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UKAS TESTING No.0998

THE TRL DYNAMIC CONE PENETROMETER TEST

The TRL (Transport Research Laboratory) **Dynamic Cone Penetrometer** is an instrument designed for the rapid in-situ measurement of the structural properties of existing road pavements constructed with unbound materials. **Continuous** measurements are made down to a depth of approximately 850mm, or when extension rods are used, the subgrade strata beneath can be penetrated to a depth of 2 metres. These measurements and are converted to **CBR values** and **Layer Stiffness Modulus** Where pavement layers have different strengths the boundaries can be identified and the thickness of the layers determined, similarly with the strata beneath.

The TRL DCP uses an 8kg hammer dropping through a height of 575mm and a 60°cone having a maximum diameter of 20mm. (This punches a clearance hole to ensure there is no friction on the rods.) The instrument is held vertically and the hammer raised to the top of the instrument and allowed to fall freely. The resulting penetration of the rod is measured and the number of blows recorded for a of penetration of about 10mm. (The number of blows carried out per reading of penetration can be varied to suit the strength of the layer.)

After the test the DCP is carefully withdrawn using a hydraulic jack. Cones shall be checked by measurement regularly to check the wear and replaced when necessary

Modified software based on the TRL DCP program is then used to provide the strength and thickness of the layers using the data collected during the test.

From the DTP Interim Advice Note 73/06 **- Design Guidance for Road Pavement Foundations,** a calculation is then applied to the mm/blow to calculate the CBR value, using the following relationship which was developed by the Transport Research Laboratory.

$$\mathbf{Log_{10}\,(CBR) = 2.48 - 1.057 \times Log_{10}\,(mm/blow)}$$

The following equation has been used (after Powell et al, 1984) to give an estimated value of Stiffness Modulus E, acknowledging a degree of uncertainty:

$$\mathbf{E = 17.6\,(CBR)^{0.64}\ MPa}$$