

Maintaining the effectiveness of audio tactile profiled roadmarkings for their full lifecycle

Full report: www.nzta.govt.nz/resources/research/reports/615

Report promotes closer management and monitoring of ATP roadmarkings

Research has looked into approaches for maintaining audio tactile profiled (ATP) roadmarkings, and proposed an approach for monitoring and managing their ongoing effectiveness.

ATP roadmarkings in New Zealand are typically of a raised-rib design, made from thermoplastic or two-part reactive cold-hardening material (cold plastic). The roadmarkings are generally laid longitudinally on the edge-lines or centrelines of roads.

The effective life of ATP roadmarkings is now considered to be six to eight years (up from four years in the 1990s). Although there are still instances where earlier failure occurs, these situations are now better understood, and as a result are becoming less common.

Most roads in New Zealand are chipseal, although ATP roadmarkings are also used on asphaltic surfaces, such as those found on motorways and expressways. The effective life of chipseal surfaces is estimated to be 8 to 10 years, while asphaltic surfaces can last in the order of 10 to 15 years.

This makes the effective life of ATP roadmarkings comparable to those of the surfaces they are laid on. However, there are instances where ATP roadmarkings still have effective life left in them when roads need surfacing. This may be due to premature failure of the pavement or surface, or because the roadmarkings have been laid partway into the surface's life.

A lack of formal advice about what to do in these situations led the Transport Agency to commission research into how to retain ATP roadmarkings through reseal cycles. The research, by Opus International Consultants, also looked at how to maintain ATP roadmarkings and monitor their ongoing effectiveness. The research took the approach that ATP roadmarkings should be treated and managed as an asset, and their performance monitored accordingly.

Maintaining the effectiveness of roadmarkings

The research found little literature on maintaining or retaining ATP roadmarkings when roads are resealed that was relevant to the New Zealand context. However, two main techniques are being used at a local level, and local industry practitioners were contacted for their input and experience.

The two approaches are:

- in-lane resealing, where the road surface of the trafficked lane adjacent to ATP roadmarkings is resealed, but the non-trafficked shoulder and

the ATP roadmarking itself are left without being resealed

- sealing over the ATP roadmarking, with the intention that its audio tactile effects will be retained through the reseal layer.

The research examined the effectiveness of both techniques, and recommended that, in situations where a road surface is to be resealed and the ATP roadmarkings on it are still working effectively, then in-lane resealing should be considered as the preferred method.

Of the two practices, in-lane resealing offered more certainty that the residual audio and tactile life of the roadmarkings would be unimpaired. Although with good practice, some of the audio tactile effects of roadmarkings could be retained where over-sealing was used, the success of this approach was variable.

At a general level, the research determined that maintenance of ATP roadmarkings needed to independently consider their visual, audio and tactile effects.



Visual effects should be monitored during day, night and wet conditions where practicable. Visibility during night conditions is provided by different mechanisms or properties than visibility during daylight, so visibility during night should not be inferred from performance in daylight, nor vice versa. If possible, the visual effects of the roadmarkings should be measured objectively, for example by using a mobile retroreflectometer. Where this is not possible, subjective monitoring of visual performance can be used, and is better than no visibility monitoring at all.

Various techniques are available to refresh roadmarking visibility, including cleaning the roadmarking or recoating it with paint or other roadmarking material, including beads or other optical features to increase the retroreflectivity.

With respect to the audio tactile effects, the research used a car instrumented with a sound level meter and sound recording device to capture the audio effects from roadmarking ribs of various heights and spacings (a strong correlation between audio and tactile effects having previously been established). The captured sounds were then used in a driving-load stimulator to test how noticeable the differing sounds were.

An interesting finding from this aspect of the research was that the height of the ribs needed for drivers to notice and respond to ATP roadmarking on some surface types was far less than previously thought.

An earlier research project had indicated that on chipseal a minimum rib height of 4 mm height was needed before ATP markings provided sufficient audio tactile effects for drivers to notice them. However, this research found that on asphalt surfaces around 80 percent of participants detected ribs with a height of 1.8 mm, and 98 percent detected the next thickness of 2.8 mm, both far less than the 4 mm indicated by the earlier research.

The research also found that at the rib heights required by current New Zealand ATP roadmarking specifications (between 4 mm and 9 mm) there was no significant difference in audio tactile noticeability between 250 mm rib spacing and 500 mm rib spacing.

This disparity in the results was identified as an area where further research was needed. It was recognised that the current project had used different testing methods and road surfaces than the previous project, and as a result it was still unclear what threshold levels were necessary for the audio tactile stimuli provided by ATP roadmarkings to be noticed by drivers.

Asset management for roadmarkings

Other recommendations of the research were that ATP roadmarkings should be considered an asset and their performance monitored accordingly. Although there was some evidence that ATP roadmarkings are starting to be treated as assets, the project found that, in general, they were still not being managed to the same extent as other assets.

The research report details suggested best-practice management approaches for ATP roadmarkings. These include regular objective measurement of roadmarkings' visual effects, possibly using a mobile retroreflectometer, and audio tactile effects, possibly with a sound level meter mounted inside the vehicle. Where such an approach is not yet feasible, the report sets out a subjective rating system that can be used for monitoring, either as a complement to objective measurements or until an objective measurement method is developed.

The report concludes that, 'Future research should develop criteria and methods for objective measurements of the ATP marking as the primary goal, or a method for subjective rating of the ATP marking as the secondary goal. Either approach, objective or subjective, needs to account for audio, tactile and visual effects of ATP roadmarkings.'

