

THE BENEFITS OF USING TEMPORARY LINEMARKING AT ROAD WORK SITES

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The demand on driver attention can be significantly increased due to lots of additional signs and speed limit changes that they need to pay attention to while driving through road works as well as from the works themselves. This can be compounded due to the visibility of ghost and temporary linemarkings which can have very poor legibility, especially during times of sun strike, rain or darkness. The provision for clear delineation is therefore very important.

Current practice from Germany is the use of orange marking during the time of construction. By using contrasting colour and contrasting line type (ie use of a continuous line) this guides motorists accurately into and through the closure and makes it very obvious which linemarking needs to be followed.

This paper is to illicit feedback and discussion an alternate lane marking practice so to improve delineation and hence safety as well as realise potential time and money saving through smarter pavement and linemarking strategies.

Options are initially being considered for the Auckland Motorways, but will need to consider wider road network for nationwide consistency and legibility for motorists.

1. Introduction

The purpose of this technical paper is to consider the potential use of temporary lane markings at road work sites on the Auckland Motorway network as per similar practice to that used in Germany.

The demand on driver attention can be significantly increased due to lots of additional signs and speed limit changes that they need to pay attention to while driving through road works. This can be compounded due to the visibility of temporary linemarkings which can have very poor visibility, especially during times of sun strike, rain or darkness. Visual errors play a very important role as cause of crashes; therefore the provision for clear delineation is very important.

European practice to use an orange lane line for delineation within work sites where lane shifts are required could help to provide improved guidance through a worksite on the Auckland Motorway network.

2. Issues for the Auckland Motorways

The issues the Auckland Region has on its motorways are as follows:

- The removal of old linemarkings
 - i) Safety can be compromised due to ghost markings
 - ii) Cost of removal
 - iii) The time taken and available to remove and reinstate
 - iv) The impact on surfacing life and condition through multiple changes to markings
 - v) The ability of the surfacing to withstand the removal process
- The number of sites on the motorway with prolonged road works
 - i) This means that Motorists no longer appear to respect road work sites and hence new methods are required to draw attention back to the works

3. Background

A common problem during construction of Capital Projects is the appearance of ghost markings. These can occur from the wearing off of the blackened markings exposing the underlying marking (currently not accepted practice on the network), not properly removing the redundant marking whether through removal technique or ability of the surfacing to withstand the removal process, wet weather, sun strike, difference in texture or night-time lighting conditions. This often leads to confusion of the motorists and subsequently increases the risk of incidents.

Current practice from Europe is the use of orange/yellow marking during the time of construction. The contrasting colour and contrasting line type (ie use of a continuous line) guides motorists accurately into as well as through the closure and it is very obvious which linemarking needs to be followed.



Photo 1: Example from Germany (A1)

4. Current Situation

Since the start of the Auckland Motorways in October 2008 the AMA had six fatal accidents, three of which have occurred in road work zones. While not directly attributed to these incidents, linemarking practice can be changed to improve delineation and could assist in lessening the chance of incidents such as these occurring.

There have been numerous reports of issues associated with ghost marking on recently completed capital projects, notably the Northcote to Tristram widening project.



Photo 2: Example from Auckland Motorway

The above example shows what has been left behind following completion of the project. However this issue is just as serious during the works themselves.

Other challenges are also that the paving, in some areas on the network, is too old to water blast or mill effectively as the binder has become too brittle. This is a consequence of seal life being stretched out in the knowledge of an upcoming capital project that will impact on the seal.

Capital Projects can involve lots of lane shifts during the construction or the widening of new lanes. The old markings need to be removed; new temporary marking will be put onto the pavement and will be removed again when the final configuration is achieved. This process is often time consuming and costly. However even worse is that the old markings (ghost markings) can become visible after a while and this leads to a serious safety risk.

5. Options to consider

There are several options to consider when looking for ways to improve delineation through road work sites:

- Contrasting colour and contrasting line type (such as the 3M Type)
- Textured black out (currently being trialled with varying degrees of success)
- Wider milling / blasting – disguise the location at old lines, but can take longer and cost more
- At the end of each project a new seal is important so no superseded markings are left
- Surfacing Management Strategy – cannot allow pavement life to be extended due to upcoming road work as its brittleness can limit the ability to remove the markings. The use of a tape may mean that there is less chance of ghost markings being left following completion of works and hence there is no need to delay a programmed reseal (dependant on the nature of the upcoming capital project).

6. Proposed System

European practice is to use a continuous orange/yellow line and it is proposed to consider this as an option for use on the Motorway network. As the motorists of Auckland are not used to this practice, there will need to be some education around this.

This could be done by:

- VMS boards "*Please follow orange lane lines*"
- Ask Phoebe in NZ Herald
- NZ Herald Article
- Short spot on TV (e.g. Close up)
- Advertising on buses

7. Initial Stakeholder Consultation

Discussions have been held with both the Police and numerous Capital works project managers about the challenges of road marking within a road works site. They have all expressed their interest and support in developing a better solution for improving road marking with respect to safety, efficiency and improved pavement longevity through minimising damage from numerous remarking exercises.

8. Value for Money / Opportunities / Benefits

With the orange/yellow tape in place, there will be no need to remove the existing markings and also no need to remark the lines at the end of the project if the lane configuration stays as it was before. The tape will also help to reinforce temporary speed limits that are put in place by the project site.

The obvious benefits for the project would be:

- less closures to be implemented on the network (less time to remove old markings),
- less damage to the pavement through removal of markings
- no ghost markings being present
- a reasonable amount of savings for the projects, as
- less time needed to put down the tape and remove it in the end, and
- there is no need to remove existing markings (cost and time saving)
- no need to reseal early, or over extend life of pavement due to upcoming road works

9. Risks

During the design of the lane shifts some special attention needs to be given to where the tape should be placed. If it will be close to the existing lane with Audio Tactile Paint (ATP's) on or domes, this might cause disruption to the driver when his wheels are constantly driving on these ones and may not be appropriate in these cases.

There might be the risk that motorists will get confused about the use of the yellow lines on local roads (no overtaking) and the use of continuous orange tape in road works construction areas on the motorway network. However there are no yellow lines on the Motorway to confuse a yellow versus orange lane line.

10. Conclusions

- Present practice leaves temporary markings that can be confusing and hence causing safety hazards
- The repeated removal and application of linemarkings can surely damage the pavement integrity thus reducing the lifetime of the pavement
- Considerable time, and hence cost, and traffic disruption is involved in the repeated marking and removal of linemarkings
- European countries are successfully using specialised removable tape; thus addressing the time, cost, traffic disruption, pavement damage and safety factors noted above
- There is no reason that benefits similar to the ones mentioned above cannot be achieved in New Zealand
- Further investigation, with the view to implementing a trial, should be progressed to confirm the suitability of adopting this practice of using a contrasting removable tape

11. Development

Develop a business case to NZTA head office and potentially identify a working group to progress with the following tasks:

- Identify a suitable contrasting colour usable in various lighting conditions
- Address the issue of our existing practice of using yellow to denote no overtaking when internationally a solid white line denotes the same thing (this has other benefits for international driver on our roads), so that a contrasting colour to the white can be used for temporary markings
- Consider the timeframe and cost required to eliminate existing yellow markings
- Identify any legislation that needs updating to reflect the changes
- Develop guidelines for use
- Develop media communications to advise of the changes
- Consider a trial site; evaluate and monitor
- Nationwide adoption of new policy for temporary linemarkings