

TRANSPORT FOR NSW (TfNSW)

QA SPECIFICATION R73

CONSTRUCTION OF PLANT MIXED HEAVILY BOUND PAVEMENT COURSE

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1/Rev 0		First issued.	GM, RNIC	14.10.02
Ed 1/Rev 1	1.2 3.1, 4.2, 4.3, 4.4, 4.6, Annex 2, Annex 3 3.2.3.1, 3.2.3.2 4.1 Annex 4	References updated. Reference to RTA 3052 replaced by RTA 3051. References to RTA 3053, RTA 3054 replaced by RTA 3211. Reference to RTA R1 replaced by RTA G38. Reference to RTA R2 replaced by RTA G39. Reference document for identified records updated.	GM, IC	11.10.10
Ed 2/Rev 0	Global Guide Notes 1.3.1, 4.1 2.1 3.1	New edition. Title of specification changed. Clauses rearranged and reworded to improve clarity. New clause headings added. “Superintendent” changed to “Principal”. Technical Reference Notes section in Guide Notes deleted. Test Method for determining Working Times for maximum dry density and for unconfined compressive strength updated to T147. MTBB to comply with spec 3051. Binders to comply with spec 3211.	GM, IC (M Andrew)	11.11.11

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 2/Rev 0 (cont'd)	3.3	New clause on retarders added.		
	4.1 (d)	Minimum binder application rate of 4% specified.		
	5.3.2	New Hold Point on procedures and control of site blending of MTBB.		
	6.4,	New clause on placement in multiple layers.		
	6.5	Requirements added for placing by paver without automated level control (where approved by Principal).		
	7.1	Requirements on survey staff (or reflector) used in survey added.		
	8.2	New clause on verifying integrity of pavement course placed in more than one layer.		
	8.4	Previous clause 7.4.1 on progressive compaction assessment and associated Hold Point deleted.		
	8.4.1, 8.4.3	New subclauses on determining insitu density and relative compaction values for pavement course placed in more than one layer.		
	8.5	Layer thickness tolerances introduced for pavement course placed or trimmed by plant without automatic level control.		
	8.11	Previous clause prohibiting reworking of rejected Lots deleted.		
	Annex B2	Equivalent IRI _s to NAASRA roughness counts added to Table B.3 on incentives and deductions for ride quality.		
	Annex B1	Previous Pay Item P2 for prime or primer seal deleted (to be paid under the relevant prime or primer seal specs).		
Ed 2/Rev 1	2.3, 5.1	MTBB delivery requirement broadened from “certified stockpiles” to all sources.	GM, IC (M Andrew)	09.12.11
	5.6	Requirements for delivery vehicles elaborated to conform to those in Clause 5.1.		
	6.8	Clarification that final trimming is recommended to start within allowable Working Time but must be completed within nominated Working Time.		
	8.4.1	Requirements covered in Test Method T173 deleted.		
	Annex B2.2.2	“less than or equal to 95.0%” changed to “less than 95.0%”.		

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 2/Rev 1 (cont'd)	Annex L	Clause 8.4.4 - minimum frequency of testing for field moisture content amended to accord with that in Specification Q for relative compaction.		
Ed 2/Rev 2	2.3	Requirement for site stockpiles to be certified added.	GM, IC (M Andrew)	16.02.12
Ed 2/Rev 3	2.4, 5.1 3.1 3.1.3, 5.2	Content from previous clause 5.1 moved to new sub-clause 2.4. Headings inserted to form new sub-clauses 3.1.1 and 3.1.2. Content from previous clause 5.2 moved to new sub-clause 3.1.3. Clauses following previous clauses 5.1 and 5.2 renumbered.	GM, IC B Chelling'h	11.01.13
Ed 3/Rev 0	Global Guide Notes 1.1 2.1 2.3 (g) 3.1.3 4.2, 4.3 5 5.1 5.2 5.5 6 6.3 6.3.1 6.3.2	Clauses rearranged and reworded to improve clarity. Guide Notes deleted. Scope reworded. Heading title changed. Clause on stockpiles in context of sampling and testing reworded to improve clarity. Clause on delivery of binder reworded to improve clarity. Term used for approved mixed design clarified. Heading title changed. Previously sub-clause 5.1.1. Previously sub-clause 5.1.2. Subsequent clauses renumbered. Heading title changed. Headings added to form sub-clauses 5.5.1 to 5.5.3. Individual sub-clauses rearranged. Previous clause 6.3 "Trial Pavement" moved to become clause 6.9. Previously clause 6.4; heading title changed. Headings added to form sub-clauses 6.3.1 to 6.3.3. Clarified that pavement course up to 250 mm thick must be placed as one layer. Conditions for placing in two layers clarified.	GM, CPS	25.06.15

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 3/Rev 0 (cont'd)	6.3.3	Submission details for placing in two layers expanded. Hold Point for placing in two layers added.		
	6.4	Previously clause 6.5. Headings added to form sub-clauses 6.4.1 to 6.4.3.		
	6.4.3	Clause on thickness tolerances and required adjustments to finished surface levels of underlying layer reworded to improve clarity.		
	6.5	Previously clause 6.7.		
	6.6.2	Requirement for compaction at joints clarified.		
	6.6.6	New sub-clause incorporating clauses from previous clause 6.6.4.		
	6.7	Previously clause 6.8. Headings added to form sub-clauses 6.7.1 to 6.7.4.		
	6.9	Previously clause 6.3. Headings added to form sub-clauses 6.9.1 to 6.9.3.		
	6.10	Headings added to form sub-clauses 6.10.1 to 6.10.3.		
	6.10.1	Word "scouring" added.		
	6.10.3	Temporary roadways or detours to be in accordance with spec G10.		
	7.2	Headings added to form sub-clauses 7.2.1 to 7.2.3.		
	8.3	Clause on sampling for UCS reworded to improve clarity.		
	8.4.1	Clause on insitu density measurement reworded to improve clarity.		
	8.4.3	Criteria for compaction conformity for pavement course placed in two layers rewritten to improve clarity.		
	8.8, Annex B2	Terminology for ride quality corrected.		
	8.11	Headings added to form sub-clauses 8.11.1 to 8.11.3.		
	8.11.4	New sub-clause, moved here from Annex B2.		
	Annex A	Tables reorganised and consolidated. Additional guidance notes for the Tender Documenter added.		
	Annex B2	Heading title changed.		
Annex C, D	Tables on applicable deductions reorganised. Schedules amended.			

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 3/Rev 1	1.3.1 4.1	Definition of <i>grave laitier</i> amended to comprise 15% slag. Mix design requirement regarding binder application rate expanded to include that for <i>grave laitier</i> .	MCQ	25.08.17
Ed 3/Rev 2	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20



CONSTRUCTION OF PLANT MIXED HEAVILY BOUND PAVEMENT COURSE

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VERSION FOR: DATE:

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FOREWORD

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REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW R73 Edition 3 Revision 1.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

- (a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.
- (b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.

TfNSW QA SPECIFICATION R73

CONSTRUCTION OF PLANT MIXED HEAVILY BOUND PAVEMENT COURSE

1 GENERAL

1.1 SCOPE

This Specification sets out the requirements for:

- (a) supply (including mix design) and delivery of pavement material incorporating a slow setting binder and premixed in a stationary mixing plant;
- (b) placing, spreading, compacting, trimming and curing of the heavily bound pavement course;
- (c) construction of a trial section of pavement, where specified.

This specification is for use for construction of heavily bound pavement courses up to 250 mm thick, placed as a single layer.

For thicker pavement courses, only bound material comprising Material To Be Bound that is self-cementing can be considered for placement in two layers and requires the Principal's pre-approval.

1.2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

1.2.1 Project Specific Requirements

Project specific details of work are given in Annexure R73/A.

1.2.2 Measurement and Payment and Resolution of Nonconformities

The method of measurement and payment is detailed in Annexure R73/B.

Acceptance of materials and work must be in accordance with Annexure R73/B.

1.2.3 Schedules of HOLD POINTS, WITNESS POINTS and Identified Records

The schedules in Annexure R73/C list the **HOLD POINTS** and **WITNESS POINTS** that must be observed. Refer to Specification TfNSW Q for the definitions of **HOLD POINTS** and **WITNESS POINTS**.

The records listed in Annexure R73/C are **Identified Records** for the purposes of TfNSW Q Annexure Q/E.

1.2.4 Planning Documents

The PROJECT QUALITY PLAN must include each of the documents and requirements listed in Annexure R73/D and must be implemented.

1.2.5 Frequency of Testing

Nominate in the Inspection and Test Plan the proposed testing frequency to verify conformity of the work, which must not be less than the frequency specified in Annexure R73/L. Where a minimum frequency is not specified, nominate an appropriate frequency.

1.2.6 Referenced Documents

Unless specified otherwise, the applicable issue of a referenced document, other than a TfNSW Specification, is the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 1234). For convenience, the full titles are given in Annexure R73/M.

1.3 DEFINITIONS AND ACRONYMS

1.3.1 Definitions

The terms “you” and “your” mean “the Contractor” and “the Contractor’s” respectively.

The following definitions apply to this Specification:

Allowable Working Time	The lesser of the Nominated Working Time and 8 hours.
Binder	For the purpose of this Specification, a hydraulic stabilising agent, such as lime, cement or ground granulated blast furnace slag used singly or in combination, to which may be added pozzolanic materials such as fly ash or other additives and which sets when mixed with pavement materials and water.
Bound material	A material with significant tensile strength produced from Material To Be Bound mixed with a binder. Bound material is also referred to as stabilised material.
Final trimming	Trimming to achieve the finished surface level and surface evenness prior to sealing.
Fresh joint	A joint between adjacent runs where the stabilised pavement material of each run has been placed and compacted within the Nominated Working Time of the first placed run.
Granulated blast furnace slag	Glassy granular sand sized material resulting from the rapid chilling of molten iron blast furnace slag.
Grave laitier	A material containing at least 15% by mass of granulated blast furnace slag combined with a binder at an application rate of at least 2% by dry mass of pavement material.
Heavily bound material	Bound material with sufficient binder to develop an unconfined compressive strength equal to or greater than that specified in Clause 4.1.

Joint	A plane formed in the bound pavement course between different materials, or materials constructed by different construction methods, or materials with different batching times, or materials with different placement times.
Material To Be Bound (MTBB)	The material prior to stabilisation with a binder.
Nominated Working Time	The lesser of the Working Times determined with respect to maximum dry density and with respect to unconfined compressive strength, in accordance with Test Method TfNSW T147.
Pavement course	A pavement course consists of uniform material with uniform structural properties. May be applied to subbase, base and wearing courses.
Run	An area of pavement within a Lot that is placed continuously (without stopping the plant). The dimensions of a run are: <ul style="list-style-type: none">• continuous longitudinal length, and• output width from the equipment.
Slow setting binder	A binder which, when mixed with the MTBB, creates a mix with a Nominated Working Time of at least 6 hours.
Self-cementing material	A material which, following compaction, gains tensile strength slowly with time without the addition of binder(s).
Target moisture content envelope	The range of moisture content (on the dry side of the optimum moisture content) determined for compaction.

1.3.2 Acronyms

IRI_s	International roughness index of a section as defined in Test Method TfNSW T188
NATA	National Association of Testing Authorities, Australia
UCS	Unconfined compressive strength

2 MATERIAL TO BE BOUND

2.1 GENERAL

Material To Be Bound (MTBB) for use in the Works must comply with the requirements of Specification TfNSW 3051.

2.2 CERTIFIED STOCKPILES

Stockpiles of MTBB that have been tested and shown to conform to the requirements of Specification TfNSW 3051 are designated as Certified Stockpiles.

Prior to the release of MTBB from a Certified Stockpile, provide the Principal with a signed statement certifying that the material from the Certified Stockpile meets the requirements of this Specification

and the relevant properties stated in TfNSW 3051. Include NATA endorsed test results with the statement. Indicate clearly in the statement the quantity of material represented by the test results.

HOLD POINT

Process Held:	Deliveries of MTBB from a Certified Stockpile.
Submission Details:	Details of the stockpile, statement of conformity and documentation specified in TfNSW 3051 regarding conformity.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

Once a stockpile has been certified, do not add any further material to the stockpile until the additional material has been tested and shown to conform to this Specification. Provide the Principal with test certificates verifying the conformity of all such additional material.

MTBB supplied from Certified Stockpiles will generally not require any further testing.

If subsequent inspection and/or testing of the material at the stockpile or at the point of delivery indicate that the properties of the material have changed since certification, for example, due to segregation, contamination or weathering, the Principal will stop further deliveries of the material, and require further sampling and testing of the stockpile. The conformity or otherwise of the material will be reassessed, on the basis of these test results.

Each delivery docket must identify the Certified Stockpile from which the material is supplied.

2.3 SITE STOCKPILES

Delivery of MTBB to site stockpiles must comply with the requirements of Clause 2.4. If the material has not been sourced from a Certified Stockpile, the site stockpile must be certified in accordance with Clause 2.2 prior to using the material.

Place the site stockpiles of MTBB only at the locations shown on the Drawings or approved by the Principal.

You are responsible for preparation of the stockpile sites, unless otherwise specified in Annexure R73/A.

When stockpiling MTBB on site, comply with the following:

- (a) Place stockpiles on firm, even, well-drained ground or over a constructed floor.
- (b) Install and maintain around the stockpiles appropriate erosion and sedimentation controls in accordance with Specification TfNSW G38 for the duration of the Contract.
- (c) Construct stockpiles in a manner which does not result in segregation. Place the material in horizontal layers, with each new additional layer fully within the boundary of the underlying layer. Do not push the stockpile into a cone shape. Stockpiles must be of uniform shape with side slopes neither steeper than 1.5 horizontal to 1 vertical, nor flatter than 3 horizontal to 1 vertical.

The total height of any stockpile must not exceed 4 m, unless otherwise approved by the Principal.

- (d) The worked face of any stockpile must be the full face of the stockpile.
- (e) Keep the stockpile material sufficiently damp to avoid loss of fines and to keep dust levels down.
- (f) Keep the stockpiles separated from each other and maintain them to prevent the stockpiled materials from becoming intermixed, or contaminated with foreign material.
- (g) In the context of sampling and testing, the stockpile may be constructed in either one of the following two ways:
 - (i) the stockpile is built up continuously until it is complete, and once complete, no further material is added to the stockpile, with each stockpile constituting a separate Lot;
 - or
 - (ii) the stockpile is built up incrementally, and any further material added to the stockpile previously verified as conforming is considered to be a new Lot, with the new material first tested and verified as conforming before it is added to the stockpile.
- (h) Clearly and uniquely identify each stockpile by signposting, stating the type and quantity of material present in the stockpile. For the purposes of this Specification, the maximum Lot size for Certified Stockpiles is 4,000 tonnes.
- (i) On completion of Works, clear the stockpile locations of all surplus material and re-vegetate the area in accordance with Specification TfNSW R178.

Include in the PROJECT QUALITY PLAN details of procedures for the construction, operation and restoration of stockpile sites, and measures to be taken to meet the requirements of this Clause.

2.4 DELIVERY OF MATERIAL TO BE BOUND

Transport MTBB in vehicles which are so constructed that loss of material does not occur. The delivery vehicles used must be suitable for the ground conditions at the Site.

The material must be kept suitably damp to prevent segregation or loss of fines during transit and must, at the time of delivery, have a moisture content (uniformly distributed) not greater than the optimum moisture content as determined by either Test Method TfNSW T111 or T162.

MTBB delivered to the Site which is unsuitable for reasons such as segregation or contamination is considered to be nonconforming and must not be used in the Works.

Include in the PROJECT QUALITY PLAN the methods for preventing segregation and/or loss of fines during transport.

3 OTHER MATERIALS

3.1 BINDERS

3.1.1 General

Use only the binder(s) stated in the approved nominated mix design for the Works.

Binders, including blended binders, must comply with the requirements of Specification TfNSW 3211.

Include in the PROJECT QUALITY PLAN details of all cementitious and pozzolanic materials, and the blend proportions of blended binders if applicable, proposed for use in the Works, together with supporting test results traceable to the materials supplied.

3.1.2 Blended Binders

The actual proportions of the components of a blended binder must not vary by more than $\pm 3\%$ from the blend percentages nominated. Test each component at the respective minimum frequencies stated in Annexure R73/L. A reduced testing frequency may be permitted in accordance with TfNSW Q.

Where the mixing plant does not have separate silos for each binder component and/or does not have the capability of mixing the binder within the specified tolerance, blend the binder prior to delivery to the mixing plant.

3.1.3 Delivery of Binder

Transport binders in watertight containers and protect the binder from moisture until use. Do not use binder that has become caked or lumpy in the Works.

With each delivery of blended binders, provide certification that the actual blend proportions are within $\pm 3\%$ of the blend percentages nominated.

Sample and test the binder in accordance with TfNSW 3211. Detail in the PROJECT QUALITY PLAN the method of sampling the binder.

Do not use binder which has previously been spilled, and then recovered, in the Works.

Include in the PROJECT QUALITY PLAN your procedures for dealing with spillage of binders and retarders in accordance with Specification TfNSW G36 and the relevant Safety Data Sheets.

3.2 WATER

Water for use in the Works must be free from deleterious amounts of materials such as oils, acids, alkalis and vegetable substances.

Water taken from other than a town water supply system must not contain more than:

- (a) 600 mg/L of chloride ion, when measured using Test Method TfNSW T1004;
- (b) 400 mg/L of sulfate ion, when measured using Test Method TfNSW T1014;
- (c) 1% by mass of undissolved solids, when measured in accordance with AS 3550.4.

Where recycled water is proposed for use, the water must meet the above requirements and those in TfNSW G36 with the maximum concentration of 1,000 thermo-tolerant coliforms per 100 ml when tested in accordance with Test Method TfNSW T1015.

Include in the PROJECT QUALITY PLAN details of the water proposed for use in the Works, including the water source.

3.3 RETARDERS

Where you propose to use retarders to retard the setting time of the bound material, provide details of the retarders with the nominated mix design, together with a Certificate of Compliance, supported by NATA endorsed test certificates confirming compliance with AS 1478, or with another recognised national or international standard.

Include in the PROJECT QUALITY PLAN details of your procedures for incorporating the retarder uniformly within the pavement course.

3.4 SAFETY DATA SHEETS

Include in the PROJECT QUALITY PLAN the Safety Data Sheets (SDS) for the binders and retarders proposed for use in the nominated mix design and procedures for their safe handling.

4 MIX DESIGN

4.1 MIX DESIGN REQUIREMENTS

Nominated mix designs must comply with the following:

- (a) Have a Nominated Working Time (determined in accordance with Test Method TfNSW T147) in excess of 6 hours, using a slow setting binder.
- (b) Have a unconfined compressive strength (UCS) at 28 days normal curing or 7 days accelerated curing, of at least:
 - (i) 3 MPa for heavily bound material (but not exceeding 8 MPa);
 - (ii) 2 MPa for *grave laitier*.
- (c) Have a UCS strength gain of at least 1 MPa. The UCS strength gain is the difference between the UCS values measured at 7 days normal curing, and that at 28 days normal curing (or 7 days accelerated curing), when tested in accordance with Test Method TfNSW T131.
- (d) Have a binder application rate of at least:
 - (i) 4% by dry mass of pavement material for heavily bound material;
 - (ii) 2% by dry mass of pavement material for *grave laitier*.

4.2 SUBMISSION OF CONTRACTOR NOMINATED MIX DESIGN

Submit to the Principal, at least 10 working days before the commencement of work, your nominated mix design.

For each Contractor nominated mix design, provide the following information:

(a) Material To Be Bound

Details and test results of the MTBB in accordance with TfNSW 3051.

(b) Binders

- (i) Type and source of each component.
- (ii) Proportion of each component in a blended binder.
- (iii) Proportion of binder (by dry mass of MTBB) to be added.
- (iv) Test results for binder, or for each component in a blended binder complying with TfNSW 3211.

(c) Water

- (i) Source.
- (ii) Test results verifying compliance with Clause 3.2.

(d) Bound Material

- (i) Data including test results verifying that the bound material complies with the nominated mix design requirements.
- (ii) Data including test results establishing the Nominated Working Time for each nominated mix design.

Any required testing must be carried out in the 12 months immediately preceding the date of submission of the test results to the Principal. All phases of any particular test must be carried out in the same laboratory.

HOLD POINT

Process Held:	Use of each Contractor nominated mix design.
Submission Details:	At least 10 working days prior to commencement of the trial section of pavement construction (if specified in Annexure R73/A), or commencement of the pavement works, submit to the Principal details of your nominated mix design(s) and test results verifying conformity of the nominated mix design(s).
Release of Hold Point:	The Principal will consider the submitted documents prior to accepting the Contractor nominated mix design and authorising the release of the Hold Point.

4.3 VARIATION TO APPROVED CONTRACTOR NOMINATED MIX DESIGN

If you vary the source, nature or type of any constituent material, or the proportion of any of the constituent materials, by more than 10% from the nominated quantity in the approved Contractor nominated mix design, submit a new nominated mix design for approval in accordance with Clause 4.2.

The Hold Point in Clause 4.2 will again apply.

5 PLANT MIXING OF PAVEMENT MATERIALS

5.1 MIXING PLANT

The mixing plant must be capable of:

- (i) mixing the MTBB with the binder and water so as to produce a moist and homogeneous material suitable for compaction, without the addition of further water after the material leaves the mixing plant;
- (ii) providing measurements of the binder incorporated in the mix for each 200 tonnes produced to within 0.3% of the dry mass of the MTBB.

Include in the PROJECT QUALITY PLAN details of the proposed mixing plant, and its operational and calibration procedures. The information provided must include, but not be limited to, the following:

- (a) **Mixing plant**
 - (i) type;
 - (ii) proposed location;
 - (iii) mixing time;
 - (iv) output capacity;
 - (v) control of binder content and moisture content (including methods to ensure uniformity).
- (b) **Calibration**
 - (i) method(s) and frequency;
 - (ii) daily calculations to ensure compliance with the mix requirements.
- (c) **Materials handling**
 - (i) loading of mixer;
 - (ii) control of segregation during loading and mixing;
 - (iii) moisture control.

Operate the mixing plant in accordance with the manufacturer's recommendations.

5.2 BLENDING OF MTBB FROM CONSTITUENT COMPONENTS

Where MTBB is blended from its individual constituent components at the mixing plant, provide certification of its conformity to TfNSW 3051.

Prior to blending MTBB at the mixing plant, provide details of the plant operation and procedures for producing a mix conforming to TfNSW 3051 to the Principal for approval.

HOLD POINT

Process Held:	Supply of mix when the MTBB is blended from individual constituent components at mixing plant, and not from a Certified Stockpile.
Submission Details:	Procedures for the mixing process and evidence of consistent conforming supply of mix.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

5.3 PROCESS CONTROL

Control the production of each nominated mix such that the proportion of binder incorporated is not less than the nominated proportion of binder, for each 200 tonnes production.

At the completion of each 200 tonnes production, calculate the average percentage of binder added to the plant mixed pavement material, as a percentage of the dry mass of the material being bound, to the nearest 0.05%, from the amount of binder used (determined from delivery dockets, silo dippings, etc) and the quantity of material mixed and placed in the works (determined by appropriate measurement).

Submit the results to the Principal at the end of each day's production.

5.4 MOISTURE CONTENT

Develop a work method and target moisture content envelope that will ensure that:

- (a) there is adequate moisture in the pavement material to achieve binder hydration and the specified compaction;
- (b) the pavement is capable of taking traffic load without shoving or ravelling on completion of compaction.

Include in the PROJECT QUALITY PLAN the procedure to incorporate water in the Material To Be Bound and to achieve a uniform distribution of moisture within the pavement material.

Adjust the moisture content of the material until it is within the target moisture content envelope.

5.5 DELIVERY OF PLANT MIXED PAVEMENT MATERIALS

5.5.1 Discharge from Mixer

After mixing, discharge the plant mixed pavement materials from the mixer to a timed discharge hopper or alternatively to a storage bin. Do not discharge any material directly from conveyor belts into trucks or onto the ground. The drop from the conveyor to the minimum level of material in the timed discharge hopper or the storage bin must not exceed 4 m.

5.5.2 Delivery Vehicle Requirements

Deliver the mixed pavement materials in vehicles so constructed that loss of material does not occur. Vehicles must be fitted with suitable covers to prevent loss of moisture during transport.

Vehicles used for the delivery of plant mixed pavement materials to the hopper of a spreading machine or to a spreader box must have bodies or discharge equipment which enable the load to be discharged directly into the hopper or spreader box without spillage on the road or segregation of material.

Provide sufficient number of delivery vehicles to ensure delivery of the mixed pavement material at a uniform rate which is compatible with the capacity of the spreading and compaction equipment.

Do not allow delivery vehicles, either loaded or unloaded, to travel over the spread pavement material without the approval of the Principal.

Provide in the PROJECT QUALITY PLAN details of your methods for transporting the plant mixed pavement material to the spreading equipment, including:

- (a) number, type and capacity of transport vehicles;
- (b) measures to prevent loss of moisture during transport;
- (c) time delay between completion of mixing and discharge into the spreading equipment;
- (d) proposed method of discharge from the transport vehicle into the spreading equipment.

5.5.3 Delivered Material Unsuitable

Mixed pavement material delivered to the spreading equipment which is unsuitable for reasons such as segregation or contamination is considered to be nonconforming, and must not be used in the Works.

6 CONSTRUCTION

6.1 GENERAL

Place and finish the pavement course in a manner which will:

- (a) prevent segregation or loss of material;
- (b) provide the specified course thickness and surface finish;
- (c) produce a product which is homogeneous between joints and edges;
- (d) prevent slurring of the surface;
- (e) prevent the development of laminations in the pavement.

The entire process from spreading of binder, shaping, compacting through to primary trimming must proceed continuously until completion, within the Allowable Working Time of the mix.

Include in the PROJECT QUALITY PLAN:

- (i) details of your equipment and methods for spreading of binder, compacting and finishing the bound pavement course;
- (ii) details of your method for working adjacent to concrete structures such as bridges, pits, manholes or concrete medians.

6.2 WEATHER CONDITIONS

Do not carry out bound pavement construction when any of the following apply:

- (a) during rain or when rain appears imminent;
- (b) when the temperature measured at a depth of 50 mm below the surface of the underlying course is below 10°C, or the air temperature measured in the shade is above 40°C;
- (c) when the wind is sufficiently strong to cause rapid drying out of the spread pavement material;
- (d) during conditions that, in the opinion of the Principal, may cause nuisance to people, property or the environment.

Include in the PROJECT QUALITY PLAN details of procedures for cessation of operations in the event of adverse weather conditions.

6.3 PLACEMENT OF BOUND PAVEMENT COURSE

6.3.1 Placement In Single Layer

Where the bound pavement course is less than 250 mm thick, place and compact the pavement course in a single layer which, after trimming, conforms to the pavement thickness specified on the Drawings.

6.3.2 Placement In Two Layers

Where the bound pavement course is thicker than 250 mm, the Principal may approve placement of the bound pavement course in two layers, but only if the MTBB is self-cementing prior to the addition of binder and you have submitted a work method accepted by the Principal which will avoid debonding or material segregation between the two layers.

When placing in two layers, the upper layer must be at least 170 mm thick and both layers must be placed, compacted, and the upper layer trimmed, within the Allowable Working Time of the material in the lower layer. Placement must be in accordance with the approved work method.

Other than construction equipment used in placement of the bound pavement layer, do not allow traffic to travel on the lower layer during the construction of the pavement.

6.3.3 Submission of Proposal for Placement in Two Layers

Submit any proposals for placement of the bound pavement course in two layers at least 10 working days prior to commencement of the work. Include the following with your submission:

- (a) verification, including appropriate test results, that the MTBB is self-cementing;
- (b) details of the work method, and the associated process control, which will avoid debonding or material segregation at the interface between the layers, including thickness of the upper and lower layers;
- (b) details of previous successful applications of the work method, including pavement core results verifying the absence of debonding or material segregation at the interface between the layers.

HOLD POINT

Process Held:	Placement of bound pavement course in two layers.
Submission Details:	Details specified in Clause 6.3.3.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

If the Principal approves the placement of bound pavement course in two layers, verify the integrity of the course in accordance with the requirements of Clause 8.2.

6.4 SPREADING

6.4.1 Paving Machine

Spread, shape and carry out initial compaction of pavement materials using self-propelled paving machines utilising automatic level control, unless specified otherwise in Annexure R73/A. The self-propelled paving machine must have a dual tamping screed.

Paver automatic level control must be performed by sensors connected to string lines or other automated method approved by the Principal, or where mixed material is laid against another run of the same course, by a levelling beam or joint matching shoe beside the spreading machine and adjacent to the completed paving run.

6.4.2 Operation of Paving Machine

Operate the self-propelled paving machine at a uniform rate of paving, without stops/starts except at a construction joint. Schedule the delivery of material to achieve this uniform rate of paving.

Include in the PROJECT QUALITY PLAN details of your plant and methods to comply with the requirements of this Clause.

6.4.3 Allowance for Required Increase in Thickness

Should a method of placement which is other than by a self-propelled paver or grader with automated level control be approved, make due allowance for the required increase in pavement course thickness in accordance with Clause 8.5(b).

Where conformity to finished surface levels of the bound pavement course is also required, take up this increase in course thickness through a lowering of the underlying subgrade surface levels.

6.5 COMPACTION

Moisture must be uniformly distributed throughout the depth of the layer immediately prior to compaction.

Commence compaction immediately after spreading the bound pavement material. Compaction must be a continuous operation. Complete compaction on the same day as mixing, and within the Allowable Working Time of the mix.

Compact the full depth of the stabilised pavement over the entire area, except for areas adjacent to fresh joints as described in Clause 6.6.2.

Include in the PROJECT QUALITY PLAN details of the procedure to be followed to achieve the specified compaction.

6.6 JOINTS

6.6.1 General

Include in the PROJECT QUALITY PLAN details of the locations and types of construction joints, locations of unsupported edges, and compaction rolling pattern.

HOLD POINT

Process Held:	Placement of bound pavement course.
Submission Details:	Locations and types of construction joints, locations of unsupported edges and details of compaction rolling pattern.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

6.6.2 Fresh Joints

A joint is deemed to be fresh when the pavement material adjacent to both sides of the joint has been placed within the Nominated Working Time of the material placed in the first spreader run adjacent to the joint. Keep the edge of the first spreader run moist until the start of the spreader run on the other side of the joint.

A fresh joint does not constitute a Lot boundary.

Where a fresh longitudinal joint between adjacent runs is to be compacted, do not compact the 300 mm wide edge strip of material in the first run next to the joint, until the adjacent material in the second run is ready for compaction. Keep the joint moist until the start of the second run.

6.6.3 Transverse and Longitudinal Construction Joints

Spread the pavement material in a manner which minimises the number of joints.

The layout of joints must conform to the following requirements:

- (a) Transverse joints must be formed at right angles to the road centreline.
- (b) Longitudinal joints must:
 - (i) not be located at wheel paths;
 - (ii) be formed within ± 100 mm from separation lines of travel lanes;
 - (iii) be located at a minimum distance of 300 mm away from the edge lines and located within the shoulder area.
- (c) The distance between non-fresh longitudinal joints, or between a non-fresh longitudinal joint and the edge of bound pavement course, must not exceed 5 m.

6.6.4 Preparation of Construction Joints

Prior to placing adjacent pavement course, prepare non-fresh joints by cutting back the previously placed pavement course, to provide a neat and tight vertical surface exposing well compacted material. In cutting back, saw cut to at least one third of the depth of the bound pavement course.

The minimum distances for cutting back previously compacted material are:

- (a) 75 mm along longitudinal joints; and
- (b) 0.5 m at transverse joints.

6.6.5 Induced Longitudinal Joints

Longitudinal joints may be induced by saw cutting within 3 days of placement of the bound pavement course. The depth of cutting must be one third of the depth of the bound pavement course with a tolerance of ± 10 mm and be approximately 3 mm wide. The saw cut must be straight and not cause edge ravelling greater than 20 mm at any point along the joint.

6.6.6 Disposal of Cutback Material

Dispose of all cutback material. Do not incorporate cutback material into subsequent pavement courses.

Include in the PROJECT QUALITY PLAN the method of disposal of waste material.

6.7 TRIMMING

6.7.1 Preliminary Trimming

Complete preliminary trimming, within the Allowable Working Time of the run being trimmed, to produce a surface which is parallel to the finished wearing surface.

Include in your PROJECT QUALITY PLAN details of your method of trimming and survey control which ensure that the pavement course thickness is not reduced during trimming to the extent that it fails to comply with the requirements of Clause 8.5.

6.7.2 Final Trimming

Final trimming should be carried out within the Allowable Working Time but must be completed within the Nominated Working Time for the run being trimmed, to produce a surface suitable for the application of the next pavement course or bituminous surfacing.

Carry out final trimming in preparation for a prime, primerseal or seal only when the surface can be cut without causing damage to the pavement surface.

6.7.3 Pavement Surface After Trimming

Include in the PROJECT QUALITY PLAN a procedure which ensures that, after trimming, the finished surface of the pavement is a tightly bound matrix of coarse and fine material without a slurry of fines.

No roller marks must remain on the pavement surface after trimming.

6.7.4 Disposal of Trimmed Material

Dispose of all trimmed material. Do not incorporate trimmed material into subsequent pavement courses.

Include in the PROJECT QUALITY PLAN the method of disposal of the trimmed material to waste.

6.8 CURING

Curing of a Lot, to prevent the bound material from rapid drying out, must commence immediately after completion of compaction and must continue until a bituminous seal or the subsequent pavement course is placed over the bound material.

During curing, apply water to the surface uniformly and in a manner which will keep the surface continuously damp but without causing ponding, significant run off, slurring of the surface, pavement instability and erosion or leaching of the binder.

Include in the PROJECT QUALITY PLAN details of your procedures for curing.

6.9 TRIAL PAVEMENT

6.9.1 General

When specified in Annexure R73/A, construct a trial section of pavement at a location agreed with the Principal, using the same materials, equipment and methods described in the PROJECT QUALITY PLAN.

The trial section of pavement must be between 100 m and 200 m long for the proposed Lot width.

Demonstrate that, for the work at the trial section of pavement, the specified compaction, course thickness and levels as well as the specified pavement properties can be achieved.

WITNESS POINT

Process Witnessed: Construction of trial section of bound pavement.

Submission Details: Notification of the construction of the trial section of pavement at least 3 working days prior to commencement.

HOLD POINT

Process Held: Construction of bound pavement.

Submission Details: Documentation, including test results, verifying that the trial section of pavement conforms to the specified requirements.

Release of Hold Point: The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

6.9.2 Nonconformities

If there are nonconformities in the trial section of pavement, the Principal may require the construction of a further trial section of pavement before releasing the Hold Point. The Principal may also require your proposed disposition to include modifications to the equipment and/or methods of construction. Treat the nonconforming trial section of pavement in accordance with Clause 8.11.

6.9.3 New Trial Section

The Principal may require a new trial section of pavement to be carried out when you make changes to plant, equipment, method of construction, materials, mix, rate of work or when any material or work does not comply with this Specification.

6.10 PROTECTION OF WORK

6.10.1 Adequate Drainage

Provide adequate drainage of all working areas throughout the period of construction to avoid ponding and scouring.

6.10.2 Trafficking of Newly Placed Pavement

Except for construction plant and vehicles carrying out the construction or testing of a particular section of pavement, do not allow traffic on the pavement until the prime or primer seal has been applied and 7 days has elapsed after placement of the pavement course.

6.10.3 Temporary Roadways and Detours

Provide temporary roadways or detours in accordance with Specification TfNSW G10 during construction of the pavement.

Where it is not practicable to provide temporary roadways or detours, the pavement may be constructed in stages, with only part of the width of the pavement being constructed at each stage so that traffic may use the remaining width not under construction.

Include in the PROJECT QUALITY PLAN details of the procedures to comply with this Clause.

6.11 BITUMINOUS SEAL

Spraying of bituminous seal can only commence when the bound pavement surface is sufficiently firm, neatly and tightly bound without a slurry of fines, and ready to receive the sprayed bituminous seal without punching of the sealing aggregates into the bound pavement layer.

Where specified in Annexure R73/A, apply either a prime, primerseal or seal within 6 days of incorporation of binder in the MTBB. Application of prime, primerseal or seal must be in accordance with either Specification TfNSW R106 or R107, as specified in Annexure R73/A.

HOLD POINT

Process Held:	Priming, primersealing or sealing of surface of bound pavement course.
Submission Details:	Conformity reports verifying that each Lot conforms with respect to specified level, thickness, surface deviation and compaction, and notification that the bound pavement course is ready for sprayed sealing.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

7 SURVEY

7.1 GENERAL

Carry out survey in accordance with Specification TfNSW G71.

During the progress of the Works, carry out surveys to determine the levels at the top of:

- (a) underlying surface, over which the bound pavement course is to be placed; and
- (b) finished surface of the bound pavement course.

Determine the levels using a survey staff (or reflector) with a flat base of area between 300 mm² and 4,000 mm². Allow for seal thickness in determining the levels. Where the survey is undertaken for a sealed surface, remove any loose foreign matter, including loose aggregates, before the survey and determine the levels by deducting the Average Least Dimension of the cover aggregate of the seal.

7.2 SURVEY OF UNDERLYING SURFACE

7.2.1 Requirements Where Finished Surface Levels Are Specified

Where design finished surface levels are specified for the bound pavement course, submit to the Principal a schedule showing the levels of the underlying surface, at least 7 working days prior to the commencement of work. Highlight in the schedule all locations where the actual levels of the underlying surface are higher than specified in the design.

HOLD POINT

Process Held:	Placement of bound pavement course.
Submission Details:	Schedule of levels of the underlying surface.
Release of Hold Point:	The Principal will consider the submitted documents prior to authorising the release of the Hold Point.

7.2.2 Redesign of Pavement Finished Levels

After consideration of the schedule of levels, the Principal may redesign the pavement finished levels. The Principal will advise you of any such redesign within 5 working days of the receipt of the schedule.

7.2.3 Requirements Where Finished Surface Levels Are Not Specified

Where design finished surface levels are not specified for the bound pavement course, carry out a survey of the underlying surface and submit the schedule of levels to the Principal.

7.3 SURVEY FOR BOUND PAVEMENT COURSE FINISHED SURFACE LEVELS

Where design finished surface levels are specified, submit to the Principal a schedule of the bound pavement course finished surface levels for each Lot within 6 working days of completion of final trimming. Highlight in the schedule all levels which are nonconforming.

7.4 SURVEY FOR THICKNESS

Submit to the Principal a schedule of the calculated thickness of the bound pavement course for each Lot within 6 working days of completion of final trimming.

Assess thickness at centres not exceeding 15 m longitudinally in a grid pattern submitted as part of your PROJECT QUALITY PLAN. The location of each survey point must be recoverable in the horizontal plane to within ± 50 mm.

At each survey point, determine the levels of:

- (a) the underlying surface prior to placing the pavement course;
- (b) the surface of the bound pavement course after completion of compaction and trimming.

8 CONFORMITY

8.1 GENERAL

Each Lot must comply with the following requirements. Nonconforming Lots must be dealt with in accordance with Clause 8.11.

8.2 INTEGRITY

Where the bound pavement course is placed in two layers, verify the integrity of the course by taking cores at the minimum frequency specified in Annexure R73/L. The cores taken must achieve full recovery and penetrate into the lower layer.

If debonding or segregation is evident at the interface between the layers in the core, the bound pavement course in the area represented by the core will be rejected.

8.3 UNCONFINED COMPRESSIVE STRENGTH

For each Lot of pavement material, prior to placing, take samples at the minimum frequency specified in Annexure R73/L.

Prepare and test the samples as follows:

- (a) store the samples in a loose state inside airtight sealed containers prior to moulding;

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Construction of Plant Mixed Heavily Bound Pavement Course

- (b) mould the samples within the Allowable Working Time for the mix, and at the moisture content corresponding to that for maximum standard compaction;
- (c) test the samples in accordance with Test Method TfNSW T116, at either 28 days normal curing or 7 days accelerated curing.

Record and report the following in addition to the reporting requirements of TfNSW T116:

- (i) chainage and offset of each sampling location;
- (ii) time of commencement and completion of mixing at the sampling location;
- (iii) time of taking each sample;
- (iv) time of commencement of compaction of each UCS sample.

Where the average strength of a pair of UCS cylinders, when tested in accordance with TfNSW T116 at 28 days normal curing or 7 days accelerated curing, does not comply with the mix design strength requirements, it is deemed to be nonconforming and deductions in accordance with Table R73/B.1 will apply.

8.4 COMPACTION AND MOISTURE CONTENT

Determine the sampling locations for each Lot in accordance with TfNSW Q. Each Lot must be visually homogeneous.

For each sampling location, obtain the insitu density and take samples for determining the field moisture content and the maximum wet density in the laboratory.

8.4.1 Insitu Density

Carry out insitu density tests in accordance with Test Method TfNSW T173 on the stabilised material within the Allowable Working Time of the mix after completion of compaction.

Initially, during construction of the trial pavement (refer Clause 6.9) or during the first Lot of pavement construction if a trial pavement is not specified, take density measurements of the lower layer before placing the upper layer.

When the relative compaction requirements are shown to conform for each layer, you may then take density measurements after both layers have been placed.

The depth of testing is as follows:

- (a) **Pavement course \leq 250 mm thick:**
 - as close to the bottom of the bound pavement course as the probe will allow.
- (b) **Pavement course $>$ 250 mm thick and placed in two layers:**
 - (i) Where the density measurement for the lower layer is taken before the upper layer is placed:
 - as close to the bottom of the lower layer as the probe will allow, and as close to the bottom of the top layer.
 - (ii) Where the density measurement is taken only after both layers have been placed (see Test Method TfNSW T173 for definition of depths “X” and “Y”):

- at depth “Y”, equal to 150 mm, and
- at depth “X”, which is as close to the bottom of the lower layer as the probe will allow.

Determine the wet density D_z for the lower part of the bound pavement course in accordance with TfNSW T173.

Repair nuclear density test holes with freshly mixed material identical to that of the surrounding pavement. Compact the repair material within the Nominated Working Time to the same extent as that of the surrounding material. Detail in the PROJECT QUALITY PLAN the method of repairing test holes.

8.4.2 Maximum Wet Density

The location of the sample for the determination of maximum wet density must be the same as that for the determination of insitu density.

Determine the maximum wet density in accordance with Test Method TfNSW T162 on a sample taken prior to compaction. Compact the sample within 3 hours of sampling and within the mix’s Allowable Working Time.

Record and report the time of commencement of mixing of the material at the sampling location and the time of sampling.

8.4.3 Relative Compaction

Calculate the relative compaction in accordance with Test Method TfNSW T166.

Determine the characteristic value of relative compaction in accordance with TfNSW Q and report to one decimal place.

For pavement course ≤ 250 mm thick, the characteristic value of relative compaction must be $\geq 102\%$.

For pavement course > 250 mm thick and placed in two layers:

- (a) Where the density measurement for the lower layer is taken before the upper layer is placed:
The characteristic value of relative compaction for both lower and upper layers must be $\geq 102\%$.
- (b) Where the density measurement is taken after both layers have been placed:
 - the characteristic value of relative compaction at depth “X” must be $\geq 102\%$; and
 - the individual value (not characteristic value) of relative compaction at each test location, based on the calculated wet density D_z for the lower part of the bound pavement course, must be $\geq 95\%$.

Record and report the following:

- (i) test locations;
- (ii) relative compaction result(s) for the pavement depth at each location; and
- (iii) characteristic value of relative compaction of each Lot.

8.4.4 Field Moisture Content

At each test location where an insitu density test was performed, take a sample for the determination of field moisture content. Take samples immediately prior to compaction.

Determine the moisture content in accordance with Test Method TfNSW T120, T121 or T180.

The field moisture content must be within the target moisture content envelope as specified in Clause 5.4.

8.5 THICKNESS

Determine by survey the respective surface levels for use in calculation of the pavement course thickness, in accordance with Clause 7.

After final trimming, the thickness of the bound pavement course at any point must be:

- (a) 0 to 20 mm above the thickness specified on the Drawings where the bound pavement course is placed by paver with automated level control or trimmed with a grader with automated level control; or
- (b) 10 mm to 30 mm above the thickness specified on the Drawings where the bound pavement course is not placed by a paver with automated level control and/or is trimmed with a grader without automated level control.

8.6 SURFACE LEVELS

After final trimming, the pavement surface must be parallel to the design finished surface.

The surface levels after preliminary trimming must be between 0 and 50 mm above the finished surface levels shown on the Drawings.

The surface levels after final trimming must be between 0 and 10 mm above the finished surface levels shown on the Drawings.

8.7 SURFACE DEVIATION

After final trimming, test the surface with a 3 m straight edge laid in any direction.

Include in the PROJECT QUALITY PLAN details of the planned locations for taking straight edge measurements.

The surface of the bound pavement course must not deviate from a 3 m straight edge laid in any direction by more than 5 mm. Additionally, there must be no abrupt change of levels in the transition from the pavement to fixed structures such as a bridge deck, or adverse changes that will affect surface pavement drainage.

8.8 RIDE QUALITY

Where specified in Annexure R73/A, measure the ride quality of the finished pavement surface within 2 weeks after the prime, primerseal or seal has been applied and swept, with either:

- (a) a calibrated NAASRA Roughness Meter in accordance with Test Method TfNSW T182; or

(b) a laser profilometer in accordance with Test Method TfNSW T188.

Include in the PROJECT QUALITY PLAN details of the equipment to be used for measuring the ride quality of the finished pavement surface, and associated calibration data.

Where the NAASRA Roughness value over a 100 m survey interval is less than 65 counts/km (equivalent to IRI_s value of 2.5 m/km), incentives or deductions in accordance with Annexure R73/B2 will apply.

Where the NAASRA Roughness value over a 100 m survey interval is equal to or exceeds 65 counts/km (equivalent to IRI_s value of 2.5 m/km), the pavement course constructed for that length must be either reworked, or removed and replaced.

8.9 WIDTH

Measure the width of bound pavement between the outside edges of the bound pavement course.

The width of bound pavement must not be less than the width shown on the Drawings.

8.10 CERTIFICATE OF CONFORMITY

Unless approved otherwise by the Principal, submit weekly to the Principal a signed certificate verifying conformity with the requirements of Clause 8.

Where appropriate, submit with the certificate a summary of test results from a laboratory accredited by NATA. Additionally, submit daily to the Principal the moisture content and relative density test results.

Highlight any nonconforming Lots.

8.11 TREATMENT OF NONCONFORMING LOTS

8.11.1 General

Where a Lot is nonconforming, submit to the Principal a Nonconformity Report and your proposed disposition of the Lot.

Lots that are nonconforming with respect to UCS, compaction or ride quality may be accepted with a deduction in accordance with Annexure R73/B2. Nonconforming Lots not accepted with a reduction must be either rectified or replaced.

HOLD POINT

Process Held: Rectification or replacement of a nonconforming Lot.

Submission Details: Nonconformity Report and details of your proposal to rectify or replace the Lot.

Release of Hold Point: The Principal will consider the submitted documents prior to authorising the release of the Hold Point

8.11.2 Rectification

Where rectification by re-stabilisation is proposed, in conjunction with an appropriate NATA registered laboratory, prepare and submit to the Principal a re-stabilisation proposal which takes into account the effects of the binder already incorporated in the rejected Lot.

Where rectification by an alternative to re-stabilisation is proposed, submit to the Principal:

- (a) your proposed alternative, supported by pavement design calculations;
- (b) NATA endorsed test certificates and a report of the investigations carried out; and
- (c) proposed method of carrying out the work.

8.11.3 Removal and Replacement

Removal and replacement of the pavement course must comply with the requirements of this Specification.

8.11.4 Cost of Rectification

The costs of rectifying, or removal and replacement, of nonconforming Lots, including any restoration work to any underlying or adjacent surface or structure which becomes necessary as a result of such rectification or replacement, will be borne by you.

ANNEXURE R73/A – PROJECT SPECIFIC REQUIREMENTS

NOTES TO TENDER DOCUMENTER (Delete this boxed text after customising Annexure R73/A)

Complete the table below by deleting whichever option that is not applicable.

Table R73/A.1 – Construction Requirements

Clause	Description	Requirement
2.3	Preparation of stockpile site by Contractor	Yes / No
6.4.1	Paving using self-propelled paving machine utilising automatic level control required	Yes / No
6.9.1	Trial section of pavement required	Yes / No
6.11	Application of the following bituminous sealing layer required:	
	Prime	Yes / No
	Primerseal	Yes / No
	Seal	Yes / No
6.11	Application of prime, primerseal or seal to be in accordance with	R106 / R107
8.8	Measurement of ride quality required	Yes / No

ANNEXURE R73/B – MEASUREMENT AND PAYMENT

B1 MEASUREMENT AND PAYMENT

Payment will be made for all costs associated with completing the work detailed in this Specification in accordance with the following Pay Items.

If applicable, bituminous seal will be paid for under the pay items in the specification nominated in Annexure R73/A.

Where no specific pay items are provided for a particular item of work, the costs associated with that item of work are deemed to be included in the rates and prices generally for the Work Under the Contract.

Unless specified otherwise, a lump sum price for any of these items will not be accepted.

Pay Item R73P1 – Bound Pavement Course

The unit of measurement is the “square metre”.

The quantity is determined from the area shown on the Drawings or as directed. No account will be taken of any placement outside the areas shown on the Drawings or as directed.

This Pay Item must cover all costs associated with the manufacture, delivery and spreading of the bound pavement materials, incorporation of water to achieve the required moisture content, compaction, trimming, disposal of excess material, curing and testing.

B2 DEDUCTIONS FOR NONCONFORMITIES AND INCENTIVES

Lots that are nonconforming with respect to unconfined compressive strength, compaction or ride quality may be accepted with a deduction to the rate for Pay Item R73P1, as specified hereunder.

The deduction is applied to the quantity of material in the Lot(s) represented by the test results.

(a) Unconfined Compressive Strength (refer to Clause 8.3)

Where the unconfined compressive strength of a Lot is nonconforming, deductions in accordance with Table R73/B.1 will apply.

Table R73/B.1 - Deductions for Unconfined Compressive Strength (UCS)

Heavily Bound Material		<i>Grave Laitier</i>	
UCS⁽¹⁾	Deduction⁽²⁾	UCS⁽¹⁾	Deduction⁽²⁾
≥ 2.5 to < 3.0 MPa	5%	≥ 1.5 to < 2.0 MPa	15%
≥ 2.0 to < 2.5 MPa	30%	< 1.5 MPa	Reject ⁽³⁾
< 2.0 MPa	Reject ⁽³⁾		

Notes:

- (1) At 28 days normal curing or 7 days accelerated curing.
(2) Applied as % deduction to rate for Pay Item R73P1 for the quantity represented by test results.
(3) Rectify, or remove and replace, quantity represented by test results.

(b) Compaction (refer to Clause 8.4.3)

Where the characteristic value of relative compaction of a Lot is nonconforming, deductions in accordance with Table R73/B.2 will apply to the Lot.

Table R73/B.2 - Deductions for Relative Compaction

Relative Compaction⁽¹⁾	Deduction⁽²⁾
≥ 101 to < 102%	10%
≥ 100 to < 101%	30%
< 100%	Reject ⁽³⁾

Notes:

- (1) Characteristic value of relative compaction.
(2) Applied as % deduction to rate for Pay Item R73P1 for quantity represented by test results.
(3) Rework, or remove and replace, quantity represented by test results.

Where the course thickness exceeds 250 mm, and the relative compaction calculated for the lower layer is less than 95.0% at one or more points, the Lot may be accepted but with a deduction of 20% to the rate for Pay Item R73P1 for the Lot. This deduction is in addition to the deductions specified in Table R73/B.2.

(c) Ride Quality (refer to Clause 8.8)

Where the NAASRA Roughness value over a 100 m survey interval is less than 65 counts/km (equivalent to IRI_s value of 2.5 m/km), incentives or deductions to the rate for Pay Item R73P1 in accordance with Table R73/B.3 will apply.

Where the NAASRA Roughness value over a 100 m survey interval is equal to or exceeds 65 counts/km, the pavement course constructed for that length must be either reworked, or removed and replaced. If, after reworking, the NAASRA Roughness value is less than 65 counts/km, any deductions applicable will be in accordance with Table R73/B.3, but incentives will not apply.

Table R73/B.3 – Incentives and Deductions for Ride Quality

NAASRA Roughness (counts/km) over 100 metre length	Equivalent IRI_s (m/km) over 100 metre length	Incentive/Deduction ⁽¹⁾
< 20	< 0.80	+ 3%
20 – 24	0.80 – 0.95	+ 2%
25 – 34	0.96 – 1.35	+ 1%
35 – 39	1.36 – 1.55	Nil
40 – 49	1.56 – 1.95	- 2%
50 – 54	1.96 – 2.10	- 4%
55 – 59	2.11 – 2.30	- 8%
60 – 64	2.31 – 2.50	- 16%
≥ 65	> 2.50	Reject ⁽²⁾

Notes:

- ⁽¹⁾ Applied as % deduction to rate for Pay Item R73P1 for quantity represented by test results.
- ⁽²⁾ Rectify, or remove and replace, quantity represented by test results.

ANNEXURE R73/C – SCHEDULES OF HOLD POINTS, WITNESS POINTS AND IDENTIFIED RECORDS

Refer to Clause 1.2.3.

C1 SCHEDULE OF HOLD POINTS AND WITNESS POINTS

Clause	Type	Description
2.2	Hold	Certification of stockpiles
4.2	Hold	Submission of Contractor nominated mix design
5.2	Hold	Submission of procedures for blending of MTBB and evidence of consistent conforming supply
6.3.3	Hold	Submission of proposal for placement in two layers
6.6.1	Hold	Locations and types of construction joints, locations of unsupported edges and rolling pattern details
6.9.1	Witness	Construction of trial section of pavement
6.9.1	Hold	Submission of documentation verifying conformity of trial section of pavement
6.11	Hold	Priming, primersealing or sealing of surface of bound pavement course
7.2.1	Hold	Submission of schedule of levels of underlying surface
8.11.1	Hold	Submission of Nonconformity Report and rectification proposal

C2 SCHEDULE OF IDENTIFIED RECORDS

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

Clause	Description of Identified Record
2.2	Certification of stockpiles
4.2	Approved Contractor nominated mix design
4.3	Variation to approved Contractor nominated mix design
5.2	Conformity documentation for MTBB blended from constituent components
6.6.1	Locations and types of construction joints, locations of unsupported edges and details of rolling pattern
6.9.1	Conformity documentation for trial section of pavement
7.2.1	Underlying surface levels
7.3	Bound pavement course finished surface levels
8.3	UCS sampling locations and test results
8.5	Thickness of bound pavement course
8.10	Certificate of conformity

ANNEXURE R73/D – PLANNING DOCUMENTS

Refer to Clause 1.2.4.

The following documents are a summary of documents that must be included in the PROJECT QUALITY PLAN. The requirements of this Specification and others included in the Contract must be reviewed to determine additional documentation requirements.

Clause	Description
2.3	Procedures for construction, operation and restoration of stockpile sites
2.4	Methods to prevent segregation and/or loss of fines during delivery of MTBB
3.1.1	Details of cementitious and pozzolanic materials, and blend proportions of blended binders if applicable
3.1.3	Method of sampling binder
3.1.3	Procedures for dealing with spillage of binder and retarder
3.2	Details of source of water
3.3	Procedures for incorporating retarders within pavement course
3.4	Safety Data Sheets and procedures for safe handling of materials
5.1	Details of mixing plant, operational and calibration procedures
5.4	Procedures to achieve uniform distribution of water within the plant mixed pavement material
5.5.2	Method of transporting plant mixed pavement material to spreading equipment
6.1	Equipment and methods for spreading, compacting and trimming bound pavement course
6.1	Method for working adjacent to concrete structures
6.2	Procedures for cessation of work in the event of adverse weather conditions
6.4.2	Details of paving machine and methods for a uniform rate of paving
6.5	Procedure to achieve required compaction
6.6.1	Locations and types of construction joints, locations of unsupported edges and details of rolling pattern
6.6.6	Method of disposal of waste material from joints
6.7.1	Method of trimming and survey control to produce required pavement thickness
6.7.3	Procedure to produce required pavement surface after trimming
6.7.4	Method of disposal of the trimmed material to waste
6.8	Procedures for curing
6.10	Procedures for working around traffic
7.4	Survey grid for thickness assessment
8.4.1	Method of repairing holes from insitu density testing
8.7	Locations for straight edge measurements

Clause	Description
8.8	Equipment for measuring ride quality and calibration data

ANNEXURES R73/E TO R73/K – (NOT USED)

ANNEXURE R73/L – MINIMUM FREQUENCY OF TESTING

Clause	Characteristic Tested	Test Method	Minimum Frequency of Testing
2.1	Properties of MTBB	TfNSW 3051	As per TfNSW 3051
3.1.3	Quality of binder	TfNSW 3211	As per TfNSW 3211
3.2	Quality of water		
	Chloride ion concentration	TfNSW T1004	1 per contract per source
	Sulfate ion concentration	TfNSW T1014	1 per contract per source
	Undissolved solids	AS 3550.4	1 per contract per source
	Concentration of thermo-tolerant coliforms	TfNSW T1015	1 per contract per source
3.3	Quality of retarder	Conformity with AS 1478 or other standard appropriate to the particular retarder	1 per contract per source
5.3	Proportion of binder incorporated in pavement material	As per Clause 5.3	1 per 200 tonnes of plant mixed material
8.2	Integrity of pavement course, where placed in more than one layer	As per Clause 8.2	1 core per 250 m ²
8.3	Unconfined compressive strength	TfNSW T116	One pair per 400 tonnes or part thereof
8.4.1	Insitu density	TfNSW T173	As per TfNSW Q for specified relative compaction
8.4.2	Maximum wet density	TfNSW T162	As per TfNSW Q for specified relative compaction
8.4.3	Relative compaction	TfNSW T166	As per TfNSW Q for specified relative compaction
8.4.4	Field moisture content	TfNSW T120, T121 or T180	As per TfNSW Q for specified relative compaction
8.5	Pavement course thickness	As per Clause 8.5	At each location as defined in Clause 8.4
8.7	Deviation from straight edge	As per Clause 8.7	Minimum 1 per 20 m ²
8.8	Ride quality	TfNSW T182 or T188	Continuous reading per Lot
8.9	Width	As per Clause 8.9	Minimum of 1 per 20 linear metres

ANNEXURE R73/M – REFERENCED DOCUMENTS

Refer to Clause 1.2.6.

TfNSW Specifications

TfNSW G10	Traffic Management
TfNSW G36	Environmental Protection
TfNSW G38	Soil and Water Management
TfNSW G71	Construction Surveys
TfNSW Q	Quality Management System
TfNSW R106	Sprayed Bituminous Surfacing (with Cutback Bitumen)
TfNSW R107	Sprayed Bituminous Surfacing (with Polymer Modified Binder)
TfNSW R178	Vegetation
TfNSW 3051	Granular Pavement Base and Subbase Materials
TfNSW 3211	Cements, Binders and Fillers

TfNSW Test Methods

TfNSW T111	Dry Density/Moisture Relationship of Road Construction Materials
TfNSW T116	Unconfined Compressive Strength of Remoulded Road Construction Materials
TfNSW T120	Moisture Content of Road Construction Materials (Standard Method)
TfNSW T121	Moisture Content of Road Construction Materials (Sand Bath or Hot Plate Method)
TfNSW T131	Unconfined Compressive Strength of Road Construction Materials (Blended in the Laboratory with Cementitious Binders)
TfNSW T147	Working Time for Road Construction Materials (Blended in the Laboratory with Slow Setting Binders)
TfNSW T162	Compaction Control Test (Rapid Method)
TfNSW T166	Relative Compaction of Road Construction Materials
TfNSW T173	Field Wet Density of Road Construction Materials (Nuclear Gauge in Direct Transmission Method)
TfNSW T180	Moisture Content of Road Construction Materials (Microwave Oven Method)
TfNSW T182	Pavement Surface Roughness
TfNSW T188	Project Ride Quality (Vehicular Laser Profilometer)
TfNSW T1004	Quantitative Determination of Chloride Ion in Water
TfNSW T1014	Quantitative Determination of Sulfate Ion in Water
TfNSW T1015	Microbiology of Water used in Roadworks (Thermotolerant Coliforms)

Australian Standards

AS 1478	Chemical admixtures for concrete, mortar and grout
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AS 3550.4

Waters – Determination of solids – Gravimetric method