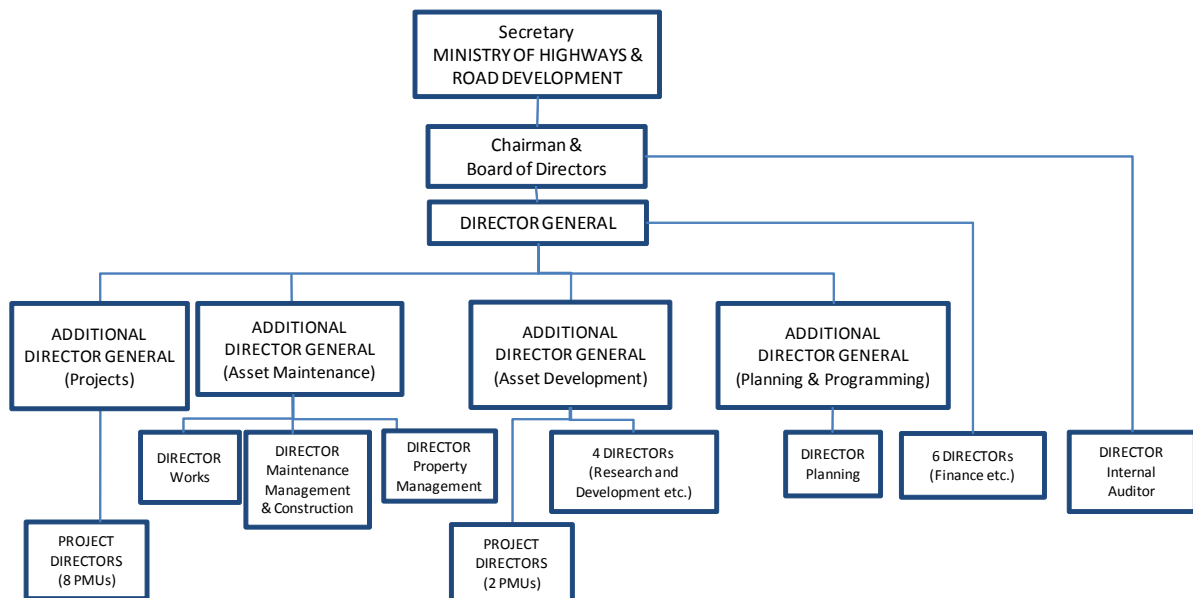
problems have been pointed out in the survey; the improved road alignment enables the vehicles to go faster, which have made some of the residents feeling it a little dangerous; and some roadside ditches are not functioning in the rainy season, leaving the roads flooded during heavy rains. Apart from such problems, however, this project has brought significant positive impacts to the people along the roads.

In conclusion, it can be said that this project was carried out with appropriate measures to deal with potential social and environmental problems. It has also stimulated greater economic activities as originally planned, and a much higher level of comfort on the roads has provided greater satisfaction to the people living in the project area.

### 3.5 Sustainability (Rating: b)

#### 3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance of national highways after the project is under the responsibility of RDA's Maintenance Management & Construction (MM&C). In practice, RDA's provincial offices are responsible for operation and maintenance activities in each province under the supervision of MM&C. This project is being supervised by the provincial offices in Kandy and Nuwara Eliya.



Source: RDA

Figure 3: Organization Chart of RDA (simplified version)

The offices in Kandy and Nuwara Eliya have 111 and 82 staff, respectively, working on the operation and maintenance of national highways. RDA feels that it has insufficient

manpower for the large geographical area it covers.

Table 7: Number of Staff for Operation & Maintenance (2009)  
(Unit: Person)

	Kandy Area	Nuwara Eliya Area
Executive Engineer	1	1
Technical Staff	4 (2 Officers, 2 Assistants)	4 (2 Officers, 2 Assistants)
Gang Leader (Supervisor)	3	2
Maintenance Laborer	103	75
<b>Total</b>	<b>111</b>	<b>82</b>

Source: Results from the interviews with each RDA office

RDA has a view that it has a structure established for operation and maintenance, but has difficulties in increasing the number of maintenance staff due to the lack of financial resources. In particular, a shortage of laborers has become a cause for the troubles that often occur during the rainy season, when a lot of operation and maintenance work is required.

The operation and maintenance workers in each area are divided into several groups at a district level. The road sections included in this project, therefore, are maintained and managed by a smaller number of staff than the number shown in Table 7. Since the sections are still in good conditions as only a short period of time has passed since the completion of the project, a larger number of staff members have been assigned to the operation and maintenance of other routes.

### 3.5.2 Technical Aspects of Operation and Maintenance

RDA comments that it has sufficient technical skills for operation and maintenance and has no major problems in this respect. The actual operation and maintenance is carried out by the staff at RDA's provincial offices. The good conditions of the roads suggest that there are currently no problems in terms of technical aspects.

RDA trains its staff at a training center in Colombo. It offers a course on road maintenance. The technical staff members attend three training sessions running for several days every year, and some skilled workers have one training session each year to obtain a higher level of skills for their daily operation and maintenance work. Also, the maintenance staff often take part in the training programs offered by donor agencies and international organizations as well as the workshops held by external organizations such as universities and research institutions.

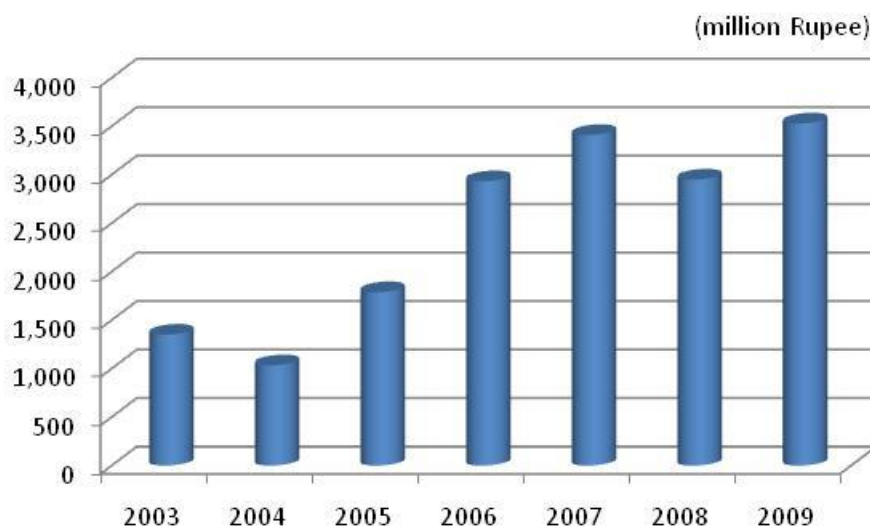
However, while the staff generally have a lot of opportunities for training, they sometimes seem unable to use their expertise to its fullest potential, partly due to the lack of equipment they need on the ground to apply the knowledge and skills they have learned.

### 3.5.3 Financial Aspects of Operation and Maintenance

RDA's budget allocated for operation and maintenance work has been growing on average with some fluctuations, at a rate higher than the inflation rate observed during the same period. However, while a number of road construction projects and large-scale rehabilitation projects are implemented, human and financial resources appropriated for operation and maintenance are insufficient compared to the demand for them. This situation applies not only at the national level but also at a local level (Kandy and Nuwara Eliya).

The lack of operation and maintenance of the roads has long been pointed out as a problem. To address this perennial problem, the Road Maintenance Trust Fund (RMTF) was established in December 2005 in order to secure sufficient budget for road operation and maintenance. Each liter of gasoline and diesel has a levy of 1 and 0.5 rupees respectively, which amounts to 1.5 billion rupees of tax money annually channeled into the RMTF. As a result, a substantial increase in the budget for operation and maintenance has been achieved since 2006. It is expected that the RMTF will continue to finance not all but at least a considerable part of the maintenance budget every year. However, at the time of the ex-post evaluation, RDA has not yet been authorized to directly use RMTF's money, as it is still under the control of the Ministry of Finance and Planning. RDA is now in discussions with the Ministry on how the fund should be managed. At present, RDA is provided with funds from the general budget, which includes the amount coming from the RMTF.





Source: RDA

Figure 4: Trend in the Road Operation and Maintenance Budget

Table 8: Operation & Maintenance Budget Allocated to Kandy and Nuwara Eliya Offices of RDA

(Unit: million Rupee)

	Kandy	Nuwara Eliya
2008	166.8	40.8
2009	427.1	104.7

Note: Total amount of major activities such as routine and periodic inspections

Source: RDA (Kandy and Nuwara Eliya Offices)

#### 3.5.4 Current Status of Operation and Maintenance

The roads improved in this project have generally been kept in good conditions. The Ramboda Tunnel, the only tunnel on the national highway in Sri Lanka, is inspected by the RDA technical staff every week and is kept in good conditions. The road in this project was developed with durable structures both on the carriageways and shoulders, and this aspect should be highly evaluated under the shortage of operation and maintenance budget. In some districts, however, the shoulders or other parts of the roads are blocked due to the encroachers, or the surfaces have not been fully repaved after water pipes were laid down. Adequate measures should be taken so that the life of the roads will not be shortened. In addition to the financial difficulties described in the previous section, it seems that the following issues need to be attended to in the future operation and maintenance of the roads.

##### (1) Cleaning of Road Shoulders

It did not seem practical that RDA, without sufficient number of laborers for operation

and maintenance, would undertake all the maintenance works. For this reason, it is imperative to have voluntary cleaning activities by the roadside residents, but the reality is that some of the road sections, adjacent to the residential area, are not cleaned properly at some places. On the other hand, some sections have been kept tidy by the residents in those towns. It is assumed that these differences may depend on the recognition of the importance of cleaning and also the distances of such locations from their houses and shops.

#### (2) Subsidence of Road Surface

It was found during the on-site survey that several parts of the road were subsiding towards a cliff along the Route AB013. The road sections in this project go through the mountainous area where there are frequently heavy rains, which makes the conditions severe for the improvement, operation and maintenance of the roads. It is believed that the road subsidence was not due to any design problems, but occurred unexpectedly. If the road subsides further in the future, it is expected that large-scale road construction works will be required.

#### (3) Shortage of Maintenance Equipment

According to RDA, the shortage of equipment, especially the large machinery, is a problem closely related to the shortage of budget. It means that it is not always able to supply necessary equipment as needed. It is feared that some problems may arise especially when carrying out a large-scale operation and maintenance work.

Some problems have been observed in terms of structural and financial aspects of operation and maintenance; therefore sustainability of the project is fair.

## **4. Conclusion, Lessons Learned and Recommendations**

### **4.1 Conclusion**

This project was implemented to improve arterial roads that were regarded as one of the critical social and economic infrastructure facilities in Sri Lanka, and is highly relevant with its development policy and needs of the country. As the actual project period was longer than the planned period, its efficiency is fair. In terms of its future sustainability, there seem to be some concerns about the manpower and budget needed for the roads in terms of their operation and maintenance. But the improved roads have realized smoother traffic flows in the areas covered by this project, which has also encouraged economic activities. The project is also highly appreciated by the roadside residents, and has achieved most of its

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

## **4.2 Recommendations**

### **4.2.1 Recommendations to the Executing Agency**

#### **(1) Securing of Budget for Operation and Maintenance**

Appropriate operation and maintenance of the roads is as important as construction and rehabilitation. As more roads are constructed, the demand for operation and maintenance grows. In this respect, it is critical to secure the budget for conducting operation and maintenance work in an efficient way. As the RMTF is an important step towards achieving this, it is desirable to gradually develop a scheme that allows RDA to consider how to make appropriations from the RMTF in a flexible manner so that the effects of operation and maintenance will be maximized.

#### **(2) Management of Road Shoulders by the Residents**

This issue is closely related to the sense of ownership and beauty of the residents for the roads. Under the current circumstances, it is difficult for the staff of RDA and local governments to keep the roads free from litter in all road sections, especially during the rainy season. An option for RDA to address this problem is to consider the ways of having the residents regularly clean the roads and do the basic operation and maintenance work, by exploring the possibility of making a certain amount of appropriation for their cleaning activities. As a way of operating and maintaining the roads, a pilot project is now getting launched under the assistance of ADB with a view to introducing a performance-based operation and maintenance program<sup>4</sup>. This initiative is being undertaken to find out how the limited budget can be used effectively for operation and maintenance work. For this purpose, it is desirable to measure its effectiveness and find a combination of methods that would allow national highways to be operated and maintained in the optimal way.

### **4.2.2 Recommendations to JICA**

Despite a number of minor problems, the supervision and the construction work in this project was carried out by the consultants and contractors smoothly. But the sustainability of the project effects, that is, the appropriate operation and maintenance, depends largely on how RDA works to achieve them. In order to keep the roads in good conditions, it will be crucial to do the appropriate operation and maintenance as well as the construction of

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<sup>4</sup> In this program, operation and maintenance of certain sections of a road is contracted out for a specific amount of payment. This is expected to make the operation and maintenance work more efficient and create jobs in the private sector.

new roads. Therefore, it seems necessary for JICA to collaborate with other donors such as ADB, which are providing concrete assistance on operation and maintenance, on how the RDA's maintenance budget should be secured and what should be done to strengthen its operation and maintenance system.

#### **4.3 Lessons Learned**

In this project, it took as long as one year before completing the pre-qualification assessment of an overseas contractor who had expressed an interest in participating in this project. This became a major factor for the delay in the completion of the project as a whole, despite its generally smooth construction progress afterwards. This experience suggests that in the road or other infrastructure construction projects, making efforts to keep the schedule of tenders for pre-qualification assessment will ensure that the project is to produce its effects much sooner.

### Comparison of Original and Actual Scope of the Project

Item	Original	Actual
(1) Project Outputs	<p><u>Civil Engineering Work</u></p> <p>a. Improvement of geometric alignment of Route Class A and B (by ensuring the road design standard of Road Development Authority (RDA)) and pavement strengthening [Option 1 work (provision of 7.4 m carriageway and 1.8 m paved shoulders)]</p> <ul style="list-style-type: none"> <li>- Approximately 20 km on Route AA005 (Gampola – Pussellawa)</li> <li>- Approximately 20 km on Route AB013 (Gampola – Nawalapitiya)</li> </ul> <p>b. Pavement Strengthening of Route Class A and B [Option 2 work (provision of 6.0 m carriageway and 1.2 m paved shoulders)]</p> <ul style="list-style-type: none"> <li>- Approximately 40 km on Route AA005 (Pussellawa – Nuwara Eliya)</li> </ul> <p>c. Rehabilitation and widening of bridges</p> <ul style="list-style-type: none"> <li>- Route AA005 (No. of bridges: 2)</li> <li>- Route AB013 (No. of bridges: 3)</li> </ul> <p><u>Consulting Services</u></p> <p>a. Pre-contract assistance</p> <p>b. Construction supervision</p> <p>c. Assistance to RDA in Operation &amp; Maintenance</p> <p>d. Environmental Protection            Planning of environmental protection method during construction            Environmental monitoring during construction</p> <p><u>Total of 544 MM</u></p>	<p><u>Civil Engineering Work</u></p> <p>All the components in a., b., and c. in the original scope were implemented and the following components were added as a result of the design review.</p> <ul style="list-style-type: none"> <li>- 10 bridges, not to be widened in the original design, were widened to 2-lane standards</li> <li>- Shoulders were paved with asphalt concrete which were proposed to do with SBST/DBST</li> <li>- A concrete-lined vehicle tunnel, 220 m long, 6.0-7.2 m wide with 4.2 m clearance was constructed</li> <li>- A utility corridor of minimum 0.5 m width was provided for future improvements</li> <li>- A weighbridge was installed in Gampola to prevent overloading</li> <li>- Built-up drains were provided on one side of the road to facilitate drainage</li> </ul> <p><u>Consulting Services</u></p> <p>a. Pre-contract assistance, Pre-qualification assessment of contractors</p> <p>b. Design review</p> <p>c. Construction supervision</p> <p>d. Preparation of Operation &amp; Maintenance manual</p> <p>e. Planning and supervision of environmental protection work</p> <p><u>Total of 772 MM</u></p>
(2) Project Period	August, 1999 – March, 2005 (68 months)	August, 1999 – March, 2007 (92 months)
(3) Project Cost		
- Amount paid in foreign currency	1,508 million yen	1,466 million yen
- Amount paid in local currency	2,501 million yen (1,352 million Rupees)	3,377 million yen (2,761 million Rupees)
Total	4,009 million yen	4,843 million yen
Japanese ODA loan portion	3,078 million yen	3,075 million yen
Exchange Rate	1 Rupee = 1.85 yen (As of January, 1999)	1 Rupee = 1.22 yen (Average between August, 1999 and March, 2007)