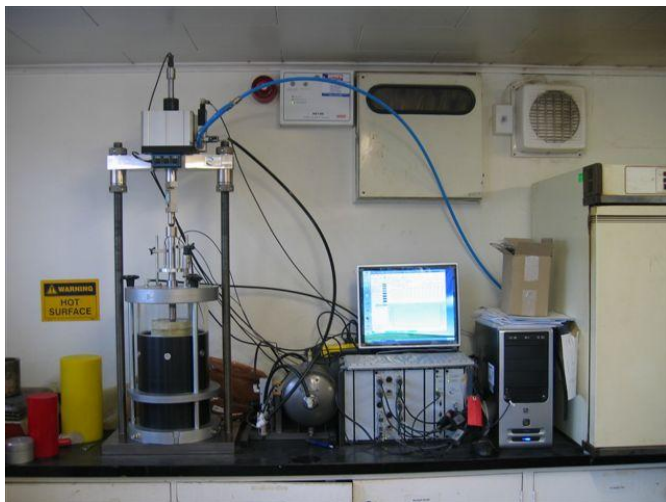
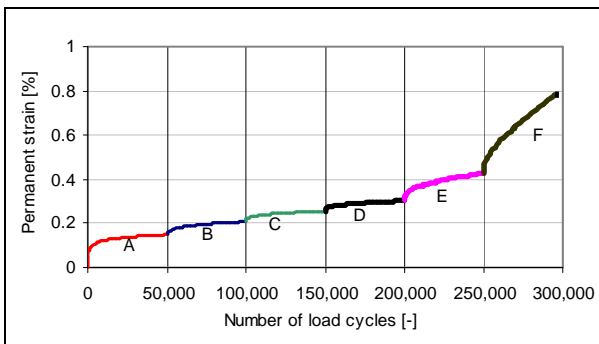


Performance Testing Aggregates – can your aggregate stand up to today’s heavy vehicle loadings?

A new development on the horizon for aggregate specifications is the introduction of a Repeated Load Triaxial test to measure the performance of basecourse aggregates for road pavements. “This test has been around for some time in research circles being able to simulate vehicle loading in the laboratory to predict the on road performance of an aggregate” says Dr Greg Arnold, managing director of Pavespec Ltd. Dr Greg Arnold completed his doctorate from the University of Nottingham, England in 2004 to develop an RLT test to predict the performance of aggregates and has continued his research in New Zealand assisting Transit New Zealand to develop a practical test and method of predicting performance and proving it works on New Zealand aggregates.

The RLT (Repeated Load Triaxial) apparatus as shown in the photo applies repetitive loading on cylindrical materials for a range of specified stress conditions, the output is deformation (shortening of the cylindrical sample) versus number of load cycles (usually 50,000) for a particular set of stress conditions. Multi-stage RLT tests are used to obtain deformation curves as shown below for a range of stress conditions to develop models for predicting rutting.





Dr Arnold says “The Repeated Load Triaxial (RLT) test provides the opportunity to prove in the laboratory that alternative materials would work in the road without the need to road trials. All sort’s of options are possible for developing alternative aggregates that will “do the job” on the road as a basecourse, but do not necessarily meet any traditional specifications. One example is the use of GAP products or overburden materials previously used as low cost fill or aggregates on unsealed roads or discarded. These discarded products could be tested either: “as is” or “modified” with cement or lime or similar additive in the Repeated Load Triaxial apparatus to determine what traffic

loadings unmodified and modified materials are suitable for. Options of aggregate type are only limited to ones imagination, for example waste materials like glass bottles could be turned into aggregate provided the results of the RLT test are positive.

On a more disconcerting note current aggregates complying with existing specifications may not stand up to today's heavy vehicle loadings. Despite all that effort to meet the basecourse specification requirements for grading, crushed faces, source rock durability, sand equivalent, and fines content the final aggregate mix may not have the necessary strength when wet and become blamed for early pavement failures. Aggregates get their strength from stone roughness and shape in terms of how they interlock and slide against each other. Existing specifications do not consider these factors. The RLT test is a measure of the aggregates performance and can determine with appropriate analysis whether or not it will survive with minimal rutting over the design life of the road. RLT tests can be conducted at different moisture contents to see whether or not an aggregate will fail if it gets wet. Hence, Transit is considering a requirement for an RLT test for aggregates to be used on their highest trafficked state highways.

Pre-empting the formal introduction of the RLT test into specifications and many seeing the advantage for developing new improved aggregate mixes has resulted in many larger quarry operators conducting RLT testing with Pavespec Ltd's equipment.

Winstone Aggregates has recently completed the largest RLT study ever undertaken in NZ on basecourse aggregates and GAP products. Jason Lowe, National Manufacturing Manager of Winstones says "RLT testing has allowed us to further develop knowledge of the performance characteristics of our existing TNZ M/4 aggregates and Gap products. It has also given the opportunity to investigate new materials as alternative basecourses". "So far there have not been any surprises although we are excited to have developed modified basecourses that appear to outperform traditional TNZ M/4 aggregates, especially in wet conditions. Work is continuing on evaluating and developing these products". "The RLT test could be specified in projects to allow aggregate producers to manufacture the most suitable product that will meet the performance requirements". "Winstone Aggregates focus is primarily on understanding and improving the performance of our basecourse aggregates to ensure higher quality, better performing roads".

Stevenson Resources General Manager, Steve Ellis, says our "Technical Solutions Team" understand the significant advantages to be had by employing ongoing RLT testing. "Our vision is that the RLT testing along with our existing pavement trial sections, will enable us to":

1. Validate the performance of our already high performing Basecourse.
2. Further develop Low Cost Alternatives.
3. Explore the use of Sustainable Materials.
4. Create Innovation and Challenge Traditional Thinking.

Steve says RLT is not just a performance predicting tool, Stevenson see it as much more than that!

Dr David Hutchison, Technical Manager, Works Infrastructure, whom has undertaken RLT tests for one of their quarries says: “I see the potential for the RLT test to investigate the use of cheaper lower quality locally available aggregates for low trafficked roads”.

Looks like RLT testing is here to stay for more information visit the informative website www.rltt.co.nz developed by Pavespec Ltd.