IS IT TIME TO LOOK AT BRIDGE ASSET MANAGEMENT DIFFERENTLY?

BIG QUESTIONS

Tim Heldt, Neal Lake and Joshua Seskis, Australian Road Research Board

Does your community expect that they can safely use the road network, including the bridges?

Reasonable expectation? What about the old bridges and those with issues – so much need, so little funding! It seems like every year new urgent problems visit at least one of our structures, driving a reactive rather than a proactive mindset. Bridge asset management can feel like a fire fighting exercise with no off-season. Is it time to consider bridge asset management from a different perspective?

The fundamental problem for the structural asset owner is scarcity of funding, and everything else needs to support making appropriate spending decisions to maintain the level of service – which needs to be defined properly and extends well beyond avoiding collapse. Engineers typically associate structural risk mitigation with avoiding collapse. Bridge asset managers must take a much broader view centred on level of service (which includes avoiding collapse). How might one think differently about managing bridges?

Farmers are renowned for being frugal and resourceful. Can we learn something from them? A typical broad acre farmer has a good handle on asset criticality. The reliability of primary ploughing tractors and header are critical to the business, they are carefully selected, operated and maintained. Manufacturers advice and the farmers accumulated operational knowledge are combined to prioritise resource allocation to support these work horses. Other machines are useful, but less critical. The old tractor dedicated to slashing the paddock edges, or the old 4 wheel drive farm run-about, still get some attention, but “run to fail” may form at least part of their routine operations and maintenance philosophy. Importantly the farmer doesn’t start the year by seeking expert technical advice to plan the resourcing and maintenance for the fleet. Based on business requirements, asset criticality, and other simple knowledge (what did we do last year), the plan is established, then modified if required. Expert knowledge is only sought when there is a clear case to do so. The good farmer tries to do the simple things consistently well, then manage the aberrations when they arise, and does not have a “one size fits all” approach to management of assets.

ARRBs regular business involves providing advice to bridge asset owners. In our experience, there is often a perception that more sophisticated inspection, measurement or analysis will facilitate better bridge asset management. Bridge asset management has certainly improved over the past 30 to 40 years. Asset registers have been developed for bridges and culverts, and we have some information about their condition. In most cases, some historical information has been collated about their construction, and in some cases there are estimates of structural capacity – design or otherwise. Is improving the quality of technical inputs the next developmental step for structural asset management?

If the farmer gets it wrong, the consequence is typically a production impact. If the bridge asset manager gets it wrong, loss of life is a distinct possibility. Our experience suggests that...
this difference in risk profile of bridges motivates a different more technically focussed asset management approach for bridges compared with the broad acre farming example. So is the next step in the development of bridge asset management a stronger investment in technical inputs (inspections, measurement, analysis), or is it improved understanding and response to risk? It is the authors view that next step improvement for bridge asset management must focus on due diligence more than improving technical inputs.

“Engineering Due Diligence means the reverse engineering of the decisions of our courts. It means aligning the laws of man with the laws of nature, prior to the event with the positive support of lawyers.” (http://www.r2a.com.au/rather-publicly-need-engineering-due-diligence/).

It also means systematically making (and being able to demonstrate) reasonable decisions based on common experience of a reasonable person. If the worst happens, then this test will be the starting point for enquiry - were the simple and obvious things being consistently done well? Of course when the worst happens, the forensic journey is undertaken with the benefit of hindsight. If specific (possibly identified) risks have materialised into reality and the consequences are all too certain. In reality, this only further emphasises the need to do the simple things consistently well. An additional benefit of this due diligence approach is likely to be improved targeting of expert advice to the best value.

As discussed above, current asset management information systems typically provide a reasonable record of historical documents, condition and capacity, but are these the most important records? The records of most importance to demonstrate due diligence is the decision trail along with the basis for those decisions. These are typically poorly articulated and recorded in many current asset management information systems. It is possible that some stakeholders consider this ambiguity a defence against liability because it is harder to prove ‘who was to blame’. The failure to demonstrate due diligence (timely effective decision making based on contemporary understanding) is arguably of much greater problem than being technically inaccurate (based on hindsight).

Demonstration of due diligence requires not just doing the simple things consistently well, but maintaining documented evidence of same, with the benefit that this documentation is a key input to the continual improvement process. What does due diligence look like in bridge asset management land? Are the Level 1 inspections being consistently undertaken, and are remedial actions being appropriately resourced. Is there a clear asset strategy that matches resource availability? Are the critical assets understood in this context? Have critical decisions been identified? Is the Level 2 and 3 inspection resourcing consistent with this context? Does the asset management information system clearly articulate and represent this understanding?

Good decision planning underpins due diligence, particularly pre-determining who makes which decisions, how they are made, when are they due, how are they communicated, and who is accountable. Decision planning needs to span from minor operational and maintenance decisions to strategic decisions integrated into network and business planning. Due diligence allows criticality to be understood by all both in terms of critical assets (those services of key importance to business outcomes), and critical decisions (high consequence decisions, even for non-critical assets). Decision planning facilitates a network of transparent team decisions, with decisions made by those in the best position to make them. The transparency of the approach also supports organisational governance and continual improvement. Unfortunately the human trend to avoid accountability works against planned decisions and due diligence along with the fear of being found wrong.

Accountability and due diligence is not new to the broad acre farmer discussed above, because business success relies on it. While the farmers context is different, the management principles share many similarities with the needs of bridge asset management including business aligned strategy, planned decisions, consistently doing the simple things well, targeted resource allocation and risk management. It is time to look at bridge asset management differently? A better understanding of risk, and improved due diligence practice are the next improvement steps for bridge asset management.