

Master Specification Part RD-BP-C2

Construction of Foamed Bitumen Stabilised Pavement

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RD-BP-C2 Construction of Foamed Bitumen Stabilised Pavement

1 General

- a) This Master Specification Part specifies the requirements for the construction of insitu and plant mixed foamed bitumen stabilised pavement, including:
 - i) the documentation requirements, as set out in section 2;
 - ii) the materials requirements, as set out in section 3;
 - iii) the constraints to work, as set out in section 4;
 - iv) the plant requirements, as set out in section 5;
 - v) the trial pavement requirements, as set out in section 6;
 - vi) the construction process requirements, as set out in section 7;
 - vii) the curing requirements, as set out in section 8;
 - viii) the surface finish requirements, as set out in section 9;
 - ix) the sampling and testing requirements, as set out in section 10;
 - x) the test procedures, as set out in section 11;
 - xi) the Hold Point and Witness Point requirements, as set out in section 12; and
 - xii) the verification requirements and records, as set out in section 13.
- b) The construction of insitu and plant mixed foamed bitumen stabilised pavement must comply with the Reference Documents, including:
 - i) ADWG6 - Australian Drinking Water Guidelines 6;
 - ii) AS 1289 Methods of testing soils for engineering purposes;
 - iii) AS 3972 General purpose and blended cements;
 - iv) AS 1672.1 Limes and Limestones Part 1: Limes for building;
 - v) Department Test Procedure TP061. Site Selection by Stratified Random Technique;
 - vi) Department Test Procedure TP164 Determination of the Dry Density/Moisture Content Relation of a Soil - 3 Point Method;
 - vii) Department Test Procedure TP166. Assignment of Maximum Dry Density and Optimum Moisture Content Values;
 - viii) Department Test Procedure TP226 Sampling of Soil, Aggregates and Rocks; and
 - ix) Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio;
- c) Pavements must be placed in the configuration specified in the Contract Documents. Any additional information regarding the existing materials or pavement or any additional requirements for design and construction of the pavement are included in the Contract Documents.
- d) For the purpose of this Master Specification Part, “secondary binder” means any non-bituminous binder, such as lime or cement.

2 Documentation

2.1 Construction Documentation

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

- a) detail of any secondary binder to be used;
- b) details of all plant types proposed and method of controlling binder content and moisture content (including methods to ensure uniformity);
- c) procedures for calibration of plant (including frequency);
- d) a procedure for verifying binder content, including evidence of reliability of the procedure;
- e) procedures for material handling, including mixing and control of segregation;
- f) detailed procedures for pavement construction, including sequence of operations, from initial production through final placement, compaction and trim (including stabilisation depth and achieving surface finish where used with a spray seal);
- g) detailed procedures for ceasing operations in the event of rain or strong wind;
- h) methodology to ensure complete stabilisation across the full width of the pavement where there is a change of crossfall or a crown in the road;
- i) a procedure 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;
- j) evidence of compliance with the materials requirements set out in section 3;
- k) a copy of the certificate of calibration for the binder measuring device, as required by section 5.1b); and
- l) trial pavement methodology as required by section 6c).

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) evidence of the quality and age of the binder as required in section 3.2b);
- b) the calibration certificates required in section 5.1d);
- c) the records of work required in section 7.2.1h);
- d) the records of work required in section 7.2.1g);
- e) the record the tonnage of secondary supplementary binder used per Work Lot as required in section 7.2.2h);
- f) the calibration records for the weigh cells within the plant required in section 7.2.3c);
- g) the depth measurement required in section 10.2b);
- h) the results of the compaction testing required in section 10.3f); and
- i) the verification requirements and records required in section 13.

3 Materials

3.1 General

Prior to the incorporation of any material in the Works, the Contractor must provide evidence of compliance with this section 3 as a part of the Construction Documentation.

3.2 Bitumen

- a) Binder must be class 170 bitumen in compliance with RD-BP-S1 "Supply of Bituminous Material".
- b) The Contractor must provide evidence of the quality and age of the binder as part of the Quality Management Records.

3.3 Secondary binders and additives

In relation to secondary binders and additives for the construction of insitu and plant mixed foamed bitumen stabilised pavement:

- a) lime must be hydrated lime conforming to AS 1672.1 Limes and limestones Part 1: Limes for building;
- b) cement must conform to AS 3972 General purpose and blended cements;
- c) supplementary binders must not be older than 3 months from time of manufacture; and
- d) any foaming agents used must not constitute more than 2% of the bitumen by mass.

3.4 Water

- a) The Contractor must source water which is:
 - i) free of any matter that may be deleterious to the pavement, including organic matter, oils, salts, acids and alkalis;
 - ii) not be marine water; and
 - iii) be potable, satisfying the requirements of the ADWG6 - Australian Drinking Water Guidelines 6.
- b) If water is not sourced from a reticulated water supply, the water must be tested for compliance with Table RD-BP-C2 3-1 and the test results provided as part of the Construction Documentation:

Table RD-BP-C2 3-1 Water quality requirements

Property	Test frequency	Test method	Acceptance criteria
pH		APHA 4500-H B or approved equivalent	6 to 10
Electrical conductivity		APHA 2510-B or approved equivalent	<3500 μ S/cm
Sulfate content (expressed as SO ₄)	At periods not exceeding 3 months or whenever the source of water has changed	AS 1289.4.2.1 or other published or validated classical chemistry technique or instrumentation technique (1)	1.9 grams / litre or 0.05%
Undissolved solids		AS 3550.4 or APHA 2540 D or approved equivalent	1% by mass
Concentration of thermo-tolerant coliforms		AS/NZS 4276.7 (for low turbidity water) or AS/NZS 4276.6 (for turbid water)	\leq 1,000 coliforms per 100 ml

- c) Where recycled water is used, the water must:
 - i) comply with the requirements in section 3.4b); and
 - ii) comply with any additional environmental management requirements included in PC-ENV1 “Environmental Management”.

3.5 Granular materials

If additional granular pavement material is required to improve the existing pavement material or to correct levels, this material must be spread (insitu process) or introduced at the rate required (stationary plant-mix process) so as to produce a homogeneously blended mix. The material must comply with RD-PV-S1 “Supply of Pavement Materials”.

3.6 Reclaimed asphalt pavements (RAP)

If RAP is to be used as additional pavement material, it must be:

- a) pulverised asphalt obtained from the profiling of asphalt pavements or by crushing to a graded material with a maximum particle size of 40 mm;
- b) free flowing and capable of uniform spreading and incorporation into the recycled pavement or for addition through the stationary plant-mix; and
- c) spread by the Contractor at the rate or to the levels specified in the mix design or schedule of job details.

4 Constraints to work

4.1 Traffic

- a) The length of Work Lot must be determined to avoid delays to traffic in excess of 10 minutes. Sections of pavement opened to traffic during daylight hours must be monitored by the Contractor. The Contractor must implement appropriate action to ensure that traffic does not damage the freshly stabilised pavement.
- b) Refer to PC-SM1 “Traffic and Pedestrian Management” for other constraints relating to traffic control.

4.2 Sealing

A bituminous wearing course must be placed not later than 7 days after stabilisation.

4.3 Excavation adjacent to retained existing pavement

Excavation adjacent to an existing pavement to be retained must be carried out such that it does not damage the existing pavement.

4.4 Climatic restraints

Stabilisation (including plant-mix operations, spreading, compacting and finishing) must not proceed:

- a) during rain;
- b) during periods when the wind is sufficiently strong to cause particles of the supplementary binder to become air-borne, unless effective mitigation procedures are adopted;
- c) during conditions that may cause nuisance or danger to people, property or the environment;
- d) when the temperature (measured at a depth of 50 mm in the pavement for insitu work) is below 10°C; or
- e) when the air temperature measured in the shade exceeds 40°C.

5 Plant

5.1 General

- a) The insitu stabiliser or plant-mix mixer must have:
 - i) bitumen temperature gauges to verify bitumen temperature;
 - ii) a computer controlled bitumen flow meter for verification of bitumen content;
 - iii) an inspection or test jet fitted to ensure the flow of bitumen and that the required expansion and half-life qualities of the bitumen are being achieved; and
 - iv) self-cleansing bitumen jets.
- b) The Contractor must provide a copy of the certificate of calibration for the binder measuring device (for both insitu and plant-mix operations) as a part of the Construction Documentation.
- c) The certificate of calibration required in section 5.1b) must be valid at the time of insitu stabiliser or plant-mixer operation. Where the certificate is not valid, a valid certificate must be obtained and submitted to the Principal, which will constitute a **Hold Point**. The operation of the insitu stabiliser or plant-mixer must not commence until this Hold Point has been released.
- d) The calibration certificates required in sections 5.1b) and 5.1c) must be submitted as part of the Quality Management Records.

5.2 Insitu stabilisation

The insitu stabiliser must as a minimum be a single-rotor mix-in-place plant of a type (i.e. plant that mixes in-situ) specifically designed for the dual task of reclamation and stabilisation work with the following characteristics:

- a) minimum power capacity of 315 kW and not less than 155 kW/m of the drum width;
- b) capable of mixing to the specified depth;
- c) purpose built foamed bitumen spray bar located inside the mixing chamber of the stabiliser or stabiliser / reclaimer;
- d) bitumen injection systems linked to the ground speed to ensure an accurate application of foamed bitumen throughout a run irrespective of the speed of the plant;
- e) inspection or test jet to ensure uniform flow of bitumen and that the required expansion ratio and half-life of the foamed bitumen are being achieved;
- f) self-cleaning bitumen jets;
- g) bitumen foaming jets can be shut off individually for partial reclaimer width stabilisation;
- h) bitumen temperature gauges to verify bitumen temperature;
- i) bitumen injection bar and supply lines equipped with a heating system to maintain the bitumen temperature.
- j) capable of supplying both water and additive such that incorporation rates can be varied across the full width of the stabilising box and incrementally across the box;
- k) computer controlled bitumen flow meter for verification of applied additive content;
- l) calibrated and capable of spreading varying widths; and
- m) an inspection or test jet fitted to allow for sampling.

5.3 Plant-mix

The plant-mix mixer must:

- a) be purpose built for the process of producing foamed bitumen stabilised road making materials, and be maintained and calibrated so as to provide a uniformly mixed product without segregation of the aggregate material;
- b) have a fully computerised control system associated with weigh-cells on the variable feed rate for constituent materials, with read out meters to allow continuous monitoring and control of bitumen, supplementary binder, foaming water, added moisture and other additives (e.g. wetting agents or dispersants). This monitoring at the operation control station is recorded by percentage by weight of pavement material; and
- c) have a minimum continuous production capacity of 100 t/hr.

5.4 Compaction equipment

Compaction must be undertaken with the following minimum equipment requirements:

- a) a vibrating padfoot roller of a minimum mass of 18 t for compacting thicknesses of up to 200 mm, and a minimum mass of 21 t for compacting thicknesses of up to 300 mm;
- b) a vibrating smooth drum roller with a minimum mass of 18 t; or
- c) a multi-tyre roller with a minimum mass of 12 t.

6 Trial pavement

- a) At least 14 days prior to the commencement of the foamed bitumen stabilised works the Contractor must undertake a trial pavement which demonstrates:
 - i) effectiveness of the construction plant;
 - ii) effectiveness of spreading lime and slaking of quicklime, and mixing to the required depth;
 - iii) number of passes of the stabilisation machine necessary to achieve uniform pulverisation and mixing or the combined work of a profiler and stabilisation machine to achieve the specified requirements;
 - iv) field moisture content required to achieve specified compaction requirements;
 - v) effectiveness of bitumen foaming process with the bitumen supplied by tanker and tested using the inspection jet;
 - vi) visual observation of the full depth of the mixed material to ensure no bitumen streaks and uniform incorporation of the foamed bitumen and supplementary binder;
 - vii) jointing of the mixing runs;
 - viii) the rolling routine required to meet specified compaction requirements; and
 - ix) preliminary and final trimming of the surface to the specified levels and tolerances.
- b) The requirements of section 6a) must be demonstrated by the Contractor either by:
 - i) constructing a trial pavement; or
 - ii) providing documented evidence from a previous project using the same plant, materials and construction methodology.
- c) Details of how the Contractor will verify compliance with section 6a) and 6b) must be provided in the relevant Construction Documentation.
- d) Any trial pavement must be located within the works area and must be between 50 and 100 m in length over the full width proposed to be stabilised.
- e) The Contractor must provide 7 days' prior notice of the construction of a trial pavement which will constitute a **Witness Point**. The trial pavement must not be constructed until the Contractor has proceeded past the Witness Point.

- f) Test results from the trial pavement or evidence from a previous project required by section 6b) will constitute a **Hold Point**. Construction of the foamed bitumen stabilised pavement forming the permanent Works (excluding the trial pavement) must not commence until this **Hold Point** has been released.

7 Construction process

7.1 Initial preparation and milling

- a) For insitu stabilisation, the pavement must firstly be pulverised to 50 mm above the depth to be stabilised. If thick in-fill layers of asphalt are present, the Contractor must mill the asphalt and evenly spread the milled asphalt onto the surface of the existing pavement to avoid creating discontinuities in the stabilised pavement.
- b) Additional material required for shape correction must be added after the preliminary pulverisation. It must be spread onto the surface to a shape suitable for stabilisation and compacted and trimmed to the alignment, heights and shapes in accordance with the Contract Documents.
- c) Prior to spreading the secondary binder, the existing surface must be shaped, compacted and trimmed to the required shape to a degree that is sufficient to facilitate stabilisation, compaction and trimming to the alignment, heights and shapes in accordance with the Contract Documents.

7.2 Mixing and placement

7.2.1 General

- a) Mixing uniformity must be continuously inspected visually by the Contractor and work must stop when bitumen streaks or blotches are observed and resolve the issue and rework the defective areas before recommencing work.
- b) The resultant material must have no lenses, pockets, lumps or granules of either incompletely mixed material, or incompletely mixed stabilising agent.
- c) The sprayed bitumen must exhibit a minimum expansion ratio of 10 and a half-life of 20 seconds at the time of incorporation.
- d) The bitumen must be sprayed at a temperature of between 170°C and 190°C. The expansion ratio and half-life of every tanker load of bitumen must be checked using the inspection nozzle on-board the mixing chamber.
- e) The bituminous binder must not be incorporated into the pavement material where the foaming properties of the bitumen load supplied is less than that specified in section 7.2.1c).
- f) The construction tolerance for the application rate for the binder and secondary binder is -0% and +10% of the values as per the Contract Documents.
- g) The Contractor must complete daily record sheets, which must then be certified correct by the Contractor and submitted as part of the Quality Management Records at the completion of each day in which foam bitumen stabilised pavement has been constructed.
- h) Details of all materials applied must be recorded immediately after completion of each activity and included as part of the Quality Management Records at the completion of each day in which foam bitumen stabilised pavement has been applied.

7.2.2 Insitu stabilisation

- a) Where insitu stabilisation is used, the mixing of the binder and the mixing of the supplementary binder must be undertaken in 2 separate passes and the pulverised material must be stabilised to the depth specified.

- b) Cutting, pulverising and mixing must continue until all material passes a 37.5 mm AS sieve and the lime, water, and foamed bitumen are evenly distributed through the mass to produce a mixture of unchanging appearance.
- c) The stabilisation machine must be equipped with a variable depth of cut control and an accurate gauge of depth of cut readily visible to the operator. Stabilisation work undertaken each day must be to the full width of the lane.
- d) Bituminous binders must be uniformly incorporated by a controlled device that provides calibration to the application rate of bitumen.
- e) The mixing chamber must be equipped with a spray system to allow variable widths of binder to be incorporated into the pavement material.
- f) Supplementary binders must be uniformly spread with the use of a spreader equipped with calibrated electronic load cells to ensure that a controlled mass is spread across the pavement.
- g) The spreader must be fitted with calibrated load cells and be capable of accurately regulating the discharge of the supplementary binder at various widths.
- h) The Contractor must record the tonnage of secondary binder used per run and mat or tray results at regular (at least daily) intervals and provide as part of the Quality Management Records. Once the secondary binder has been spread, the only traffic that may travel over the area to be stabilised must be construction plant employed for the stabilisation work.
- i) The stabilising equipment must have provision for adding water to the mixture automatically at a variable controlled rate to bring the material to the moisture content necessary to achieve compaction. The equipment must be capable of including other additives (e.g. wetting agents of dispersants).

7.2.3 Plant - mix stabilisation

- a) Where a plant mix is used, the binder must be uniformly incorporated by a controlled device that provides calibration to the application rate of bitumen. The inspection nozzle must be used to verify the foaming characteristics for every bitumen tanker load.
- b) Application rate checks / reconciliation measured in kilograms per tonne of product must be monitored and recorded for every 100 t of production, via the on-board weigh-cell computerised accumulator system.
- c) Regular calibration of all weigh cells within the plant must be undertaken and recorded, in line with the manufacturer's instructions. The Contractor must provide a copy of the calibration records for the weigh cells within the plant as a part of the Quality Management Records.
- d) The material produced by the stationary plant-mix must be transferred and spread in one concurrent operation, and after compaction, the finished surface levels on the base (or subbase) courses must be within the specified tolerances stated in the Contract Documents without subsequent addition of material.
- e) The mix is to be placed without visual signs of segregation and any such areas are to be removed and replaced with fresh mix.

7.3 Initial compaction and trimming

- a) Immediately after stabilisation, the stabilised area must be initially compacted to eliminate the height differential between the bulked stabilised material and any wheel ruts left by the stabiliser in the stabilised layer. This may be achieved with 2 passes of a vibrating roller immediately after the completion of stabilisation.
- b) After the initial compaction and before final compaction commences, the surface must be trimmed to approximately the alignment, heights and shapes as per the Contract Documents for the completed work.
- c) Any depressions must be filled with excess, complying, mixed (stabilised) material that is placed and compacted within 3 hours of bituminous stabilisation.

7.4 Trimming after final compaction

- a) After final trimming, the surface must be free from loose pockets, holes, bumps, lenses of material and marks caused by a pad foot roller.
- b) Final trimming must be carried out as soon as practicable after the rollers have completed the compaction of the pavement.
- c) All trimming must be cut to waste and the material disposed of. Any treatment necessary to rectify localised depressions and rises must be:
 - i) subject to prior approval; and
 - ii) treated as a Non-Conformance and the Contractor must issue a Non-Conformance Notice and Non-Conformance Report in accordance with PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable).

7.5 Joints

7.5.1 General

- a) Prior to commencing the next day's work, and where the stabilisation operation, including compaction, has been halted for any reason for a period exceeding 4 hrs, the Contractor must provide construction joints at each discontinuity in the operation.
- b) Where necessary for traffic safety, the Contractor must temporarily ramp longitudinal and transverse joints. Temporary ramping must be formed with hot asphalt or premix such that the slope of the ramp is not less than 10 horizontal : 1 vertical. Ramps must be removed prior to the application of the primer seal, spray seal or asphalt surfacing.
- c) A construction joint is be deemed to be fresh when the material on each side of the joint has been placed and compacted within 4 hrs.

7.5.2 Longitudinal joints

- a) Longitudinal joints must not be located in the wheel paths. Where a fresh longitudinal joint between adjacent runs is to be compacted, the outside 300 mm of material from the first run must be left uncompacted until the adjacent material is ready for compaction.
- b) Overlaps of joints that are not fresh must not be less than 75 mm and not greater than 150 mm. The overlap of stabilising agent of all longitudinal joints must not exceed 150 mm.

7.5.3 Transverse joints

- a) Where transverse joints are not made within 4 hours, the adjoining section previously stabilised must be cut back by at least 1.5 m. The cutback material must be removed and disposed of, with all replacement material being constructed in full compliance with this Master Specification Part.
- b) For the insitu process, after this material has been replaced with complying material, the secondary binder must be spread over the 1.5 m cutback length and it must be included in the stabilisation process of the adjoining section to be stabilised.

8 Curing

- a) The water curing operation must commence immediately after the completion of compaction. Water curing is generally used for foamed bitumen stabilised pavements prior to the bituminous curing coat being applied.
- b) The stabilised layer surface and edges must be maintained in a slightly damp condition, via an occasional application of uniformly applied fine mist, until the layer is sealed with a bituminous wearing course.

- c) Water must be applied in a manner such that slurring of the surface, pavement instability and erosion or flushing of the pavement surface are all avoided.
- d) The stabilised layer must 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.
- e) The surface of the stabilised layer must be kept moist, in good order, in good condition and free from contamination. Construction and other traffic must not traverse the stabilised layer where damage to the surface may occur.

9 Surface finish

- a) The surface of the pavement layers must be uniformly tight and free of loose uncompacted material, segregated or 'bony' material or soft, over wet areas and free of roller indentations.
- b) Where a spray seal is to be used on a foam bitumen base course, the Contractor must include in the procedures for the placement of base, a minimum of 6 passes with a class PR22 multi-wheel roller to achieve a uniformly tight surface.
- c) The surface level of the stabilised base must not vary by more than 5 mm in any direction when tested with a 3 m straight edge. The crossfall must not depart from the corresponding crossfall shown in the documents by more than 0.5% absolute.
- d) The finished wearing course and any lower layers constructed must have a smooth transverse and longitudinal profile. RD-BP-D4 "Surface Characteristics of Flexible Pavements" roughness and other surface characteristic requirements, as appropriate for the wearing course type (sprayed seal or asphalt), must be applied to the finished works.
- e) Where a detailed geometric model is not available the crossfall must be measured:
 - i) 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 must be made between the extreme edges of the pavement verge on each side of the pavement;
 - ii) transverse to the centre line of the carriageway; and
 - iii) within the boundaries of a cross-section element which has a constant crossfall.
- f) The Contractor must maintain the stabilised layer during curing and until it has been overlaid with another pavement layer or surfaced with the final wearing course.

10 Sampling and testing

10.1 Work Lots

- a) Acceptance of the quality of the stabilised layer must 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 that 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, including:
 - i) segregated or "bony" areas;
 - ii) soft, over-wet or "fatty" areas;
 - iii) ravelling and loose material; compaction planes; or
 - iv) surface cracking, shoving and ruts.

10.2 Depth

- a) The depth of stabilisation must be verified by measuring the depth of the cutting (insitu) or placed material (plant-mix) adjacent to an existing pavement material in at least two locations within the Work Lot and measured to the nearest 5 mm for conformation against the requirements of Contract Documents.
- b) The depth measurement required in section 10.2a) must be recorded and provided as part of the Quality Management Records, which will constitute a **Hold Point**. The placement of any overlying layer must not proceed until this Hold Point is released.

10.3 Compaction

- a) Stabilised pavement layers must be compacted uniformly to the full depth and over the full width. Unless otherwise stated in Contract Documents, compaction must not be less than that specified in Table RD-BP-C2 11-1.
- b) The location of the tests must be on a stratified random basis in accordance with Department Test Procedure TP061 Site Selection by Stratified Random Technique. Acceptance must be based on discrete results. Where a result fails, the stratum represented by that result must be treated as a Non-Conformance and the Contractor must issue a Non-Conformance Notice and Non-Conformance Report in accordance with PC-QA1 "Quality Management Requirements" or PC-QA2 "Quality Management Requirements for Major Projects" (as applicable).
- c) Laboratory compaction testing must be performed on a "one to one" basis with the field density testing unless it can be demonstrated that an assigned maximum dry density can be consistently established in accordance with Department Test Procedure TP166 Assignment of Maximum Dry Density and Optimum Moisture Content Values.
- d) Sampling sites must be determined by the stratified random method and the MDD bulk samples removed and the compaction points completed within an hour and a half of the binder being applied.
- e) The field compaction test must be performed at the same location that the related laboratory compaction sample was derived.
- f) The results of the compaction testing required in this section 10.3 must be recorded and provided as part of the Quality Management Records, which will constitute a **Hold Point**. The relevant cutting or placed material must not be covered until this Hold Point has been released.

11 Test procedures

The Contractor must use the test procedures specified in Table RD-BP-C2 11-1 (refer https://www.dpti.sa.gov.au/contractor_documents) to verify conformance with this Master Specification Part:

Table RD-BP-C2 11-1 Test procedures

Test	Test procedure
Site selection by stratified random technique	Department Test Procedure TP061 Site Selection by Stratified Random Technique
Sampling of soil, aggregates and rocks	Department Test Procedure TP226 Sampling of Soil, Aggregates and Rocks
Preparation of samples	AS 1289.1.1 Methods of testing soils for engineering purpose
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)

Test	Test procedure
Microwave method	AS 1289.2.1.4 Methods of testing soils for engineering purposes, Method 2.1.4: Soil moisture content tests - Determination of the moisture content of a soil - Microwave-oven drying method (subsidiary method)
Sand replacement method	AS 1289.5.3.1 Methods of testing soils for engineering purposes, Method 5.3.1: Soil compaction and density tests - Determination of the field density of a soil - Sand replacement method using a sand-cone pouring apparatus
Field density:	
Nuclear method	AS 1289.5.8.1 Methods of testing soils for engineering purposes, Method 5.8.1: 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
Determination of the dry density / moisture content relation of a soil - 3 point method	Department Test Procedure TP164 Determination of the Dry Density/Moisture Content Relation of a Soil - 3 Point Method
Assignment of maximum dry density and optimum moisture content values	Department Test Procedure TP166 Assignment of Maximum Dry Density and Optimum Moisture Content Values
Compaction control test - dry density ratio and moisture ratio	Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio

12 Hold Points and Witness Points

- a) Table RD-BP-C2 12-1 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-BP-C2 12-2 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-BP-C2 12-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
5.1c)	Valid certificate of calibration for the binder measuring device	Documentation	24 hours review
6f)	Test results from the trial pavement or evidence from a previous project required by section 6b)	Documentation	24 hours review
10.2b)	Stabilised layer depth measurement	Documentation	24 hours review
10.3f)	Compaction testing results	Documentation	24 hours review

Table RD-BP-C2 12-2 Witness Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
6e)	Notification of construction of trial pavement	Construction quality	7 days notification

13 Verification requirements and records

13.1 Test records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-BP-C2 13-1 have been complied with.

Table RD-BP-C2 13-1 Test records

Section reference	Subject	Property	Test procedure	Test frequency	Acceptance limits
7	Pavement material properties	Insitu work: binder application rate	Determined by "on-board" measuring devices	each 100 m linear interval	within $\pm 10\%$ of that specified
		Plant mix : binder application rate	Determined by calibrated plant measuring devices	each continuous production run or 100 to of pavement material	within $\pm 10\%$ of that specified
9	Ride quality	NAASRA roughness counts	Refer RD-BP-D4 "Surface Characteristics of Flexible Pavements"	Refer RD-BP-D4 "Surface Characteristics of Flexible Pavements"	Refer Contract Documents
11	Pavement construction	Dry density ratio	Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio	1 test per 400 m ² per layer with a minimum of 3 tests per Work Lot.	not less than 96%
11	Pavement construction	Stabilisation depth	Direct measurement	2 locations per Work Lot	Refer Contract Documents

13.2 Other records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-BP-C2 13-2 have been complied with.

Table RD-BP-C2 13-2 Other records

Section reference	Subject	Record to be provided
7.2.1g)	Daily record of work	<p>Details of each days' work, including quantities on materials used, including:</p> <ul style="list-style-type: none"> a) records of tanker dipping's for runs or plant use; b) binder temperature records; c) records of weighing / measuring cell readouts; d) records of mat / tray spread rate assessment; e) binder and secondary binder rate calculations; and f) assumptions made in determining application rates.