

RC 423.02

Manual of Testing

MEASUREMENT OF SURFACE LEVELS OF PAVEMENT
LAYERS (Random Site Selection)

1. INTRODUCTION

This method sets out the procedures for the random selection of sites for measurement of levels in a lot of constructed pavement, measurement of levels and calculation of the level characteristics for the lot. The method requires the calculation of mean and standard deviation of differences in level between the actual level and the design levels at each site.

2. APPARATUS

- (a) Surveying Level accurate to 1mm per 50 m of reading distance.
- (b) Apparatus for locating test sites to the nearest 1 m longitudinally and 0.3 m transversely. (Pacing and stepping out are adequate for the task.)
- (c) Electronic spreadsheet or calculator capable of generating random numbers between 0 and 1. Alternatively, a chart of random numbers, e.g. Table 1 of AS 1289.1.4.2, may be used.

Note: A Microsoft Excel spreadsheet for calculating the location of test sites is available from GeoPave by application to geopave@roads.vic.gov.au.

3. SELECTION OF SITES

3.1 Selection of the Lot

- (a) Select each lot according to the requirements of the job specification.
- (b) Select the number of sites (N) (or intervals) within the lot in accordance with the scale of work required in the job specification.

3.2 Selection of Longitudinal Sites

- (a) Divide the longitudinal length of lot into N number of sections of equal length D .

$$D = L/N$$

where L = the total length of the lot in metres measured along the design reference line.

- (b) Select a random number R_y using the spreadsheet, calculator or chart (see AS 1289.1.4.2 for the use of Table 1).

- (c) Multiply the length of the section D by the random number R_y to obtain the longitudinal offset from the starting point of the section y , and add the full length of the $(y-1)$ section, to obtain the position of section y from the start of the lot

e.g. for the first section:

$$D_1 = R_1 \times D + (1-1) \times D = R_1 D$$

where D_1 is the longitudinal offset from the starting point of the lot; and

R_1 is the random number selected in Step 3.2(b) for the first site.

For the y th section

$$D_y = R_y \times D + (y-1) \times D$$

where D_y is the longitudinal position of the y th section from the starting point of the lot; and

R_y is the random number selected in Step 3.2(b) for the y th site

- (d) Repeat this process for each section to obtain the longitudinal offset for each site in the lot.
- (e) Record the longitudinal offset calculated.

3.3 Selection of Lateral Locations

At each longitudinal site selected in Clause 3.2:

- (a) Select a random number R_w using the spreadsheet, calculator or chart (see AS 1289.1.4.2 for the use of Table 1).

- (b) Multiply the width of the section W at that point by the random number R_w to obtain the transverse offset from edge of the lot.

(c) Repeat this process for each longitudinal site within the lot.

(d) Record the transverse offset calculated.

4. MEASUREMENT OF LEVELS

(a) Determine the level of a fixed reference point on the job to which all levels may be referred.

(b) Determine the level at each site relative to the reference level and record the level to the nearest 1mm

(c) Determine and record the location of each.

5. DESIGN LEVELS

Determine the design level (H_{dy}) at each location recorded in 4(c) from the relevant design drawings or electronic files.

6. CALCULATIONS

6.1 Difference in levels from design levels

Calculate the difference in levels at any test site d_y using the following equation:

$$\delta_y = H_{dy} - H_y$$

where δ_y is the difference in levels at site y ;
 H_{dy} is the design level of the pavement layer at site y ; and
 H_y is the measured level of the pavement layer at site y .

6.2 Mean difference of levels

Calculate the mean difference in levels of the lot D using the following equation:

$$\Delta = \Sigma \delta_y / N$$

where δ_y is the difference in levels at site y ;
 N is the number of sites in the lot.

6.3 Standard deviation of differences of levels

If required, calculate the standard deviation of the difference in levels of the lot using the following equation:

$$S = \sqrt{\frac{\Sigma (\Delta - \delta_y)^2}{N - 1}}$$

where Δ is the mean difference in levels of the lot;

δ_y is the difference in levels at site y ; and
 N is the number of sites in the lot.

7. REPORTING

Report the following:

(a) The bounds of the lot;

(b) The longitudinal and lateral location of each site as determined in step 4(c);

(c) The measured level and the required level at each site in the lot to the nearest 1 mm;

(d) The mean difference in the levels for the lot to the nearest 0.1 mm;

(e) The standard deviation of the differences in levels for the lot, if required, to the nearest 0.1 mm.

(f) The characteristic value of the differences in levels for the lot, if required, to the nearest 0.1 mm.