

The Challenges of Making the Most of the Asset

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Introduction

Road assets are the largest group of assets owned and managed by councils across New South Wales. The best estimate of the total replacement value of local and regional roads in NSW is approximately \$13.2 billion. Management of these assets has largely been on an ad-hoc basis with outcomes being determined by the skills applied by individual engineers. It is only in recent years that formal road asset management systems have been developed and implemented. Even so, our knowledge of pavement asset performance is at best incomplete. Decision makers are still apprehensive about relying on the management strategies produced by these systems.

There is a need to better understand the performance of road pavements, to measure the condition of our networks and to determine cost effective long term financial strategies which will deliver assets in a condition which meets the needs of our community.

Within this environment there is a need for peak industry bodies such as IPWEA and AAPA to work together to develop new pavement strategies which will provide road assets of a quality which will satisfy community expectations within the scarce resources available to meet competing needs.

The Roads & Transport Directorate

The Roads & Transport Directorate has been set up to meet the demand from members of IPWEA (NSW) over the past few years to act as a focus for research activities and to provide technical advice.

Its main purpose is to assist Local Government in NSW in the area of road infrastructure and transport related activities by:

- Assisting members in discharging their road management roles in the most effective manner consistent with current legal obligations and the most recent technical practices particularly in the critical area of consistent and cost effective asset management;
- Assisting the IPWEA (NSW), the Local Government Association of NSW and the Shires Association of NSW, individual Councils and members in lobbying for a higher priority to be placed on road infrastructure provision and maintenance and for a more equitable share of resources and funding; and
- Providing for IPWEA members and Local Government a powerful technical and research resource on transport issues at regional, state and national level. The activities would be, as circumstances dictate, either proactive or reactive to achieve the optimum benefit for the region or state.

The Directorate commenced operation in October 2004 and has been involved in determining the needs of members and developing solutions to meet those needs.

Identified Issues

The range of issues that have been identified by the Directorate include:

- Asset Management
- Sources of Road Funding
- The Development of Road Asset Management Plans
- Support of the ARRB Road Deterioration Study
- Monitor the IPWEA National Asset Management Strategy (NAMS) "Asset Condition & Financial Reporting Guidelines" Project and implement the outcomes
- Sustainability
- Road design standards
- Timber Bridge Management
- Road and Transport planning issues
- Airport runway management

By far the most urgent and important issue confronting Local government at the present time is road asset management.

Road Asset Management

Each year councils in New South Wales are required to submit a *Special Schedule 7 Condition of Public Works* return with their annual financial statements. This schedule includes estimates of:

- Depreciation Rate
- Depreciation Expense
- Cost of the Asset
- Accumulated Depreciation
- Written down Value
- An Estimate of Asset Condition
- Estimated Cost to bring to a satisfactory standard
- Estimated Annual Maintenance Expense; and
- Program Maintenance Works for the Current Year

for each asset class. Depreciation rates are based on generic rates contained in AAS27 not the actual deterioration of the individual assets. Depreciation is applied on a straight line basis and does not take into account non-linear behavior of assets such as road pavements. There are no guidelines available to either engineers or finance managers to enable uniform and meaningful information systems to be developed.

The cost of assets is determined by the cost of constructing the asset at current cost and is therefore influenced by the cost of materials and construction efficiency.

The estimated cost to bring to a satisfactory standard is calculated within each council using its pavement management system or is estimated by experienced staff. The estimated annual maintenance expense is evaluated on a similar basis.

The result is that each council is reporting a large estimated cost to bring its road assets to a satisfactory standard. This estimate is increasing each year a situation that is supported by the observed worsening condition of the road network.

The difficulty faced by decision makers is that they cannot rely on the financial data that is available. The majority of councils do not have long term (greater than 20 years) financial plans based on accurate estimates. Such long term plans allow for the development of financing strategies to smooth the cost of asset management from year to year.

The Roads & Transport Directorate is currently undertaking a Road Asset Benchmarking Project to provide a snapshot of the current reported condition of regional and local roads in NSW, an estimate of the shortfall in funding necessary to bring them to a satisfactory condition and specific recommendations about rectification of the problems identified. These recommendations will form the basis for the future direction of asset management in the state.

In summary, we have substantial road assets that have not been maintained at a satisfactory level and there is insufficient data available to develop a long-term financial strategy.

Immediate Needs

The immediate aim is to improve the reliability of data available to asset managers. Extensive work has been carried out by the IPWEA National Asset Management Strategy (NAMS) Committee, resulting in development of the International Infrastructure Management Manual (IIMM). This manual was developed in conjunction with Ingenium in New Zealand and has now become an international standard for asset management.

The Roads & Transport Directorate promoted a series of two day workshops around the state in March and April this year aimed at transferring asset management knowledge to the local government industry. Asset management plans prepared in accordance with the IIMM consist of four steps:

Step 1. Identifying Levels of Service

Step 2. Predicting Demand

Step 3. Preparing Life Cycle Management Plans

Step 4. Undertaking Risk & Financial Projections

Preparation of Road Asset Management Plans by each road authority is considered to be essential to ensure that community assets are adequately maintained and efficient use is made of scarce resources.

To date there have not been a large number of road asset management plans completed because of inadequate staffing resources being available to complete the project.

The long term solution to getting the most out of our existing assets follows from the four steps involved in the creation of asset management plans listed above.

Asset Management Problem Solutions

Assuming that road authorities had developed asset management plans how would we be better off? What solutions to the present apparent problem might become available? The following sections explore some of the ways in which the value of our assets might be better protected and managed in the future.

Levels of Service

In the past the level of service provided for road assets has been determined by individual councils on the basis of technical advice provided by engineering staff. This approach did not provide for any input from the general community of road user groups. What if the level of service we are providing is well above that expected by the community or for which the community is willing to pay? One possible answer is that we are allocating resources to asset management which might be more productively employed elsewhere.

Determination of the level of service involves engaging the community in an honest way so that we can understand customer values. We must respond to community needs through providing level of service options together with the associated costs. The outcome may well 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 may differ between communities and their ability to meet the costs incurred.

Service Demand

In every road design task we undertake we make a decision about the demands that are to be made of the asset over its service life. There must be an understanding of the way in which demand is generated (increasing population, change in the pattern of vehicle ownership and the expected proportion of heavy vehicles) and how this demand will impact on the long term performance of the asset. This is a difficult task which has been somewhat neglected in the past. Failure to predict significant increases in demand is likely to result in poor asset performance with associated cost of rectification.

One important factor at the present time is the effect that increasing oil prices will have on vehicle usage. It may be that there will be a decrease in private vehicle usage and an increase in the use of car pooling, public transport or the use of other modes of transport. This is not an easy assessment to make as a longer term reduction in oil price may reverse any short term reductions in demand.

Finally, there is the option of managing demand by the use of strategic transport planning. The provision of more efficient public transport systems, the provision of cycle ways and the imposition of tolls and CBD charging schemes are examples of how demand management could be achieved. All of these strategies need sound long term planning to be effective.

Life Cycle Management Plans

In making the decision to acquire a new asset we need to know not just the capital cost but also the maintenance costs that will be incurred over the life of the asset. For a road pavement which may have a life of 80 years we need to know the capital construction cost, the cost of routine maintenance each year, the cost of crack filling every 8 years and the cost of resurfacing every 15 years. We can then project cash flow requirements over the life of the asset. If necessary, reserves can be set up to smooth cash flow peaks which are likely to occur at various periods during the life cycle. This is particularly relevant when we look at the aggregate of assets that make up our road networks.

For networks which have a range of existing assets the same assessment applies with the added requirement that the existing condition and expected performance of the assets are known.

This is an essential element that must be carried out if we are to maximise the value of our assets to the community that has entrusted them to our stewardship.

It is in this area that the asphalt industry can have the greatest impact in the future. I will discuss a number of aspects arising from this analysis in later sections.

Risk & Financial Projections

One constraint will always exist when the issue of financial projections is discussed – there will never be sufficient resources to maintain road assets in the condition we would like. The final question to be answered by the asset management plan is: given the resources that are available how do we minimize the inherent risk?

The process set out in the International Infrastructure Management Manual is to identify failure modes and the consequences of failure in financial terms and then to evaluate acceptable risk in terms of a ratings scale or expected costs. It is in this section that the financial assumptions on which the model is based are identified and documented.

It is now possible to carry out a sensitivity analysis to determine the best fit solution which will meet the community's expectations.

Asset Valuation

Two of the major items in setting up a life cycle costing model are determining the value of the road asset and estimating pavement performance over time. The latter element

determines the timing of maintenance requirements over the life of the asset and also determines the size of the current 'funding gap' for existing assets.

The asset value of road assets is defined as the cost of providing the existing asset based on current construction rates. Inherent in this definition are issues such as:

- Materials cost
- Fluctuations in the cost of bitumen
- Efficiency of construction
- Deterioration performance of different pavement materials
- The minimum level of service expected of the road asset

Part of the solution to reducing the existing funding gap is therefore based not on providing additional resources (although this is necessary) but on:

- Development of improved construction techniques
- Increased efficiency in the pavement construction process
- Development of improved pavement materials
- Enhanced pavement performance over time
- Increased long term load capacity of pavements

Asset managers are looking for new paving techniques which will give increased pavement life at existing or reduced capital cost. Viewed on a whole of life costing basis, increased pavement life will result in a reduction in cost over the life of the asset.

Product Development

The development of successful new paving techniques relies ultimately on proven performance in service. The majority of new products and techniques are imported from overseas and there is no data available to support their long term performance under Australian conditions.

Understandably, asset managers have been reluctant to trial unproven new products on their roads because of the consequences of unsatisfactory performance. Through lack of understanding, communities view such failures as unacceptable.

A solution to this problem is the development of a procedure for product trialing based on risk sharing between the asphalt industry and road managers supported by an education and information programme.

It is essential that the development of new products and techniques is supported if road asset managers are to make the best use of ever increasing resources. The systematic research of overseas developments must be supported so that we can import technology sooner in order to maximise the benefits available.

Pavement Performance

The development of pavement deterioration curves is an essential tool which allows asset managers to accurately determine the optimum strategy to be employed in

obtaining best value from their road assets. This information is essential for determining the timing of intervention during the life of a pavement and the corresponding whole of life costings.

Research is currently being carried out by ARRB to develop standard deterioration curves for Australian road pavements. In conjunction with this project emphasis needs to be placed on the financial implications of the application of deterioration modeling in relation to long term financial planning.

Conclusion

Better definition of pavement performance will result in better management of our road assets. This requires a better knowledge of the performance of pavement materials than we have at our disposal at the present time.

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.

Finally, 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.

References

International Infrastructure Management Manual - 2002 Edition.