**Upgrading laboratory testing methodologies to improve in-service behaviour of road aggregates**

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| Road aggregates are assumed to have constant properties over time and location. However, weathering process can age this materials and change the properties of them in a relatively short time. I developed field and laboratory based experimental methodologies to better understand the influence of environmental conditions on road aggregates.  Two sources of andesitic unbound aggregates are used, one source of aggregates is characterised to be of high quality and the other of more marginal quality according to the local standard New Zealand Transport Agency (NZTA) M4 specification. The results showed that both sources of aggregates are weatherable within a relatively short-time and thus the current labelling method of aggregates cannot thoroughly evaluate their durability.  **Introducing a new field-based experiment:**  The chemical and physical degradation of road aggregates within quarries are considered as an observable analogue of in-situ weathering of aggregates in the pavement structure. In-situ weathering of aggregates is analysed using Clay Index test and verified by variety of analytical methods, including XRF, XRD, and thin section petrography. The results revealed short-term weatherability of road aggregates in local environmental conditions.  **Lab-based experiments (on loose aggregates)**  WQI and Water absorption testing methodologies are modified. It is believed that modified testing methodologies can simulate a wider range of environmental conditions in the laboratory and provide a better indication of weatherability and durability of unbound aggregates in the pavement structure.  **Lab-based experiments (on compacted aggregates)**  The effect of Wetting and Drying (W-D) cycles on the performance of compacted aggregates are investigated by conducting California Bearing Ratio (CBR) alongside Repeated Load Triaxial (RLT) tests.  W-D cycles affect the quantity and quality of fine materials in compacted condition. The W-D can also have an appreciable effect on the permanent deformation, resilient modulus and CBR values of specimens. |