

# combination chipseals

## CHIPSEALING IN NEW ZEALAND CHAPTER 3: PRACTICE NOTE 1



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### Introduction

A common fault seen on New Zealand's lightly built roads is flushing and/or rutting in the wheel paths.

This is the result of heavy traffic loading which is often confined to set wheel paths particularly where the pavement widths are narrow.

Combination chipseal provides a cost effective option for repair.

### The issue

Flushing and/or rutting in the wheel paths are the result of heavy traffic loading. This is often confined to set wheel paths particularly where the pavement widths are narrow.



Densification occurs in both the layers of chipseal and also the underlying pavement layer causing depressions in the wheel paths.

The wheel paths often become flush as the chipseal layers build up over the life of the pavement.

Some densification of the pavement in the wheel paths can also occur on new pavements.

Loss of skid resistance can be a significant hazard on these sites due to loss of texture/flushing, ponding of water or both in the wheel paths.

The application of a conventional chipseal in this situation would inevitably lead to early flushing of the wheel paths and possible chip loss in the coarse un-trafficked areas of the surface. There would be no improvement to any wheel path depressions that may exist.

Traditionally these risks have been reduced or eliminated by completing pre-reseal treatments<sup>1</sup> such as:

- water blasting of flushing in the wheel paths
- voidfilling of selected areas

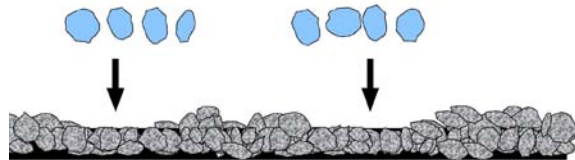
- completing pavement smoothing repairs or rut filling of the wheel track depressions
- completing the chipseal using a sprayer fitted with a variable spraybar<sup>2</sup>.

However, a cost effective alternative may be to use a combination chipseal.

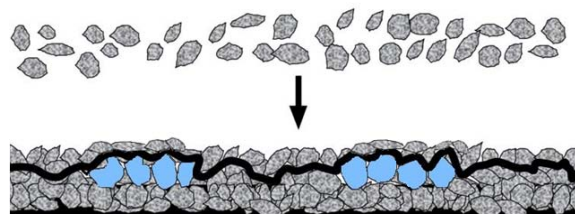
### What is a combination chipseal?

A combination chipseal uses a sandwich<sup>3</sup> seal in the wheel paths and a voidfill<sup>4</sup> seal outside the wheel paths in the un-trafficked areas.

#### Apply large chip to wheel paths



#### Apply binder then small chip across width of lane



Combination chipseals are designed to chipseal surfaces where the wheel paths are clearly defined by significant bitumen rise/flushing or depressions or a combination of both.

There is generally a significant variation in texture of the surface between the coarse un-trafficked areas, (the shoulders, between the wheel paths and the centreline), and the lower textured wheel paths.

<sup>1</sup> Pre-treatments: *Chipsealing in New Zealand*, section 3.7.10.

<sup>2</sup> Variable spraybar: *Chipsealing in New Zealand*, section 10.3.1.3.

<sup>3</sup> Sandwich seal: *Chipsealing in New Zealand*, section 3.7.10.

<sup>4</sup> Voidfill seal: *Chipsealing in New Zealand*, section 3.7.9.

## Constructing a combination chipseal

The construction of a combination chipseal includes:

- application of the large chip, tightly packed, applied only in the well defined wheel paths (flush and/or depressed) approximately 0.6 to 0.9m wide strips
- rolling of this layer of chip if desired (not essential)



- assessment and application of the bitumen across the full width of the carriageway



- application of the second smaller chip across the full width of the carriageway
- rolling of the total chipseal.



## Points to consider

The large chip should be quite tightly packed as for a sandwich chipseal.

The small chip will then be supported high in the chipseal and not fall into the voids between the large chip. This is to ensure that a matrix of sealing chip and voids is formed. This matrix has internal voids that can soak up some of the surplus bitumen in the wheel paths.

The two chip sizes for a combination chipseal need to be chosen carefully. The small chip should fit correctly in the void of the coarse un-trafficked areas of the existing surface as a voidfill chipseal.

The bitumen application rate can then be determined based on the amount of bitumen required to complete the voidfill chipseal without flushing occurring.

The large chip will be selected based on the depth of rutting and/or the depth of bitumen where flushing is present in the wheel paths.

Experience has established that the bitumen application rate for a combination chipseal is somewhere between the design rate for a voidfill, (dependent on the chip grade, generally 4 or 5), and the design application rate for a large chipseal, (usually grade 2 or 3), if either of these chipseals was completed at the site.

This is somewhere between 20 and 30% less than the standard application rate for the large chipseal.

Experience has shown that the large chip should be spread along the entire length of the wheel paths and not stopped and started depending on the apparent amount of bitumen in the wheel path.

Scabbing of the seal does not occur where there appears insufficient bitumen to hold the large chip but flushing will often occur on those areas where flushing was not evident at the time of sealing and so the large chip was not applied.

## Variation in the construction of a combination chipseal

On young pavements that have wheel track depressions without the flushing associated with a layer of chipseals, a light coat of bitumen may need to be applied in the wheel paths prior to the application of the large chip to ensure sufficient bitumen to hold the sandwich seal together.