

**Transferring road maintenance to the private sector:  
preliminary literature review and proposed study area for  
the project**

**by C C Parkman**

**Unpublished Project Report  
PR/OSC/135/98  
[Project No. R6889]**

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**PROJECT REPORT PR/OSC/135/98**

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Subsector:	Transport
Theme:	Reduce the costs of constructing, rehabilitating and maintaining road infrastructure and vehicle operation costs
Project Title:	Transferring road maintenance to the private sector
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## **EXECUTIVE SUMMARY**

The Department for International Development (DFID) project R6889 entitled 'Transferring road maintenance into the private sector' is being undertaken by the Overseas Centre of the Transport Research Laboratory. The purpose of the project is to identify the successful methods by which road maintenance might be procured by road administrations in countries with developing and transitional economies.

This report is the first output of the project and summarises the available literature on the subject and describes the proposed direction of the project. First, it defines the relevant terms which are in common use and then it summarises the various functions which are required in order to carry out road maintenance. Although there are a number of different approaches worldwide, it appears that most organisations are now considering their activities in terms of three fundamental functions - that of the 'client' or 'owner', that of the 'manager', and finally that of the 'contractor' or 'service provider'. This functional separation is generally reported to be beneficial.

The various methods of carrying out the three functions, by either private or public sector, are then summarised. The types of contract which are used are for the various organisational approaches are outlined. It is noted that the fundamental issue is the policy which a road administrations adopts concerning allocation of risk between public and private sector. For countries with a more highly developed contracting industry, a greater allocation of risk to the private sector is apparent.

Trends in the use of different approaches are described and the report concludes with recommendations on the direction of the project. A final project report is proposed which will address the issues which a road administration should consider in order to achieve best value for money in its road maintenance activities by use of either the public or private sector.

# **TRANSFERRING ROAD MAINTENANCE TO THE PRIVATE SECTOR - LITERATURE REVIEW AND PROPOSED STUDY AREA FOR THE PROJECT**

## **ABSTRACT**

Road administrations have made increased use of the private sector in recent years in order to procure road maintenance services. This report considers the extent and nature of such changes by reviewing currently available literature on the subject. The different functions required to manage a network are described and the organisational approaches that have been adopted to achieve this are summarised. The different types of contract in use are summarised and discussion then follows on trends in procurement of road maintenance. The report concludes by proposing a direction for this study by suggesting how a report might be useful to inform agency opinion on the subject.

## **1. INTRODUCTION**

Recent years have seen a significant change in most countries to the means by which road networks are maintained and this has reflected broader political and economic developments which have occurred. Increased involvement of the private sector to carry out road maintenance management activities has mirrored a general desire to reduce the involvement of government in 'operational' functions and to concentrate on the 'higher' functions of a client 'enabling' organisation (McGillicuddy, 1996).

This report is the first output of a project which seeks to assess the success or otherwise of the recent changes that have occurred, specifically considering the issues involved if a road administration is considering transferring road maintenance into the private sector. Relevant publications have been reviewed of worldwide experience to date, and the report concludes by summarising the proposed direction of the project. A summary bibliography is included as an appendix.

## **2. DEFINITIONS**

A wide variety of definitions are in use worldwide in the area of road maintenance management. The following terms are those used most often, and their definition for the purposes of this review paper are given.

### ***Routine maintenance***

On-going maintenance work which involves both maintenance of the pavement and off carriageway items. It is normally funded out of the recurrent budget, is carried out at intervals of less than one year, and includes such items as road sign repair, vegetation control, drainage maintenance, pothole repairs and crack sealing.

### ***Periodic maintenance***

Maintenance work which is carried out at intervals of several years and is funded from either the recurrent or capital budget. It usually refers to resurfacing works such as thin asphaltic overlays

and sprayed bitumen surface dressings. It sometimes also refers to thick asphaltic and granular overlays, which improve the structural integrity of the road, but these are more often referred to as pavement reconstruction or rehabilitation.

***Emergency and winter maintenance***

These works cannot be estimated with certainty in advance and funding typically comes from special or contingency funds, or sometimes the recurrent budget. Examples include repair of washouts, clearance of debris, salting and gritting and snow removal.

***Direct labour organisation (DLO)***

The organisation within a client road administration which carries out road maintenance work on site. If subject to competition, then the DLO will compete with contractors to perform the work.

***Contractor***

A private organisation which performs work for client road administration under contract.

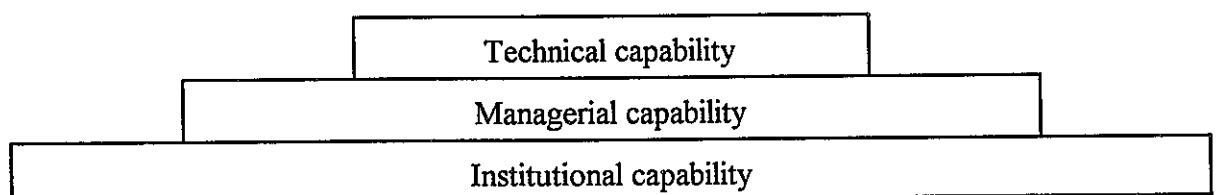
### **3. FUNCTIONS REQUIRED TO MANAGE ROAD MAINTENANCE**

#### **3.1 The importance of effective forms of procurement for road maintenance**

The importance of good road maintenance cannot be overstated. For most countries, there has been a gradual increase in awareness of the need to make better use of road sector budgets in maintaining the existing networks. This has been stimulated by the fact that funds have usually been inadequate to perform the optimum maintenance required and so initiatives to improve both the effectiveness ('doing the right work') and efficiency ('at the best value') of road maintenance operations have been sought.

Analyses have been performed to determine the constraints which prevent organisations responsible for road maintenance from performing their tasks satisfactorily. Summaries of existing situations and proposals for reform have been carried out for individual countries and on a more global basis (Heggie, 1995). A useful summary of the relevant issues and their comparative importance in developing countries has suggested that they fall into three major categories (Brooks et al, 1989). This is illustrated in Figure 1.

**Figure 1**  
**Interdependence of institutional, managerial and technical capabilities**



The message is simple. For any tier of the pyramid to function properly, the underlying tiers must be structured to provide adequate support. If this is not the case, then any initiatives to improve

capabilities in the higher tiers will be constrained by the requirement for more fundamental change.

### 3.2 The different functions required for road maintenance

One of the important factors which contribute to the successful operation of a road network is the need for those organisations responsible to have clear objectives. Organisational procedures and structures are needed which promote the ability of organisations to achieve these objectives. This has led in recent years to a clearer definition, worldwide, of the functions of a road administration. A general consensus seems to have arisen that there are broadly three functions, or roles, which traditionally have been carried out by road administrations. The boundaries between the three functions often become rather blurred, and there is therefore sometimes a possible subdivision within each function, reflecting the 'higher' and 'lower' sub-functions which are nearer to the function above or below. The three functions are:

- 1) 'Owner' or 'Client' role. That function of an administration which makes fundamental decisions and develops policies about the nature of provision of road transport.
- 2) 'Manager' role. That function of an administration which implements policies of the 'Owner' by translating policies into packaged items of work.
- 3) 'Contractor' or 'Service provider' role. That function of an administration which carries out the works packages as defined by the 'Manager'.

These three roles and the typical tasks which are carried out are expanded in Table 1, with specific reference to road maintenance.

**Table 1**  
**The different functions required for road maintenance activities**

Function	Typical task
'Client' or 'Owner'	Defining network to be managed Defining how network will be managed Setting standards for network Selecting organisations to perform work
'Manager'	Selecting service providers Administrating contracts Developing works programmes
'Contractor' or 'Service provider'	Road maintenance operations

### 3.3 Functions and capabilities

By combining the functions required to achieve road maintenance with the capabilities required, a useful framework can be developed to define the activities affecting effective implementation



of such work. This is illustrated in Table 2.

**Table 2**  
**Functions and capabilities required for road maintenance**

Function	Capability		
	Institutional	Managerial	Technical
Owner	Reliable revenues	Identify appropriate forms of procurement	Understanding of maintenance methods
Manager	Reliable payment mechanisms	Development of contract documents Programming of works Packaging of works	Identification of maintenance needs Development of appropriate specifications
Operator	Access to capital financing Reliable payment	Programming of works Resource scheduling	Appropriate maintenance techniques

From the above table, it can be seen that the procurement of road maintenance is essentially a managerial issue. In order for the chosen form of procurement to be successful, adequate institutional measures will need to be in place. Also, technical improvements will be less effective if road maintenance is not procured in the most effective manner.

#### **4. ORGANISATIONAL APPROACHES TO CARRY OUT THE DIFFERENT FUNCTIONS**

It is difficult to develop a system of classifying the wide range of approaches in use worldwide as there is so much variation and any aspects are the result of the unique development of each particular country. There also tends to be considerable variation even within countries, depending on the type of maintenance carried out as well as the hierarchy of road network being considered. Nevertheless, broad similarities do exist and the various generic approaches which have been used to carry out the different functions as outlined above are described below. Brief outlines of the reported advantages and disadvantages of each are also given. The reasons for the number of different approaches are then discussed in the following section.

## 4.1 Traditional 'owner does all' approach

Owner
Manager
Service provider

This has been the common 'de facto' arrangement that has evolved as countries have developed to date. The relevant government ministry takes responsibility for the management and provision of all aspects of road maintenance and staff within the organisation have usually had to consider a number of objectives. For example, a senior foreman is responsible not only for identifying the requirements for maintenance on the road, but is also responsible for controlling works gangs as they carry out the maintenance work. However, with the increasing tendency in recent years to the use of contract maintenance, the organisational structure of the administration has often been revised to reflect the three functions so that the roles of staff have become more specific and focused on their appropriate objectives.

For works which can be more easily formulated into a traditional works package, such as periodic maintenance overlays and reseals, there has been a greater tendency to contract the 'service provider' function out to an external organisation, as described in section 4.2. However, for works which are more difficult to specify in terms of reliable estimates of quantities and nature of work, such as routine and emergency maintenance, the above arrangements have dominated.

Examples of such an approach are:

- common 'de facto' arrangement in the majority of road administrations worldwide

The following advantages of such an approach have been noted:

- long term knowledge of network retained by client
- ability of client to respond to emergencies and unforeseen events more flexibly
- a public service ethos 'for the greater good' ensures that works are carried out with the right balance of quality versus cost from a long term perspective
- long term costs of network maintenance are predictable and not subject to market fluctuations
- some consider that there are more opportunities for corruption if contracting is used

The following disadvantages of such an approach have been noted:

- inefficiencies due to organisation not being subject to market competition
- maintenance work being 'resource' rather than 'needs' based
- government required to commit long term resources and capital investment in equipment, facilities and human resource development
- private sector might be seen as more innovative and effective
- funds can more easily be diverted away from maintenance if government is not committed by contract

## 4.2 Service provider by contract



This is probably the most common form in use worldwide of private sector involvement in road maintenance. In particular, it is most common for the procurement of more major periodic maintenance and pavement rehabilitation, although its use has increased in recent years for routine maintenance and emergency and winter maintenance.

The boundary between the function of manager varies from country to country and for different maintenance activities. Also, the form and type of contract employed varies between and within countries and this is discussed in Section 5.

Examples of such an approach are:

- local roads in UK
- various states in Australia
- various states and counties in USA
- many emerging and developing countries, for example Malaysia, Chile, Pakistan and Kenya

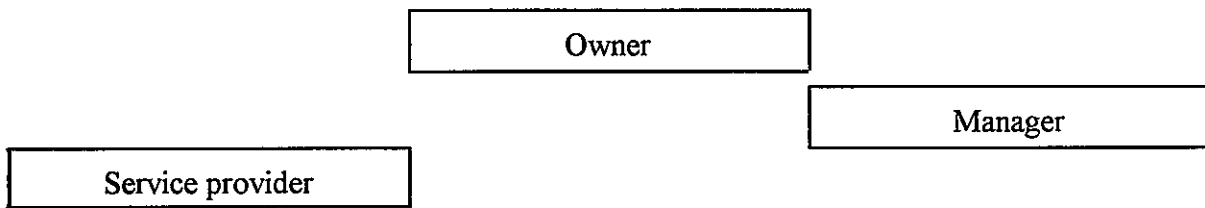
The following advantages of such an approach have been noted:

- maintenance tends to be needs rather than resource driven
- budgets might be more easily controlled
- clear definition and understanding of each parties objectives
- legal commitment by government once contract entered
- more efficiencies if there is healthy market competition
- more effective maintenance which might benefit from private sector innovation

The following disadvantages of such an approach have been noted:

- loss of long term knowledge of network by client
- difficulties in specifying and predicting some types of maintenance work
- loss of client ability to respond to tasks for which there is a vital responsibility to the travelling public, for example emergency and winter maintenance
- profit motive of service provider might not be for long term good of network
- client at mercy of market forces in trying to control costs of maintenance
- increased management supervision required

### 4.3 Service provider and manager by contract



If the role of manager is contracted out then this is the most commonly adopted approach, whereby the manager and service provider functions are carried out by different organisations who both have a separate contract with the client. Typically, the manager will be a 'traditional' consulting engineer and perform these services under a form of agreement such as the ACE conditions of contract or various country specific forms. The service provider will typically operate under a contract in which the manager performs the traditional role of contract administrator, designer of works, certifier and dispute settler.

Many of the advantages and disadvantages of this approach are similar to those stated in Section 4.2 and these are not restated here. However, additional issues specific to this approach are noted. Examples of such an approach are:

- areas of UK trunk road network since 1986
- Roads and Traffic Authority, Sydney region, New South Wales, Australia
- some USA authorities
- other countries where a consulting industry is active and developed

The following advantages of such an approach have been noted:

- innovation might be increased in the management of road maintenance
- separate manager role performs adjudicator role between client and service provider
- drive towards development of more consistent standards

The following disadvantages of such an approach have been noted:

- increased management supervision required

### 4.4 Manager by contract



Once a road administration has restructured into the three functions, the manager and service provider roles are often subject to market competition between the existing in-house agency or DLO and the private sector. In this situation, it might be possible that the DLO wins a maintenance contract on a competitive basis but is supervised by an external consultant, and this

is the case described here. In the developing world, this might also be true where an international consultant is contracted to manage a programme of private sector development in this area, although the intention will be to develop the role of manager either within the client organisation or with local consultants.

Examples of such an approach are:

- Essex and other such counties, UK
- some USA authorities

It is difficult to locate reference to any specific advantages or disadvantages of this specific approach, other than those more generally identified in sections 4.2 and 4.3.

The specific issue raised by the approach is that the manager has a client who is very familiar with the service provider. Whilst this might be seen as a strength when considering contract administration in that both parties have a knowledge of the other, this might also have its weaknesses. For example, the manager might find it difficult to apply rigorous standards if there has been a culture of resistance to this change within the road administration, as he will not have the support of the client. Hence any advantages or disadvantages are likely to be very specific to the culture and background of such a development.

#### **4.5 Combined manager and service provider by contract**



This approach has only been adopted in more developed countries and represents a considerable transfer of the road maintenance function to the contractor. It relies on an experienced contract culture by both parties and represents a greater risk to the client than any of the previous approaches since the responsibility for maintenance rests with one external organisation. In the extreme, the contractor might also be responsible for providing finance for the work, in which case this becomes a concession for an agreed term. Examples of this are the various private finance initiatives in use worldwide, such as the UK Design Build Finance and Operate (DBFO) and many concessions in Europe, the Far East and the Americas.

The degree of management responsibility transferred varies. The contractor might be responsible for carrying out individual maintenance activities to a required standard as defined by the client, or he may be responsible for maintaining the network at a given level of service over the term of the contract and then to hand back the network in a defined condition. In this latter case, the responsibility of the contractor is considerably greater, with the former case being more akin to that described in section 4.2.

Examples of such an approach are:

- British Columbia, Canada
- Roads and Traffic Authority, Sydney region, New South Wales, Australia

- Parts of networks of various developed and emerging countries

The following advantages of such an approach have been noted:

- contractor encouraged to maximise innovation
- budget levels are known for an extended period

The following disadvantages of such an approach have been noted:

- very little experience in the long term problems since a relatively recent innovation
- work might become resource rather than needs based
- effects of long term risks such as latent conditions, contractor becoming insolvent could be disastrous for public

## **5. CONTRACTUAL ARRANGEMENTS**

### **5.1 Types of contract**

Many types of contract have been used to procure the service provider function of road maintenance. The type chosen depends on the contract strategy adopted by the client and is usually driven by local historical precedent on the approach to contract management in general. In essence, the issue is one of allocation of risk and the following paragraphs describe the different types of contract, presented in order of increasing risk to the contractor (and decreasing risk to the client).

#### ***Hourly rates***

Employing a contractor on an hourly rates basis represents only a small development from employing a DLO to deliver road maintenance works. Indeed, this form of contract has often been used in situations where the majority of work is performed by a DLO, as a means of coping with resource scheduling problems. For example, a road administration might not have enough resources to cope with extreme emergencies, and in this case will hire in contractors to work on this under supervision by the client. Examples of this approach can be found in many countries moving towards contract maintenance (e.g. Northern Territories, Australia).

The 'lengthman' system in Kenya is an example of a development of this approach, since the contractor agrees a price to perform work for 3 days per week over the period of a year. His work is specified by a supervisor, who has the authority to withhold payment if work is not carried out to a satisfactory standard.

#### ***Activity based unit price***

This is the most common type of contract in use worldwide. It has developed from traditional forms of contract for construction with adaptation to the specific requirements of road maintenance procurement. Periodic maintenance contracts, which are closest in nature to new construction (the contracts can be specified with items similar to construction projects and are in discrete, known locations) are typically procured in this way.

For routine and emergency maintenance, neither the location nor the nature nor the amount of work is known in advance. In order to overcome this, the following approaches have been

adopted:

- some agencies merely ask contractors to submit a Schedule of Rates for various items, with no indication of the quantities of work required. The contractor is selected based on the overall anticipated quantities of work and is appointed for a fixed term. He then performs work on issue of a site instruction by the manager and is paid for each instruction in accordance with his Schedule of Rates (e.g. some authorities in Australia, UK authorities in first contract maintenance appointments in 1986).
- other agencies require contractors to submit bids against a Bill of Quantities. The lowest bid contractor is usually appointed who then performs work according to individual site instructions issued by the manager, paid in accordance with the contract rates. There are a variety of approaches to dealing with the issue of quantities being different from those given in the contract documents. Some agencies will negotiate different rates if the quantities vary by more than a stated amount (e.g. USA, Chile, Algeria), although others do not include this provision (e.g. second term maintenance appointments in UK). Other agencies have assembled engineers estimates of rates and contractors have submitted bids stating how their rates will vary from these rates in percentage terms and are paid accordingly (e.g. Belgium).

### ***Activity based lump sum***

By specifying a lump sum contract, the risk of variation in expenditure to the client is reduced. Hence this approach has only been used where there is a skilled and developed contracting industry. The experience of British Columbia is well documented as the best example of this type of approach, which involves a transfer of much of the manager function to the contractor as well. In British Columbia, lump sum contracts have been awarded on the basis of a build up of estimated items by the contractor, and some flexibility has been retained by allowing a change to the value of the contract if some items change by a significant amount. Whilst performance standards are a part of this contract, they refer to short term expectations of performance (e.g. response times to defects and end specifications for activities) rather than the longer term performance indicators which are used in a performance contract.

### ***Performance based***

Performance based contracts offer the most significant transfer of risk to the contractor and these can include concession agreements in which the contractor provides financing as well. Examples of these contracts fit the organisational approach described in Section 4.5 and include the Regional and Traffic Authority in Sydney, Australia and DBFO schemes in UK, which require the contractor to maintain the highway to a given standard as measured by a performance indicator. Typical performance indicators include a road riding quality and deflection life criteria.

## **5.2 General remarks**

The length of appointment of a contractor varies but generally increases in the order of contract given above. Hourly rates contracts might be 1 month terms, and concessions might extend beyond 10 years. The choice of term is dictated by such issues as acceptable bidding costs for contractors, ability to manage contracts by client, and the need for a contractor to be given the opportunity to cope with variations in workload through the term and improve performance.

The issue of geographical size of contracts is determined by similar factors to the term of the contracts. Since the use of activity based lump sum contracts and performance contracts are a reasonably recent innovation, their use has been limited to trial areas within a network or specific road sections or links.

## **6. TRENDS IN THE USE OF DIFFERENT APPROACHES**

### **6.1 Pressures for and resistance to change**

As stated in section 4, the 'de facto' situation in most countries has been that described in section 4.1. Indeed, the method of classifying the road administrations role into the three functions was in itself an innovation from an organisational structure which was more usually based on regional or works type classifications (for example, regional engineers were responsible for all functions of maintenance, or all functions of construction etc.). In general, the order in which the various organisational approaches have developed has followed that given in section 4. The speed of change, and the particular approach adopted, has been unique to each country and dependent on many factors associated with different cultures and environments.

The pressures for and resistance to change from the early model of a road administration which carried out all aspects of the road maintenance function to the organisational approaches described above have been wide ranging. They can usefully be classified according to Figure 1 into institutional (and external), managerial and technical factors.

The most obvious drive for change has been due to political and strategic pressures. Within the developed world, this pressure has come from governments who sought greater use of the private sector and a reduced level of government interference throughout society. Market forces and competition have been seen as means by which to achieve effective and efficient public services, although these have sometimes been stated objectives and detailed analysis of the opportunities for this have been overlooked in the drive to merely ensure greater involvement of the private sector. Examples of this pressure can be seen throughout Europe and in the developed world in general. Perhaps from the above governmental pressure, this viewpoint has also developed in the major development agencies so that it has often become a condition of grant aid and development loans that the private sector is involved and competition encouraged within road administrations.

Opposition to this pressure has often occurred within road administrations which have been mandated to change. A natural reaction has been to maintain the status quo and this might have been prevalent at all levels within the administration. Out of this has often developed a pragmatic approach at a management level which has sought to ensure the agency workforce is competitive and effective in the work it carries out. This has stimulated a drive to properly monitor all maintenance and to set standards and define specifications which ensure that maintenance can be properly administered and justified. This management drive has, in itself, opened up the opportunity for the private sector to become involved since the work has become more tightly defined and hence easier to administer by contract.

Finally, the technical aspects of contracting out have been considered. Whilst most countries have contractors who have experience in road construction, few have had contractors experienced in maintenance. Therefore, the ability of contractors to perform the work and administrations to manage the work has required analysis. Often, trial projects have been implemented in the



developed world to assess the likely problems associated with change. In the developing world, these trials have often been extended and involved significant training and institutional development components.

## **6.2 Comparisons of different approaches**

Comparisons of the success or otherwise of the process of change from one organisational model to another are difficult. It is impossible to perform before/after studies and even where comparisons have been attempted by an agency by setting up different approaches within a network (for example, RTA in Sydney, New South Wales), there are usually a number of factors 'external' to the comparison (for example, differing conditions on the network) which mean that comparisons become very subjective, in terms of either the quality or the cost of road maintenance.

In essence, the level of risk taken by the client function decreases with the organisational approaches as presented in this report, whilst the level of risk assumed by the private sector increases. Whilst increased competition will tend to reduce the costs of road maintenance, it is also to be expected that the private sector will reflect the level of increased risk in their prices for work. It is this combination of risk and competition which determines the cost of road maintenance.

Cost comparisons are notoriously difficult as stated above and some organisations have invested much time and resources in setting up systems which compare the approaches on an equitable basis so that a suitable form of procurement is adopted where there is a choice of options. Reports vary as to the relative costs but most conclude that it is not the involvement or otherwise of the private sector per se but the introduction of competition which improves efficiency. Thus a competitive administrative structure in which DLOs are able to compete for work has been seen to stimulate efficiencies, even without the involvement of the private sector.

## **7. CONCLUSIONS AND SUGGESTED STUDY AREA OF PROJECT**

A review of the literature as outlined above reveals the breadth and diversity in the way by which road maintenance is procured and the various viewpoints taken on the issue. However, it appears that most reports conclude that:

- clear objectives are required by road administrations in the area of road maintenance
- these objectives should be translated into organisational roles which achieve these objectives, the owner/manager/service provider role appearing most successful
- these objectives should be translated into levels of service, or standards, of the network which road maintenance should achieve
- to achieve these standards, suitable specifications and methods of measurement should be adopted
- effective forms of contract should be adopted which allocate the risk to the party most able to take that risk
- works should be defined to encourage the maximum fair competition, and avoid either a public sector or private sector monopoly

Various issues are raised which are more relevant to the developing world and include:

- the role of donor and loan agency involvement in the process
- the requirement for training of both the private and public sector
- the development of an environment conducive to competitive road maintenance

Table 2 is reproduced below with two cells of the matrix highlighted.

**Table 3**  
**Functions and capabilities required for road maintenance**

Function	Capability		
	Institutional	Managerial	Technical
Owner	Reliable revenues	Identify appropriate forms of procurement	Understanding of maintenance methods
Manager	Reliable payment mechanisms	Development of contract documents Programming of works Packaging of works	Identification of maintenance needs Development of appropriate specifications
Operator	Access to capital financing Reliable payment	Programming of works Resource scheduling	Appropriate maintenance techniques

It appears that the highlighted cells are an area where road administrations might benefit from some more rigorous guidelines than are currently available. There has been a major initiative in recent years to address the institutional capabilities and aspects such as road funding and financing mechanisms. There are also many publications in the technical area. Whilst much emphasis has been given to the training and development of the private sector in the developing world when developing strategies for contract maintenance, it seems that there is less in the public domain on the developments required within the existing road administration in order for it to carry out its new function as a client successfully.

It is suggested that a report which offers guidance in the above area, addressing the process as noted at the beginning of this section, would be appropriate. A draft layout for such a report is included in Appendix A with summaries of the topics which might be included under each heading. On the basis of this layout, detailed information will now be sought by further literature study as well as specific case studies in countries from whom lessons might be learnt. For this purpose, the World Bank will be visited where it is hoped that more guidance on suitable countries suitable for a case study will be forthcoming.

## **8. REFERENCES AND BIBLIOGRAPHY**

A brief summary of each reference is included in the bibliography in Appendix B.

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## **APPENDIX A**

### **DRAFT TABLE OF CONTENTS FOR FINAL PROJECT REPORT**

**TITLE: IMPROVING THE DELIVERY OF ROAD MAINTENANCE**

**Target audience:**      1) Policy makers/politicians for executive summary  
                                 2) Middle level managers within road administrations who are responsible for delivery of road maintenance for main report

**Style:** strategic document (hence not ORN) with concise recommendations (hence not textbook)

#### **CHAPTER 1 - INTRODUCTION/BACKGROUND**

Importance of maintenance  
Danger of fashion

#### **CHAPTER 2 - PURPOSE OF ORGANISATION**

Objectives for maintenance  
Mission statements to achieve objectives

#### **CHAPTER 3 - CONCEPTS OF MANAGEMENT**

How organisations might be designed to reflect mission statements  
Brookes pyramid and where these recommendations fit  
Clear separation of owner/manager/service provider roles  
Decentralisation (after conversation with Derek Miles)

#### **CHAPTER 4 - ASSESSING THE PERFORMANCE OF A DLO**

Performance information (is it effective)  
Cost information (is it efficient)  
SWOT analysis  
Availability of skills/equipment/depots and facilities

#### **CHAPTER 5 - ASSESSING THE PRIVATE SECTOR**

How much opportunity is there for competition? Monopolies (either client or contractor)  
What skills are there?  
It probably will not have much experience in maintenance hence how difficult might it be to improve its skills?  
Location of maintenance and location of contractors  
Equipment  
Management capabilities  
What incentives are there for private sector to get involved?

## CHAPTER 6 - OPTIONS FOR CHANGE

Evaluating the way forward - what are the implications of a move towards greater use of the private sector?

Can we compensate for the deficiencies noted above?

Socio-political effects of different courses of action

Training required of private sector/DLO/client as client or manager

Plant and equipment

Problems of developing private sector might be as significant as problems of improving DLO

3 options:

- Improve DLO
- Mixed market
- Wholesale privatisation

Recommend middle ground but guidance follows on each

## CHAPTER 7 - ORGANISATION OF CLIENT

Establishment of client capability

Setting policy standards and procurement procedures

Cost accounting

Authority for managers

Developing competition

## CHAPTER 8 - ESTABLISHING A COMPETITIVE ENVIRONMENT

Benchmarking

Finnish model of competing DLOs

Avoiding monopolies

## CHAPTER 9 - IMPROVING A DLO

Setting up separate accounts

Performance targets

Financial support for DLO and penalties for failure

Need for good estimating

Ownership of plant

Multi skilling - operating like a contractor

Training

## CHAPTER 10 - MAINTENANCE CONTRACTS

Concept of risk

Lots of small or few big contracts?

Conditions of contract

Form of contract

Area or task based appointments - what term?

Specification

## CHAPTER 11 - CONTRACT MANAGEMENT

Quality

Supervision

Role of client to ensure fair value for money

Training versus defaulting on contracts

## CHAPTER 12 - SPECIFIC ISSUES OF TRANSFER TO PRIVATE SECTOR

TUPE rights and employee transfer

## CHAPTER 13 - MONITORING SUCCESS OF SERVICE DELIVERY



## **APPENDIX B - BIBLIOGRAPHY AND LITERATURE REVIEW**

**BENNATHAN E and L S THOMPSON (1992). Privatization problems at industry level: Road haulage in central Europe. World Bank Discussion Paper No.182, World Bank.**

This report discusses the issues involved with privatization of the road haulage industries in central Europe, with specific reference to the experience of Poland and Hungary. It describes the process which these countries went through in order to develop an efficient haulage industry, and emphasises that such a process must be carried out in stages. Specifically, countries must ensure that publicly owned enterprises of doubtful viability must not be transferred until they are made viable, so that enterprise restructuring must happen first. Only then should a programme of privatization be embarked upon, and this will require decisions on the regulatory regime to be adopted.

**BROWN T J and M I CHOUDHURY (1990). Periodic maintenance by contract of regional highways in north west Bangladesh. Volume 1, Sixth conference proceedings, Road Engineering Association of Asia and Australasia, Kuala Lumpur.**

This paper describes an IDA funded initiative to improve road resurfacing maintenance in Bangladesh and adopt contract maintenance procedures. The method of rating roads is described and this was used in order to develop cost estimates for the resurfacing projects. An extensive programme of pavement testing and materials investigation was carried out and specifications have been reviewed for use in contract maintenance. All contracts included preliminary pavement repairs as well as resurfacing works. The ability of contractors to perform works to specification was checked at prequalification, which reduced the number of tenderers from 55 to 19, and indicated the need for intermediate equipment to be used, as even with a 30% loan on offer, contractors had a limited capital base and suitable 'high tech' equipment was simply unavailable. General conditions of contract were developed based on the New Zealand Standards Association, which were considered to apportion risk more equitably than FIDIC, from which they were derived. The ability to cope with variations during the contracts, which were admeasured based on a bill of quantities, was paramount and two alternatives for achieving this are discussed in the paper. The paper concludes that the major obstacle to achieving a good road network in Bangladesh is the quality of routine, and not periodic, maintenance.

**CONRAD J F, P NELSON and K JONES (1993). Project cost evaluation methodology approach to privatization in the Washington State Department of Transportation. Transportation Research Record 1409, TRB.**

Due to increased interest in the different methods of procuring road projects, the Washington state legislature commissioned this study in 1985 to better understand the differences and compare costs between works carried out by the public and private sectors. A methodology (PCEM) for comparing costs on a project by project basis was developed and a 3 year pilot test was conducted to assess how useful it might be. Results from the maintenance element of the study have shown that increased flexibility in allowing competition for works would be beneficial. Typical issues highlighted during the study included the need for specifications where work has traditionally been carried out by a DLO, and the incompatibility of existing budget procedures with maintenance practices. The method is recommended by the authors as an effective decision tool, but it is noted that it is more applicable to large, easily specifiable projects rather than smaller and less defined projects where an element of subjective interpretation is required.

**FORBES, D E (1997). Road maintenance - To privatize or not to privatize. Transportation Research Board presentation, TRB.**

This presentation describes the lessons learnt by the Oregon Department of Transportation in commercialising road maintenance. Oregon considered 'full privatisation' rather than simply contracting out the various maintenance activities. The key lessons were: 1) Competition is more important than privatisation. For this to be effective, full accounting of all costs is required in order to make valid comparisons, there must be a number of viable public and private sector competitors and economies of scale must be introduced. 2) A 'philosophy' must be built which defines the extent of maintenance, its relationship to construction, and the principles of priority (eg safety, useability and appearance). 3) Levels of service (LOS) must be established which are related to the class of road and which can then be related to the priority rules to determine maintenance needs for each road. 4) Clearly outline responsibilities of public and private sectors for such issues as activities, road closure, road/bridge rating, major investment, displaced government employees and transfer of equipment. Safety and emergency items should be retained by client, who should be careful not to retain only low profit/high overhead items. The biggest gains will come from collapsing client service delivery structure. 5) Avoid loss of control - define LOS in contract, monitor, tie compensation to performance, share the risk, define the status of displaced workers and maintain an ability to bring back work in house.

**FRANK GRAHAM AND PARTNERS (?). Contracting out motorway maintenance in England - a consultants viewpoint. Unpublished.**

This outlines the changes that occurred, from a consultants viewpoint, when a section of the UK motorway network (West Yorkshire) was handed over to private contractors and consultants for road maintenance works. Consultants were appointed in 1985 to manage the maintenance of this network and in late 1985 they set up a working group with the Department of Transport to address the issues involved in appointing contractors for the work. It was agreed that familiar conditions of contract should be used, and so the ICE 5th edition was amended for this purpose. Most work for routine and emergency maintenance was carried out by works order, so that a Schedule of Rates replaced the usual Bill of Quantities and the various amendments to the contract are outlined. The usual UK specification ('Blue book') was used as a basis for the specification but it needed amendments to cover safety management, emergency procedures, routine maintenance, stocks of materials and winter maintenance. During the tender period, many enquiries were received and on appointment of the successful bidder (by comparing schedule of rates against ghost quantities and rates) a six week 'work-in' period was allowed prior to contractual handover from the DOT DLO to the contractor on 1 April 1996. The paper concludes by suggesting that the client now receives a more effective and cost effective delivery of road maintenance.

**FROST M and C LITHGOW (1996). Improving quality and cutting costs through performance contracts: Australian experience. Road management training seminar, Washington 17-18 December 1996, World Bank, unpublished.**

This paper describes developments in contract maintenance in New South Wales with the RTA. Contract maintenance had already been trialed (see Smith et al, 1994) but it was decided that a performance based 10 year contract, covering 450km, would be let in 1994. For such a significant shift of risk to the contractors, it was decided that tenderers should submit their 'concept' proposals and that these would be developed. After a 10 month tender preparation period, the proposals were evaluated and the preferred bidder chosen with whom detailed contracts were

developed. Some staff from RTA were offered the chance of transferral to the contractor but most declined and voluntary redundancies were allowed. The contract includes five documents: 1) Conditions of Contract (to which no changes are expected), 2) Code of Maintenance Standards (containing Level of Service requirements and Intervention Standards for every asset), 3) Maintenance Services Specification, 4) Commercial Schedules and 5) Benchmark Information (BI). The BI lists the assets, inventory and pavement models to be used when anticipating road performance. Payment is made for base services on a monthly basis without invoicing, and additional work is paid for under Provisional or Additional Services. Since the contract is performance based, it does not mention detailed procedures and materials to be used except in the case of major bridges, embankments, force majeure, as RTA retain the risk of these for fear of excessive price if handed over to the contractor. RTA require regular monitoring and the contractor has established a PMS for this purpose. For such a long term agreement, the principles of 'partnering' have been adopted.

**GASTON B (1996). New methods, new partners (Ontario Maintenance and Operations). Ministry of Transportation, Ontario, unpublished.**

These overheads summarise a presentation outlining the current plans for Ontario to develop a new strategy for the delivery of highway maintenance by the private sector. The MOT has reviewed the experience of a number of countries worldwide and has concluded that a stepwise process should be undertaken, which maintains competition, encourages entrepreneurial flexibility and recognises that 'nobody has got it just right, so far'. Two strategies are being trialed and a decision will be made after this period as to the direction to proceed. Managed outsourcing is one option, in which MOT staff will be responsible for road patrolling and delivery of maintenance through a series of functional unit price tenders. Area maintenance contracts are another option, which will be awarded on the basis of a lump sum for all routine maintenance operations over a three year term. The contractor will work to performance targets, be allowed to purchase surplus ministry equipment, and be subject to penalties for non compliance. Term maintenance contracts have been considered, which include construction and maintenance in a long term (five year) performance type contract, but these are not being pursued at present.

**GASTON B (1994). Lessons from the BC privatization experience. Ministry of Transportation, Ontario, unpublished.**

This summarises and comments on a review undertaken by the Minister of Transportation and Highways (British Columbia) in 1993, which sought an independent perspective on the cost effectiveness of the province's recent privatisation program. The purpose of the summary is to highlight issues which might be pertinent to initiatives in Ontario. The summary addresses operational, human resource, financial and economic impacts. It notes that finding optimum maintenance levels is complex, and that the often conflicting objectives of maintenance (eg salt and sand actually cause deterioration in a road surface) are therefore better managed by the client/owner, rather than transferring management to the operator; in extreme cases, there might be a commercial advantage for a contractor to reduce preventive maintenance. End result specifications are recommended, although their development is difficult and their application requires dispute resolution procedures. Whilst comparison of costs by DLO or contract are difficult, it is considered that the public has a right to know but that this will involve detailed cost auditing procedures. Loss of knowledge by the client is inevitable when work is outsourced, and labour regulations are complex and difficult to solve. Management of contracts often requires more staff than originally anticipated and costs do not necessarily reduce (it is suggested that BC costs increased).

**GERKE R J and P J SAWCHUK (1997). Privatization of a complete primary highway network, 'The Alberta Experience'. Presentation to AASHTO subcommittee for maintenance, Saratoga Springs, NY, July 1997.**

Alberta Transportation and Utilities (ATU) decided in 1995 that it would undertake wholesale privatization of the road maintenance activities in the province in an attempt to reduce total cost whilst maintaining standards on the network. A review of worldwide experience was undertaken, and after close consultation with counterparts in British Columbia, ATU decided to opt for setting up large scale geographically based contracts. The implementation strategy adopted is described and this involved setting up a team of seven members from all levels within ATU to manage the process. Documentation and specifications were developed (using ideas from RTA in Australia for a Code of Practice) and extensive consultation with industry and employees was carried out. Proposals of tenderers were evaluated and this process required considerable preplanning. Considerable training of those ATU staff retained in their new 'client' role was anticipated. Employee consultation was continual and clearly successful as initial negative reactions were transformed. A half day workshop was held initially, followed by more detailed 2 day workshops and continual newsletter updates and employee involvement. Similarly intensive consultation was performed with potential contractors. The paper concludes with a summary of lessons learnt and the perceived benefits of the privatization.

**HORNSBY K R (1990). Road maintenance by contract: the Northern Territory experience. Volume 1, Sixth conference proceedings, Road Engineering Association of Asia and Australasia, Kuala Lumpur.**

Increased government pressure meant that the Northern Territories embarked on a programme of use of the private sector in road maintenance. This has resulted in staff reductions, but these have been achieved through normal rates of attrition, and plant reductions, which has enabled government expenditure to be diverted to other activities rather than equipment management. Two forms of contract have been used - a simpler Service Order which includes no liquidated damages, and a form based on National Conditions of Contract which is applicable to more complex projects. Contracts have been procured on an Hourly Hire, Specific Work (either by schedule of rates or lump sum) or Period basis and the above order is that recommended in order to develop a more experienced contracting industry, based on the experience in NT. Hourly Hire contracts require the same type and degree of management by the client as DLO. Specific Work contracts have been used for resurfacing projects, but the most innovation has occurred through the Period contracts. These require a long term commitment from government (NT have used a three year term, with annual reviews and possibility of cancellation of subsequent years works), but NT have found that quality improves with time (unlike trends noted in USA). Client staff, used to DLO procedures, require a significant amount of training for these contracts but have responded by becoming more effective, mainly due to their less ambiguous and more clearly defined role.

**HYMAN W A (1997). Role of novel procurement procedures and intelligent transport systems in the development of maintenance management systems. Presentation to AASHTO subcommittee for maintenance, Saratoga Springs, NY, July 1997.**

This paper analyses trends in the use of maintenance management systems and notes that these have developed due to new technology and introduction of life cycle costing techniques. There has also been a trend towards performance, rather than method, specification in the management of roads. Maintenance management systems must reflect this and the example of Maryland, who

let the specification of a maintenance management system as a turnkey project, is described. If the public and private sector are to compete in developing MMS, then true cost comparisons must be made. An option of developing ideas is to allow open solicitation, by which private consortia can develop proposals for partially or completely self financing projects. These proposals are then made public so that other competitors can submit proposals during a limited period and then the project, if approved, is awarded to the best proposer. The idea of Partnership Proposals, where prospective tenderers put 'ideas' on the table and develop these further with the client is also considered, and the article concludes by suggesting that the lowest bid option should not be the criteria for project selection.

**KERASIOTES J J (1993). Essex County privatization. Transportation Research Board, 72nd annual meeting, January 10 -14 1993.**

The author of this paper was appointed Commissioner of the then Department of Public Works of the Massachusetts Highway Department (MHD) in 1991. After ordering a study of MHDs labour force that year, a decision was taken to embark on a programme of privatization of the entire maintenance operations of the Essex County regional office. Conditions prior to privatization are described and these were particularly unsatisfactory, showing a labour force which appeared to be operating extremely ineffectively and inefficiently. State workers were offered the opportunity to compete for the new contracts, but ultimately the MHD felt the union plan for this was unacceptable. The direct cash benefits of the process are presented and the paper states that the quality of maintenance has dramatically improved under the new procurement procedures.

**LANTRAN J-M (1990-1994). Contracting out of road maintenance activities: Volumes 1 to 5. Infrastructure divisions, Technical and Sahelian Departments, Africa Region, World Bank.**

**LIGHTHIZER O J (1994). The pros and cons of privatization. State Government News, The Council of State Governments, February 1994 issue.**

The author is secretary of the Maryland Department of Transportation, which has reviewed its use of the private sector in carrying out many of its functions. The DOT has 10,000 employees, a budget of US\$2 billion and is responsible for all modes of transportation within the state. A review was undertaken to recommend opportunities for privatisation, and there was initial surprise that the existing practice included so much (51%) use of the private sector. Consideration was given to privatisation of the airport, but it was decided that the complicated planning processes and the governments ability to raise large sums of money both meant it was easier to retain the operation of the airport in-house. Privatisation is a solution if the private sector is better and cheaper but is not preferable if there is a risk to vitality of an economic asset as exemplified by the Maryland Port Administration. Privatisation is also recommended where the application of a new technology is required to improve a service, since it avoids the need for government investing in technology which might become obsolete or training and devoting resources to such technology.

**McMULLEN C C (1986). Maintenance activities accomplished by contract. National Cooperative Highway Research Program Report 125, TRB.**

This report draws on a review of literature and the results of a survey by questionnaire in 1983 of 75 agencies in the USA involved in road maintenance. The questionnaire sought information

from agencies on: 1) which activities were carried out by contract, 2) the decision criteria for use of contractors or agency staff, 3) cost comparison methods, 4) administrative and legal issues encountered, 5) contract methods and organisational control, 6) experience in the use of 'total' maintenance packages (rather than specific activities or grouped activities) which was found to be negligible, 7) inspection and work control procedures and 8) major problems or successes that had been encountered. After listing the various issues which influence whether contract maintenance will be used by an agency, from the viewpoints of various relevant parties, the report goes on to note that for agencies where the experience of the contracting industry is minimal, a gradual process of contract maintenance implementation is required with considerable communications between all parties. In deciding whether to contract out maintenance, an agency should consider 4 key issues on which the report expands: 1) Is it a requirement? 2) Is it needed? 3) Is it feasible? 4) Is it desirable? All the different aspects of contract administration are then summarised and finally the research needs in this area are highlighted, which include the development of guideline road maintenance activity specifications and also the development of appropriate inspection and quality control procedures.

**MADLIN K B (1993). The case for in-house staff. Proceedings of the Institution of Civil Engineers (Municipal Engineer), 98, June, pp85-88.**

This paper discusses the relative merits of using in-house staff or private consultants. The particular area discussed is that of design services for local authorities in the UK. It starts with four basic assumptions: that private consultants will always be required for some aspects of local authority work, that the quality of work from either in-house staff or private consultants is the same, that the in-house organisation is already divided into a client and consultant organisation, and that everybody makes mistakes. The paper states what it considers should be the objectives of a private consultancy and then outlines the benefits of in-house staff in terms of cost, quality, added value and competition. The paper then concludes by suggesting that an expert client provides long term benefits for the public: by properly briefing, monitoring and controlling a consultant, by understanding and good judgment of the inherent risks in engineering, and by providing an informed and expert opinion in wider political discussions within government. A final mention is made of the public sector ethos to serve the public, which might be eroded by working solely for the profit motive.

**MADLIN K B (1994). Maintenance by private contractor or direct labour. Routes/Roads No.282, pp61-70, PIARC.**

This article reviews the practice of using private contractors or direct labour to conduct road maintenance work. It is based on presentations made by members of the Committee of Road Management (C6) in 1992 and from subsequent submissions. It also draws on information from a report by the World bank in this area (Miguel and Condon, 1991). It notes that there is a need to understand and separate the client and contractor roles, and to apply specification and contract procedures to the Direct Labour force (DLO). This process improves efficiency and there is no evidence of savings when comparing an efficient DLO with a private contractor. A DLO should be retained as it can respond to emergencies, has local knowledge and pride of ownership, can be flexible and provides competition for private contractors. Competition should be promoted between organisations, both between DLO and private contractors, as well as between local DLOs and by setting performance targets. Appendices provide data from various countries experiences and outlines typical costs of efficiency improvements in Shropshire, UK.

**MADLIN K B (1996). Driven to action. New Civil Engineer, 7 November 1996, pp10-11,**

## **Institution of Civil Engineers.**

This article recognises that there is a drastic need for road maintenance to improve. Whilst significant improvements by means of needs budgeting, consistent standards and monitoring have been achieved, the public demands that further improvements are still required. The key might be to look at the water industry, which fell into disrepair and under investment but was then privatised. Significant improvements were then put in place, but these were at a cost and a major contributing factor was the fact that water charges were directly levied by the provider to customers, rather than the previous unstable flow of funds by means of local council rates. A major review of roads should be undertaken which: 1) identifies roads for movement, which should be privatised, and roads for access, which should remain under control of local government, 2) establishes road performance criteria, 3) establishes a direct payment mechanism between road users and road operators and 4) develops sustainable methods for road charging on roads for movement.

**MILES D W J (1996). Promoting small contractors in Lesotho: privatization in practice. Proceedings of the Institution of Civil Engineers (Civil Engineering), 114, August, pp124-129.**

This paper is based on experience with the road maintenance and regravelling project (ROMAR) in Lesotho and outlines how a strategy was implemented to develop small contractors to carry out these tasks using appropriate technology. The process adopted was: 1) to study the local contracting industry, 2) design a programme of development, 3) develop contractors based on the management training principle 'import/convert/export', 4) implement a system of accreditation. Bottlenecks encountered during this process were those of changing entrenched attitudes within the client, from becoming a DLO to a client type organisation, and more research is recommended for this area.

**MINNESOTA DEPARTMENT OF TRANSPORTATION (1997). Managing competitiveness position paper. Unpublished.**

This paper was circulated to all DOT managers to inform current discussions within the department between employees on this subject, and to seek feedback on their views. The stated position of the DOT is 'to be competitive in everything we do'. Out-sourcing, the method by which services are procured from an external organisation with accountability for the outcome remaining with DOT, is often used by DOT but privatization has not been carried out. Competitiveness is measured in terms of cost, quality and responsiveness/timeliness and DOT want to measure these so that objective decisions can be made on the use or not of outsourcing. The strategy is to seek customer requirements, identify how these will be achieved, and then determine how best to deliver the services. Initiatives for accurate measurement of cost, quality and responsiveness are underway and services will only remain in-house if they prove to be competitive

**MIQUEL S and J CONDRON (1991). Assessment of road maintenance by contract. Report INU91, Technical paper, World Bank.**

This is a report based on a survey of the experience of using contract maintenance to date in a number of countries. It lists the reasons given for use of contract maintenance and notes that no cost comparisons have usually been carried out when a country has moved from use of a DLO to increased use of the private sector. Work to be contracted out must be clearly defined and

measurable, and there should preferably be a concentration of work in a given location for it to be attractive to contractors. Good quality control procedures must be in place. The most common type of works to be contracted out are periodic maintenance activities, with some contracting of routine maintenance, but emergency and winter maintenance is usually considered too critical to let by contract. The various types of contract are discussed, and these vary in terms of the risk allocation between client and contractor, from lump sum term contracts through to maintenance activities specified by works orders. Each step in the procedure of letting contracts is reviewed and the report specifically notes that developing countries with inexperienced contracting industries have had to establish procedures to ensure participation and development of local contractors. This transition requires planning in advance which should be flexible to future change and must be a gradual process. Results of specific country surveys are included as appendices.

**NEWMAN R B, J E GARMONG and H P HATRY (1991). Maintenance contracting. National Cooperative Highway Research Program Report 344, TRB.**

This reports on a study whose objective was to prepare guidelines for carrying out road maintenance by contract. Draft guidelines are included as Appendix A and the main body of the report describes the background and major conclusions from the study. Questionnaires were sent to agencies and contractors, but responses, particularly from contractors, were not too forthcoming. The reasons for contracting out road maintenance are discussed, and it is concluded that most work can be performed by contract and that many agencies carry out a nominal (10%) amount in-house in order to maintain a client expertise and a minimum staffing level for emergencies. A system used by Texas to determine the 'contractibility' of works is presented, as are the various methods in practice to compare costs between the two alternatives. Contract maintenance is defined as project type (eg overlays), maintenance type (eg litter collection) or smaller, purchase order type arrangements. The guidelines in Appendix A suggest that a clear strategy for procuring road maintenance is required, and then go on to discuss requirements pre-award and during contract administration. Appendix B provides a summary of experience in British Columbia.

**NORWELL G and G YOUDALE (1997). Managing the road asset in Australia and New Zealand. Routes/Roads No.296, October 1997, pp59-68, PIARC.**

This article presents the latest developments in the Antipodes concerning best practice in road management. Austroads has been used as a coordinating body to initiate strategic developments and considers that improving asset management relies on the following issues: 1) recognition of community benefits, 2) knowledge of road system performance, 3) knowledge of asset features, 4) knowledge of asset condition, 5) understanding of asset use, 6) understanding of physical treatments and 7) management of use of the asset. Using this as a framework, agencies can therefore develop their own improvements in road asset management.

**OLIVER J (DoT) (1992). UK developments in procurement of maintenance. Overheads for lecture to PIARC committee on road management, meeting 13/15 October 1992, Shrewsbury, UK.**

This lecture defines the background to UK developments, noting they were driven by government policy to subject the widest possible range of activities to competition. The report on maintenance in 1982 had identified that competitive tenders were required for most work, that pilot projects for use of the private sector in total maintenance should be established, that better



definitions of maintenance works were required and that sharper agency agreements were necessary. The background is given (see Sir Owen Williams and Partners and Unpublished, both at this meeting) and benefits are reported as crisper agreements, dedicated teams and 10-15% savings in cost. Disbenefits are noted as more management required by the client and a loss of local knowledge/continuity. Problems of extending these pilot trials to municipal areas are mentioned, where work tends to be of a smaller nature and more liaison is required with local bodies. The future holds for reorganisation of both DoT and Local government and is unclear.

**PLETAN R (1996). Notes on visit to UK to learn of maintenance operations and views for application in Minnesota. Unpublished.**

These notes highlight aspects of various conversations and interviews which the author had during a study visit to the UK in February 1996. They provide a summary of the current UK approach to procuring road maintenance, as discussed elsewhere - see Frank Graham and Partners (?), Oliver (1992), Sir Owen Williams and Partners (1992) and Tarmac Roadstone (1992). The author summarises that privatisation had been used in UK by government as a means of driving down costs by introducing competition and that procurement of maintenance was modelled on traditional lines of construction procurement. He identifies a preferable approach as: 1) to define maintenance in product/service categories rather than activities, based on customer requirements determined from surveys, 2) to determine indicators to gauge these products/services and develop means of measuring performance against these indicators, 3) to build a competitive spirit and compare districts using these indicators, 4) to write performance based contracts for districts and measure performance, 5) to derive costs of activities within these 'product' lines, and only then 6) to open up competition between public and private sector.

**SIR OWEN WILLIAMS AND PARTNERS (1992). The experience of a consultant in managing highway maintenance. Paper to PIARC committee on road management, meeting 13/15 October 1992, Shrewsbury, UK.**

This paper details the experience of a consultant managing a network in the UK for the Department of Transport (DoT) - for background see Unauthored, 1992. The consultants are appointed as agents for the DoT by a two envelope system (technical and financial). The financial bid is separated into Lump Sum items, which are for acting as agents on the term maintenance contracts (routine and winter emergency) and are given as a percentage of those contract values, Basic Fee items, which are for design of major maintenance works and are inversely proportional to the value of such works and Additional Fee items, which are for such activities as detailed inspections and for site supervision of major maintenance and are cost plus. Monthly billing is in operation. The consultant submits annual bids for funds for maintenance of the network and often these requests are not fully met, so that a problem noted is that of a conflict between the Codes of Practice to which the consultant is obliged to work and the necessary reduction in standards due to this funding shortfall. The Term Maintenance contracts are carried out by Works Orders and Works Instructions and emergency maintenance is covered by ensuring that some staff are on standby at all times. The paper concludes that this method of working has been a success but notes that it is based on a good working relationship between the consultant and contractors.

**SMITH R B, M FROST and J S FOSTER (1994). Contract road maintenance in Australia: a pilot study. Proceedings of third international conference on managing pavements, San Antonio, May 1994, TRB.**

This paper describes a 12 month pilot study that was undertaken by the Roads and Traffic

Authority (RTA) of New South Wales in 1990/91 to compare road maintenance delivery by the private and public sectors. Three pilot networks were established :1) maintained by contractor and managed by private sector manager, 2) maintained by RTA DLO and managed by private sector manager and 3) maintained by RTA DLO and managed by RTA managers. Ideally a 5-10 year performance contract would have been used but future uncertainty over budget, poor records of maintenance history, inventory and pavement performance meant that schedule of rates (with provisional quantities) contracts were used. A major concern if using a performance contract was the possibility of claims for latent defects by a contractor who had not constructed the roads. The contracts followed QA procedures, and a maintenance Code of Practice. This established priorities for works activities, intervention levels and response times. Significant improvements in the technical quality of repairs were noted, as well as a general shift of work from routine to structural works based on this needs driven approach. Comparisons over a short period are difficult, but there was a definite improvement in productivity of DLO and this was due as much as anything to restructuring within RTA along contract procedural lines and increased competition. The paper concludes by suggesting that performance contracts would be the ideal, but that more information will be needed for these for such a significant change to the risk sharing of road maintenance.

**SMITH R B, J S FOSTER and J SHARP (1996). Contract road maintenance in Australasia: a review. REAAA journal, January 1996, pp7-15.**

This paper is based on a position paper commissioned by the Regional Transport Authority of New South Wales. A questionnaire was sent out to Australasian road authorities and information was also sought from UK, USA and Canada. The various approaches adopted by different authorities are summarised, and this reveals a considerable difference in both the amount of maintenance contracted out as well as the type of contracts adopted for this work. There is little data available on cost comparisons, as the introduction of private sector operations into road maintenance has usually been motivated by politicians, but it is generally considered that competition has promoted more efficient operations. The major lesson is that it is the split of asset ownership/supervision from service delivery which allows a greater emphasis on needs based rather than resource driven maintenance activities. A range of models of management are summarised with their advantages and disadvantages, and these vary from total owner provided service provision through to management and provision of maintenance works being the responsibility of a contractor under a long term performance contract. Finally, advantages and disadvantages of direct labour versus contract works programmes are highlighted.

**STENBERG I L (1990). Road maintenance by contract. Volume 1, Sixth conference proceedings, Road Engineering Association of Asia and Australasia, Kuala Lumpur.**

This paper reports on an on-going World Bank funded project in Belize, Central America, which is aiming to develop a road maintenance contracting industry. Traditionally, road maintenance has been carried out by direct labour on a district basis. Whilst the quality has been fair, it is suggested that improvements could be made by addressing issues of plant maintenance and availability, knowledge of personnel, and diversion of maintenance resources to other activities. A pilot trial on a section of the network was conducted: local contractors attended seminars and this formed one basis for prequalification. FIDIC conditions were adapted to suit. Specification of the works has been by method and materials, rather than end result, and extraordinary maintenance has been included as a provisional item on dayworks. Activities are measured on a cost/km basis. Cost comparisons show the contractors to be more expensive than the traditional DLO, but these are not reliable as the quality and effectiveness of maintenance has improved

dramatically.

**TARMAC ROADSTONE (1992). The experience of a contractor in undertaking all aspects of highway maintenance. Paper to PIARC committee on road management, meeting 13/15 October 1992, Shrewsbury, UK.**

Tarmac Roadstone secured the contract for maintenance of the South Yorkshire motorway network in April 1986 and this paper describes their experience. The original contract documents were based only on a Schedule of Rates, with no indication of quantities of work, but this has now been revised although the contractor still cannot claim if there are substantial changes to the quantities in the contract. Tarmac took on the DLO operators, and used specialist subcontractors where necessary and for winter maintenance intended to use employment agencies for HGV trucks on a call off basis. The basis of the contract was the ICE 5th edition and the 1987 version of the Method of Measurement for Highway Works. Work is carried out by Works Order, each being subject to a completion and maintenance certificate. Winter works are carried out based on a 'level of response' time, for which the contractor is obliged to respond within a defined time limit depending on the time of year (eg. High response times are required for December to February) and a similar principle is adopted for emergency maintenance. The paper concludes that it is the characters and cultures rather than the contractual specifications which make these projects a success or otherwise.

**UNAUTHORED (?1992). Contracting out of highway maintenance. ?Paper to PIARC committee on road management, meeting 13/15 October 1992, Shrewsbury, UK.**

This paper briefly summarises UK experience of the 1980s in this subject. In 1986, the maintenance of trunk roads in four areas (Manchester, South Yorkshire, West Yorkshire and West Midlands) was contracted out. Consultants were appointed to manage the maintenance, using contractors who were employed on term maintenance agreements (using schedule of rates). The consultants term was 5 years, the contractors term was 2 years, so that consultants supervised different contractors during their appointment. A Model G agreement was developed for the Client/Consultant relationship, which draws on previous consultant terms of appointment as well as local authority agency agreements. Since this form of procurement was untried, a clause was included to allow either contractor or client to terminate after one year of service. Ex authority staff were taken on by both consultants and contractors. The second terms began in 1988 for which tighter contracts had been developed and for which there was more competition than previously, suggesting the trial had been a success. Cost comparisons are difficult - a straight comparison suggests a 15% reduction in costs, but the cost of managing consultants by the client in addition to other client functions is difficult to track, and issues of professional indemnity insurance are also relevant.

**ZIETLOW G J (1997). Reform of financing and management of road maintenance. IRF/GTZ web site, <http://www.mindspring.com/~irfgtz/votrweb.html>**

This paper has been developed during a joint IRF/GTZ initiative entitled 'Financing and Institutional Reform of Road Maintenance in Latin America and the Caribbean'. It notes that the fundamental problems which have led to a crisis in road maintenance in many countries are twofold: 1) a lack of adequate and stable flow of funds and 2) a number of institutional barriers which prevent effective and efficient road maintenance being carried out. In terms of financial reform, shadow tolls, tariffs and separate Road Funds are advocated. In terms of institutional reform, autonomous Road Maintenance Boards which represent stakeholders in the road network

are recommended. In terms of management of maintenance, it is suggested that substantial cost savings can be made by using private contractors to carry out the work in a competitive environment. Unit price contracts are most common but long term performance based contracts such as those used by the RTA in New South Wales (see Frost et al, 1996) and Argentina are encouraged. However, these require well qualified contractors, but even where less experienced contractors are available, the case is argued for a shift to the private sector.