

**Specification (Measurement)**

**Transport and Main Roads Specifications  
MRS07B Insitu Stabilised Pavements using Cement or  
Cementitious Blends**

**July 2024**



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## 1 Introduction

This Specification applies to the stabilisation of materials insitu by the addition of a cementitious stabilising agent.

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications*, MRS50 *Specific Quality System Requirements*, and other Specifications as appropriate.

This Specification forms part of the Transport and Main Roads Specifications Manual.

## 2 Measurement of works

### 2.1 Standard Work Items

In accordance with the provisions of Clause 2.1.3 of MRS01 *Introduction to Specifications*, the Standard Work Items covered by this Specification are listed in Table 2.1.

**Table 2.1 – Standard Work Items**

| Standard Item No.  | Description  | Unit of Measurement |
|--|--|---------------------|
| <b>Insitu Stabilised Pavements using Cement or Cementitious Blends</b> |  |                     |
| 40201P   | Excavation and disposal of material not suitable for stabilisation, [ <i>type of material</i> ] (Provisional Quantity, if ordered) | m <sup>3</sup>      |
| 40205P   | New material to replace material not suitable for stabilisation [ <i>type of new material</i> ] (Provisional Quantity, if ordered) | m <sup>3</sup>      |
| 40209  | Preliminary pulverisation [ <i>location</i> ]  | m <sup>2</sup>      |
| 40211  | Additional material for shape correction [ <i>type of new material</i> ]   | m <sup>3</sup>      |
| 40214  | Insitu stabilisation using cement or cementitious blends [ <i>description, location</i> ]  | m <sup>2</sup>      |
| 40215  | Supply of stabilising agent [ <i>description, location</i> ]   | tonne               |
| 40216  | Water curing [ <i>location</i> ]   | m <sup>2</sup>      |

Item 40211 may be nominated as “Provisional Quantity” when the Principal has been unable to accurately determine an estimated quantity.

### 2.2 Work Operations

#### **Item 40201P Excavation and disposal of material not suitable for stabilisation, [*type of material*] (Provisional Quantity, if ordered)**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) excavating, loading and hauling of material not suitable for stabilisation, and
- c) disposal of material.

**Item 40205P New material to replace material not suitable for stabilisation [type of new material] (Provisional Quantity, if ordered)**

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and delivery of all materials
- c) spreading the materials
- d) compacting, shaping and trimming the materials to facilitate insitu stabilisation and work operations related to it
- e) maintenance of the subgrade and/or pavement courses, and
- f) associated material and construction compliance testing.

**Item 40209 Preliminary pulverisation [location]**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) pulverising the material to be stabilised,
- c) compacting, shaping and trimming the material to facilitate insitu stabilisation, and work operations related to it, and
- d) associated material and construction compliance testing.

**Item 40211 Additional material for shape correction [type of new material]**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply and delivery of all materials
- c) spreading the materials
- d) compacting, shaping and trimming the materials to facilitate insitu stabilisation and work operations related to it
- e) maintenance of the subgrade and/or pavement courses, and
- f) associated material and construction compliance testing.

**Item 40214 Insitu stabilisation using cement or cementitious blends [description, location]**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) compacting, shaping and trimming prior to spreading of the stabilising agent for each pass
- c) uniform spreading of the stabilising agent for each pass
- d) incorporation of the stabilising agent into the material after each spreading pass
- e) compacting, shaping and trimming of materials between each incorporation pass
- f) supply, delivery, storage, application and incorporation of water

- g) compaction
- h) trimming
- i) treatment at construction joints
- j) disposal of excess and trimmed material
- k) proof roll testing
- l) maintenance of the stabilised layer, and
- m) associated material and construction compliance testing.

**Item 40215 Supply of stabilising agent [description, location]**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply, transport, delivery and storage of the stabilising agent, and
- c) associated material and construction compliance testing.

**Item 40216 Water curing [location]**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) supply, transport, delivery and storage of water
- c) application of the water to maintain the stabilised layer in a damp condition at all times during the curing period, and
- d) associated material and construction compliance testing.

**2.3 Calculation of quantities**

Items 40209 and 40214 (m<sup>2</sup>) shall be calculated as per Clause 2.3.1. Where pavement shoulders, verges and/or batters are to be insitu stabilised, this area must be considered in the calculation of quantities.

Item 40215 (tonne) shall be calculated as per Clause 2.3.2.

Item 40216 (m<sup>2</sup>) shall be calculated as per Clause 2.3.3.

Items 40201P, 40205P and 40211 (m<sup>3</sup>) shall be calculated as per Clauses 2.3.4, 2.3.5 and 2.3.6 respectively.

**2.3.1 Preliminary pulverisation and insitu stabilisation**

The calculated quantity shall be the pavement surface area that is insitu stabilised (in m<sup>2</sup>) excluding any overlaps and joints. It shall be calculated using the lengths and widths of the insitu stabilised lots.

## 2.3.2 Stabilising agent

### 2.3.2.1 Stabilising agent without hydrated lime

Where the stabilising agent does not contain hydrated lime, the mass of stabilising agent shall be calculated using the following formula:

$$M = \frac{A \times S}{1000}$$

where:  $M$  = mass of stabilising agent in tonnes  
 $A$  = surface area of the pavement to be insitu stabilised, in  $m^2$ , and  
 $S$  = specified stabilising agent spread rate in  $kg/m^2$ .

The mass of stabilising agent for each lot shall be calculated using the above formula.

The total mass of stabilising agent shall be the sum of the masses of stabilising agent calculated for each lot.

### 2.3.2.2 Stabilising agent with hydrated lime

Where the stabilising agent does contain hydrated lime, the mass of stabilising agent shall be calculated using the following formula:

$$M = A \times \left[ S_{NL} + \left( S_{HL} \times \frac{AL_x}{AL_y} \right) \right] \times \frac{1}{1000}$$

where:  $M$  = mass of stabilising agent, in tonnes  
 $A$  = surface area of the pavement to be insitu stabilised, in  $m^2$   
 $S_{NL}$  = specified stabilising agent spread rate for the proportion that is not hydrated lime, in  $kg/m^2$   
 $S_{HL}$  = specified stabilising agent spread rate for the hydrated lime proportion, in  $kg/m^2$   
 $AL_x$  = available lime index for hydrated lime used in the laboratory mix design testing (%), and  
 $AL_y$  = available lime index for hydrated lime used in construction (%).

The mass of stabilising agent for each lot shall be calculated using the above formula. The total mass of stabilising agent shall be the sum of the masses of stabilising agent calculated for each lot.

The available lime index shall be determined for the stabilising agent used in both laboratory design and construction. Except where stated otherwise in Clause 9 of Annexure MRTS07B.1, an available lime index of 90% shall be assumed for the laboratory mix design testing.

The quantity of stabilising agent shown in the schedules shall be based on an available lime index of 90%. The Contractor shall make allowance for variations of the available lime index. Payment for the supply of stabilising agent shall be based on an available lime index of 90%.

### 2.3.3 Water curing

The surface area ( $m^2$ ) of water curing shall be calculated from the lengths and widths of the insitu stabilised lots for which water curing has been specified.

### 2.3.4 Removal and disposal of material not suitable for stabilisation

The volume of material not suitable for stabilisation shall be calculated from the loose truck volume of material disposed of from the site. Before commencing this operation, the measured volume of the haulage plant and the loading method shall be deemed suitable by the Administrator. The total volume of material removed and disposed of shall be agreed with the Administrator each day.

### 2.3.5 New material to replace material not suitable for stabilisation

The volume of replacement material shall be calculated by measuring the volume of the excavation. The volume of the excavation shall be determined from the three-dimensional shape boundary by the bottom of the excavation and the finished shapes and dimensions as shown on the drawings or otherwise nominated in the Contract. A survey pick-up shall be used, or an alternative method deemed suitable by the Administrator.

### 2.3.6 Additional material for shape correction

The volume of material shall be determined from the three-dimensional shape bounded by the lines, dimensions and shapes shown on the Drawings or otherwise nominated in the Contract.

## 3 Utilisation of a rejected lot for a reduced level of service

### 3.1 Maximum reductions in standards for a reduced level of service

A lot shall not be utilised for a reduced level of service if:

- the actual value for any property or requirement not listed in the first column of Table 3.1 has failed to meet the specified limit or requirement for such property or requirement.
- the actual value for any property or requirement listed in the first column of Table 3.1 has deviated from the extended limit stated in the second column of Table 3.1
- the actual value for any property given in Table 3.1 has deviated from the specified limit (not the extended limit) for the same property in the immediately preceding lot, or
- the actual value for any property given in Table 3.1 has deviated from the specified limit (not the extended limit) for that property in more than three lots for any preceding work period.

**Table 3.1 – Extended limits**

| Property   | Extended Limit   |
|--|--|
| Characteristic value of relative compaction            | Minimum characteristic value of relative compaction no less than the specified relative compaction minus 2%.   |
| Road roughness (surface evenness)                      | Maximum road roughness value of $R_m$ as stated in Clause 1 of Annexure MRS07B.1 or, where $R_m$ is not so stated, it shall equal $R_s + 0.76\text{m/km}$ , where $R_s$ is defined in MRTS07B. |
| Stabilising agent content                              | Minimum content no less than the ordered content (expressed as a percentage) minus 0.5%.   |
| Characteristic value of the stabilised later thickness | Minimum characteristic value of the stabilised layer thickness no less than the design layer thickness minus 20 mm.  |
| Moisture ratio ( $MR_u$ ) – lower limit                | Moisture ratio ( $MR_u$ ) no less than the specified minimum minus 10%.  |



### 3.2 Determination of the reduced value

#### 3.2.1 General

The reduced value shall be determined from the formula given below for the relevant property. Where there is more than one reduction, the percentage reduction for each property shall be added together to provide a total percentage reduction which shall be applied to the scheduled rate for all Work Items covered by Clause 2.2.

#### 3.2.2 Compaction standard

Where a product standard applies to compaction, the percentage reduction shall be determined from the following formula:

$$\text{Percentage Reduction} = (C_s - C_a) \times 4$$

where:  $C_s$  = the specified value of compaction, and

$C_a$  = the actual minimum characteristic value of compaction.

#### 3.2.3 Road roughness (surface evenness)

The percentage reduction shall be determined from the following formula:

$$\text{Percentage Reduction} = (R_a - R_s) \times 26.49$$

where:  $R_a$  = the actual road roughness value, and

$R_s$  = the specified road roughness value as defined in MRTS07B.

#### 3.2.4 Stabilising agent content

The percentage reduction shall be determined from the following formula:

$$\text{Percentage Reduction} = (S - S_a) \times 10$$

where:  $S$  = the ordered stabilising agent content (expressed as a percentage) as defined in MRTS07B, and

$S_a$  = the actual stabilising agent content (expressed as a percentage) determined in accordance with MRTS07B.

#### 3.2.5 Thickness of stabilised layer

If indicated in Clause 2 of Annexure MRS07B.1, the percentage reduction shall be determined from the following formula:

$$\text{Percentage Reduction} = ((D_d - 5) - D_a) \times 2$$

where:  $D_d$  = the design layer thickness of the stabilised layer (mm), and

$D_a$  = the actual minimum characteristic value of the stabilised layer thickness measurements determined in accordance with MRTS07B (mm).

#### 3.2.6 Moisture ration (MR<sub>u</sub>) – lower limit

The percentage reduction for moisture ratio shall be determined from the following formula:

$$\text{Percentage Reduction} = (M_s - 5) - M_a$$

where:  $M_a$  = the actual average moisture ratio (%), and

$M_s$  = the specified minimum moisture ratio value (%).

When the actual average moisture ratio of a lot is less than 85%, but greater than or equal 80%, the Contractor shall raise a suitable Nonconformance report. As per the above formula, a percentage reduction shall not apply for this lot.

When the actual average moisture ratio of a lot is less than 80%, but greater than or equal to 75%, the Contractor shall raise a suitable Nonconformance report. As per the above formula, a percentage reduction shall apply for this lot.

When the actual average moisture ratio of a lot is less than 75%, the Contractor shall raise a suitable Nonconformance report. As per Table 3.1, the Administrator may reject this lot.

### **3.3 Application of the reduced value payments**

The reduced values shall apply to the lot represented by the tests for the total thickness of the (individual) stabilised layer. This shall be applied to the scheduled rate for all Work Items covered by Clause 2.2.

## **4 Additional payment for a higher standard of surface evenness**

### **4.1 General**

If indicated in Clause 3 of Annexure MRS07B.1, an additional payment above the scheduled rate, shall be made for the additional benefit of a higher standard of surface evenness on the surface of the final pavement layer as represented by the road roughness value. This shall be applied to the scheduled rate for all Work Items covered by Clause 2.2.

### **4.2 Payment**

Any additional payment shall be determined from the formula:

$$\text{Additional Payment} = R \times Q \times P$$

where:  $R$  = scheduled rate for the Work Item for the top stabilised layer  
 $Q$  = compacted quantity in the lot (as modified by Clause 4.3), and  
 $P = \frac{(R_s - R_a)}{9.4} - 0.02$

where:  $P$  = the additional payment factor due to achieving a higher standard of surface evenness

$R_s$  = specified road roughness value as defined in MRS07B, and

$R_a$  = measured road roughness value.

Notwithstanding the above the maximum value of  $P$  shall be 0.04.

### **4.3 Quantity of pavement to which the additional payment applies**

The additional payment shall apply to the lot represented by the higher standard of surface evenness for the total thickness of the (individual) stabilised layer.

