Specification (Measurement)

Transport and Main Roads Specifications MRS07C Insitu Stabilised Pavements using Foamed Bitumen

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Queensland Government

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Contents

1 Introduction

This Specification applies to the stabilisation of materials insitu by the addition of bitumen, as a foam, and secondary stabilising agent. It only applies to insitu stabilisation of the uppermost layer/s of an existing pavement to form a single stabilised layer of either base or sub-base.

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications* and other specifications as appropriate.

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

2 Measurement of work

2.1 Standard Work Items

In accordance with the provisions of Clause 2.of MRS01 *Introduction to Specifications*, the Standard Work Items covered by this Specification are listed in Table 2.1.

Table 2.1 - Standard Work Items

Standard Item No.	Description	Unit of Measurement
Insitu Stabilised Pavements using Foamed Bitumen		
4266P	Excavation and disposal of material not suitable for stabilisation, [*type of material*] (Provisional Quantity)	m³
4267P	Additional material for shape correction [*type of new material*] (Provisional Quantity)	m³
4268P	New material to replace material not suitable for stabilisation [*type of new material*] if ordered (Provisional Quantity).	m³
4275	Pulverisation prior to insitu stabilisation using foamed bitumen [*location*]	m²
4276	Insitu stabilisation using foamed bitumen *[location*].	m²
4277	Insitu stabilisation using foamed bitumen with bitumen supplied by Principal [*location*]	m²
4281	Transport of Class 170 bitumen supplied by the Principal, from [*supply location*]	litre
4286	Supply of secondary stabilising agent [*description, location*]	tonne
4296	Water curing [*location*]	m²

2.2 Work Operations

Item 4266P Excavation and disposal of material not suitable for stabilisation, [*type of material*] (Provisional Quantity)

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) excavating, loading and hauling of material not suitable for stabilisation, and

c) disposal of material.

Item 4267P Additional material for shape correction [*type of new material*] (Provisional Quantity)

Item 4268P New material to replace material not suitable for stabilisation [*type of new material*], if ordered (Provisional Quantity)

Work Operations incorporated in the above items include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) supply and delivery of all materials

c) spreading the materials

d) compacting and trimming the materials to facilitate insitu stabilisation and work operations related to it

e) maintenance of the subgrade and/or pavement courses, and

f) associated material and construction compliance testing.

Item 4275 Pulverisation prior to insitu stabilisation with foamed bitumen [*location*]

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) pulverising the material to be stabilised

c) compacting and trimming the material to facilitate insitu stabilisation, and work operations related to it, and

d) associated material and construction compliance testing.

Item 4276 Insitu stabilisation using foamed bitumen with bitumen

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) compaction and trimming prior to spreading of the secondary stabilising agent for each spreading pass, if required

c) uniform spreading of the secondary stabilising agent after each spreading pass

d) supply, delivery, storage and application of water for slaking of the secondary stabilised agent, if required

e) supply, delivery, storage, application and incorporation of water into the material to be stabilised, if required

f) compaction and trimming prior to incorporation of the foamed bitumen stabilising agent, if required

g) supply, delivery and storage of Class 170 bitumen

h) supply, delivery, storage and incorporation of bitumen foaming additive(s)

i) uniform application/spraying of the foamed bitumen stabilising agent

j) mixing into the material to be stabilised the foamed bitumen stabilising agent, secondary stabilising agent and, if required, water

k) compaction

l) trimming

m) treatment at construction joints

n) disposal of excess and trimmed material

o) testing for visible deflection

p) maintenance of the pavement courses, and

q) associated material and construction compliance testing.

Item 4277 Insitu stabilisation using foamed bitumen with bitumen supplied by Principal [*location*]

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) compaction and trimming prior to spreading of the secondary stabilising agent for each spreading pass, if required

c) uniform spreading of the secondary stabilising agent after each spreading pass

d) supply, delivery, storage and application of water for slaking of the secondary stabilised agent, if required

e) supply, delivery, storage, application and incorporation of water into the material to be stabilised, if required

f) compaction and trimming prior to incorporation of the foamed bitumen stabilising agent, if required

g) Transport of Class 170 bitumen supplied by the Principal (refer to Work Item 4281)

h) uniform application/spraying of the foamed bitumen stabilising agent

i) mixing into the material to be stabilised the foamed bitumen stabilising agent, secondary stabilising agent and, if required, water

j) compaction

k) trimming

l) treatment at construction joints

m) disposal of excess and trimmed material

n) testing for visible deflection

o) maintenance of the pavement courses, and

p) associated material and construction compliance testing.

Item 4281 Transport of Class 170 bitumen supplied by the Principal, from [*supply location*]

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) transport of Class 170 bitumen from the point of supply by the Principal to the Site as set out in the Principal Supply Material List (C6827)

c) supply, delivery and incorporation of bitumen foaming additive(s), and

d) associated material and construction compliance testing.

Item 4286 Supply of secondary stabilising agent [*description, location*]

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) supply, delivery and storage of the secondary stabilising agent, and

c) associated material and construction compliance testing.

Item 4296 Water curing [*location*]

Work Operations incorporated in the above item include:

a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*

b) supply, delivery and storage of water

c) application of the water to maintain the stabilised layer in a damp condition at all times during the curing period, and

d) associated material and construction compliance testing.

2.3 Calculation of quantities

The mass of stabilising agent for each lot shall be calculated using the below formulae in conjunction with the dry density of the corresponding representative sample (compacted to 100% of standard compaction) for the lot.

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

2.3.1 Bituminous stabilising agent

The volume of the bituminous stabilising agent, at 15ºC, based on the design shall be calculated using the following formula:

$$V = \frac{A \times S_p}{1.04}$$

where:

V = volume of bituminous agent in litres

A = surface area of pavement to be insitu stabilised in m², and

S_p = specified primary stabilising agent spread rate in kg/m².

2.3.2 Secondary stabilising agent

2.3.2.1 Hydrated lime

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

$$M = \frac{A \times S \times AL_X}{1,000 \times AL_Y}$$

where:

M = mass of secondary stabilising agent in tonnes

A = surface area of the pavement to be insitu stabilised in m²

S = ordered stabilising agent spread rate for hydrated lime, in kg/m²

AL_X = available lime index for quicklime used in the laboratory mix design testing (%), and

AL_Y = available lime index for quicklime used in construction (%).

The mass of secondary stabilising agent for each lot shall be calculated using the above formula. The Available Lime Index shall be determined for the secondary stabilising agent used in both laboratory design and construction. Except where stated otherwise in Clause 13 of Annexure MRTS07C.1, an available lime index of 90% shall be assumed for laboratory mix design testing. The quantity of lime shown in the schedules is based on an Available Lime Index of 90%. The Contractor is to make allowance for variations. Payment for the supply of secondary stabilising agent shall be based on an Available Lime Index of 90%.

2.3.2.2 Quicklime

Where quicklime is specified, the mass of stabilising agent shall be calculated using the following formula:

$$M = \frac{0.76 \times A \times S \times AL_X}{1,000 \times AL_Y}$$

where:

M = mass of secondary stabilising agent in tonnes

A = surface area of the pavement to be insitu stabilised in m²

S = ordered stabilising agent spread rate for quicklime, in kg/m²

AL_X = available lime index for quicklime used in the laboratory mix design testing (%), and

AL_Y = available lime index for quicklime used in construction (%).

The mass of secondary stabilising agent for each lot shall be calculated using the above formula. The Available Lime Index shall be determined for the secondary stabilising agent used in both laboratory mix design and construction. Except where stated otherwise in Clause 13 of Annexure MRTS07C.1, an available lime index of 90% shall be assumed for laboratory mix design testing. The quantity of lime shown in the schedules is based on an Available Lime Index of 90%. The Contractor is to make allowance for variations. Payment for the supply of secondary stabilising agent shall be based on an Available Lime Index of 90%.

2.3.3 Water curing

The area of water curing shall be calculated from the lengths and widths of the lots of pavement stabilised with foamed bitumen. No measurement for water curing shall be made for those lots for which curing with a sprayed bituminous curing coat has been specified.

2.3.4 Removal and disposal of material not suitable for stabilisation

The volume of material shall be calculated from the loose truck volume of material disposed of from the site. Before commencing this operation the measured volume of the haulage plant and the loading method shall be as approved by the Administrator. The total volume of material removed and disposed of shall be agreed with the Administrator each day.

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

3.1 Maximum reductions in standards for a reduced level of service

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

a) the actual value for any property or requirement not listed in the first column of Table 3.1 has failed to meet the specified limit or requirement for such property or requirement

b) the actual value for any property or requirement listed in the first column of Table 3.1 has deviated from the extended limit stated in the second column of Table 3.1

c) the actual value for any property given in Table 3.1 has deviated from the specified limit (not the extended limit) for the same property in the immediately preceding lot, or

d) the actual value for any property given in Table 3.1 has deviated from the specified limit (not the extended limit) for that property in more than three lots for any preceding work.

Table 3.1 - Extended limits

Property	Extended limit
Primary Stabilising Agent Content (foamed bitumen)	Minimum content no less than ordered content minus 0.5%.
Secondary Stabilising Agent Content	Minimum content no less than ordered content minus 0.5%.
Characteristic value of relative compaction	Minimum characteristic value of relative compaction no less than specified relative compaction minus 2%.
Relative Moisture Ratio (RMR)	Minimum RMR no less than Specified Average RMR minus 10%.
Road roughness count rate	Maximum road roughness count rate of R_m as stated in Clause 1 of Annexure MRS07C.1 or, where R_m is not so stated, R_s + 20, where R_s is defined in MRTS07C.

3.2 Determination of the reduced value

3.2.1 General

The reduced value shall be determined from the formula given below for the relevant property. Where there is more than one reduction, the percentage reduction for each property shall be added together

to provide a total percentage reduction which shall be applied to the scheduled rate for all Work Items covered by Clause 2.2.

3.2.2 Compaction standard

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

Percentage Reduction = $(C_s – C_a) \times 4$

where:

C_a = the actual characteristic value of compaction, and

C_s = the specified value of compaction.

3.2.3 Surface evenness

The percentage reduction shall be determined from the following formula:

Percentage Reduction = $R_a – R_s$

where:

R_a = the actual road roughness count rate, and

R_s = the specified road roughness count rate as defined in MRTS07C.

3.2.4 Stabilising agent content

The percentage reduction for both the bituminous and secondary stabilising agents shall be determined from the following formula:

Percentage Reduction = $(S – S_a) \times 10$

where:

S_a = the actual stabilising agent content as a percentage calculated in accordance with MRTS07C, and

S = the ordered stabilising agent content as a percentage as defined in MRTS07C.

The calculation shall be made for each stabilising agent that is outside the specified limit. Where the stabilising agent content of more than one stabilising agent is outside the specified limit, a percentage reduction shall be calculated for each stabilising agent and summed to get the total reduction related to stabilising agent content.

3.2.5 Relative moisture ratio

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

Percentage Reduction = $(M_s – M_a)$

where:

M_a = the actual average relative moisture ratio, and

M_s = the specified average relative moisture ratio.

3.3 Application of the reduced value payments

The reduced values shall apply to the lot represented by the tests for the total thickness of the (individual) stabilised layer.

4 Additional payment for a higher standard of surface evenness

4.1 General

If indicated in Clause 2 of Annexure MRS07C.1, an additional payment above the scheduled rate shall be made for the additional benefit of a higher standard of surface evenness on the surface of the final pavement layer as represented by the road roughness count rate. This shall be applied to the scheduled rate for all Work Items covered by Clause 2.1.

4.2 Payment

Any additional payment shall be determined from the formula:

Additional Payment = R x Q x P

where:

R = scheduled rate for the Work Item for the top stabilised layer

Q = compacted quantity in the lot, and

P = $\frac{0.4 \times (R_s - R_a - 5)}{100}$

where:

P = the additional payment factor due to the achievement of a higher standard of surface evenness

R_s = specified road roughness count rate defined in MRTS07C, and

R_a = measured road roughness count rate.

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

4.3 Quantity of pavement to which the additional payment applies

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