

ARE THERE OPPORTUNITIES FOR PUBLIC PRIVATE PARTNERSHIPS (PPP) TO DELIVER MORE EFFECTIVE ROAD ASSET MANAGEMENT SOLUTIONS?

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ABSTRACT

Road Asset Management is generally the remit of central and local government. There is a challenge to develop smarter financial, sustainable and efficient models through long-term partnership arrangements between the public and private sectors that deliver strategic, technical, financial and commercial benefits to the tax payer and society.

Often there is a mismatch between the current road network condition, and today's expected level of service. This paper will explore the dynamics and opportunities for using Public Private Partnerships (PPP) to drive improved levels of service, road safety, value for money and long-term management of risk. The paper will question whether accepting the status quo is really acceptable.

The authors will draw upon a unique international experience of PPP's for roading service provision based on specified outcomes, technical modelling and risk allocation. The paper discusses, amongst other aspects, the use of pavement asset management principles including surface condition, operational skid resistance performance, residual design life and ride quality. It challenges what mechanisms of payment would stimulate innovation and kick start long term benefits for the asset owner and society.

The paper identifies a number of areas that could be developed holistically to generate some challenging ideas, and to promote consistency, clarity and reality in the long term maintenance of a regional roading network .

INTRODUCTION

This paper sets out to be controversial.

It is intended to provoke debate and encourage conversation around existing practices, and challenges a response to the premise that the roading industry has become complacent and stagnant.

The paper is purposely not technical and will leave the full technical analysis of pavement surface friction to other authors.

This paper will, however, promote that the public sector has a mandate to continually strive for improvements in delivery and the identification of efficiencies. The roading industry has to get out of its complacency mode, and refocus around understanding consequential expectations, whilst challenging current and past practices.

An opportunity to break the current stagnation is through a Public Private Partnership (PPP) approach applied to network-wide maintenance. The premise used in this paper is around a PPP contract for whole roading network management; this is a model that is finding increased traction particularly in the United Kingdom.

The views and opinions expressed in this paper are those of the authors. They do not necessarily accord with the policies of Auckland Transport or AECOM.

PUBLIC PRIVATE PARTNERSHIPS (PPP'S)

PPP's can be defined as an arrangement between the public and private sectors to deliver a specified service over an extended period of time. The arrangements can be considered as being one of the purest forms of asset management in that the public sector defines contractual levels of service, largely in terms of specified outcomes. In turn, the private sector has the opportunity to engineer solutions to best deliver these outcomes and maximise financial return. Failure to meet the outcomes specified can lead to payment deductions and/or other incentivisation measures, which may as an ultimate sanction result in step-in rights or contract termination.

The contract structure itself has to be flexible, depending upon the risk allocation between the participants. For the management of existing roading networks, the contractual focus is on the availability and performance of the network to specified PPP standards, with deductions of payments, if availability and performance targets are not met. This results in the Service Company taking an increased cognisance of whole of life issues (and consequential impacts) with the design, construction and maintenance regimes.

The PPP Service Company has opportunity to drive some radical solutions, by demanding that the road environment is adopted as a Total Environment, and that any impact/interruption to that environment will have a financial and contractual consequence.

For example a utility company excavating the road to replace underground apparatus. In many cases the reinstatement may be of very poor quality, and have no cognisance to the safety dynamics of the road surface such as ensuring similar macro and micro textures to the existing road surface, roughness, joint smoothness, joint waterproofing, or road markings. The challenge for the Service Company lies in requiring that any work performed on the road is of an identical quality and performance as the surrounding road and is undertaken correctly first time.

It is accepted that commercial factors are often the cause of poor workmanship and the use of inappropriate materials. However, the cost of not doing work right the first time will often impact the customer and the community considerably more in terms of disruption and inconvenience. A PPP will often drive greater compliance through a higher level of audit and targeting of poor practices.

Similarly traffic disruption and delays would be evaluated, and modelled for planned work, and overruns would impact upon network availability payments, whilst unplanned work would incur payment deductions.

Under a PPP contract the Service Company can be made financially accountable for unplanned disruptions and delays on the network due to a number of reasons:

- Utilities operations
- Accidents
- Illegal parking and unloading/loading of trucks
- Illegal usage of HOV lanes
- Clearways obstructions
- Road maintenance operations
- Road capital works
- Inappropriate phasing/operations of signals

Further financial impacts can be incurred in not meeting physical performance standards in:

- Roughness
- Friction intervention levels, and frictional continuity
- Conspectuity of signs and road markings

- Pavement residual life
- Signal operational maintenance
- Street lighting maintenance
- Vegetation controls
- Rubbish collections
- Footpaths (roughness/trips)

Many would argue that these elements will be aggressively challenged, as non-standard, unfair, incorrectly focussed, unbankable, and possibly inoperable. However, they are the fundamental issues that matter to customers and a PPP could provide the opportunity to thinking somewhat laterally and progressively, to get the industry revitalised.

FRictional Performance and PPP'S

For the development of a PPP contract it is critical that there is sufficient and accurate pavement condition data on which the potential Service Company can assess risk and undertake technical modelling to acquire a robust price. Too often this data is incomplete or lacks sufficient historical data to enable trends to be established. This impacts upon the reliability of the base line information upon which the payment mechanism often hinges. This is a significant risk for both the Client and the Service Company.

The process and reliability of data in terms of quality of skid resistance surveys (as well as physical pavement condition and residual life) gathered for urban networks such as Auckland (as an example), has been historically inconsistent, due to previous City Councils having differing standards and priorities. This has had an immediate impact for the newly formed Auckland Transport (an operating arm of the new Auckland Council), in that the regional road network does not have a balanced and strategic database. This historical inconsistency also highlights that the performance expectation of the road network is not in compliance with current specifications, which in itself creates a number of challenges.

To create a strong and confident database of network condition, there is urgent need to develop innovative approaches to allow substantial urban surveys to be performed with high levels of consistency and data accuracy. This will require the current specification(s) to be modified by utilising international best practise or by developing local research programmes

This should address such issues as friction surveys being undertaken outside prescribed periods; no seasonal corrective factor applied and survey coverage being inconsistent and used for local project specific reasons.(This refers to not only the annual survey, but also all the local surveys undertaken by different parties using a variety of output criteria).

The suitability and repeatability of the spectrum of surveys is often doubtful. Surveys are sensitive to seasonal variations and the differences between particular years, along with changes in traffic patterns due to active traffic management. The data is also influenced by the amount and quality of routine road maintenance undertaken, especially patching and utility reinstatements.

It is imperative that there is an understanding that all measurements are accurate only at the time of the actual survey, and consistent measurements are imperative over a long period of time to understand the rate of deterioration.

Whilst there is a necessary acceptance of the intrinsic flaws associated with pavement data collection, this is difficult to quantify numerically. What is clear is that survey data collection methodology needs to be different for the rural and urban environments to reflect the specific urban road frictional characteristics and demands. However, if this change is implemented the resulting data from both the rural and urban environments needs to be compatible in order that a whole network view is obtained.

CHALLENGES THAT COULD BE OVERCOME BY PPP'S

Network Governance

The majority of transport strategies in Australasia have in some way acknowledged the importance of safety as part of the outcome or justification. Most of these strategies focus on Engineering, Enforcement and Education with little guidance on how these individual strands should be holistically applied and success measured across discrete delivery organisations. Instead we have individual client organisations, often with different corporate objectives, impacting on the roading environment. What is clearly missing is the understanding that the majority of these organisations are publicly funded and that the tax payer has little or no interest in organisational boundaries and responsibilities.

The Challenge

How can the various public sector bodies develop a holistic, non-political integrated governance of the roading environment embracing the need for a coordinated 'best for customer' approach?

Authors Views

There is no easy answer to this challenge. Organisations have by their very nature different objectives and goals and have different funding mechanisms, aspirations and understanding about delivery and customer service. The difficulty is developing an overarching leadership framework that spans across organisational boundaries to set region-wide performance indicators against which the combined public sector performance is measured. The problem would be accountability and the need for a mature approach when issues arise.

If a PPP were to be developed and operated across a region-wide urban network, the specific network outcomes can be specified focussing on delivering enhanced customer service across all funding streams. These outcomes could be targeted around reducing congestion caused by road works, minimising construction based noise, improved reinstatement standards, and reducing unplanned 'emergency' work.

Experience has demonstrated that where a PPP Service Company has been given responsibility for overseeing and coordinating utility works on the roading network, then greater coordination of road openings and a reduction in unplanned work has resulted. The potential customer benefits in expanding this concept across all public sector and utility organisation could potentially be immense.

Current Practices

The roading industry is conservative by nature and reluctant to adopt new practices, methods or materials. Standard solutions in terms of pavement construction, road markings, lighting and signage are delivered often as a result of competitive fee bidding and a focus around the initial capex cost.

Too often standard design solutions and construction methods are employed because they were either accepted by the Client last time, or because trying something new takes too much effort or increases risk. There is little acknowledgement of whole of life costing principles, and more importantly consequential impacts, which include financial, social and technical.

The industry remains inward looking and fearful of looking outside the square and challenging the basics.

The Challenge

How can the industry seriously embrace innovation and a significant step change, whilst understanding and managing the financial risks?

Authors Views

There is no understanding or appreciation of the consequential impacts of road works. The current drivers continue to be short-sighted and only look at the rate of discount and the immediate impact. Consequentiality needs to be part of the payment/decision making matrix and a focus around taking a longer term view around investment and maintenance decisions.

A PPP contract spanning 25 or more years is forced to look at long-term planning. The investment decisions will be made around the appropriate choice of materials and methods to meet not only the outcomes specified but also to ensure that the technical deterioration model assumptions around dates for future interventions are met. This will lead to innovation or change of 'accepted' normal practices such as full depth pavement recycling, the use of higher quality surfacing materials. The benefits to the customer are often a safer network, shorter construction periods and less frequent intervention intervals. The risk of using these techniques and materials falls to the Service Company as would any potential cost saving. It is clear that bringing a commercial approach to network management will, given the right operational and financial framework, deliver innovation and change.

The Intelligent Client?

In the roading industry the 'intelligent' client procures work through various fee-based mechanisms without really having the knowledge to challenge what is being produced. The current business models are essentially focussed around lowest price and lowest acceptable quality to the customer. This is a natural consequence of price competition and a lack of product knowledge by the customer.

What is often missing is the experienced engineer with local knowledge of the network who intuitively knows failed or stable road pavements for example. You cannot specify local knowledge.

Question

How often do Clients really know what they are asking for in contracts and specifications?

Authors Views

Most Clients do not appear to have a breadth and depth of commercial awareness or acumen (they do, however have a very good appreciation of the rules of spending public money and the responsibilities of following procurement rules). In contrast the consultant and construction industry can only survive on having acute commercial acumen. Therefore a chasm exists between the parties. For the Client to understand what he actually needs, to develop a proper scope and a formal contract that embraces all aspects, requires the inputs of others outside his arena. Interestingly the Client has to be able to assess technical requirement and solutions, but also have a significant skill, and capability in social and community sensitivity.

The other parties (consultants and contractors) are by definition technical engineers, who deliver often purely technical solutions. However, in today's society there is a substantial demand from communities for social engineering aspects to be considered. These include noise generation, traffic diversion routes, temporary mitigating measures, consultation, communication and other people based softer skills. This is an area that is often poorly understood and appreciated by these parties. Application of technical capability needs to be aligned and integrated with these social engineering challenges.

Within a PPP environment, the Client often does not have to take too much cognisance of these issues. Once appropriate outcome specifications have been established and tailored to the payment mechanism, then the risk of design and delivery lies with the Service Company. This can equally apply to dealing with customers and those impacted upon works. The Client's focus should be around the outcome not the method used to achieve it. These outcomes can be as simple as keeping grass in berms and verges between 25mm and 75mm in length or something more complicated such as road pavement condition. Additionally, there is no reason why

appropriate outcomes can be specified for customer satisfaction, either for particular aspects of a service or for the service as a whole. This approach could, subject to the national legal framework in place, be extended to dealing with third party litigation for alleged defects in the road.

Does Quality Assurance Deliver?

Quality Assurance and associated systems have been in place for a considerable period of time. The intent is to have a verified documented trail of the design and construction process so that all parties involved in the process understand and perform in accordance within the project terms and conditions.

However it is becoming more evident that Quality Assurance is undertaken as a required process that is not integrated into the actual task system. The paperwork is duly filled out and receives the appropriate tick/stamp. What the industry is not getting is real tangible quality workmanship with quality materials and products.

If the time and money spent on having Quality Assurance systems that just tick the boxes was redirected in to doing the job properly first time without trying to cut corners or supply cheaper materials, then the whole industry would benefit through less rework or acceptance of a non-conforming product and a more durable and longer performing asset.

The Challenge

Does Quality Assurance deliver tangible benefits to the industry?

Authors View

Quality Assurance as a process is fundamentally sound. It sets out to provide a fully documented and verifiable audit trail to ensure that the product complies with the specification and standard required. It generally does not make comment about the appropriateness of that specification.

It can be argued that within a PPP environment, Quality Assurance for the Client is largely redundant. The Service Company has taken the risk for the design, construction and operation of the asset, with the Client only interested in outcomes and the condition on hand back.

As an example

There are numerous sites that have over the years had high friction surfacing material applied, using industry best practice and/or manufacturers' specifications. However there have been a number of consistent failures after a short service life that renders dependability into question. How is it that failures still occur? There is little or no appetite by the industry to provide a long-term bond (warranty) for this type of work. A PPP would negate this issue entirely, as the Service Company would have to hold frictional performance above the minimum intervention threshold irrespective of the reasons or rationale

Technical Skills

As part of an asset programme there is a substantial amount of asset data collected, primarily from surveys (SCRIM, Griptest, FWD, Benkelman Beam, High Speed Data Collection, and visual) on a regular basis. The data collected has been refined over years on the basis that greater understanding and predictive outputs will allow greater accuracy on funding justification and allocation.

The issue being created is that the industry no longer has the wisdom/skill/experience to use practical assessment and understanding. We are today expecting our young engineers to readily accept whatever "answers" the computer gives, without reality checks or the application of common sense. We are rapidly losing Engineering Capability, and becoming merely technocrats.

The Challenge

How can we re-establish a balance between modelling outputs and on the ground condition status, so that engineering skills are developed, not lost?

Authors Views

Maybe the solution lies in going back to basics and insisting that all young engineers start with getting their hands dirty, and actually doing the dirty work. Let them build personal capability, competence and experience.

We need to develop engineers who have engineering judgement and local experience and this takes time. We need to take the young engineers and give them a through grounding all aspects of design, construction and operation.

Within a PPP environment, with a 25-year or longer contract, there is an opportunity for the industry to develop graduate and technician training programmes which meet the current and future needs of the contract. It is an environment where innovation is encouraged and a wide range of engineering activities can be experienced. The initiative can be expanded to encompass school college students through participative events and work experience thereby raising life and career expectations, whilst supporting future staffing needs over the life of the contract.

Sustainability

The industry repeatedly assures itself that it is being sustainable and has a good grasp of reducing the environmental impacts. However there is an increasing use of high PSV aggregates for asphalts in high friction sites, as well as the meeting the mandate of overall reduction of accidents. The current specifications do not allow 100% recycling, so continuation of using virgin, high premium rock continues. More significantly only about 10% of the high friction aggregate used in asphalts actually can do the job of imparting high friction to the road surface, the rest sits inside the asphalt being totally useless.

We continue to use various types of road marking systems, especially in urban situations, that have very poor effective durability and more seriously, have almost no night time effectiveness in rain or standing water. The same situation occurs with raised reflective pavement markers (RRPMs). Their apparent durability to operate effectively in retro reflective outputs appears to be extremely limited, despite assurances about operational life and performance.

There is serious need for the industry to go back to the basic principles and constructively challenge the way specifications and expectations have developed. If road markings were developed to work "effectively" in heavy rain at night then we should expect a realistic improvement in accident statistics, and a consequential reduction in delay and disruption on the network.

The Challenge

Why do we continue to accept the status quo?

Authors Views

The performance expectations and financial penalties would incentivise the PPP Service Company to seek solutions with long life performance and guaranteed service life. The Service Company would be released from all method based specifications and would also be charged with developing specifications that were based on actual performance. This approach could challenge some of the most fundamental principles currently prevalent in the roading industry.

Real Life Interactive Performance

The safety performance of a vehicle includes the interaction between the rubber tyre and the frictional performance of the road surface. A great deal of time, effort and money is spent in developing and understanding the dynamics of rubber tyres, the frictional performance and durability of road surfacing, and how to develop greater safety. In New Zealand there is a mandatory vehicle inspection every six months (for vehicles over 5 years of age). Besides this check there is no other mechanism in place to monitor tyre tread depth/condition. But we have regular random speed checks, and also random driver breath analysis (for alcohol and drugs).

The Challenge

Why do we not develop random tyre condition checks, as part of the proactive driver programme?

Authors Views

Accidents occur for a multitude of reasons, none of which are apparently due to driver error or fault. Within a regional network the overall speed zoning keeps speeds within a slower speed medium than found on motorways or rural locations. Besides the financial and medical costs of accident (rarely fatal), the most significant costs are delay and congestion impacts. Understanding the reasons behind accidents, the education of drivers and the appreciation of the road environment will all have a part to play. BUT there is an ongoing risk that we divorce drivers from accidents, and that society begins to accept that it is not the drivers fault. One innovative aspect that could be introduced is the development of Tyre Tread Monitoring Plates, which are set in the road surface (much like weigh-in motion plates), These plates would be able to detect and measure tyre tread, pressure, tread patterns, tread deformations, wheel alignment, frictional performance in wet and dry conditions, speed and a host of associated physical conditions. With a variety of algorithms the outputs would allow a significant amount of data capture, permit the development of real life scenarios that could be developed into on road trials. Continuous filtered data outputs linked to NPR (number plate recognition software) could be linked to Enforcement Services, for fixed penalty notices to be issued.

SUMMARY

The introduction of a PPP in the road asset arena will require the Service Company to challenge some fundamental assumptions and traditions. These challenges should create strong and healthy debate about how roads are used, maintained and monitored. This paper has identified some aspects that are in serious need for improvement, and development. The current status quo does not seem to have the stimulus to activate such challenges. A PPP contract may break this apparent log jam, and revitalise the industry.

Another relevant and important theme of PPP's is that the payment mechanism has to be developed in a manner that continually drives actual improvements and performance of the asset. This will include not only the measureable elements of the physical asset, but also aspects such as reduction in accidents, reductions in disruption and delays, reduction in urban traffic noise, and tangible reduction in greenhouse gas emissions.

This paper is intended to be controversial. The authors hope that irrespective of whether their views are accepted by the industry, the paper will spark on-going conversation and debate.

AUTHOR BIOGRAPHIES

Jon Lewando

Jon Lewando is a Civil Engineer and is a Member of the Institute of Civil Engineers.

Jon has over 30 years' experience of road construction, management and maintenance. His experience initially in the UK, but the last 17 years has been in New Zealand with 3.5 year tenure in Australia.

His background has been, as a roading client (UK and NZ), and as a roading contractor (NZ and Australia). Strong experience in the pragmatic challenges of road surfacings (construction and/or maintenance), and the “on road” performance characteristics of the materials allowed him to introduce a hydro texturing process in Australia in 2001, which has had significant impact on asset and safety improvements.

More recently Jon has taken on a role with AECOM Consultants, as an Associate Director, Auckland Transportation Group.

Andy Finch

Andy Finch holds a degree in Civil and Structural Engineering and is a Member of the Institute of Civil Engineers. He also holds a post-graduate management qualification.

Andy has over 25 years’ experience of roading design, management and maintenance. The majority of this experience has been in the UK public sector working within local and national government. A key achievement was leading the development, procurement and delivery of a 25-year PPP contract for the rehabilitation and management of a local authority road network – an externalisation of roading asset management. The first in the UK.

In 2008 Andy immigrated to New Zealand where he has worked in the private sector delivering roading and public transport projects and maintenance strategies. He has recently been appointed Manager - Asset Management and Programming for Auckland Transport where he is establishing robust and innovate asset management processes.

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