**The Direct Science of Granular Pavement Layer Compaction**

|  |
| --- |
| The performance of granular pavement layers are heavily dependent on the density that is achieved during construction. The Waka-Kotahi NZTA B-series specifications require the Contractor to undertake plateau density tests to determine the compaction plant combination and number of compaction passes required to achieve the specified pavement layer density. Current industry best practise in New Zealand is to conduct the plateau density test using a nuclear density meter (NDM) in backscatter mode. The principle of compacting granular pavement layers is to compact the layer from the bottom up, yet the backscatter mode on the NDM only measures the top 70 to 90 mm. High air voids at the bottom of a cement bound granular layer on a major infrastructure project sparked further investigation with the following findings and results:* the plateau density test carried out using the NDM’s backscatter mode generates a low number of primary high amplitude compaction passes and a high number of secondary static compaction passes when compared with performing the plateau density test using the NDM in direct transmission mode to the full depth and half depth of the layer, which generated the opposite rolling pattern.
* The degree of compaction in the areas that were compacted using the direct transmission plateau density test rolling patterns achieved a significantly different outcome in the voids in the lower bounds of the pavement layer.
* These results have led to changing both the plateau density test and the density acceptance criteria test from using NZS 4407:2015-Test 4.3 – Backscatter mode to NZS 4407:2015-Test 4.2 – Direct Transmission mode.
* The degree of compaction acceptance criteria has been set as per the relevant tables in NZTA B/2 to B/8 for both the full depth and half depth direct transmission tests.
* Density calculations of the lower half of the compacted layer are used for monitoring of trends and data collection purposes rather than being a contractual requirement.

The findings of the above project trails were incorporated into the “Plateau Density Test” technical advice note (TAN), was drafted by the NPTG for Waka-Kotahi NZTA since mid-2020. The TAN provides guidance of the appropriate compaction equipment used for a variety of materials, the layer thicknesses appropriate for these materials and describes how the plateau density test should be carried out on new pavement construction and pavement rehabilitation projects in New Zealand.This presentation outlines the results of the trials and the content of the draft TAN on this subject. |