

# Investigating and Comparing Different Methods of Line Marking Removal

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# The Issue



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## Road Scarring:

- reduces the service life of the road
- can lead to visibility of removed lines



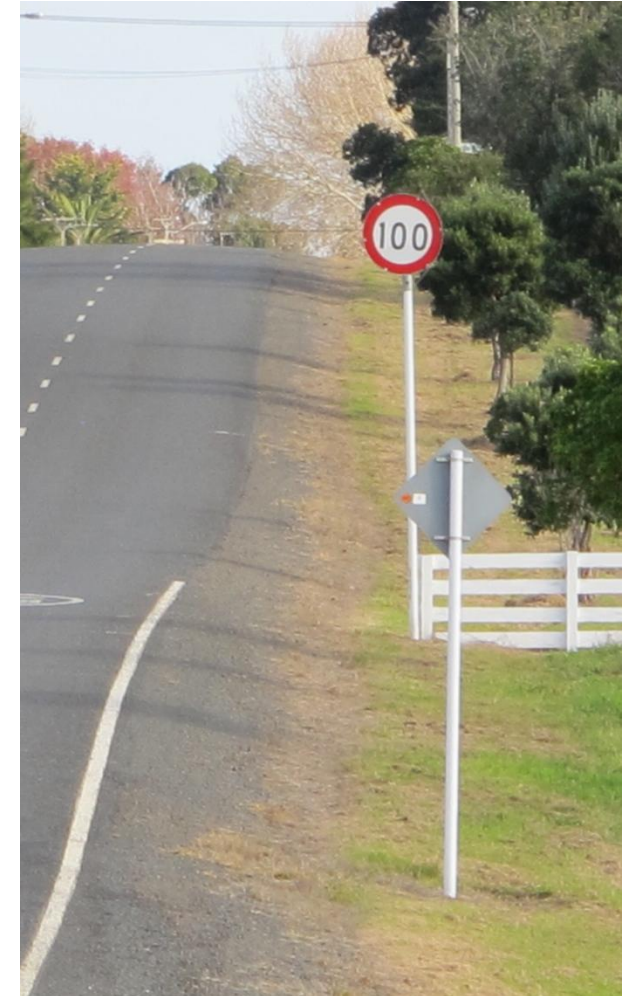
# Standards in New Zealand



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- There are only Standards dedicated to road marking application
- New Zealand Standards provide no constraints or guidelines on how to remove road marking

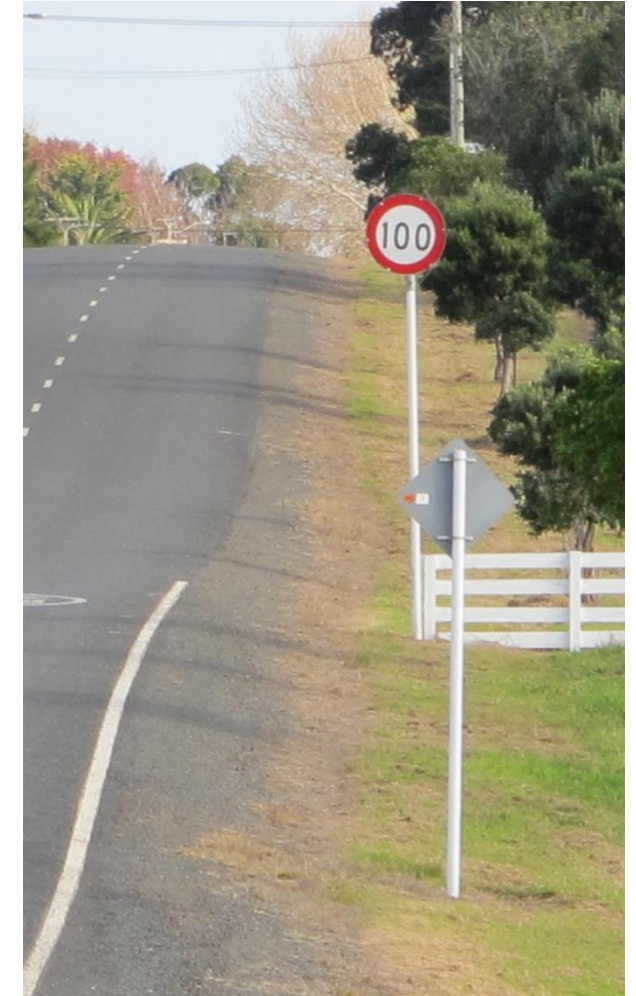
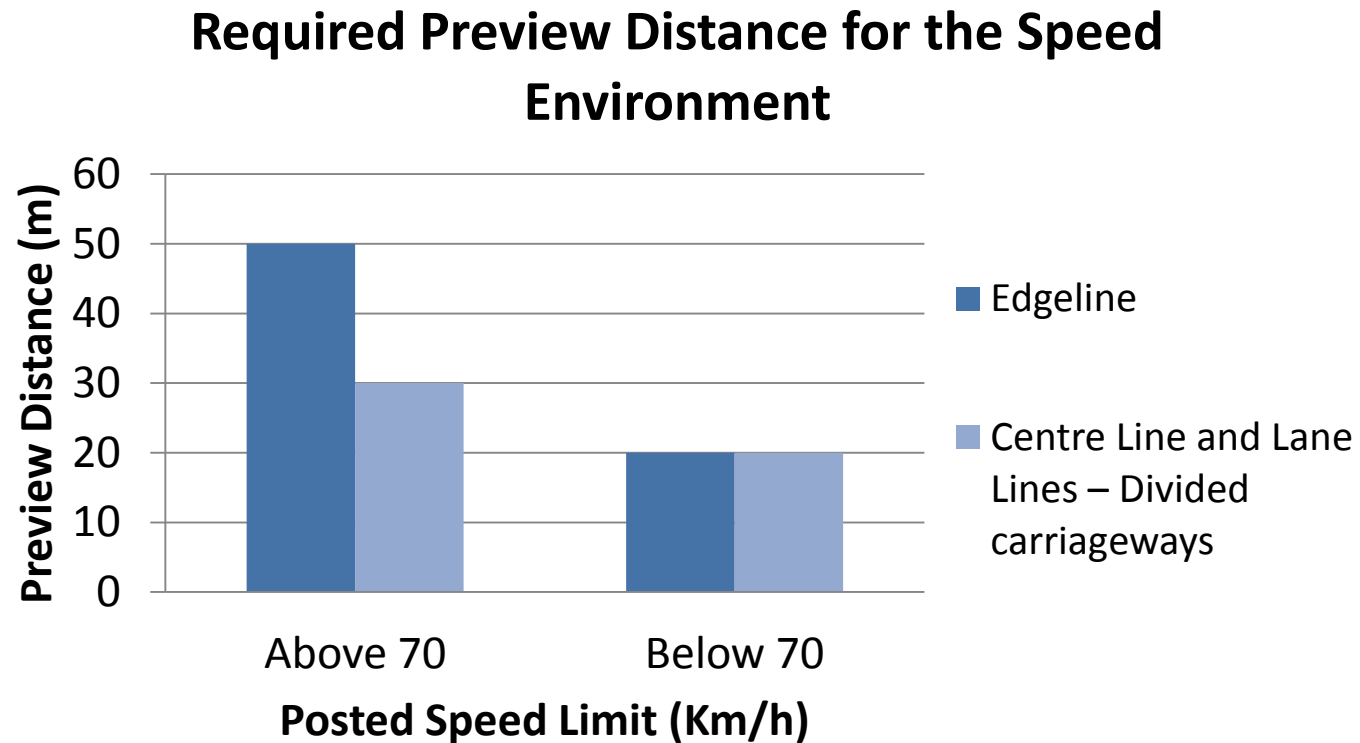


# Standards in New Zealand



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# The Goal of Our Research

Our Goal was to:

- see if there is a correlation between percentage of paint retained and preview distance
- understand the operators control of the water blaster



# Princes Street East



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Three methods along each section of line:

- Varying pressure
- Varying operator speed
- Operators attempt at reaching required percentage of paint retained





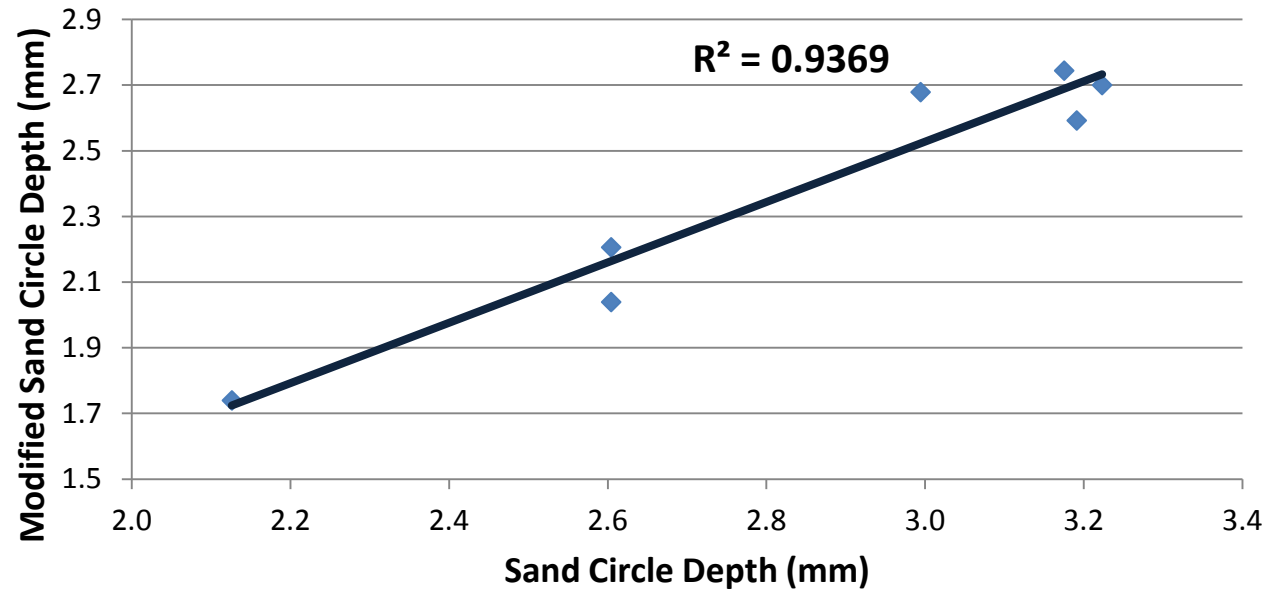
# Modified Sand Circle



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Modified Sand Circle Depth vs Sand Circle Depth



Sand Circle  
Equation

$$D = \frac{57300}{d^2}$$

Modified Sand  
Circle Equation

$$D = \frac{45000}{80 \times L}$$

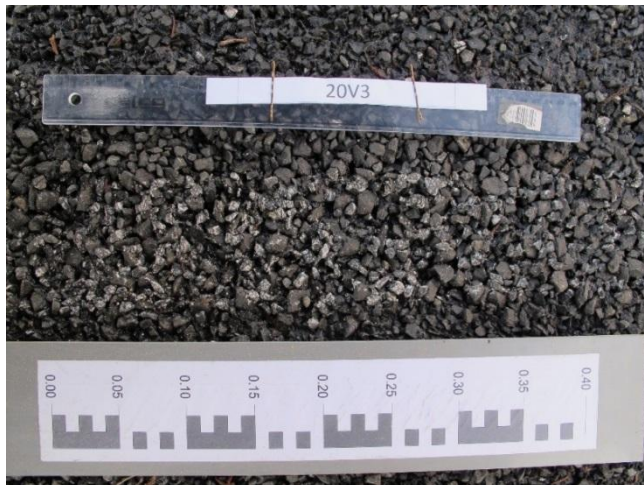


# Paint Retention



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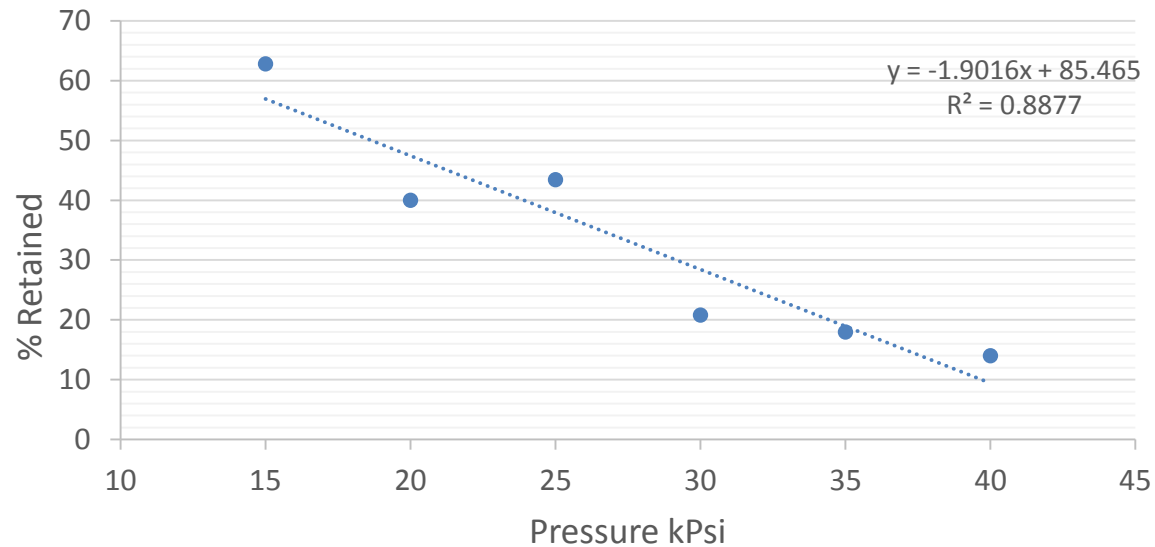
# Test Results – Operators Control



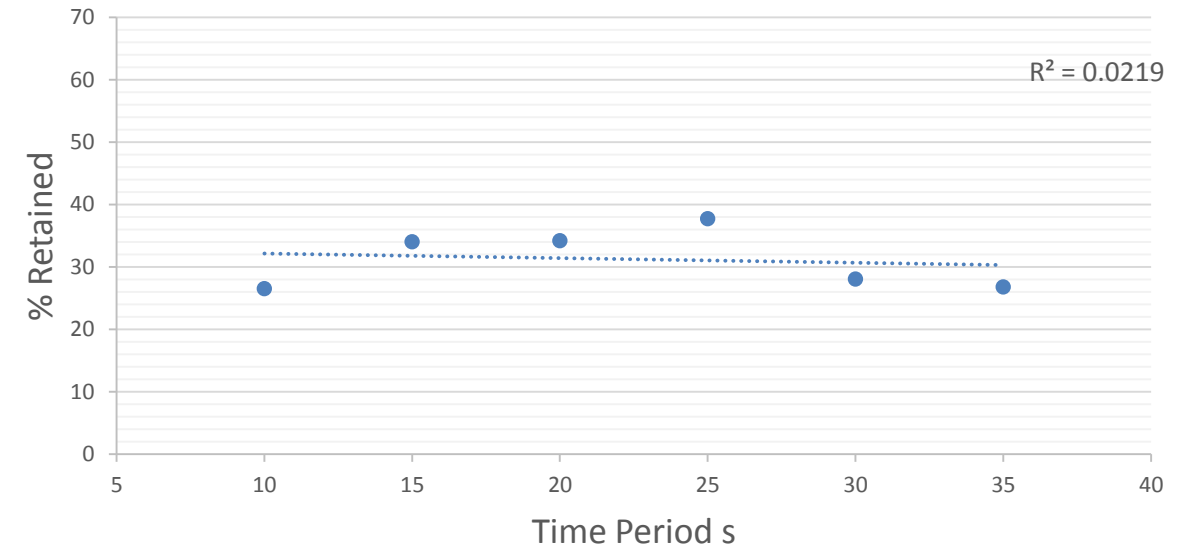
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Paint Retention with Varying Pressure



Paint Retention with Varying Time Period



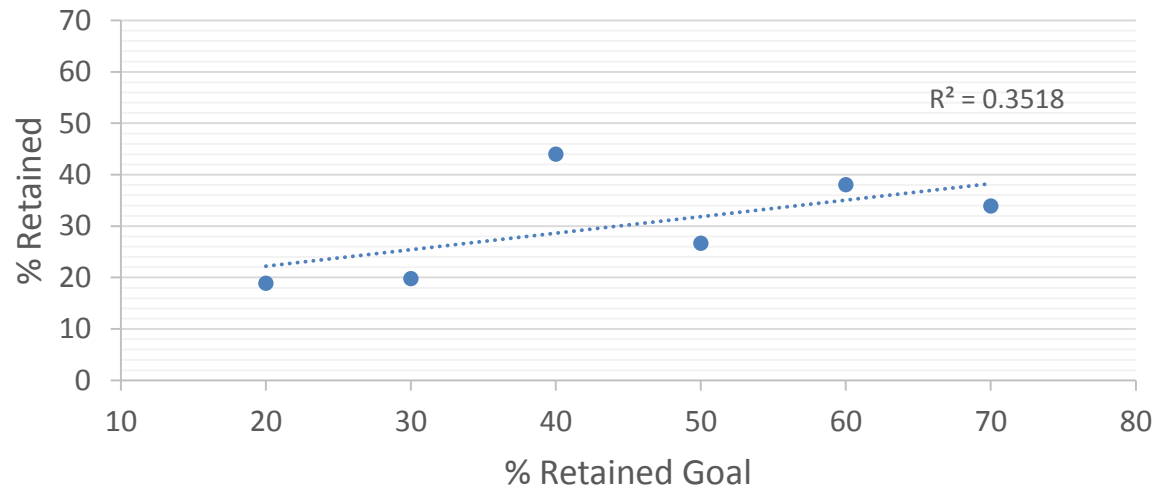
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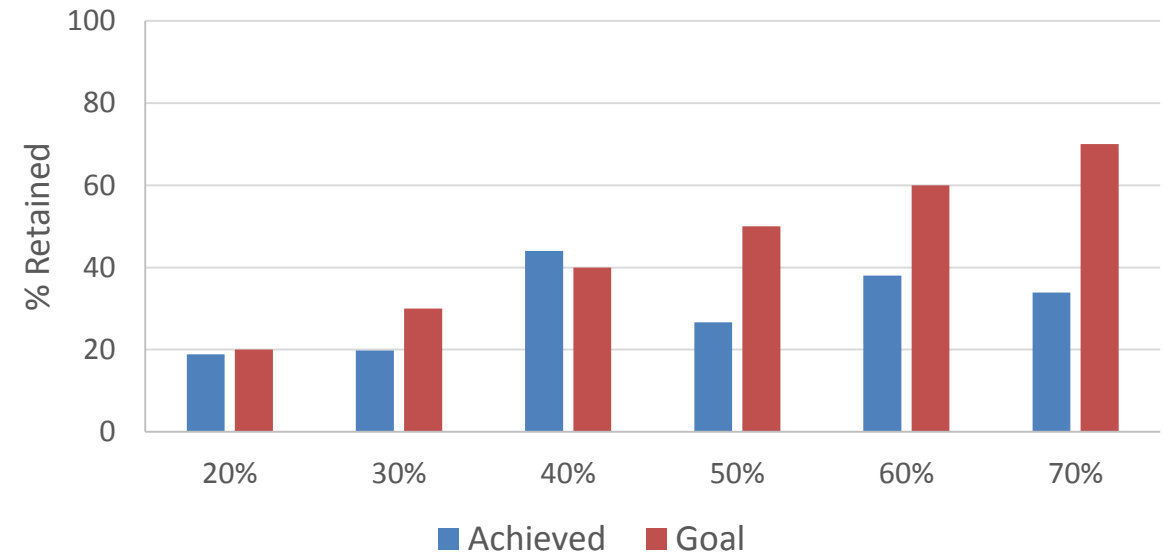
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Paint Retention Corresponding to Percentage Retention Goal



Paint Retention for Markings initially at 100%



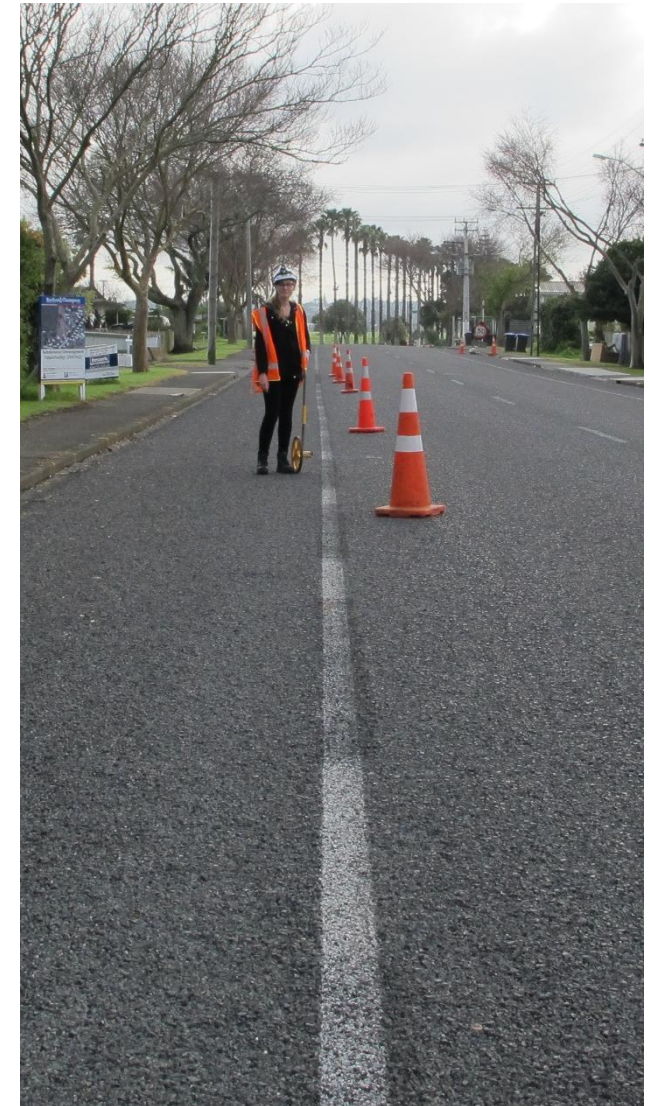
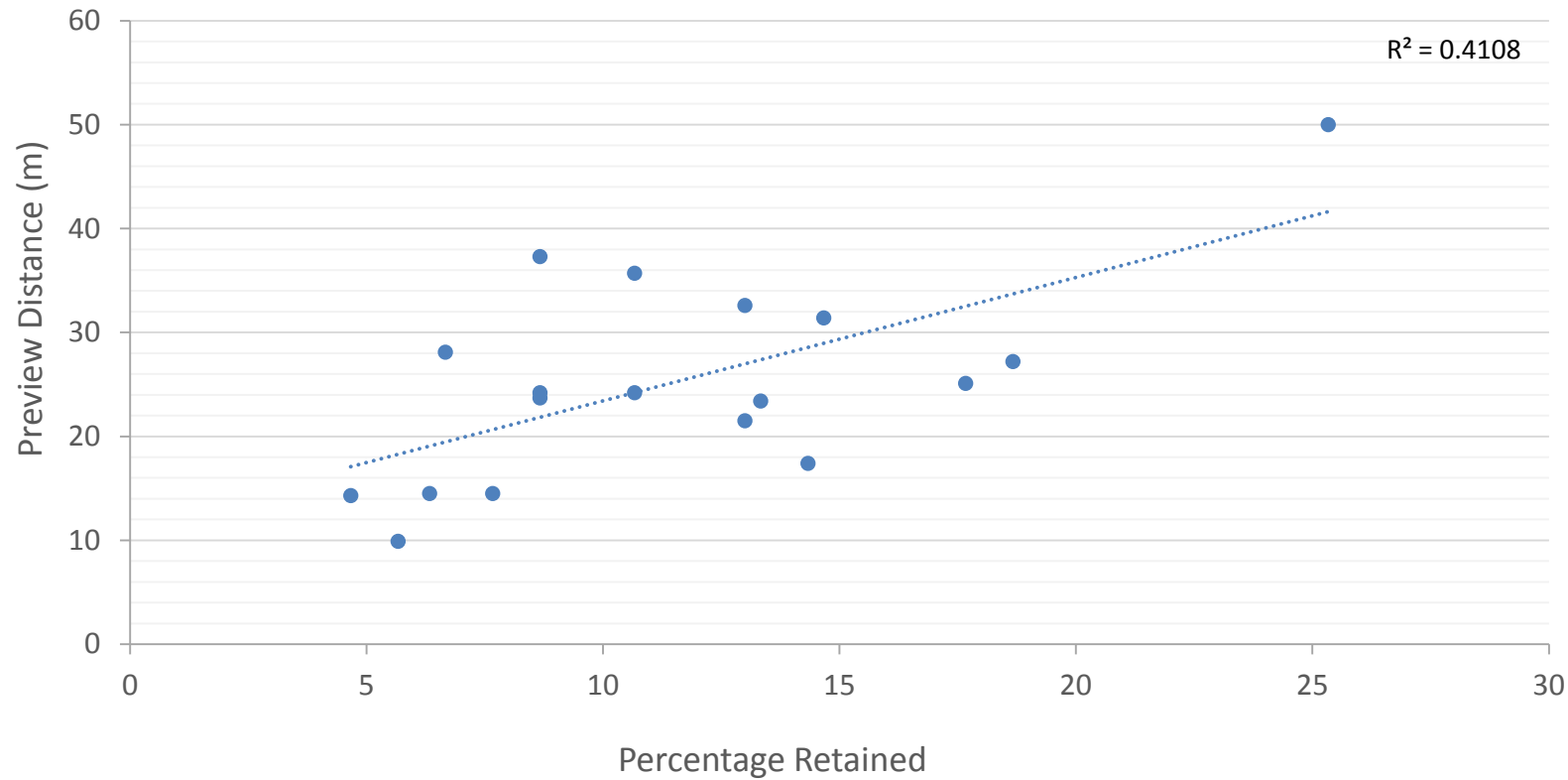
# Test Results – Preview Distance



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Preview Distance vs Paint Retention





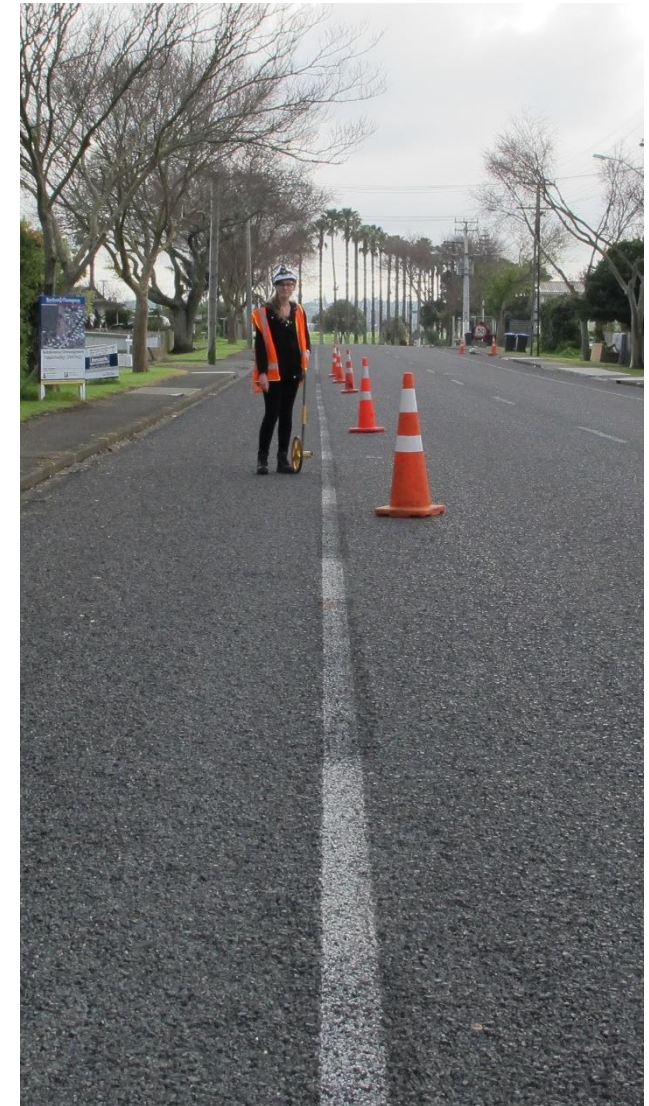
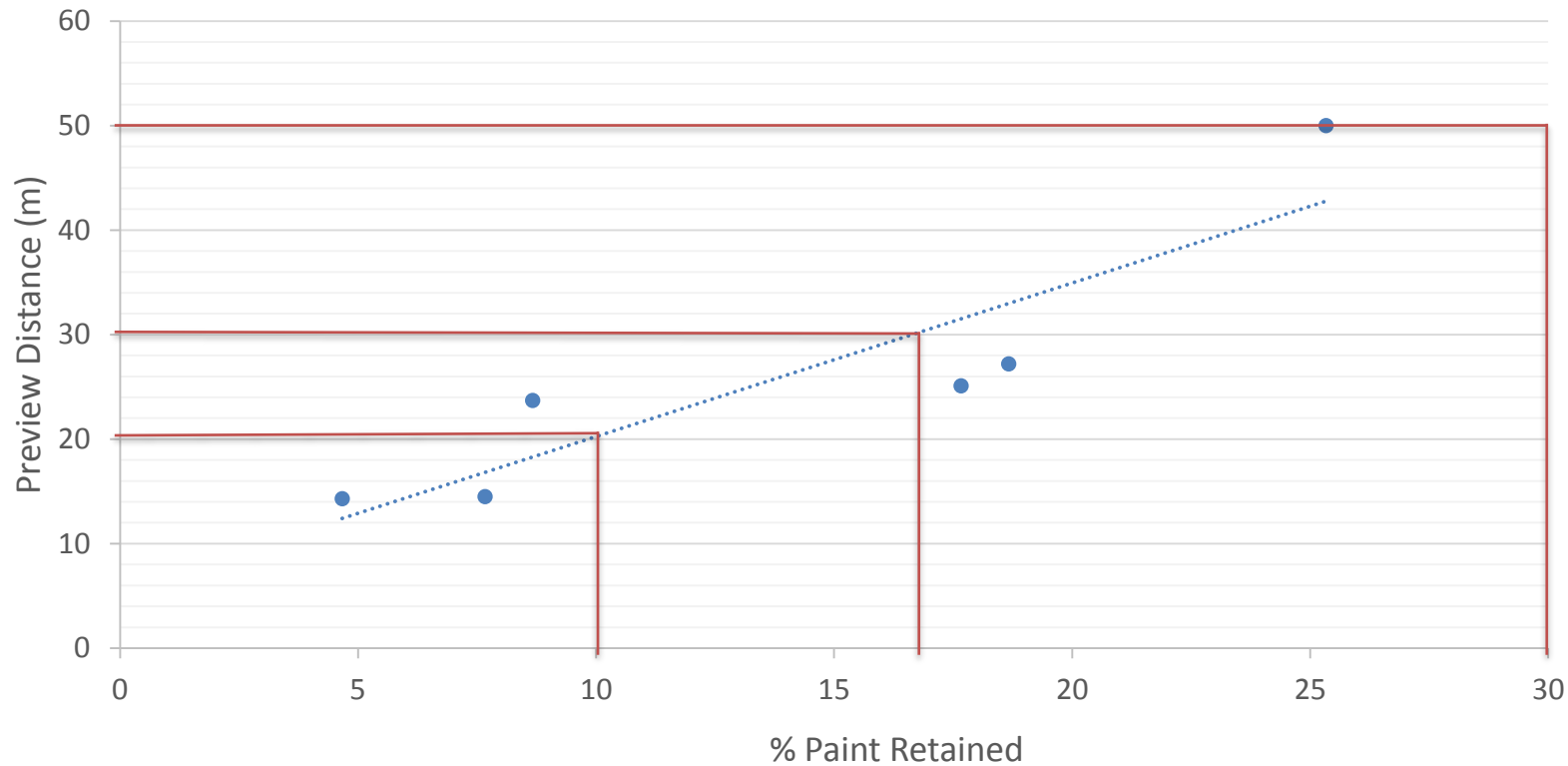
# Test Results – Preview Distance



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Preview Distance v Paint Retention for Varying Pressure



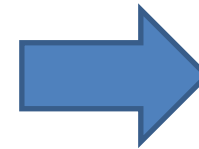
# Test Results – Line Removal Guide



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Line Type	Posted Speed Limit (kph)	Viewing Direction	Viewing Point Distance (m)
Edgeline	Above 70	With travel	50
Centre Line and Lane Lines	Above 70	Both	30
Centre Line and Lane Lines – Divided carriageways	Above 70	With travel	30
Edgeline	Below 70	With travel	20
Centre Line and Lane Lines	Below 70	Both	20
Centre Line and Lane Lines – Divided carriageways	Below 70	With travel	20
Intersection Markings	Rural	With travel	10
Intersection Markings	Urban	Both	10



Preview Distance	Percentage Retained
20m	10
30m	17
50m	30



# Test Results- Photos



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**10 % Line Marking Retention**



**17 % Line Marking Retention**



**30 % Line Marking Retention**



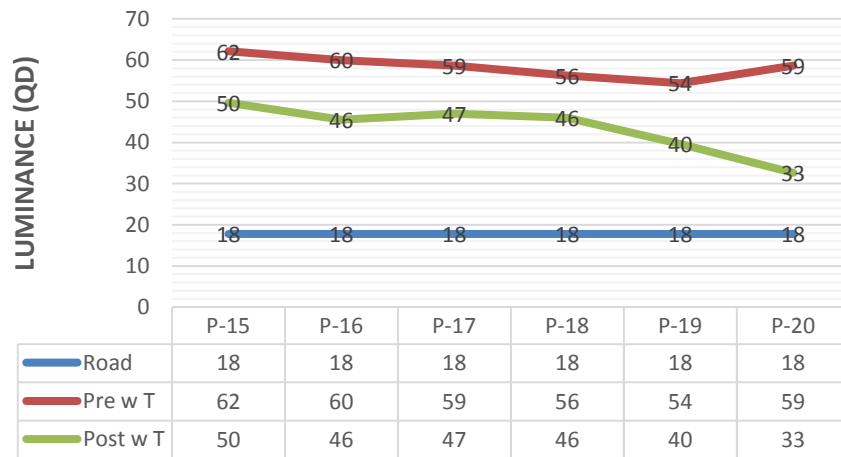
# Day & Night Time Visibility



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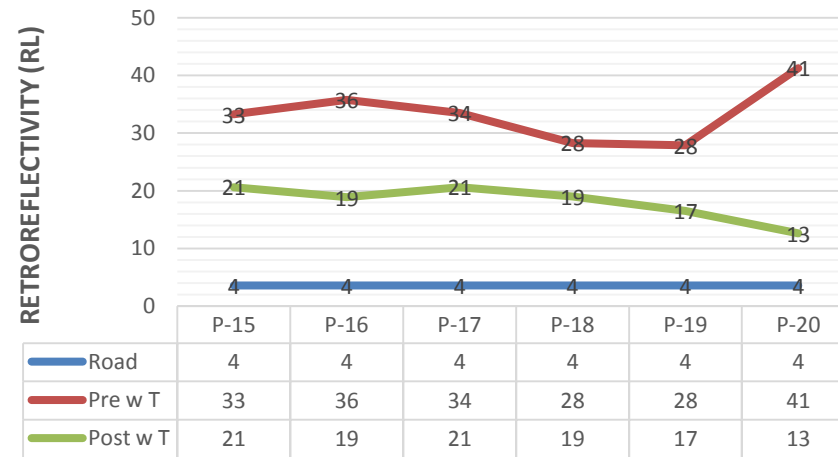
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## Luminance (Day)

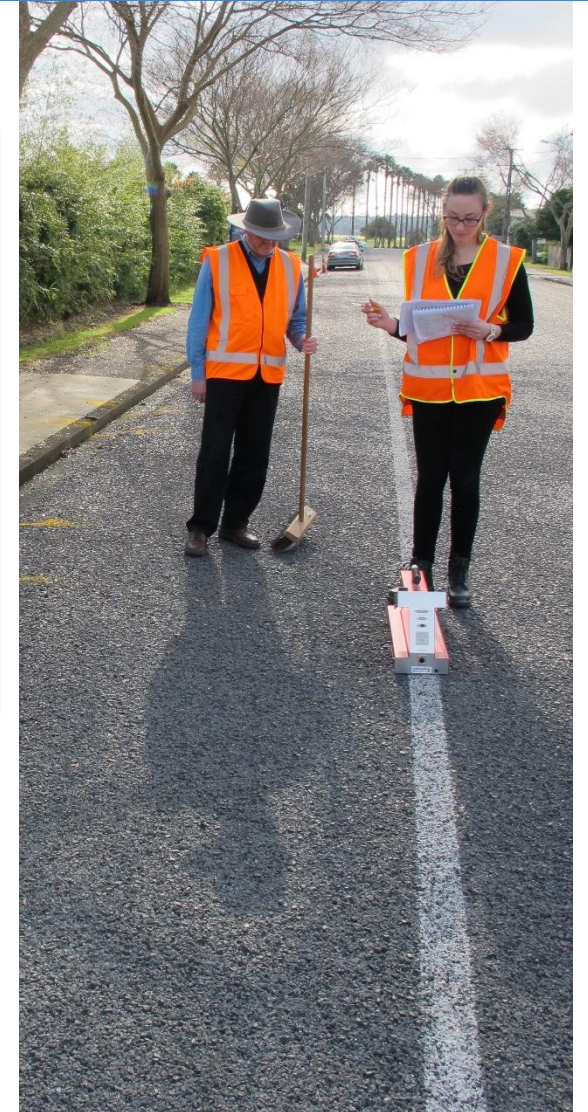


Required: 100 mcd/m<sup>2</sup>/lux

## Retroreflectivity (Night)



Required: 150 mcd/m<sup>2</sup>/lux



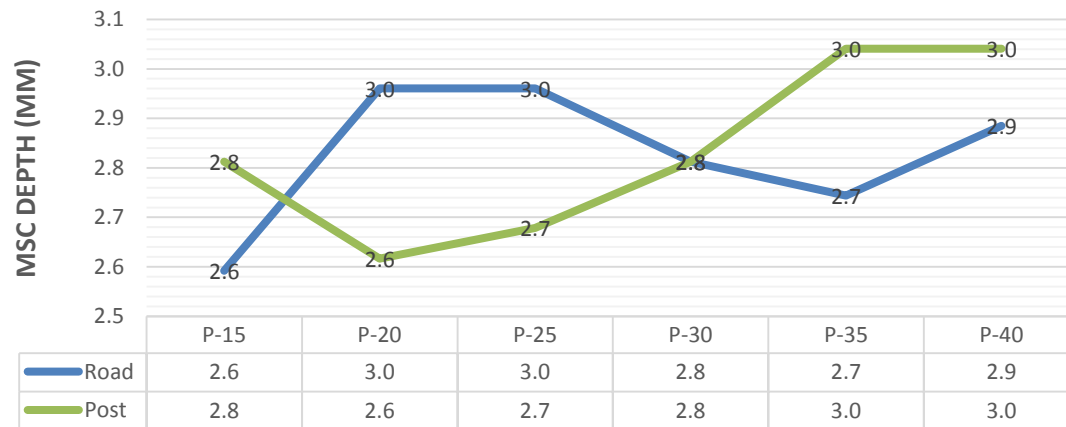
# Modified Sand Circle



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## Modified Sand Circle

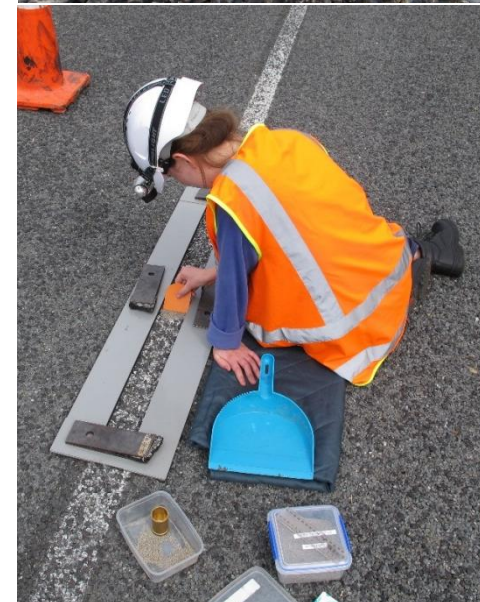


## Greatest Variance in Macro Texture



Depth Before 2.9mm

Depth After 4.3 mm



# Conclusions



- There is a correlation between road preview distances and paint retention and therefore paint retention can be used as a reference for different speed environments.
- The operator found it hard to achieve a required percentage of paint retention based on verbal prompts.

Preview Distance	Percentage Retained
20m	10
30m	17
50m	30



# Recommendations

## Future research:

- Further testing to validate the relationship between paint retention and preview distances.
- A more reliable photo analysis should be used to achieve the true paint retention value.
- Further testing using more mechanically operated controls.
- Further testing on roads which meet the minimum visibility standards
- Further testing to be done on wet nights where ghostmarking is more visible.

# Acknowledgements

A big thank you to:

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**Aquamax**  
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