

## **SECTION TWELVE**

### **INSITU STABILISATION OF EXISTING PAVEMENT MATERIALS**

#### **12.01 DESCRIPTION**

This section covers the requirements for insitu stabilisation of existing pavement layers by addition of cement, blended cement, lime or other specified pozzolanic material. The requirements relate to preparation of existing pavement materials, quality of additive, construction plant, and spreading, mixing, and compaction procedures.

#### **12.02 DEFINITIONS**

- Quicklime: Quicklime is a granular form of lime consisting primarily of calcium oxide and which can be readily slaked.
- Hydrated lime: Hydrated lime is a powdered form of lime consisting primarily of calcium hydroxide.
- Equivalent calcium: Equivalent calcium oxide content is the amount of calcium oxide
- Oxide Content: Expressed as percentage by mass, which:
- (a) in quicklime produces calcium hydroxide after slaking;
  - (b) in hydrated lime is chemically proportioned to the amount of calcium hydroxide available after slaking.

#### **12.03 CONFORMITY WITH DRAWINGS**

Stabilised base and sub base layers shall be finished to reasonably smooth and uniform surfaces and after compaction shall conform within the following limits to the levels, lines, grades, thicknesses and cross sections shown on the drawings, or specified, or directed by the Superintendent.

(a) Surface Level

The level of the top of the stabilised layer shall not differ from the specified level by more than 20mm.

(b) Thickness

The thickness of the stabilised layer at any point shall be not less than the thickness specified by more than 15mm. The average thickness of the layer over any 100 M section for the full carriageway width shall be not less than the specified thickness.

(c) Alignment

The edges of the stabilised layer shall be not more than 50mm inside, and not more than 100mm outside, the specified offset from centreline or design line.

(d) Width

The width of the stabilised layer shall be not less than the specified width by more than 50mm and not greater than the specified width by more than 100mm. The average width of the layer determined from measurements at 6 sites selected randomly over any 300 M shall be not less than the specified width.

(e) Shape

No point of the surface of the stabilised layer shall lie more than 15mm below a 3M straight edge placed in any direction on the surface.

**12.04 MATERIALS**

(a) Stabilising Additive

(i) Cement

Cement shall be supplied by the Contractor and shall be General Purpose Cement Type GB complying with AS 3972. The Contractor shall nominate the type, brand and source of cement or blended cement. The Contractor shall also supply on request a Certificate from the supplier stating that the cement complies with AS 3972.

The use of pozzolanic additives shall be subject to prior approval in writing by the Superintendent.

The Superintendent's approval shall be obtained prior to changing the source and quality of the nominated cement.

(ii) Quicklime

The equivalent calcium oxide content of quicklime shall be not less than 60%.

The residue of quicklime after slaking shall not exceed 30%.

At the time of spreading, quicklime shall comply with the grading requirements specified in Table 12.041.

**Table 12.041**

<b>AS Sieve Size (mm)</b>	<b>Test Value (% passing)</b>
9.5	100
4.75	95 - 100
2.36	85 - 100

(iii) Hydrated Lime

The equivalent calcium oxide content of hydrate lime shall be not less than 60%.

Bulk hydrated lime shall be dry and shall have been produced not more than 14 days before delivery.

At the time of spreading, hydrated lime shall comply with the grading requirements specified in Table 12.042.

**Table 12.042**

<b>AS Sieve Size (mm)</b>	<b>Test Value (% passing)</b>
4.75	100
0.600	95 -100
0.075	85 - 100

Prior to use, the Contractor shall confirm to the Superintendent the source from which lime will be obtained. The Contractor shall supply, on request, a Certificate from the supplier stating the minimum equivalent calcium oxide content of the lime.

The Superintendent's approval shall be obtained prior to changing the source and quality of the nominated lime.

(b) Water

Water shall be clear and substantially free from impurities such as oils, salts, organic substances, acids, alkalis and vegetable substances. The amounts of chloride and sulphate shall each be no greater than 0.03%.

(c) Pavement

The material to be stabilised shall be the existing surfacing and pavement material and any additional material placed over the existing pavement for mixing with the layer below.

**12.05 CONSTRUCTION PLANT**

(a) General

The Contractor shall provide and operate sufficient spreading, mixing, watering and compacting plant to carry out the specified work.

(b) Additive Spreader

Mechanical equipment specifically designed for the spreading of stabilising additives shall be used to spread the additive onto the prepared roadbed. It shall be capable of accurately regulating the discharge of the additive such that the requirements of Clause 12.06(c) are met.

(c) Stabilisation Machine

The pulverisation and mixing of pavement material, water and additive shall be carried out by a machine specifically designed for stabilisation of road materials. Rotary hoes and other agricultural type machinery shall not be used. The machine shall be capable of uniformly mixing the additive throughout the specified depth. The machine shall be capable of pulverising the pavement such that most of the material shall pass a 50mm sieve after pulverisation.

(d) Watering Plant

Watering plant shall be capable of uniformly distributing water in a fine spray.

**12.06 CONSTRUCTION**

(a) General

Construction includes the preparation of insitu materials, spreading and mixing of additives and materials, and compaction, trimming and curing of the stabilised layer.

Unless otherwise specified, stabilisation work undertaken each day shall be completed across the full pavement width.

Stabilisation operations should only continue in the event of rain, if the moisture content of the pavement is kept below modified optimum moisture content.

(b) Preparation of Pavement

The existing pavement shall be scarified and mechanically mixed prior to spreading of additive and in such a manner as not to disturb the material beneath the layer to be stabilised. The scarified pavement shall be compacted sufficiently to provide a reasonably even surface.

The Contractor shall remove any large masses of asphalt patching materials and place additional granular material if necessary to ensure that the requirements of Clause 12.04 are met.

(c) Spreading of Additive

The Contractor shall spread sufficient additive over the prepared pavement to conform with the distribution rate specified in Schedule 1.

Spreading shall not be carried out during windy periods if the additive could be dispersed or become a nuisance or a hazard to persons, property or livestock.

Where the additive to be spread is lime, the lime additive shall be spread uniformly over the prepared surface at a rate determined as follows:

$$\text{Spreading rate} = \frac{\text{Specified distribution rate} \times 100}{\text{Equivalent calcium oxide content}}$$

The specified distribution rate is that rate specified in Schedule 1.

Quicklime shall be slaked with sufficient water to allow complete hydration such that the materials remains friable after slaking.

Slaking of quicklime or mixing of hydrated lime shall not commence without review by the Superintendent.

No traffic or construction plant unless engaged in the stabilisation operations shall traffic the prepared pavement until the spread additive has been mixed into the underlying layer.

(d) Mixing

Mixing shall commence as soon as practical after spreading of additive and sufficient mixing shall be undertaken to ensure that all pavement materials and additives are uniformly blended throughout the full depth of the stabilised layer.

The moisture content of the stabilised material at the time of mixing shall be within the range 80% to 100% of the Modified optimum moisture content.

(e) Compaction

Compaction of the mixed material shall commence immediately after mixing and shall be carried out in a continuous operation from initial to final rolling.

Compaction other than that required for surface preparation shall be completed within 2 hours of mixing cement additive. Unless otherwise specified, compaction of pavement materials stabilised with additive other than cement shall be completed on the same day that mixing occurs.

Where necessary during compaction, the Contractor shall water the material to maintain moisture content within 80% to 100% Modified optimum moisture content.

(f) Trimming

On completion of initial rolling, the stabilised material shall be trimmed to the specified surface tolerances. Light applications of water may be applied during this operation to replace evaporated moisture and to assist in rapid achievement of a tightly knit surface.

Surface irregularities, deficiencies in level and high areas shall be rectified by the Contractor within half of one hour of trimming. Within this period scarification, addition or removal of material, reshaping and recompaction shall be permitted. Rectification after half of one hour shall be carried out by replacing material with freshly stabilised materials as necessary.

The material trimmed off shall be cut to waste and shall be removed from the site.

## **12.07 JOINTING**

The work shall be organised such that longitudinal joints between compacted and freshly mixed material are avoided. Transverse joints shall be formed where stabilised operations have been halted for more than 2 hours and at the end of each day's work. Longitudinal joints shall be constructed parallel to the centreline of the carriageway and transverse joints at the right angles of the centreline.

Joints shall be formed by cutting back into the previously stabilised material to a fully compacted section, over the full depth and width of the layer(s), and continuing stabilisation from that point. The material disturbed during cutting back shall be remixed and incorporated into the new work. Additional stabilising additive shall be spread adjacent to the joint. Placement of additional additive shall be deemed to be part of the joint preparation.

The level and shape of the surface at all joints shall be within the limits specified in Clause 12.03.

## **12.08 TEST ROLLING**

The stabilised layer shall be so compacted that it is capable of withstanding, without visible deformation or springing, test rolling with either a smooth wheeled roller of mass not less than 12 tonne and load intensity on the rear wheels of not less than 6 tonne per metre of width, or a pneumatic tyred roller having tyres inflated to 700 kPa and being loaded to not less than 4.5 tonne per tyre, or such other roller as the Superintendent may approve.

Test rolling shall be carried out by the Contractor in the presence of and to the satisfaction of the Superintendent immediately following the completion of compaction.

## **12.09 CURING, PROTECTION AND MAINTENANCE OF STABILISED PAVEMENT LAYERS AND SURFACE**

The Contractor shall keep the stabilised pavement surface moist, in good order and condition, free from contamination and protected until the areas of work are accepted by the Superintendent and subsequently primer sealed or covered by additional pavement layers by the Contractor. Unless otherwise approved by the Superintendent primer sealing and placement of additional pavement layers shall be carried out within 48 hours of notification of acceptance of the stabilised pavement layer.

## **12.10 REQUIREMENTS FOR TESTING AND ACCEPTANCE OF ADDITIVE CONTENT**

The average spreading rate of additive shall be ascertained by dividing the mass of additive spread by the area over which the additive has been spread. Where the average spreading rate is less than the specified rate, additional additive shall be spread to bring the average up to at least the specified rate.

The Contractor shall check the uniformity of the spreading of additive by placing mats with a plan area not less than 1 m<sup>2</sup> in the path of the spreading vehicle and dividing the mass of additive deposited on each mat by the plan area of the mat. Where the spreading rate so determined for any mat is less than the specified rate by more than 10% , additional additive shall be spread over the part or all of the area over which the additive has been spread.

Within 24 hours of delivery of additive to the site, the Contractor shall supply the Superintendent details of weigh bridge dockets showing the date, the name of the supplier, the registration number of the vehicle, the nature and source of the additive and empty and loaded masses of the vehicle.

#### **12.11 REQUIREMENT FOR ACCEPTANCE OF COMPACTION**

Unless otherwise specified or approved by the Superintendent acceptance of work as far as compaction is concerned will be based on density testing of the work in lots. A lot will consist of a single layer of work which is considered by the Superintendent to have been constructed under essentially uniform conditions and to be essentially homogeneous with respect to materials and general appearance. The bounds of each lot to be tested will be defined by the Superintendent.

Unless otherwise directed or approved by the Superintendent, density testing will be carried out not less than 48 hours, and not more than 72 hours, after the addition of lime.

The lot will be inspected by the Superintendent and shall be test rolled in accordance with Section 12.07. Any unstable area detected by test rolling or any area which is otherwise deemed unsuitable by the Superintendent will be excluded from the lot by the Superintendent before testing commences. Excluded areas shall be rectified by the Contractor using methods agreed to by the Superintendent except that if the total of the excluded area exceeds 20% of the area of the lot, the whole of the lot shall, unless otherwise approved or directed by the Superintendent, be rectified and represented for testing.

For each lot, sites for density testing will be selected on an essentially random basis.

#### **12.12 OCCUPATIONAL HEALTH AND SAFETY**

The Contractor shall ensure that his employees are instructed concerning the hazards of working with lime and that safe working practices are observed. Personnel engaged in handling, spreading and mixing of lime shall wear suitable protective clothing such as overalls, boots, gloves, goggles and respirator and shall have access to skin protection cream, hand cleanser, clean water and towels.