



Abstract overview

Wednesday 1 September

A proactive approach to addressing crash risk on DOC roads. Jay Baththana, Abley Limited

The Department of Conservation (DOC) is a road controlling authority (RCA) responsible for almost 1,100 kms of public road. These roads are predominantly unsealed, low volume roads, connecting other RCA roads to key tourist and recreational destinations on public conservation land all over New Zealand.

The crash record over a ten-year period shows run-off road and head-on crashes are the most common crash types on DOC roads; however, many crashes on these remote roads are not reported. The limited crash record, combined with low traffic volumes, makes it difficult to assess risk across DOC's road network using crash data alone.

Therefore, a proactive risk assessment framework was developed to identify high risk DOC roads. A set of actions were then developed to quantify improvements to the network.

High-risk roads were identified by using the three basic components of crash risk: exposure, likelihood, and severity. Forty-five roads that satisfied the pre-set criteria within the framework were classified as high-risk roads.

Consequently, DOC is carrying out safety inspections to validate the risk and identify appropriate low-cost interventions, ranging from driver information through to on-road infrastructure changes, that will address the crash risks on those roads. The project is ongoing.

Bio - Jay is a Transportation Engineer who specialises in Road Safety and Transport Planning. He has ten years' experience working on various road safety projects in New Zealand and overseas. He has Road Safety audit qualifications and applies his skills to promote the safe system approach and work towards vision zero.

Thursday 2 September

Under 35 presentations – 1045 – 1205

Presentation order confirmed closer to the time.

Design and testing protocol for Local Authority Networks. Jamie Clark, Fulton Hogan

The introduction of the NZ Guide to Pavement Evaluation and Treatment Design (Rehab Guide) in 2017 significantly expanded the investigation and design process for pavement rehabilitations. Due to the lack of other guiding documents, many Councils followed Waka Kotahi's lead and required that the Rehab Guide be adhered to in their maintenance contracts. Although the guide is based on best practice, its approach to pavement investigation is more suited to sites with higher traffic volumes and risk. However, many council roads have traffic volumes that are significantly lower than the State Highway network and do not require such a robust level of investigation in order to gain the information required for a design to be undertaken.

Fulton Hogan have developed a client-focussed Design and Testing Protocol for Local Authority Networks based on our extensive design and construction experience throughout New Zealand with the aim of offering a more targeted practical approach to designing rehabilitations. The Protocol allows a more cost-effective solution, while still satisfying the Client's performance expectations. This in turn enables our Clients to ensure their maintenance program delivers more value for money,

with less focus on digging test pits and more focus on maintaining roads.

Bio - Jaime is a Pavements Engineer in Fulton Hogan's Engineering Solutions team. His past roles have included Site Engineering and Project Management of various civil infrastructure projects. Jaime's interests include design and construction of Low Volume Roads and the creative solutions that can be implemented on these projects.

Snooping up the drainpipes. Brendan Gardner, Downer New Zealand

Culverts are underground and largely un-noticed. Internal inspection and/or replacement of these assets are not seen as a priority until an issue arises. If the problem becomes unchecked the consequences can mean road closures, public backlash, emergency design and a higher cost to repair when compared to a risk based planned renewal.

Deferring spending on hidden infrastructure is not uncommon amongst asset owners. As the saying goes 'out of sight, out of mind'. Visible infrastructure such as parks, playgrounds and road surfaces are noticed by ratepayers. Collecting detailed inspection information is the first step to understanding when and where to replace culverts in a planned and cost-effective manner. This takes time and costs money.

Using a low cost and locally designed and built 'snoopy cam' trolley, a GoPro camera and a torch has proven a useful tool for culvert inspection and subsequent condition rating of culverts. The key benefits being;

1. It doesn't require specialist CCTV equipment; saving money and being readily available by inspectors
2. Camera footage quality and the wide angle GoPro lens is proving adequate for condition assessment
3. Cost-effective method to operate; road inspectors can operate with minimal training



Figure 1 - Screenshot from the 'snoopy cam' in-action

Low volume roads do not mean less culverts, but often there are less funds to inspect or renew each asset. A cost-effective internal camera inspection of culverts is the way forward to enable data driven, risk based planned renewals ahead of time to avoid reacting to pipe collapses and unplanned closures.

Bio - Brendon is a Senior Asset Manager at Downer working across both State Highway and Local Authority Roads. He is passionate about the power of good inspection data to make the right decisions and hence the reason for today's presentation.

Network performance using Fault data. Gurpreet Singh, Downer New Zealand

The assessment of Low Volume Roads condition (roughness, rutting, texture) is often infrequent, so what can we do if we are not collecting this condition data regularly for these roads? Networks that Downer support collect faults across all severity classes from routine inspections which we call "All Faults".

This presentation will show how we use this data for managing low volume roads through;

1. Development of a deterioration model which can utilise the All faults as a proxy for condition to calculate pavement & surfacing Defect Score.

2. The identification of 'high cost' sections using Fuse reporting. This allows enquiry from various perspectives such as renewal planning, maintenance activity management, asset performance and financial management.
3. Tracking network condition over time utilising "All faults" and assigning a 'severity index' to this data to get a network condition score.

Bio - Gurpreet has a Master's of Engineering at Auckland University. After working on collection of data from Long Term Pavement Performance sites all over New Zealand he then worked as an Asset Engineer for Waitomo DC. Gurpreet is now with Downer, an Asset Engineer, working on east coast north island council networks.

An unsealed road journey. Gee Tsang, Downer New Zealand

The IDS Unsealed Roads Model provides an evidence based advanced Asset Management tool for Asset Managers to support the decisions that allows an unsealed network to be managed on a tactical or strategic level. The simplicity of the model allows any Asset Manager to easily configure and apply the model to any network.

This presentation will describe the journey taken to use of the model for the first time on the Gisborne network including;

1. Initial data collection, model setup, and calibration
2. Field validation and model feedback based on the initial model runs
3. The model outputs including a forecasted optimised grading and metalling programme

The optimisation works by continuously analysing the trade-off between the best material, material transport costs and gravel need. In doing so the model output will forecast the required quantity of aggregate from network gravel sources to meet performance needs and minimise environmental impacts.

Bio - Gee has a Bachelors of Engineering in Civil Engineering and a Masters in Environmental Engineering. With a combined modelling experience of 5 years in the UK across the water and roads industry, his experience has consisted of hydraulic modelling, sealed roads modelling and more recently unsealed roads modelling.

Road to nature. Lia van den Kerkhof, WSP

It has been more than 3 years since the construction of the "Road to Nature" field trial led by Tūhoe. There were two trial sites in Te Urewera which were constructed using tall oil pitch (TOP) as the stabilising material. While the Rosie Bay site had to be abandoned due to accidental grading and thus damage to the stabilised pavement during the first year of the project, the Mangapae site has performed well with minimal maintenance treatments over the past 3 years. The site has exceeded all expectations in terms of its dust suppression and resistance to failures (such as potholes and corrugations) that are common for unsealed gravel road surfaces. This treatment method has shown merits as an alternative option for unsealed road networks. Investigation into samples extracted from the site indicate the TOP binder has been retained as first constructed. In this presentation, we will examine the surface friction of the site, quantify the effect of ageing of the binder over its service life and investigate whether the material can be recycled and re-used to improve whole-of-life cost of this treatment selection.

Bio - Lia is a research scientist in the pavements team at WSP. She works across a wide portfolio of projects focusing on the rheological characterisation of bitumen, epoxy bitumen, development and investigation of more sustainable alternatives to bitumen, re-use of waste materials and the development of performance-based specifications.

Thursday 2 September – pm

Unsealed Roads Inspections. Mark Chamberlain, Selwyn DC

Following on from the 2019 workshop and the presentation by Lee and Ros from HEB Construction Ltd on setting up our unsealed inspections, I will present on the results of the five completed inspections (six monthly), issues found, the response from elected Council and future use of the information.

Bio - Mark is the Team Leader Transportation in the Service Delivery unit at Selwyn District Council and has worked at Selwyn District Council (and Ellesmere County Council prior to amalgamation in 1989) since 1979 (except for a two year hiatus with a local builder) predominantly on roading maintenance and construction.

Good roads cost less – Do we have the balance right? – finding the proof for unsealed roads. Scott Mackenzie, Mackenzie District Council and Grant Holland, Waugh Infrastructure Management

In the days of performance management data and evidence-based decision making, is there still room for gut feel, working from first principals, seat of the pants decisions, out of the box thinking and innovation? What approach drives efficiencies and the asset management outcomes sought? In one of New Zealand's most challenging, diverse & changing environments Mackenzie District is on a path of change and transition. Balancing today's demands and levels of service with a sustainable management for the long term is a constant juggle and balance of risk. There needs to be room for trial and error, testing, learning, constant improvement and innovating along the way (Nothing ventured, nothing gained). The Roading Manager having full oversight of the transportation operation-has shown experience & working with the contractor and the community can deliver good results. Decisions made today have a long-lasting impact.

Presentation considerations.

- The traditional approach of the past
- The challenges
- The balance maintaining fit for purpose network would look like in the future?
- Our sustainability goals?
- Our vision?
- Are we on the right track?

Bios - Scott, Roading Manager, Mackenzie District Council. As Roading Manager for the past five years Scott has a hands-on knowledge of the Mackenzie District and the issues faced. Scott is keen to innovate and see the network serve the community effectively.

Grant, Waugh Infrastructure Management. Grant is an asset management specialist contributing to local, national, and international transport practice. He is a regular presenter at IPWEA events.

End to End unsealed network management. Andy Brown, Northland Alliance, and Tim Ward, Broadspectrum

This is the story of the Northland Transportation Alliance and the Northland Maintenance Contractors and how we began changing the unsealed road network in Northland into a more sustainable, more customer focused network that provided levels of service embedded into the maintenance contracts and used ONF/ONRC to do it.

Asset Management and planning

The first steps were for us to understand and develop a plan. This involved data, data and more data. We collected loads of data, geometry, traffic, freight and in particular forestry and then built a model (in parallel to IDS and dTIMS) that predicted re-graveling of pavements and re-graveling of wearing coarse across the whole network.

Performance Aggregate

Paige – Green was key. Having sources that we knew would do the right job in the right place meant we could deliver the specific outcomes from our model reliably. Knowing that we could expect a certain return on investment by having invested time into developing material supplies that delivered real world solutions to the unsealed networks was a significant breakthrough.

Delivery

This was our biggest hurdle, getting a change across the whole region to a uniform delivery required a lot of time and investment in staff. Teaching grader drivers' new tricks and getting our engineers to write the specs into our maintenance contracts so it became our BAU treatment was a slow journey but 3 years on we are now seeing real world improvements network wide.

Bios – Andy, Northland Transportation Alliance Asset Manager - I've been involved in the industry for over 20 years, my early career was developing and refining the data collection for LTPP dTIMS calibration sites. I've had time on the shop floor with FH, first as a maintenance manager on the wellington NOC then as an asset manager and now I currently live and work in the winterless north as part of the Northland Transportation Alliance Asset management team.

Tim Ward – Ventia Maintenance Contract Manager

Gisborne District Council Polycom Unsealed Roads Trial. Amal (Jimmy) Prasad, Downer New Zealand

The Gisborne District Council like many local authorities in Aotearoa, is challenged with high demands from forestry loadings, poor local material quality, and climate change impacts. These challenges make providing an appropriate level of service on unsealed roads difficult for the limited funding available.

The Gisborne District Council (GDC) and Downer identified that traditional methods of unsealed road maintenance may no longer be sustainable given these local challenges and so decided to trial an alternative method. The team agreed to trial the Polycom stabilising agent because of the benefits being identified from its use in the forestry sector and Jimmy's past experience with the product in Fiji for similar challenges.

The team identified Ngakoroa road as the ideal candidate to test the effectiveness of the Polycom product. The site in question had significant longitudinal and horizontal grade changes making it a challenging sit to trial the product. This presentation will focus on;

1. Why we felt it necessary to do depart from traditional maintenance methodologies and why this site was chosen for a trial.
2. Why we chose Polycom as a product to use for the trial and how it was constructed
3. How the site is performing and the benefits it presents from level of service and economic contexts.

Bio - Amal (Jimmy) is a Roding Asset Engineer with over 20 years of Asset management, Roding and Transportation experience in both Fiji and New Zealand. Currently working for Downer as an Asset Manager for Gisborne State Highway and Local Road Contract. He possesses broad engineering experience encompassing most aspects of roading maintenance and construction works.

Utilizing New Zealand's Geothermal resource for dust control. Steve Urquhart, Geo 40

Innovation – Geothermal aquifers are found all over the world and are high in silica. In the geothermal electricity world, silica scaling in reinjection pipes is a significant problem for geothermal power plant operators. However, Geo40 has found a way to harvest the silica, removing it from the hot water prior to reinjection into the aquifer which prevents the issue of silica scaling.

Naturally sourced - The Geo40 process for making colloidal silica mimics what nature has been doing all along. Steam is separated from hot geothermal water and used to generate renewable

power. (In a natural geyser the steam vents to the air). The separated water is cooled in the Geo40 process and the dissolved silica becomes supersaturated in the water and forms colloidal silica nanoparticles. (In nature, silica over time forms a solid and builds beautiful natural silica sculptures around geysers and geothermal pools). In this process, the colloidal silica nanoparticles are filtered out of the water, washed of trace minerals, and then grown using geothermal heat into final products.

Uses for dust control – The colloidal silica is then able to be added to applications of magnesium chloride which is commonly used for dust control. When added to magnesium chloride Geo40's colloidal silica reacts with the magnesium chloride to form a hydrogel trapping the magnesium chloride. This hydrogel controls the release of magnesium ions reducing leaching by up to 95%.

Friday 3 September

National Land Transport Programme funding. Mark Weeds, Waka Kotahi NZ Transport Agency
Information to come.

Inspecting and maintaining structures on Low Volume Roads in Taranaki. Nicholas Zglobis, WSP
WSP provides a quasi-real time overview of the condition and asset management of structures on LVR within the Taranaki Network

This presentation gives a brief overview of some of the unique structures, under, over and on the roads and a selection of the monitoring and reporting tools used.

WSP assists with inspection and maintenance of structures on low volume roads within the Taranaki region. This includes structure types, materials, ages, specific topography and road users.

The subsequent analysis brings in other data sources and focusses on life cycle management, condition reporting, asset performance and risk profile.

Inspection and data analysis on 10 years of structural and routine maintenance has enabled:

- **Robust** funding forecasts for 3, 10 and 30 year horizons.
- Risk (and **opportunity**) identification within the network
- **Proactive** recommendations for actions through the long term collaborative contracts in place between client, contractor and consultants.

The presentation will also include a summary of recent developments utilised, such as UAV, ROV and 3D scanning to enhance current knowledge of specific assets and inform future maintenance.

Bio - Nicholas is a WSP Senior Engineer, CMEngNZ & CEng (UK) with 11 years' work history across a broad range of assets, environments, and industries.

His New Zealand experience covers the inspection and maintenance supervision of structures on 5 State highways networks and 9 local authority roading networks.

Bitumen Emulsion Stabilisation. Nikhil Vishwanath, Road Science

Bitumen stabilisation is the term South African's use in their TG2 guide to encompass both a road stabilised with foam bitumen or bitumen emulsion as these are just different mechanisms of mixing bitumen into the aggregate base. Laboratory tests by Road Science show a bitumen emulsion stabilised aggregate with 1% cement has similar properties as a foam stabilised mix with 1% cement except less residual bitumen is needed with the bitumen emulsion which is also supported by the TG2 guide.

Although, a low-cost application explored by Road Science is simply applying 1.5% residual bitumen emulsion without the addition of lime or cement when stabilising the base aggregate to a depth of 100mm. This is a way of improving the flexibility of the pavement whilst also increasing the waterproofness of the base course aggregate. Testing and trialling done by Road Science has proven that adding bitumen emulsion to base course vastly improves the wet properties of the base course making it comparable to dry, unbound base course performance. This waterproofness prevents

potholes and rutting seen in wet weather especially under first coat seals and can extend the sealing season. This application of bitumen emulsion is another tool in the tool kit for pavement designers to use to reduce the risk of a granular pavements failing early while not incurring the significant extra cost of a structural asphalt pavement.

This presentation will discuss the problem that emulsion stabilisation is solving, lab testing and field trial results that have been completed and the types of applications that would benefit from bitumen emulsion stabilisation.

Keywords: Bitumen Stabilisation.

Bio - Nik is the Technology Implementation Manager for Road Science. "What does this mean?" most people ask. Basically, it entails working with people much smarter than him and taking the clever developments these people make in the lab and scaling it up to commercial sized quantities. Nik's role manages the implementation of new technology in the materials and IoT (Internet of Things) space. Nik tries to ensure this transition is as smooth as possible to ensure new products reach the market in a fast but controlled manner.