**Technical Specification**

# Transport and Main Roads Specifications
# MRTS115 Insitu Stabilised Subbases using Triple Blend

**July 2024**

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## Contents

## 1 Introduction

This Technical Specification applies to the stabilisation of insitu materials by the addition of a triple blend stabilising agent (a combination of hydrated lime, GP cement and fly ash).

This Technical Specification applies to the insitu mixing of lime / cement / fly ash (or triple blend) into existing pavement materials to form a stabilised subbase layer. The triple blend stabilised subbase layer is typically not sealed with a bituminous surfacing and not exposed to public trafficking. An overlying pavement layer or layers is typically placed on the triple blend stabilised layer.

The thickness of the triple blend stabilised subbase layer, is typically between 300 mm to 350 mm. At this depth, subgrade materials may be incorporated into the insitu stabilised layer. This is quite common and, provided there has been adequate material sampling and laboratory testing, incorporating subgrade materials should not be purposely avoided.

For the insitu cementitious stabilisation of a pavement base layer which will be bitumen sealed and exposed to public trafficking, refer to MRTS07B *Insitu Stabilised Pavements using Cement or Cementitious Blends.*

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

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

## 2 Definition of terms

The terms used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Additional terms used in this Technical Specification shall be as defined in Table 2. Where indicated in Table 2, a more complete definition is contained in the referenced clause.

***Table 2 – Definition of terms***

| Term | Definition |
|---|---|
| Actual stabilised layer thickness | Achieved stabilised layer thickness, as measured from the bottom of stabilised layer to the top of compacted and trimmed stabilised layer. |
| Allowable working time | The time measured from the commencement of incorporation (that is, mixing) of stabilising agent into the material, to completion of compaction and trimming. |
| Amelioration period | The time required for lime (hydrated lime or quicklime) to react with clayey materials prior to compaction, also known as mellowing period. |
| Available lime index | The available calcium oxide for quicklime, or available calcium hydroxide for hydrated lime in accordance with AS 4489.6.1. |
| Bulking | Increase in vertical height during the incorporation of the stabilising agent into material using a stabiliser. The increased vertical height of the material, is measured from the surface level prior to this incorporation process - refer Figure 8.6.10. |
| Curing materials | Materials applied to the exposed surfaces of the completed stabilised layer for curing. |

| Term | Definition |
|---|---|
| Design depth | As specified in the construction drawings and contract documents – refer Figure 8.6.10. |
| Finish surface level | Top level of the stabilised layer, as specified in the Drawings and Contract documents – refer to Figure 8.6.10. |
| Hydrated lime | Hydrated lime is a granular form of lime consisting primarily of calcium hydroxide ($Ca(OH)_2$). |
| Lime slurry | Lime slurry is formed after the quicklime has been fully slaked and takes the form of a slurry. |
| Lower reference level | Lower reference level is the finish surface level minus the design depth. It is the bottom level of the stabilised layer, as specified in the drawings and contract documents - refer to Figure 8.6.10. |
| Moisture ratio (uncompacted) ($MR_u$) | The ratio of the insitu moisture content compared to the laboratory optimum moisture content expressed as a percentage for uncompacted materials. |
| Principal Contractor | The person or entity who is bound to execute the work under the Contract. |
| Quicklime | Quicklime is a granular form of lime consisting primarily of calcium oxide (CaO), which can be readily slaked. |
| Slaking | The addition of water to quicklime (the purpose is to fully hydrate the quicklime). |
| Spot check | Inspecting quicklime after slaking process, to identify that all quicklime is completely slaked. |
| Stabiliser | A single rotor, mix in place plant of a type (that is, plant that mixes insitu) specifically designed for the dual task of reclamation and stabilisation Work. |
| Stabilising agent | A triple blend product consisting of lime, GP cement and fly ash. |
| Stabilising subcontractor | Contractor or Supplier (including their personnel), engaged by or on behalf of the Principal Contractor, with respect to the insitu triple blend stabilising Works under the Contract. |
| Subbase course | A course or courses principally intended to distribute to the subgrade the loads from overlying course(s). |
| Subgrade | The portion of the formation on which the pavement is constructed, and which provides support to the pavement. |
| Target depth | Target depth is the mixing depth required by the stabiliser to achieve the lower reference level and shall consider the bulking height – refer Figure 8.6.10. |
| Triple blend | A stabilising agent which is a combination of GP cement, fly ash and lime (hydrated lime or quicklime). |

## 3 Referenced documents

Table 3 lists documents referenced in this Technical Specification.

***Table 3 – Referenced documents***

| Reference | Title |
|---|---|
| AS/NZS 3582.1 | *Supplementary cementitious materials - fly ash* |
| AS 3582.2 | *Supplementary cementitious materials - slag* |
| AS 3972 | *General purpose and blended cements* |

| Reference | Title |
|---|---|
| AS 4489.6.1 | *Test Methods for limes and limestones - Lime index - Available lime* |
| MRTS01 | *Introduction to Technical Specifications* |
| MRTS05 | *Unbound Pavements* |
| MRTS07B | *Insitu Stabilised Pavements using Cement or Cementitious Blends* |
| MRTS23 | *Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisation* |
| MRTS50 | *Specific Quality System Requirements* |
| MRTS56 | *Construction Surveying* |
| NGTM | *Nuclear Guage Testing Manual* |

## 4 Standard Test Methods

The standard Test Methods listed in Table 4, shall be used in this Technical Specification.

Further details of Test Method numbers and test descriptions are given in Clause 4 of MRTS01 *Introduction to Technical Specifications*.

***Table 4 – Standard test methods***

| Property to be Tested | Method No. |
|---|---|
| Available lime index | AS 4489.6.1 |
| Calculation of characteristic value of a lot | Q020 |
| California Bearing Ratio | Q113A |
| Crushed particles | AS 1141.18 |
| Curing moulded specimens of stabilised material | Q135B |
| Degradation factor | Q208B |
| Deviation from a straightedge | Q712 |
| Fines ratio | Q103A |
| Flakiness index | Q201 |
| Foreign Material (Type 2 materials containing recycled material) | Q477 |
| Moisture Density Relationship (MDR) | Q142A, Q143, Q144A |
| Linear shrinkage | Q106 |
| Liquid limit | Q104A |
| Moisture content | AS 1289.2.1.1, AS 1289.2.1.4, AS 1289.2.1.6 |
| Particle size distribution | Q103A |
| Petrographic assessment of aggregates | Q188 |
| pH (Type 2 materials containing recycled concrete) | AS 1289.4.3.1 |
| Proof rolling test | Q723 |
| Relative compaction | Q140A, Q141A, Q141B |
| Moisture ratio of uncompacted soils and crushed rock | Q250 |
| Sampling – aggregates | AS 1141.3.1 |

| Property to be Tested | Method No. |
|---|---|
| Selection of sampling or test Sites | AS 1289.1.4.2 |
| Spot sampling of soils, crushed rock and aggregates | Q061 |
| Stabilising agent content | Q134A |
| Sulfate content | AS 1289.4.2.1, other published or validated classical chemistry technique or instrumentation technique# |
| Surface spread rate of stabilising agent | Q719^ |
| UCS (Type 2 materials containing recycled concrete) | Q115 |
| UCS (unconfined compressive strength of stabilised materials) | Q115 |
| Water absorption | AS 1141.6.1 |
| Wet strength | AS 1141.22 |
| Wet / dry strength variation | AS 1141.22 |
| Working time of stabilised material | Q136A |

Notes:

# Instrumentation techniques may include Ion Chromatography / Inductively Coupled Plasma / Discrete Analyse and so on. NATA-endorsed test results are evidence of a validated technique.

^ For Q719, the requirement for the test to be carried out by a registered NATA and Construction Materials Testing (CMT) Supplier in accordance with MRTS50 *Specific Quality System Requirements*, shall be relaxed.

## 5 Quality system requirements

### *5.1 Hold Points, Witness Points and Milestones*

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points, Witness Points and Milestones applicable to this Technical Specification are summarised in Table 5.1.

***Table 5.1 – Hold Points, Witness Points and Milestones***

| Clause | Hold Point | Witness Point | Milestone |
|---|---|---|---|
| 5.2.2 | 1. Approval of construction procedures and construction program. | | Supply of the construction procedures and construction program for the stabilisation Works (21 days). |
| 7.1 | 2. Compliance of all materials, prior to their incorporation. | | |
| 8 | 3. Construction permitted to proceed. | | |
| 8.3 | 4. Survey of services, utilities buildings and drainage. | | |

| Clause | Hold Point | Witness Point | Milestone |
|---|---|---|---|
| 8.4 | 5. Contractor's determination of the allowable working time. | | |
| 8.5.2.1 | 6. Approval of compaction based on a process requirement. | | |
| 8.5.2.2 | | 1. Construction of trial section (if process standard specified for compaction). | |
| 8.6.1 | | 2. Removal and disposal of material not suitable for stabilisation. | |
| 8.6.2 | | 3. Preliminary pulverisation. | |
| 8.6.4 | | 4. Compacting and trimming surface prior to spreading of the stabilising agent. | |
| 8.6.6.1 | | 5. Spreading stabilising agent. | |
| 8.6.6.3.3 | 7. Slaking (if quicklime is used). | | |
| 8.6.9 | | 6. Nominating the target depth. | |
| 8.7.2.1 | | | Ordered spread rate of stabilising agent (14 days). |
| 9.8.2 | | 7. Proof rolling test. | |
| 9.9 | 8. Acceptance. | | |

## *5.2 Construction procedures*

### 5.2.1 General

The Contractor shall prepare documented procedures for all construction processes in accordance with Clause 6 of MRTS50 *Specific Quality System Requirements*.

The construction procedure described in Clause 5.2.2 shall be submitted to the Administrator.

### 5.2.2 Insitu stabilisation

A construction procedure, detailing all work described in this Technical Specification, shall be prepared.

The construction procedure shall include, but not be limited to:

a) details of all plant associated with the work detailed in this Technical Specification

b) details of how services, utilities, buildings and drainage components shall be located and protected (refer to Clause 8.3)

c) details of how services, utilities, buildings, drainage components and plant personnel shall be protected from damage, injury, and so on (refer to Clause 8.3).

d) the daily calibration procedures of spreader and verification of spread rates in the field (refer to Clause 8.6.6), and

e) a detailed sequence of operations for all aspects of the stabilisation Works, including, but not necessarily limited to:

   i. details of joint locations

   ii. details of joint overlaps

   i. the length of each run

   ii. the width of each run

   iii. marking-out the extents of each run

   iv. details of procedures for working up to, or against, structures, kerb, kerb and channel and road safety barriers, and such as bridges, access chambers, gullies, culverts and concrete medians and any existing pavement cutback point, and

   v. curing methodology.

f) the proposed program of Works, and

g) a testing program which shall include, but not be limited to, the testing methodology that shall be used to assess:

   i. stabilising agent spread rate

   ii. slaking of quicklime (if quicklime is used)

   iii. stabilisation target depth

   iv. moisture ratio

   v. compaction standard

   vi. geometric tolerances

   vii. actual stabilised layer thickness, and

   viii. strength gain of the stabilised layer with time (UCS test) if required.

The following shall also be submitted to the Administrator, along with the construction procedure:

a) details of the proposed source(s) of the stabilising agent(s)

b) test results demonstrating compliance of the constituents of the proposed stabilising agent(s) to the required standards

c) test results demonstrating the compliance of each proposed water source

d) compliance test results (including Test Method Q136A *Working Time of Stabilised Material* if applicable) and a representative sample of the unbound granular material from each proposed source to be used for shape correction and/or to replace material not suitable for stabilisation, and

e) the available lime index of each proposed lime source.

The proposed construction procedure shall be submitted to the Administrator at least 21 days prior to the commencement of stabilisation Works. **Milestone**

No stabilisation Works shall be commenced until the construction procedure for the stabilisation Works is acceptable to, and approved by, the Administrator. **Hold Point 1**

### *5.3 Conformance requirements*

The conformance requirements which apply to lots of stabilised material covered by this Technical Specification, are given in Clause 6 to Clause 9.

### *5.4 Testing frequencies and lot sizes*

The maximum lot sizes shall be as stated in Table A1 of Appendix A, or otherwise stated in Clause 1.1 of Annexure MRTS115.1.

The minimum testing frequencies shall be as stated in Table A2, A3 and A4 of Appendix A or otherwise stated in Clause 1.2 of Annexure MRTS115.1.

Material compliance testing requirements shall be as specified in Table A2 of Appendix A.

Construction compliance testing requirements shall be as specified in Table A3 of Appendix A.

Geometric and deviation from a straightedge compliance testing requirements, shall be as specified in Table A4 of Appendix A.

Certification of the compliance of each stabilising agent with this specification, is required for each source and for each load.

## 6 Material

### *6.1 New material to replace material not suitable for stabilisation*

New material which is required to replace material not suitable for stabilisation, shall be unbound granular material that complies with the requirements stated in Clause 2 of Annexure MRTS115.1.

Where not so stated in the Annexure, materials shall be either of Type 2, Type 3 or Type 4 unbound granular material complying with the requirements of MRTS05 *Unbound Pavements*.

Stabilised material shall not be used as new material for replacement material.

Additionally, any new material incorporated into the stabilisation, shall have a water soluble sulfate content less than 0.19%.

> Sulfate content is typically not an issue for materials sourced from approved quarries. Therefore, for quarried materials, the Administrator may elect to waive the requirement for sulfate testing.
>
> For existing pavement materials that have been reclaimed for reuse, the original source may be unknown. Therefore, where reclaimed materials are used, sulfate testing is typically required.

### *6.2 Additional material for shape correction*

Where specified in the Drawings or Contract, shape correction material shall be imported and spread after preliminary pulverisation, as per the requirements of Clause 8.6.3.

Additional material that is required for shape correction, shall be unbound granular material that complies with the requirements stated in Clause 3 of Annexure MRTS115.1.

Where not so stated in the Annexure, materials shall be either of Type 2, Type 3 or Type 4 unbound granular material complying with the requirements of MRTS05 *Unbound Pavements*.

Stabilised material shall not be used as additional material for shape correction.

Additionally, any new material incorporated into the Works, shall have a water-soluble sulfate content less than 0.19%.

> Sulfate content is typically not an issue for materials sourced from approved quarries. Therefore, for quarried materials, the Administrator may elect to waive the requirement for sulfate testing.
>
> For existing pavement materials that have been reclaimed for reuse, the original source may be unknown. Therefore, where reclaimed materials are used, sulfate testing is typically required

### *6.3 Stabilising agents*

The stabilising agent shall comply with the relevant Specifications and standards given in Table 6.3.

The type, estimated content and specified spread rate of the stabilising agent to be used at specific locations, shall be as stated in Clause 8 of Annexure MRTS115.1.

***Table 6.3 – Stabilising agent requirements***

| Agents | Relevant Technical Specification or Australian Standard |
|---|---|
| GP cement | Type GP cement that complies with AS 3972. |
| GB cement | Type GB fly ash blended cement that complies with AS 3972. |
| Hydrated lime | Hydrated lime that complies with MRTS23 *Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisation*. |
| Quicklime | Quicklime lime that complies with MRTS23 *Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisatio*n.<br>Quicklime shall not be blended with other stabilising agents. Quicklime shall be spread as its own separable portion, to allow for slaking. |
| Fly ash | Fly ash that complies with AS/NZS 3582.1 and be Special Grade or Grade 1. |
| Triple blend | A blend of the following:<br>• GP cement that complies with AS 3972<br>• Special Grade or Grade 1 fly ash that complies with AS/NZS 3582.1, and<br>• hydrated lime (or quicklime) that complies with MRTS23 *Supply and Delivery of Quicklime and Hydrated Lime for Road Stabilisation*. |

Where the triple blend stabilising agent supplied to the Works is a blended product, all of the stabilising agent components shall be completely, homogeneously and accurately blended / mixed by a dedicated blending plant, prior to delivery to the works.

At the time of spreading, each component of the stabilising agent shall:

a) comply with the relevant Standard(s) and Technical Specification(s), and

b) not be more than three months old, measured from its date of manufacture to the time of spreading, unless it has been retested for conformance within one month of use (up to a maximum of six months old).

The lime shall have an available lime index of not less than 80% from the time of manufacture up to the time of spreading.

### *6.4 Water*

Where possible, water used for insitu stabilisation works shall be ‘potable water’.

| |
|---|
| Water sources classified by the relevant water authority as ‘potable water’, shall be exempt from any testing requirements. |

Where ‘potable water’ is not available, the Administrator may consider water from other sources.

| |
|---|
| Unless otherwise accepted by the Administrator, any ‘non-potable water’ sources shall be tested. |

In all cases, the water used shall contain less than 0.05% of sulfates and be free from oil, acids, organic matter, and any other matter that could be deleterious to the mixture.

Marine water and recycled water shall not be used for triple blend stabilisation.

The source(s) of water shall not be changed without approval from the Administrator.

## 7 Material compliance testing

### *7.1 General*

No material shall be incorporated into the Works, unless it has been demonstrated, to the Administrator’s satisfaction, that the material to be used complies fully with the requirements of this Technical Specification. **Hold Point 2**

The Contractor is responsible for carrying out sufficient testing, to ensure that the material complies with the requirements of this Technical Specification. However, the Contractor's testing program shall be such that the testing frequencies and number of tests are not less than those given in Clause 5.4.

The testing of individual samples shall be carried out in accordance with the Test Methods described in Table 4. Testing frequencies and lot sizes shall be as per the requirements of Clause 5.4.

The material / sources used in the Contract, shall be the same as those for material supplied as samples, or for which certificates of compliance with this Technical Specification are provided.

The costs associated with material compliance testing, shall be deemed to be incorporated in the relevant Work Items.

### *7.2 Stabilising agents*

Sampling and testing shall be carried out in accordance with the relevant Technical Specifications.

A certificate of test results demonstrating compliance of each of the constituents of the proposed stabilising agent to the relevant standards or Technical Specifications, shall be provided for each load, or part thereof, of stabilising agent.

### *7.3 Water*

A certificate of test results demonstrating the compliance of each proposed water source, shall be provided.

### *7.4 Unbound granular material*

Compliance testing of unbound granular material used to replace material not suitable for stabilisation, shall be carried out in accordance with the requirements of Clause 5.4.

Compliance testing of unbound granular material used for shape correction, shall be carried out in accordance with the requirements of Clause 5.4.

In all cases, Type 2, Type 3 and Type 4 material shall also comply with MRTS05 *Unbound Pavements*.

## 8 Construction

Prior to acceptance (Clause 9.9), construction shall not proceed until the Administrator is satisfied that the requirements covered from Clause 8.1 to Clause 8.7.5.5.3 have been adhered to by the Contractor. **Hold Point 3**

### *8.1 General*

Construction of the stabilised layer shown in the Drawings or otherwise specified in the Contract, shall be completed as one layer.

The required design depth shall be stated in Clause 8 of Annexure MRTS115.1.

The datum for measurement of the design depth (refer to Figure 8.6.10), shall be as stated in Clause 9 of Annexure MRTS115.1.

Details of measuring the actual thickness of stabilised layer is described in Clause 8.7.5.3.2.

### *8.2 Program of Works*

The Contractor shall submit the proposed program of the stabilisation Works to the Administrator at least 21 days prior to the commencement of stabilisation Works, unless otherwise agreed to by the Administrator.

Stabilisation Works shall not be commenced, until the program has been approved by the Administrator (refer to Clause 5.2.2 and Hold Point 1).

### *8.3 Site services, utilities, buildings and drainage*

A survey of the Site to determine the location and depth of services, utilities, buildings and drainage components, shall be carried out prior to commencement of construction. The survey shall include details of how these and plant and personnel onsite shall be protected and how the stabilisation Works shall be completed, without any detrimental effects to them. All such details shall be included in the proposed construction procedure (refer to Clause 5.2.2).

Stabilisation Works shall not commence until the survey has been completed and a copy of the report provided to the Administrator. **Hold Point 4**

### *8.4 Allowable working time*

Compaction and trimming of the stabilised layer, shall be completed within the allowable working time.

The allowable working time is measured from the commencement of the incorporation (that is, mixing) of the GP cement stabilising agent component into the insitu material, to the completion of compaction and trimming of the stabilised layer (excluding static multi-tyre rolling).

The maximum allowable working time shall be stated in Clause 8 of Annexure MRTS115.1. If no such value is given, it shall be three-and-a-half hours.

Alternatively, the allowable working time may be determined by the Contractor, prior to commencement of insitu stabilisation using Test Method Q136A. For Test Method Q136A, the Contractor shall adopt the following:

- type of stabilising agent nominated in Clause 8 of Annexure MRTS115.1
- blend ratio of the stabilising agent nominated in Clause 8 of Annexure MRTS115.1
- estimated stabilising agent content nominated in Clause 8 of Annexure MRTS115.1
- Contractor's proposed source(s) of stabilising agent(s)
- Contractor's proposed source of water, and
- existing pavement materials blended with the Contractor's proposed unbound granular import materials as appropriate.

All test results shall be reported to the Administrator. **Hold Point 5**

### *8.5 Construction process*

#### 8.5.1 General

The construction process shall be based on either a process requirement, or a product standard. The method for this Contract shall be as stated in Clause 8 of Annexure MRTS115.1. Where not so stated in the Annexure, product standard shall apply.

#### 8.5.2 Construction based on process requirements

If a process requirement is specified in Clause 8 of Annexure MRTS115.1, construction shall:

a) incorporate the methodology and construction of trial sections in accordance with the requirements of Clauses 8.5.2.1 and 8.5.2.2

b) comply with the construction requirements stated in Clause 8.6, and

c) comply with the product standards stated in Clause 8.7, except that compaction testing shall not be required on completed Works other than trial sections, provided that the Contractor uses the same construction plant, process and methodology as that used for the trial section.

##### 8.5.2.1 Methodology

Each section of the Works with a unique combination of stabilising agent type, stabilising agent spread rate, material(s) to be stabilised and depths, shall be identified as a separate area for construction.

A trial section shall be constructed for each separate area for construction, in accordance with the requirements of Clause 8.5.2.2.

The compaction of each trial section shall be tested in accordance with Clause 5.4 and checked for compliance with Clause 8.7.4. If the minimum characteristic value of the relative compaction results for the trial section is not less than the value specified in Clause 8.7.4, no further compaction testing shall be carried out for the balance of the area for construction that is represented by that trial section, provided that the same construction plant, processes and methodology is used to construct the remaining area as that used for the construction of the trial section.

If the minimum characteristic value of the relative compaction results for the trial section is less than the value specified in Clause 8.7.4, the trial section shall be rectified so that it complies with this Technical Specification and an additional trial section shall be constructed and assessed in accordance with this Clause 8.5.

Construction based on a process requirement and a trial, shall not be used for the balance of the Works without approval of the Administrator. **Hold Point 6**

#### 8.5.2.2 Trial section

A trial section shall be constructed using the same construction plant, processes and methodology that are proposed to be used for the remainder of the Works represented by the trial section. **Witness Point 1**

A trial section shall be at least 200 metres long and three metres wide and include a longitudinal joint.

All operations, testing and so on, required by this Technical Specification, including compaction testing, shall be used in the construction and testing of a trial section.

### 8.5.3 Construction based on product standards

If a product requirement is specified in Clause 8 of Annexure MRTS115.1, construction shall:

a) comply with the construction requirements stated in Clause 8.6, and

b) comply with the product standards stated in Clause 8.7.

## *8.6 Construction requirements*

### 8.6.1 Removal and disposal of material not suitable for stabilisation (if required)

Material not suitable for stabilisation shall include:

a) any particle or conglomeration, that exists after preliminary pulverisation, with a dimension greater than 75 mm along any axis

b) any material(s) deemed unsuitable by the Administrator, which may include:

   i. concrete

   ii. cement treated patches

   iii. asphalt patches where the total asphalt thickness is greater than 50 mm, and

c) any additional requirements as stated in Clause 4 of Annexure MRTS115.1.

At least seven days prior to the date shown in the Contractor's program of Works for the removal of material not suitable for stabilisation, the Administrator will mark out patches and/or identify Unsuitable Materials that are to be removed and replaced.

Where material not suitable for stabilisation is encountered, the volume to be removed shall be agreed with the Administrator, prior to commencing removal and replacement of the material.
**Witness Point 2**

Material that is unsuitable for stabilisation, shall be removed and disposed of in accordance with Clause 10 MRTS01 *Introduction to Technical Specifications*.

New material conforming to the requirements stated in Clause 6.1, shall be used to replace the material removed. It shall be spread, compacted and trimmed to the alignment, heights and shapes specified in the Drawings or Contract for the completed Work.

Compaction of the new material shall be administrated through either product requirement (Clause 9.3) and/or process requirement (Clause 9.2). This shall be approved by the Administrator. The minimum characteristic value of the relative compaction results shall not be less than 100%.

This compaction testing requirement is not applicable if the layer thickness is less than 100 mm.

### 8.6.2 Preliminary pulverisation

The materials to be stabilised shall be pulverised in accordance with the requirements of this clause. One pass of a stabiliser hooked-up to a fully laden water truck, shall be undertaken to pulverise the materials to be stabilised.

The pulverisation pass shall be undertaken to a depth that is 50 mm less than the design depth (50 mm above the lower reference level). **Witness Point 3**

Preliminary pulverisation shall occur:

a) after the removal and replacement of material deemed by the Administrator as material not suitable for stabilisation

b) prior to the addition of shape correction or overlay material, and

c) prior to the addition of the stabilising agent.

The pulverisation pass shall be undertaken with the incorporation of moisture from the water truck hooked-up to the stabiliser.

> The incorporation of moisture during the pulverisation pass, allows the insitu materials to be pre-conditioned (in particular, those insitu materials with higher water absorptions).
>
> Typically, 0.2-0.5% moisture rate through the stabiliser for the pulverisation pass.
>
> Where the insitu materials has a relatively higher moisture content at the time of insitu stabilising, the addition of moisture during the pulverisation pass may not be required to pre-condition the materials.

Any additional patches identified during preliminary pulverisation as material not suitable for stabilisation and accepted by the Administrator as being material not suitable for stabilisation, shall be removed and replaced as specified in Clause 8.6.1.

Any particle or conglomeration with a dimension greater than 75 mm along any axis, shall be removed from the pulverised material and the voids made good prior to stabilisation. Voids shall be made good by using either new material in accordance with Clause 6.1, or excess pulverised material that is both adjacent to the void and suitable for stabilisation.

### 8.6.3 Additional material for shape correction (if required)

The shape of the pavement shall be corrected after the preliminary pulverisation and prior to the importation of any shape correction material, unless otherwise agreed to by the Administrator.

Additional material required for shape correction shall be as specified in Clause 6.2 and shall be spread after preliminary pulverisation has been completed. It shall be spread onto the surface of the pavement to a shape suitable for stabilisation and compacted and trimmed to the alignment, heights and shapes specified in the Drawings or Contract.

Compaction of the additional material required for shape correction, shall be administrated through either process requirement (refer Clause 9.2) and/or product requirement (refer to Clause 9.3). This shall be approved by the Administrator. The minimum characteristic value of the relative compaction results shall not be less than 100%. This compaction testing requirement is not applicable if the layer thickness is less than 75 mm.

### 8.6.4 Compacting and trimming of the surface prior to spreading of the stabilising agent

Prior to spreading of the stabilising agent, the surface shall be shaped, compacted and trimmed to a degree that is sufficient to facilitate stabilisation specified in the Contract. **Witness Point 4**

### 8.6.5 Stabilising agent equipment

Stabilising agent shall be transported, stored and spread using equipment that is both waterproof and watertight. Equipment used to transfer the stabilising agent, shall also be waterproof during the transfer process. All such equipment shall be emptied, cleaned and dried prior to the introduction of each type of stabilising agent to be used in the stabilisation Works.

The stabilising agent shall be spread using a purpose-built calibrated spreader. The stabilising agent and water shall be incorporated into the material using a stabiliser.

Where a stabiliser with a calibrated integrated spreader is nominated (refer to Clause 5 of Annexure MRTS115.1), the stabilising agent shall be incorporated directly into the material to be stabilised.

### 8.6.6 Spreading of stabilising agent

#### 8.6.6.1 General

The stabilising agent shall be uniformly spread over the insitu material at a controlled rate (mass per unit area, kg/m²).

Traffic shall be stopped during spreading of stabilising agent, if wind direction is such that airborne cementitious blends are impeding through traffic.

At the start of each individual spreading run, the surface spread rate of the stabilising agent shall be determined using the surface spread rate Test Method Q719. The surface spread rate test shall be carried out within a distance of 35 m from the start of each individual spreading run. After the purpose built calibrated spreader / integrated spreader has spread over the mat or tray(s), the spreader shall be halted, the actual spread rate measured and this result compared with allowable tolerances specified in Clause 8.7.2.3. If the spread rate result is within the allowable tolerance, the spreader shall be allowed to complete the run. If the spread rate result is outside the allowable tolerance, additional surface spread rate tests shall be repeated in 35 m intervals, until the measured surface spread rate result is within the tolerance stated in Clause 8.7.2.3. The Contractor shall undertake corrective action in the area which has nonconforming surface spread rates. **Witness Point 5**

Additional surface spread rate tests at other locations (for example, middle and/or end of a run), shall be conducted upon the request of the Administrator.

Once the stabilising agent has been spread, no traffic, other than the construction plant employed for the stabilisation Work, shall travel over it.

All surface spread rate test results shall be recorded and included in the Contractor's quality records (refer to Clause 9.5).

#### 8.6.6.2 Spreading of a blended triple blend stabilising agent product

Where the triple blend stabilising agent supplied to the Works is a blended product, the spreading of the blended product shall comply with this clause.

The maximum amount of the blended triple blend stabilising agent to be spread in one pass, shall be 15 kg/m² to avoid wastage. The number of passes shall be calculated to comply with this requirement.

Spreading of the stabilising agent shall be undertaken in accordance with Clause 8.6.6.1.

> Only hydrated lime can be used in a blended triple blend stabilising agent product. Quicklime cannot be used in a blended product, as it needs to be slaked.

#### 8.6.6.3 Spreading of separable triple blend stabilising agent products

Where the triple blend stabilising agent supplied to the Works are separable products, the spreading of each individual stabilising agent shall comply with Clauses 8.6.6.3.1 and 8.6.6.3.2.

> Hydrated lime or quicklime can be used for separable triple blend stabilising agent products. Separate spreading and mixing runs for each stabilising agent component, will allow quicklime to be successfully slaked.

Lime may be spread, slaked (where required), and incorporated into the insitu materials the day or work shift prior to the spreading and incorporation of the GP cement and fly ash stabilising agents. In this situation, the working time (as per Clause 8.4) will start from the commencement of the incorporation (that is, mixing) of the GP cement stabilising agent into the insitu material.

For existing materials with a high clay content, an amelioration period may be required prior to commencing the spreading and incorporation of the GP cement and fly ash stabilising agents. The Administrator may permit a maximum amelioration period of up to 48 hours. During the amelioration period, the Contractor must ensure that the lime treated layer is compacted with an adequate roller to minimise evaporation loss or excessive wetting from possible rains.

#### 8.6.6.3.1 Hydrated lime, GP cement and fly ash

The maximum amount of hydrated lime to be spread in one pass, shall be 10 kg/m² to avoid wastage. For GP cement and fly ash stabilising agent, the maximum amount of stabilising agent to be spread in one pass, shall be 20 kg/m² to avoid wastage. The number of passes shall be calculated to comply with these requirements.

Spreading of the stabilising agents shall be undertaken in accordance with Clause 8.6.6.1.

#### 8.6.6.3.2 Quicklime, GP cement and fly ash

Where quicklime is spread, it shall be slaked in accordance with Clause 8.6.6.3.3. The longitudinal grade and crossfall of the subbase level, prior to spreading quicklime, shall not be greater than 5% to avoid excessive water flow and displacement of quicklime or slaked lime during the slaking process. The fully slaked lime or lime slurry formed from the slaking of quicklime, shall then be incorporated into the material in accordance with Clause 8.6.8 before spreading subsequent stabilising agents.

The maximum amount of quicklime to be spread in one pass, shall be 10 kg/m² to avoid the displacement of the quicklime during the slaking process and the slaking water not being able to penetrate the full depth of the quicklime. For GP cement and fly ash stabilising agent, the maximum amount of stabilising agent to be spread in one pass, shall be 20 kg/m² to avoid wastage. The number of passes shall be calculated to comply with these requirements.

Spreading of the stabilising agents shall be undertaken in accordance with Clause 8.6.6.1.

#### 8.6.6.3.3 Slaking of quicklime

The Principal Contractor shall ensure the slaking of quicklime is completed by a Stabilising Subcontractor. The Stabilising Subcontractor shall be responsible for the provision of water / water carts / operators and associated plant / operators for the purpose of slacking quicklime. This is to ensure the slaking procedures, plant and water is adequate for the purpose of slaking quicklime in accordance with this clause.

Quicklime shall be slaked with sufficient water to allow complete hydration such that the material remains friable after slaking and no further exothermic reaction occurs when additional water is added to the lime.

All through traffic shall be stopped during slaking operations.

Quicklime and/or lime slurry formed from the slaking process, shall be evenly placed and contained within the stabilising area at the required spread rate. Where displacement of quicklime and/or lime slurry outside the stabilising area has occurred, corrective action shall be undertaken by the Contractor prior to commencement of the incorporation. The Contractor shall ensure that no quicklime and/or lime slurry runs into the adjacent table drain or watercourse during the spreading and slaking operations.

The slaked quicklime shall be spot checked with a temperature probe and a shovel, to ensure that no pockets of unslaked quicklime remain (refer to Figure 8.6.6.3.3). Where excessive amounts of quicklime is present (for example, due to poor distribution), additional slaking shall be carried out to ensure complete hydration prior to the incorporation. Where an impervious thin layer (or crust) forms on the top of the quicklime making it difficult for additional water to penetrate for the slaking process, the Contractor shall open up the crust in a safe manner (with proper personal protective equipment) so further water can access the unslaked quicklime beneath.

The results of the spot checks performed on the slaked quicklime, shall be included in the Contractor's quality records (refer Clause 9.5). The frequency of the spot check testing shall be as per Clause 5.4. **Hold Point 7**

***Figure 8.6.6.3.3 – Checking completion of slaking with temperature probe***


Process of spot check for slaking:

1. remove the 'crust' formed on the top of quicklime after the initial slaking
2. insert temperature probe to cover the full depth of quicklime being slaked
3. add water to the area surrounding the temperature probe (water bottle suggested) and
4. note for any rise in temperature and steam.

If increase in the temperature (and steam), additional slaking is required and steps 1 to 4 above should be repeated, until no temperature rise and further steaming occurs (exothermic reaction).

### 8.6.7 Time between spreading and mixing

#### 8.6.7.1 Hydrated lime, GP cement and fly ash

The maximum allowable time between spreading the hydrated lime, GP cement and fly ash stabilising agent components and incorporation into the insitu material, shall be as stated in Clause 8 of Annexure MRTS115.1. Where no such time is stated in the Annexure, the maximum time between spreading and mixing shall be 60 minutes.

#### 8.6.7.2 Quicklime

The maximum allowable time between spreading quicklime, slaking quicklime and incorporation into the insitu material, shall be two hours.

In all cases, the maximum allowable time between spreading quicklime and commencement of slaking shall be 30 minutes. The Contractor shall ensure that the slaking is completed, as per requirements of Clause 8.6.6.3.3 before commencement of incorporation.

### 8.6.8 Incorporation of stabilising agent

#### 8.6.8.1 General

Incorporation of the stabilising agent shall be achieved using the stabiliser. The stabiliser shall be hooked-up to a fully laden water truck to allow for the incorporation of moisture.

> The incorporation of moisture together with the stabilising agent allows the insitu materials to be pre-conditioned (in particular, those insitu materials with higher water absorptions).
>
> Through the incorporation pass(es), the Contractor should target incorporating approximately 50% of the required total moisture needed to achieve the specified moisture ratio (refer to Clause 8.7.3).
>
> Where the insitu materials has a relatively higher moisture content at the time of insitu stabilising, the addition of moisture during the incorporation pass(es) may not be required to pre-condition the materials.

The Contractor shall ensure that no excess stabilising agent is spilt into the adjoining section during the spreading and incorporation passes. This shall be achieved by:

a) ensuring the stabiliser slows down as it approaches the limit of the section, and

b) any excess stabilising agent which is spilt into the adjoining section is spread by the grader back into the section which is currently being stabilised.

#### 8.6.8.2 Single incorporation pass and final moisture incorporation pass

Where a single pass is required to spread the ordered amount of stabilising agent specified in Clause 8.7.2.1, at least two mixing passes shall be undertaken.

The first (and only) incorporation pass of the stabilising agent shall be to a depth that is 50 mm less than design depth (50 mm above the lower reference level) in accordance with Clause 8.6.8.1.

Compacting, shaping, and trimming of surface prior to the final moisture incorporation pass, shall be undertaken as per Clause 8.6.9.

The final moisture incorporation pass shall be to a depth specified by the target depth (to ensure mixing to the lower reference level) in accordance with Clause 8.6.10.

#### 8.6.8.3 Multiple incorporation passes

Where more than one pass is required to spread the ordered amount of stabilising agent specified in Clause 8.7.2.1, the stabilising agent be incorporated into the material after each spreading pass.

All incorporation passes of the stabilising agent shall be to a depth that is 50 mm less than design depth (50 mm above the lower reference level) in accordance with Clause 8.6.8.1.

Compacting, shaping, and trimming of surface between incorporation passes, shall be undertaken as per Clause 8.6.8.4.

Compacting, shaping, and trimming of surface prior to the final moisture incorporation pass, shall be undertaken as per Clause 8.6.9.

The final moisture incorporation pass shall be to a depth specified by the target depth (to ensure mixing to the lower reference level) in accordance with Clause 8.6.10.

#### 8.6.8.4 Compaction and shaping of surface between incorporation passes

Adequate compaction shall be completed after each application of stabilising agent has been incorporated into the materials to be stabilised, as stated in Clause 8.6.8.3. This shall be carried out using a roller that can achieve relatively uniform compaction over the depth of the stabilised layer. The compacted surface shall be adequately shaped to the specified crossfall, to allow for subsequent spreading of the stabilising agent.

### 8.6.9 Compaction and trimming of surface prior to the final moisture incorporation pass

Prior to the final moisture incorporation pass, the surface level shall be compacted and shaped to the specified crossfall. Surface level heights higher than specified in the Drawings or Contract after compaction and shaping due to the effects of ‘bulking’, shall be uniform and shall be identified. In this case, the difference in height between specified in the Drawings or Contract and attained (bulking), shall be added to the design depth to determine the stabilising target depth for the final moisture incorporation pass (refer to Figure 8.6.10). **Witness Point 6**

Alternatively, the surface shall be shaped, compacted and trimmed to the alignment, height and crossfall specified in the contract documents, prior to the final moisture incorporation pass.

### 8.6.10 Final moisture incorporation pass

The distribution of the stabilising agent and water shall be uniform throughout the entire layer depth for the area stabilisation. The moisture content shall be adjusted as necessary, during the wet incorporation process, to achieve the moisture ratio stated in Clause 8.7.3. The target depth shall ensure mixing to the lower reference level thereby meeting the requirements of Clause 8.7.5.3.

Unless otherwise approved by the Administrator, water shall be added by means of a controlled pressure feed distribution system, located inside the mixing chamber of the stabiliser. This system shall be capable of spraying varying rates across its width.

Where test results or visual inspection by the Administrator indicates that any of the requirements stated in this clause have not been met, additional mixing passes shall be carried out to improve the uniformity of the:

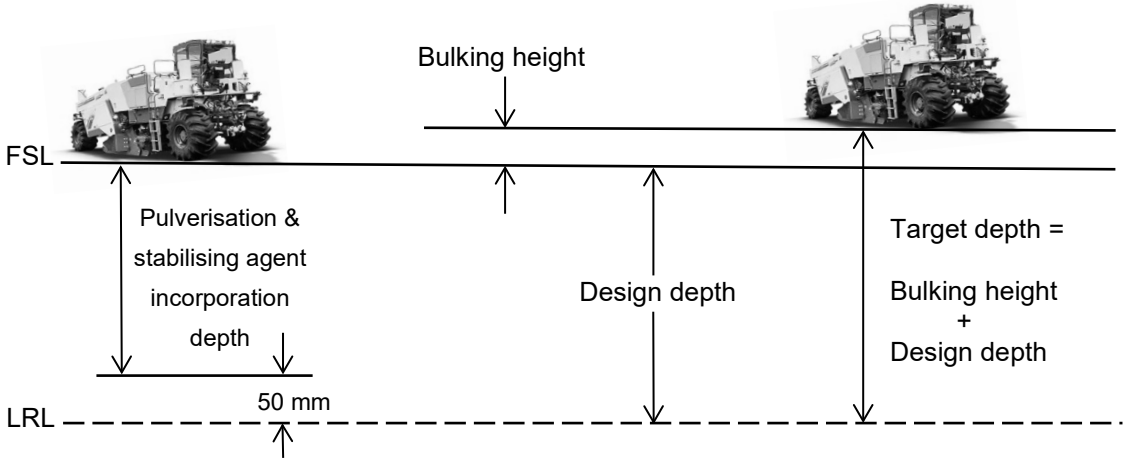
a) materials to be stabilised

b) distribution of the stabilising agent, and

c) distribution of water.

No additional or separate payment shall be made for any additional passes ordered by the Administrator.

***Figure 8.6.10 – Target depth sketch***




Design depth – as specified in the construction drawings and contract documents.
FSL : Finish Surface Level
LRL : Lower Reference Level

| Pulverisation and incorporation of stabilising agent | Bulking after incorporation of stabilising agent | Target depth on the final moisture incorporation pass |
|---|---|---|
| Preliminary pulverisation and incorporation of stabilising agent shall be 50 mm less than the design depth. | After surface compaction and trimming, the materials will change in volume, due to incorporation of the stabilising agent.<br>The bulking height above Finished Surface Level (FSL), needs to be identified and added to the design depth. | Mixing depth required on the final pass by the stabiliser to reach the Lower Reference Level (LRL), shall account for the additional bulking above the FSL. |

### 8.6.11 Compaction and trimming after final moisture incorporation pass

Immediately after wet incorporation pass, the stabilised area shall be compacted with adequate rollers (refer to Clause 8.6.15) to achieve the compaction stated in Clause 8.7.4.

For layer thicknesses 200-350 mm which are being compacted using a pad foot roller (refer to Clause 8.6.15), pad foot marks shall be removed to prevent differential compaction and the pad foot marks reflecting to the surface. The Contractor shall ensure that no marks caused by a pad foot roller remain on the surface. A minimum cut to -100 mm from the Finished Surface Level (FSL) of the stabilised layer, is required to completely remove the influence of the pad foot marks and not create a thin false layer when the stabilised material is reinstated.

Removing (or cutting out) of the pad foot marks, can be undertaken using a grader or stabiliser.

In both cases, a minimum cut to -100 mm from the Finished Surface Level (FSL) of the stabilised layer is required.

Where a grader is used to remove the pad foot marks, the stabilised material shall not be wasted. Once the pad foot marks have been completely removed, the stabilised material can be reinstated to allow the completion of compaction and trimming.

Where a stabiliser is used to remove the pad foot marks, the upper 'loose' stabilised materials can be compacted and trimmed in place to complete the stabilised layer. The stabiliser's tyre tread marks (or ruts) must be removed to prevent differential compaction and the tyre tread marks reflecting to the surface. A sufficiently deep cut with the grader is required to completely remove the influence of the tyre tread marks and not create a thin false layer when the stabilised material is reinstated.

For layer thicknesses < 200 mm which are being compacted using smooth drum and multi-tyre rollers (refer to Clause 8.6.15), removal of pad foot marks is not required. However, the stabiliser's tyre tread marks (or ruts) shall be removed to prevent differential compaction and the tyre tread marks reflecting to the surface. The Contractor shall ensure that no marks caused by the stabiliser's tyre tread marks remain on the surface. A sufficiently deep cut with the grader is required to completely remove the influence of the tyre tread marks and not create a thin false layer when the stabilised material is reinstated.

Initial shaping of the stabilised surface shall be carried out after the stabilised layer has been compacted.

The trimmed surface shall be free from loose pockets, holes, bumps and lenses of materials. The identified depressions shall be filled with additional stabilised material that is mixed and placed within its allowable working time as specified in Clause 8.4.

No marks caused by any roller or stabilisation plant shall be left on the surface of the stabilised layer.

All final trimming shall involve cutting to waste. All material cut to waste shall be disposed of in accordance with Clause 10 of MRTS01 *Introduction to Technical Specifications*. No separate payment shall be made for the disposal of material cut to waste. The cost of all activities associated with the disposal of material cut to waste, shall be deemed to be incorporated into the relevant Work Items.

Compaction and trimming (excluding static multi tyre rolling) shall be completed within the allowable working time as specified in Clause 8.4.

When finishing compaction using the vibrating smooth drum roller, adequate care and attention must be undertaken to avoid “over-compacting” the stabilised layer (also commonly referred to a “de-compacting” or “shattering”). Over-compaction can commonly occur when the smooth drum roller is operated on high amplitude vibration mode.

To avoid over-compaction and damaging the stabilised layer's surface, typical best practise is low amplitude vibration mode for the forward direction, and static (or no vibration) for the backwards direction.

The following guide may be considered in the construction process where a stabilised layer may take longer 'set up' in lower temperatures:

- Initial compaction is required to be carried out immediately after the wet incorporation pass.
- Final trim can be carried out within 48 hours of the completion of the wet incorporation pass.
- Back-rolling using a combination of static smooth drum and multi-tyre rollers has been found to be very effective in achieving the required compaction.
- Bulking which has resulted from the stabilisation process can remain until final trim.
- Where possible, water curing (especially initial water curing) should be performed without the water truck travelling over the stabilised surface.
- In cases of boxed excavations, adequate over excavation of the crown is required to accommodate for machine mixing offsets / capabilities and compliance with the longitudinal joint requirements of this Technical Specification. In addition, compliance of longitudinal joint requirements for subsequent pavement layers, shall be considered.

### 8.6.12 Construction joints

#### 8.6.12.1 General

Joints shall be constructed such that the material at the joints complies with the requirements of this Technical Specification.

A construction joint (longitudinal or transverse) shall be deemed fresh when the material on each side of the joint has been stabilised, placed and compacted within the allowable working time (refer to Clause 8.4) of the stabilised material constructed first.

#### 8.6.12.2 Longitudinal joints

##### 8.6.12.2.1 General

Longitudinal joints shall not be located in the through traffic wheel paths.

Where a fresh longitudinal joint between adjacent runs is to be compacted, the outside 300 mm of material from the first run, shall be left uncompacted until the adjacent material is ready for compaction. The joint shall be water cured during this period. When the fresh joint is compacted, the roller shall be partially supported on the portion of the first run that has been previously compacted.

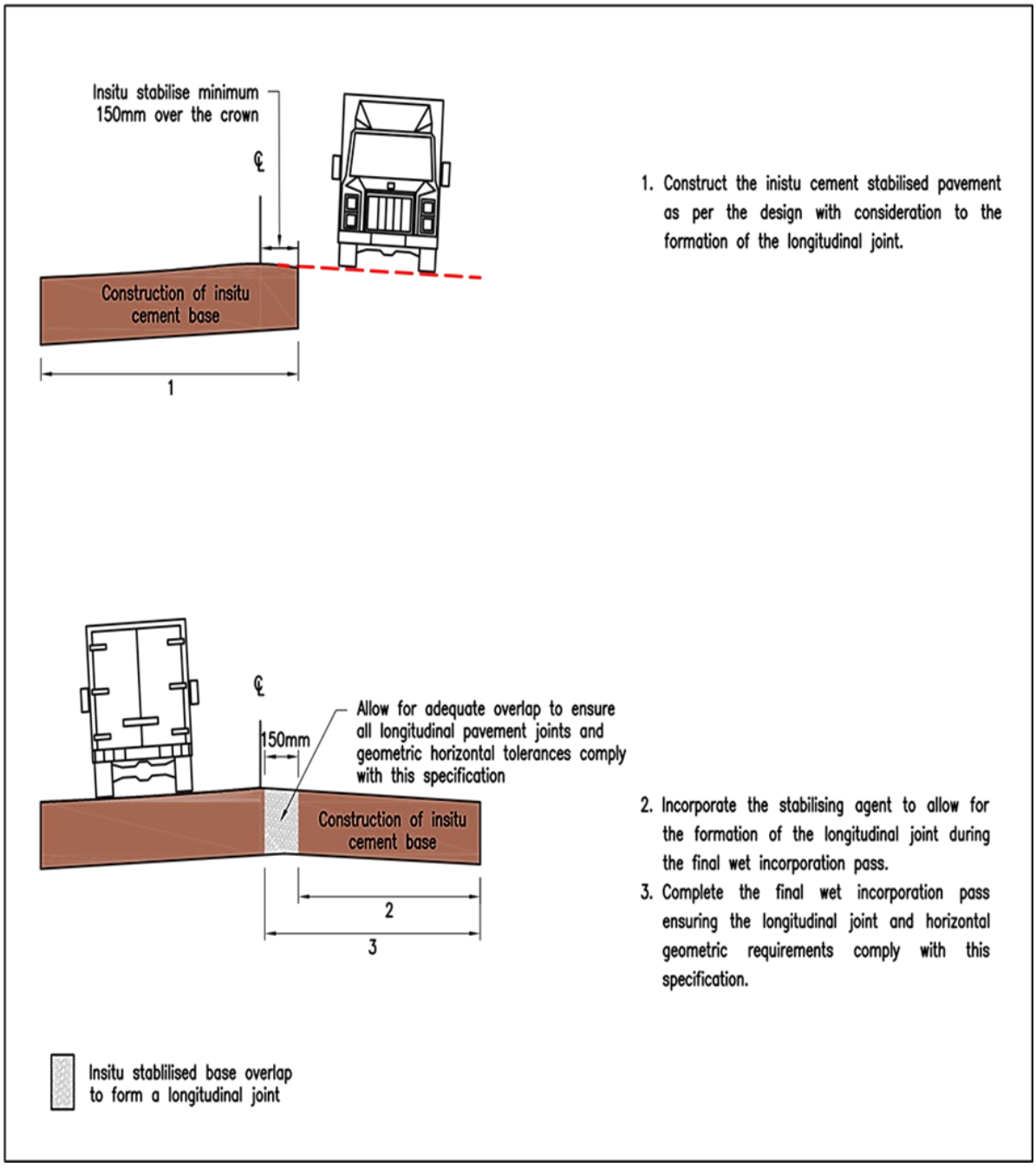
No separate or additional payment shall be made for the disposal of material cut to waste. The cost of all activities associated with the disposal of material cut to waste, shall be deemed to be incorporated into the relevant Work Items.

#### 8.6.12.2.2 Single insitu stabilised layer

For longitudinal joints that are not fresh, to ensure complete stabilisation across the full width of the pavement, the minimum distance for cutting back / overlapping into previously stabilised material, shall be the greater of 100 mm or the distance to a point where the stabilised material complies with this Technical Specification.

The overlap at a change of crossfall or crown, shall be carefully considered to comply with the longitudinal joint requirements of this clause and Clause 8.7.5.

***Figure 8.6.12.2.2 – Typical construction process for single insitu stabilised layer***



When constructing a longitudinal joint in accordance with this clause and Figure 8.6.12.2.2, the Contractor must ensure that the final moisture incorporation pass encompasses the entire area where the stabilising agent has been spread and mixed.

To achieve this, the Contractor may consider adopting the following process:

- Spread and mix the stabilising agent 150 mm offset from the longitudinal joint location, which is commonly the crown and/or centreline as shown in Figure 8.6.12.2.2 (refer to Step 2 in Figure 8.6.12.2.2).
- Complete the final moisture incorporation pass ensuring the stabiliser cuts into the adjoining stabilised materials thus forming a sufficient overlap (refer to Step 3 in Figure 8.6.12.2.2).

#### 8.6.12.2.3 Multiple insitu stabilised layers

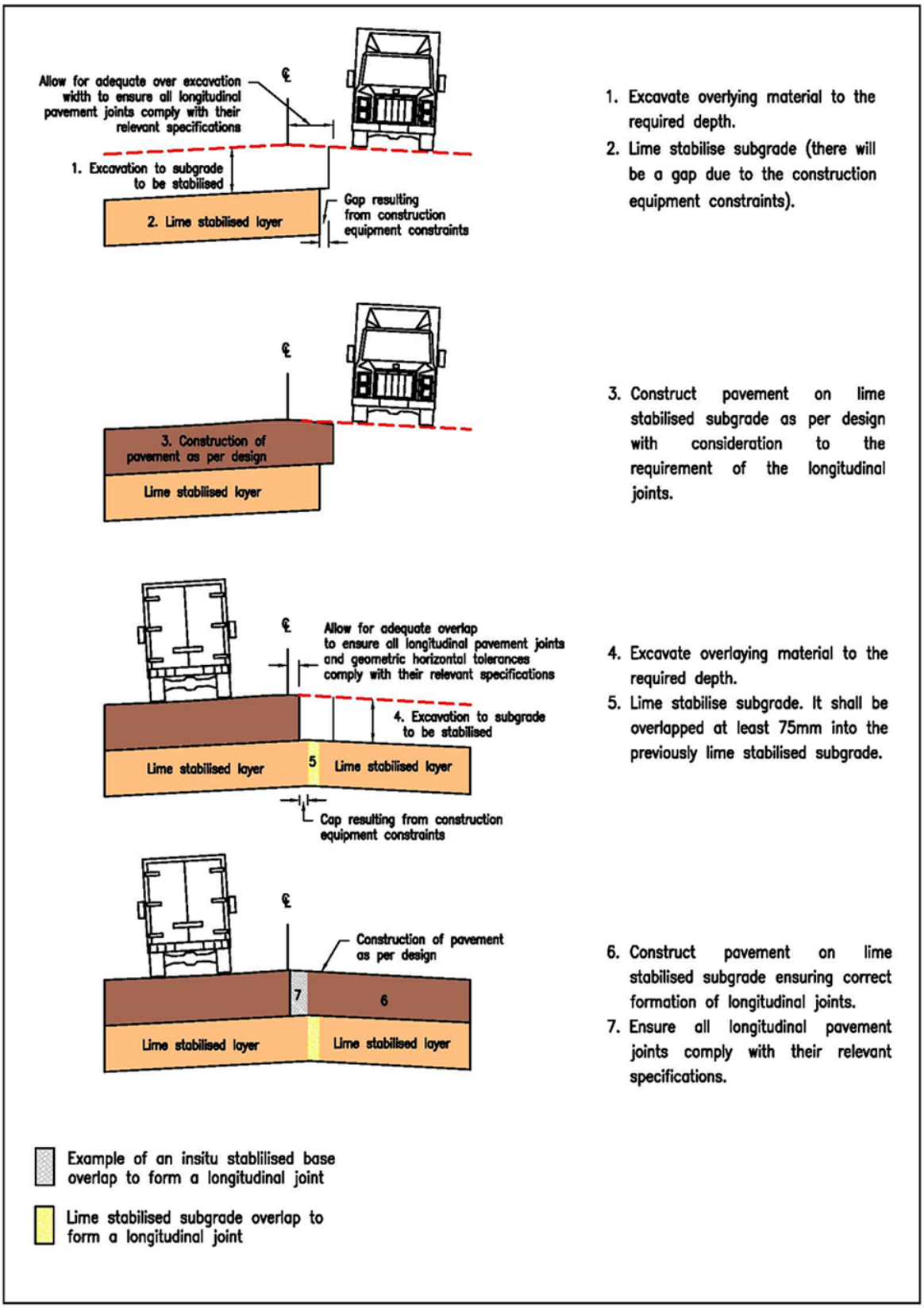
Where there is more than one layer of insitu stabilised material, the formation of the longitudinal joint at the crown shall be considered.

For longitudinal joints that are not fresh, to ensure complete stabilisation across the full width of the pavement, the minimum distance for cutting back / overlapping into previously stabilised material, shall be the greater of 75 mm or the distance to a point where the stabilised material complies with this Technical Specification.

Where the existing pavement is boxed to subbase / subgrade level, the Contractor shall ensure that the subbase / subgrade material is fully stabilised to the full width specified in the Drawings or Contract. The offset between the mixing equipment and the vertical face of the excavation to allow correctly formed longitudinal joints conforming to this clause, shall be considered.

The Contractor shall ensure that any pavement layers which overlay the triple blend stabilised subbase / subgrade layer have correctly formed longitudinal joints, in accordance with their relevant specification. A typical construction process for a boxed pavement is shown in Figure 8.6.12.2.3.

***Figure 8.6.12.2.3 – Typical construction process for multiple insitu stabilised layers***



#### 8.6.12.3 Transverse joints

For transverse joints that are not fresh, the adjoining stabilised section shall be mixed using a stabiliser by the greater of 1.5 m, or the length ordered by the Administrator.

Where there is more than one layer of insitu stabilised material, the transverse joints of each layer shall be offset from the underlying layer's joint by a minimum distance of 150 mm.

### 8.6.13 Curing

A curing operation shall commence immediately after the completion of compaction. Curing operation shall be carried out with extreme care to avoid any damage to the stabilised layer.

The stabilised layer shall be cured using water by maintaining the layer surface and edges in a continuously damp condition, using a uniformly applied fine mist, until the stabilised layer is covered by an overlying pavement layer or a sprayed bituminous surfacing with cover aggregate.

Water shall be applied in a manner such that slurrying of the surface, pavement instability and erosion and/or leaching of the stabilising agent, are all avoided. During the water curing process, no heavy construction equipment shall be allowed on the stabilised layer.

### 8.6.14 Maintenance of the stabilised layer

The stabilised layer shall be maintained by the Contractor until a bituminous surfacing with a cover aggregate is applied, or until the stabilised layer is covered by another pavement layer, or until the Administrator accepts and takes responsibility for that area (whichever is the longer).

The surface of the stabilised layer shall be kept moist, in good order, in good condition and free from contamination. Construction and other traffic shall not traverse the stabilised layer where damage to the surface may occur.

No separate or additional payment shall be made for maintenance of the stabilised layer. The cost of all activities associated with maintenance of the stabilised layer, shall be deemed to be incorporated into the relevant Work Items for the stabilised layer.

Where the insitu stabilised layer is to be overlaid with another pavement layer, consideration needs to be given on how to adequately prepare the surface to maximise the bond between pavement layers.

If the insitu stabilised layer is to be overlaid with another insitu stabilised layer, it is recommended that the overlying layer be insitu stabilised to a depth which will 'tuck in' to the underlying layer. The 'tuck in' details shall be provided in the Contract documents.

If the insitu stabilised layer is to be overlaid with a plant-mixed stabilised or granular layer, it is recommended that the finished surface be hard-cut and/or broomed to produce a roughly textured surface before placing the next layer.

### 8.6.15 Minimum requirements and numbers of particular plant

The minimum requirements and numbers of particular plant that shall be on Site at all times during the stabilisation Works, shall be as stated in Clause 5 of Annexure MRTS115.1. Where not so stated in the Annexure, the minimum requirements and numbers of particular plant that shall be on Site at all times during the stabilisation Works, shall be as stated in Table 8.6.15.

***Table 8.6.15 – Minimum requirements and numbers of particular plant***

| Description | Minimum requirement for each piece of plant | |
|---|---|---|
| Stabiliser or<br>Integrated spreader stabiliser | a) Minimum power capacity of 155 kW/m of the drum width.<br>b) Capable of mixing to the specified depth.<br>c) Capable of supplying water such that incorporation rates can be varied across the full width of the stabilising box and incrementally across the box.<br>d) Calibrated and capable of uniformly spreading stabilising agent to varying widths (if integrated spreader stabiliser). | |
| Purpose built calibrated spreader | Calibrated with load cells and capable of uniformly spreading stabilising agent using a fixed bulk bin, feeding a mechanical or hydraulic driven spreading rotor to varying widths. | |
| Vibrating pad foot roller | For layer thickness<br>< 200 mm: not required | For layer thickness<br>200-350 mm: 21 tonnes |
| Vibrating smooth drum roller | For layer thickness<br>< 200 mm: 16 tonnes | For layer thickness<br>200-350 mm: 16 tonnes |
| Multi-tyre roller | Minimum 12 tonnes. | |
| Water truck | Minimum capacity of 6000 litres. | |
| Grader | Manned by final trim Operator. | |

The Contractor shall utilise adequate roller sizes and rolling patterns to achieve the specified relative compaction.

When compacting an insitu stabilised layer thickness of 200-350 mm, a padfoot roller is required for initial compaction. After the removal of padfoot marks (refer to Clause 8.6.11), care needs to be taken by the Contractor to ensure that the final smooth drum rolling does not de-compact (or crack) the stabilised layer.

Typically, insitu stabilised layer thicknesses are not less than 200 mm. However, for layer thickness < 200 mm, the Contractor shall use a combination of smooth drum and multi-tyre rollers which has demonstrated it will achieve the specified relative compaction. After the removal of the stabiliser's tyre tread marks (refer to Clause 8.6.11), care needs to be taken by the Contractor to ensure that the final smooth drum rolling does not de-compact (or crack) the stabilised layer.

### 8.6.16 Conditions under which stabilisation shall not proceed

The entire stabilisation process shall not proceed in any of the following situations:

a) during rainfall

b) when rainfall appears to be imminent

c) during periods when the wind is strong enough to cause particles of the stabilising agent to become airborne

d) during conditions that may result in the work causing nuisance or danger to people, property, the environment, or live stock

e) when the pavement temperature, measured 50 mm below the surface, drops below 10ºC, or

f) when the air temperature, measured in the shade, exceeds 40ºC.

## *8.7 Product standards*

### 8.7.1 General

Compliance testing of the stabilised layer shall be undertaken for each lot. Where a process standard is specified (refer to Clause 8.5.1), the compaction requirements in Clause 8.7.4 shall apply to the trial sections, but not to other sections. Where a product standard is specified (refer to Clause 8.5.1), the compaction requirements in Clause 8.7.4 shall apply to all lots.

### 8.7.2 Stabilising agent spread rate

#### 8.7.2.1 Ordered spread rate

At least 14 days prior to the commencement of stabilisation Works, the Administrator will confirm or adjust the specified stabilising agent spread rate and any blend ratio stated in Clause 8 of Annexure MRTS115.1. The confirmed or adjusted stabilising agent spread rate, shall be the ordered spread rate of stabilising agent. **Milestone**

#### 8.7.2.2 Corrected content

Notwithstanding the ordered spread rate of stabilising agent given in Clause 8.7.2.1, the content to be used for the stabilisation Works shall be the corrected content, $CC_o$, as calculated below.

Where hydrated lime is used:

$$CC_o = C_o \times \left[\left(\frac{P_{NL}}{100}\right) + \left(\frac{P_{HL}}{100} \times \frac{AL_x}{AL_y}\right)\right]$$

where: $CC_o$ = corrected content of stabilising agent in percent (%)

$C_o$ = ordered content of stabilising agent in percent (%), defined in Clause 8.7.2.1

$P_{NL}$ = proportion of the blend in percent (%) that is not hydrated lime

$P_{HL}$ = proportion of the blend in percent (%) that is hydrated lime

$AL_x$ = available lime index of hydrated lime (%) used in the laboratory mix design

$AL_y$ = available lime index of hydrated lime (%) used in construction

Where quicklime is used:

$$CC_o = C_o \times \left[\left(\frac{P_{NL}}{100}\right) + \left(0.76 \times \frac{P_{HL}}{100} \times \frac{AL_x}{AL_y}\right)\right]$$

where: $CC_o$ = corrected content of stabilising agent in percent (%)

$C_o$ = ordered content of stabilising agent in percent (%), defined in Clause 8.7.2.1

$P_{NL}$ = proportion of the blend in percent (%) that is not hydrated lime

$P_{HL}$ = proportion of the blend in percent (%) that is hydrated lime

$AL_x$ = available lime index of hydrated lime (%) used in the laboratory mix design

$AL_y$ = available lime index of quicklime lime (%) used in construction

#### 8.7.2.3 Actual spread rate

The actual spread rate shall be represented by the average of the surface spread rates of the stabilising agent for each lot.

The actual stabilising agent spread rate shall be within ±10% of the ordered spread rate as specified in Clause 8.7.2.1.

### 8.7.3 Moisture ratio

The moisture ratio of the uncompacted materials during the final moisture incorporation pass, shall be determined in accordance with Clause 9.7, and shall comply with the requirements specified in Table 8.7.3.

***Table 8.7.3 – Moisture ratio requirements***

| Property | Minimum value (%) | Maximum value (%) |
|---|---|---|
| Moisture ratio (uncompacted) ($MR_u$) during the final moisture incorporation pass | 90 | 105 |

### 8.7.4 Compaction standard

The minimum characteristic value of the relative compaction results for the full thickness of the stabilised layer, shall be determined in accordance with Clause 9.6, and shall comply with the requirements specified in Table 8.7.4.

***Table 8.7.4 – Compaction requirements***

| Layer | Minimum relative compaction value |
|---|---|
| Triple blend stabilised layer | 100% (standard compaction) |

### 8.7.5 Geometrics

#### 8.7.5.1 General

The stabilised layer shall be constructed so as not to depart from the alignment, widths, thicknesses, lengths, heights and shapes specified in the Drawings or Contract by more than the tolerances stated in Clause 8.7.5.2 to Clause 8.7.5.5.

When constructing the stabilised layer, the Contractor shall consider the geometric tolerances of any overlying layer(s) and shall prepare the stabilised layer in such a manner that will permit the geometric conformance of the stabilised layer and any overlying layer(s).

#### 8.7.5.2 Geometrics, vertical tolerances

##### 8.7.5.2.1 Primary tolerance

A primary tolerance shall apply to the height of any point on the finished surface of the stabilised layer.

The primary tolerance shall be as stated in Clause 6.1 of Annexure MRTS115.1 and be one of the alternatives given in Table 8.7.4.2.1. If no such indication is given, the primary tolerance shall be Alternative B (-5 and +15 mm).

***Table 8.7.5.2.1 – Primary tolerance***

| Alternative | Primary tolerance (mm) |
|---|---|
| A | -5 and +10 |
| B | -5 and +15 |
| C | Thickness only |

Alternative A primary tolerance (-5 to +10 mm) is recommended for an insitu stabilised layer when the subsequent overlying layer is asphalt.

In all cases, the primary tolerance shall also apply for the thickness of the completed stabilised layer (refer to Clause 8.7.5.3.1).

Where Alternative C (thickness only) has been specified in Clause 6.1 of Annexure MRTS115.1, the following shall apply:

a) height of collimation (also known as a 'dumpy level' technique), shall be used to determine the actual stabilised layer thickness

b) minimum testing frequency for determining the actual stabilised layer thickness, shall be at each compaction test location (refer Clause 9.6), and

c) at any point of the completed stabilised layer, the measured thickness shall be within -5 mm and +15 mm of the design depth stated in Clause 8 of Annexure MRTS115.1.

### 8.7.5.3 Geometrics, thickness tolerances

#### 8.7.5.3.1 Thickness tolerance

At any point of the completed stabilised layer, the measured actual stabilised layer thickness (refer to Clause 8.7.5.3.2) shall be within the primary tolerance nominated in Clause 8.7.5.2.1 of the design depth specified in Clause 8 of Annexure MRTS115.1.

#### 8.7.5.3.2 Measuring actual stabilised layer thickness

During each final moisture incorporation pass and prior to compaction, depth checks shall be undertaken to determine the lower reference level at the bottom of the stabilised layer. The frequency of the depth checks shall be stated in Clause 5.4. Depth checks shall be undertaken by a Surveyor in accordance with the limits of accuracy defined in MRTS56 *Construction Surveying*.

Following compaction and final trim, levels shall be obtained from the top of the finished stabilised layer. They shall be recovered in the horizontal plane to an accuracy of ±50 mm of the same location as those from which the lower reference levels were obtained. The difference between the finished surface level and lower reference level shall be recorded as the actual stabilised layer thickness.

The actual stabilised layer thickness shall be recorded by the Contractor and reported to the Administrator. The record for each thickness determination shall include:

a) the position and measurement of the lower reference level at each depth check location

b) the position and measurement of the finished surface level at each depth check location

c) the actual stabilised layer thickness result obtained by subtracting the finish surface level measurement from the lower reference level measurement for each test location (rounded to the nearest 1 mm), and

d) the minimum characteristic value calculated in accordance with Clause 12 of MRTS01 *Introduction to Technical Specifications*, of all stabilised layer thickness measurements for each lot.

As an alternative to measuring the finished surface level recovered in the horizontal plane to an accuracy of ± 50 mm of the same location as the lower reference level measurements, a Triangular Irregular Networks (TIN) surveyed surface may be used by the Contractor.

The Contractor shall submit to the Administrator the proposed reporting positions (grid pattern and offsets) for the finished surface level survey capture. The use of TIN shall not be accepted until the Administrator has approved the Contractor's methodology.

In some locations, the finished surface level design geometry may be sub-optimal in crossfall and/or longitudinal grade and therefore not suitable for TIN surface creation. In these locations, the use of TIN shall not be accepted by the Administrator.

A Surveyor shall undertake the as-constructed survey capture of the finished stabilised layer in accordance with the geometrics conformance requirements of this Specification, and the As Constructed Survey requirements of MRTS56 *Construction Surveying*. From the as-constructed survey capture, a TIN surface can be developed and used to represent the finished surface level of the stabilised layer.

The actual stabilised layer can be measured and reported to the Administrator using this TIN surface as per the requirements of this Clause.

In all cases:

- the reported positions must be recovered within the bounds of the developed TIN surface, and
- the finished surface level and lower reference level measurements are recovered in the as-constructed survey to an accuracy of ± 1,000 mm.

#### 8.7.5.4 Geometrics, horizontal tolerances

The horizontal position of any point on the pavement shall not differ from the corresponding point shown on the Drawings, or as otherwise specified in the Contract, by not more than ±50 mm, except where alignment of the pavement with an existing pavement or structure is necessary. In this case, the new work shall be joined neatly to the existing work or structure in a smooth manner, as shown on the Drawings, or as otherwise specified in the Contract.

If the Drawings or other Contract documents do not demonstrate, describe or specify how new work is to join to existing pavement or structures, then it shall be done in a manner that is acceptable to the Administrator.

#### 8.7.5.5 Additional tolerances

##### 8.7.5.5.1 General

Where required by Clauses 8.7.5.5.2 and 8.7.5.5.3, additional tolerances shall apply to the stabilised layer.

Additional work shall be carried out by the Contractor where necessary, to achieve these additional tolerances. Payment for any such work shall be deemed to be included in the Contractor's scheduled rate for the relevant Work Items.

##### 8.7.5.5.2 Deviation from a straightedge

Clause 6.2.1 of Annexure MRTS115.1 specifies whether a deviation from a straightedge tolerance is to be applied. If no indication is given, deviation from a straightedge tolerance shall apply.

The deviation from a 3 m long straightedge placed anywhere on the surface of a layer, shall not exceed the limit stated in Clause 6.2.2 of Annexure MRTS115.1, due allowance being made for design shape, where relevant.

The limit stated in Clause 6.2.2 of Annexure MRTS115.1 shall be one of the alternatives given in Table 8.7.5.5.2. If no limit is given, it shall be Alternative E (8 mm).

***Table 8.7.5.5.2 – Tolerance for deviation from a straightedge***

| Alternative | Maximum value (mm) |
|---|---|
| D | 5 |
| E | 8 |
| F | 15 |

Alternative D primary tolerance (5 mm) is recommended for an insitu stabilised layer that will be bitumen sealed and trafficked, or when the subsequent overlying layer is asphalt.

##### 8.7.5.5.3 Crossfall

Clause 6.3 of Annexure MRTS115.1 specifies whether a crossfall tolerance applies, if no indication is given, crossfall tolerance shall apply.

The crossfall shall not depart from the corresponding crossfall shown in the Drawings or Contract by more than 0.5% absolute.

The crossfall shall be measured:

a) between any two points more than 2 m apart, except where a pavement verge is less than 2 m wide. For pavement verges less than 2 m wide, the measurement shall be made between the extreme edges of the pavement verge on each side of the pavement

b) transverse to the centre line of the carriageway, and

c) within the boundaries of a cross-section element that has a constant crossfall.

# 9 Construction compliance testing

## *9.1 General*

Unless otherwise stated in this Technical Specification, the selection of sampling or test locations shall be carried out using random stratified sampling. Exceptions include testing of:

a) geometrics (Clause 9.4)

b) the stabilising agent content (Clause 9.5), and

c) proof rolling of pavement layers (Clause 9.8).

The Contractor is responsible for performing sufficient tests to ensure that the pavement complies with the standards and requirements of this Technical Specification. However, the Contractor's testing program shall be such that the testing frequencies and number of tests are not less than those specified in Clause 5.4.

## *9.2 Process requirements*

Where construction has been carried out using process requirements, checking for compliance with the specified requirements shall be carried out during and after the construction operation, as relevant. Except for compaction, compliance checking shall be carried out in accordance with Clause 5.4. If process requirement is specified for compaction, the minimum testing frequencies and minimum number of tests for compaction specified in Clause 5.4 apply to trial sections and do not apply to other sections.

Notwithstanding this, the requirements of Clause 8.5.2 shall apply.

## *9.3 Product standards*

Where construction has been carried out using product standards, compliance testing of the stabilised layer shall be undertaken for each lot. If product standard is specified, the minimum testing frequencies and minimum number of tests for compaction specified in Clause 5.4 apply.

Notwithstanding this, the requirements of Clause 8.5.3 shall apply.

## *9.4 Geometrics*

### 9.4.1 General

All geometric tolerances, except for surface evenness, shall be checked at regular intervals not greater than the frequency specified in Clause 5.4.

## *9.5 Stabilising agent spread rate*

The stabilising agent spread rate shall be determined by Test Method Q719. The stabilising agent spread rate shall be within the allowable tolerance specified in Clause 8.7.2.3 in all cases.

The results of all surface spread rate tests shall be recorded and included in the quality records and reported to the Administrator. The record and report for each surface spread rate test shall include:

a) the position, date and time

b) all values and calculations, including ordered spread rate and assumptions, used to calculate the surface spread rate, and

c) the calculated surface spread rate.

The testing program shall be discussed and agreed with the Administrator prior to commencement of stabilising operations (refer to Clause 5.2.2 **Hold Point 1**)

In addition, the tonnage of stabilising agent placed during each spreading run shall be recorded and reported to the Administrator. The record and report for each spreading run shall include:

a) the start position, date and time

b) the end position, date and time

c) the length of the run

d) the width of the run

e) the tonnage of stabilising agent in the spreader at the start of the run

f) the tonnage of stabilising agent at 500 m intervals (if the length of the run exceeds 500 m)

g) the tonnage of stabilising agent in the spreader at the end of the run

h) the tonnage of stabilising agent spread for each 500 m interval (if the length of the run exceeds 500 m), and

i) the tonnage of stabilising agent spread for the entire run.

### *9.6 Compaction*

The compaction standard for each lot, shall be represented by the minimum characteristic value of the compaction results. The characteristic value shall be calculated as stated in Clause 12 of MRTS01 *Introduction to Technical Specifications* or Test Method Q020, using the individual relative compaction results determined from testing each lot.

Where the minimum characteristic value of a lot's compaction results does not comply with the requirements of this specification, the Contractor shall raise a suitable Nonconformance report. The Administrator should review each individual compaction result. The review may necessitate the need for additional investigation to identify the underlying cause(s) for the Noncompliance. The Administrator should also review the homogeneity of the Works.

The locations of all tests undertaken for the determination of insitu dry density and relative compaction, shall be at the same locations of samples taken to determine the corresponding laboratory MDR.

Sampling of stabilised materials to determine the laboratory MDR as detailed in Test Method Q142A, shall take place immediately after the final moisture incorporation pass and prior to the commencement of compaction of the stabilised material.

The relative compaction of the stabilised material as detailed in Test Method Q140A, shall be determined for the entire thickness of the stabilised layer.

Inherently, the insitu stabilisation process involves the mixing of existing materials whose properties can be unpredictable and may also vary within the Project limits. Therefore, caution must be applied when seeking to determine nuclear gauge biases (refer to Nuclear Gauge Testing Manual (NGTM) Test Method N01) and/or attempting to establish and monitor assigned values (refer to Test Method Q144A).

#### 9.6.1 Time limits for MDR laboratory compaction

Following sampling, the MDR testing shall be completed to a stage where laboratory compaction has been completed within two hours of the commencement of the final moisture incorporation pass for the corresponding lot.

To comply with the above requirements, the Contractor may need to consider the establishment of an annex laboratory facility onsite.

Additionally, following sampling, oven drying of all specimens used to determine the moisture content, shall commence within the same work shift as the stabilisation Works for the corresponding lot.

#### 9.6.2 Time limits for the determination of compacted density

Unless otherwise approved by the Administrator, the determination of compacted density using Test Method Q141A or Test Method Q141B, shall be completed to a stage where the wet density has been determined within 24 hours after the end of the work shift where stabilisation Works were completed for the corresponding lot.

Additionally, any moisture sub-sample is being oven dried within the same work shift as the compacted density testing for Test Method Q141A or Test Method Q141B is being undertaken.

#### 9.6.3 Time limits for the determination of material biases

For the determination of material biases for Test Method Q141A, compacted density testing using Test Method Q141B shall be completed to a stage where the wet density has been determined within 24 hours after the end of the work shift where stabilisation Works were completed for the corresponding lot.

Additionally, any moisture sub-sample is being oven dried within the same work shift as the compacted density testing for Test Method Q141B is being undertaken.

### *9.7 Moisture ratio*

The moisture ratio of the uncompacted materials ($MR_u$) shall be determined in accordance with Test Method Q250.

The moisture sample locations shall be identical to the MDR sampling locations for compaction testing (refer to Clause 9.6). The moisture samples shall be extracted immediately after the final moisture incorporation pass by the stabiliser and prior to the addition of any additional moisture for the purposes of compaction and trimming.

Following sampling, oven drying of all specimens used to determine the moisture content, shall commence within the same work shift as the stabilisation Works for the corresponding lot.

The moisture ratio shall be calculated using the individual moisture content, compared to the optimum moisture content for each corresponding location (refer to Clause 9.6). As a minimum frequency, the moisture ratio of the uncompacted materials shall be assessed at each test location for compaction. The results shall be reported to the Administrator as soon as it is available.

### *9.8 Proof rolling*

The proof rolling test specified in this clause shall apply to a completed stabilised layer, unless stated otherwise in Clause 7 of Annexure MRTS115.1. If no indication is given, the proof rolling test shall apply.

Each stabilised layer shall be tested for perceptible surface deformation by 'proof rolling' the stabilised layer, in the presence of the Administrator. **Witness Point 7** All areas of the stabilised layers shall be 'proof rolled', including all trafficked lanes, shoulders and other areas.

Testing shall be in accordance with Test Method Q723, unless otherwise approved by the Administrator. Testing for perceptible surface deformation is exempt from the requirement for NATA accreditation or CMT registration.

Where the surface of any section of a stabilised layer displays perceptible surface deformation under proof rolling, the Administrator may require the Contractor to undertake additional compliance testing to ensure that the affected section of the stabilised layer complies with Clauses 8.7.2, 8.7.3 and 8.7.4. No additional payment shall be made by the Principal for such additional testing.

Where the surface of any section of a stabilised layer displays perceptible surface deformation under proof rolling, the construction of any overlying pavement layer and/or spray seal shall not proceed until the Administrator grants the Contractor permission to proceed in accordance with Clause 9.9.

The proof rolling result reported for any stabilised layer lot shall be representative of the condition of the lot immediately prior to it being covered by another pavement layer or spray seal. If the stabilised layer lot has been subjected to rainfall or moisture ingress in any way since proof rolling was undertaken, the Administrator may direct the Contractor to retest the lot to prove conformance. If the retested results do not comply with the requirements of this Technical Specification, the Contractor shall rectify the stabilised layer such that it complies with the requirements of this Technical Specification. No additional payment will be made by the Principal for any such additional efforts.

> Test Method Q723 provides a method for using a loaded water tanker for proof rolling.

### *9.9 Acceptance*

For any completed stabilised pavement lot, the Contractor shall submit to the Administrator all compliance testing relevant to that lot within 72 hours after the completion of the lot's final moisture incorporation pass (refer to Clause 8.6.10). Construction shall not proceed until the Administrator has received these compliance test results. The Contractor shall allow at least one working day for a response from the Administrator.

Compliance test results need to be provided by the Contractor to the Administrator in a timely manner (within 72 hours after the completion of the lot's final moisture incorporation pass). This will allow the Contractor and Administrator to monitor the progress and quality of the Works and address any Nonconformances promptly.

No stabilised pavement lot shall be covered by a subsequent layer of pavement or a surfacing, until all compliance testing has been completed and the layer has been presented to the Administrator for permission to proceed. **Hold Point 8**

No stabilised pavement lot shall be covered by a subsequent layer of pavement or a surfacing until the As Constructed Survey requirements for the stabilised pavement lot have been met, as specified in MRTS56 *Construction Surveying* and notice of such Works has been provided to the Administrator.

## 10 Supplementary requirements

The supplementary requirements given in Clause 10 of Annexure MRTS115.1 shall apply.

## Appendix A: Maximum lot sizes and minimum testing frequencies

***Table A1 – Maximum lot size requirements***

| Construction Activity | Maximum Lot Size |
|---|---|
| Supply of unbound granular materials for shape correction and new material to replace unsuitable material | 5,000 tonnes |
| Construction of insitu stabilised subbases using triple blend | The area (in m²) of production, of completed stabilised layer, achieved during a single work period, provided the material is, in the opinion of the Administrator, essentially uniform. |

***Table A2 – Unbound granular materials for shape correction and new material to replace unsuitable material – source and product compliance testing requirements***

| Property | Test Method | Normal Testing Level | | Reduced Testing Level | |
|---|---|---|---|---|---|
| | | Minimum Testing Frequency | Minimum No. of Tests | Minimum Testing Frequency | Minimum No. of Tests |
| **Source Testing** | | For Type 2, Type 3 or Type 4 unbound granular material refer to MRTS05 *Unbound Pavements* | | | |
| Petrographic assessment of aggregates | Q188 | | | | |
| Wet strength | AS 1141.22 | | | | |
| Wet / dry strength variation | AS 1141.22 | | | | |
| Water absorption | AS 1141.6 | | | | |
| Degradation factor | Q208B | | | | |
| **Product Testing** | | | | | |
| Flakiness index | Q201 | | | | |
| California Bearing Ratio* | Q113A | | | | |
| Particle size distribution (grading) | Q103A | | | | |
| Fines ratio | Q103A | | | | |
| Liquid limit | Q104A | | | | |
| Linear shrinkage | Q106 | | | | |
| UCS (Type 2 materials containing recycled concrete) | Q115 | | | | |
| Foreign Material (Type 2 materials containing recycled material) | Q477 | | | | |
| pH (Type 2 materials containing recycled concrete) | AS 1289.4.3.1 | | | | |
| Sulfate content | AS 1289.4.2.1[#] | 1 test per material source | | | |
| Sulfate content (water) | AS 1289.4.2.1[#] | 1 test per water source | | | |

Notes:

* Refer to MRTS05 for CBR testing requirements for Type 2, Type 3 and Type 4 materials.

[#] Or other published or validated classical chemistry technique or instrumentation technique.

***Table A3 – Construction compliance testing requirements***

| Construction Activity | Test Method | Normal Testing Level | | Reduced Testing Level | |
|---|---|---|---|---|---|
| | | **Minimum Testing Frequency** | **Minimum No. of Tests** | **Minimum Testing Frequency** | **Minimum No. of Tests** |
| Compaction | Q140A | 1 test per 500 m² | 4 tests per lot | 1 test per 1000 m² | 2 tests per lot |
| Moisture ratio (uncompacted) ($MR_u$) | Q250 | 1 test per 500 m² | 4 tests per lot | 1 test per 1000 m² | 2 tests per lot |
| Surface spread rate of stabilising agent | Q719^ | Minimum 1 per spreading run | | | |
| Slaking spot checks (quicklime) | Clause 8.6.6.3.3 | 1 per 25 linear m (selecting the thickest area) | | | |
| Depth checks | Survey | a) 1 per 5 linear m within the first 20 m of each final moisture incorporation pass, and<br>b) 1 per 20 linear m for the remaining length of each final moisture incorporation pass | | a) 1 per 5 m within the first 20 m of each final moisture incorporation pass, and<br>b) 1 per 50 m for the remaining length of each final moisture incorporation pass. | |
| Proof rolling | Q723 | Refer to Clause 9.8 | | | |

Note:

^ For Q719, the requirement for the test to be carried out by a registered NATA and CMT Supplier in accordance with MRTS50 *Specific Quality System Requirements*, shall be relaxed.

***Table A4 –Geometrics compliance testing requirements***

| Construction Activity | Test Method | Normal Testing Level | | Reduced Testing Level | |
|---|---|---|---|---|---|
| | | **Minimum Testing Frequency** | **Minimum No. of Tests** | **Minimum Testing Frequency** | **Minimum No. of Tests** |
| Geometrics horizontal position | Survey | Each 20 linear m – measured at all shoulder edges, lane lines and other changes in grade across the pavement | | | |
| Geometrics vertical levels | Survey | | | | |
| Geometrics layer thickness | Survey | 1 per 20 linear m | | 1 per 50 linear m | |
| Deviation from a straightedge | Q712 | a) **within lane**:<br>1 per 20 linear m along each stabilising run, unless otherwise approved by the Administrator.<br>Measurements shall be taken in both the transverse and longitudinal directions.<br>b) **longitudinal joint**:<br>1 per 20 linear m along each joint, unless otherwise approved by the Administrator.<br>c) **transverse joint:**<br>1 measurement per joint in each wheel path in each lane.<br>For the measurement of joints, place the straightedge on the completed layer, perpendicular to the joint.<br>With the end of the straightedge directly over the joint, gradually move the straightedge across the joint for its full length and identify the point on the layer that produces the largest deviation under the straightedge (between two points of contact).<br>Record the deviation at this point.<br>d) **joint to existing pavement (not constructed under the Contract):**<br>1 measurement per joint in each wheel path in each lane.<br>For all joints that tie the new Works to existing pavement (not constructed under the Contract), place the straightedge on the road surface perpendicular to the joint.<br>With the end of the straightedge directly over the joint and the other end located within the Works, record the largest deviation under the straightedge (between two points of contact). | | | |
| Crossfall | Survey | 1 per 20 linear m – measured for all crossfalls shown in the design documentation at the point of testing | | | |