Test Method

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

RC 316.10

January 2020

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 lots either with six test sites, or with three test sites.

2. Definition

Lot : For the purposes of this method, a test lot consists of a single layer, batch or area of like work which has been constructed or produced under essentially uniform conditions and is essentially homogeneous with respect to material type, general appearance, test rolling response, moisture condition during compaction, compaction technique and nature of underlying materials. Discrete portions of a lot which are non-homogeneous with respect to material and appearance shall be excluded from the lot and shall be either treated as separate lots, or reworked. The extent of each lot shall not exceed one day's production. The test lot is to be used for the assessment of characteristic density ratio for an area of work using more than one test site.

3. Apparatus

Calculation and measuring devices, commercially available and of suitable precision to achieve the tolerances in the method.

4. Procedure

The procedure shall be as follows:

(a) Determine and record both the boundaries of the test lot to be assessed and any areas to be excluded within the boundaries of that lot (see clause 2).

(b) Areas within 200 mm of the edges of construction or within 2 metres of either lateral construction joints or ends of trenches, shall be excluded from the test lot.

(c) 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).

(d) Record in digital form the date in days and months and the time in hours and minutes using the 24 hour clock.

(e) Add the values of day, month, hour and minutes and then sum each digit of the sum to obtain a single digit number (N).

(f) Select a random number (R) from Table 1 corresponding to N. (see example, for $N = 6$, $R = 0.2$.)

Example: Test on 31 December, at 14:39 hours
Add first: 31 + 12 + 14 + 39 = 96
Then 9 + 6 = 15; and 1 + 5 = 6
Thus N = 6 and R = 0.2

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

(g) 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.

(h) Measure the distance L_s from the starting transverse boundary of the lot and locate the first site longitudinally to within 0.5 m.

(i) 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.

(j) Select a number set from Table 2, corresponding to the day number of the month (see Note 1).

(k) Starting from the first number on the left in the number set, calculate the lateral location from the test lot edge by multiplying the number by the width of the lot at that longitudinal location and adding 0.2 m for the excluded edge. This gives the lateral location at the first longitudinal location (see Note 2).

(l) 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. As an aid to calculation, see Note 3.

(m) 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 4 and 5).

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).

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. *A Microsoft Excel spreadsheet for calculating the location of test sites is available from VicRoads website, Test Methods RC 316.10B.*
4. *The same edge should be used as datum for measurement of the lateral distances.*
5. *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 Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Day Number	Number set Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
1	0.0	0.6	0.5	0.1	0.8	0.3	17	0.7	0.4	0.3	0.5	1.0	0.6
2	0.5	0.2	0.4	0.1	0.7	0.3	18	0.7	0.9	0.3	1.0	0.1	0.5
3	0.7	0.0	0.1	0.8	0.4	1.0	19	0.1	0.3	0.7	0.4	0.2	1.0
4	0.3	1.0	0.1	0.6	0.8	0.4	20	0.8	0.2	0.6	0.9	0.7	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	0.8	0.1	0.3	0.4	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	0.2	0.5	1.0	0.1	0.9	0.4
8	0.8	0.5	0.6	0.2	0.1	1.0	24	0.5	1.0	0.1	0.7	0.4	0.9
9	0.6	0.0	0.2	0.5	1.0	0.4	25	0.4	0.8	1.0	0.0	0.6	0.5
10	0.2	0.8	0.7	0.5	1.0	0.9	26	0.3	0.1	0.9	0.4	0.0	0.2
11	0.6	0.4	1.0	0.9	0.0	0.7	27	0.0	0.5	0.8	0.2	0.3	0.9
12	0.6	0.9	0.5	0.8	0.7	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	0.9	0.4	0.1	0.2	0.5	30	0.7	0.1	1.0	0.3	0.6	0.2
15	0.3	0.0	0.9	1.0	0.2	0.3	31	0.4	0.9	0.0	0.6	0.5	0.8
16	0.2	0.9	0.1	0.5	0.0	0.7							

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VicRoads Test Method - Revision Summary

RC 316.10 – Selection of Test Sites within a Test Lot

Date	Clause	Description of Revision	Authorised by
January 2020	Cl 4(k) Notes Table 2	Adjusted text so lateral location measured from lot boundary Added new Note 3 and re-number Adjusted values to equalize random selection for n = 6 and n = 3	Manager – Construction Materials
March 2018	1 2 3 4(a) 4(b) 4(f)	Add : or with three test sites Test lot definition consistent with Section 173.02 and RC 316.00 Apparatus requirements simplified Refers to new Note 1, sub-clause split New, and changed to 2 m, Revised example	Manager – Construction Materials