

# Africa Transport Technical Note

Road Management Initiative  
(RMI)



SSATP Note No. 14

July 1998

## Cutting Costs and Improving Quality through Performance Specified Road Maintenance Contracts

Pilot experiences in Latin America offer lessons for Africa

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Experiences in several Latin American countries show the promises and challenges of contracting out road maintenance based on performance standards rather than on the traditional way, which is based on a schedule of unit prices and estimates of quantities.

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Cutting the cost of road maintenance and improving road conditions are the main reasons why several Latin American countries have started to look for new ways of contracting out road maintenance. With technical assistance from the International Road Federation and German Aid, Colombia, Brazil, Guatemala, and Uruguay have initiated so-called Performance Specified Road Maintenance Contracts on a pilot basis. In addition, Chile has let two such contracts recently. Most of these contracts have been operating for more than a year and cover routine and periodic maintenance and, in some cases, road rehabilitation as well. Extension of the road network, road surfaces and conditions, and the time period vary in each pilot project and will provide a wide basis for evaluation and improvements (Table 1). The experiences of the road rehabilitation and maintenance concessions let in Argentina in 1990 were used in the design of these projects. In addition, several developed countries, including Australia, Great Britain and, most recently, the United States have begun contracting out road maintenance based on performance specifications.

The traditional way of contracting road maintenance is based on a schedule of unit prices and estimates of quantities. The works to be performed are specified in the contract, and payments are based on executed measured works. By contrast, a Performance Specified Road Maintenance Contract defines the minimum conditions of road, bridge, and traffic assets that the contractor must meet. Payments are based on how well the contractor manages to comply with the performance standards defined in the contract, and not on the amount of works executed. The nature of the contract allocates responsibility for work selection, design, and delivery solely to the contractor. Hence, the choice and application of technology and the pursuit of innovation in materials, processes, and management are up to the contractor. This raises the risk for the contractor compared to the traditional contract arrangement, but may also increase the contractor's margin where improved efficiency and effectiveness of technology, process, design or management reduces the cost of achieving the specified standards.



**Table 1. Examples of Performance Specified Road Maintenance Contracts**

Country	Number of contracts	Length in km	Years duration of contracts	Maintenance	Cost per km and year in US\$
Chile	2 (a)	747	5	r	A: 3 200 B: 2 700 C: 3 850
Colombia	3	542	2	r,s	A: 5 000
Guatemala (microenterprises)	70	2,995	1 (b)	r (drainage system and right of way only)	1 950
Uruguay	1(a)	359	4	r,p	A: 4 950 C: 4 750
Uruguay (microenterprises)	2	275	2 (b)	r	A,B and G: 3 100
Uruguay (Montevideo)	1(a)	1.5x10 <sup>6</sup> sqm	3 (b)	r,p	A: 1.8/m <sup>2</sup> C: 2.8/m <sup>2</sup> G: 2.0/m <sup>2</sup>
Brazil (Santa Catarina)	1(a)	375	5	r	A and G: 3 000

(a) Contracts include some initial road rehabilitation works

(b) Can be extended for one period of equal duration

r: routine maintenance; p: periodic maintenance; s: other services provided to users (telephone, ambulance, towing)

C: cement concrete; A: asphalt concrete; B: double surface treatment; G: gravel

Defining these standards is challenging (Table 2). The aim is to minimize total systems cost, including the long-term cost of preserving the roads as well as the cost to the road user. To avoid ambiguity, performance standards have to be clearly defined and objectively measurable. Typical performance standards are:

- The International Roughness Index (IRI) to measure the roughness of the road surface, which affects vehicle operating cost,
- The absence of potholes and the control of cracks and rutting,
- The minimum amount of friction between tires and the road surface for safety reasons,
- The maximum amount of siltation or other obstruction of the drainage system,
- The retroflexivity of road signs and markings, and
- The control of vegetation close to the roadway to a specific height.

As traffic conditions vary from road section to road section, different parameters will create minimal system cost. The application of the Highway Design Model (HDM) can be helpful in defining some of these parameters, such as the IRI.

In addition, performance standards may include other obligations, i.e., supplying direct services to the road user, including roadside telephone, ambulance and towing.

The contract award is done following similar bidding procedures as with “traditional” contracts. For medium or long-term contracts, payment streams are discounted using interest rates, which are particular to each country. In order to encourage employees of the road administrations in Guatemala and in Uruguay to form small scale maintenance enterprises, contracts have been let based on negotiated prices for a one- or two-year contract period respectively.

Payments to the contractor as well as penalties imposed are periodically adjusted to reflect inflation. In some cases complex formulas are being applied to reflect increases in contractor’s cost, while others use a construction price index or the consumer price index.

### Control procedures and penalties

In Argentina inspectors are making random checks to verify compliance at least twice per month. Over time, inspectors become more experienced and familiar with trouble spots along the roads. Experiences underline the importance of having a well-documented inventory of the road as well as daily records of activities undertaken by the contractor. This helps in understanding the specific behavior of the roads and contributes to better preventive maintenance. In Argentina the road user has a very important role in participation and control. Each toll station keeps a complaints and suggestions book and users are en-

**Table 2. Examples of performance standards applied in different contracts**

<b>Asset Class</b>	<b>Component</b>	<b>Performance Standard</b>
<b>Pavement</b>	Potholes	No potholes
	Roughness (asphalt)	IRI < 2.0 (Argentina), IRI < 2.8 (Uruguay)
	Roughness(bituminous) treatment	IRI < 2.9 (Argentina), IRI < 3.4 (Uruguay)
	Rutting	< 12mm (Argentina), < 10mm (Uruguay, Chile)
	Cracks	Sealed
<b>Gravel surfaces</b>	Potholes	No potholes
	Roughness	IRI < 6 (Uruguay), IRI < 11 (Chile)
	Thickness of gravel layer	> 10 cm (Chile, Uruguay)
<b>Shoulders</b>	Potholes	No potholes sealed (Peru)
	Cracks	Sealed
	Joints with pavement	Vertical alignment < 1cm (Chile, Uruguay),
<b>Drainage system</b>	Obstructions	No obstructions. Should allow for unhindered flow of water (Chile, Uruguay)
	Structures	Without damages and deformations (Chile, Peru)
<b>Road signs and markings</b>	Road signs	Complete and clean (Argentina, Chile, Peru)
	Road markings	Complete and visible (Argentina, Chile, Peru)
	Reflectivity of road markings	>160 mcd/lx/sqm. (Argentina) > 70 mcd/lx/sqm. (Uruguay)
<b>Right of way</b>	Vegetation	< 15cm height (Argentina, Uruguay)
	Foreign elements	No foreign elements allowed

couraged to report incidents to the Road Administration. Extensive use of this mechanism has helped improve road conditions and revealed the road users' increasing satisfaction with the new scheme.

In Chile there are four kinds of inspections: (i) monthly inspections for the effect of payments cover 10 percent of the roads under contract. Selection of stretches of 1 km each is based on a random sample well defined in the contract; (ii) weekly inspections looking at 5 percent of the roads randomly selected; (iii) non-programmed inspections to respond to complaints by road users; and (iv) follow-up inspections to verify that appropriate action has been taken by the contractor to rectify non compliance. Payments to the contractor are based on the results of the monthly inspections. A percentage of compliance is being calculated based on a formula using the results of each individual performance standard as input data. Full payment will only be made on 100 percent compliance. During the first year of operation compliance is around 95 percent. Penalties are being applied if the contractor does not rectify established deficiencies within a certain time limit.

To enable the contractor to manage and the road administration to monitor the contract, it is vital that the contractor has a proper management and quality control system in place. Part of

the obligations of the contractor is to keep records of his inspections, quality control procedures, and works undertaken. This is especially important to monitor and adjust the pilot projects.

With regard to disputes between the contracting parties, systematic non-performance, or even bankruptcy by the contractor, the same procedures apply as in "traditional" contracts.

#### **Implementation of pilot projects**

The implementation approach depends very much on the specific circumstances of each country. The experiences of the road administrations with contracting out road maintenance and the competence of local contractors play major roles. The longer the experience of contracting out road maintenance, the more comprehensive the scheme to implement pilot projects based on performance standards can be. If all maintenance is still being executed by force account, pilot projects should be limited to small-scale schemes.

In order to gain experience, Brazil, Chile, Colombia, Peru, and Guatemala have started with one to three pilot projects with a road network of approximately 300 kilometers each, concentrating mainly on roads with asphalt concrete and bituminous treated surfaces. In some cases gravel roads were included. Typical contract duration is three to five years. Generally, con-

tracts have been awarded based on public bidding. Prior to the preparation of bids, extensive discussions took place. Because this is a new contracting scheme, the road administrations as well as the contractors went through a learning and adaptation process in coming up with the final contract documents. Close cooperation between the road administration and the contractors during the operation is critical to the success of the pilot schemes.

In Guatemala and Uruguay staff of the road administration have been encouraged to form small road maintenance enterprises and to maintain roads under the new contracting scheme. The road administrations were then able to reduce staff as well as gain experience in contracting out road maintenance by performance standards.

### Lessons learned

So far none of the pilot schemes has failed. In fact, road conditions in the pilot areas have improved notably and maintenance costs have either stayed the same or have been reduced. Road administrations and contractors express satisfaction with the preliminary results. Nevertheless, it is far too early to reach any final conclusions. However, some preliminary conclusions can be drawn:

- Pilot schemes for contracting out road maintenance based on performance specifications should be carefully planned and implemented. The complexity of the contracts, especially with regard to performance specifications, road surfaces and contract duration, should be based on past experience in contracting out road maintenance, the ability of the road administration to prepare and monitor such contracts, and the qualifications of local contractors to manage these new road maintenance contracts. Wherever there is little experience with contracting out road maintenance, a stepwise approach is recommended, starting with short-term contracts and simple performance standards with regard to the control of potholes or cracks, or the cleaning of the drainage system. Whenever roads are not in maintainable conditions, prior rehabilitation is necessary, either based on unit prices or included in the fixed monthly payments the contractor receives over the contract period.

- As with all new concepts, the road administrations, as well as the contractors, have to cooperate closely to make the scheme work, and some adjustments may be required during the course of the pilot project.
- Substantial improvement of road conditions and/or reduction of road maintenance costs cannot be expected immediately. At first, cost may even be higher, reflecting higher risks taken by the contractor due to the unfamiliar contract scheme. Proper risk allocation between the road administration and the contractor, as well as full information on the possible risks involved, might reduce this problem.
- Wherever experienced contractors are managing the pilot projects, the new contracting scheme has encouraged new technologies in order to reduce maintenance cost.
- With less experienced contractors, especially with newly formed small-scale road maintenance enterprises, training in management, financial, and technical issues is essential for the success of the pilot projects.
- Proper control and application of sanctions for non-compliance with performance standards is equally vital for the new scheme to be successful. Principally, these contracts are far easier to control than traditional contracts. Supervision of the pilot projects might be contracted out, applying stiff penalties if controls are not done properly. In addition, as long as performance standards are made public, road users will turn into the best “inspectors” and will complain if standards are not met.

The principal advantage of contracting out road maintenance based on performance standards is its potential to reduce road maintenance cost and improve road conditions, especially in developing countries. Unfortunately, improper implementation of this scheme could backfire and produce adverse effects. Most likely, contracting out road maintenance based on performance standards will spread quickly throughout the world and will eventually replace the traditional way of contracting out road maintenance based on unit prices.

### Road Management Initiative

The RMI was launched in 1988 by the United Nations Economic Commission for Africa (UNECA) and the World Bank, under the auspices of the Sub-Saharan Africa Transport Policy Program (SSATP). The countries taking part in the RMI are Cameroon, Kenya, Madagascar, Rwanda, Tanzania, Uganda, Zambia, and Zimbabwe. Others receiving assistance from the program include Angola, Benin, Ethiopia, Ghana, Lesotho, Malawi, Mozambique, and Togo. RMI is administered by the World Bank's Africa Region, and is co-financed with the governments of Denmark, France, Germany, Japan, the Netherlands, Sweden, Switzerland, and the European Union. France, Japan and Norway provide senior staff members to work on the Program.