

Master Specification

Part RD-PV-C3

In situ Pavement Stabilisation

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RD-PV-C3 In situ Pavement Stabilisation

1 General

- a) This Master Specification Part sets out the requirements for the construction of in situ stabilised pavement and subgrade, including:
- i) the documentation requirements, as set out in section 2;
 - ii) the requirements for trial sections, as set out in section 3;
 - iii) the requirements for spreading of binder, as set out in section 4;
 - iv) the stabilisation requirements, as set out in section 5;
 - v) the requirements for surface finish, as set out in section 6;
 - vi) the testing requirements and frequency, as set out in section 7;
 - vii) the thickness, width, level and tolerance requirements, as set out in section 8;
 - viii) the construction joints and curing requirements, as set out in section 9;
 - ix) the test procedures, as set out in section 10;
 - x) the Hold Point and Witness Point requirements, as set out in section 11; and
 - xi) the verification requirements and records, as set out in section 12.
- b) The construction of in situ pavement stabilisation must comply with the Reference Documents, including:
- i) AS 1289 Methods of testing soils for engineering purposes;
 - ii) AS 1289.1.4.2 Methods of testing soils for engineering purposes, Method 1.4.2: Sampling and preparation of soils - Selection of sampling or test sites - Stratified random number method;
 - iii) AS 1289.2.1.1 Methods of testing soils for engineering purposes, Method 2.1.1: Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (standard method);
 - iv) AS 1289.2.1.4 Methods of testing soils for engineering purposes Soil moisture content tests - Determination of the moisture content of a soil - Microwave-oven drying method (subsidiary method);
 - v) AS 1289.5.2.1 Methods of testing soils for engineering purposes Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using modified compactive effort;
 - vi) AS 1289.5.8.1 Methods of testing soils for engineering purposes Soil compaction and density tests - Determination of field density and field moisture content of a soil using a nuclear surface moisture-Density gauge - Direct transmission mode;
 - vii) Department Test Procedure TP164 Determination of the Dry Density/Moisture Content Relation of a Soil - 3 Point Method (available from: https://dit.sa.gov.au/standards/test_procedures);
 - viii) Department Test Procedure TP226 Sampling of Soil, Aggregates and Rocks (available from: https://dit.sa.gov.au/standards/test_procedures); and
 - ix) Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio (available from: https://dit.sa.gov.au/standards/test_procedures).
- c) For the purpose of this Master Specification Part only, stabilised subgrade is deemed to be pavement.

- d) The pavement must be placed in the configuration specified in Contract Documents. Any additional information regarding the existing materials or pavement or any additional requirements for design or construction of the pavement are included the Contract Documents.

2 Documentation

2.1 Construction Documentation

In addition to the requirements of PC-CN3 “Construction Management”, the Construction Documentation must include:

- a) trial section methodology, as required by section 3b);
- b) the binder spread rate determination, as required by section 4b);
- c) the method of pavement construction, including the method to achieve the specified surface finish, as required by section 6c); and
- d) the method of MDD determination, as required by section 7.2c).

2.2 Quality Management Records

In addition to the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable), the Quality Management Records must include:

- a) daily calculation of average binder content as required by section 4g)i);
- b) daily production records of binder consumed, material mixed and placed as required by section 4g)ii); and
- c) the verification requirements and records, in accordance with section 12.

3 Trial section

- a) The Contractor must demonstrate the suitability of the equipment and method of in situ pavement stabilisation proposed by carrying out the process on a trial section of road.
- b) The Contractor must provide a trial section methodology as part of the Construction Documentation. The trial section must be 1,000 m² and to an agreed depth and width.
- c) The Contractor must provide 24 hours prior notice of the trial which will constitute a **Witness Point**. The trial must not commence until the Contractor has proceeded past the Witness Point.
- d) The completion of the trial and submission of test results demonstrating compliance to this Master Specification Part will constitute a **Hold Point**. Stabilisation works must not commence until this Hold Point has been released.

4 Spreading of binder

- a) The Contractor must ensure that the binder is spread uniformly over the area to be stabilised, using a mechanical spreader specifically designed for such work.
- b) The Contractor must provide details of the proposed method of determining the binder spread rate as part of the Construction Documentation.
- c) The Contractor must ensure that the spreading machine:
 - i) is capable of accurately controlling the spread rate of the binder at the specified rate with a tolerance of -0, +10%; and
 - ii) is be equipped with calibrated on-board measuring devices that allow the spread rate to be calculated for each 50 m linear interval.

- d) Where this Master Specification Part refers to a percentage of binder, the percentage must be determined by weight.
- e) The use of trays over which the spread rate is measured will only be accepted as compliant where they are placed at a frequency not less than 4 in every 100 m continuous run. Where, for any reason, the spreader stops it must be considered to be a new run.
- f) The Contractor must ensure that spreading of binder is not affected by adverse weather and that there are no gaps between spreader runs. Once the binder has been spread, the Contractor must ensure that no plant other than that engaged in the stabilisation operation traffic the prepared pavement until mixed into the underlying material.
- g) The Contractor must maintain records of the:
 - i) daily calculation of average binder content; and
 - ii) daily production records of binder consumed, material mixed and placed,and submit such records as part of the Quality Management Records.

5 Stabilisation

- a) The Contractor must ensure that the in situ pavement stabilisation process incorporates the following steps in a single operation:
 - i) cutting and pulverising any existing pavement (including bituminous seal if applicable);
 - ii) mixing of any additional material placed;
 - iii) concurrent mixing of binder and addition of water (with or without additives); and
 - iv) screeding.
- b) The Contractor must ensure that the stabilising machine:
 - i) is specifically designed to carry out the operation detailed in section 5a);
 - ii) has provision for automatically adding water at a variable controlled rate whilst mixing to bring the material to the moisture content necessary for compaction and to prevent excessively wet areas; and
 - iii) is equipped with a variable depth of cut control with an accurate gauge of depth of cut readily visible to the operator. The depth of cut must have a tolerance of -0, +10%.
- c) The Contractor must ensure that cutting, pulverising and mixing continue until all material (other than rock) passes a 37.5 mm AS sieve and the binders and water (with or without additives) are evenly distributed through the mass to produce a uniform mixture.
- d) Where stabilisation exceeds 250 mm depth, the Contractor must ensure that a minimum of 2 mixing passes are undertaken.
- e) The Contractor must ensure that, during cutting, pulverising and mixing, any stone or portions of seal greater than a nominal 100 mm in size are removed from the pavement and discarded.
- f) Overlapping of runs by the stabilising machine must be a minimum of 100 mm parallel to the direction of travel and a minimum of 300 mm transverse to the direction of travel.
- g) Unless otherwise specified in the Contract Documents, the Contractor must ensure that work undertaken each day is completed across the full pavement width in order to open the road to traffic at the completion of each days' work.
- h) The Contractor must ensure that the surface of compacted stabilised cement layers (greater than 2%) is kept continuously moist for a minimum period of 7 days or until covered by a subsequent pavement layer.

6 Surface finish

- a) The Contractor must ensure that the surface of the stabilised layers is uniformly tight and free of:
 - i) loose uncompacted materials;
 - ii) segregated or “bony” materials;
 - iii) soft, over wet areas; and
 - iv) roller indentations.
- b) Where a spray seal is to be applied, the Contractor must ensure that pavement layers are compacted with a minimum of 6 passes of a class PR22 multi-wheel roller to achieve a uniformly tight surface.
- c) The Contractor must submit details of the method of pavement construction, including the method to achieve the surface finish specified in this section 6, as part of the Construction Documentation.
- d) At the completion of in situ pavement stabilisation and prior to the placement of subsequent pavement layers, including sprayed bituminous surfacing or asphalt treatment, a **Hold Point** will apply. The placement of subsequent pavement layers, including sprayed bituminous surfacing or asphalt treatment must not commence until this Hold Point has been released.

7 Testing requirements and frequency

7.1 Quality standards

- a) Acceptance of the compaction of the stabilised layer will be based on an analysis of a set of random sited tests taken from each Work Lot.
- b) The Contractor must determine the proportion of the Works which will constitute a single Work Lot in accordance with PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable). Compliance will apply to the whole of the Work Lot of the Works from which the set of tests is taken.
- c) Any area which is deemed unsuitable must be excluded from the Work Lot before testing commences. Excluded areas must be rectified prior to testing. If the total of the excluded areas in a Work Lot exceeds 10% of the Work Lot the whole of the Work Lot must be rectified prior to testing.
- d) Unsuitable areas include:
 - i) segregated or “bony” areas;
 - ii) soft and over-wet areas;
 - iii) ravelling and loose material;
 - iv) compaction planes; and
 - v) surface cracking, shoving and ruts.

7.2 Dry density ratio

- a) The stabilised layer must be compacted uniformly to the full depth and over the full width to the following minimum dry density ratios will apply unless specified otherwise in the Contract Documents:
 - i) base and subbase: 96% modified compaction; and
 - ii) subgrade: 93% modified compaction.

- b) The Contractor must determine the dry density ratio of a test sample in accordance with Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio. The Contractor must perform "one for one" MDD testing for each test site.
- c) The Contractor must submit details of the method of MDD determination as part of the Construction Documentation.

7.3 Number and location of sites

- a) The minimum frequency of testing of the stabilised layer must be one test per 400 m² with a minimum of 3 tests per Work Lot.
- b) The location of tests must be selected by the Contractor for each Work Lot on a stratified random basis in accordance with AS 1289.1.4.2 Methods of testing soils for engineering purposes, Method 1.4.2: Sampling and preparation of soils - Selection of sampling or test sites - Stratified random number method.
- c) The number of strata must be equal to the number of tests required for a given Work Lot.

8 Thickness, width, levels and tolerances

Unless specified otherwise in the Contract Documents, the allowable tolerances on the finished levels of each pavement course must be:

- a) if no tolerance on finished subgrade levels has been specified, the tolerance on the compacted surface must be ± 15 mm;
- b) if no tolerance on finished pavement levels has been specified, the tolerance on the compacted layer thickness must be ± 15 mm;
- c) in addition to the tolerances specified, the surface must not deviate by more than 10 mm from a 3 m straight edge laid on the surface; and
- d) the tolerance on overall width must be ± 50 mm.

9 Construction joints and curing

- a) Prior to commencing the next day's work and where the stabilising operation has been halted for any reason for a period exceeding 2 hours, the Contractor must provide construction joints at each discontinuity in the operation.
- b) The Contractor must ensure that longitudinal joints are formed by cutting back into the compacted stabilised material by 100 mm.
- c) The Contractor must ensure that transverse construction joints are formed by cutting back 1 m into the compacted stabilised material.
- d) Unless otherwise stated in the Contract Documents, the Contractor must ensure that the surface of compacted stabilised cement layers (greater than 2%) are kept continuously moist by watering with suitable spraying equipment for a minimum period of 7 days.

10 Test procedures

The Contractor must use the test procedures specified in Table RD-PV-C3 10-1 to verify conformance with this Master Specification Part.

Table RD-PV-C3 10-1 Test procedures

| Test | Test procedure | |
|---|---|---|
| Site selection by stratified random technique | AS 1289.1.4.2 Methods of testing soils for engineering purposes, Method 1.4.2: Sampling and preparation of soils — Selection of sampling or test sites — Stratified random number method | |
| Sampling of soil, aggregates and rocks | Department Test Procedure TP226 Sampling of Soil, Aggregates and Rocks | |
| Field density: Nuclear method | AS 1289.5.8.1 Methods of testing soils for engineering purposes Soil compaction and density tests - Determination of field density and field moisture content of a soil using a nuclear surface moisture-Density gauge - Direct transmission mode | |
| Moisture content: | Oven drying method | AS 1289.2.1.1 Methods of testing soils for engineering purposes, Method 2.1.1: Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (standard method) |
| | Microwave method | AS 1289.2.1.4 Methods of testing soils for engineering purposes Soil moisture content tests - Determination of the moisture content of a soil - Microwave-oven drying method (subsidiary method) |
| Maximum dry density: | Modified compaction | AS 1289.5.2.1 Methods of testing soils for engineering purposes Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using modified compactive effort |
| | Three point method | Department Test Procedure TP164 Determination of the Dry Density/Moisture Content Relation of a Soil - 3 Point Method ⁽¹⁾ |
| Dry density ratio | Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio | |

Table notes:

(1) The 3 point method may be used to provide MDD value in stabilised material.

11 Hold Points and Witness Points

- a) Table RD-PV-C3 11-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.
- b) Table RD-PV-C3 11-2 details the review period or notification period, and type (documentation or construction quality) for each Witness Point referred to in this Master Specification Part.

Table RD-PV-C3 11-1 Hold Points

| Section reference | Hold Point | Documentation or construction quality | Review period or notification period |
|-------------------|--------------------------------|---------------------------------------|--------------------------------------|
| 3d) | Trial section test results | Documentation | 2 Business Days review |
| 6d) | Completion of stabilised layer | Construction quality | 6 hours notification |

Table RD-PV-C3 11-2 Witness Points

| Section reference | Witness Point | Documentation or construction quality | Review period or notification period |
|-------------------|---------------------------------------|---------------------------------------|--------------------------------------|
| 3c) | Notification of commencement of trial | Construction quality | 24 hours notification |

12 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-PV-C3 12-1 have been complied with.

Table RD-PV-C3 12-1 Verification requirements

| Subject | Property | Frequency | Acceptable limits |
|--|--|---|---|
| | Binder content | Refer section 4b), per 50 m linear interval | Refer section 4b), within -0% and +10% of that specified |
| Mixed material properties | Moisture content | One test per calibration curve | a) AS 1289.2.1.1 Methods of testing soils for engineering purposes, Method 2.1.1: Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (standard method); or b) AS 1289.2.1.4 Methods of testing soils for engineering purposes Soil moisture content tests - Determination of the moisture content of a soil - Microwave-oven drying method (subsidiary method) |
| Pavement compaction | Dry density ratio | Refer section 7.3, one test per 400 m ² with a minimum of 3 tests per Work Lot | Refer section 7.2, not less than: a) base and subbase: 96% modified compaction; and b) subgrade: 93% modified compaction. |
| Thickness, widths, levels and tolerances | Thickness, widths, levels and tolerances | No more than 10 m apart longitudinally. As specified in PC-SI1 "Site Surveys" | Refer section 8 |