IMPLEMENTATION OF PARTNERING IN ROAD CONSTRUCTION

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SYNOPSIS

The extent of changes taking place in South Africa can truly be defined as real paradigm shifts. The institutional and political changes in South Africa offered the opportunity to affect real change in the road industry, too. The changes that have occurred have either resulted from or been made possible by partnering. Some of the changes have been the formation of a South African National Roads Agency (SANRAL), ambitious multi-national regional development BOT toll road projects, and road maintenance by contract. The lessons in partnering learned from these Build Operate and Transfer (BOT) projects are reflected upon and the effect of road maintenance contracts on small contractor development. Lastly the partnering between various private sector players in pooling resources to form road surveillance and specialist asphalt laboratory services are described as further proof of the benefits of partnering in road construction.

1. INTRODUCTION

Paradigm shifts of significant magnitude are occurring worldwide in the broad field of infrastructure delivery. Traditional methods of road construction and maintenance delivery are increasingly coming under threat and are being replaced with more effective and efficient delivery mechanisms. In a number of cases the trigger for these paradigm shifts is institutional and political in nature (ANC, 1994) while in other cases it is pure economic reality. The democratisation processes and resulting institutional changes which happened in South Africa (SA) since 1994, created an ideal “laboratory for change” for the roads industry. The paradigm shift there led to a lowering in the normal resistance to change and created opportunity for innovation in delivery in the road construction and maintenance environment. In this paper it is indicated how partnering facilitated new road construction, road maintenance contracting and laboratory services. The new realities and priorities forced government departments at all levels to enter into alternative means of service delivery (DOF, 1997). These include Spatial Development Initiatives (SDIs), build-operate-transfer (BOT) toll roads, Public Private Partnerships (PPP) and Municipal Service Partnerships (MSPs).

The deterioration of the National Road Network in SA over the past 10 to 15 years is well documented. Part of the reason was the associated severe lack of funding which prompted the NDoT to investigate various innovative ways to meet the need for new road construction and the increasing backlog in maintenance and

rehabilitation. A new National Transport Policy resulted (DOT, 1996a) and the National Department of Transport (NDoT) embarked on a strategic commercialisation drive which culminated in the establishment of the South African National Roads Agency (SANRAL) (DoT, 1996b).

The implementation of partnering in road construction started with Build Operate and Transfer (BOT) at the national level on 3 to 4 major National Toll Road projects. These forced contractors, consultants and suppliers to work together for the first time and the private sector to work closely with the public sector. Various lessons in smoothing the partnering process have been learnt in an evolutionary fashion from these major projects. Developments in commercialisation and privatisation of road construction at State/provincial and local government level are lagging behind due to different institutional and economic reasons, throwing the contrast between the paradigms into stark relief.

At the other end of the scale, partnering for the Government and its road agency SANRAL also meant forging a new relationship with Civil Society. Road maintenance by contract was identified by the NDoT, and subsequently by its agent, SANRAL, as an ideal area where small, medium and micro enterprise (SMME) emerging contractors can be empowered (development opportunity for previously disadvantaged individuals and groups). It is recognised that these maintenance contracts will soon evolutionary develop into some form of Performance Specified Maintenance Contracts (PSMCs) as is happening elsewhere in the world. (Zietlow, 1996)

A change process of the magnitude that has been experienced in South Africa creates various opportunities for innovation. One striking example is the loss of experienced human resources that triggered change in an important area like laboratory services. Typically road authority laboratories at local, provincial and central government level were either closed down or mothballed as a result of this "brain drain" and human resources redistribution effect. This did however create opportunities for partnering between players in the private sector to fill the gap. A typical example is the industry-based support that developed to pool specialist asphalt laboratory and road surveillance equipment into a new service delivery company, Specialised Road Services (SRT). This had consultants, suppliers and contractors as shareholders. The benefits of the resource pooling effect was further enhanced by the donation of valuable laboratory equipment by the NDoT to SRT and linking it to academic agreements with the Universities of Pretoria and Witwatersrand to create training and research facilities for engineering students.

2. PRIVATE SECTOR INVOLVEMENT IN ROAD PROVISION

The total road network in South Africa is 520 000 km, being some 300 000km of proclaimed roads and 220 000 km of unproclaimed roads. The road network can broadly be classified into two categories, viz (DOT, 1996c).

> "***Economic roads*** ", *which are regarded as a strategic economic asset, vital to the country's ability and which improves economic growth through industrial growth and exports,*
>
> **and**
>
> "***Social roads****" , which are essential for the general social accessibility needs of the communities such as access to schools , clinics and work*

opportunities.

Economic roads or financially viable roads are roads which normally have potential to be used as toll roads. It is particularly in the case of economic roads that the NDoT and its agent, SANRAL, believe that the market principles of private funding can be used effectively via the Build Operate and Transfer (BOT) method. In SA traffic figures as low as 3 000 vehicles per day (vpd) are used to consider roads for toll road potential. Social roads are not financially viable as toll roads (mostly due to insufficient traffic volumes) and therefore do not classify as roads with potential for traditional toll road operations.

The present National Roads network of SA is about 8 000 km. It is anticipated that this length of National Road network will increase to 20 000 km by taking over lengths of road presently under the authority of the Provinces. Of the anticipated 20 000 km of National Road length only about 10% of that network is economically viable to become toll roads (DoT, 1996a). The agent of the NDoT, SANRAL, is increasingly aware that it must guard against the private sector being involved in only the attractive economically viable toll roads while the need for socially important roads is not addressed.

Recently a system of network concessions has been considered to achieve some form of cross subsidisation between the two. Notably, the Gauteng Department of Public Works and Transport (Gautrans, 1998), is presently developing new legislation to achieve this objective. It is anticipated that these network type toll roads will have to take a quantum step in tolling methodology by utilising electronic tolling as most of the roads are in an urbanised environment.

There are however various commercialisation levels or partial commercialisation across the whole road life cycle. In Figure 1 the commercialisation activities are illustrated versus important indicators such as: Capital funding requirement, risk taking, complexity and expertise requirement and contract period. This broad classification of economic roads and social roads is indicated in Figure 1 by the diagonal division. Build Operate and Transfer (BOT) and Fund Rehabilitate Operate and Maintain (FROM) type contracts fall in such economic roads category while Repair Operate and Maintain (ROM) and Maintain and Operate (MO) type contracts generally fall into the social roads category.

3. LESSONS IN PARTNERING LEARNT FROM BOT PROJECTS IN SA

There have been several large-scale BOT projects in South Africa in recent years. The N4 Maputo Development Corridor BOT project awarded in 1998 was the most significant BOT project handled by SANRAL since commercialisation started. This forms part of the Spatial Development Initiative (SDI) involving SA, Mozambique and Swaziland. Subsequent to this project the high traffic volume toll road on the N3 National Route network from Heidelburg (Gauteng Province) to Durban (KwaZulu Natal Province) has been awarded as a BOT toll road project. It has a phased new route section and major upgrading of the existing NDoT toll road section. The extension of the Maputo Corridor westwards over Pretoria to link with the Trans-Kalahari highway through Botswana to Walvisbay in Namibia has also recently been awarded to the preferred bidder.

From these regional projects a number of lessons to make partnerships run more

smoothly have been learnt. They are as follows:

a) Most new toll road projects are in effect, not “greenfield” projects, but upgrading and improvement of existing road infrastructure[1]. Since the award of the Maputo Development Corridor BOT, an increased tendency to use a phased approach in construction and upgrading or improvement of existing roads has been followed. This evolutionary approach makes a lot of economic sense and helps to manage overall risk for the government and the contractor.

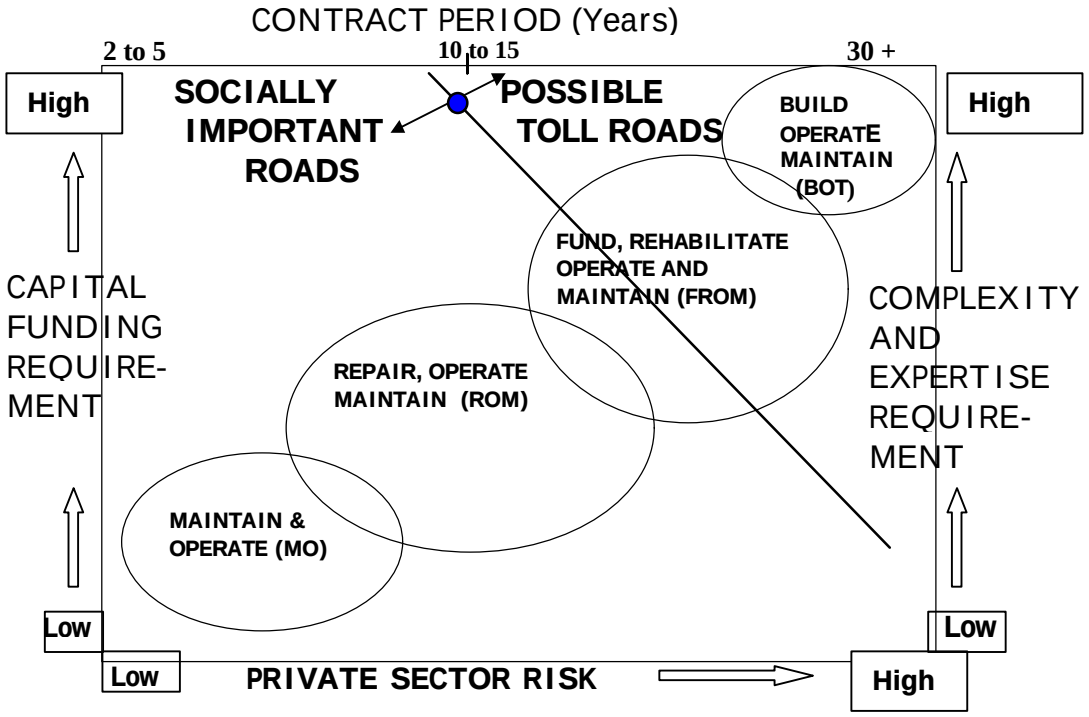

Figure 1. Illustration of contract models in terms of significant parameters

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b) In the risk management of BOT projects there are a number of aspects to consider as indicated in Figure 2 to follow on the next page. When BOTs form a major element of regional economic development, such as the SDI of the Maputo Corridor Development Initiative, it was found that the client couldn't reasonably follow a total non-recourse approach, as had been tried elsewhere. Typically the client must handle expropriation and rights to road reserves. Law enforcement typically also cannot be transferred to the concessionaire. Traffic risk has however been put squarely in the risk domain of the concessionaire.
c) The initial BOT project tendering proved to be very costly to bidders, particularly if unsuccessful. SANRAL has now changed the rules to provide all prospective bidders with the geotechnical information and proposed basic planning road alignment. This ensures that all bidders share the same basic information and eliminates costly duplication. SANRAL also narrowed project proposals or call

[1] RSA recently amended its legislation on toll roads enable the NDoT, or their agent, to declare existing roads or sections of road as toll roads without having to construct or provide an alternative road as in the past for government financed toll roads.

for tenders down by doing much more preparation work in-house before going out on tender. This helped to compare apples with apples. The initial project is lately also analysed and used as benchmark in the adjudication process.

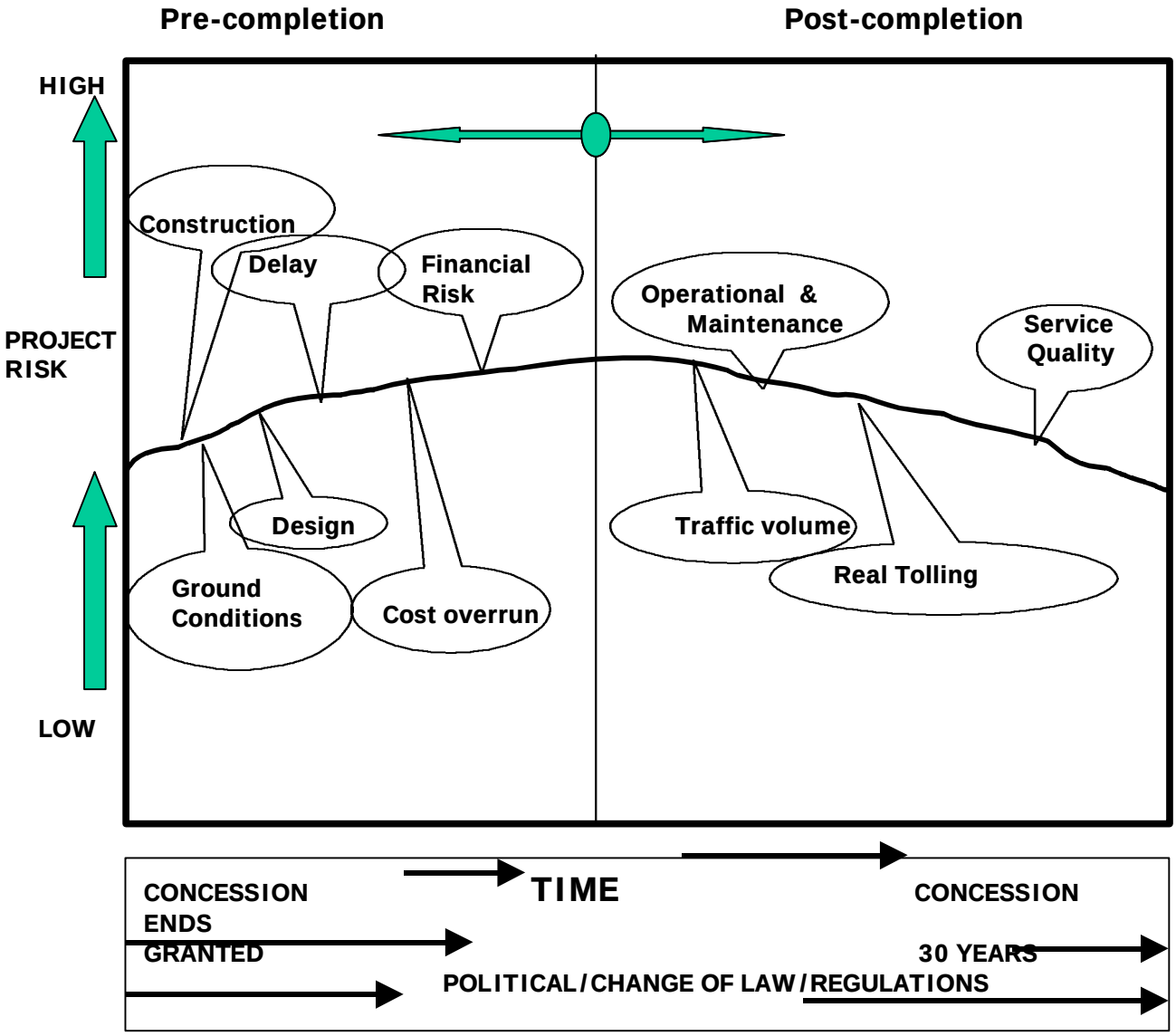

Figure 2. Projects Risk Factors for BOT Projects

d) Bidders now must determine positions of proposed toll plazas and negotiate with local communities and role-players. All socio-economic and public participation aspects of this negotiation need to be in place prior to serious evaluation of a bid. This lessons was learnt on the Maputo Corridor where communities were separated and traffic figures generated by local traffic increased dramatically with a negative impact on local user discounts.

e) BOT projects had, as an objective, certain empowerment targets to more closely involve the local communities in the projects. The empowerment objectives of BOT projects have been on target and proved to be sustainable. There is however still much to be done inter-departmentally to ensure major initiatives from various government agencies are co-ordinated and phased in a region to give added sustainability to empowerment activities.

f) A procedure developed for unsolicited bids was put into place, and is being

refined to better meet the needs of public and private sector. Proposals are now investigated aggressively for economic viability prior to giving the proposal maker development status. During the development status phase funding for the further development of the proposal is provided by SANRAL. The refined proposal is then exposed to the normal tender invitation phase to ensure lowest cost will be achieved. The original proposal originator can then continue to team up with bidder consortiums or quit. At least two unsolicited bids of a total proposal lot of about 40 have now reached developer status. This approach tends to enable consultants to be more innovative than before, since their initial cost recovery is better guaranteed than it was when linking up with contractors on an at-risk basis.

4. ROAD MAINTENANCE BY CONTRACT IN SOUTH AFRICA

4.1 Policy

Internationally the concept of road maintenance with private sector involvement is well established. In some countries the privatisation of road maintenance was implemented years ago (for instance in the UK, Spain, Canada, Australia and New Zealand). In other countries, such as the Netherlands, Zambia and Ghana, pilot projects have also been embarked upon. (Balcera at al, 1995 and Heggie, 1995)

A key element of the new SA National Transport Policy (DoT, 1996a) is the strong emphasis on close co-operation with the private sector. It commits itself to create a climate which "encourages private participation in the ownership, planning, financing, construction, maintenance and management of transportation infrastructure". It also states "This should promote truly shared profit opportunities and risk-taking between government and the private sector, whenever this is possible and appropriate." (DOT, 1996c)

The effect of road construction on the economy is very direct, but with a limited sustained effect on employment creation. The indirect effects continue over time, albeit at a lower level.

When the focus is, however, on road maintenance, then there is a definite sustained effect over time on the local economy, albeit at a lower level than capital investment via construction projects. The indirect effect of maintenance activities also has a longer-term effect in sustaining jobs better. NDoT recognised that road maintenance offered the possibility of a partnership between government and the previously disadvantaged sector if the contracts could be appropriately structured. This meant the development and support of emerging contractors.

If road maintenance programmes involving emerging contractors, also involved a benefit/cost analysis which includes a welfare distribution analysis, e.g. including social benefits and costs (Pienaar, 1997), the positive effect has much stronger effects in welfare redistribution. These are issues at the heart of the empowerment motive linked to road maintenance activities in SA.

4.2 New specifications and tender documentation

The NDoT recognised from the outset that the present tender documentation and specifications used on road maintenance and construction projects are not suited to

the empowered involvement of SMME contractors. Documentation procedures used in South Africa and elsewhere in the world were considered. The FIDIC contract documentation used by the World Bank and the New Engineering Contract (NEC) were obvious considerations. The Committee of State Road Authorities (CSRA) from the previous SA dispensation developed very good sets of national specifications which were in general use in SA. The traditional General Condition of Contract was also investigated to ascertain which would best suit the needs of the NDoT in using and empowering SMMEs and ensuring delivery of routine road maintenance services. All of these procedures have potential, but the CSRA documentation was found to be best suited if adjusted to facilitate the incorporation of SMMEs and if an evolutionary phasing in of contracts on the National Road network was to be followed.

It was further recognised that the implementation strategy decided on involved the use of established consultants and contractors as managing and mentoring agents with understanding and experience of the present tender and specification system. It was also recognised that the various Provincial Road Authorities, which traditionally acted as agents for the NDoT on maintenance of National Routes also needed to be incorporated into a system which can contractually bind them to value for money and actual accountability for funding received. For that reason it was decided to rewrite some of the clauses which relate to SMME involvement and compile it in one comprehensive document for use in this implementation phase.

This comprehensive tender and specification document built on previous research effort for the NDoT for SMME type new works. This documentation described each activity in detail based on the previously mentioned CASRA specifications. Maintenance activities were added to the specifications. The CSRA clause reference and layout methods were used to enhance familiarity and continuity. Typically maintenance activities received a prefix “m”. Additional activities, which were identified by workshopping this document with the regional engineers of the DOT, were included in the final draft.

4.3 Implementation and progress

An implementation strategy was followed by the NDoT where 8 Route Managers were appointed by the NDoT on sections of 100 to 150 km lengths of National Routes which were not maintained by Provincial Authorities at that time as agents for the NDoT in 1997/98. The Route Managers were joint appointments of established consulting firms with previously disadvantaged firms in order to maximise the total empowerment effect.

The task of these Route Managers was to do a detailed inspection of maintenance needs, create an inventory, break it down into activities as described in the comprehensive specifications document, get a cost estimate and put these jobs out to tender. The adjudication procedure prescribed in this comprehensive specification document ensured that the promotion and use of SMME contractors and empowerment and training were built into the successful tenders.

The average cost per km for routine maintenance done by the provincial maintenance gangs pre-1998 was in the order of A$ 2 000/km for rural areas and about A$ 5 000/km in urban environments. This was restricted to work only on the road surface and excluded any work in the road reserve, e.g. litter picking and

vegetation control. Such items were seen as extra by the provinces and anything that looked like a light rehabilitation, e.g. fog sprays or chip and sprays were also motivated as requiring extra funding. The cost figures quoted above therefore in effect amounted to about double these amounts. The backlogs and increased scope of work included in the new contracts led to a doubling of the annual maintenance budget handled by SANRAL for NDoT. The SANRAL annual budget for road maintenance is now in the order of A$ 40 to 50 million (R120 to 150 million) per annum.

No performance indicators or average maintenance costs were available when the pilot projects were initiated in 1997/98. A costing system was developed, Maintcost", which started recording average cost per item for all the contracts. It is impossible to compare the previous situation with the present maintenance by contract, but the following cost figures are available.

- A typical rural section now costs A$ 1 660/km for the full road reserve maintenance versus A$ 2000 pre-1998 for lesser work in the road reserve.
- A typical urban maintenance contract around Johannesburg cost A$ 6 600/km versus A$ 5 000 pre-1998. The previous dispensation, as stated before, involved less work, though. This specific contract is seen as an outlier demanding such high cost due to high traffic figures (the highest in SA) and number of lanes.
- A typical urban maintenance contract around a smaller urban centre cost A$3900/km versus A$5000/km pre-1998, again for doing more work now.

In Figures 3 and 4, on the next page, typical estimated costs versus actual costs are shown and a breakdown per maintenance activity. SANRAL nevertheless believes that much better value for money is obtained, particularly if measured against a fairly simple measure such as:

Value for money = Level of service or performance/Cost

Initially only 8 national road sections of 120 to 180 km were let on contract in 1997. The initial contracts were for 2 years with the option of 1 year extension. Overseas experience (e.g. British Columbia) has also started in such a way and has increased the contract periods now to 5 years. During 1998 the total number of contracts let was 32 covering the total 7 500 km of present National Roads network. Average contract road lengths range from 120 to 200 km. One or two sections stretch to 350 km in the arid rural areas. The evolutionary learning curve of these road maintenance contracts is demonstrated by the fact that the new contract periods were extended to 5 years with a 2 year extension period. In the previous round only 2 contracts were terminated after the initial 2 years due to non-performance.

The empowerment objectives with the involvement of SMME contractors were generally met in all cases. The use of consultants as route managers and main contractors managing the SMME sub-contractors also contributed towards a steep learning curve for the SMMEs. Their biggest concern was sustainability and need to be multi-skilled. The extended contract periods achieved the sustainability objective while better work packaging and scheduling were learnt very quickly by the SMMEs.

4.4 Product Performance Guarantee System

The Product Performance Guarantee System (PPGS) application in South Africa and initiative had its birth at the CAPSA'94 conference (Bonnot, 1994 and Horak and Strauss, 1994). As the name indicates, it focuses more on innovative products and technology and particularly that of asphalt products.

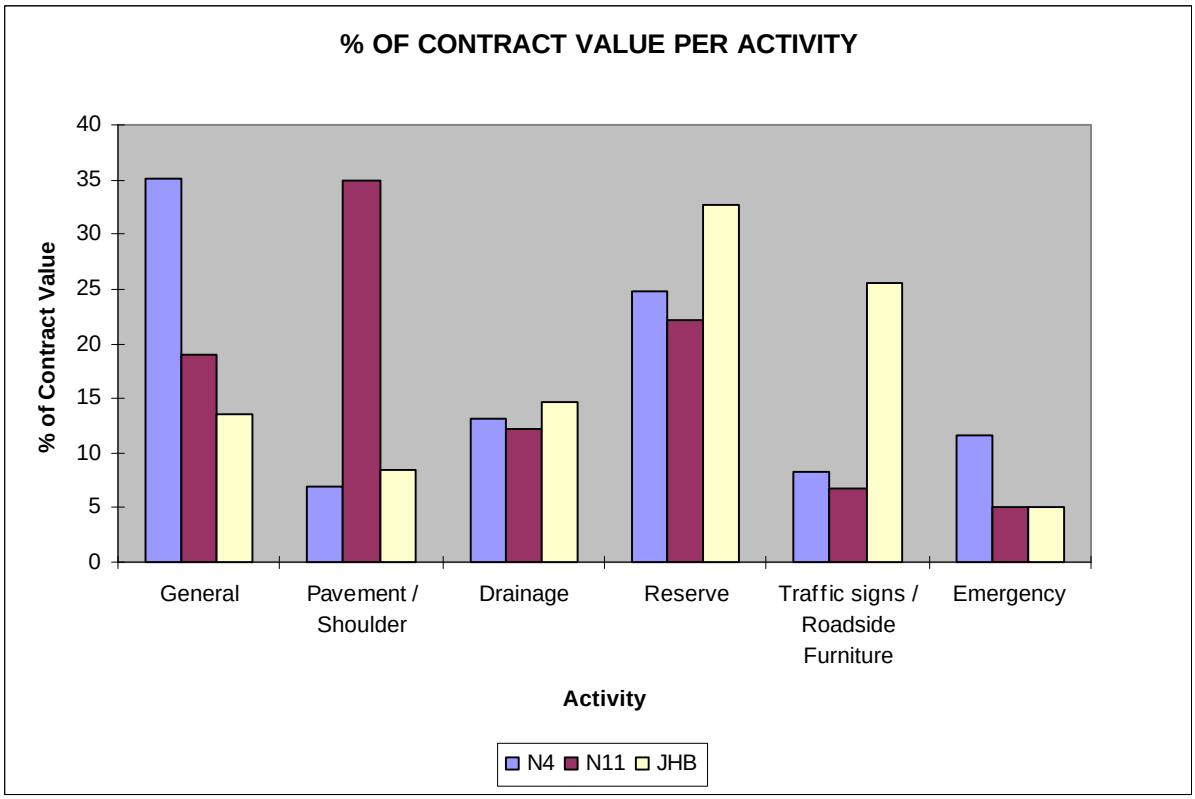

Figure 3: Percentage of cost per maintenance activity

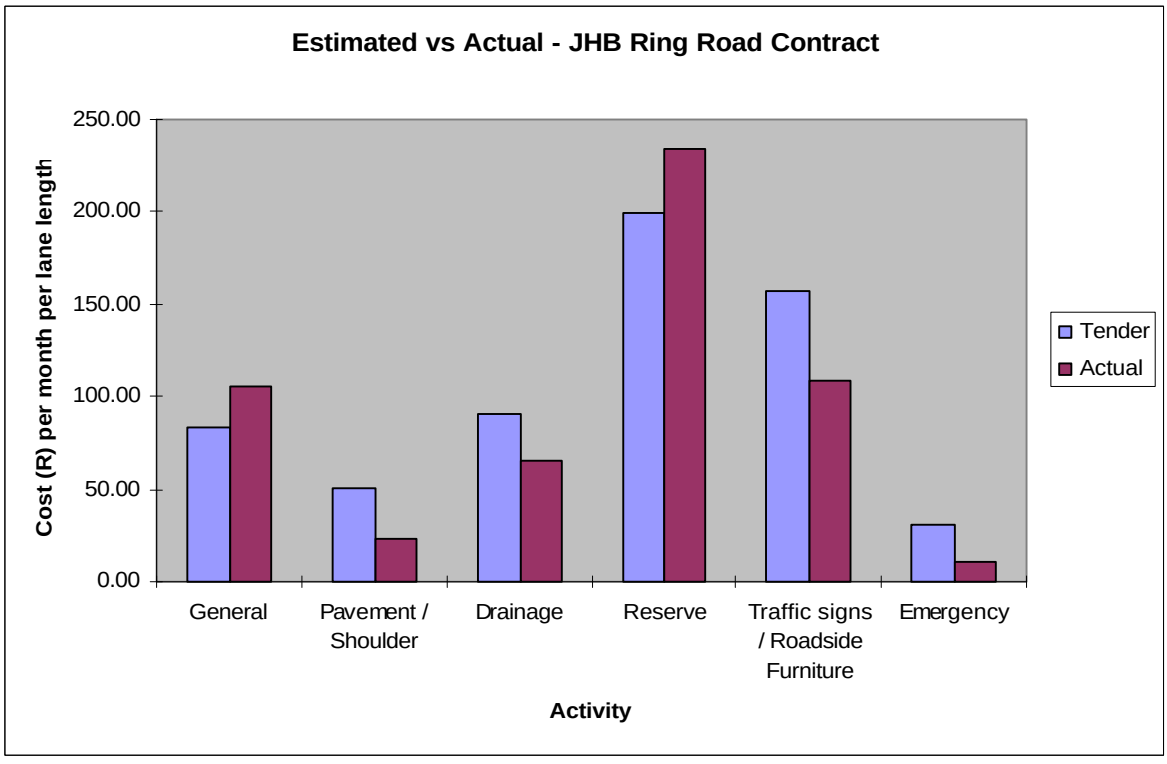

FIGURE 4. Estimated versus actual maintenance costs

This has been the output of a strong partnership between the asphalt industry (and the asphalt industry body SABITA) and the government agency (NDoT) with its consulting engineers. The pilot PPGS project in KwaZulu Natal province showed all players the need to work together in what was a new area. At pilot project, it was clear that proper understanding and definition of performance and specific indicators was needed from a contractual viewpoint. All the parties sat down together to work these out, and they have formed the basis of the performance specifications in South Africa today.

Key things stood out in this partnership:

- Mutual respect was evident between the various players
- The various staff had worked together previously on many industry and professional committees
- Open and frank discussion with an attitude of moving ahead together and teaching each other as it went forward
- A willingness to own up when someone did not understand any aspect
- The positive role played by the industry association, SABITA[2], in creating the right atmosphere for partnering
- The commitment to go ahead based on the principle, even though the details were not then settled (and as it turned out couldn't have been settled until the pilot project had been run which taught everyone enough to settle them)
- When there was distress after the first year on some sections, the players all sat together to see how serious the problems really were, see if the specification should be changed, see if the modified bitumen really was sub-standard, and how performance could be restored. This was a very different meeting from the historic confrontational meeting that prevailed only recently, and the results moved the industry forward rather then dragged things down.

5. PARTNERING IN LABORATORY SERVICES IN THE ASPHALT ROADS INDUSTRY

The emergence of the new democratic South Africa is associated with institutional changes affecting most road authorities. The increase in number of Provinces in the new South Africa has led to a redistribution and loss of laboratory expertise and resources in their road departments. This had a major impact on the functioning of road laboratories at various levels of government.

The NDoT commercialisation process can illustrate the impact. Once laboratory services were not featured as a core service of SANRAL, their main and regional laboratories at Pietermaritzburg, Pretoria and Cape Town were phased out, and as a result, there was the loss of the pool of expertise in the field of road materials, testing and laboratories.

- A new delivery method was needed for the provision of quality, accredited specialised asphalt laboratory and surveillance services.

[2] Who are perceived to be fair, independent and professional

This was paralleled by the emerging need for contractors to take on responsibility for pavement surveillance in the new type of BOT and PPGS contracts that were coming out at the same time. This was a totally new area for them, since it had been completely under road authority control previously, and there was a lack of skills and equipment to be addressed there as well.

The existence of some pioneering specialist laboratories in asphalt, concrete and soils even in the previous dispensation and some pioneering feasibility exercises by the authors in this regard in Gauteng province, showed a way forward in the re-engineering of the delivery of asphalt and road surveillance services. The lessons learnt in the creation and operation of the forerunner laboratory companies were viewed as a valuable resource and were therefore pooled in the re-engineering process.

It was decided to create a commercial service provider company which addressed the need for cutting edge non-destructive road surveillance testing and equipment, coupled with asphalt and binder laboratory services. This unusual coupling allowed a broader base to be created to soften the troughs in the demand associated with single equipment and surveillance service in a "narrow" market. It also had the benefit of providing multi-skilled work opportunities for the career development of operators and laboratory personnel. The specialist nature and natural inter-linking of the two fields supported this coupling.

The basis for this new company was partnering - in terms of ownership and customers. Initially there were 3 shareholders. Colas SA (supplier) therefore contributed its fully operational asphalt laboratory and associated human resources. One major consulting firm contributed a newly acquired Falling Weight Deflectometer (FWD) and another consulting firm its new Griptester and the custom built high-speed profilometer to enhance the road surveillance suite of equipment.

SRT grew by bringing in the Durban asphalt laboratory of Bitutek[3] , and the FWD testing service of the IDM company Further shareholders came on-board to wide the represtation and extend the nature of partnering. They included both consultants and contractors, to the point where the shareholding of SRT can now be stated to be very broad based in its support.

6. LINK WITH THE ACADEMIC SECTOR

The Universities of Pretoria and Witwatersrand, like other higher education institutions, are faced with dwindling government subsidies, increased pressure to promote research and technology development and to make more effective use of expensive laboratory facilities. The need for better utilization of facilities is incidentally promoted by the new legislation on higher education, which also promoted collaboration between educational institutions.

With the need to move from the initial premises at Isando, SRT moved to the South Campus of University of Pretoria. The intention was to link up with education facilitation. At the same time, DoT were looking to dispose of their now-redundant

[3] Itself a forerunner in partnering, with 7 consulting engineers and one supplier as shareholders. It is no doubt that the respect and relationships built up in running Bitutek were material in making the PPGS pilot project work as well.

laboratory equipment, and were free to donate equipment to other government departments or to be used by education institutions.

NDoT supported the principle of pooling of resources to the benefit of the broader industry. In support of its initiative to support the Northern Center of Development, they donated asphalt testing equipment in 1998 to the University of Pretoria provided the University of the Witwatersrand also had access to it. Such donated laboratory equipment, as well as those of SRT, was to be made available to students from these two universities for research and education purposes. Apart from these specific specialist laboratory items, DoT donations were made to various government departments and to technikons.

This laboratory is a truly pooled resource from a broad based group of role players in the roads industry. It is a specialised asphalt and binder laboratory which can fulfil the commercial needs of all role players in the roads industry and is still used fruitfully by both mentioned universities for training, education and research needs. These are facilities that both universities did not previously have. It has also substantially contributed to other subsequent collaborative efforts between these two university departments of Civil Engineering.

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