

Test Method

# Selection of Test Sites within a Test Lot (random stratified sampling method)

## RC 316.10

### 1. Scope

This test method sets out the method for selecting and locating test sites for compaction control testing in a test lot using a random stratified sampling method. The principles upon which the method is based are detailed in the May 1989 NAASRA Technical Report — *Pavement Materials: Statistical Assessment of Quality*. The tables included are sufficient for six test sites.

### 2. Definition

**Lot** For the purposes of this method, a lot is defined as an area of work which is essentially homogeneous in relation to material type and moisture condition, rolling response and compaction technique, and which is to be used for the assessment of the density ratio for an area of work with more than one test site.

### 3. Apparatus

- (a) Calculator, if required.
- (b) Measuring devices : commercially available tapes, wheels and rulers, of suitable precision to achieve the tolerances in the method.

### 4. Procedure

The procedure shall be as follows:

- (a) Determine and record the boundaries of the lot to be assessed and any areas excluded within the boundaries of that lot. Areas within 200 mm of the edges of construction and within 5 m of a lateral construction joint shall be excluded from the lot. In the case of trenches, areas within 200 mm of the long edge and within 2m of the end of the trench shall be excluded from the lot.
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- (b) Divide the length of the test lot ( $L$ ) (excluding the distance from lateral construction joints) by  $n$  to obtain the longitudinal distance between sites ( $d$ ).

- (c) Record in digital form the date in days and months and the time in hours and minutes using the 24 hour clock.
- (d) Add the values of day, month, hour and minutes and then sum each digit of the sum to obtain a single digit number ( $N$ ).

*For example : 31 December at 13:41 hours*  
*Add 31 + 12 + 13 + 41 = 97;*  
*then 9 + 7 = 16; and 1 + 6 = 7*  
*thus N = 7*

- (e) Select a random number ( $R$ ) from Table 1 corresponding to  $N$ .  
(In example for  $N = 7$ ,  $R = 0.7$ .)

Table 1 - Random numbers for selection of longitudinal locations	
Sum of digits ( $N$ )	Random Number ( $R$ )
1	0.4
2	0.9
3	0.1
4	0.6
5	0.3
6	0.2
7	0.7
8	0.8
9	0.5

- (f) Multiply the longitudinal distance between sites ( $d$ ) by ( $R$ ) to obtain  $L_s$ , the distance of the first test site from the start of the longitudinal boundary of the lot.
- (g) Measure the distance  $L_s$  from the starting transverse boundary of the lot and locate the first site longitudinally to within 0.5 m.
- (h) Locate the other sites longitudinally by measuring the distance ( $d$ ) from one site to

the next until  $n$  longitudinal sites have been located. Mark the longitudinal locations 1 to  $n$  in order.

- (i) Select a number set from Table 2, corresponding to the day number of the month (see Note 1).
- (j) Starting from the first number on the left in the number set, calculate the lateral location from the lot boundary (excluding the 200 mm from the edges) by multiplying the number by the width of the lot at that longitudinal location. This gives the lateral location at the first longitudinal location (see Note 2).
- (k) Continue across the number set, calculating the lateral locations for each longitudinal site in order 1 to  $n$  until the  $n$  sites required have been located laterally. For  $n = 3$ , use the first three numbers of the six numbers available.
- (l) Measure to the nearest 0.1 m the lateral locations calculated in step (l) at the appropriate longitudinal location from one edge of the lot and mark the test site (see Notes 3 and 4).

### 5. Records

The following test records shall be maintained:

- (a) The test lot bounds and any areas excluded from the lot.
- (b) The date and time of the selection of the test sites.
- (c) The random number (R) selected in step 4 (f).
- (d) The number of sites ( $n$ )
- (e) The number of the number set selected in step 4 (j).
- (f) The longitudinal and lateral location of each test site.

### 6. Report

Report the following for each test lot:

- (a) The test lot bounds and any areas excluded from the lot.
- (b) The longitudinal and lateral location of each test site.
- (c) The number of this method RC 316.10.

### 7. Notes

- 1 *If more than one lot is tested in a day the next number set should be selected in day number order. Recommence at set 1 if set 31 is exceeded.*
- 2 *In cases when the width of the lot varies, such as in turning lanes and super-elevated formations, the width of the lot should be taken at the longitudinal location selected.*
- 3 *The same edge should be used as datum for measurement of the lateral distances.*
- 4 *When the site has been located and it is found that the surface is unsuitable or that there is a single rock which may cause an erroneous reading, the site should be located within a 0.5 m radius of that selected.*

**Table 2 Number sets for selection of lateral locations**

Day Number	Number set	Day Number	Number set
1	0.1 0.6 0.5 0.0 0.8 0.3	17	1.0 0.4 0.3 0.5 0.7 0.6
2	0.5 0.2 0.4 0.1 0.7 0.3	18	0.7 0.1 0.3 1.0 0.9 0.5
3	0.7 0.4 0.1 0.8 0.0 1.0	19	0.1 0.3 0.7 0.5 0.2 1.0
4	0.4 1.0 0.1 0.6 0.8 0.3	20	0.8 0.7 1.0 0.9 0.2 0.0
5	1.0 0.8 0.1 0.3 0.5 0.0	21	0.2 0.6 0.0 0.1 0.9 0.7
6	0.5 0.9 0.4 0.1 0.3 0.8	22	0.2 0.3 0.0 0.8 0.7 0.6
7	0.9 0.8 0.4 0.3 0.6 0.0	23	0.4 0.5 1.0 0.1 0.9 0.2
8	0.9 0.5 0.6 0.2 0.1 1.0	24	0.4 1.0 0.9 0.7 0.5 0.1
9	1.0 0.0 0.4 0.5 0.6 0.2	25	0.5 0.8 1.0 0.0 0.6 0.4
10	0.5 0.8 0.7 0.2 1.0 0.9	26	0.3 0.1 0.4 0.9 0.0 0.2
11	0.6 0.1 1.0 0.9 0.0 0.7	27	0.0 0.5 0.8 0.2 0.3 0.9
12	0.6 0.7 0.5 0.8 0.9 0.0	28	0.3 0.6 0.5 0.0 0.1 0.8
13	0.7 0.4 1.0 0.2 0.8 0.9	29	1.0 0.7 0.1 0.9 0.3 0.6
14	0.3 0.2 0.4 0.1 0.9 0.5	30	0.7 0.1 1.0 0.3 0.6 0.2
15	0.3 0.0 1.0 0.9 0.2 0.3	31	0.4 0.9 0.0 0.6 0.5 0.9
16	0.5 0.9 0.1 0.2 0.0 0.7		

## Test Method - Revision Summary

### RC 316.10 Selection of Test Sites within a Test Lot (random stratified sampling method)

Date	Clause Number	Description of Revision	Authorised by
June 2013	New Cl 3 Cl 4(b) & (k)	Apparatus added. Consequential re-numbering Included values for n (number of test sites)	Manager – Construction Materials
December 2012	Full document Clause 3  Tables 1 & 2 3(j) & Table 2 Step 3(h)	Re-styled with minor corrections made. Steps re-numbered, old step (i) sub-divided, and "lateral location" replaces "lateral distance" "location" replaces "position" Introduced "day number" Reword to "...L <sub>s</sub> from the <u>starting transverse</u> boundary ...."	Principal Advisor – Pavements & Materials