

CEO's Report: Continued Lack of Funding is Damaging Networks

By Greg White



Over the last twelve months I have spoken with many road authority engineers in either state or local government organisations regarding the deteriorating state of Australia's road network.

The continual lack of funding for roads is causing concern across the country. The recent floods and heavy rainfalls across much of eastern Australia have emphasised the problem, as roads that performed adequately in the extended drought conditions were found wanting as soon as the pavements were subjected to high levels of moisture.

The greatly increased traffic (both volume and axle loads) has exacerbated this further. The majority of our road network was designed and constructed before mechanistic design of pavements was introduced and very little design traffic information. This has resulted in pavements that are not suitable for today's traffic loads or, more importantly, the expected increase.

Often the main problem is in the sub-grades; too many roads are constructed on poor quality clays that are greatly affected by moisture.

Poor or failed sub-grades being under other pavement layers are expensive to access for rehabilitation. The engineer is often left, due to restricted finances, with the only alternative to patch and reseal. This does not remedy the problem. It creates a cycle of annual patching causing poor ride and ultimately a far more expensive proposition.

Many studies have shown that the repairing of small areas results in patching

being required adjacent to that patch, often within twelve months. The result in a few years is patchwork pavement which requires full rehabilitation. The resultant cost to the community is excessive; not only construction costs, but the social costs of continuous interruption to traffic flow and poor rideability.

The use of lime to stabilise clays has been used since Roman times. The great advantage is that the lime reacts chemically as well as physically with the clay, transforming it into a concrete-like material. So not only is the moisture sensitive clay eliminated, it is transformed into a structural element of the pavement. This is highly advantageous in clays that are susceptible to swelling.

The recent floods in Queensland have shown that their extensive stabilised pavements have performed far better than granular pavements and are regularly used as an emergency treatment for floodways because of their performance in the most adverse conditions.

Queensland's main road authority has long seen the advantages of lime stabilisation, especially with their reactive clays. They are further expanding their stabilised network in the extensive rehabilitation works which have just begun.

VicRoads has long used Austroads design procedures to incorporate stabilised clays in the pavement design. Not only is the resultant lower layer of the pavement impervious to water ingress, therefore maintaining pavement strength, but the pavement is thinner and therefore less expensive due to the incorporation of the strengthened sub-grade into the design. It is a pleasing trend that more and more road authorities are using stabilisation of sub-grades to improve the long-term performance of pavements.

AustStab will be releasing design procedures for stabilised sub-grades using the work done by Austroads in the near future. This will hopefully give designers the ability and confidence to design more cost effective pavements that are stronger and better equipped to withstand the environmental and traffic loads that our roads are subjected to.

I hope that designers and road authorities will investigate and consider implementing the

many advantages of sub-grade stabilisation to repair the road network which is suffering from lack of funding. I will continue to talk with road authority engineers in local government and state authorities about these advantages and ease of design and implementation.

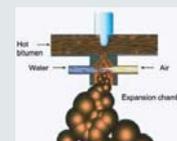
I would also like to take this opportunity to thank Scott Young for his efforts as AustStab President since 2009. During Scott's time as President he has shown a continuous commitment to pursuing excellence and professionalism in the stabilisation industry. Scott will be replaced at the next AGM in August as president in accordance with the articles of association.

Bitumen sticks to the finer things

Foamed bitumen is a mixture of air, water and bitumen. When injected with a small quantity of cold water, the hot bitumen expands rapidly to about fifteen times its original volume and forms a fine mist or foam. In this foamed state, the bitumen has a very large surface area and an extremely low viscosity.

This expanded bitumen mist is incorporated into the mixing drum where the bitumen droplets are attracted to and coat the finer particles of pavement material, forming a mastic that effectively binds the mixture together.

A foamed bitumen stabilised pavement can be produced either insitu (Figure 1) or by using a central plant through a pugmill-paver operation.



Rapid foam bitumen expansion



Bitumen coats the finer particles

President's Message

By Scott Young



It is with pleasure that once again I am able to talk about the growing health of the pavement recycling and stabilisation industry.

I have spoken to many engineers and asset managers from around the country this year who are all continuing to say the same thing – “We don't have enough funding to keep doing things the same old way. “We have to start looking at more economically viable solutions to keep our pavements alive longer.” As a result, we are seeing a sizable shift towards planners and specifiers giving stabilisation the consideration it deserves.

We are continuing to educate the industry about all facets of stabilisation. More people now have adequate access to information through our two-day courses, our website, our guest lecturing program, feature articles, the Stabilisation Guide and newsletters.

We are now offering nine two-day courses each year which enables us to engage with around 300 people in metropolitan and regional locations throughout Australia.

Our website continues to improve with more valuable information being made accessible over the past three months.

Guest lecturing at universities, to both under-and-post-graduates, is still expanding which exemplifies the demand for knowledge on the process of stabilisation.

Although we still have copies of the guide remaining in stock, the first 3,500 have reached all corners of the nation. Please contact us if you require a copy, as they are a must have for anybody involved in pavement maintenance and/or construction.

Finally, we are about to enter the world of electronic newsletter communication. This monthly edition, which is due to commence being distributed in April/May, will not only reach all of our members (nearly 50 organisations), but will reach over 500 local government organisations nationally. So to keep up with current news, events and other stabilisation related information, ensure you are on our distribution list by registering online at our website on the News tab.

We again look forward to our annual conference in August. This year it is being held at Box Hill in Melbourne. On the back of record attendance in 2011, our expectations are high for another fabulous event with great support being forecast.

The inception of our Excellence Awards will certainly add a new dimension where recognition of those who have contributed to our industry is acknowledged. Further details of the Excellence Awards are provided in this edition and on our website.

Additionally, we are pleased to promote another new initiative for our annual conference; a site visit will complement the annual golf day for day one of the three-day event. This opportunity to participate in an informal environment being hosted by a specialist in their field, with of course a relationship to stabilisation, should not be missed.

The constant exploration to develop a suitable asset strategy for dealing with our unsealed road network in Australia continues to pose challenges to asset managers. Probably one of the biggest issues facing local government in particular is, not only the skills shortage as our ageing workforce moves

into retirement but, the fact that budget allocations versus required funds is a diverging cyclone spiralling out of control.

Policy change is required if there is to be any closing of this gap. Although industry bodies continue to lobby state and federal governments for increased funding, the fact is we all keep complaining about how hard it still is to keep our unsealed roads up to scratch. Prudent spending of these limited funds is therefore paramount with residual benefit to rate payers who ultimately are the end user.

Federally funded research, carried out by AustStab that commenced in 2007, has clearly identified a different strategy to managing unsealed roads. The strategy included lime stabilising unsealed road pavements, as well as ensuring the pavement shape was fit for purpose. The primary benefit, apart from reductions in dust and demands on natural materials, is the reduction in maintenance frequency and increased overall life. These two factors alone allow budget allocations and required funds to commence the journey of convergence. All that is left to do is for individual councils to embark on this journey!

With our friends at AAPA sharing every second edition of the Roads magazine with us, this will be the last edition I am able to provide AustStab's views as President. This is my third term in office which requires a replacement at our annual conference this August. To all of those people who have assisted me since 2009 in a variety of ways, including the current board ... I owe you all a wealth of gratitude and thanks. Our association is in a strong position and, with imminent growth of stabilisation across the country, our multiple roles as educators, advisors and regulators will become more and more important.

In closing and, as I have often been heard saying; “There are quarries – and there are quarries. The best ones are those that we drive on every day, so why not recycle them?”



AWARDS FOR EXCELLENCE

Peer and industry recognition for excellence in Work, Health and Safety; Research or Education; Sustainability In Pavement Stabilisation and Recycling in Stabilised Pavements in Local Government.

For more information visit
www.auststab.com.au

Submissions close 15 July 2012
ENTER NOW

AustStab prepares for Excellence Awards for 2012

Industry awards for excellence give official recognition of excellence and best practice in an industry.

Awards are a way of promoting the best performing companies to the public and industry peers. Award ceremonies and dinners provide opportunities for the industry to celebrate these performances, and provide an excellent marketing tool for winners of the awards.

They encourage a continual raising of industry standards and provide a benchmark for best practice in the industry. Industry awards are available in many sectors including the television and film industry, such as the AACTA Awards or the Logies, and the broader civil construction industry with the CCF Earth Awards. The pavement stabilisation industry is ready to test the waters on this strategy for recognizing excellence.

In 2012, AustStab is planning on presenting the inaugural AustStab Excellence Awards. The Awards are the initiative of the current executive committee, which seeks to

encourage and reward excellence and innovation in the stabilised pavement industry.

Australian stabilisation projects are presented with a unique opportunity to showcase the great developments. AustStab sees this as a natural progression of the Honorary Member Award, which has previously recognised the efforts of individuals who provide outstanding contributions to the industry.

Last year's recipient, Mal Bilaniwsky, reflects that his nomination recognises his involvement in the development of deep insitu pavement stabilisation, but would have been happy if he had been able to share industry recognition with the field staff at the time, who were also key to the development of the work.

Scott Young, AustStab President, believes that the insitu pavement stabilisation process is sufficiently mature and nationally accepted that the awards will be valued by the recipients. The awards will recognize excellence and innovation in Work Health and Safety, Excellence in Research or Education,



Innovation or Excellence In Sustainability In Pavement Stabilisation, and Innovation or Excellence in Recycling of Stabilised Pavements in Local Government.

Award nominations may come from many sectors including private businesses, local government, road authorities and students or academics.

The nomination and submissions are to be submitted electronically, via the AustStab website from 1 June 2012. The submission process will close on 15 July 2012 and judging will be completed by 31 July 2012.

The Awards will be presented in Melbourne on 21 August 2012, at the AustStab Annual Dinner being held at the Tudor Inn at Box Hill, Melbourne.

Bituminous stabilised materials: a pavement solution

Bituminous stabilised materials (BSM) fit into the insitu pavement stabilisation suite of pavement solutions for treating granular pavements, previously cement treated pavements or reclaimed asphalt pavement (RAP) layers.

It is suitable as a base course or sub-base treatment. Deep lift asphalt or granular pavements should also be considered for the same rehabilitations. It is being used extensively to rehabilitate failed pavements due to its fast construction time, cost saving and the recycling of the existing materials to give pavements new lives.

Foamed bitumen in soil stabilisation technology in Australia is often referred to as a new technology, though it was first proposed as a solution in 1956 by Dr Ladi Csanyi at the Engineering Experiment Station in Iowa State University. Mobil Oil Australia acquired the patent rights for the process, but it was not prevalent in the Australian market until the late 1990s.

The process has been extensively used in Australia, South Africa, New Zealand and Europe, though the models for design of foamed bitumen vary in each of these

countries. In Australia, the pavement is treated as a bound pavement. It produces a relatively high strength, it requires less pavement depth than comparative rehabilitation alternatives, offers resistance to moisture ingress, behaves in a flexible manner and is produced at a lower cost than an equivalent asphalt pavement.

Site investigation is straight forward, and utilises testing facilities that are available in most geotechnical test facilities. The design requires an understanding of the existing pavement thickness and current and predicted traffic loadings and sub-grade CBR's and pavement material grading.

An Australian-suitable host material grading envelope is used in identifying suitable material. Ideally the host material will be essentially a good granular material. It will have a plasticity index (PI) of less than twelve.

BSM behave differently to other pavement materials and are not always well understood. Training, through courses such as CPEE and AustStab's Insitu Stabilisation training course, is recommended. Also, the designer should be able to design a suitable pavement using the Austroads Guide to Pavement

Technology series or the AustStab Pavement Recycling and Stabilisation Guide (2011).

Mix design material testing is required in terms of determining the initial, cured and soaked modulus for the design. Expansion ratios and the half-life of the bitumen will also need to be tested to determine the suitability of the bitumen for use in the process. Specialised facilities and equipment is required for this testing.

As bitumen manufacturers use anti-foaming agents in the manufacture of bitumen a foaming agent may sometimes be required in the field process.

Supplementary binders are mostly used with BSM. In Australia, lime is commonly used. Secondary binders can assist with the adhesion of the bitumen, reduce the PI of the host material, harden the bitumen and promote early strength for trafficking. The timing for incorporating specific additives is dependent on the specific purpose of the supplementary binder, though it is usual for it to be applied just before the bitumen.

The construction process should always be completed by a stabilisation contractor

(Continued on page 38)

experienced in foamed bitumen stabilisation. Proper construction methods will result in a structurally sound and suitable pavement with a new pavement life. Particular focus for surveillance should concentrate on foaming quality, uniformity of mixing, control of moisture, effectiveness of compaction and focus on curing of the pavement.

Wearing courses adhere well to these pavements. A reduction in the bitumen required in the courses should result in cost savings to any project. A 10% reduction in the application rate for sprayed seals or elimination of the tack coat could offer cost savings on works, particularly in the case of large projects.

Research is currently being completed by the Australian Road Research Board in consultation with state road authorities and AustStab to determine the failure mechanism in Australia, which will assist in further defining the design model for foamed bitumen stabilised pavements.

Local Bitumen Supply will continue to be reliable



Bitumen is an important material from the oil industry produced from the refining of crude oil.

Contrary to popular rumour, it is neither a by-product nor a waste stream from the refinery operations, but a carefully manufactured product requiring dedicated crude oil sources and specific refinery hardware.

The bitumen supply chain to Australia is undergoing changes particularly with more product being sourced directly from overseas refineries.

This should not be a concern for the Australian bitumen consumer, according to Nigel Preston, the Bitumen Technical Manager of The Shell Company Australia. He believes the supply of bitumen will be reliable and secure in Australia and the products imported into Australia continue to meet the AS 2008-1997, albeit under a different delivery model.

The Shell Company is the only bitumen supplier associated with AustStab.

Pavement Stabilisation

The advantages of quicklime over hydrated lime

Lime, also known as calcium oxide and hydroxide, reacts with clay physically changing its characteristics making it more friable and greatly reducing its "slippery" properties.

It also creates a chemical reaction forming similar compounds to that found in concrete, calcium silicate hydrate and calcium aluminate hydrate. The resultant material is impervious to water and strengthens the pavement. Coring of old lime stabilised pavements has given strength results similar to lean mix concrete.

Lime in Australia is brought to site in two forms, quicklime or hydrated lime. The form that reacts with the clay is the hydrated lime. Quicklime delivered to site has to be converted to hydrated lime before the stabilisation process is started.

The procedure is to spread the quicklime onto the pavement using a computer calibrated spreader and then using a water cart to wet the lime. The conversion of quicklime to hydrated lime by the reaction with water is called slaking. The heat generated causes the excess water to be driven off as steam. For hydrated lime, it is simply spread on the pavement. From that point both processes are identical with the subsequent mixing and compaction of the earthworks.

Hydrated lime is produced simply by adding water to the quicklime in the production plant and then transporting the resultant powder to site.

So which form of lime should be chosen?

In the majority of cases quicklime is chosen for the following reasons:

- Quicklime is cheaper as there is one less process needed in its production and the cartage is 30% cheaper due to the added water. Simply put, 4% hydrated lime is equal to 3% quicklime;
- The bulk density of hydrated lime is typically 30-50% lower which often requires extra

truck loads so a further 30-50% increase in cartage plus a reduction in productivity;

- If the pavement is too wet, quicklime can be used to dry out the pavement by chemical reaction as well as heat generating steam. This often requires no additional water being required;
- Quicklime is granular and coarser than hydrated lime and so is far less likely to become airborne by wind on site; and
- Hydrated lime is not always available in all areas of Australia.

Quicklime is safe to use; it requires use of the recommended personal protective equipment and procedures, as outlined in relevant material safety data sheets. Most stabilising operators choose quicklime to provide an economical outcome without supply delays. Too many specifiers avoid quicklime because of a concept it is difficult to use. This is not always accurate as the process has been used safely for many years throughout Australia.

Both quicklime and hydrated lime are suitable for incorporation in pavement stabilisation. Quicklime offers some production advantages over hydrated lime to stabilising operators.

Table: Quicklime versus Hydrated Lime		
	Quicklime	Hydrated Lime
Bulk density (kg/m ³) (Uncompacted)	850-1200	480
Suitability for use on wet pavements	Suitable - dries out pavement	Suitable - not as effective per tonne
Susceptibility to airborne distribution	Lower susceptibility	Higher susceptibility
Availability	Readily available in all areas of Australia	Not readily available in all areas of Australia



Slaking the quicklime — generating heat and steam