

Sustainability of Flexible Pavements for Local Government

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Introduction

Local Government is focused on sustainability across the full range of services provided. Local and regional roads are the major asset class managed by councils so the sustainability of flexible pavements is a principal focus across the industry at present.

A survey carried out by the Roads & Transport Directorate in 2005/06¹ reported that road and bridge assets managed by local government in New South Wales have a replacement value of \$36.74 billion and that these assets are being consumed at the rate of \$587 million per annum. This represents a significant management issue on a Local, State and National level.

The Roads & Transport Directorate

The Roads & Transport Directorate was set up as a joint undertaking between the Local Government Association of NSW, the Shires Association of NSW and IPWEA (NSW). The Directorate commenced operations in October 2004. Funding for the Directorate is provided by annual contributions from member Councils. All Councils in NSW are eligible to become members.

The Purpose of the Roads and Transport Directorate is to assist Local Government in NSW to adopt and maintain best practice in the planning, provision and maintenance of local road infrastructure and transport related activities.

Background

At the 2005 Conference held in Surfers Paradise I presented a paper titled "*The Challenges of Making the Most of the Asset*"². The conclusions presented were:

- Better definition of pavement performance will result in better management of our road assets.
- The development of formal road asset management plans will allow councils to develop more useful long term costing models to ensure that optimum performance is obtained from their road assets.
- There is a need for better education of engineers, councilors and finance professionals in the principles of asset management if we are to obtain the best possible performance from our road assets.

¹ IPWEA (NSW) Roads & Transport Directorate – *Road Asset Benchmarking Project – Road Management*, September 2006

² Mick Savage IPWEA(NSW) – *The Challenge of Making the Most of the Asset*, AAPA Pavements Industry Conference, Surfers Paradise, September 2005.

The purpose of this paper is to provide an update on developments over the past two years and to suggest some areas where co-operation between the Asphalt and Local Government Industries might lead to mutual benefit.

Local Government Sustainability Inquiry

The Local Government and Shires Associations of NSW (LGSA) commissioned an Independent Inquiry into the Financial Sustainability of Local Government in NSW (Local Government Inquiry) to be completed by the end of April 2006. An independent Panel of three persons highly experienced in public policy making, completely autonomous of local government or its Associations, undertook the Inquiry.

On 3 May 2006 the Inquiry released its third and final publication, the *Final Report: Findings and Recommendations*³. The *Final Report* can be viewed on the Inquiry website at: www.lgi.org.au.

The Executive Summary states that the report:

It uncovers a number of pressing problems that need urgent attention. The biggest of these is a huge backlog in infrastructure renewals (over \$6 billion), which is expected to grow to almost \$21 billion within 15 years if the annual renewals gap (the difference between the rate at which councils' physical assets are depreciating and the rate at which they are being replaced) stays at around \$500 million per annum.

This report concludes that NSW Local Government needs to find an extra \$900 million a year to overcome its infrastructure crisis. \$400 million of this would go in debt charges to service a \$5.3 billion debt raising to overcome the infrastructure renewals backlog problem (excluding water and sewer assets). The remaining \$500 million would be used to close the annual gap between what is spent on renewing assets and what is actually consumed in assets as measured by their depreciation.

The Report also contains two recommendations of particular relevance to the management of assets, namely:

Recommendation 6: Infrastructure Management

The State Government provide financial incentives and technical assistance to enable all councils within three years to adopt a total asset management (TAM) system with consistent asset accounting practices , and

Recommendation 34: Long-Term Planning

All councils develop and adopt a long-term strategic and financial plan in close consultation with their communities that would be subject to annual external compliance audits and updated in the first year of each council's term.

³ Local Government and Shires Associations of NSW (LGSA), *Final Report: Findings and Recommendations Independent Inquiry into the Financial Sustainability of NSW Local Government*, May 2006

Following this report both the Local Government and Shires Associations of NSW and the NSW Department of Local Government established taskforces to establish implementation strategies arising from the report's recommendations. A final outcome in relation to asset management has not yet been released by the Department of Local Government, however, indications are that Local Government in NSW will soon have new, integrated planning requirements which will include a strategic financial plan (10 year) supported by a long term (20 year) asset management plan.

Valuation of Assets at Fair Value

Australian Accounting Standard AAS27 *Financial Reporting by Local Governments* is in the process of being replaced by AASB 116 *Property, Plant and Equipment*. Australian Accounting Standards Board (AASB) 116 deals with how to account for tangible fixed assets and covers acquisition, subsequent measurement including revaluations and depreciation, and disposal.

AASB 116 applies to reporting entities and those entities producing general purpose financial statements for periods beginning after 1 January 2005. It is also applicable to reporting entities in the non-profit sector. AASB 116 defines a 'not-for-profit' entity as an entity whose principal objective is not the generation of profit. This definition includes all Australian councils.

Because of the volume of information to be reviewed as part of this process an implementation schedule covering several years has been adopted. The timetable for the reporting of transport infrastructure asset at fair value is:

2007/08	Property plant and equipment, land, buildings and other.
2008/09	Roads, bridges, footpaths and drainage.

The effects of these changes will be to:

- Increase the reported value of infrastructure assets
- Require an objective assessment of the remaining life of assets
- Increase the importance of depreciation as an indicator
- Focus attention on strategic asset management.

A focus on asset management by local government will result in greater scrutiny of road construction and maintenance techniques and a demand for maximum performance from pavement systems.

Asset Management in Local Government

Over the past two years there has been little change in the number of NSW councils having asset management plans. The Roads & Transport Directorate Road Asset

Benchmarking Report⁴ identified only 19% of councils as having an adopted Road Asset Management Plan. Subsequent data collection confirms that this figure has not increased significantly.

However, change is about to occur with over 50 councils completing the first module of the NAMS.PLUS Asset Management Programme developed by IPWEA. It is expected that 60 or 70 councils will have completed asset management plans by the middle of 2008.

Each of these asset management plans will address the following issues which will have implications for the Asphalt Industry:

1. Levels of Service

Ultimately, levels of service will be determined through a community consultation process as part of each council's strategic planning process. To do this, councils will have to provide level of service options together with the cost of those options. The result will be the establishment of different levels of service based on functional road hierarchy resulting in an overall reduction in resources allocated to the road network. Outcomes will differ between communities because of their abilities to meet the costs incurred.

2. Service Demand

Pavement design is based on knowledge of service demands that will be applied over its operating life. Poor prediction of increasing demand will result in a reduction of service life and a corresponding increase in costs. This has become a significant issue for Local Government with the introduction of Higher Mass Limits (HML) in NSW.

3. Life Cycle Management Plans

In order to prepare life cycle management plans based on whole of life costing, asset managers need to know how each of the components of a road pavement will perform over the long term. For example, road asset managers need to know how long a wearing course will last and the ongoing maintenance costs as well as the upfront resheeting cost.

This is critical information that must be considered if we are to minimise the cost of providing the levels of service agreed to with the community. The asphalt industry will have the greatest impact on this area in the future. I will discuss a number of aspects of this impact in later sections.

4. Financial Projections

Once the information outlined in sections 1 to 3 above is known the final step is to develop a long term financial plan based on the life cycle management plans. The effectiveness of these long term financial projections is obviously dependant on the accuracy of the asset management plans on which they are based. Over time, these

⁴ IPWEA (NSW) Roads & Transport Directorate – *Road Asset Benchmarking Project – Road Management*, September 2006 p (i)

projections will incorporate the actual performance characteristics of the various pavement components.

Global Warming

Over the past two years there has been an increasing acceptance of global warming as being real and having an impact on local communities. Many local councils are now looking seriously at their carbon footprint and have established programmes to deal with the problem. The outcomes of these programmes are being reported to local communities as part of the annual reporting process. Communities are increasingly expecting their councils to take an active leadership role in dealing with global warming at the local level. An indication of the commitment of Local Government can be measured from the fact that a total of 225 of the 700 councils across Australia have signed onto the Cities for Climate Protection Programme being sponsored by The International Council for Local Environmental Initiatives (ICLEI).

Councils are trying to find ways to achieve a reduction in their carbon footprint by increased recycling, the identification of alternative new products and increased use of renewable energy. These considerations are increasingly being written into council procurement specifications.

So what? How do these issues impact on the *Sustainability of Flexible Pavements for Local Government* and how do they impact on the Asphalt Industry?

Asphalt Industry Implications

It is my view that the environment described above is in the process of changing the relationship between asset owners and asphalt suppliers which existed in the past. This is not to suggest that the relationship will become more difficult. In fact I think there is an opportunity now for Local Government and the Asphalt Industry to work together to produce enhanced results for both.

In the past, road authorities determined what products would be provided and where. Asphalt companies competed for business on price alone and performance was judged on the quantity of mix spread and the appearance of the pavement at the end of the paving job.

In the following sections I have outlined some areas where I consider that Local Government's approach to asphalt products is changing and where opportunities exist for the Asphalt Industry to become more involved in determining the long term performance of asphalt products.

Product Selection

As I stated above product selection in the past was based on meeting the requirements of the asset owner. It was not unusual that a council standard was to provide a 25mm asphalt resheet to all streets. Initially there was a key cut adjacent to the gutter and the

asphalt was applied across the existing surface. This resulted in the crown being raised with each application. In more recent times profiling has been used to overcome this problem.

This approach ignored the structural adequacy of pavements and certainly did not have regard to the minimisation of whole of life costs.

Councils are now concerned about minimising the whole of life cost of their road pavements. To achieve this they must have information on projected traffic loadings, pavement depth, pavement materials, pavement stiffness and deflection characteristics.

The marketplace now provides a considerable number of products, many of which can be modified in design and by the use of binder additives. In addition, communities also want to minimise the carbon footprint of all products and services purchased.

The correct selection of pavement materials has become a much more complex problem that requires matching of available products with the specific needs of road authorities. The minimisation of initial cost is no longer the main driver for product selection. In the immediate future councils will require information on initial cost, life of treatment, annual maintenance cost and replacement costs so that products can be considered on a whole of life basis. The “that’s the way we’ve always done it approach” is no longer adequate since that approach has led to our existing funding gap.

It is my view that the solution to this problem lies in the development of generic information on the performance of pavement design and product performance which will allow asset managers to select appropriate products to meet the service level needs of their communities. I am not advocating further research since there are a wealth of good design manuals and individual product specifications. What I am suggesting is the development of some basic principles which will allow asset managers to compare the whole of life costs of available pavement products on a sound technical basis.

Product Efficiency

My definition of product efficiency is simply the selection of the product that will provide the level of service required by the community at the minimum whole of life cost. This seems like a straightforward problem having a simple solution. It’s not! The issues that need to be addressed in reaching a solution include:

Product Selection:

- What level of service is required?
- What product life is expected (Years and ESAs)?
- What is the load distribution (ie % heavy vehicles etc)?
- What roughness is acceptable?
- What deflection is acceptable?
- What level of cracking can be tolerated?
- Are turning movements an issue?

Whole of Life Cost

- What is the initial cost?
- What are the rates of deterioration (roughness, deflection, cracking etc)

What are the annual maintenance costs (Including resurfacing, texture improvement, crack filling etc)?

How many applications will be required to achieve the required service life?

What are the costs of removal and reapplication (e.g. profiling and resheeting)?

What is the carbon footprint over the total service life?

What additional costs are required to meet council's greenhouse targets?

Residual value at end of life?

This reinforces the need to develop basic principles which will allow asset managers to compare the whole of life costs of available pavement products on a sound technical basis.

Product Effectiveness

Having selected a pavement product, there are several other issues under the heading of effectiveness that should be considered. These issues are critical in insuring that products perform as expected.

1. Correct Product Selection

Selection of the appropriate product for the job at hand is a critical consideration in the pavement management process. This applies in two ways: firstly making sure that the product is fit for purpose and will meet all aspects of the specification. Secondly, to ensure that the product provided does not far exceed the specification. Provision of a product which provides for a level of service in excess of the specification (eg increased thickness) means that resources are being unnecessarily consumed. This is unacceptable in an environment of scarce resources and already existing funding gaps.

2. Pavement Preparation

In order for a new wearing course to perform as designed the remainder of the pavement must properly prepared. Poor pavement preparation will usually result in poor wearing course performance.

As an example, I am monitoring a section of recent SMA seal which has been laid on a poorly prepared pavement. The original construction was a 30mm asphalt wearing course laid on a hand packed sandstone pavement. Preparation involved the profiling of 25mm of the wearing course and resheeting with 25mm of SMA. Profiling in some isolated sections removed all of the old asphalt exposing the underlying sandstone. Laying of a minimum thickness SMA over these areas has resulted in some bleeding of the SMA and porous sections of seal which allows water to seep out after rainfall (and to let water into the pavement during rainfall). This is not a problem with product selection, but rather a problem of poor job preparation. Both the asset manager and the asphalt contractor must be aware of the capability of products and insure that poor preparation does not result in poor product performance.

3. Quality Control

The final issue I would like to draw attention to is quality control. This issue is largely the responsibility of the contractor although asset managers can also have an impact in this area.

Again, by way of example, I am monitoring a recent paving job which has a 30mm AC wearing course. This would appear to be the appropriate surface treatment and pavement preparation and asphalt application and compaction appear to be satisfactory. The problem? There are two asphalt joints located on the outside edges of the running lanes which weep water following rain. This pavement is only two years old and I expect that potholing will occur along these joints in the near future. The pavement will not achieve its design life without some significant remedial work.

The cause of this problem appears to be the development of cold joints, a conclusion supported by knowing that the work was carried out during mid winter.

In order to obtain design performance from our road assets it is essential that pavements are constructed in accordance with best practice guidelines. Contractors must become more proactive in ensuring correct site preparation and maintaining quality control, particularly in relation to moisture and temperature conditions at the time of application.

Asset managers also have some responsibility in this area. How frequently has a contractor been called in the first week of a wet June with a statement that tens of thousands of dollars has just become available for resheeting providing it is spent by 30th June? Invariably this asphalt is laid, but are we obtaining value for money?

Education and Training

The solution to dealing with these issues can be achieved by developing a more uniform understanding of the techniques necessary to produce first class outcomes every time and dispersing this information within the industry through an enhanced programme of education and training. This programme must include asset managers as well as asphalt contractors. It is only through a clear understanding of these issues by both the owner and the contractor that we will be able to move towards maximizing the value of our road infrastructure,

Conclusion

In summary:

- The Local Government industry has recognised the need to minimise whole of life costs for its infrastructure assets to provide maximum return on the scarce resources available.
- The Asphalt Industry in conjunction with the Local Government Industry need to develop some basic principles which will allow asset managers to compare the whole of life costs of available pavement products on a sound technical basis.

- Asset Managers must assist contractors to become more proactive in ensuring correct site preparation and maintaining quality control, particularly in relation to moisture and temperature conditions at the time of application.
- Consideration needs to be given to developing a more uniform understanding of the techniques necessary to produce first class outcomes every time and dispersing this information within the industry through an enhanced programme of education and training.