Transport
Roads & Maritime
Services

Test method T161

Penetration resistance of a soil (Dynamic cone penetrometer – 9 Kg mass)

OCTOBER 2012

Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D.Dash	May 1999
		Date on Test Method Revised to Agree with Date on Revision	D.Dash	Feb 2001
		Penetrometer Clause 2(a) Revised tor refer to A.S. 1289.6.3.2	D.Dash	Aug 2003
		Generally Revised-Title changed. Altered AS references. Incorporate interpretation in an Appendix.	D. Hazell	Jun 2008
		5.Appendix: Interpretation of Results Added. Omitted in previous revision	D. Hazell	Mar 2009
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	October 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T161 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T161

Penetration resistance of a soil (Dynamic cone penetrometer – 9 Kg mass)

1. Scope

This test method sets out the procedure for determining the resistance of natural ground and earthworks to penetration by the Dynamic Cone Penetrometer with a 9 kg mass.

2. General

(a) The Dynamic Cone Penetrometer provides a means of:

- (i) Detecting soft or wet soil layers
- (ii) Defining boundaries of particular types of materials
- (iii) Checking the uniformity of materials (e.g. sub grade)
- (iv) Comparing the relative strength of materials

(b) The Test is not appropriate for direct application to pavement thickness design

(c) The resistance is expressed as the depth of penetration obtained by either:

- (i) Each blow of the sliding hammer

OR

- (ii) The number of blows per graduation interval marked on the shaft

(d) The Dynamic Cone Penetration shall only be used in fine-grained materials

3. Apparatus, Preparation and Procedure

(a) This test method is identical to AS 1289.6.3.2.except for the following amendments:

- (i) Prepare the test site in accordance with the requirements in the following table

Type of layer	Preparation
Consisting of fine grained material	Sweep away loose material from the test site.
Overlain by another layer (e.g. wearing surface, macadam, FCR, spalled material)	Excavate a hole through the layer to expose the surface of the required layer. The size of hole is to provide unobstructed operation of the penetrometer. *NOTE: An auger may be used or coring if material is well consolidated. Take care not to penetrate too far into the required layer.* Sweep away loose material for a diameter of at least 150 mm from the test site. The original surface is the reference for all depth measurements.

NOTE: *Usually, where the penetration rate is slow, measure by counting the number of blows for each 25 mm of penetration.*

- (ii) Measure the depths to the nearest 5 mm
- (iii) Record a visual assessment of the moisture condition at layer interfaces. Where required as part of an investigation, obtain samples for moisture content
- (iv) Where required, analyse the results to infer an in-situ CBR for consistent layers (refer to the Appendix)

4. Reporting

Report the results in accordance with AS 1289.6.3.2 except in the report also include:

(a) The depth measurement to the nearest 5 mm

(b) Visual assessment of the moisture condition at the layer interfaces

(c) Where required, graphical presentation of the results (e.g. Blows Vs Depth).

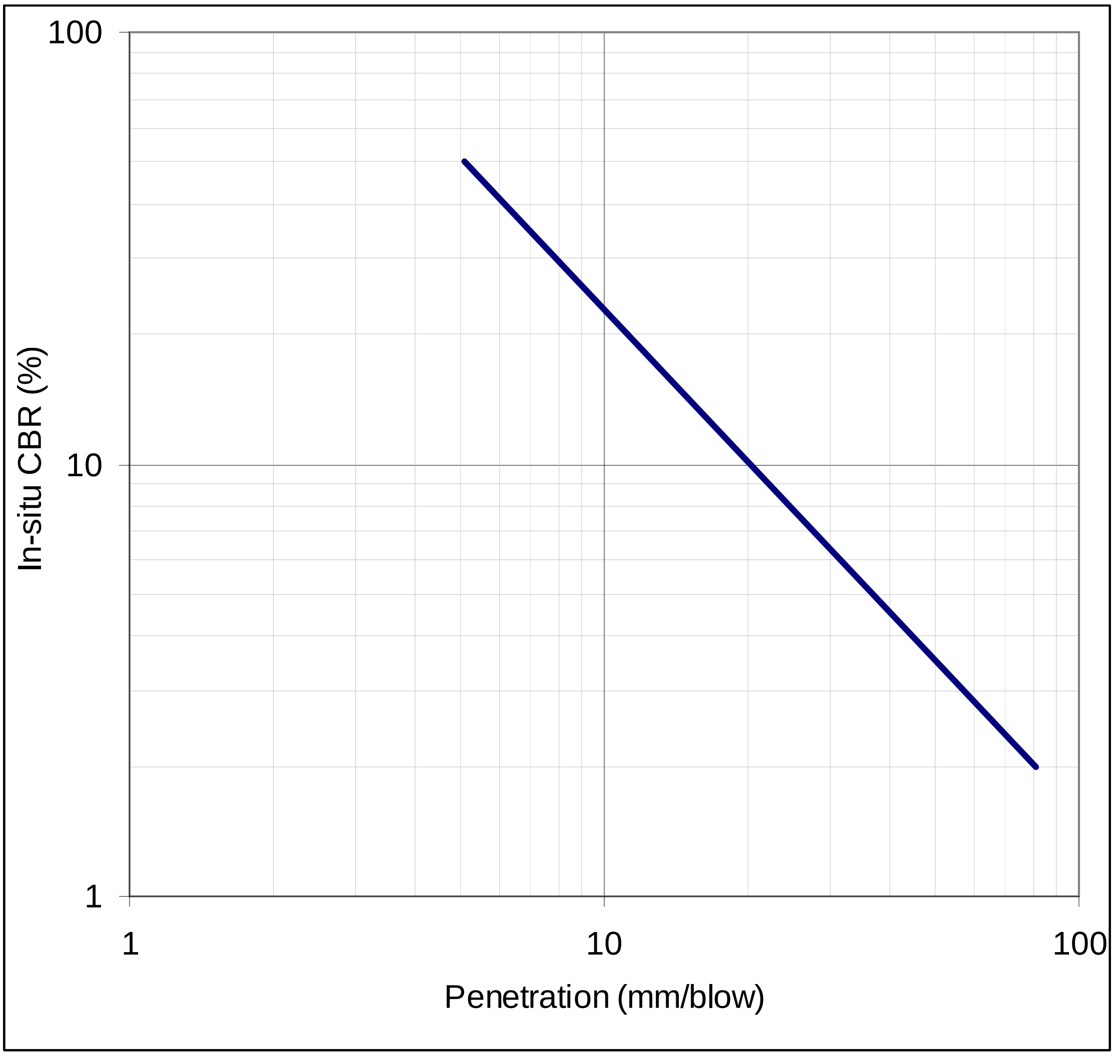
(d) Make reference to this test method

Appendix A: Interpretation of Results[1]

The penetration rate at any particular depth, expressed in terms of mm per blow, can be used to infer an estimate of the in-situ California Bearing Ratio (refer to Figure 1).

However, conversion of penetration rates to their approximate in-situ CBR is rarely necessary. The actual rate of penetration values obtained should be sufficient for comparison purposes.

Figure 1. Estimation of In-situ CBR from DCP Data



NOTE: The calibration is generally applicable to cohesive soils but not necessarily to sands.

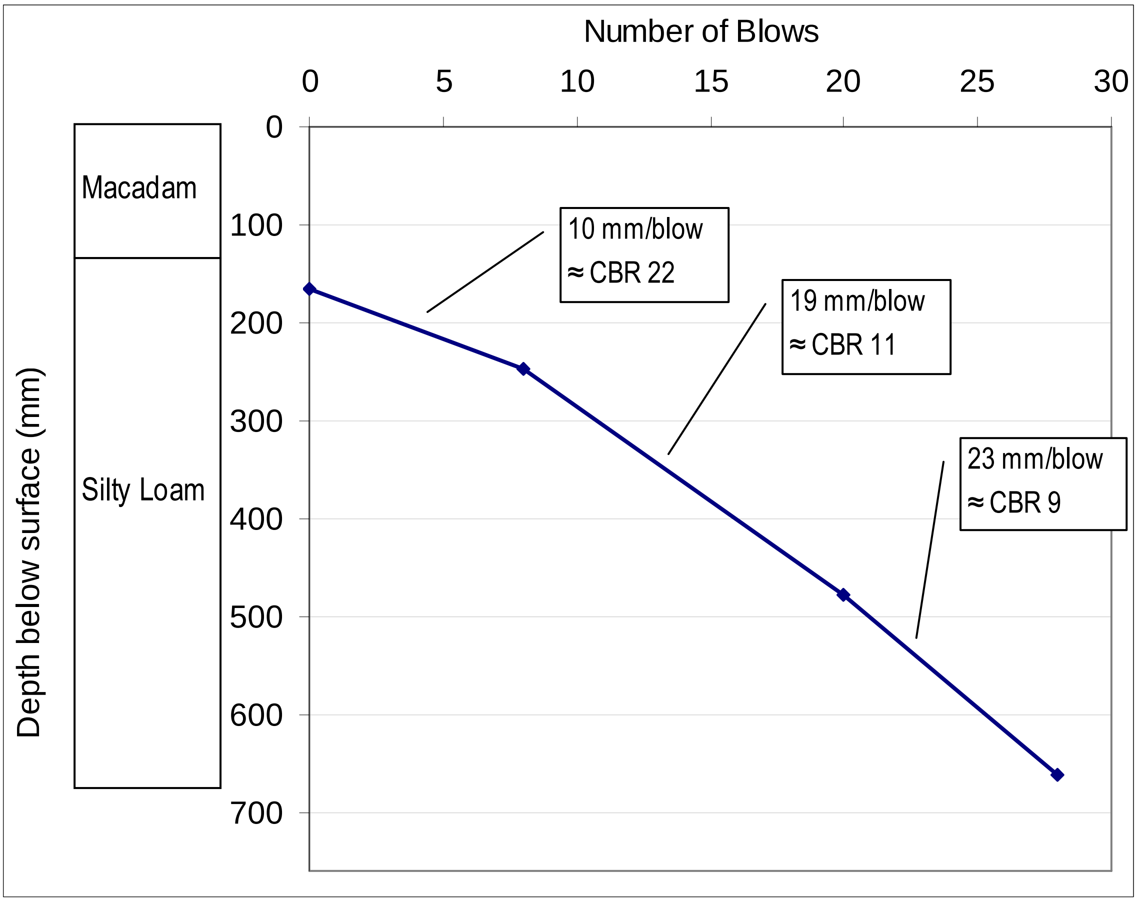
Converted units and redrawn.

The slope of the graph at any particular depth provides an indication of the relative strength of the material at the time of the test (refer to

Figure *2*).

[1] Based on Dept of Main Roads M&R Circular №. 60 dated 2 August 1972.

Figure 2. Example of DCP Blows Plotted against Depth



NOTE: Converted units of depth and redrawn. CBR obtained from Figure 1.