

# Policy Paper on Infrastructure

## Policy Challenges in the Implementation of Performance-based Contracting for Road Maintenance



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# Foreword

The topic of this policy paper – how to develop contractual methods to secure the full usable-life of roads – is of critical economic and fiscal importance to all countries, but especially so for countries with limited public budgets for road rehabilitation and maintenance. In most developing and merging market economies (EMDEs), which include the EBRD's client countries, roads require rehabilitation, or indeed even reconstruction, many years before the date one would have expected according to their original year of construction. Simply put: usable life is not equal to design life: it is not uncommon to find that a road must be rehabilitated only halfway into its estimated original asset duration. Whilst harsh climate conditions with large seasonal temperature changes may play a role, much of this 'premature' investment is down to lack of systematic maintenance that is normally applied in countries with regular 'asset management' funding regimes. As numerous studies by the OECD, the World Bank and others have shown, every 1 euro/dollar of deferred maintenance today results in 3 euro/dollars needed in rehabilitation tomorrow. Fortunately, applying Performance-Based Maintenance Contracting (PBMC) to the road sector can produce significant improvements for the fiscal purse and for users in the form of better maintained and therefore safer roads.

This paper provides a condensed yet substantive overview of the key international lessons learned in the area of PBMC. As explained, not only must the performance standards be carefully set and calibrated to the particular country/road network under analysis, but one has to pay close attention to the state of development of the local private road construction/maintenance industry which will be asked to bid on the performance-based contracts. The paper also highlights the importance of building up the local capacity of the public sector over time and learning what it takes to monitor PMBC contracts. If performance criteria are not able to be verified by competent and well-organised public sector actors, it will prove difficult to hold the private sector contractor accountable through enforcement of standards. As

with PPPs, PBMCs only create 'value for money' (VfM) versus the traditional input-based 'unit-cost' contracts when the public monitors the contracts in a professional and diligent manner.

This policy paper was produced under the auspices of EBRD's Infrastructure Project Preparation Facility (IPPF), and has funded the effort with the active engagement of a number of EBRD's client countries interested in improving their efforts to implement PBMC. In addition to preparing well-structured infrastructure projects for client countries, disseminating good practice and knowledge is critical to the mission of EBRD's IPPF.

We would like to thank the active and engaged contributions from the public sector experts from Albania, Azerbaijan, Bulgaria, Moldova, Morocco, Kazakhstan, Romania and Serbia; EBRD colleagues Toshi Sakatsume, Yulia Martyushina; as well as Mike Taylor and Edin Begovic from Roughton who acted as principal external consultant in the preparation of the paper. Their collective inputs and feedback during the seminar and the preparation of the policy paper itself have greatly improved the final product.

As one of a series of IPPF-funded policy papers on the infrastructure sector prepared over the course of 2016 and 2017, the EBRD looks forward to further dialogue with all its client countries in the road sector, for both the preparation of PBCs, as well as other complex infrastructure investments to produce bankable and scalable projects.

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# 1. Introduction

Road authorities worldwide face mounting problems with maintaining the serviceability of their road networks. Over the years there has been a gradual progression in road maintenance philosophy. In general terms, it was traditionally carried out directly by the road authority with its own maintenance organisation supplementing its own capacity, to a greater or lesser degree, by contracting some works to contracting companies. Over the years, there has been a steady rise in the contracted element of the works with many authorities reaching the point where all maintenance activity is carried out by contractors applying traditional methods of contracting and measurement of works under the authority's supervision.

Over the last 20 years, however, there has been a steady rise in implementing contracted maintenance through the use of performance based methods<sup>1</sup>. Under this Performance Based Maintenance (PBM) methodology, the contract is based on the concept of payment for specified results (resulting in a well maintained road) based on the Contractor meeting specified standards of performance rather than measuring and paying for the quantities of work which he actually does, i.e. based on outputs. This contracting method is generally considered to be more cost effective than the traditional, input based, methods using measurement of units of work undertaken with payment at unit rates.

In most developed countries, output-based contracting of road maintenance operations has been effective, where appropriate conditions and institutional settings have been in place. It requires careful preparation in order to create a contract that is balanced, provides an adequate incentive for private sector participation, and is feasible.

The PBM concept for roads has generally been found to be less successful in most of the EBRD's Countries of Operation (COO) in South-Eastern Europe and the CIS (Commonwealth of Independent States), when compared to countries (both developed and developing) where successful implementation of PBM type contracts has been pointed out as a positive example for this new approach to road maintenance.

This raises the questions:

1. Is present approach towards introduction of PBMC in transition countries the right one?
2. Are EBRD COOs ready for the implementation of PBM?
3. What is the the scope and timing of reforms that need to be introduced in each individual country to enable introduction of PBM concept?
4. Are there better ways how EBRD and the other IFIs can back the implementation of PBM in these countries?

Some countries simply may not yet be ready for PBMC due to a variety of reasons:

- Legal and regulatory reasons related to financing and implementation of multi-annual, long term contracts;
- Market readiness including presence of the private companies with the required expertise and resources;
- Economic situation;
- Political instability;
- Development level of the local contracting industry;
- Strategy for road maintenance operations, particularly the belief that must be carried out by state-owned and controlled companies;
- Vested interests; or
- Lack of awareness and detailed knowledge of PBMC.

<sup>1</sup> There are many acronyms in use for performance based methods. For simplicity's sake this Paper tries to restrict itself to just two: PBM for Performance Based Maintenance (PBMC being used as an extension of PBM to refer to a PBM Contract) and PBC for Performance Based Contracting where PBC is used to refer to contracts implemented using the performance based ethos for works which may include construction as well as maintenance.

Experience of other IFIs (International Financing Institutions)/donor programmes and countries is widely available and some example cases are described in this document. The World Bank (WB) has been particularly proactive in promoting PBM (often OPBRMC in WB jargon); however, although WB supported PBM projects have generally been described as successful, particularly in the pilot stage, sustainability is an issue.

This Infrastructure Policy Dialogue Initiative is aimed at assessing the key conditions required for the successful initiation of PBMC, the major issues requiring resolution before initiation and, in general, how can EBRD's COOs begin to move effectively toward PBM contracting for road maintenance. The participants in the Infrastructure Policy Dialogue (IPD) tried to assess why, what and how needs to be done to change the approach to PBMC at policy level.

The Initiative comprised a combination of structured interviews and communications with beneficiaries from selected countries and a substantial seminar at which issues were identified and discussed. It specifically targeted markets in Albania, Azerbaijan, Bulgaria, Moldova, Morocco, Kazakhstan, Romania and Serbia involving key stakeholders, such as road agencies, regulators and policy makers.

**The main objectives of the dialogue with EBRD and beneficiaries from selected target countries (COOs) and of this follow-up Policy Paper were to:**

- i. **IDENTIFY CHALLENGES and RECOMMEND SOLUTIONS that would enable successful implementation of PBMCs;**
- ii. **Provide Governments in the COOs with information and guidance on policy reforms required to facilitate the use of PBMCs.**

The one-day seminar took place in London on 27th May 2016 bringing participants from six of the target countries together<sup>2</sup> at a round table to discuss and address policy issues and market oriented reforms needed in order to implement PBMCs and/or improve the way the sector functions. During the event, identified issues were addressed by EBRD and the Consultant who shared their knowledge and similar experiences and provided advice on the best solutions for these and other issues raised.

This Policy Paper follows from the seminar and addresses the transition and reform issues identified. It focuses on defining the challenges and their importance to the sector, and points toward the range of possible policy solutions including best-practice, market-driven approaches and other "commercialised" alternatives which might be used to achieve successful results.

<sup>2</sup> Unfortunately Azerbaijan and Bulgaria were unable to attend.

## 2. Key concepts of performance-based maintenance contracts

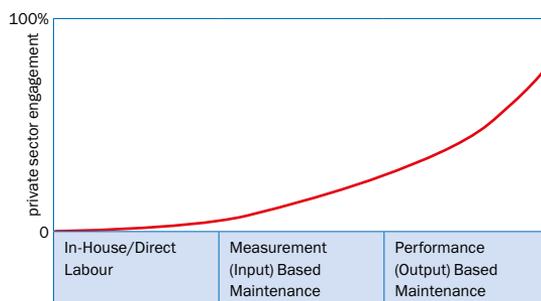
This section describes the general concepts and characteristics that need to be known about PBC in Road Maintenance. It is a high-level description of the model and its peculiarities.

### 2.1 Approaches to road maintenance

Road maintenance is usually carried out through one of three contracting methodologies:

<b>In house (direct labour)</b>	The Road Agency uses its own staff, labour and resources.
<b>Measurement (Input) Based Maintenance</b>	External contractors work under the instructions/inputs of the agency staff and are paid using unit rates applied to the measured volumes of work items executed. Contractors are usually selected through some form of open tender procedure.
<b>Performance (Output) Based Maintenance</b>	Contractors are paid a fixed rate or lump sum for maintaining an identified road or group of roads to predefined standards, regardless of the works required.

The three methodologies are not wholly separate and a considerable amount of overlap between the different models can occur.



The in-house model, under which the Road Agency retained its own maintenance organisation and carried out all operations with its own labour and equipment, was always prepared to make use of contractors' services when faced with tasks which it could not accomplish itself. A gradual, and in some cases abrupt, change took place under which the in-house organisations found it more and more economical to contract elements of maintenance to the contracting industry. This was especially the case with equipment-intensive operations where the industry was better equipped and better able to utilise its equipment on a wider variety of operations. In many countries the process had progressed to the point where all maintenance was being carried out by contractors executing operations on the basis of tendered rates, as directed by the Agency.

PBM is the most recent maintenance model. It places the responsibility for operational decisions on the Contractor and simply requires roads to be maintained to set standards. The model is gradually winning fairly widespread acceptance and has been adopted as the basic model for the implementation of maintenance in many countries.

The progression through the three models has been driven principally by the desire for better maintenance and/or reduced maintenance costs and it is generally accepted that PBM, effectively implemented, will provide either the same level of maintenance for less money or a higher level of maintenance for the same money than its predecessors.

**Cost savings of PBM relative to conventional contracts in selected countries**

Country	Cost savings
Norway	About 20% - 40%
Sweden	About 30%
Finland	About 30% - 35%
Holland	About 30% - 40%
Estonia	20% - 40%
England	10% minimum
Australia	10% - 40%
New Zealand	About 20% - 30%
United States	10% - 15%
Ontario, Canada	About 10%
Alberta, Canada	About 20%
British Columbia, Canada	Some, but might be in the order of 10%

Source: P. Pakkala cited in World Bank Transport Note no. TN-27, Sept. 2005.

This table is commonly quoted and often queried. Note however, that listed countries have reasonable estimates of their costs and their maintenance standards were roughly the same before and after adoption of PBM.

Whilst the detail of the quoted savings is open to query, it is clear that in all cases, there is a reported cost saving from the adoption of PBM.

## 2.2 Basic Philosophy of PBM Contracts

The essence of the PBM concept is that the Contractor undertakes to carry out all necessary maintenance to a road or roads to keep them at a predetermined required standard. There is no measurement of the volume of works carried out and the agency does not dictate to the Contractor what should be done or when it should be done. The Contractor is free to organise the work required as and when it suits him subject only to maintaining the road at the specified standard. The Contractor is responsible for quality control, both of the overall standard of maintenance and of the details of materials used and work performed. His performance is measured by monitoring a specific set of measurable values related to road condition – a typical example is shown in a Table 1.

Direct cost implications aside, the attractions of the PBMC model from the Agency’s viewpoint, are that it should reduce the technical inputs (and therefore the staffing levels) as well as physical infrastructure (maintenance depots, equipment, stockpiled materials etc) required from the government agency to a minimum whilst providing a guaranteed, consistent, visible level of maintenance throughout the contract period and across all the contract road sections.

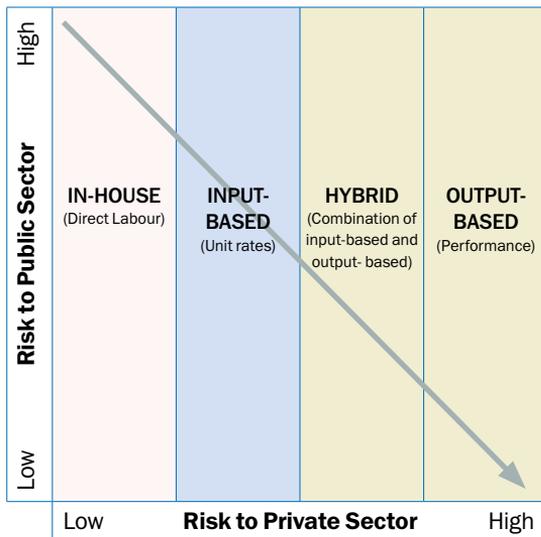
From the Contractors’ side, the attraction is that in return for receiving a smooth monthly income they are free to organise the works needed to accomplish this in the manner that best suits them ie in the most economical manner for them in terms of applying the lowest cost organisational and technical model for delivery of standard of maintenance specified by the contract. As the fixed revenue side for the Contractor is no longer a variable of interest,, his focus shifts to delivering the required quality at least possible cost.

## Performance indicators – an example

Pavement maintenance			
Indicator	Target value	Measurement/detection	Response time and tolerance permitted
Potholes	No pothole permitted	Visual inspection; ruler	Any pothole must be repaired within 7 days from the detection.
Patching	Patches (i) shall be squared or rectangular, (ii) shall be level with surrounding pavement, (iii) shall be made using materials similar to those used for the surrounding pavement and, (iv) shall not have cracks wider than 3 mm.	Visual inspection (for detection of (i) and (iii)); Ruler (for detection of (ii)); Small transparent ruler (for iv)	Any non-complaint patch must be repaired in within 7 days from the detection.
Cracks	There shall not be any crack more than 3 mm wide. There shall not be more than 10m of cracks on a street.	Crack widths measured with small transparent ruler. For calculation of the length of a crack, 0.5 m will be considered at each edge of each crack.	Any crack wider than 3 mm and/or any cracks with a total length of 10m or more shall be sealed within 7 days from the detection.
Rutting	There shall not be ruts deeper than 20mm. There shall not be more than 10m of ruts on a street.	Measured with two rulers (horizontal ruler of 3 metres length placed perpendicularly across lane; rut depth measured as space between horizontal ruler and lowest point of rut, using a small ruler with the scale in mm)	Rutting above threshold value must be eliminated within 20 days from the detection.
Raveling	Ravelled areas must not exist.	Visual inspection	Ravelled areas must be sealed within 28 days from the detection.
Loose pavement edges	There should not be loose pavement edges, or pieces of pavement breaking off at the edges.	Visual inspection	The pavement edges must be repaired within 20 days from the detection.

The evolution from Direct Labour, through input based contracting to output based PBM has implemented a steady reallocation of risk from the Road Agency to the private sector contractors; i.e. the public to the private sector.

**Risk allocation between public and private sector for various types of road maintenance approaches**



The contractor’s performance under PBMC is based on self-compliance with his own (agency-approved) self-control/Quality Assurance system and is periodically checked by formal and informal monthly monitoring inspections (instead of staff-extensive, day-to-day works supervision), and is complemented by road user complaints (if any) in case of non-conformance with expected Levels of Service (LoS) and maintenance standards and the information originating from the Agency’s automated Management Information Systems (MIS), when these are in place.

**2.3 Form and extent of the PBM Contracts**

PBM within the road sector can be described as “pure” or “hybrid”<sup>3</sup>. The former completely defines all work items through performance indicators, while the latter combines features of both PBM and ad-measurement contracts with payment for most of the services being linked to meeting performance indicators. The payment for some (usually the more variable or contentious elements) is made on the basis of measured quantities and unit rates.

**PBM Contracts in Estonia**

In 2000, the Estonian National Road Authority started using PBM contracts on a regular basis. 10,288 km (63 per cent) of the national paved and gravel road network, is covered under five-year PBCs.

The PBM contracts are awarded only for those road corridors where rehabilitation is not warranted (only maintenance), so such PBM contracts can be considered as ‘pure PBM’. These contracts typically cover routine maintenance and winter maintenance (snow removal, snow blowing, ice cleaning).

<sup>3</sup> The term Hybrid should be used carefully. It is sometimes used to describe contracts which combine maintenance with rehabilitation or other construction works, even though all the works concerned are covered by a performance based specification. In this Paper the term is used only to describe contracts which combine performance based requirements with significant elements of admeasurement works.

Performance based specifications are not limited to maintenance works and can be used for rehabilitation and construction as well.

### Output- and Performance-Based Road Maintenance Contracts in Serbia

With World Bank support, Serbia implemented two pilot Output Performance-based Maintenance Contracts between 2004-2008 for routine maintenance of about 1,200km of roads in the Mačva and Kolubara districts.

Both contracts were so-called “hybrid” contracts as each of them involved three types of payment mechanisms for executed works:

- A **performance-based lump sum payment** component for part of the road maintenance works, verified by monitoring whether the required service level was achieved.
- A measurement (unit-price based) payment component for part of the road maintenance works, depending on the quantity of measured work executed.
- An additional works payment component for emergency works in case of extremely harsh winter conditions – a separate calculation for each individual event is done on the basis of a unit rate approach.

A PBM may cover either individual assets (for example, only traffic signs, only bridges, only pavements), or all or some combination of road assets within the ‘right-of-way’.

### Urban street maintenance in the city of Portsmouth (UK)

The City of Portsmouth awarded a long-term contract (25 years) with performance-based features for maintenance of its urban streets in 2004. It is the first contract of its kind in the United Kingdom.

The contract covers all of the city road network (480 km of roads) with adjacent structures (84 structures) and infrastructure (19,000 street lights, traffic lights, etc.). The contract includes street cleaning, winter maintenance and emergencies.

The level of complexity of a PBM contract can range from “**simple**” to “**comprehensive**” depending on the number of assets and range of services included. At one extreme, a “simple” PBMC might cover just a single service (for example, only mowing, only street light maintenance), and because of this simplicity the contract could be awarded for relatively short periods (several months or one year). At the other extreme, a “comprehensive” PBM could cover all road assets within the right-of-way and comprise the full range of services needed to manage and maintain the contracted road corridor. Such services would include routine maintenance, periodic maintenance, traffic accident assistance amongst others. Such complex contracts are usually awarded for much longer periods. To get the most economic benefit from the arrangement the Contractor requires time to set up operations and to amortise his organisation and equipment. Longer contracts ensure that the Contractor has an incentive to carry out works with their future performance clearly in mind and, additionally, long contracts assist with the economic planning and execution of periodic maintenance works (for example, resurfacing, regravelling) which are repeated only at infrequent, multi-year intervals. Contracts should be as long as practical, certainly from five to 10 years and can continue up to 30 years. In such a long-term “comprehensive” PBM much of the works are often outsourced by the main Contractor to subcontractors.

### Managing Agent Contracts (MAC) in the UK

The UK Highway Agency deployed its first MAC contracts in 2001. Under MAC, the Contractor assists the UK Highway Agency in the comprehensive management and operation of an assigned network that includes all elements of roads and bridges, together with the associated highway technology (such as electronic road signs).

## 2.4 PBM Contract duration and progression

Initial (pilot) PBM contracts are frequently relatively short term (perhaps only three to five years), often due to artificial constraints imposed by budget regulations and funding agencies or to a reluctance by the Agency to commit to a long-term project using new methods. In the longer term, it is better if contracts can be made longer. PBM contracts for up to five or seven years are common and longer periods not unusual. This gives the contractor, working on a 12-month seasonal cycle, the chance to develop and optimise his management and organisation and to set off much of the initial costs involved in a new venture<sup>4</sup> against the long-term operating income.

Ultimately, these long-term contracts are to the agency's benefit, as they produce better, more experienced contractors who are able to lay off substantial one-time costs over much longer periods, whilst the use of fewer, longer contracts greatly reduces the agency's procurement workload.

Restriction of funding to medium term at best is a congenital problem for most funding agencies. However, in many cases more severe problems arise for statutory organisations, such as cities and/or municipalities, who may have little control over their budgets beyond the present year and no way at all to secure the availability of funds over a five or seven year contract.

A typical (although not mandatory) evolution of a PBM programme is shown below.

### Progression of PBM contracts – time line

Type of PBM contracts	Duration
1st generation pilot PBM	3-5 years
2nd generation PBM	5-7 years
Comprehensive PBM	5-10 years
Comprehensive PBM + Asset Management	15+ years

Depending on specific circumstances prevailing in a country of operations, certain steps in the above sequence can be skipped or merged and the duration of PBM Contracts can be modified if feasible and if they better suit the actual situation and specifics of the country. For example, there is a potential for trading off between geography and duration so that by bundling fewer/better roads, in cases where other requirements are met, it is possible to have longer initial PBM contracts or even to combine them immediately with elements of Asset Management.

<sup>4</sup> Under a PBM Contract, the contractor should purchase/lease equipment, hire qualified staff, rent offices and warehouses, invest in inventory and incur the costs for all of the above initially, in expectation of recovering such costs throughout the duration of the contract.

## 2.4.1 Pilot PBM Contracts

The first step for most road agencies who have decided that they need to move towards a system of PBM contracting will be consideration of a pilot project, very often with the support of IFIs.

The purpose of a typical pilot project is to:

- Test the existing institutional framework for longer term implementation of PBM Contracts.
- Induce institutional, legal, organisational and financial changes in the road maintenance system in order to enable implementation.
- Test market readiness.
- Establish the right balance of risk allocation between private and public sector.
- Create critical mass of knowledge and expertise in the road agency and other stakeholders, such as the control and audit authorities.
- Build up capacity of the local contracting industry to implement new types of maintenance contracts.

### Options considered for selection of a pilot area for pilot PBM contract in Moldova

#### Option 1:



One of the existing regions

#### Option 2: (recommended)



One territory composed by adjoining raions (second level of administrative division) from three adjacent regions

#### Option 3:



Two territories composed by adjoining raions from 2 adjacent regions

The duration of a pilot contract is usually for a minimum of three years, very often optionally extendable to five years, as was the case with pilot PBM Contracts in Serbia. However, seven-year pilot contracts are not unknown too, such as in Ukraine. The duration of the pilot contract can be dictated by many factors, some of them being natural road maintenance/rehabilitation cycles and the economic exploitation periods for road maintenance equipment.

Furthermore, the implementation of a pilot contract is usually constrained to only a carefully selected part of the network – the so-called pilot area – where a new concept is tested mostly in isolation from other areas where road maintenance continues to be executed in a traditional manner.

Although some pilot PBM Contracts may also include initial rehabilitation as well as routine maintenance, it is recommended to keep rehabilitation and routine maintenance separate, at least in the initial (pilot) stages of PMB programmes. It is also important to include only routine maintenance in the pilot PBM Contract due to usually high rehabilitation costs, which in turn overshadow the maintenance component costs. Alternatively, when rehabilitation is included, the pilot PMB Contract needs to take into account the road life cycle and the need for increased maintenance that usually arises five years following the new construction or road rehabilitation/capital repair. A minimum of seven years is recommended.

## 2.4.2 Second generation PBM Contracts

Following implementation of a pilot PBM Contract, particularly if it was successful, the logical step forward is to expand the programme to a larger portion of the road network and to improve PBM Contracts based on lessons learned during the implementation of a pilot project by launching the second, or 2nd, generation of PBM Contracts.

Whilst some interim institutional solutions can be put in place to enable commencement of a pilot project, by the time that 2nd generation PBM Contracts are about to be launched, proper institutional reforms facilitating performance-based road maintenance should be put into effect as permanent solutions.

The typical duration of 2nd generation PBM Contracts is between five to seven years, and they usually include routine maintenance plus elements of periodic maintenance.

### 2.4.3 Comprehensive PBM Contracts

Once shift towards PBM Contracts is successfully made through pilot contracts (one or two generations) and the institutional environment is reformed through practical implementation of PBM Contracts in the previous stage, a more complex form of the PBM Contract, the so-called “comprehensive” PBM can be introduced.

As noted above, a “comprehensive” PBM could cover all road assets within the right-of-way and comprise the full range of services needed to manage and maintain the contracted road corridor.

Such contracts would include routine maintenance, periodic maintenance, traffic accident assistance, etc and are usually awarded for much longer periods - usually from five to 10 years or more.

### 2.4.4 Comprehensive PBM Contracts and Asset Management

A mature PBM environment can move forward and combine performance-based road maintenance with full-scale asset management. In essence, this means that the road asset is handed over by the road agency to a private contractor under long-term concession/PPP (15-30 years). In principle, the contractor is obliged to manage and maintain the asset in a condition equal to or better than the one used when he took over the asset from the road agency. In practice, as in previous generations of the PBM Contract, this is achieved through the requirement that the contractor complies with contractually pre-defined performance-criteria that enable at least the same or better level of service for the road network. Naturally, the road agency should have LoSand the corresponding performance criteria defined prior to the award of such a PBM Contract and a detailed condition survey is necessary prior to tendering, in order to set a benchmark for measuring the compliance with contractual performance criteria.

## 2.5 Initial repairs and emergency works in PBM Contracts

PBM contracts are essentially **fixed price** contracts, although they will contain some provision to cover price variation, usually based on materials, equipment and labour cost indices. However, they will also usually contain a schedule of prices allowing for the reimbursement of costs resulting from necessary emergency works, as measured work at unit rates. This effectively enables the agency to carry the major risks attached to unforeseen emergency works and, by defining the nature and extent of occurrences which would qualify as “emergency works”, to calibrate the allocation of risk between agency and Contractor. To the extent that most PBM contracts contain some allowance for emergency works they may be said to be “Hybrid” contracts. However, the term is usually reserved for contracts where the measurement element covers more than just major unforeseen emergencies.

**PBM Contracts can include measured works and tendered rates for selected items through the use of “Hybrid” contracts. This can be used by the Client to adjust the sharing of risk between Contractor and Agency.**

If sections of the roads in question are in poor condition, the contract may also include provision for the **rehabilitation** of these sections. In this case, final design of rehabilitation works should be assigned to the Contractor and payments to these works included in the lump sum contract price, forming a PBM Contract that resembles a structure similar to a Public-Private-Partnership (PPP). A traditional option to carry out the rehabilitation works using the measurement or “input” based method, with a predetermined design and quantities and payments made on the basis of measurements and unit prices, is not optimal and so not recommended as it removes the “performance” element from the Contract and provides no incentive to the Contractor to optimise his operations and costs.

Rehabilitation is not a compulsory component of a “comprehensive” PBM. Some agencies include essential rehabilitation as part of the performance based contract using either the “Pure” or the “Hybrid” approach; others choose to handle rehabilitation separately using traditional input-based ad-measurement contracts.

**Performance-based Contracts are not limited to routine maintenance. Periodic maintenance and rehabilitation can all be specified as lump sum performance-based works.**

To include initial rehabilitation works in the PBM Contract has both advantages and disadvantages, as demonstrated below.

### Advantages

- Gives the Contractor an incentive to perform well on the rehabilitation works to ensure good service life of the rehabilitated road, avoiding subsequent increased maintenance costs and disruption and discomfort for road users.
- Ensures that maintenance will start immediately after the rehabilitation works have been finished, rather than permitting the gap which often occurs before the new road is taken into a formal maintenance contract. These pauses before proper maintenance commences can become extended with consequential drops in Level of Service and accelerated deterioration and periodic maintenance requirements.

### Disadvantages

- A high rehabilitation component turns an intended maintenance contract into a rehabilitation contract with an almost trivial maintenance element. This is particularly to be avoided where the contract is intended to introduce and demonstrate PBM.
- Drives up project costs; often diverting funds intended for maintenance of extensive road sections into rehabilitation of much shorter road lengths.
- It reduces the risk transferred to the Contractor since the asset is in better condition and needs less maintenance.

## 2.6 Incentives and penalties in PBM Contracts

### 2.6.1 Incentives

There is no explicit incentive for the Contractor in a basic PBM contract. The incentive is implicit. If the Contractor can save money, through more efficient working or through innovative methods, then this is reflected in increased profits.

#### Output and Performance-Based Road Maintenance Contracts in Serbia

The Serbian Pilot projects' Contractor showed large savings in winter maintenance supplies of road salt which were used to provide additional payments under an incentive formula.

### 2.6.2 Penalties

The PBM Contract includes some form of sanction on the Contractor if he fails to carry out his maintenance function properly in a timely manner. Such sanctions, implemented through contractual provision for penalties, should incentivise the Contractor to perform and also provide the route for PBM Contract termination in cases of grave under-performance. Contractual penalties are usually linked to a measurable set of Performance Indicators that are usually set out in the PBM Contract through Technical Specifications. Most maintenance operations are controlled by the time permissible between a fault occurring (or being identified) and the fault being rectified. Failure to carry out rectification/remedial works within the permitted time will attract a penalty. Different contracts express the penalty in different ways and, especially for initial contracts, the penalty regime may be varied to cater for the Contractor gaining experience; for example, a limited number of faults may be allowed penalty free in the first year with the number reducing in successive years.

#### Output and Performance-Based Road Maintenance Contracts in Serbia.

##### Contractual penalties:

Points accrued for period	Demerit points thresholds	Remedial action
By end of 1st year	100 (approx. 0.5% of the Contract value)	The Agency may terminate the Contract
By end of 2nd year	160 (approx. 1.4% of the Contract value)	The Agency may terminate the Contract
During the 3rd year	200 (approx. 2% of the Contract value)	The Agency may terminate the Contract
During entire Contract	175 (approx. 1.6% of the Contract value)	The Contractor forfeits his right to participate in any new tender with the same Agency in the next two years

##### Financial penalties:

Number of points		Valued to one point in RSD
From	To	
1	50	20,000 (€200)
51	75	50,000 (€500)
76	125	100,000 (€1000)
126	175	120,000 (€1200)
176	200	150,000 (€1500)
	>200	200,000 (€2000)

Penalties may be calculated in different ways. The World Bank document considers each fault equivalent to a length of road for which no payment will be made in the month it occurs. The Serbian pilot contracts used a system under which each fault attracted a number of demerit points with a set penalty value per point. In all cases there are limits on the total penalties which are allowable with the Agency having the option to consider the Contractor in default and to apply financial penalties or in some cases even contract termination. In the Serbian case, the limit reduced in successive years.

## 2.7 Input-based and Performance-based Road Maintenance - advantages and disadvantages

Both input-based and PBM contracts have advantages and disadvantages. On balance the PBM form of contract offers the preferable option, provided that necessary financial backing can be found and that the overall road maintenance situation is not so grossly underfunded that the reduced flexibility of the PBM operation becomes impossible to accept.

The traditional input-based contract when used for road maintenance, especially Routine Maintenance, has both problems and benefits and places substantial responsibilities on the Agency when this could often be better carried out by the Contractor.

### 2.7.1 Problems and benefits of input-based Road Maintenance contracts

#### 2.7.1.1 Problems

- **Inputs are dictated by the Road Agency.** The Contractor carries out tasks as required by the Agency. The Agency must devote substantial technical resources to define these tasks, to supervise them and subsequently to measure the quantity and the quality of the work done.
- **No focus on overall performance.** As long as the Contractor performs the tasks to a technically acceptable standard, he is entitled to be paid. He is not responsible for ensuring that the completed task actually performs the required function.
- **Programme of works is dictated by the Road Agency.** The Agency will require tasks to be executed as and when it considers them necessary and not when it is most cost-efficient for the Contractor, which is a fundamentally uneconomical method of working.
- **Reactive Routine Maintenance.** The general model of Routine Maintenance under these circumstances tends to be reactive with little scope for undertaking precautionary or preventive works in order to forestall future demands.
- **Numerous variations and claims.** The contract has a considerable scope for variation, which can be viewed by government as a convenient way to make economies and by contractors as a convenient way to make claims. Neither action is conducive to an orderly and organised maintenance process.
- **Resource-intensive procurement.** Contracts are usually of relatively short duration (particularly for Periodic Maintenance), hence frequent rounds of bidding for contracts become necessary which results in inefficiencies and significant resources spent on numerous procurement procedures.

#### 2.7.1.2 Benefits

- **Planning flexibility.** The Agency can remain free to direct maintenance efforts in any direction and to set them at any level which the conditions dictate. Contracts can be phrased to avoid any commitment to specific levels of maintenance or to specific roads.
- **Fiscal flexibility.** Flexibility in adverse conditions, especially financial conditions, as an input-based contract can be used for road maintenance under any situation of bad road condition or fiscal constraint or uncertainty.

Once the problems of finance and flexibility have been overcome, the advantages of the PBM system are extensive. However, the PBM contract is not a universal panacea which guarantees the solution of all road maintenance problems. The format has disadvantages as well as its clear advantages as shown below.

## 2.7.2 Problems and benefits of Performance-Based Road Maintenance Contracts

### 2.7.2.1 Problems

- **Maintenance standards if roads are in poor condition:** Sometimes is difficult to formulate a specific maintenance standard to define the maintenance operations, for example for roads in poor condition. Even where continued maintenance in relatively poor condition is foreseen there is almost always going to be a requirement for a high(er) cost initial phase to put roads into a condition where a specifiable level of continuing maintenance can be executed.
- **Inflexibility of standards:** Once a standard had been specified and a contract let, the contractual requirement for adherence to the standard means that the Agency cannot subsequently save money by economising on the maintenance operations. Although to some extent this issue can be addressed through contract provisions, that is through optional reductions in levels with the predefined reduction in price determined at the tender stage, such an approach is not recommended as it does not incentivise the Contractor to ensure the required Level of Service in later stages of the PBM Contract.
- **Inflexibility of operations:** The context of the PBM contract effectively constrains the contractors operations to the specific road(s) covered by the contract. The Agency cannot make best use of a reduced budget by transferring operations and resources to different areas of the system.
- **Inflexibility of finance:** The PBM contract commits a fixed amount of the maintenance budget to the maintenance of specific roads for a specific period. There is no easy option for the Agency to change these commitments to accommodate changes to its own financial situation, Although financing for the PBM Contract should be secured prior to its commencement, nonetheless the reality in many transition economies is that Road Agencies find themselves occasionally exposed to reduced revenue streams due to economic and financial challenges which in return may have an impact on their investment priorities. With single-year “classical” maintenance contracts such as prioritisation, although normally to be avoided (if at expense of road maintenance) was easier achievable.

### 2.7.2.2 Benefits

- **Expenditure certainty.** The Contractor is paid a fixed price, based on a regular schedule, and the Road Agency has a full understanding of forthcoming expenditures. Frequent claims and contract amendments to increase quantities of work by the Contractor are avoided.
- **Multi-year stable financing of a maintenance programme.** Knowing the exact contracted amount, the necessary resources to be committed for future years are clear to the Road Agency and the Ministry of Finance, particularly as PBM Contracts require strong commitment towards secure and uninterrupted financing of the Contract.
- **Reduction of the in-house workforce.** Adoption of PBM contracting reduces the staffing requirements at the Agency level. There is reduced procurement, less need to supervise the works and little requirement for interim or final expenditure verifications. For example, in Estonia, when 63% of the national network was taken under PBMC the workforce of the national and sub-national road agencies declined from 2,046 in 1999 to 692 in 2003.
- **Generally improved conditions of contracted road assets and reduction of road sections in poor condition.** It is generally acknowledged that successful PBM Contract implementation results in road assets being returned in an improved condition compared to the conditions before the award. This is largely due to the imposition of clearly defined requirements for maintenance standards which, because of the nature of the contract, are not open to amendment. For example, through the implementation of CREMA performance-based contracts in Argentina the maintenance backlog, that is the proportion of roads with an IRI>4, has been reduced from about 35% to 10%; the proportion of roads in poor to bad condition, that is with an IRI>5, has been reduced from 11% to a current value of about 2%, while the proportion in good condition has increased from 65% to 90%.
- **Greater road user satisfaction.** Road users appear to become more satisfied with the services delivered and condition of roads maintained under PBMCs.
- **Better transparency and accountability.** The PBMC approach provides clearly defined maintenance requirements with improved control and enforceable quality standards. All agencies become accountable to road users, responsible for providing them a better driving experience, while road users can more easily understand the road standard they can expect and demand, and are satisfied to see the exact result of the fees they are paying.
- **The procurement model is more resistant to corruption than traditional input/output contracting.**  
(i) there are fewer transactions involved, therefore auditing is much easier, and (ii) the maintenance standards in force can be made public and defined in such a way that the public is able to understand whether contractual compliance is being achieved.

# 3. Issues and solutions to be considered before PBM adoption

This section addresses the issues and challenges faced in the implementation of a PBC and presents them in a detailed and structured way.

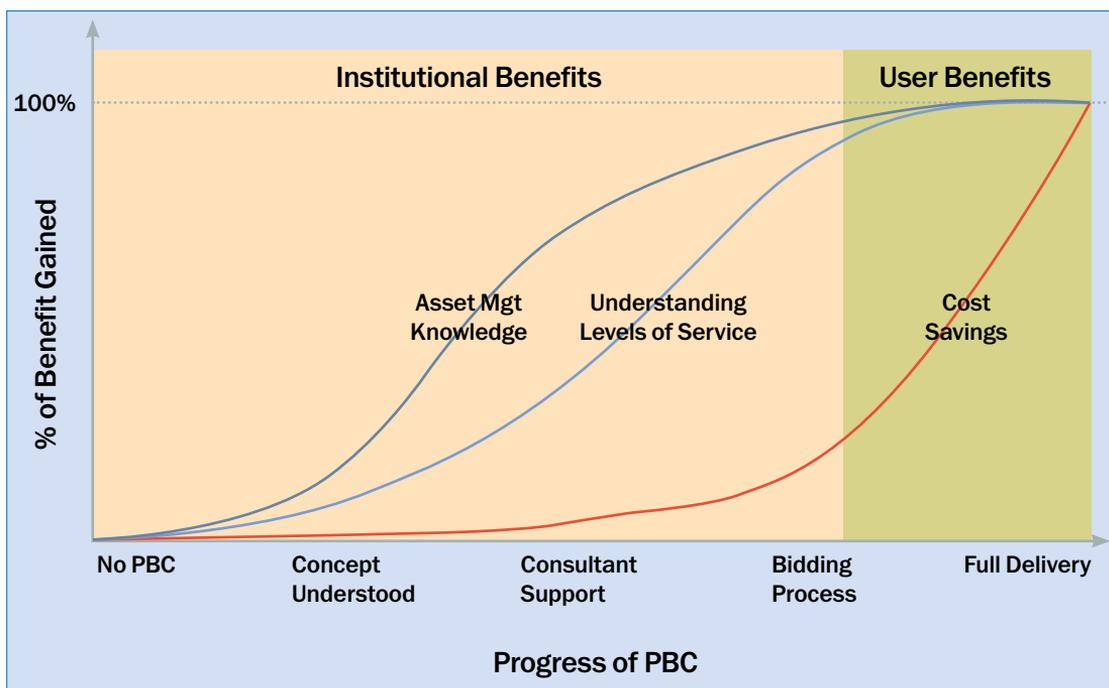
## 3.1 General approach

Very few PBMs fail once implemented (although not all deliver the full benefits that were initially realised). Most “failures” of PBM are actually situations where the implementation did not occur at all. Even where implementation did not occur, there are potentially significant benefits to be gained from the prior steps, such as: the definition of levels of service, an understanding of the necessary funding levels to deliver least whole-of-life cost solutions, risk allocation, and the collection and analysis of asset data to gain a better understanding of the scope of work required.

It has to be noted that focusing on the successful delivery of a PBM as the outcome, and regarding anything less as a total failure, is not appropriate. Linked to the significant benefits of implementing Asset Management, the benefits gained in progressing towards a PBM are significant in their own right, and the actual procurement of the PBM is in many cases the “icing on the cake”. By not pre-ordaining the outcome of the entire process as “PBM must occur” and instead focusing on “Asset Management must occur, PBM may be a good support tool that will be examined at some stage”, the level of apathy towards PBM could be greatly reduced, as Asset Management does not in its own right require that PBM is the outcome.

However, most of the user benefits are gained through the actual implementation of the PBM, with much of this often associated with the securing of an appropriate funding stream to enable LoS to be delivered.

### Benefit realisation through PBM Contracts



Source: Gericke, B., Henning, T., Greenwood, I., Review of performance based contracting in the road sector-Phase 1, Transport Paper No. 42A, The World Bank, 2014

**Performance monitoring** is key to the success of this type of contracting road maintenance. The methodology should be clearly and accurately spelled out in the contract to prevent any misunderstanding from the Contractor's side and avoid potential disputes. Operational performance indicators (KPIs) apply to the daily serviceability of the road network being maintained and include the condition of the pavement and road furniture. The manner and frequency of monitoring inspections of PBM activities throughout the duration of PBM have to be defined. The whole project team should measure performance, using the performance standards on a daily, monthly and annual basis. On a daily basis, the Contractor and field supervisors should survey the system for deficiencies, while the Contractor should maintain a daily log of activities as well. The monthly review is a subjective windshield survey, while the annual review is an objective engineering evaluation. Both time critical (that is, the response time) and condition-related performance measures are considered in the evaluations.

If a PBM has made it to the final link, then the result is more likely to be a variation in the degree of success (for example, delivery of all LoS), rather than outright failure. This is likely due to the fact that to make it to this final stage the PBM project would have received high-level support within the agency for several (three or more) years, the understanding of Asset Management would be reasonably well-advanced, and other necessary enablers for the PBM to occur would have been put in place (for example, training, risk management, monitoring).

## 3.2 Issues and possible solutions

### 3.2.1 Legal Framework

#### 3.2.1.1 Contract Duration – are multi-annual Maintenance Contracts possible in accordance with a national legal framework?

##### Issues

Some countries have restrictions with the type and length of contracts which may be entered into.

The type of contract in some countries (such as Kazakhstan) is subject to specific definition which is linked to contract duration, for example maintenance contracts may only be for one year.

This is commonly a problem where the type of contract - maintenance/rehabilitation/etc. - is too clearly defined in existing legislation, with the result that contracts as defined maintenance contracts have a limited length.

For example, Morocco presently limits multi-annual contracts to three years, regardless of the definition.

Other countries such as Romania, Moldova, Kazakhstan and Serbia limit financing of Maintenance Contracts to one year.

Apart from the issues above there are frequently regulations that have a legal effect (that is, the breach of regulation can be construed as a criminal act), which constrain the implementation of contracts, especially contracts of extended duration. For example, legal requirement that public procurement cannot be launched unless 100% of project funds are secured.

For the Road Agency to enter into a contract, it must have assurance of its ability to meet its long-term commitments under that contract. In some jurisdictions, regulations will ensure that such assurance is not present. This is especially the case where maintenance is required to be financed from the recurrent budget (that is, set annually) whereas a long-term contract (although for maintenance) needs a commitment over a much longer period and might therefore require consideration as a part of the capital budget.

##### Solutions

In some cases the problem can be resolved through the fact that national legislation permits the application of a supra-national principle that IFI loan conditions take precedence over the national law.

However, such use of the IFI conditionality is only a temporary expedient convenient for early stages of a PBM contracting programme (pilot and 2nd phase PBM Contracts) and will not cover the eventual situation where the Agency will need to make its own contracts using national funding.

The long-term solution is appropriate revision of the national legislation and financial regulations to enable multi-annual road maintenance contracts and adequate multi-annual budgetary framework when planning the national budget. These revisions should address at least:

- Appropriate duration of the contract, depending on the budget planning framework. For pilot PBM Contracts, it is generally considered it could be for a minimum of three years.
- Enable transferring unspent maintenance funds from one year to another.

The Ministry of Finance needs to be involved, in addition to the Road Agency and the Ministry of Transport.

IFI support may be necessary to push through legal changes to enable implementation of PBM Contracts and obtaining full support from policy and decision makers in the government.

Reforms of legal systems and other “soft measures” to enable PBM Contracts could become covenants of IFI’s loan disbursement for future programmes in the road sector.

##### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

### 3.2.1.2 Contract Type – Are PBM contracts in accordance with national contract classification?

#### Issues

Problems are also encountered where legal definitions specify the contract type in terms of the need to measure quantities and make payments in accordance with contractual unit rates. This appears to be the case in Romania where regulations seem particularly restrictive about the use of lump sum contracts for recurrent maintenance operations funded from the State budget.

This problem can be additionally complicated by the fact that in certain jurisdictions (Romania, Kazakhstan), performance-based maintenance contracts are not appropriately classified in the national contracts classification system.

Solutions	Enabling condition for
This might be solved by using unit rates for maintenance per km per month. For instance, this solution was used in Georgia in the past, prior to more comprehensive legal reform, for design-build contracts in environment with similar legal restrictions.	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> </ul>
In cases where applicable legal requirements are too specific to allow the strategy described above or where specific legal classification of performance-based contracts is lacking and is otherwise necessary, the only way forward is reform of national legislation regulating financing road maintenance in order to bring it in line with more flexible approaches towards financing recurrent maintenance tasks in a similar way as for capital investment.	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>
Introducing PBM Contract classification in national legal and procurement regulation.	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> </ul>

### 3.2.1.3 Competitive bidding – Is Open Tendering possible in the initial (pilot) stage of PBM programme?

#### Issues

Many countries have quite strict rules regarding transparency and open tendering with the format for open tendering being laid down.

This is reasonable on the surface but can act against introduction of new systems (such as PBM) where some degree of cooperation/negotiation between Agency and Contractor, prior to contract signature, could greatly ease the initial problems of introducing a new type of contract.

Similarly, extensive interaction between Client and Tenderers during and prior to the tendering phase may be needed to properly allocate risks, and set the first PBM contracts.

Whilst these activities may be technically acceptable and indeed, desirable, there is always the possibility of losing Tenderers using them as ammunition to upset the Contract or of giving rise to accusations of corruption.

#### Solutions

Use of Open Tendering during the procurement in order to set a better and feasible risk allocation between the Road Agency and the bidders under PBM Contract. This process, properly structured, does not constrain competition which is key for the Agency to obtain a good price.

Most modern national procurement laws include the possibility to procure goods, works and services through a two-stage Open Tender when they involve an innovative scope of work. This is in line with EU regulations and recommendations and should be encouraged when possible, particularly in the initial phases of a PBM programme.

In some cases, such as when there is a lack of open competition as a certain Contractor is best positioned to deliver a successful pilot Contract due to, for example, geographical presence, there is scope to consider a Direct Award.

However, such an approach should be a rare exception rather than a rule as it may raise a number of doubts about the transparency of the process and justification of the criteria leading to such a decision.

More time spent on preparation of bidding and contract documents, preferably after intensive training and an awareness campaign amongst Contractors/potential Tenderers and following dialogue with industry champions on the right balance between the risk and reward in a PBM Contract, and on the right risk allocation balance between private and public sector.

In some instances, like in Indonesia, IFI (the World Bank) would dedicate separate funds for training the Contractor(s) in new methods of construction/maintenance as part of industry capacity-building effort.

#### Enabling condition for

- 1st generation (pilot) PBM Contract

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

## 3.2.2 Financial

### 3.2.2.1 Availability of funds – Is stable funding ensured to meet Agency contractual obligations?

#### Issues

The Agency's annual budget may be a gross amount to cover all road expenditures with allocation to be determined by the Agency, or it may already be split between maintenance and capital works by government/treasury.

Any split may have been made with the Agency's agreement/advice or may have been dictated to it.

The Agency presumably currently spends the whole of its annual budget and may have to consider how to introduce PBM within its existing budgetary constraints.

It is likely that PBC will mean that costs for maintenance of the roads affected will go up even though, ultimately will reduce overall costs and/or improve the standard of the roads. If the Agency budget is fixed, this will mean less money to spend on the remainder of the network.

However, as often quoted, analyses carried out by the World Bank show that \$US 1 invested in road maintenance saves \$US 3 that would otherwise be required for rehabilitation/capital repair of un-maintained road over the same period of time.

Solutions	Enabling condition for
<p>In the shorter term, measures to assist funding for long-term maintenance contracts might include:</p> <ul style="list-style-type: none"> <li>• Provision for the Road Agency to retain unspent funds to roll over from one year to the next.</li> <li>• Earmarking of funds or Treasury guarantees that the funding for long term contracts will be available.</li> </ul>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>
<p>In the longer term, reasonable cost planning for road maintenance would be desired. Routine and Periodic Maintenance cost should be well assessed. Rehabilitation measures/Periodic Maintenance should whenever possible be separated and if feasible even excluded from pilot PBM contracts as with PBM fixed monthly payments principle they make cash flow for contractors unattractive, due to (in such cases) usually very high initial rehabilitation costs. These then usually reduce substantially throughout the maintenance phase, as opposed to fixed (and usually constant) periodic lump sum payments that do not resemble the cost cash flow.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>
<p>Consider introducing tolling systems and/or other ways of optimising road user charges to improve revenues from road users that would be used for road maintenance. For example, Kazakhstan intends to introduce electronic toll collection and to use collected revenues for road maintenance and improvement. Fair distribution of road user charges may increase available funding and stability of funding for road maintenance. These road user revenues can be assigned to a special Road Fund account.</p>	<ul style="list-style-type: none"> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>

Solutions	Enabling condition for
<p>High-level commitment from the government to contribute improving management of public finances through resulting commitment to provide available and secure funds for multi-annual maintenance contracts.</p> <p>The Agency must develop a clear case for the adoption of PBM, outlining the improvements in road maintenance which will accrue, the immediate economic benefits which these will bring (primarily reduced Vehicle Operating Costs), the improvements in public (voter) relations resulting from improved road conditions and the ultimate savings which will be made in overall road expenditures resulting from substantially longer intervals between periodic and rehabilitation interventions.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>
<p>It is desirable that a comprehensive, overall, road maintenance strategy plan be developed to cover all these topics and unite them into a coherent government policy. IFIs should be willing to assist with Technical Assistance to prepare such an overall strategic plan and subsequently to help with the implementation of the revised maintenance strategies which will result in reduced road maintenance costs for the Road Agency, better use of public funds for the government and better levels of service for road users.</p>	<ul style="list-style-type: none"> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>

### 3.2.2.2 Sources of funding – Are stable multi-annual government budget allocations for road maintenance in place?

#### Issues

Budget allocations for road maintenance are seldom driven by demand – more often they are reflecting a country's fiscal position during previous budgetary period and macroeconomic projections for the incoming one. As a result, there may be no guarantee that next budget cycle's allocation (often one year) will equal the current one. This makes it difficult to enter into long- term contracts with fixed financial obligations.

Besides, road maintenance is often seen as a convenient target for savings as soon as fiscal times get tough. This poses a question: are government commitments to the Road Agency reliable and how secure is road maintenance funding?

#### Solutions

IFI support is often valuable and necessary, particularly with financing initial stages of a PBM programme (1st and 2nd generation) with an emphasised rehabilitation component (if not separated from Routine and winter Maintenance), but also with financing technical assistance services in preparation and design of PBMC programmes.

However, the availability of IFI funding may also be limited in terms of duration, depending on the Bank's own policies. For example, if a Funding Agency's framework allows for loan-financed contracts to be effective for, say, up to 48 months after the loan becomes eligible, that means loan proceedings could be used by the Agency for payments only for that period, which limits the duration of the PBM Contract to about the same period. Besides, maintenance in the PBMC is a "current" expenditure that needs to be funded by "current" budget (coming either from road users or taxpayers), not by passing the burden onto future generations through long-term IFI loans.

Government contribution to the loan for rehabilitation may be treated as the sovereign commitment part of the budget (as in the case of the pilot PBM contract in Albania).

The long-term solution is the creation of an environment with smooth road maintenance funding on the premise that real-term financial effects can be achieved if necessary future road maintenance is anticipated – proper funding for Routine and Periodic Maintenance can prolong intervals between capital road repairs.

In some cases the answer may be the creation of a Road Fund as a means to get round the uncertainties of central budget funding with a clearly defined, legally committed source(s) of revenue which allows the Road Agency to plan with a reasonably sure knowledge of its funding availability. This has been the case in Western Balkans in various shapes and forms. Depending on the size of the fund and the manner of funding it may cover only Routine Maintenance, or routine and periodic or routine, periodic and capital improvements.

Such a Road Fund should have a reasonable degree of isolation from government control/interference. This needs to be spelt out in the legislation setting up the fund and implemented in a way which protects that isolation.

#### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

### 3.2.3 The Contracting Industry

#### 3.2.3.1 Capacity – Is local contracting industry developed and does it have adequate capacity to implement PBM?

##### Issues

Most countries would like to remain self-sufficient in terms of road maintenance. It is a recurrent, year-in-year-out activity and they do not wish to become reliant on foreign contractors for the work. However, this requires an adequate capacity of the local industry. The Road Agency must consider carefully the adequacy of their local industry.

The industry as a whole must have sufficient capacity to meet implementation requirements for PBM contracts. The main questions about capacity are:

- Does the local industry have enough companies of a reasonable minimum size to carry out all the Routine Maintenance requirements?
- Does the local industry have enough companies with which the Agency will be able to keep up a regular schedule of truly competitive bidding?
- Do the local companies have the motivation to carry out PBM? They can be dragged into it as long as they do not have enough other work. They may need to be persuaded as to the benefits which they will obtain - long contracts with a regular income stream.

Solutions	Enabling condition for
To some extent the Road Agency can address the issue of the industry capacity by setting the size of the maintenance contracts to the average capacity of the local companies. But note that a purely Routine Maintenance contract can actually cover quite a large length of road for not too great an annual expenditure when compared to other road construction activities. Eg. Routine Maintenance may cost from 2-5 % of the cost of rehabilitation.	<ul style="list-style-type: none"><li>• 1st generation (pilot) PBM Contract</li><li>• 2nd generation PBM Contract</li></ul>
Balanced risk allocation - the Road Agency will need to consider the issue of risk allocation carefully in order to make risks commensurate to the capacity of the contracting industry. Early contracts are likely to need the Agency to retain much higher levels of risk than will be the case when PBM implementation is widespread. This can be accomplished through the use of Hybrid contracts	<ul style="list-style-type: none"><li>• 1st generation (pilot) PBM Contract</li><li>• 2nd generation PBM Contract</li><li>• Comprehensive PBM Contract</li></ul>

### 3.2.3.2 Capability and know-how – Does the local contracting industry have the required capability and knowledge to implement PBM?

#### Issues

Capability and knowledge is required, as well as capacity..

One of the benefits of PBM is having the Contractor take responsibility for quality control.

During the implementation of a pilot PBMC Contract in Albania, it was noted that this was a shortcoming with the local contractors. Contractors will need help in this area since local contractors will not have the Quality Assurance expertise. The Albanian case also notes quite marked cases of contractors not being able to plan the maintenance works adequately, although this problem reduced as they came to grips with the work.

#### Solutions

The Road Agency might consider with IFIs whether a scheme to provide technical assistance to the Contractor(s) during the implementation can be set up. This approach could help to get an initial PBM project off the ground.

An example is Indonesia (Sumatra), where funding agency (USAID) had training programmes for contractors as well.

IFI assistance could be considered to help provide technical assistance to local contractors undertaking their first PBM contracts. They are likely to benefit most from TA covering Organisation and Management and Quality Control.

It has the drawback that training is being given to just one or a few contractors but this is always a problem with pilot projects.

#### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract

### 3.2.3.3 International or local Contractors? Should only local contractors be eligible for PBM?

#### Issues

Early in the process, a basic decision is required regarding the use of International vs Local contractors. If a decision favours international contractors, then this should be a long-term policy or it should be short term with the aim of transferring maintenance to the local industry as soon as possible.

The alternative to using local contractors is to aim for international participation. There are some countries which have little history of domestic contracting in the road industry; they must go international of necessity. Equally, if a country does not have enough local contractors, or if the Agency feels that it needs the capability of an international contractor, then international participation must be promoted.

Solutions	Enabling condition for
<p>Pilot contract sizes may be determined in light of the decision whether they are intended to use international or local contractors due to the expected capability for them to deliver expected outcomes.</p> <p>International contracting is likely to require substantially bigger contracts than would be considered for local companies. There has to be a substantial financial incentive for international companies to want to get involved - unless they are already present in the country.</p> <p>Smaller contracts of a size appropriate to local companies should be used if local contractors are envisaged. If local contractors are sought then there should be as many contracts as possible in order to spread the experience widely.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> </ul>
<p>If international contractors are to be used for initial PBM Contracts, then it is probably desirable to encourage them to make maximum use of the capacities of the local industry whenever these can be deployed for PBM Contracts. This may provide an opportunity for on-the-job training the local contractors in PBMC, introduce local contractors to the PBM ethos and equip them to tender for further rounds of PBM work in their own enhancing the competition for future stages of PBM tendering.</p> <p>The Road Agency should ensure that the international contracts should, at the least, make provision for the maximum possible level of subcontracting to encourage local participation, and may possibly make a certain level of subcontracting mandatory. Note that IFIs have strict procurement rules that look for fairness and equality of opportunities in the procurement of services to potential bidders when it involves IFIs financing.<sup>5</sup></p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>

<sup>5</sup> The EBRD's Procurement Policies and Rules (PP&R) state that "The laws and practices for carrying out procurement should not discriminate between foreign and local products, suppliers or contractors and the procedures should be transparent and fairly applied."

Read more at;

[www.ebrd.com/cs/Satellite?c=Content&cid=1395236484644&pagename=EBRD%2FContent%2FContentLayout#0XczicG7ltf6sv9W.99](http://www.ebrd.com/cs/Satellite?c=Content&cid=1395236484644&pagename=EBRD%2FContent%2FContentLayout#0XczicG7ltf6sv9W.99)

### 3.2.3.4 Contract packaging - Adopting generic principles, packaging and format to the specific local context<sup>6</sup>

#### Issues

What is the optimum design of contract packages for local contracting industry to be commensurate with their capacity and risk appetite. Or otherwise, if there is no local capacity, for foreign contractors to be attracted to come and share their experience and expertise.

Solutions	Enabling condition for
<p>PBM contracts aimed at the domestic industry need to provide experience as widely as possible. The Albanian example is noteworthy in this respect. The pilot project was divided into four contracts, each of a size appropriate to the local companies. Direct experience was therefore spread relatively widely; in turn, this wider spread of the direct experience is more likely to lead to a dissemination of experience through the industry rather than a situation where only a single contractor is involved and may try to keep his experience very much to himself.</p> <p>Whilst much will depend on specific circumstances, for a simple pilot project, this use of four contractors probably comes close to the limit of practicality. With even more contractors, either the project will become too large or the contracts too small. If PBM contracts are aimed at the domestic industry only and the likely outcome is that they will be awarded to the local contractors, it is highly recommended to involve the supervisor with the appropriate experience. Ideally this should be done at least for the initial stage until skills set is being transferred onto both the Agency and the contractors.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>
<p>However, the contract packaging then must be suitably designed to enable sufficient contract size to be attractive for an international contractor. In reality, this usually implies a smaller number of larger PBM contracts.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>

<sup>5</sup> The EBRD's Procurement Policies and Rules (PP&R) state that "The laws and practices for carrying out procurement should not discriminate between foreign and local products, suppliers or contractors and the procedures should be transparent and fairly applied."

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### 3.2.4 The Roads Agency

#### 3.2.4.1 Ability to change' approach – Is the Road Agency willing and capable to change its role and modus operandi?

##### Issues

Transitioning to PBM will require substantial changes in the way Road Agency staff work and think about how the Road Agency itself sees its role and plans its work. The main questions during this transformation are:

- Does the Agency have a cadre of relatively young staff who can easily move from one job to another?
- Are too many of the present staff set in their ways and used to doing just one set of duties?

It is a basic concept of PBM that much of the Road Agency workload transfers to the contractor. With PBM it is clear that the Agency should need fewer staff.

One of the benefits of PBM is that Agency workload should reduce - substantially. There are likely to be fewer contracts altogether and as contracts will be for substantial periods - for example five years - you can expect that there will be many fewer contracts each year.

The whole question of staffing and reduction in numbers should be considered carefully as the Road Agency considers PBM itself.

If there is a constant turnover there may be problems with newly-trained staff departing and being replaced with staff who do not understand the new system. This would be a particularly serious problem in the early years of PBM adoption although it should ultimately disappear as the system settles down.

PBM will require a whole new way of thinking for the Agency staff. Some will adapt easily. There are others who will have great difficulty; there are examples where staff have simply been unable to get to grips with the idea that a contractor can be paid without physically measuring his work. The idea that in some months the Contractor will be paid just the same, even though he has had to do no work to speak of, is unthinkable.

As the use of PBM develops, the Road Agency should be seeing the process in terms of remaking the Agency itself. Many of the old jobs will disappear, for example supervisors will no longer have to be on site at all times directing the Contractor what to do; that is now the Contractor's business.

Continued

Solutions	Enabling condition for
<p>Once the pilot project has succeeded, the Agency should try to formulate a long term policy, based on proposed maintenance strategy to determine future technical activities and the required staffing levels.</p> <p>It should then assess how these aims are to be met, which staff are the most valuable, how staff should be reduced. Note that staffing will be affected by the Agency's decisions regarding the use of Consultants.</p> <p>Staff reduction can be effected in a number of ways:</p> <ul style="list-style-type: none"> <li>• Natural wastage.</li> <li>• Retirements.</li> <li>• Redundancies.</li> <li>• Transfers to contractors in some cases (especially where public organisations are being privatised).</li> <li>• Dismissals.</li> </ul> <p>Based on the World Bank study, the Province of British Columbia was a pioneer in outsourcing Road Maintenance under Performance-based Contracts (PBCs) in Canada. The first round of PBCs was in 1988. Later on, Alberta (in 1995) and Ontario (in 1996) introduced this approach. At present, 100% of provincial highways are maintained under PBCs in British Columbia, 60% in Ontario and 100% in Alberta (under Hybrid contracts). There has been a successful development of the local industry as a result of this process.</p> <p>The government employees working in the road maintenance were offered the following options:</p> <ul style="list-style-type: none"> <li>• Accept employment with the successful contractor in the district.</li> <li>• Stay with the government and fill vacant positions anywhere in the public service.</li> <li>• Take the early retirement package (if they were qualified).</li> <li>• Resign.</li> <li>• Severance pay was not available under any option.</li> </ul> <p>At the end of the privatisation for the first round of contracts in 1988, 2,280 employees were transferred to the new Road and Bridge Maintenance contractors, 20 employees stayed with the government, a few resigned, and about 200 took early retirement. In 1995, companies owned by ex-government employees held 16 contracts and controlled 57% of the total value of all 28 contracts. Today some of those companies work internationally.<sup>7</sup></p>	<ul style="list-style-type: none"> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>

<sup>7</sup> Source: Performance-based Contracting for Roads in Canada - [http://www-esd.worldbank.org/psc\\_resource\\_guide/Case-Canada.htm](http://www-esd.worldbank.org/psc_resource_guide/Case-Canada.htm)

### 3.2.4.2 Capacity, capability and know-how - Are there skills and expertise within the Road Agency adequate, particularly in terms of project management?

#### Issues

Staff in most Roads Agencies in the transition region does not have experience with or sufficient detailed knowledge of PBMC in order to design and launch pilots.

As well as preparing contracts and checking the contractors' outputs, the Agency needs to be developing a much more proactive Asset Management role; for instance, staff may need to handle pavement and condition surveys, traffic counting, roughness surveys and vehicle weighing.

Unless there is a reasonable level of desire within the Agency, the change to PBM will be difficult and may well fail. Failure often happens at the project preparation stage rather than the physical implementation. Once a contract is up and running on the ground, then there are quite strong forces on all parties, pushing them to make a success of it.

Solutions	Enabling condition for
<p>As PBM is rolled out, more and more Agency staff will become involved and they will find themselves taking on different roles with a changed perception of their duties and functions -- providing appropriate training is available.</p> <p>Intensive trainings for Agency staff is often required, particularly in the early (pilot) stages of a PBM programme. Training programmes are usually organised by external consultants hired to assist with institutional reform and design and the preparation of (pilot) PBM Contracts. These typically include several modules:</p> <ul style="list-style-type: none"> <li>• General awareness of the main principles of Performance-Based Road Maintenance</li> <li>• Preparation of PBM Contracts</li> <li>• Administration, management and monitoring of PBM Contracts</li> </ul>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> </ul>
<p>Where local expertise is not immediately available, it can be purchased from overseas by engaging experienced international consultants who can assist the Road Agency in the design and preparation of PBM Contracts, as well as for the training of the Agency's staff.</p> <p>Given that very often the national procurement rules and budgetary constraints make it difficult for the Road Agency to procure such services easily, strong support from IFIs in providing technical assistance for design and preparation of PBM contracts and training of Agency's staff is desirable, particularly for pilot projects. IFI-funded technical assistance is often available through various instruments, be they grants as part of wider national or regional/sectoral programmes supported by an IFI or as part of the loan arrangements.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> </ul>

### 3.2.5 Consultants

#### 3.2.5.1 Short-term strategy - Does the local consulting industry have the required capability and knowledge to implement initial stages of PBM programme?

##### Issues

To get the PBM process started, the presence of an experienced consultant will be very helpful. Such a Consultant will be able to offer the Agency the knowledge that it lacks and provide much-needed assistance. This possible need for consultant assistance depends on the confidence of the Agency, as well as the outlook and versatility of its staff. The original instigators of the PBM approach did it without the use of consultants. Expertise of experienced consultants is usually being used to support the Roads Agency in the design and preparation of initial (pilot) PBM Contracts. This has happened in Albania, Serbia and to some extent in Moldova as well.

Solutions	Enabling condition for
<p>In the initial phases of PBM introduction (a pilot project), an external Consultant may help with assessing the network, selecting candidate roads, preparing contract documents, conducting Contractor workshops and training, bidding and evaluation. Subsequently a consultant may be recruited to function as or provide support to the Agency's Project Manager and Monitor for the initial contract(s) implementation, with gradual training of the Agency's staff and handing-over the supervision to the client as is envisaged in the Ukraine PBMC project.</p> <p>At the pilot phase you will need to insist that the international consultant affiliates with at least one and preferably two local companies and that a training element for these affiliates is written into the main consultancy contract.</p> <p>There will be less concern regarding training for Agency staff, although this will still be a consideration since the Agency should have some personnel who are familiar with the whole process.</p> <p>Following any pilot phase, if the Agency feels that it is now capable of acting for itself, unaided, then the continued introduction of PBM may be carried out without further assistance or, perhaps in the medium term with just a single headquarters adviser to assist with general oversight, the preparation of contract documents and dealing with specific problems.</p>	<ul style="list-style-type: none"><li>• 1st generation (pilot) PBM Contract</li><li>• 2nd generation PBM Contract</li></ul>

### 3.2.6 Policy Makers

#### 3.2.6.1 Commitment of higher-level government – Is there a political will to introduce a PBM programme?

##### Issues

Introduction of PBM can be an all-round challenging process involving not just the technical matters handled by the Agency, but general policy considerations affecting senior policy makers as well.

The manner in which the Agency operates and the way in which it executes its remit is nearly always under the scrutiny of senior policy makers to some degree. A significant change in its procurement ethos and contracting methods, such as the change to PBM, cannot escape the attention of this group.

Policy makers generally can be taken to include ministerial levels and national elected representatives.

Without adequate support at these levels, PBM introduction is likely to fail. This is especially the case when the introduction of PBM will require changes to legislation or budget planning; actions which cannot succeed without the support of ministries, particularly the Ministry of Finance.

##### Solutions

The Road Agency needs to be able to interact with policy makers, particularly with the Ministry of Finance, to explain the PBM concept: what it is, why it is different, how it can improve roads for people and how it should save money for everyone in the end.

After all, the entire PBM exploit is about improved road conditions and better value for money.

Representatives of the Ministry of Finance should be involved in the process of defining the PBM programme as early as possible, in order to better understand processes and changes that are required as well as benefits to be gained in future and to assist with creating a supportive environment for introduction of the PBM.

Early involvement of the Ministry of Finance in the design of a PBM programme ensures they become one of the owners, supporters and promoters of the programme. This is crucial for the success of a PBM programme, as it is the Ministry of Finance who should ensure long-term commitment for funding a multi-annual PBM Contract, without which the pilot PBM project and entire PBM programme cannot be initiated.

##### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

### 3.2.6.2 Project size – Is the project of appropriate size to attract sufficient attention and support from policy makers to implement changes?

#### Issues

There is a tendency for projects to have a “critical mass”. If they are too small they will not attract the attention of policy makers and will therefore not receive the attention and priority which they require, especially where policy makers actions are essential to secure necessary legislative or regulatory changes.

This was highlighted in discussion of an early attempt at PBM in Romania (Sfantu Gheorghe Municipal Infrastructure Project), where the relatively small size of the pilot project meant that policy makers had no incentive to bring about regulatory changes essential to implementation.

Solutions	Enabling condition for
<p>Design early stages of a PBM programme in such way that the project is big enough to attract the attention and support of key decision makers in the Government.</p> <p>Select significant parts of the road network for a pilot project. For example, primary and secondary roads in 2-3 maintenance regions or primary or secondary roads only in more (5-10) maintenance regions.</p> <p>Projects should not be too big either, particularly in the initial stages, as they may be too difficult to deliver.</p> <p>Road sections selected for a PBM pilot should form a reasonably compact group.</p> <p>Try to avoid political considerations to set up a project comprising widely separated roads, which will drive up contracting and supervision costs and problems.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>

### 3.2.6.3 Electoral factors – Should elections cycle be taken into account as an important factor for PBM programme?

#### Issues

A particular problem with elected policy makers is that many of them tend to have a limited view of events, with much of their attention being governed by the electoral time cycle. Elected policy makers are less likely to support actions which they see as being unpopular with voters as elections approach.

The political voting cycle is a fact of life and should be taken into consideration as a factor – the maximum time horizon that politicians are interested in is from election to election.

Solutions	Enabling condition for
<p>A short-term solution involves awareness of the influence of electoral factor and planning the PBM programme, particularly its initial stages, by taking account of the electoral timeframe.</p> <p>A long-term solution is the creation of an environment with stable road maintenance funding and with a reasonable degree of isolation from political control and interference. This needs to be spelt out in the legislation setting up the fund and be implemented in a way which protects that isolation.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>

### 3.2.7 Control/Audit Authorities

#### 3.2.7.1 Do Control/Audit Authorities have sufficient understanding of the PBM Concept and its place in the legal framework?

##### Issues

In the transition region (as elsewhere in the world), the implementing agencies – including Road Agencies – are accountable for managing the public funds to State Control/Audit Authorities (sometimes also called Court of Accounts or Financial Inspection or Revision). These should ensure that public expenditures are made in a transparent manner and that the best value for public money is obtained within the existing country's procurement and contracting systems, as well as other parts of legal framework.

Road maintenance operations, being treated as current expenditures, traditionally are contracted on the measurement (input) based principle, that is, only executed and measured quantities of approved works are being paid using unit rates for units of measured works.

“Pure” PBM Contracts are in essence lump-sum contracts through which the Contractor is no longer paid for quantities of executed works but for maintaining the road to a required maintenance standard. Adherence to maintenance standards is not being measured but monitored. The Contractor receives lump sum partial payments in regular time intervals as long as he provides the required level of service for the contract road through adherence to maintenance standards.

The shift from payment for the measured quantities concept to payment lump sum for an achieved maintenance standard is paramount and unless the adequate legal framework exists for this type of contract and unless such a shift in contracting method and reasons are properly understood by Control/Audit Authorities, these may create many issues for the Road Agency who decides to implement the PBMC.

##### Solutions

The early involvement of Control/Audit Authorities in understanding the concept and, most of all, its fiscal benefits is crucial and could be achieved through awareness workshops designed specifically for them or preferably carried out at the same time and with the participation of policy makers (Ministry of Finance and other stakeholders) too. This way, better coordination could be achieved in early stages of the design of a PBM programme. Moreover, if legal reform to enable PBMC is required, the involvement of representatives of Control/Audit Authorities can be beneficial as they could provide a valuable contribution to required legal reform. That is, of course, if there is any interest of Control/Audit Authorities to take part, something that should be encouraged by Road Authorities at all levels of the Government.

##### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

### 3.2.7.2 Project size – Is the project of appropriate size to attract sufficient attention and support from policy makers to implement changes?

#### Issues

There is a tendency for projects to have a “critical mass”. If they are too small they will not attract the attention of policy makers and will therefore not receive the attention and priority which they require, especially where policy makers’ actions are essential to secure necessary legislative or regulatory changes.

This was highlighted in the discussion of an early attempt at PBM in Romania (Sfantu Gheorghe Municipal Infrastructure Project), where the relatively small size of the pilot project meant that policy makers had no incentive to bring about regulatory changes essential to implementation.

Solutions	Enabling condition for
<p>Design early stages of a PBM programme in such way that the project is big enough to attract the attention and support of key decision makers in the Government.</p> <p>Select significant parts of the road network for a pilot project. For example, primary and secondary roads in 2-3 maintenance regions or primary or secondary roads only in more (5-10) maintenance regions.</p> <p>Projects should not be too big either, particularly in initial stages, as they may be too difficult to deliver.</p> <p>Road sections selected for a PBM pilot should form a reasonably compact group.</p> <p>Try to avoid political considerations to set up a project comprising widely separated roads which will drive up contracting and supervision costs and problems.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> </ul>

### 3.2.7.3 Electoral factors – Should the election cycle be taken into account as an important factor for a PBM programme?

#### Issues

A particular problem with elected policy makers is that many of them tend to have a limited view of events, with much of their attention being governed by the electoral time cycle. Elected policy makers are less likely to support actions which they see as being unpopular with voters as elections approach.

The political voting cycle is a fact of life and should be taken into consideration as a factor – the maximum time horizon politicians are interested in is from election to election.

Solutions	Enabling condition for
<p>A short-term solution involves awareness of the influence of the electoral factor and planning the PBM programme, particularly its initial stages, by taking account of the electoral timeframe.</p> <p>A long-term solution is the creation of an environment with stable road maintenance funding and with a reasonable degree of isolation from political control and interference. This needs to be spelt out in the legislation setting up the fund and be implemented in a way which protects that isolation.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>

### 3.2.8 Road Conditions

#### 3.2.8.1 Should road sections in poor condition be considered for PBM?

##### Issues

Where roads are in poor condition – normally referred to as “not in maintainable condition” – the preferred option seems to be to rehabilitate and then start maintenance. This is all very well for the occasional road section, but where roads generally are in poor condition and finances are tight, it is useless to say they must be rehabilitated before they can be maintained by PBM.

Contractors do have issues with taking long-term risk related to the maintenance of assets that are not in a maintainable condition, unless there is detailed information on their status.

##### Solutions

Contracts for road maintenance should be separate from contracts for road rehabilitation – it is recommended that the pilot PBM contract includes only road maintenance without road rehabilitation.

Data collection on road condition (an up-to-date road database) is essential in order to prepare properly balanced PBM Contracts.

Specifications need to be modified to suit the circumstances of each contract.

Roads which are in poor condition must be brought up to some kind of acceptable minimum and suitable maintenance standards framed to cater for maintaining them at that level. The right level of minimum work can be part of the Competitive Dialogue or be advised by the Consultant.

The acceptable minimum might be no more than the essentials for preserving the road structure in an effective functioning state. Having done this work as a least-cost initial phase, perhaps spread over the first year of the PBM contract, then the roads can be maintained in a stable condition until the financial situation allows the Agency to consider whether, under the next contract, to maintain the status quo, to specify further gradual improvement or to consider a Periodic Maintenance intervention – or, perhaps, rehabilitation.

Some basic improvement of an existing, neglected road does not have to be done through wholesale rehabilitation. Some level of meaningful improvement can usually be achieved through the application of regular maintenance practices. A substantial reduction in roughness may be achieved simply through the careful repair of all potholes and cracks, carried out as a part of restoring the waterproof nature of a bituminous surfacing.

This notion of improvement through maintenance should be applied carefully. It is not a substitute for rehabilitation, but it does offer the chance to delay rehabilitation by a substantial length of time at the price of a small increase in maintenance costs.

##### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract
- Comprehensive PBM Contract

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract

### 3.2.8.2 Should road sections in good condition be considered for a PBM?

#### Issues

There is sometimes a less obvious problem when dealing with the maintenance of roads in good condition; all too often people believe that they need no significant maintenance at all – ‘just cut the grass’. Some of the policy makers might be the worst offenders of this attitude.

Even the best roads need maintenance and the roads in the best condition will repay maintenance over and over again, because it is maintenance that keeps the value of that road as an asset.

Solutions	Enabling condition for
<p>The importance of proper maintenance of roads in good condition should always be kept in mind. Agencies should be on their guard against the belief that such roads represent targets for cost cutting and must ensure that all concerned are clear about the maintenance needs and the longer term benefits of proper maintenance of roads in good condition.</p> <p>Data collection on road condition (an up-to-date road database) is essential in order to prepare properly balanced PBM Contracts. If the road is not in maintainable condition, it might be worth spending funds in upgrading the road condition rather than in collecting the information.</p>	<ul style="list-style-type: none"> <li>• 2nd generation PBM Contract</li> <li>• Comprehensive PBM Contract</li> </ul>

### 3.2.8.3 Electoral factors – Should the election cycle be taken into account as an important factor for a PBM programme?

#### Issues

Very low volume roads present different problems and are not usually the problem of the major Road Agency. The trouble with these roads is that it is very often difficult to make out a case for having them at all, let alone maintaining them.

The need for such roads is usually founded on social rather than economic grounds and it is social considerations which say that they cannot be abandoned.

Solutions	Enabling condition for
<p>PBM holds the key to the economic maintenance of these roads. Not the usual complex contract with detailed maintenance requirements and LoS but a very simple contract with a simple performance requirement: that access over this road should be possible for a vehicle of a certain type at a certain minimum average speed on every day of the year except, if appropriate, when snow depth on the road exceeds a specified minimum depth or when snowfall in a specified time exceeds a minimum.</p> <p>If the Agency does have responsibility for the maintenance of roads of this type then it might consider having a pilot project consultant prepare a suitable document for their maintenance on these lines.</p>	<ul style="list-style-type: none"> <li>• 1st generation (pilot) PBM Contract</li> </ul>

### 3.2.8.4 What is the optimum design of a PBM contract in terms of road conditions?

#### Issues

The road sections within a proposed PBM Contract are likely to be a mix of good and bad roads with some having been newly rehabilitated, or they may just be a mix of roads in fair to poor condition.

In one case, the Road Agency had decided that the PBM pilot project represented an opportunity to get a group of neglected roads rehabilitated and virtually every road needed rehabilitation, resulting in a pilot PBM maintenance project which was actually 85% rehabilitation works. This is not a recipe for success.

#### Solutions

Ideally, a pilot PBM contract should include only maintenance of newly- rehabilitated or newly-built roads (after expiry of their respective Defects Liability Periods), and in any case no less than 60% of the network should already be in good condition before commencement of a pilot PBM Contract.

Contracts for road maintenance should be separate from contracts for road rehabilitation – it is recommended that pilot PBM contract includes only road maintenance without road rehabilitation.

In cases where this is not possible or not desirable, particularly for the 2nd generation of PBM contracts, the recommendation is that a minimum 50% of the scope of the PBM Contract should be maintenance and a maximum 50% should be rehabilitation.

#### Enabling condition for

- 1st generation (pilot) PBM Contract
- 2nd generation PBM Contract

# 4. Introducing performance-based maintenance

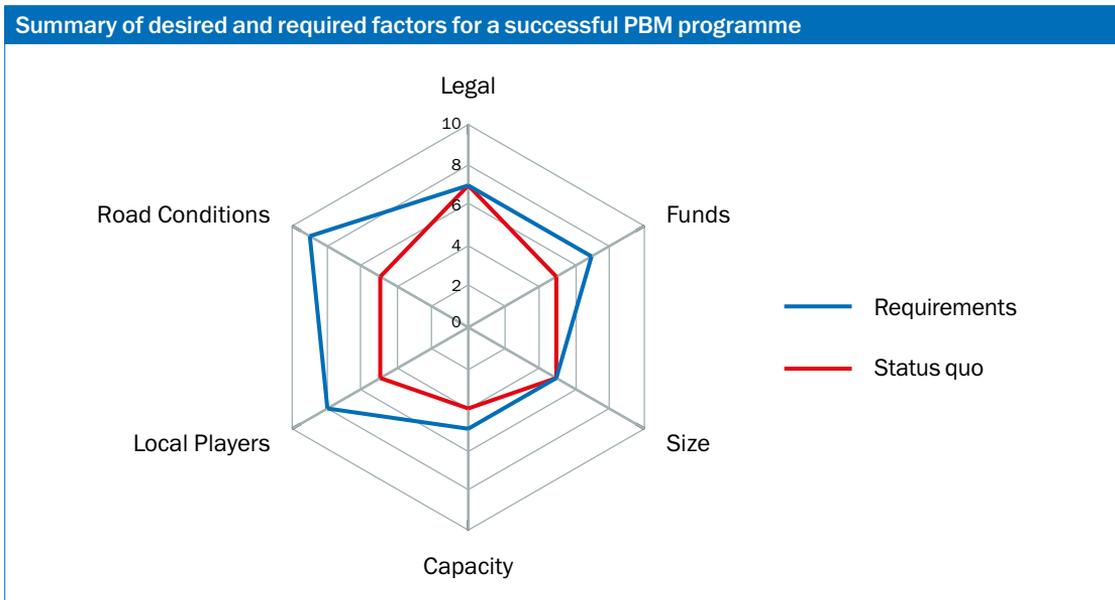
This section addresses the issues and challenges faced in the implementation of a PBC and presents them in a detailed and structured way.

## 4.1 Enabling conditions

The experience from countries with a lengthy implementation history of PBM Contracts indicates that the following conditions must be in place to enable PBM contracts, or are desired to facilitate the successful implementation of such an approach.

Enabling conditions for PBM Contracts		
<b>1. Legal</b>	<b>Required</b>	<b>Desired</b>
Multi-annual maintenance contracts possible in accordance with national legal framework (contract duration)	✓	
National contract classification, where it exists, should have PBM contracts amongst the possible contract types	✓	
Procurement by two-stage, open tendering at least in initial (pilot) stage of PBM programme, enabling Tenderers/Agency partnering contract terms whilst allowing sufficient flexibility for the Tenderers to determine the optimised mix of technical solutions and economical solution that result in a competitive tender.		✓
<b>2. Financial</b>	<b>Required</b>	<b>Desired</b>
Stable funding to meet Agency contractual obligations must be assured (availability of funds)	✓	
Stable multi-annual Government budget allocations for road maintenance are in place (sources of funding)		✓
<b>3. Contracting Industry</b>	<b>Required</b>	<b>Desired</b>
Developed local road maintenance contracting industry		✓
Local contracting industry has adequate capacity to implement PBM		✓
Local contracting industry has required capability and knowledge to implement PBM		✓
Adopt contract packages and size the contracts to target the private sector that will more likely deliver successful services		✓
<b>4. The Road Agency</b>	<b>Required</b>	<b>Desired</b>
Road Agency willing and capable to change its role and modus operandi	✓	
Adequate skills and expertise within the Road Agency do exist, particularly in terms of project management (capacity, capability and know-how), or are readily available on the market (new staff can be hired)	✓	
Road Agency's monitoring system has to be rational and easy-to-use to be credible, whilst the sanctioning system for non-compliance with KPIs needs to be clear, reasonable and workable. Automated systems are preferred, whenever their deployment is feasible. Road users should be able to provide feedback to the system / client		✓

5. Consultants	Required	Desired
Local consulting industry has required capability and knowledge to implement initial stages of PBM. Alternatively, involve international consultants to transfer knowledge		✓
6. Policy Makers	Required	Desired
Commitment of higher-level Government – political will	✓	
Project is of appropriate size to attract sufficient attention and support from policy makers to implement changes		✓
7. Control/Audit Authorities	Required	Desired
Understanding of the PBMC model by Control/Audit Authorities	✓	
8. Road Agencies	Required	Desired
Only road sections in good condition should qualify for PBM Contracts. Otherwise use Hybrid Contracts.		✓



From the above, it is clear that institutional factors such as the legal framework, secured financing, political will and capability of the Road Agency are required factors. Without these factors it makes little sense to initiate a PBM programme.

Other factors such as the existence of the contracting industry and experienced consultants is not necessarily a condition to commence a PBM programme, although there is a lot of scope to develop capacity in these areas once a long-term PBM programme commences.

## 4.2 A typical PBM Programme

Typical stages of a PBM Programme comprise the following stages:

- I. Ensuring that minimum legal and financial conditions enabling PBM are developed (up to 1 year).
- II. Design and implementation of 1st generation (pilot) PBM Contract (3 to 5 years).
- III. Design and implementation of 2nd generation (pilot) PBM Contract (5 to 7 years).
- IV. Design and implementation of a comprehensive PBM Contract (7 to 10 years).
- V. Design and implementation of a comprehensive PBM Contract with Asset Management (15+ years).

Each stage includes the following steps:

- Contract strategy definition.
- Development of model PBM Contract documents.
- Selection of a pilot territory and data collection.
- Finalising tender documents.
- Tendering.
- Contract negotiations and award.
- Implementation.
- Benchmarking, monitoring and supervision.

A Gantt chart showing the timing and detailed sequence for each step at every stage of a PBM programme is shown further in Annex 4.

## 4.3 Commencing a PBM Programme - Pilot projects

The first step for most road Agencies who have decided that they need to move towards a system of PBM will be consideration of a Pilot project.

Before a pilot project can be implemented there are a number of preliminary considerations to be dealt with.

### 4.3.1 Legal, Regulatory and Financial Climate

Before attempting to introduce a first contract for a PBM, the Agency needs to ensure that all required legal and regulatory provisions are in place to cater for a contract of this type and length, as described in previous sections.

Similarly, the Agency needs to be certain that the necessary financial provisions are in place and agreed to permit meeting the long-term financial demands of this type of contract, without impinging unfavourably on the Agency's other maintenance obligations.

### 4.3.2 Data

It is absolutely essential for the Agency to be able to provide tenderers with a clear picture of the roads they are being asked to maintain and types of the works which they are being asked to perform on those roads. Equally, it is essential for the Agency to have a clear understanding of the condition of its roads and of the works necessary to bring them to an appropriate, sound condition for the functions they are expected to fulfil.

The Agency must compile adequate data for the information of contractors. It is no good simply telling the contractors to inspect the roads and make their own decisions. The tender provisions almost always require bidders to satisfy themselves as to the road conditions, but this is not a substitute for provision of carefully acquired data by the Agency which has an in-depth knowledge of the roads and which should be compiling data, as a matter of course, as a basic element of their asset management strategy.

Wherever possible, data for rural highways should include:

- Condition surveys of each road section.
- Roughness surveys (if possible historic surveys to indicate deterioration rates).
- Traffic data (including seasonal variation if appropriate).
- Distribution of vehicle types.
- Axle loads and extent of overloading.
- Weather data for each road section (especially winter weather data - temperature and snowfall records).

If the Agency does not have this level of data then it should consider collecting as much of the above data as possible as a part of the project preparation.

At a higher level of PBM, under which the Contractor is responsible for decisions regarding Periodic Maintenance, data in respect of pavement strength will be required, usually Falling weight deflectometer (FWD) test results and analysis. If the Agency does not have this data itself, the PBM contracts themselves can include allowance for the Contractor to carry out suitable tests and analysis and report back to the Agency with the results.

Where urban road networks are concerned, the data requirements become much more extensive. Maintenance of urban networks can require much more than a record of the visible assets, which will include additional items such as street and traffic lighting, sidewalks, kerbing, parking areas, together with all the associated signage and markings. The Agency must also obtain details of all aspects of the system which lie beneath the surface. Buried services such as drainage, water and electricity will all have a bearing on his maintenance activities either directly because, like surface water drainage facilities, they are a part of his responsibilities, or indirectly because any operations by the other utilities concerned will affect his maintenance operations.

For a PBM tender any apparent work elements which are not described in reasonable detail by the available data will just result in the Contractor increasing his prices. If the volume of the missing data is too great it will result in contractors refusing to submit bids or in bids becoming unacceptably high. Alternatively, it will lead to inexperienced contractors putting in bids which are too low and do not allow for the necessary works at all, leading to subsequent implementation problems and, perhaps, contract failure or the need to renegotiate contracts in order to save the project.

### 4.3.3 Long-Term Strategy

Having decided on the need for change in maintenance philosophy, the Agency and its government, must decide on a basic forward strategy regarding the means of implementation.

This strategy needs to determine how the future of maintenance is to proceed. Decisions should be made regarding the use of contractors - local or international and, if international, whether for the short or long term.

At the same time decisions are required regarding the future role of the Agency itself. See Section 3 for a more detailed analysis of strategic decisions.

### 4.3.4 Selection of roads for Pilot projects

Having decided on the need for change in maintenance philosophy, the Agency and its government, must decide on a basic forward strategy regarding the means of implementation.

#### 4.3.4.1 Rural and Urban Roads

Rural highways usually comprise a relatively simple infrastructure with all elements within the competence of a relatively small-scale roads contractor: pavement, side drainage, structures, vegetation, signs, miscellaneous items such as guardrails, etc.

Urban roads are fundamentally much more complex and present problems including all the above, plus items such as: street lighting, traffic lights, kerbs, sidewalks, parking, underground services, primarily water and drainage, but can also include telephones and power, limited working space, pedestrians, and congested traffic with perpetual needs for control and diversion. All this results in a far more complex interface to be managed which means less of a risk transfer to the Contractor.

Note that although some roads may appear urban as a result of their location/area, they can quite reasonably be considered as “rural” because of their basic nature - that is, none of the complexities of the urban type.

#### 4.3.4.2 Preferred Road Package

**Routine Maintenance** comprises the execution of the basic regular tasks necessary for maintaining a road in good condition and preserving an adequate level of service. Routine Maintenance is normally taken to include winter maintenance. **Periodic Maintenance** comprises the operations required at less regular intervals of more than one year to bring a road back into peak condition. Usually some form of resurfacing, maybe combined with other activities.

It is suggested that the first steps to initiating PBM systems should be confined to a relatively simple contract(s) for PBM covering the Routine Maintenance of a package of rural highways/roads.

This approach allows the Agency to start devolving the day-to-day operations and Contractors to gain an understanding of PBM responsibilities without involving either side in too great a level of complexity.

If such a contract goes wrong, it is the simplest one on which to take corrective measures and one in which the least damage will be done whilst such measures are put into effect.

The current state of roads is likely to make development of such a “pure” Routine Maintenance approach impractical with a practical implementation of the contract, requiring some form of initial rehabilitation or improvement works to at least some of the project roads.

The need for such initial improvement works does not invalidate the concept of a straightforward maintenance contract, but the detail of the contract will become more complex since it will need to make clear provision for some form of remedial works period during which the basic defects in some or all of the project roads are corrected.

Where roads are in truly poor condition they should probably not be included in an initial, simple, pilot project; however, where large parts of the system are not in good condition this level of selectivity is likely not practical. In this case, the Agency should try to avoid becoming enmeshed in a complex contract with extensive rehabilitation provisions. Selected roads should be such that corrective measures required are as simple as possible with the aim of completing them in Year 1 of the contract with Routine Maintenance following thereafter.

Where this approach of limited works is considered impractical then the inclusion in the contract of some road sections for Periodic Maintenance is a possible alternative.

### 4.3.5 Technical Assistance

Any Agency proposing to transition from traditional road maintenance models, either in-house or input-based contracting, towards the more modern PBM model should consider looking outside for technical assistance (TA). The use of Consultants has been discussed at length in Section 3. IFIs will be willing to assist the Agency in securing suitable consultant services to guide the Agency through the transition to PBM.

There is a wealth of international experience available. It is best if this is brought into the process at an early stage. TA can assist the Agency with the whole process of creating and implementing a pilot project, including the procedures for:

- Assessing the existing roads.
- Classifying and determining appropriate maintenance standards.
- Estimating costs.
- Selecting a roads package.
- Assessing the local contracting and consulting industries.
- Deciding on the use of local or international consultants and contractors.
- Creating appropriate contracts and specifications.
- The procurement process including prequalification.
- Evaluation and award of contracts.
- Project management of pilot contract(s).

Prior to implementation of a pilot, the Agency should decide whether to proceed alone or to seek TA. If IFI assistance is being sought for the pilot stages, then the IFI might also have requirements regarding the use of TA services. Where the Agency is operating with its own funds then the decisions will also be its own.

### 4.3.6 Pilot Implementation

#### 4.3.6.1 Classifying and determining appropriate maintenance standards

As a precursor to establishing a PBM system it is necessary to set out a system or schedule of appropriate LoS for different road types and traffic levels and to establish how these LoS should be equated to maintenance operation performance indicators.

##### Costing the risk over time

Experience shows that there is a one-in-five risk of some event happening on a 5-year contract. The estimated cost of rectification is US\$ 50,000. To the Agency, taking the long-term view, this risk is effectively a US\$ 10,000 a year cost. To a Contractor working on a 1-year Contract it is a potential US\$ 50,000 cost, whereas to a Contractor working on a 5-year Contract it is also a US\$ 10,000 a year cost.

In order to specify the parameters for the implementation of a PBM system, it is necessary to assess the appropriate level of maintenance for different road types within the network, based on class and traffic, and then to apply that appropriate level to the actual road sections.

### 4.3.6.2 Assessing the existing roads

No maintenance programme can be set out without some understanding of the condition of the existing roads and the traffic loads to which they are subject.

The Road Agency should really have a comprehensive database of condition surveys covering all its roads together with data on traffic and importance. To the extent that data on the road system, which is not crucial for type of works under a PBM Contract is not complete the PBM Contract should include provisions for the Contractor to make good/update these data gaps on the contract roads as a part of his duties under the contract. In any case, provision can be included for information to be updated during and at the close of the PBM contract, thus helping to ensure that the Agency database is comprehensively updated. Similar provision in future contracts will extend this updating function until data on all roads under PBM is being continuously revised.

The road assessment should be used to decide which are the most suitable candidate roads for inclusion in the pilot PBM project, bearing in mind the desirability of restricting work, as far as possible to Routine Maintenance in the first phases of transition, with the inclusion of some periodic elements if necessary and the avoidance of whole scale rehabilitation if at all possible.

### 4.3.6.3 Estimating costs

An important function of the TA will be to form estimates of maintenance costs for the standards of maintenance specified for the project roads. Initial estimates should be prepared as a part of the procedure for establishing the optimum maintenance regimes for the country's roads generally. These can then be refined to cover the roads selected for inclusion in the project.

Estimates of cost are obviously important in determining the possible size and extent of the pilot project. The question of cost estimating is made more complex in these early stages because of the known tendency for early stage PBM contracts to be somewhat higher priced than expected. Partly due to the fact that the maintenance standards are clearly specified and not subject to ad hoc modification to suit budgets - this makes comparison with previous maintenance costs very suspect - and partly because contractors are likely to be cautious bidding for a class of work with which they are not familiar.

As the PBM system develops, these costing problems should dissipate; experience elsewhere shows that like-for-like maintenance costs tend to stabilise at lower costs under PBM. However, if existing maintenance has been of a noticeably lower standard than the PBM specification now calls for, then the PBM maintenance may well end up costing as much or more than previously but will yield a higher standard of asset preservation with eventual savings being realised in the reduced costs of Periodic Maintenance and rehabilitation.

#### 4.3.6.4 Assessing the local contracting and consulting industries

Decisions regarding participation by both local contractors and by local consultants will be coloured by the capacity and capabilities of the local industries.

Before deciding on the form and scope of the PBM pilot it is desirable to evaluate these factors and assess the ability of the local industries to participate.

Some Agencies would prefer to retain the whole assessment and procurement cycle in-house, whilst others may go entirely the other way and aim to contract as much as possible of the work to consultants. The decisions in this respect will depend in large part on a realistic assessment of the capabilities and potential of the local consulting industry and of the Road Agency, as well as on the availability of international capacity in case the local consulting industry does not exist.

#### 4.3.6.5 Selecting a roads package

Ideally the package should comprise a group of roads which are contiguous and located within a reasonably compact area. This will facilitate both the contractors maintenance efforts and the Agency's supervision work. A compromise may well have to be struck between the desire for a compact grouping of roads and the aim of avoiding excessive initial works.

Depending on the funding available and the estimated costs of maintenance it may be possible to create more than one contract. As discussed above, the use of more, smaller contracts can be a desirable aim since it will have the result of providing experience and training for more than one contractor.

The road package(s) and consequent maintenance costs need to be sized to suit the expected bidders.

#### 4.3.7 The Contract

The form of contract for initial PBM works should reflect the abilities of the target contracting group. This is especially important where that group is the local industry.

The World Bank document<sup>8</sup> seems to be the basis for most PBM contracts undertaken by MDBs but is really more suited to international bidding. Where the local industry is less sophisticated, then attention should be given to the possibility of creating simpler documents with less complex specifications and penalty procedures and simpler and more clearly spelt out obligations. This will require a combination of technical consultant and local legal expertise.

The extent of initial road condition upgrade works should be well-defined in the contract documents or in accompanying condition surveys provided to bidders; the form of contract should either provide for a separate scale of remuneration whilst these works are accomplished, or should make clear that contractors will be required to finance the initial costs through augmented rates for overall maintenance.

It is recommended that, particularly in a pilot project contract, there should actually be a formula to pay for initial costs. A possibly simple formula might involve the tender maintenance rate per kilometre per month during the first year being set at some multiple of the rate for the remainder of the contract period. The multiple would be determined by the Agency on the basis of cost estimates and fixed in the bid document. Different multiples and durations might be set for different road sections based on the assessed costs and condition.

Where it is not considered possible to implement PBM without some element of more formal improvement, the worst of the selected road sections might be considered for upgrading through a Periodic Maintenance intervention as a part of the PBM contract

<sup>8</sup>-"Sample Bidding Documents; Procurement of Works and Services under Output and Performance-based Road Contracts"

Simple Periodic Maintenance procedures can often be reduced to a set series of operations:

- Repair existing pavement
- Overlay
- Repair shoulders
- Renew pavement markings
- General cleaning and reshaping of side drainage
- General overhaul of safety features - mainly guardrail
- Minor repairs to drainage structures
- Clean and tidy RoW.

### 4.3.8 Allocation of Risk

There are always risks when works are to be undertaken and these risks must be carried by one of the parties or apportioned between them. One of the objects of PBM is to allocate many of the risks presently carried by the Agency to the Contractor on the basis that, since he is now in a position to decide how and when works shall be executed, he is better able to assess and minimise these risks. However, it is no good allocating risk to the Contractor if such an allocation will cost the Agency more than if it carried the risks itself.

The risks involved in a PBM contract can be loosely categorised as physical risks, contractual, and financial risks. The extent to which these risks are divided between Contractor and Agency depends on the experience of the parties in PBM and the nature of the roads to be maintained and is fixed primarily by the provisions which the Agency writes into the contract document. Additionally, the Contractor may perceive certain elements of financial risk outside the contract related to his own project financing requirements. The main areas of risk are indicated in the following table and discussed further below.

Risk	Allocation of Risk
Emergency works - major unforeseen physical works	A
Physical works (cost, amount and timing)	C
Other physical unforeseen works	A
Asset management	C (A)
Price escalation	A (C)
Traffic and axle load variation	C (A)
Site access and 3rd party activity	A (C)
Legal and regulatory changes	A

A = Agency risk; C = Contractor risk; A (C) = Agency carries major risk, Contractor carries minor risk

The allocation of risk indicated in the table is appropriate to an initial or pilot contract where it is important to provide the inexperienced Contractor from excessive risk, or risk due to short contract duration.

### 4.3.8.1 Physical Risks

This refers to the Contractor undertaking a PBM contract with the risks of becoming involved in works of a magnitude greater than that which he had foreseen in his costing.

The works of Routine Maintenance are visible and readily assessed; they will vary from road to road depending on present condition. The risks for the Contractor come in forecasting events beyond the normal and providing for them in his costs. Emergency works' provisions and similar Bill of Quantity (BoQ) provisions, as already discussed, are a means by which the Agency takes over risks arising from extreme or unforeseen events. These provisions are an element in the PBM contract where Bill of Quantity items covering certain types of works associated with potential risks are provided. The Contract specifications will describe the events which constitute Emergency Works, defined by the extent of the event and/or by the type of remedial works which would be required; any remedial measures required under these definitions will be paid as additional works using measurements of work done and paid using BoQ items and rates.

A PBM contract with an ad-measurement element such as this is usually called a Hybrid contract, where the BoQ works element is greater than might be required to cover only the truly exceptional risks.

The Hybrid contract provides a means of taking a standardised contract and calibrating the risk allocation between Agency and Contractor, simply by adjusting the size and nature of the BoQ elements. A PBM contract in a well-developed PBM contracting environment with long, multi-year contracts executed by experienced contractors, might include Emergency Works covering only the effects of a major flood and landslide events, whereas a shorter, initial pilot project, aimed at contractors with no PBM experience, might include the Emergency Works triggered by much smaller floods and landslides, and could also include much of the snow and ice clearing operations of the winter maintenance phase.

The effect of most risk events varies very clearly with contract duration. Longer contracts present less risk for contractors whilst enabling them to actually carry more of the risks.

#### Intervention times as a function of maintenance standards

Many maintenance operations, particularly those applicable for paved surfaces remain much the same regardless of traffic volumes. They are needed to preserve the pavement as a functioning asset. Where maintenance standards will show variations is in the permissible timing for interventions.

A lower standard of maintenance, for example, will allow a Contractor more time before a pothole must be repaired, but it must still be repaired since one function of the pavement surface is to prevent the ingress of water. The presence of the pothole affects traffic as if there is a lot of traffic the impact (and cost) is greater, whereas if there is little traffic the impact is smaller. The economics dictate that the pothole should be repaired quickly in the high traffic volume case but that there is no hurry, as long as there is no consequential pavement damage, as in the case of low traffic volume.

In essence, the shorter the contract, the more risks it is appropriate for the Agency to carry.

### 4.3.8.2 Contractual Risks

There are a variety of non-physical risks which are customarily dealt with under the terms of the contract and have the effect of allocating the risks to either Client or Contractor.

#### 4.3.8.2.1 Price Escalation

It would be unusual to contemplate a contract of three years or more duration that did not include a price escalation clause of some sort. The Contractor has no control over the variation in prices of the basic materials, plant and labour on which his works depend and, just as a normal admeasurement contract (certainly where duration exceeds 12 months) includes price escalation, so should a PBM contract. The mechanism would normally be applied from the end of the first year of the contract.

Depending on the precise formula used and on the indices selected, the contract can be framed in such a way that the Agency effectively carries the full risk of price escalation or escalation can be distributed between Contractor and Agency. The usual approach would be for the Agency to shoulder, roughly, the full cost of escalation from the end of year 1; this has the effect of making the Contractor responsible for escalation prior to that date. The rationale for this approach is that it is reasonable for the Contractor to be able to make an estimate of near-term escalation and also that much of this near-term escalation may not affect the Contractor since he will already carry equipment, spares and some materials in his inventory.

#### 4.3.8.2.2 Traffic Volumes/Axle Loads

In the initial project data, the Agency should have provided the Contractor with details of traffic, in terms of both vehicle numbers and axle loads, LoS, together with an estimate of annual traffic growth.

Pavement maintenance is primarily affected by axle loads, while pavement surface markings and shoulders are affected by traffic volumes. The overall difficulties of working on the road are also a function of traffic volumes. Hence, the traffic data for the various road sections within a maintenance contract are important.

The contract will normally include a formula allowing for increases in the Km/month maintenance rates for roads where traffic and/or axle loads increase substantially beyond the levels and rates given in the contract data.

To give effect to a mechanism of this nature, either the contract must include the necessary provisions for monitoring both traffic and axle loads or the Agency must have in place a reliable means of monitoring outside the contract. In this case the means of monitoring should be open to the contractor's inspection since it may affect his remuneration.

#### 4.3.8.2.3 Access to the Site/Third Parties/ Utilities

In order to carry out maintenance operations efficiently and economically, the Contractor requires and is entitled to unrestricted access to the site. Where the Agency is aware in advance of factors that may impede this access, then details can be given in the Contract Data and the Contractor is required to make allowance in his costings. However, there are many instances where access problems, and subsequent remedial works problems, arise which were not foreseen at the tender stage. Perhaps the most common problem is that of utility companies opening up the road surface, without warning or permission, perhaps interfering with the Contractor's activities, and then executing substandard remedial works which then add to the Contractor's maintenance workload.

Such problems can either be dealt with through the Emergency Works provisions, the Agency then taking all risk, or alternatively, under a system whereby the lesser occurrences fall to the contractor's account and only major problems are classed as Emergency Works. What should be avoided though is turning PBMC into a perpetual Emergency Works. As the experience with MAC/EMAC/ASC contracts in UK shows, the best way to avoid this situation is to have contract management teams that merge representatives of both the Contractor and the Agency/Client and who work as partners, rather than as "adversaries".

#### 4.3.8.2.4 Legal and Regulatory

When the Agency reimburses the Contractor as a result of legal and regulatory changes occurring after contract signature this leads to significant extra costs that are specific to the service provision. A general change in law (taxes for example) will not lead to compensation for the Contractor.

#### 4.3.8.3 Contractor's Financing and the Banking System

Although at first sight the question of availability of finance for Contractors would appear to be a Contractor's risk, it is in fact of importance to the Agency. There will be considerable problems in securing tenders for a PBM if the local banking system is not prepared to offer the necessary finance for contractors to implement PBM contracts.

However, this risk is very limited since it will only apply to Pilot projects that require significant initial works which should be avoided in most cases other than in Rehabilitation contracts.

The Contractor requires his bank(s) to provide both working capital and also to arrange the necessary Tender, Performance and Advance Payment Guarantees. Although this is common practice for Contractors working with the public sector, if the local banking system cannot or will not meet these demands there are substantial problems in placing the works with local contractors. It is desirable that the Agency ascertain, before proceeding, whether such problems exist and, if they do, what reassurance the banks will require in order to proceed.

### 4.3.9 The Timeline for a pilot PBM Contract

In considering the construction and implementation of a pilot PBM project, attention must be paid to the timing and the amount of time likely to be taken in the preparatory stages.

Commencing with the need for possible legal and regulatory changes and allowing reasonable times for the procurement of TA services as well as the actual PBM procurement, the time required for the implementation of even a 3-year pilot project could easily run to a total of four years.

	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4												
1st generation contracts (3-year pilot PBMC, preferably hybrid and routine maintenance only for 300-500 km)																
Enabling legal and financial conditions to introduce PBMC	■	■														
Procure Initial TA		■	■													
Develop Maintenance Standards				■												
Assess local Contracting and Consulting capacity				■												
Assess Roads Generally				■												
Preparation of templates for PBM pilot project for routine maintenance				■												
Data collection for preparation of PBM pilot project for routine maintenance				■												
Selection of pilot areas for PBM pilot project for routine maintenance				■												
Preparation of bidding documents for PBM pilot project for routine maintenance					■											
Procure Project Management TA						■										
Training for potential bidders							■									
Procurement of pilot PBM contracts							■	■								
Pre-bid workshop								■								
Contract award for pilot PBM contracts									■							
Implementation of pilot PBM contracts										■	■	■	■	■	■	■

### 4.3.10 Procurement

The key features of the procurement process are twofold:

- The regular procedures of invitation, prequalification, tender and contract award
- The additional need to ensure that interested contractors are educated in the needs and intricacies of PBM estimating, tender preparation and execution.

Appropriate tender documentation will be prepared with the help of the TA consultant. Where the Agency looks for the involvement of local Contractors, the use of the two-stage tender (involving prequalification in the first stage) is highly desirable since, in addition to the advantage of being more selective in choice of tenderers, it offers considerably greater opportunities to interact with potential tenderers for training and education sessions and also enable pre-qualified tenderers to spend more time in preparing well the main/key elements of their tender.

This question of contractor training is, perhaps, one of the most important aspects of the procurement period. In many countries, securing an audience of interested contractors for extensive training sessions on the details of PBM is simply not possible. It is only when the prospect of an actual contract is held up that the interested contractors come forward and can be clearly identified. The procurement process should make attendance at several training seminars as well as pre-qualification and pre-bid meetings compulsory for would-be bidders. Even though they will frequently be unwilling to admit it, most contractors know little of a PBM where it is not already in use, and this procurement period may be the only opportunity to ensure that the local bidders receive some grounding in the proposed methods.

During preparation of a pilot PBM contract in Albania, only one seminar for contractors together with a pre-bid meeting largely devoted to PBM techniques were held. Contractors subsequently said they needed more instruction before bidding.

### 4.3.11 Supervision and Control

The Agency must exercise a supervisory function to confirm that the Contractor is fulfilling his obligations. To do this, the Agency appoints a Project Manager (PM) who is both responsible for checking that the Contractor is compliant with the contract and who is also the principal link between Contractor and Agency.

The PM certifies, on the basis of comprehensive site checks and control checks on the contractors quality control/laboratory, that the standard of Routine Maintenance works is acceptable and on this basis the Agency pays the Contractor the contracted amounts due. If the PM identifies work which is not acceptable or faults which have not been rectified in accordance with the specification, the contract contains provisions for deductions to be made from the contractor's monthly payment and the PM certifies these penalties.

Where abnormal works are undertaken under the Emergency Works' provisions these are measured in accordance with the terms of the contract and paid for at the unit rates tendered by the Contractor. Such works have to be executed to specified standards, just as would have been required under a traditional admeasurement contract.

If the contract has been designed with a large proportion of work to be executed at unit rates (that is, the Agency is carrying a high proportion of the contract physical risks), then provision for this needs to be made in the supervision arrangements since the PM's staff will need to be proportionally higher than would otherwise have been the case.

The use of automated systems, such as Road Weather Information Systems (RWIS) should be encouraged whenever possible. As an example from the implementation of a pilot PBM project in Serbia shows, the use of RWIS reduced the consumption of de-icing material for winter maintenance by about 50 per cent.

## 4.3.12 Incentives and Penalties

### 4.3.12.1 Incentives

While it is common to talk of incentives for contractors, it is actually not easy to incorporate them into the relatively simple contracts that will form the basic initial steps into a PBM.

The essence of the contract is that the Contractor undertakes to carry out certain tasks and the Agency pays him a set amount for doing so in accordance with the specified standards. Under normal circumstances, the Agency will not require the Contractor to do more than is required by the contract and, in any case, will not have the funds to pay him an “incentive” for doing so.

There is no explicit incentive for the Contractor in a basic PBM contract. The incentive is implicit. If the Contractor can, through more efficient working or through innovative methods, save money then this is reflected in increased profits.

In the long term, where the contract places responsibility on the Contractor to control roughness, for example, the contract will have an allowable rate of roughness deterioration. If the Contractor is able to control this and ensure that roughness is lower than the contract has allowed for, then there will be a VoC saving. In this situation there is a case for providing some form of cash incentive for the Contractor to do better than the contract limits. This would require a sophisticated approach with an understanding within government that savings were being made at the national economic level through the VoC savings which justified the additional funds being made available to meet the Contractor’s incentive payments.

### 4.3.12.2 Penalties

The contract has to include various forms of sanction on the Contractor if he fails to carry out his maintenance function properly in a timely manner. Most maintenance operations are controlled by the time which is permissible between a fault occurring (or being identified) and the fault being rectified. Failure to carry out rectification/remedial works within the permitted time will attract a penalty. Different contracts express the penalty in different ways and, especially for initial contracts, the penalty regime may be varied to cater for the Contractor gaining experience; for example, a limited number of faults may be allowed, penalty free, in the first year with the number being reduced in successive years.

Penalties may be calculated in different ways; the World Bank document considers each fault equivalent to a length of road for which no payment will be made in the month it occurs: the Serbian pilot contracts used a system under which each fault attracted a number of demerit points with a set penalty value per point. In all cases there are limits on the total penalties allowable, with the Agency having the option to consider the Contractor in default if the limit is exceeded. In the Serbian case, the limit reduced in successive years.

## 4.4 After the Pilot - The Way Forward

### 4.4.1 The Expansion of a PBM

Following implementation of a successful pilot project, the Agency will, presumably, wish to press on with the introduction of a more widespread PBM.

As already noted, it is likely that the pilot project contracts will have had to make some provision for initial repair works and the measures written into the pilot contract documents can be expanded to cover the wider requirements of a larger PBM maintained roads system.

In Albania, an initial pilot project comprising four contracts for 250 kilometres of national highway maintenance with some initial improvement works was concluded satisfactorily for three of the contracts in 2012. In 2016, this had been expanded into the tendering of four international contracts covering some 1,500 kilometres and 75 small local contracts covering about 2,000 kilometres, to provide PBM maintenance for the whole of the national network.

### 4.4.2 The Inclusion of Periodic Maintenance

It has been noted above that Periodic Maintenance might need to be included in an initial pilot project. Even if this is not the case, if it is the Agency's intention that Periodic Maintenance should become a part of the PBM system, then there is a good case for including periodic elements in the succeeding tranches of PBM contracts.

Periodic Maintenance is likely to require more quality control than straightforward Routine Maintenance, particularly asphalt surfacing material and laying standards. This additional level of control will require additional supervisory effort from the PM team and needs to be allowed for in the team make-up.

Although paid for on the basis of a set rate per unit length, the periodic work will require more stringent control of standards of workmanship and materials with use being made of a standard roadworks specification for this purpose.

Payment for Periodic Maintenance operations is best made on the basis of progress achieved using some simple formula, such as 80 per cent of the rate payable per kilometre for completed asphalt surfacing and the balance of 20 per cent payable for each kilometre certified as complete by the project manager. An arrangement along these lines keeps payments reasonably in line with contractors expenditure and reduces the need for expensive interim financing.

### 4.4.3 Execution of Rehabilitation

As the Agency's familiarity with PBM methodology and versatility grows and as the capability of its contracting and consulting industries improve, it will find that it is possible to extend the range of PBM activities to include not just Periodic Maintenance but also full-scale rehabilitation.

Rehabilitation differs from Periodic Maintenance, both in the depth and complexity of the operations involved and in the fact that it will require significant design capability. This design requirement will frequently require the Contractor to take on a consultant as either a partner or a sub-contractor. From the Agency's perspective, the preparation of the contract will be more complex, requiring a comprehensive set of requirements which the design is required to fulfil. These will include such elements as geometric design parameters, safety parameters, structure requirements, design traffic loadings, land acquisition limitations and so forth.

By taking responsibility for the design and construction, the Contractor is able to use the methods which suit him best and to adjust the alignment to suit his perceptions of the most economical construction methods.

In 2014, Georgia undertook a 220 kilometre performance-based design and build road rehabilitation. The contractor was given an old, existing design for the road to form design parameters and act as a basis for his tender. He elected to change pavements from flexible to concrete and to move major bridges, of his own design, from planned locations to new alignment to facilitate construction.

Rehabilitation projects may be let as standalone projects, as construction followed by prolonged periods of maintenance or as elements in larger PBM contracts. These contracts can be structured under a PPP model where the Contractor was repayed in the long term by the Agency for the cost of the rehabilitation based on the fact that the Contractor meets performance requirements. It requires a much more detailed risk allocation, which addresses risk in the long term and results in a bankable contract that the Contractor will use to raise financing. However, PPPs are not part of the scope of this paper.

# 5. Key messages to the EBRD and road authorities in transition region for the future

The PBMC is a useful delivery model for governments to provide road services. It demonstrates savings and efficiencies in the long term, but requires careful definition of the strategy and a set of enable conditions being met.

The long-term strategy starts by launching a pilot simple project and work for warranting other long-term institutional reforms during the implementation of the pilot stage. The strategy should also address market reform and government capacity.

Starting up the PBM industry is challenging. The trade-off is between small contracts for building local capacity that may not generate a lot of value for money initially and large contracts that could attract international players (but may exclude local contractors).

Institutional factors, such as the legal framework, secured funding, political will and the capability of the Road Agency are required factors without which it makes little sense to initiate a PBM programme. In summary, the minimum enabling factors needed for its success are the following:

- **Minimum legal framework** – multi-annual contracting, budgeting, contract classification and procurement laws that allow for some level of dialogue with bidders.
- **Political will** – maintenance needs to be genuinely elevated in terms of “political” importance. This is also required for the commitment to fund adequately road agency and to support the initiative over the electoral cycle.
- **Road Agency capacities** – mind change from input-based to an asset management approach. This also includes a shift to securing long-term funding to ensure that the agency has the credibility to attract good contractors. Capacity can be built over time, with consultancy help and support from IFIs, but a minimum understanding is required from the outset.

- **Long-term funding** commitment for road maintenance – IFIs may help in initial stages of project preparation and capacitation, but ultimately it should come from public budget. Maintenance is a current cost that should not be financed in the long term.

Any Agency or Government considering implementation of a PBC for road maintenance should avoid the following when embracing the programme and especially the pilot project:

- Short-term duration of the contract – the duration should **not be less than three years**.
- Inadequate **choice of roads** in terms of remote locations and not-to-standard road condition.
- **Bundling rehabilitation with Routine and Periodic Maintenance** disproportionately when the rehabilitation component is too large (>30 per cent total payments).
- Transferring too many **risks to the Contractor**, as well as unreasonable risks such as inflation in the long term.
- Treating the Contractor as an “adversary” – rather than **building a partnership** (within the limits of the Contract).
- Launching a pilot PBMC without the Agency’s commitment to a roll-on PBM programme in case of the pilot’s successful implementation.
- Neglecting public opinion, which if addressed properly: i) could be one of the most powerful allies in ensuring successful and efficient monitoring; and ii) could create demand for road services that politicians cannot ignore.

Finally, do not get discouraged. The PBC model might result in a higher cost for the pilot project especially if compared with the status quo, but it is only in the long term when savings and efficiencies materialise that the industry develops and ensures true competition and partnership with the Agency.



# 6. Annexes

## Annex 1: An overview of innovative international contracting practices for road maintenance

Source: Pekka A. Pakkala, FRA

	In-house	Out-sourced	Activities included	Contract type	Contract duration	Contractor selection criteria	Area or corridor contracts	Quoted savings	Comments
<b>Alberta, Canada</b>		X	Routine Maintenance	Unit Hybrid	5, 6 & 7 Years	95% Price 5% Past performance	30 Areas	25%	Winter Maintenance Standby receives about 35% Lump Sum Payment
<b>British Columbia, Canada</b>		X	Routine Maintenance	Lump Sum	10 Years	60% Price 40% Other	28 Areas	10%	Line Marking & Lighting are not included. A single contractor can only win 4 area contracts
<b>Ontario, Canada</b>		X	Routine Maintenance	Hybrid (Lump Sum & Unit Prices)	7-9 Years	95% Price 5% Other	48 Areas	12%	16 Performance-Based Area Contracts Remainder - "Maintenance Outsourced" by the "Salesman Model"
<b>Estonia</b>	X	X	Routine Maintenance	Hybrid	5 Years New-7 Years	75% Price 25% Other	16 Areas	Up to 20%	Own in-house forces compete against private contractors. 63% of Maintenance is tendered
<b>Norway</b>		X	Routine Maintenance	Hybrid	4 Years	Lowest Price, Conforming Tender	107 Areas	20-30%	Client maintains most inspection
<b>Sweden</b>		X	Routine Maintenance	Hybrid	3-6 Years	98% Price 2% Other	136 Areas	20-30%	New Winter Maintenance Payment Scheme based upon actual weather conditions
<b>Finland</b>		X	Routine Maintenance	Hybrid & Lump Sum	3, 5 & 7 Years	75% Price 25% Other	85 Areas	Over 30%	New separate contracts for line marking, resurfacing and bridges are Long-term duration

	In-house	Out-sourced	Activities included	Contract type	Contract duration	Contractor selection criteria	Area or corridor contracts	Quoted savings	Comments
<b>Holland</b>		X	Different Activities	Lump Sum	1-3 Years	100% Price	Many Areas	30-40%	Future - Investigating MAC model from England and will adapt Holland Situation
<b>Australia (VIC Roads)</b>	X	X	Routine Maintenance	Lump Sum	2-3+1+1 Years	100% Price	About 50% of Network	Some	Competition between In-house and Private Sector. Still quite input based
<b>Australia Western, Australia</b>		X	Basically All	Lump Sum	10 Years	50% Price 50% Other	8 Areas	20%	
<b>England</b>		X	Basically All	Lump Sum (Unit Price for Undefined)	5+2 Years	25% Price 75% Other E-MAC is 100% Quality (Target Price)	14 Areas	Over 10%	Includes up to £500k worth of periodic maintenance (bridges or resurfacing). E-MAC is similar to "Alliance Model"
<b>New Zealand</b>		X	Routine Maintenance + All	Unit Price Hybrid Lump Sum	3+1 Years 3+1+1 Years 10 Years	Low Bid Weighted Avg. QPTO	24 Areas	10-15%	Still using about 50% Traditional Maintenance Contracts. Very small staff
<b>USA (NCDOT)</b>	X	X	Activity Based	Unit Price	1 Year	100% Price	Corridor	Unknown	Outsource those activity that are more efficiently done by Contractor or balancing work
<b>USA (MDSHA)</b>	X	X	Activity Based	Unit Price	1 Year	100% Price	Corridor	Unknown	
<b>USA (MNDOT)</b>	X	X	Activity Based	Unit Price	1 Year	100% Price	Corridor	Unknown	
<b>USA (DDOT)</b>	X	X	Basically All	Lump Sum	5 Years	50% Price 50% Other	Corridor	Unknown	Does not include major bridge rehabilitation

	In-house	Out-sourced	Activities included	Contract type	Contract duration	Contractor selection criteria	Area or corridor contracts	Quoted savings	Comments
<b>USA (VDOT)</b>	X	X	Basically All Proposed	Lump Sum Lump Sum	5 Years (New) 3+3+3	50% Price 50% Other 100% Price	Corridor	Unknown	Still basically in-house. Only 1 integrated contract (VMS). New Contracts planned for routine maintenance 3+3+3 years, with low bid
<b>USA (FDOT)</b>	X (about 20%)	X	40% Routine Maintenance 40% Salesmen	Lump Sum Unit Priced	7+7 Years Yearly	40% Price 60% Other 100% Price	Corridor	Unknown	Goal is to achieve 80% outsourced. Using a Maintenance Rating program (MRP) to measure performance. 10 years Rest Area Contract

## Annex 2: International best practice

### Example 1: Brazil

#### Key facts:

- More than 150 CREMA PBMCs executed between 2000 and 2008 covering about 30,000 km or 16 per cent of the Brazilian paved roads network, reaching one-third of the Federal network and more than 10 per cent of the states' network by 2010.
- CREMA PBMC rehabilitation unit cost of works were 25-35 per cent lower than traditional rehabilitation costs signed at the same period. Maintenance unit costs have been 34 per cent lower than the conventional maintenance unit costs.
- CREMA PBMC contracts executed between 2001 and 2006 on 5,000 km roads have reduced the number of tender procedures by a factor of 7, when compared to what would have been needed in the traditional approach.

The performance-based model adopted in Brazil introduced a number of radically new features as regards traditional management of contracts in the road sector in Brazil, including:

- lump sum/global prices contracts, instead of classic detailed input-based contracts, with an important transfer of responsibility in the design and execution of rehabilitation works to the contractors
- a remuneration based on contractors' performance to achieve predetermined outputs, instead of inputs admeasurements (means and material)
- an increased commitment of contractors to quality through self-control, in line with the ISO philosophy, instead of agency-led control.

The adoption of CREMA by the private sector has finally been successful with: (i) a high level of competition at the bidding stage, with in average of 14 competitors per bid and an average discount relative to the engineering designs estimates of 21 per cent, in line with the situation observed for traditional contracts, and (ii) overall better road conditions obtained at lower costs in CREMA than in contemporaneous traditional rehabilitation and maintenance contracts.

The CREMA final unit cost over a full 5-year rehabilitation and maintenance cycle has been 19 per cent lower than the rehabilitation and maintenance cumulative costs on 13 identified roads at the federal level, benefiting from separate contracts for rehabilitation works and maintenance services afterwards.

Under the traditional approach, many rehabilitated road sections were never followed by Routine Maintenance contracts, and when these occurred there was an average gap of 2.7 years between the end of the traditional Rehabilitation contract and the beginning of the traditional Maintenance contract. This break in servicing the road, resulting from the difficulties of road administrations in planning, bidding and financing civil works' contracts, has not occurred under CREMA.

Overall, better results with respect to visual distresses and the International Roughness Index (IRI) were usually observed on the road favorable to road sections maintained under CREMA.

Under a PBMC, maintenance services seamlessly followed rehabilitation works, without any need for the executing Agency to specifically plan the intervention or prepare specific bidding processes for contracting maintenance services. In addition, CREMA contracts combining rehabilitation and maintenance have been in place for considerably longer than the usual duration for traditional rehabilitation and maintenance. Contract supervision has been eased thanks to CREMA's simplified monitoring of the performance in executing the task and the auditing of Contractors' quality assurance processes.

Finally, the success of CREMA contracts allowed for a substantial increase in the government's commitment to road maintenance and rehabilitation, traditionally neglected among road investment programmes.

## Example 2: District of Columbia, USA

### Key facts:

- US\$ 70 million Federal aid-funded contract implemented in the 2000-2005 period.
- Rehabilitation and maintenance of 75 miles of the National Highway System in the District of Columbia.

This project was the first urban, performance-based asset preservation effort of its kind in the USA. Performance-based asset preservation aimed to rehabilitate and maintain the roadway, roadside, bridge, and tunnel assets, while reducing overall rehabilitation and maintenance costs by encouraging innovative, cost-effective, and flexible preservation strategies.

The 75 miles of the National Highway System (NHS) in the District of Columbia were heavily used by residents, commuters, businesses and tourists. The District's NHS infrastructure needed Routine Maintenance and timely preservation. The aging of the infrastructure and reduction in public sector staffing forced the District to look at alternatives, such as the DC Streets project, for timely preservation.

Assets covered by the project included tunnels, pavement, bridges, roadside assets (that is, curbs, gutters, sidewalks, retaining walls), traffic safety assets (that is, guardrails, barriers, attenuators, pavement markings, signs, lighting), roadway and roadside cleaning, drainage structures, roadside vegetation, pedestrian bridges, weigh-in-motion stations, and snow and ice control.

The DC Streets project has allowed the District of Columbia Department of Transportation to both improve the condition of the assets on the NHS and allocate their in-house maintenance resources to local neighbourhood streets. The effort has also provided local small businesses and residents with increased opportunities for employment.

The project team measured performance using the performance standards on a daily, monthly and annual basis. On a daily basis, the project partners surveyed the system for deficiencies; the Contractor maintained a daily log of activities as well. The monthly review was a subjective windshield survey, while the annual review was an objective engineering evaluation. Both time critical (that is, timeliness of response) and condition-related performance measures were considered in the evaluations.

The monthly evaluations were video-recorded and distributed on DVD. A report for each evaluation was also generated. These deliverables helped the Contractor plan and perform work, based on the deficiencies noted during the survey. Most annual ratings were performed with an approximate 10 per cent sampling rate. The data was used to evaluate performance against the appropriate performance standards. In an effort to enhance the NHS infrastructure by meeting or exceeding the performance standards, the project partners tracked the results of the project to date. For example, an overall and well-informed subjective score is computed monthly so the project team may adjust strategies or methodologies as needed. The evaluators assigned subjective ratings of good, fair, and poor at the maintenance element level.

A summary of the results through month 56 shows that there has been substantial subjective improvement over the course of time (Figure 1). The worst month was month 3, with approximately 70 per cent poor ratings. The best month was month 41, when 99 per cent of the ratings fell in either the good or the fair categories.

## Annex 3: Regional experience in the transition region – case studies and identification of key issues

### Albania

#### Key facts:

In the past, the Albanian Road Authority (ARA) implemented a pilot project for the introduction of output and performance-based road maintenance (OPBRM) contracts between 2009 and 2012 in two geographical regions, Tirana and Kukes. The four contracts (two contracts in each region) covered approximately 265.8 kilometres of national roads. The main objective was to avoid a premature deterioration of these roads and to provide road users with a level of service which is adequate for their needs, whilst at the same time reducing the cost of maintaining these service levels.

Currently, ARA is in the process of launching internationally targeted bids, using Output and Performance-Based Maintenance Contracts procedures, for four contracts, which will include 1,332 km of the primary and primary secondary roads.

The Government of Albania was and remains very keen on improving the efficiency of road maintenance through implementation of a PBMC. There are no concerns about the long-term support of the Government for long-term road maintenance and PBMC.

Albania enjoys strong IFI support for road maintenance and safety programmes, including PBMC. The present four major PBM contracts are being funded through IFI.

#### Key challenges

During the implementation of the pilot Output and Performance-Based Road Maintenance Contracts in the Kukes and Tirana areas, the following challenges were identified:

- Awareness seminars, provided to the contractors at the pre-bid meeting, did not fully address and describe the risk, responsibilities, scope of services, performance standards and performance levels and penalties for non-achievement of monthly performance standards, so the contractors were inexperienced to do this type of road works using PBMC procedures.
- Most contractors under-estimated the scope, quantity and cost of the works during the bid preparation phase.
- Contractors failed to raise issues relating to the extent of the works and road condition, as described in the bidding documents during the pre-bid phase.
- The whole PBM process was a new experience for contractors who were on a steep learning curve.
- Contractors had problems in coming to terms with new ways of working and generating the commitment and belief required to get through the early part of the contract.
- Contractors' site management was not adequate.
- Contractors' failure to provide skilled and experienced staff to perform the roles required under the PBM concept.

#### Required conditions that should be put in place to facilitate further development of a PBM

- PBM contracts require more preparation than traditional FIDIC contracts and the scope of works and services were not clearly understood during the planning and bid preparation stage.
- There should be no contradictions between the bidding documents and the specification.
- Performance criteria should cover all aspects of the contract but take into account the fact that different roads within a contract area might require different service levels, that is, road condition, terrain, availability of materials, capacity of contractor, traffic volume and composition and environment.

## Kazakhstan

### Key facts:

Kazakhstan has no experience with PBM contracts to date.

Until now, there was a single service provider for maintenance of the national road network: RSE “Kazakhavtodor”. Currently it is planned that RSE “Kazakhavtodor” will be put up for privatization.

A system of payment/tolling for use on the national road network has been recently introduced. To date, 211 km is tolled. By 2020 it is planned for about 7,000 kilometres to be tolled. It is assumed that the fees charged will completely eliminate the need for additional financing. Thus, favourable conditions will be created for the implementation of PBM forms of contract on the toll roads.

### Key challenges

- Lack of market principles in the maintenance of roads.
- Usually contracts for maintenance of national roads are for not more than 1 year, which is not commercially attractive.
- The classification of types of work is rigidly fixed: major repairs, medium repairs, maintenance. This classification cannot enable conditions for the formation of the more flexible forms of contract implied by PBM.
- In Kazakhstan a quantitative method of measurement for contract performance and payments is applied, rather than quality indicators.
- There is no proper definition of LoS.
- There is no objective system in place for assessing the technical condition of roads.
- The Ministry of Finance does not consider road maintenance as a priority because these costs do not fall into the category of the development budget.

### Required conditions that should be put in place to facilitate further development of a PBM

- Increase the term of maintenance contracts up to 5 years.
- Legislate to allow the use of PBM format contracts.
- Change the system of financing from the basis of measurement of physical works executed to quantifying and meeting qualitative indicators of the road condition.
- Prepare standard technical specifications for contracts.
- Implement a road asset management system to objectively evaluate the technical condition of roads.
- Implement pilot sites for this form of contract for the transfer of experience in content, project management, planning etc.
- Together with the IFIs, work on the issues of development of technical specifications for these contracts and their pilot implementation.
- Institute a clear division of strategic and realizable functions between the Ministry and the national operator for the development and maintenance of roads - JSC NC “KazAvtoZhol”.

## Moldova

### Key facts:

Moldova has no experience with the implementation of PBM contracts. Preparation of a pilot PBM contract is underway – implementation is expected in 2017 at the earliest.

Routine road maintenance is carried out by 12 state-owned companies, organised regionally and operating on a measured works basis. Periodic maintenance is carried out by commercial companies through competitive tender, as well as on a measured works basis. However, there is no real competition in routine road maintenance as rates for Routine Maintenance works are imposed by the Ministry/State Road Administration. Therefore, road maintenance companies are barely breaking even.

### Key challenges

- Funding, in general, and for road maintenance in particular has been erratic in the last 1-2 years.
- The legal framework does not enable budgets to be approved for more than one calendar year, although 3-year budgetary frameworks are in place.
- No real experience or capacity in State Road Administration (SRA) to implement PBMC.
- Decisions are required regarding the future of contracting in general, the relationship between the commercial companies and the state companies and, ultimately, the proper privatisation of those companies.
- In spite of workshops and information-sharing through previous PBMC-related consultancies, a lot more awareness and training needs to be achieved with local Contractors.
- Although the Ministry of Transport and Road Infrastructure seems to understand positive aspects of and the need for PBMC, there appears to be a lack of enthusiasm/political will elsewhere in the Government (particularly the Ministry of Finance in particular).
- Further IFI support is conditioned by the Government of Moldova fulfilling commitments from previous loans.

### Required conditions that should be put in place to facilitate further development of a PBM

- Technical assistance and training for road Agency staff and for contractors.
- Promotional campaigns.
- Adoption of a market approach by the maintenance companies.
- High-level Government support for the PBMC concept, in spite of possibly expected higher initial costs.
- Continuous IFI support with technical assistance and funding.

## Morocco

### Key facts:

Morocco has no practical experience with the implementation of PBM contracts – two recent tenders failed. The country has launched Pilot contracts this year in the Agadir and eastern regions.

Limited experience with contracting out road maintenance in general – this work is mostly done in-house according to ‘public works department’ principles.

The first experiment of contracting out the Routine Maintenance by networks was in 1997. The second experiment was with contracting out road maintenance by axis.

### Key challenges

- Morocco has launched a PPP law on January 2015 but there is no specific law on PBC.
- The Moroccan regulation on contracts is based on quantities and the maximum contract duration for Routine Maintenance works of roads is just three years.
- No clear strategy or action plan.
- If contracting is to be based on a service level and not on quantities, then the selection of appropriate Performance Indicators and methods of measuring them are amongst the issues to be addressed.
- Decision makers see the costs of PBM as being higher than traditional systems.
- Need of additional funds for road maintenance.
- Generating an understanding of PBC within the road industry.
- Expertise and training of Road Directorate (RD) staff to handle PBM.
- A general lack of suitable staff/HR.

### Required conditions that should be put in place to facilitate further development of a PBM

- Suitable expertise to help the RD is required.
- Develop awareness of importance of Routine Maintenance through PBC among political decision makers.
- Organising seminars to deal with these issues.
- Sharing dialogue with partners (World Bank, EBRD, OIC, and other institutions).
- Sharing draft contract with Contractors' Association.
- Benchmark and share international experiences.
- Associate with consulting firms.

## Romania

### Key facts:

Romania has no experience in the implementation of PBM contracts. There is limited experience with contracting out road maintenance in general.

Several previous attempts failed (Sfantu Gheorghe, Covasna, Buzau, Sibiu), mostly at the tendering stage (no bids received or contract finally not concluded). In most cases projects were funded by the EBRD.

### Key challenges

- The Romanian Court of Audits does not accept that lump sum PBMC contracts are in line with Romanian legislation, as maintenance is not considered as an investment and therefore must be executed on a 'price for measured quantity' basis or on the basis of measurable physical parameters.
- In the current circumstances, a multi-year, performance-based contract requires a similar approach to that required for a design-build contract. That is, it requires a detailed design to be done twice: once for obtaining technical-financial parameters for investment from relevant authorities (required for building permit) and then the Contractor's detailed design.
- Problems with Procurement Law and Budgetary Provisions (unspecified).
- No offers received for previous tenders for Performance-based Contract for Management and Maintenance of Roads (PMMR)– bidders mistrust the Romanian legislative system.
- The Ministry of Finance sometimes undermines the PMMR by posing the dilemma; 'would it be part of the public debt or not?'
- Projects tried so far were perceived as being too small to attract the attention required to stimulate change and produce a favourable environment.

### Required conditions that should be put in place to facilitate further development of a PBM

- Enforcement must come from a single point that would strongly push for such type of contracts. Ministry of European Funds could be one such point as they have similar experience with enforcing projects funded through EU structural funds.
- Projects must be large enough in order to attract sufficient attention of key government agencies to change and enable implementation.

## Serbia

### Key facts:

In the past, the Roads of Serbia (Serbian Roads Agency - RoS) implemented Pilot projects for the introduction of Hybrid output and Performance-based Road Maintenance (OPBRM) Contracts between 2004-2008 in two geographical regions, Mačva and Kolubara. The two contracts each covered approximately 600 kilometres of national and regional roads. Contracts were completed successfully in spite of initial difficulties, particularly with winter maintenance. Substantial cost savings were achieved, particularly in winter maintenance.

Currently, RoS is in the process of preparing bidding documents using procedures for Output and PBMC for maintenance of a further 3,000 km of the national and regional road network.

### Key challenges

- Winter maintenance proved to be the weakest performing component of PMBCs.
- There was no immediate follow up with a new generation of PMBC following the successful pilot.
- The pilots incorporated substantial 'unit rate' elements in Hybrid contracts. These elements need to be reduced.

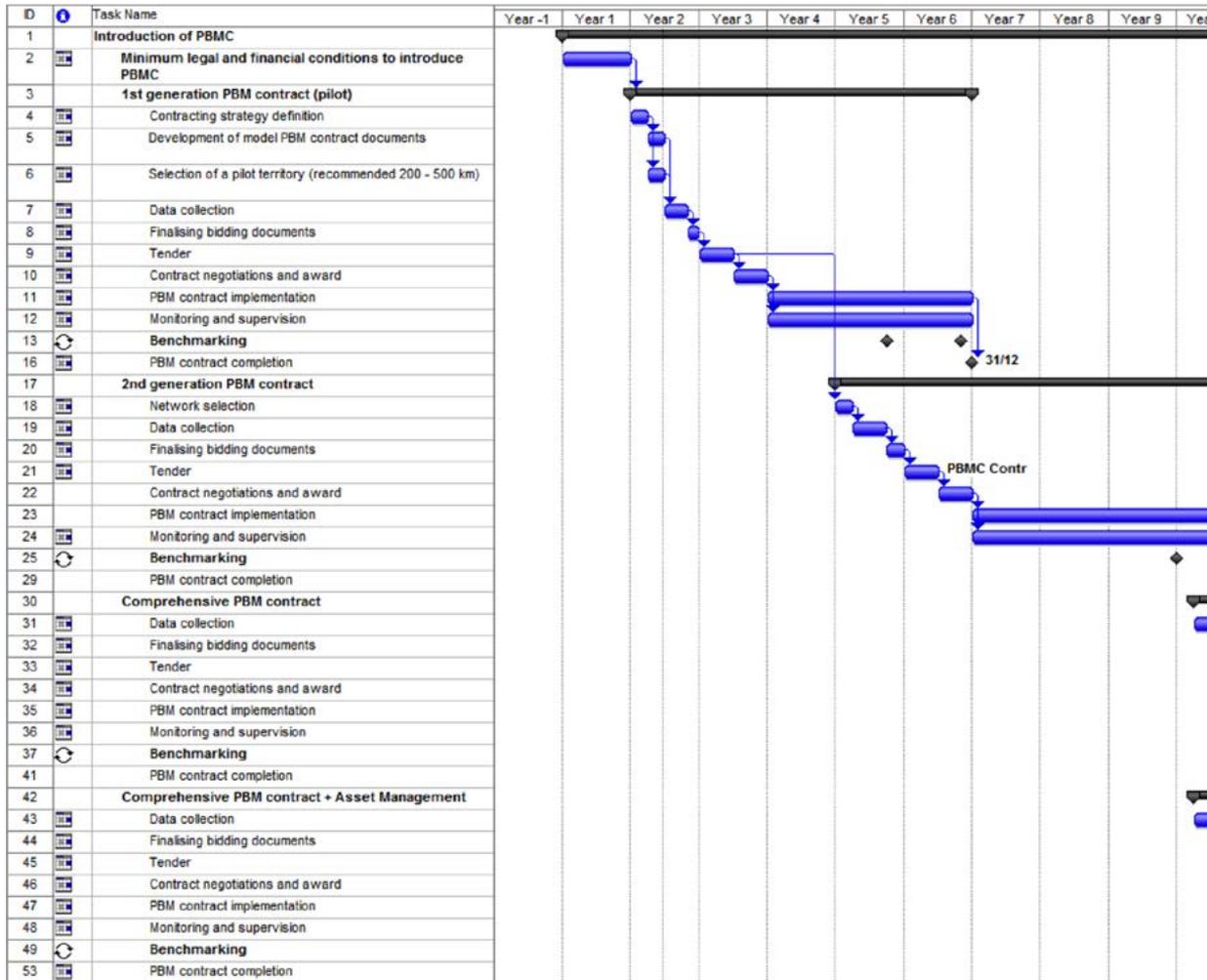
### Required conditions that should be put in place to facilitate further development of a PBM

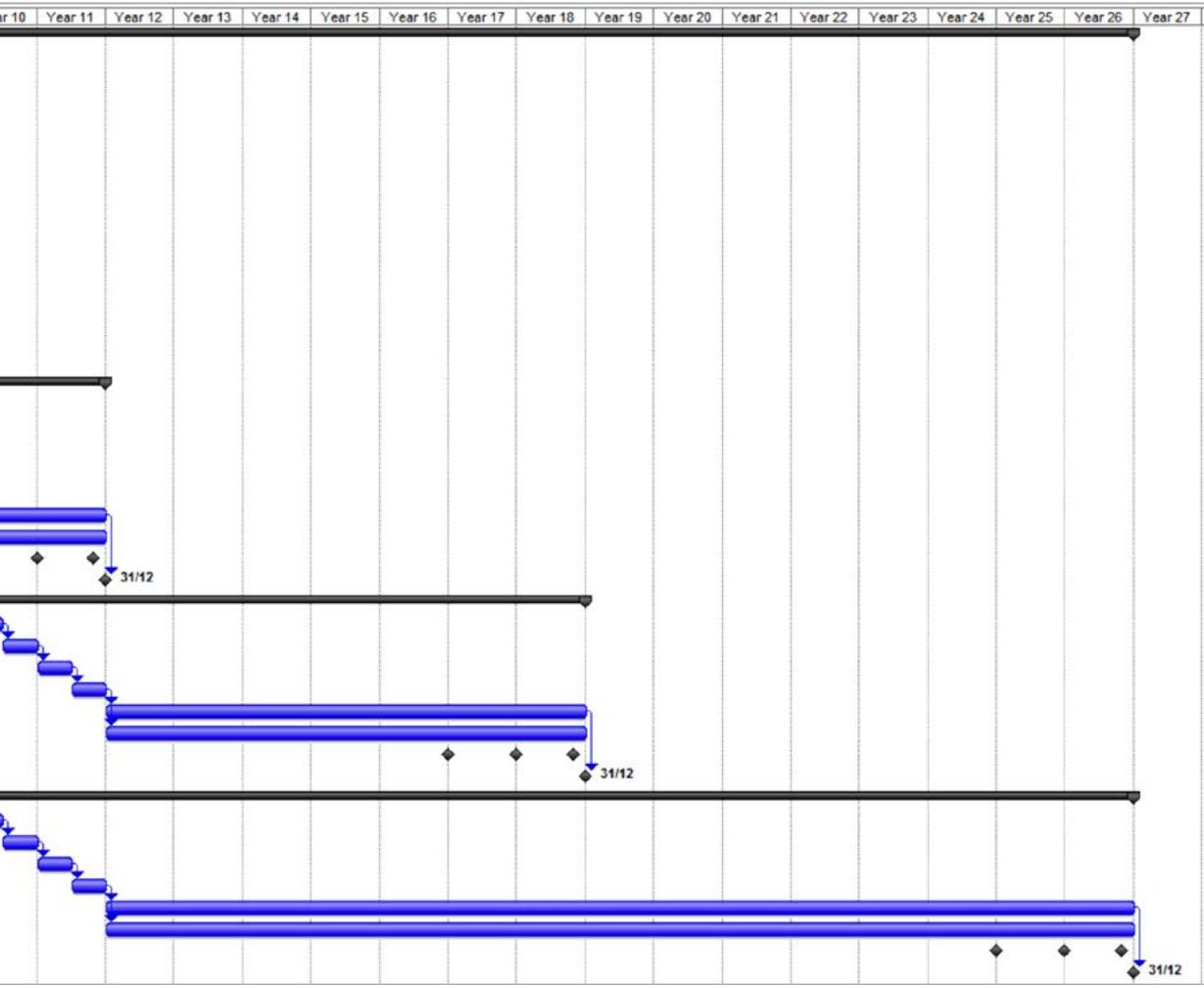
- Government commitment to continuing with PMBC/PBMC – in the case of Serbia it was lacking and until recently the PMBC follow-up did not take place.
- Hands-on involvement in balancing and adequately allocating risks between contractual parties.
- Strong IFI support for road maintenance and safety programmes, including PBMC/PMBC.



## Annex 4: Typical PBM programme Gantt chart

Source: Roughton International Ltd







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