

## 1. Project Profile and Japan's ODA Loan



Site Map: Sri Lanka - nationwide



Equipment procured under the project

### 1.1. Background

Car ownership increased sharply in Sri Lanka during the period from 1977 to 1986, at an average annual rate of 11.8%. However, the country's roads, which had no modern structures, were vulnerable to rain, and trunk roads nationwide were left in a heavily damaged state despite priority investment in road maintenance. At the time of appraisal, the construction equipment owned by the Road Development Agency (RDA) had become increasingly obsolete, and there was insufficient quantity. In addition, RDA did not have an adequate system for supplying the construction materials necessary for modernizing road structures, including asphalt and gravel.

Under these circumstances, in 1985 the Sri Lankan government developed a five-year plan to modernize road structures and maintain and repair roads in a systematic and efficient manner, with a particular focus on maintenance. The plan was insufficiently financed, however. In 1987, the government formulated a new plan for the period from 1988 to 1992 and requested foreign assistance, including an ODA loan from Japan.

### 1.2. Objectives

To mechanize road repair work with the aim of facilitating efficient operations and of modernizing road structures, and to improve the technical level of governmental and private repair agencies engaged in road maintenance and the country's road maintenance system to ensure more efficient use of construction equipment.

### 1.3. Project Scope

The project involved the routine and periodic maintenance of about 25,000 km of RDA-controlled roads and the rehabilitation of about 1,700 km of particularly heavily

damaged roads with heavy traffic. Japan's ODA loan covered the following:

- (1) Purchase of construction equipment, spare parts and workshop facilities
  - Small road rollers, asphalt heaters and other machines loaned to private repair agencies
  - Procurement of gravel and asphalt production plants, as well as related digging, civil engineering and transport vehicles
- (2) Procurement of asphalt as construction materials
  - Specifically, 51 million liters of asphalt required to repair trunk roads during the period in which the five-year plan was implemented
- (3) Consulting services
  - Technical guidance in mechanized construction work and procurement of, and guidance on management of construction equipment
  - Study of management policies related to the operation of construction equipment

#### 1.4. Borrower/Executing Agency

The Democratic Socialist Republic of Sri Lanka/The Road Development Authority (RDA)

#### 1.5. Outline of Loan Agreement

Loan amount/Loan disbursed amount	¥12,314 million/¥5,881 million
Exchange of notes/Loan agreement	March 1988/July 1988
Terms and conditions	Interest Rate: 2.75%, Repayment Period: 30 years (Grace Period: 10 years), General untied
Final disbursement date	September 1998

## 2. Results and Evaluation

### 2.1. Relevance

The project aimed to strengthen Sri Lanka's road repair functions in accordance with the government's five-year plan to modernize road structures and to achieve greater efficiency in maintenance and repair. The improvement of road infrastructure is considered indispensable to economic development. In light of these factors, the project plan is judged relevant. There were considerable differences from the initial plan in the content/quantity of equipment actually purchased using the loan. One reason is that it was necessary to procure more road surface rehabilitation equipment due to the heavy damage. Another reason is that the quantity of equipment required for routine and periodic maintenance was reduced because the responsibility for the operation and maintenance of C- and D-class roads was transferred from RDA to provincial governments.

One of the initial objectives was to foster repair agencies in the private sector. At the time of appraisal, plans called for private repair agencies to be the main contractors for

road repair work ordered by RDA. It was subsequently determined, however, that the private repair agencies were not sufficiently skilled and that they might hinder the implementation of the project. Consequently, it was decided to appoint the Road Construction & Development Corporation (RC&DC) as the main contractor, with private repair agencies as subcontractors. In 1995, RDA started to consign technically simple routine maintenance work directly to private repair agencies; thus, the objective of fostering repair agencies in the private sector has been maintained.

**Table 1 Maintenance Types and Items**

Type	Description	Items
Routine Maintenance	Maintenance work performed on a daily basis in order to maintain the condition of road surfaces and delay their deterioration	Cutting back foliage along hard shoulders, patching cracks, laying earth on hard shoulders, repairing potholes, using the sand sealing method to repair pavement, etc.
Periodic Maintenance	Maintenance aimed at restoring the condition of partially deteriorated pavement to a certain level	Patching, maintenance of hard shoulders, double bituminous surface treatment, asphalt concrete treatment, re-surfacing,
Rehabilitation	Maintenance aimed at restoring the deteriorated road surface to its original condition	continuous maintenance of hard shoulders, painting traffic signs and guard railings, maintenance of side ditches, etc.

\* There is no clear distinction among the three types of maintenance, and details of the work involved vary only marginally between projects.

## 2.2. Efficiency

### (2.2.1.) Project Cost

The actual total project cost was ¥5,634 million, compared to ¥12,314 million estimated at the time of appraisal. There were two major reasons for the cost underrun, as follows: In 1989, the responsibility for the management of C-, D- and E-class roads (total length: 15,000 km; see Tables 2 and 3 for classifications and condition) was transferred from RDA to provincial governments, reducing the length of roads subject to routine and periodic maintenance from 25,000 km to 9,000 km. Secondly, the executing agency used its own funds, instead of the JBIC loan, to procure 20% of the equipment listed in the second phase of the procurement.

### (2.2.2.) Implementation Schedule

The procurement of materials and equipment was completed in September 1998, five years and nine months later than the planned date of December 1992. The primary reason for this delay was that the process of making alterations to the types and quantity of materials and equipment, and, subsequently, the executing agency's internal approval procedure, were highly time-consuming.

**Table 2 Road Classifications in Sri Lanka**

Road class	Competent authorities	Road specifications
A	Main trunk roads: RDA (Roads linking provinces and prefectures, major ports and harbors, etc.)	Surfaced with asphalt, etc. (Total width: 12-19 m; driveway: 8-12 m)
B	Main roads: RDA (Roads linking the centers of local governments)	Surfaced with asphalt, etc. (Total width: 6-8 m; driveway: 4-6 m)
C	Provincial governments (Roads linking main roads)	Surfaced with asphalt, etc. (Total width: 7 m; driveway: 4 m)
D	Provincial governments (Plantations, irrigated areas and forests)	Gravel road (Total width: 1-2 m)
E	Villages and special organizations (Plantations, irrigated areas and forests)	Earth road

**Table 3 Road Conditions in Sri Lanka**

Road classification		Total length (km)	Pavement ratio (%)
Name	Road class		
National roads	A, B	11,462	100
Provincial roads	C, D, E	16,782	67
Local roads	C, D, E	52,244	13
Agricultural / other roads		19,389	Unknown

## 2.3. Effectiveness

### (2.3.1.) Maintenance Results and Improvements to Road Surface Conditions

At the time of appraisal, in addition to the purchase of construction materials and equipment required for road maintenance, project plans called for the routine and periodic maintenance of 25,000 km of RDA-controlled A- to D-class roads (see Table 2) and the rehabilitation of 1,700 km of such roads.

In terms of routine maintenance, the responsibility for the maintenance of C- and D-class roads was transferred from RDA to provincial governments in 1995, and as a result, the planned total length of RDA-controlled road sections subject to routine maintenance (total length of the RDA-controlled roads: not the length of sections for which repair work was actually performed) was reduced from 25,000 km to 9,000 km. The length of sections on which maintenance was actually performed was 11,272 km in total.

In terms of rehabilitation, although 1,700 km of roads were scheduled to be rehabilitated as planned, rehabilitation work was completed for only 610 km during the implementation period. The major reason for this was that nine smashed rock sprayers delivered for the project failed to spray uniformly and proved to be unusable. Subsequently, the equipment supplier provided five, more powerful smashed rock sprayers from another manufacturer free of charge, and the executing

agency modified one of the nine unusable sprayers so that it could be utilized. As a result of these measures, the initially planned capacity has been maintained.

Maintenance continues with these machines, and by June 2000, after project completion, rehabilitation work had been completed for another 136 km.

**Table 4 Distance of Actually Repaired Roads**

(Unit: km)

	Planned figure	Revised figure	Actual figure						Total
			1993	1994	1995	1996	1997	1998 <sup>*2</sup>	
Routine maintenance/periodic maintenance (sand sealing)	25,000	9,000	-	290	4,528	1,720	1,630	3,104	11,272
Rehabilitation	1,700	DBST <sup>*1</sup> 1,600	11	39	139	181	130	110	584
		A/C <sup>*1</sup> 100	-	26	-	-	-	-	26

<sup>\*1</sup> A/C stands for asphalt concrete pavement, and DBST stands for double bituminous surface treatment.

<sup>\*2</sup> Figures represent the period up to December 1998. The project was completed in September 1998.

Source: RDA materials

As described above, routine and periodic maintenance work is being performed using equipment procured under the project at a faster pace than planned. Although rehabilitation work has been delayed, maintenance work using the procured equipment continues to be performed today, contributing to the modernization of road structures -- including double bituminous surface treatment and asphalt concrete pavement -- and improvements to the condition of road surfaces.

### **(2.3.2.) Stable Supply of Raw Materials from Production Plants**

The seven normal-temperature mix asphalt plants procured under the project are the only facilities of their kind in Sri Lanka. They continue to operate smoothly at a design capacity of 150 tons/hour. In 1999, they produced approximately 42,600 tons of normal-temperature asphalt mixture.

In addition, two hot mix asphalt plants account for approximately 30% of the total capacity of all similar facilities in Sri Lanka (120 tons/hour vis-à-vis 350 tons/hour) and approximately 40% of the total capacity of similar facilities actually in operation (120 tons/hour vis-à-vis 280 tons/hour). These two plants have been in operation since August 1999 and had produced approximately 80,000 tons of hot asphalt mixture by the end of June 2000.

Smashed rock production plants account for approximately 30% of the total capacity for all similar facilities in Sri Lanka (320 tons/hour vis-à-vis 1,000 tons/hour) and also approximately 30% for similar facilities actually in operation (210 tons/hour vis-à-vis 700 tons/hour).

These material production plants are contributing to the mechanization of material production and to the stable supply of materials for road construction and maintenance. Furthermore, since these plants are scattered throughout the country, they are contributing to savings in time and in the cost of transporting materials to construction sites.

### **(2.3.3.) Technology Transfer to RC&DC and Private Repair Agencies**

During the project implementation period, a total of 74 engineers received training in equipment operation to acquire the necessary skills. In addition, they have passed on their knowledge, raising the skill level of at least 200 operators.

## **2.4. Impact**

### **Environmental Impact**

The plants were certified by the Central Environmental Authority (CEA), verifying that they met environmental standards before being installed by RDA. In addition, the plants are located at quarries, and there are no private houses in the vicinity. Therefore, noise, vibration and dust that might be generated by smashed rock production plants procured under the project were avoided. Moreover, since sprinklers prevent dust from spreading, there have been no particular problems in the neighborhood. Other equipment is having no environmental impact, either.

## **2.5. Sustainability**

### **(2.5.1.) Present Maintenance Structure**

Currently, routine maintenance work is consigned to private repair agencies by RDA. Periodic maintenance and rehabilitation work is undertaken directly by RC&DC on consignment from RDA.

**Table 5 Overview of Maintenance Organizations**

Organization name	Overview
<p>RDA (Road Development Authority)</p> <p>Personnel: 2,300 (including 400 engineers) Part-time workers: approx. 8,000</p>	<p>The RDA was established in 1985 to administer roads, taking over from the Bureau of Expressway. Initially, the RDA was responsible for the maintenance of A- to D-class roads. In 1989, however, it was decided that RDA would only be responsible for the maintenance of A- and B-class roads, and some of its offices, equipment, and personnel were transferred to provincial governments, which begin maintaining C- and D-class roads. Currently, routine maintenance work is performed by RDA or consigned to private repair agencies. Meanwhile, periodic maintenance and rehabilitation work is commissioned to RC&amp;DC.</p>
<p>Provincial government</p>	<p>Initially, provincial governments were only responsible for maintaining E-class roads. In 1987, however, maintenance of C- and D-class roads was also assigned to local governments. Organizational structures vary among the nine provincial governments, but local governments are only responsible for planning, with actual work being consigned to local construction companies in the private sector.</p>
<p>RC&amp;DC (Road Construction &amp; Development Corp.)</p> <p>Personnel: 846 (including 465 engineers) Part-time workers: About 9,000</p>	<p>RC&amp;DC was established in 1987, when the construction division of RDA was established as a separate government-owned company. The sole purpose of its establishment was to perform rehabilitation work in order to restore roads to a passable condition. In 1988, RC&amp;DC started to perform all maintenance work, including routine and periodic maintenance, and to construct bridges on consignment from RDA. However, since 1995, it has been solely engaged in periodic maintenance and rehabilitation work. It has offices in all nine provinces and 48 district offices, which are responsible for individual districts.</p>
<p>Private construction companies and repair agencies (local contractors)</p>	<p>These are private construction companies and repair agencies that actually build roads and perform maintenance and repair work. They are categorized into nine classes according to the equipment, facilities and personnel they own. In June 1998, there were 826 registered road constructors/repair agencies and 68 registered bridge constructors/repair agencies nationwide. Currently, the RDA consigns routine maintenance work on A- and B-class roads to these private contractors*, which, in addition, are commissioned by provincial governments to maintain C-, D- and E-class roads.</p>

\* Only 33 companies in the top three ranks are eligible to accept orders from RDA.

### **(2.5.2.) Operation and Maintenance Costs**

RDA's budget consists mainly of government funding allocated through the Ministry of Highways. Another source of funds, however, is the revenue from rental fees collected when RDA loans its materials and equipment to RC&DC and to private repair agencies.

Operation and maintenance costs for 1995-2000 are shown in Table 6. The budget for routine maintenance has increased slightly and for periodic maintenance it has

remained almost the same, while the budget for road surface rehabilitation, an area that has seen little progress, has increased in recent years because of funds carried over from the preceding year.

A budget of 300 million rupees was appropriated for routine maintenance, although 450 million rupees was requested, and approximately 800 million rupees was given for periodic maintenance, compared to the requested 1,200 million rupees. In both cases, about 70% of the amount requested was actually approved.

Currently, in recognition of the fact that shortfalls in routine and periodic maintenance budgets have caused the condition of road surfaces to deteriorate, the government is considering budgetary measures to improve the situation, including securing specified revenue sources and introducing toll roads.

**Table 6 Changes in RDA Operation and Maintenance Budgets**

(Unit: million rupees)

	1995	1996	1997	1998	1999	2000
Routine maintenance	200	265	265	265	300	300
Periodic maintenance	800	930	700	800	700	800
Rehabilitation	998	806	936	1,240	2,209	3,092
Total	1,998	2,001	1,901	2,305	3,209	5,292

Source: RDA materials

### **(2.5.3.) Status of Management for Procured Equipment**

RDA has four workshops nationwide, and the maintenance equipment procured using Japan's ODA loan is owned and managed by the head office and central, southern and northern workshops at respective ratios of around 60%, 20%, 10% and 10%. Repairs are performed at these workshops as necessary. The equipment is used for routine maintenance work performed by RDA or its local contractors and for periodic maintenance and road surface rehabilitation work, construction and other operations executed by RC&DC.

When RC&DC needs to use equipment, it rents from one of the workshops. In 1998, 293 of the 551 units of equipment were rented to RC&DC, and in 1999, 292 of 571 units were rented to the agency, with 3.8 million rupees in usage fees paid to RDA. The status of equipment use is controlled using computers procured under the project, and the equipment is efficiently utilized because a system for tracking the rental status of each unit and its operating hours has been established.

The management and maintenance of asphalt plants, smashed rock plants and other material production plants procured under the project is undertaken by RC&DC on consignment from RDA.



#### **(2.5.4.) Sustainability**

Although some of the maintenance equipment procured under the project is no longer used because its service life has expired, in general, the equipment is being used carefully and it is repaired repeatedly, even if its useful life has expired, thus contributing to road repair work in Sri Lanka. Of the material production plants procured, the smashed rock plant constructed in Ambalangoda in southwestern Sri Lanka has seen its operating capacity decline due to gear failures, but other equipment is being operated smoothly and maintaining the initial operating capacity. When the project was started, the technical levels of private repair agencies were not adequate. As a result, RDA consigned both maintenance and rehabilitation work to RC&DC, with such work undertaken by subcontracted private repair agencies under the supervision and guidance of RC&DC.

From 1995, RDA started to consign technically simple, routine maintenance work to private repair agencies in an effort to prevent the over-expansion and monopoly of RC&DC and to develop repair agencies in the private sector. The government's road administration policy, however, has undergone bewildering changes. For example, in 1997, RC&DC was prohibited from outsourcing periodic maintenance and rehabilitation work to private repair agencies under government-formulated guidelines. Current issues surrounding the reform of road maintenance organizations in Sri Lanka include the privatization of RC&DC, where authority is concentrated, and how best to strengthen the structure of private repair agencies.

### Comparison of Original and Actual Results

Item	Plan	Results
1. Project scope	· Procurement of maintenance equipment	· Procurement of maintenance equipment
	Operational vehicles	Operational vehicles
	- Jeeps and pick-up trucks: 110 units	- Jeeps and pick-up trucks: 70 units
	- Tipplers: 45 units	- Tipplers: 0 unit
	- Inflammable transporters: 2 units	- Inflammable transporters: 1 unit
	Carriage vehicles	Carriage vehicles
	- Water suppliers: 530 units	- Water suppliers: 25 units
	- Trucks/cranes: 13 units	- Trucks/cranes: 0 unit
	- Low-height trailer: 4 units	- Low-height trailer: 2 units
	- Dump trucks: 180 units	- Dump trucks: 217 units
	- Fueling vehicles: 20 units	- Fueling vehicles: 32 units
	Equipment for civil engineering work	Equipment for civil engineering work
	- Road loaders: 77 units	- Road loaders: 23 units
	- Hydraulic shovels: 54 units	- Hydraulic shovels: 9 units
	- Motor graders: 42 units	- Motor graders: 7 units
	- Bulldozers: 31 units	- Bulldozers: 0 unit
	- Back hoes: 10 units	- Back hoes: 4 units
	Road rollers	Road rollers
	- Vibration rollers: 540 units	- Vibration rollers: 164 units
	- Rammers: 500 units	- Rammers: 0 unit
	- Road rollers: 222 units	- Road rollers: 8 units
	- Tire rollers: 6 units	- Tire rollers: 15 units
	Equipment for special road work	Equipment for special road work
	- Asphalt heater/sprayers: 60 units	- Asphalt heater/sprayers: 60 units
	- Asphalt heaters: 500 units	- Asphalt heaters: 9 units
	- Asphalt concrete mixers: 500 units	- Asphalt concrete mixers: 0 unit
	- Smashed rock sprayers: 6 units	- Smashed rock sprayers: 9 units
	- Mechanical brooms: 6 units	- Mechanical brooms: 15 units
	- Road sweepers: 3 units	- Road sweepers: 52 units
	Production equipment	Production equipment
	- Stone smashing machines: 20 units	- Stone smashing machines: 4 units
	- Stone smashing drill: 69 units	- Stone smashing drill: 100 units
	- Crawler rock diggers: 21 units	- Crawler rock diggers: 3 units
	- Air compressors: 50 units	- Air compressors: 14 units
	- Asphalt emulsion mixers: 1 unit	- Asphalt emulsion mixers: 1 unit
	- Blasting equipment: 20 units	- Blasting equipment: 5 units
	Other equipment	Other equipment
	- Diggers: 3 units	- Diggers: 3 units
	- Movable repair vehicles: 13 units	- Movable repair vehicles: 2 units
	- Sludge pumps: 8 units	- Sludge pumps: 0 unit
- Concrete mixers: 4 units	- Concrete mixers: 0 unit	
- Lighting: 44 units	- Lighting: 0 unit	
- Welding plants: 3 units	- Welding plants: 2 units	
- Repair workshop facilities	- Repair workshop facilities: 7 sets	
Spare parts	Spare parts	
· Procurement of road construction materials	· Procurement of road construction materials	
- Asphalt 50.9 million liters	- Asphalt 61.41 million liters	
· Consulting services	· Consulting services	
- Foreign consultants 138 M/M	- Foreign consultants 176 M/M	
- Local consultants 286 M/M	- Local consultants 562 M/M	

Item	Plan	Results
		(Additionally procured equipment) <ul style="list-style-type: none"> <li>- Sand sieving &amp; washing plant: 6 units</li> <li>- Track drills: 3 units</li> <li>- Bit grinders: 5 units</li> <li>- Rippers: 6 units</li> <li>- Wheel-type diggers: 12 units</li> <li>- Forklift trucks: 7 units</li> <li>- Cargo trucks: 10 units</li> <li>- Asphalt tankers: 14 units</li> <li>- Emulsion tanker trucks: 30 units</li> <li>- Tractor with trailers: 65 units</li> <li>- Lubrication service trucks: 2 units</li> <li>- Emulsion trailer bower: 33 units</li> <li>- Fuel storage tanks: 3 units</li> <li>- Portable office complex: 9 units</li> <li>- Portable explosive magazines: 5 units</li> <li>- Hydraulic crane: 1 unit</li> <li>- Crawler crane with bucket: 2 units</li> <li>- Normal-temperature mix asphalt plants: 5 units</li> <li>- Hot mix asphalt plants: 2 units</li> <li>- Tractors: 12 units</li> <li>- Asphalt paving machines: 3 units</li> <li>- Slurry sealing machines: 2 units</li> <li>- Road makers: 4 units</li> <li>- Training machinery: 1 set</li> <li>- Inspection equipment: 1 set</li> <li>- Paved surface inspection equipment: 1 set</li> </ul>
2. Implementation schedule	March 1988 to December 1992 (57 months)	August 1993 to September 1998 (62 months)
3. Project cost		
Foreign currency	¥12,314 million	¥5,881 billion
Local currency	426 million rupees	892 million rupees
Total	¥14,359 million	¥7,591 million
ODA loan	¥12,314 million	¥5,634 million
Exchange rate	(One Sri Lankan rupee = ¥4.83, January 1987)	(One Sri Lankan rupee = ¥2.00)