SECTION 173 - EXAMINATION AND TESTING OF MATERIALS AND WORK (ROADWORKS)

173.01 GENERAL

This section covers some of the requirements for examination and testing of materials and work associated with road construction. Particular examination and testing requirements are separately specified in the relevant sections of the specification. Unless otherwise specified, the cost of all testing shall be borne by the Contractor.

173.02 LOT TESTING

Unless otherwise specified, acceptance of material and work will be based on testing of the material or work in lots. A lot will consist 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 and appearance. Unless otherwise specified, the extent of each lot shall not exceed one day's production. 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. Where the areas excluded from a lot as non-homogeneous exceed 10% of the total lot area or at other specified percentages of the total lot area, the whole of the lot shall be rejected.

173.03 TEST ROLLING

(a) General

The Contractor shall submit a test rolling procedure to ~~the Superintendent~~ Council including the method of preparing an area for test rolling, the extent of test rolling and a requirement to provide not less than 24 hours notice of the location and commencement time for the test rolling to ~~the Superintendent~~ Council.

Plant which is nominated for use in test rolling procedures shall comply with the following requirements:

~~(i) Static smooth steel wheeled rollers shall have a mass of not less than 12 tonnes and a load intensity under either the front or rear wheels of not less than 6 tonnes per metre width of wheel.~~

(ii) Pneumatic tyred plant <u>comprising of a loaded tandem truck or filled watercart (ensuring minimum capacity at 75%),</u> which shall have a mass of not less than 20 tonne and shall have a ground contact pressure under either the front or rear wheels of not less than 450 kPa per tyre. The area over which this ground contact pressure shall be applied shall not be less than 0.035 m^2 per tyre.

Each layer should be test rolled immediately following completion of compaction but if test rolling is carried out at a later time the surface of the layer shall be watered and given a minimum of three passes with the test roller prior to commencement of test rolling.

(b) Compliance

Compliance with the test rolling requirements shall be when an area withstands test rolling without visible deformation or springing.

173.04 COMPACTION AND MOISTURE CONTENT TESTING

(a) General

For the purpose of control of moisture content of material and for determination of compaction procedure the following definitions shall apply:

(i) material of nominal size 40 mm or less:

material which has 20% or less (by wet mass) retained on a 37.5 mm AS sieve

(ii) material of nominal size greater than 40 mm:

material which has more than 20% (by wet mass) retained on a 37.5 mm AS sieve.

(b) Definition of Density Ratio for Asphalt and Concrete Pavement

Density ratio is defined as follows:

(i) Asphalt Pavement

The percentage ratio of the field bulk density to the bulk density of the job design mix when compacted in the laboratory.

(ii) Concrete Pavement

The percentage ratio of the field bulk density to the mean bulk density of cylinder specimens taken from the same lot.

(c) Characteristic Value of Density Ratio or Moisture Ratio

The characteristic value of density ratio or moisture ratio of the lot shall be calculated as $\bar{x}$ - 0.92S for six tests per lot where $\bar{x}$ and S are respectively the mean and the standard deviation of the individual density ratio or moisture ratio test values respectively for the lot.

The mean of density ratio or moisture ratio is defined by:

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

The standard deviation of density ratio or moisture ratio test values is defined by:

$$S = \sqrt{\frac{\sum_{i=1}^{n} (\bar{x} - x_i)^2}{n-1}}$$

where x_i, i=1, 2, 3, ...n, is the individual density ratio or moisture ratio test value and n is the number of tests per lot.

(d) Testing Small Areas

For earthworks and pavement construction any lot which has a surface area less than 500 m^2 may be treated as a small area. When testing a small area as a lot and where test requirements are based on characteristic values of density ratio and/or moisture ratio, acceptance of the lot shall be based on the mean values of 3 individual tests. In this case the lot will be accepted as far as compaction is concerned if the mean value of the individual tests exceeds by 2.0% or more the appropriate compaction scale requirement for the characteristic value of density ratio for a lot of six tests.

(e) Samples Containing Oversize Material with a Nominal Size Greater than 40 mm

(i) Assessment Based on Characteristic Density Ratio

If the set of six samples includes no more than two samples having more than the permitted amount of 40 mm nominal size material, the lot will be accepted as far as compaction is concerned if the mean value of the individual tests exceeds the specified characteristic value of density ratio by 2.0% or more. If there are less than 4 valid samples, acceptance shall be based on the adoption of an acceptable compaction procedure and test rolling carried out in accordance with the requirement of this Specification.

(ii) Assessment Based on Mean Density Ratio

If the set of three samples includes one or more samples having more than the permitted amount of material exceeding 40 mm in nominal size, assessment shall be based on the adoption of an acceptable compaction procedure and test rolling carried out in accordance with the requirement of this Specification.

(f) Refilling Test Holes

The Contractor shall backfill test holes with material of similar quality to that removed from test holes during testing. The backfill material shall be compacted in the holes in layers with a suitable compaction device.

(g) Moisture Ratio Determination

For material of nominal size greater than 40 mm, moisture ratio shall be determined on that fraction of the material which passes the 19.0 mm AS sieve.

For material of nominal size 40 mm or less, moisture ratio shall be determined on the whole material, taking into account any adjustment for oversize material as detailed in the relevant test method.

(h) Acceptance Testing

All compaction testing of work carried out under this Contract shall be deemed to be testing for acceptance unless written advice is provided to ~~the Superintendent~~ Council prior to the commencement of the test, that such testing is for in-process monitoring only. Where the Contractor provides prior written advice to this effect, the results of such testing will not be allowable as testing for acceptance.

173.05 TESTING OF SURFACE LEVEL OF EARTHWORKS AND PAVEMENT COURSES (RANDOM LEVEL MEASUREMENT PROCEDURE)

(a) General

The requirements of this clause apply to:

- the top of Type B material in fills
- the Cut Floor Level in cuts where Type A material is specified
- the finished surface of the subgrade
- pavement courses where Scale A and Scale B surface level is specified by the random level measurement procedure in accordance with the VicRoads Test Method.

(b) Measurement of Surface Level

Measurement of surface level will be made using a level accurate to ±3 mm per 50 m of reading distance, with levels being recorded to the nearest 1 mm.

Within each lot, level measurements shall be compared with the corresponding design levels and individual departures from design, xi shall be calculated as follows:

the mean of the departures from design level $\bar{x}$, of n measurements will be determined to the nearest 0.1 mm as follows –

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

the standard deviation, S, will be determined as follows -

$$S = \sqrt{\frac{\sum_{i=1}^{n} (\bar{x} - x_i)^2}{n-1}}$$

where x_i = measured level - design level (mm).

173.06 TESTING OF SURFACE LEVEL OF EARTHWORKS AND PAVEMENT COURSES (NON-RANDOM LEVEL MEASUREMENT PROCEDURE)

(a) General

The requirements of this clause apply to:

- the finished surface of the top of Type B material in fills
- the Cut Floor Level in cuts where Type A material is specified
- the subgrade
- pavement courses where a non-random method of level assessment is permitted or where Scale C level assessment is specified.

(b) Earthwork Formation

The surface level of the finished earthwork formation including:

- table drains
- verges
- the top of Type B material in fills
- the Cut Floor Level in cuts where Type A material is specified
- the prepared subgrade

shall be checked longitudinally for conformity with the specified requirements at intervals not exceeding 20 m. Level measurements shall be taken and recorded at all changes in gradient, at the edges of prepared earthworks surfaces, designated lane lines and at intervals not exceeding 2 m transversely across the prepared surfaces prior to placing Type A material or pavement material.

(c) Pavement Courses

The surface level of each completed pavement course shall be checked longitudinally and transversely for conformity with the specified requirements at intervals not exceeding 20 m in the longitudinal direction. At each location checked for longitudinal level conformity, the surface level shall be checked in the transverse direction at all of the following locations:

(i) at the edges of the pavement

(ii) at all changes of gradient across the pavement

(iii) at intervals not exceeding 2 m across the pavement.

(d) Pavement Layer Thickness

In cases where drawings showing the finished surface level are not provided but the thickness of pavement courses or resheet is specified, the Contractor shall determine the thickness of pavement courses or resheet by taking the difference between the surface level measurements recorded in accordance with the requirements of Clause 173.06(c).