

TWEED SHIRE COUNCIL

DEVELOPMENT CONSTRUCTION SPECIFICATION

C242

FLEXIBLE PAVEMENTS

VERSION 1.3

SPECIFICATION C242 - FLEXIBLE PAVEMENTS

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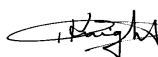

CITATION

This document is named "Tweed Shire Council, Development Construction Specification C242 - Flexible Pavements".

ORIGIN OF DOCUMENT, COPYRIGHT

This document was originally based on AUS-SPEC - Development Construction Specification C242 - Flexible Pavements, March 2001 (Copyright SWR-TM). Substantial parts of the original AUS-SPEC document have been deleted and replaced in the production of this Tweed Shire Council Development Specification. The parts of the AUS-SPEC document that remain are still subject to the original copyright.

VERSIONS, C242 FLEXIBLE PAVEMENTS

VERSION	AMENDMENT DETAILS	CLAUSES AMENDED	DATE ISSUED (The new version takes effect from this date)	Authorised by the Director of Engineering Services
1.1	Original Version		1 July 2003	
1.2	Reference QDTMR Standard Specification MRS05/MRTS05 Refer to MRS05 material designations Amend lot compaction requirements Update referenced RMS and AUSTROADs publications to current versions	C242.03, C242.05 C242.08, Table C242.2 C242.20; C242.27 C242.03	11 September 2012	
1.3	Modified compactive effort compaction testing method changed to standard compactive effort Delete bound layer compaction acceptance alternatives Substitute SWAC references with Certifying Engineer	C242.03, Table C242.3, Table C242.4, C242.08, C242.19, C242.20, C242.27 C242.20, C242.27 All	8 September 2015	

DEVELOPMENT CONSTRUCTION SPECIFICATION 242**FLEXIBLE PAVEMENTS****GENERAL****C242.01 SCOPE**

1. This Specification is for the supply, spreading, compaction and trimming of base and subbase courses of flexible and semi-rigid (bound) pavements to the specified levels and thicknesses as shown on the design plans.
2. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in the Specification Part for Quality Requirements.

Quality**C242.02 TERMINOLOGY**

- (a) Materials designated as 'base' require the provision of a wearing surface comprising either a sprayed bituminous seal or asphalt up to 50mm thick.
- (b) Materials designated as 'subbase' require a covering course of 'base'. The subbase may consist of one (1) or more layers.
- (c) A flexible pavement consists of a base and a subbase constructed of unbound materials. For the purpose of this Specification it also includes "semi-rigid" pavements.
- (d) A semi-rigid pavement is one where the base and/or the subbase is constructed of bound materials.
- (e) Bound material incorporates a binder to produce structural stiffness.
- (f) Modified material incorporates small amounts of stabilising binder to improve the properties of the material without significantly affecting structural stiffness.

Definitions**C242.03 REFERENCE DOCUMENTS**

1. Documents referenced in this Specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

***Documents
Standards Test
Methods*****(a) Council Specifications**

- | | | |
|------|---|------------------------------|
| C241 | - | Stabilisation |
| C244 | - | Sprayed Bituminous Surfacing |

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(b) Australian Standards

- AS 1141.14 - Particle shape, by proportional calliper.
- AS 1141.22 - Wet/dry strength variation.
- AS 1289.3.1.1 - Determination of the liquid limit of a soil - Four point Casagrande method.
- AS 1289.3.3.1 - Calculation of the plasticity index of a soil.
- AS 1289.3.6.1 - Determination of the particle size distribution of a soil - Standard method of analysis by sieving.
- AS 1289.3.6.3 - Determination of the particle size distribution of a soil - Standard method of fine analysis using a hydrometer.
- AS 1289.5.1.1 - Determination of the dry density/moisture content relation of a soil using standard compactive effort.
- AS 1289.5.3.1 - Determination of the field density of a soil - Sand replacement method using a sand-cone pouring apparatus.
- AS 1289.5.4.1 - Compaction control test - Dry density ratio, moisture variation and moisture ratio.
- AS 1289.5.8.1 - Determination of field density and field moisture content of a soil using a nuclear surface moisture - density gauge - Direct transmission mode.
- AS 1289.6.1.1 - Determination of the California bearing ratio of a soil - Standard laboratory method for a remoulded specimen.
- AS 3798 - Guidelines on earthworks for commercial and residential developments

(c) RTA Test Methods

- T114 - Maximum Dry Compressive Strength of Road Materials
- T116 - Unconfined Compressive Strength - Remoulded Material
- T130 - Dry Density Moisture Relations for Mixtures of Road Materials and Cement.
- T131 - Unconfined Compressive Strength
- T160 - Benkelman Beam Deflection Test
- T171 - Modified Texas Triaxial Compression Test

(d) Other Referenced Specifications

- MRS05/MRTS05 - Standard Specifications Roads - Unbound Pavements, Queensland Department of Transport and Main Roads.

C242.04 PAVEMENT STRUCTURES

1. Preliminary flexible or semi-rigid pavement material types and layer thicknesses shall be as shown on the design plans. **Material Types and Layer Thickness**

C242.05 INSPECTION, SAMPLING AND TESTING

1. Inspection, sampling and testing of the pavement shall be undertaken by the Subdivider in accordance with the requirements of this Specification before, during and after the construction of the pavement. Testing shall be carried out by a NATA registered laboratory with appropriate accreditation and suitably qualified personnel. **Subdivider's Responsibility**
2. The Subdivider shall provide the Certifying Engineer with written notice when testing is being carried out and copies of all test reports for approval to proceed. **Written Notice**
3. Field density tests shall be carried out in accordance with AS 1289.5.3.1, or, with the Certifying Engineer's concurrence, with a Nuclear Density Meter in accordance with Clause 242.19. **Density Test**

- | | |
|---|---|
| <p>4. Before the commencement of the relevant stages of road construction, reports shall be submitted from a registered NATA Consultant demonstrating to the Certifying Engineer's satisfaction:</p> <p>(a) That the pavement has been designed in accordance with the approved engineering design plans, Development Design Specification D2 - Pavement Design, and subgrade analysis per Austroads Guide to Pavement Technology. In this regard, to confirm the design assumptions, a final subgrade analysis must be performed on the finished subgrade.</p> <p>(b) That the pavement materials comply with this specification or RMS QA Specification 3051 or Queensland Department of Transport and Main Roads, Standard Specification Roads - MRTS05 Unbound Pavements.</p> <p>(c) That the subgrade under the subject pavement has been compacted in accordance with Development Construction Specification C213 - EARTHWORKS or RMS requirements.</p> | <p>Prerequisite compliance hold points</p> |
| <p>5. Pavement testing frequency shall be in accordance with Table 8.1 of AS 3798-2007. Pavement tests must conform to the requirements of this Specification.</p> | <p>Testing frequency</p> |
| <p>6. Sections C242.17 to C242.21 sets out testing frequency, relative compaction, acceptance/rejection criteria, and actions to follow tests which reveal non conformance.</p> | <p>Outcomes from pavement testing</p> |

MATERIALS

C242.06 GENERAL

- | | |
|---|--|
| <p>1. The Subdivider shall submit details of all constituents of the proposed base and subbase materials, including sources of supply and the proposed type and proportion of any binder. These details shall be submitted to the Certifying Engineer, supported with test results from a nominated NATA registered laboratory confirming that the constituents comply with the requirements of this Specification (see C242.05.4(b)). If the proposed base or subbase is a bound material, the Subdivider shall submit a completed Annexure C241A contained in the Specification for STABILISATION.</p> <p>The mix design nominated in Annexure C241A of the Specification for STABILISATION must comply with Queensland Transport or AUSTROADS mix design criteria or achieve the criteria in C242.09.9 and C242.09.10 of this specification.</p> | <p>Details of Proposed Base and Subbase to be Submitted</p> |
| <p>2. No material shall be delivered until the Certifying Engineer has approved the source of supply.</p> | <p>Source of Supply</p> |
| <p>3. If, after the Subdivider's proposals have been approved, the Subdivider wishes to make changes in any of the material constituents the Subdivider shall inform the Certifying Engineer in writing of the proposed changes. No delivery of material produced under the altered proposal shall take place without the approval of the Certifying Engineer. The cost of testing associated with any altered proposal shall be borne by the Subdivider.</p> | <p>Variations by Subdivider</p> <p>Subdivider's Cost</p> |
| <p>4. At least fourteen (14) days before placement of the material on site, the Subdivider shall submit a Certificate from a laboratory with appropriate NATA registration demonstrating and stating that the unbound material or the mix and its constituents comply with the requirements of this Specification.</p> | <p>NATA Certificate</p> |
| <p>5. Ongoing testing of materials during delivery and construction shall be undertaken</p> | <p>Sampling on-</p> |

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on samples taken from the site.

site

C242.07 TRAFFIC CATEGORY

1. Pavement materials are specified in terms of the Traffic Categories given in Table C242.1 for the calculated design traffic of the pavement.
2. The Traffic Category (or Design Traffic) for the pavement materials shall be as shown on the design plans.

**Pavement
Material Traffic
Category**

Design plans

Pavement Material Traffic Category	Description
1	Roads with design traffic equal to or exceeding 10^7 equivalent standard axle (ESA) repetitions.
2a	Roads with design traffic exceeding 4×10^6 ESAs but less than 10^7 ESAs.
2b	Roads with design traffic exceeding 10^6 ESAs but less than or equal to 4×10^6 ESAs.
2c	Roads with design traffic exceeding 10^5 ESAs but less than or equal to 10^6 ESAs.
2d	Roads with design traffic less than or equal to 10^5 ESAs.

Table C242.1 - Pavement Material Traffic Categories

C242.08 UNBOUND BASE AND SUBBASE

1. Unbound materials, including blends of two (2) or more different materials, shall consist of granular material which does not develop significant structural stiffness when compacted. Material produced by blending shall be uniform in grading and physical characteristics.
2. Unbound crushed rock materials are designated as follows:
 - DGB20 20mm nominal sized densely graded base
 - DGS20 20mm nominal sized densely graded subbase
 - DGS40 40mm nominal sized densely graded subbase
 - GMB20 20mm nominal sized graded macadam base
 - GMS40 40mm nominal sized graded macadam subbase
 - Type 2.1 MRS05 base
 - Type 2.2 MRS05 base
 - Type 2.3 MRS05 subbase
 - Type 2.4 MRS05 subbase
3. Unbound natural gravel materials are designated as follows:
 - NGB20-2c 20mm nominal sized natural gravel base for Traffic Category 2c
 - NGB20-2d 20mm nominal sized natural gravel base for Traffic Category 2d
 - NGS20 20mm nominal sized natural gravel subbase
 - NGS40 40mm nominal sized natural gravel subbase

**Granular
Material**

Crushed Rock

Natural Gravel

4. The acceptable material types for each Traffic Category are given in Table C242.2. **Material Types**

Traffic Category	Acceptable Base Material	Acceptable Subbase Material
1	DGB20, GMB20, Type 2.1	DGS20, DGS40, GMS40, Type 2.3
2a	DGB20, GMB20, Type 2.1	DGS20, DGS40, GMS40, Type 2.3
2b	DGB20, GMB20, Type 2.1	DGS20, DGS40, GMSS40, Type 2.3
2c	DGB20, GMB20, NGB20-2c, Type 2.1	DGS20, DGS40, GMS40, NGS20, NGS40, Type 2.3
2d	DGB20, GMB20, NGB20-2c, NGB20-2d, Type 2.2	DGS20, DGS40, GMS40, NGS20, NGS40, Type 2.4

Table C242.2 - Acceptable Pavement Material Types

5. Base materials shall comply with the requirements of Table C242.3. QDTMR type 2.1 and 2.2 materials shall comply with section 7.2 of MRTS05 - Unbound Pavements. **Base**

Test Method	Description	Base Material Requirements			
		DGB20	GMB20	NGB20-2c	NGB20-2d
AS 1289.3.6.1	Coarse Particle Size Distribution % passing 75.0mm sieve % passing 53.0mm sieve % passing 37.5mm sieve % passing 26.5mm sieve % passing 19.0mm sieve % passing 13.2mm sieve % passing 9.5mm sieve % passing 6.7mm sieve % passing 4.75mm sieve % passing 2.36mm sieve % passing 0.425mm sieve % passing 0.075mm sieve	- - - 100 95-100 - - 50-70 - 35-55 - -	- - - 100 95-100 - - 30-55 - 20-30 - -	- - - 100 93-100 - 71-87 - 47-70 35-56 14-32 6-20	- - - 100 93-100 - 71-87 - 47-70 35-56 14-32 6-20
AS 1289.3.6.3	Fine Particle Size Distribution Ratios expressed as percentages (for that portion of the material passing 2.36mm sieve) A. Pass 425µm sieve % B. Pass 75µm sieve % Pass 425µm sieve C. Pass 13.5µm sieve % Pass 75µm sieve	35-55 35-55 35-60	30-50 30-50 -	- - -	- - -
AS 1289.3.1.1	Liquid Limit (if non plastic) ▽	max 20	max 20	max 20	max 20
AS 1289.3.3.1	Plastic Limit (if plastic)	max 20	max 20	max 20	max 20
AS 1289.3.3.1	Plasticity Index ■	max 6	max 6	max 6	max 8

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Test Method	Description	Base Material Requirements			
		DGB20	GMB20	NGB20-2c	NGB20-2d
T114	Maximum Dry Compressive Strength on fraction passing 19mm sieve (only applies if Plasticity Index is less than 1)	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa	min 1.7 MPa
AS 1141.14	Particle Shape by Proportional Calliper % mis-shapen (2 : 1)	max 35	max 35	-	-
AS 1141.22	Aggregate Wet Strength ◇ For category 1 or 2a For category 2b or 2c For category 2d	min 80 min 70 min 60	min 150 min 130 min 100	- - -	- - -
AS 1141.22	Wet/Dry Strength Variation ◇ $\frac{\text{Dry} - \text{Wet}}{\text{Dry}} \%$ For category 1 or 2a For category 2b or 2c For category 2d	max 35 max 40 max 45	max 30 max 30 max 30	- - -	- - -
AS 1289.6.1.1	4 day Soaked CBR (100% Standard Compaction)	-	-	80	60

Table C242.3 - Unbound Base Material Properties

NOTES ON TABLE C242.3:

Material consisting of rounded river stone shall have a minimum of two (2) fractured faces on at least 75 per cent of the particles larger than 6.70mm.

- ▼ The maximum value of the Liquid Limit may be increased to 23 for non-plastic material, provided that the value determined is not influenced by the presence of adverse constituents.
- For category 2d base materials the maximum Plasticity Index shall be 8.
- ◇ All fractions of the sample specified by AS 1141.22 must be within specification. The fraction with the highest wet/dry strength variation is the value for determining conformance with the specification. The fractions 19.0mm to 13.2mm and 6.7mm to 4.75mm must be tested.

6. Subbase materials shall comply with the requirements of Table C242.4. QDTMR type 2.3 and 2.4 materials shall comply with section 7.2 of MRTS05 - Unbound Pavements.

Subbase

Test Method	Description	Subbase Material Requirements				
		DGS20	DGS40	GMS40	NGS20	NGS40
AS 1289.3.6.1	Coarse Particle Size Distribution % passing 75.0mm sieve % passing 53.0mm sieve % passing 37.5mm sieve % passing 26.5mm sieve % passing 19.0mm sieve % passing 13.2mm sieve % passing 9.5mm sieve % passing 6.7mm sieve % passing 4.75mm sieve % passing 2.36mm sieve % passing 0.425mm sieve % passing 0.075mm sieve	- - - 100 95-100 - - 50-70 - 35-55 - -	- 100 - - 50-85 - - 30-55 - 25-50 - -	- 100 - - 50-75 - - 15-35 - 5-15 - -	- - - 100 96-100 - 65-89 - 47-80 32-67 14-42 6-26	- 100 95-100 80-97 - - 48-85 - 35-73 25-58 10-33 3-21
AS 1289.3.6.3	Fine Particle Size Distribution Ratios expressed as percentages (for that portion of the material passing 2.36mm sieve) A. Pass 425µm sieve % B. Pass 75µm sieve % Pass 425µm sieve C. Pass 13.5µm sieve % Pass 75µm sieve	35-55 35-55 35-60	35-60 35-60 35-65	25-50 25-50 -	- - -	- - -
AS 1289.3.1.1	Liquid Limit (if non plastic)	max 23	max 23	-	max 23	max 23
AS 1289.3.3.1	Plastic Limit (if plastic)	max 20	max 20	-	max 23	max 23
AS 1289.3.3.1	Plasticity Index	max 12	max 12	max 12	max 12	max 12
T114	Maximum Dry Compressive Strength on fraction passing 19mm sieve (only applies if Plasticity Index is less than 1)	min 1.0 MPa	min 1.0 MPa	-	1.0 MPa	1.0 MPa
AS 1141.14	Particle Shape by Proportional Calliper % mis-shapen (2 : 1)	max 35	max 35	max 35	-	-
AS 1141.22	Aggregate Wet Strength ♦	min 50kN	min 50kN	min 130kN	-	-
AS 1141.22	Wet/Dry Strength Variation ♦ Dry - Wet % Dry	max 60	max 60	max 30	-	-
AS 1289.6.1.1	4 day Soaked CBR (100% Standard Compaction)	-	-	-	30	30

Table C242.4 - Unbound Subbase Material Properties

NOTES ON TABLE C242.4:

Material consisting of rounded river stone shall have a minimum of two (2) fractured faces on at least 75 per cent of the particles larger than 6.70mm.

- ♦ All fractions of the sample specified by AS 1141.22 must be within specification. The fraction with the highest wet/dry strength variation is the value for determining conformance with the specification. The fractions 19.0mm to 13.2mm and 6.7mm to 4.75mm must be tested.

7. Where the proposed unbound base or subbase material complies with all of the requirements of Table C242.3 or Table C242.4 as appropriate except gradings (AS 1289.3.6.1 and AS 1289.3.6.3), the Subdivider may propose the use of the material, subject to approval of the Certifying Engineer, if the material complies with the RTA Modified Texas Triaxial Classification Number (T171) requirements specified in Table C242.5, (T171 tested at not less than 85 per cent of Optimum Moisture Content and 100 per cent of Maximum Dry Density as determined by AS 1289.5.1.1).

Modified Texas Triaxial Classification

Traffic Category	Modified Texas Triaxial Classification Number (Test Method T171)	
	Base	Subbase
1	max 2.0	max 2.5
2a	max 2.2	max 2.5
2b	max 2.5	max 3.0
2c	max 3.0	max 3.0
2d	max 3.0	max 3.0

Table C242.5 - RTA Modified Texas Triaxial Classification Number Requirements

C242.09 LIME MODIFIED BASE AND SUBBASE MATERIALS

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| 1. | Modification of unbound base and subbase materials to meet the requirements of Clause C242.08 by the addition of hydrated lime or quicklime shall be subject to approval by the Certifying Engineer and to the additional requirements of this clause. After modification, the material shall meet the requirements of Clause C242.08. | Lime Modification |
| 2. | Modification of materials for Traffic Categories 1, 2a and 2b shall only be by use of hydrated lime mixed in a stationary mixing plant at the supplier's quarry. | Traffic Categories 1, 2a, 2b |
| 3. | Modification of materials for Traffic Categories 2c and 2d may be by the use of either hydrated lime through a stationary mixing plant or by hydrated lime or quicklime utilising in-situ operations. | Traffic Categories 2c, 2d |
| 4. | Material requirements of hydrated lime and quicklime shall be in accordance with the Specification for STABILISATION. | Lime |
| 5. | The method of incorporating lime through the stationary mixing plant shall ensure that the lime is mixed uniformly through the material. | Incorporation |
| 6. | In-situ operations shall be in accordance with the Specification for STABILISATION. | In-situ Operations |
| 7. | The proportion of lime shall be not less than 1.5 per cent nor more than 4 per cent by mass. The material prior to lime treatment shall not contain any added pozzolanic material. | Proportion |

- | | | |
|-----|---|---|
| 8. | The lime treated material shall yield an unconfined compressive strength not exceeding 1.0 MPa, when tested in accordance with Test Method T116 where sampling is undertaken within 24 hours of adding the lime and testing is after 7 days accelerated curing. | <i>Unconfined Compressive Strength</i> |
| 9. | For DGB20 material, prior to being treated with lime, the material shall comply with the requirements of DGS20 in Table C242.4, except that the aggregate wet strength shall not be less than 80kN and the wet/dry strength variation shall not exceed 60 per cent. | <i>DGB20</i> |
| 10. | For DGB20, the lime treated material shall yield a CBR value of not less than 100 when tested in accordance with AS 1289.6.1.1, where sampling is undertaken within 24 hours of adding the lime and testing is after 7 days of accelerated curing. | <i>CBR Value</i> |

C242.10 BOUND BASE AND SUBBASE MATERIALS

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| 1. | Bound materials utilised in semi-rigid pavements as a base layer for Traffic Categories 1, 2a and 2b shall be supplied as a crushed rock product with stabilising agent incorporated in a stationary mixing plant (pugmill) at the supplier's quarry unless prior written approval is obtained from the Certifying Engineer. | <i>Traffic Categories 1, 2a, 2b</i> |
| 2. | Bound material to be used as subbase generally or base layer for Traffic Categories 2c and 2d may be supplied as a crushed rock product with stabilising agent incorporated in a pugmill or may be produced by the in-situ stabilisation of natural or blended gravel where stabilisation is undertaken by mobile plant at the site. | <i>Traffic Categories 2c, 2d</i> |
| 3. | Prior to stabilisation, the base layer material shall meet the requirements of Table C242.4 for subbase material for the appropriate Traffic Category. | <i>Material Requirements Prior to Stabilisation</i> |
| 4. | Material requirements for the stabilising agent shall be in accordance with the Specification for STABILISATION. | <i>Stabilising Agent</i> |
| 5. | The stabilisation process shall meet the requirements of the Specification for STABILISATION. | <i>Stabilisation</i> |
| 6. | The unconfined compressive strength (UCS) of the material after seven (7) days accelerated curing as determined by Test Method T131 shall be not less than 4MPa nor more than 10MPa. Sampling and test specimen compaction of the material shall be undertaken within one (1) hour of the incorporation of the stabilising agent. | <i>Unconfined Compressive Strength</i> |

DELIVERY, STOCKPILING AND PROCESSING OF PAVEMENT MATERIAL

C242.11 DELIVERY TO SITE

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| 1. | Materials shall be supplied sufficiently damp to avoid segregation and loss of fines during transit. | <i>Damp Condition</i> |
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C242.12 STOCKPILING OF UNBOUND MATERIALS

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| 1. | Stockpile sites shall be located as shown on the design plans or as approved by the Certifying Engineer. | <i>Stockpile Sites</i> |
| 2. | Stockpile sites, which shall be cleared of all vegetation and extraneous matter, shall be shaped to form a crown so as to be free draining and compacted over the whole area to provide a relative compaction, determined by AS 1289.5.1.1 for standard compactive effort, of not less than 95 per cent. | <i>Compacted and Free Draining</i> |

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| 3. | Stockpiles and stockpile sites shall be maintained so as to prevent the stockpiled materials from becoming intermixed or contaminated with foreign material. | Stockpile Requirements |
| 4. | The total height of any stockpile shall not exceed 3m. | Height |
| 5. | Stockpiles shall be of uniform shape with side slopes neither steeper than 1.5h to 1v nor flatter than 3h to 1v. | Shape |
| 6. | The worked face of any stockpile shall be the full face of the stockpile. The stockpiled material shall be maintained at a moisture content sufficiently damp to avoid loss of fines. | Maintained Damp |
| 7. | At the completion of the works, stockpile sites shall be cleared of all surplus material and left in a clean and tidy condition. | Completion of Work |

C242.13 DELIVERY OF MODIFIED OR BOUND MATERIALS

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| 1. | Modified or bound materials shall be delivered in vehicles fitted with covers of canvas or other suitable material to prevent loss of moisture during transport. | Vehicle Deliveries |
| 2. | The time between mixing and conveyance by delivery trucks to the site, shall be such as to allow incorporation into the works including trimming and compaction within the Nominated Field Working Period. | Time Limit |
| 3. | Each truck load of bound material shall be identified by delivery dockets, indicating the time and date of mixing and registration or fleet number of the delivery truck, and such dockets shall be made available to the Certifying Engineer at the point of delivery. | Delivery Dockets |
| 4. | Bound materials shall comply with the requirements of the Specification for STABILISATION. | |

SPREADING OF PAVEMENT MATERIAL

C242.14 SPREADING PAVEMENT MATERIALS

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| 1. | Unbound materials shall not be spread upon an underlying pavement layer which has a moisture content exceeding 90 per cent of the laboratory optimum moisture content as determined by AS 1289.5.1.1 or which has become rutted or mixed with foreign matter. The underlying layer shall be corrected to comply with this Specification before spreading of the next layer of pavement. | Underlying Layer Quality |
| 2. | Where the underlying layer was constructed by the Subdivider, or where the Subdivider's activities caused the underlying layer constructed by others to become non-complying with this Specification, the cost of correcting the underlying layer to comply shall be borne by the Subdivider. | Subdivider's Costs |
| 3. | Each layer of material shall be deposited and spread in a concurrent operation and, after compaction, the finished surface levels on the base and subbase courses shall be within the permitted tolerances stated in Clause C242.22(c) without subsequent addition of material. The thickness of each compacted layer shall be neither less than 100mm nor more than 200mm for all pavement layer types, unless otherwise approved by the Certifying Engineer. | Tolerances |
| 4. | At all work boundaries in bound materials the Subdivider shall provide vertical faces to provide for transverse and longitudinal joints. | Joints |

5. When spread for compaction processes the moisture content of the base or subbase materials shall be in the range of 60-90 per cent of laboratory optimum moisture content in accordance with AS 1289.5.1.1.
6. Bound materials shall not be spread when the ambient air temperature in shade is either below 5°C or above 35°C.

TRIMMING AND COMPACTION

C242.15 GENERAL REQUIREMENTS

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| 1. | Each layer of the base and subbase courses shall be uniformly compacted over its entire area and depth to satisfy the requirements of relative compaction set out in Clauses C242.19 and C242.20. | <i>Uniform
Compaction</i> |
| 2. | On sections of pavement with one-way crossfall, compaction shall begin at the low side of the pavement and progress to the high side. On crowned sections, compaction shall begin at the sides of the pavement and progress towards the crown. Each pass of the rollers shall be parallel with the centreline of the roadway and uniformly overlap each preceding pass. The outer metre of both sides of the pavement shall receive at least two (2) more passes by the compaction plant than the remainder of the pavement. | <i>Compaction
Procedure</i> |
| 3. | At locations where it would be impracticable to use self propelled compaction plant, the pavement material shall be compacted by alternative hand-operated plant approved by the Certifying Engineer. | <i>Hand Operated
Plant</i> |
| 4. | Watering and compaction plant shall not be allowed to stand on the pavement being compacted. | <i>Plant
Movement
Restrictions</i> |
| 5. | If any unstable areas develop during rolling, the unstable material shall be rejected. The rejected material shall be removed for the full depth of the layer, disposed of and replaced with fresh material in accordance with Clause C242.24. This operation will be at cost to the Subdivider. | <i>Unstable Areas
Subdivider 's
Cost</i> |
| 6. | The placement of subsequent layers shall not be allowed until the requisite testing has been completed and the test results for each layer have been accepted by the Certifying Engineer. | <i>Placing
Subsequent
Layers</i> |
| 7. | Any unbound material in a layer that has attained the specified relative compaction but subsequently becomes wetted up shall be dried out and, if necessary, uniformly recompacted and trimmed to meet the specified density requirements and level tolerances. | <i>Excessive
Moisture
Content</i> |

C242.16 CURING OF BOUND MATERIALS

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| 1. | The curing of the surface layer of a lot shall commence after compaction is completed. | <i>Commence-
ment Time</i> |
| 2. | The stabilised work shall be protected against rapid drying out by keeping it continuously wet or damp during the period prior to the provision of a subsequent layer or the application of a prime or primer-seal. | <i>Water Curing</i> |
| 3. | Water curing shall consist of frequent light uniform spraying that will not produce significant run off or flooding on sections of the area. Slurrying of the surface or leaching of the stabilising agent shall be avoided. | <i>Caution</i> |

ACCEPTANCE OF COMPACTED LAYERS

C242.17 LOTS FOR ACCEPTANCE

1. Acceptance of work, as far as compaction is concerned, shall be based on density testing of the work in lots. A lot shall be nominated by the Subdivider, but shall conform to the following: **Lot Requirements**
- (a) cover only a single layer of work which has been constructed under uniform conditions in a continuous operation and not crossing any transverse construction joints;
 - (b) for unbound materials it may equal a day's output using the same material.

C242.18 COMPACTION ASSESSMENT

1. The Certifying Engineer shall assess compaction for each lot based on random sampling of test locations for in-situ dry density testing. **Density Testing**
2. The Subdivider shall arrange for testing to assess compaction on the basis of ten (10) tests per 5000m² with a minimum of three (3) tests per lot, and present the results to the Certifying Engineer for approval. **Sampling**
3. The cost of all testing for compaction assessment of any layer in an area of pavement shall be borne by the Subdivider. **Subdivider's Costs**
4. Alternatively, if agreed by the Certifying Engineer and Council, acceptance of lots may be determined according to the elastic rebound deflection. The elastic rebound deflection shall be taken as the maximum deflection in accordance with Test Method T160 utilising the Benkelman Beam or equivalent. The average maximum deflection for any lot shall not exceed 1.0mm, and the co-efficient of variation (CV) in recorded deflections shall not exceed 30 per cent. Measurements shall be taken at the rate of 4 per 1000 square metres, with a minimum of ten (10) measurements per lot. **Benkelman Beam Testing**

C242.19 RELATIVE COMPACTION

1. The relative compaction of pavement material at each location tested for in-situ dry density shall be calculated in accordance with AS 1289.5.4.1 as follows: **Calculation**

$$\text{Relative Compaction (per cent)} = \frac{\text{In-situ dry density}}{\text{Comparative dry density}} \times 100$$

NOTE: The comparative dry density shall be the maximum dry density determined in the laboratory.

2. The Certifying Engineer may approve some or all of the in-situ dry density testing to be carried out with a single probe Nuclear Density Meter in the direct transmission mode in accordance with AS 1289.5.8.1. **In-Situ Dry Density Testing**
3. Each day that material is produced for placement in a layer or layers, a sample of the material shall be taken by the Subdivider for maximum dry density testing to represent that day's production. **Daily Samples**
4. For unbound layers, the sample shall be tested in accordance with AS 1289.5.1.1 to determine the maximum dry density (standard compactive effort) for the material. **Maximum Dry Density**

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| 5. | For bound layers the sample shall be tested within two (2) hours after the addition of stabilising agent to the mix in accordance with RTA Test Method T130 to determine the maximum dry density (standard compactive effort) for the material. This test method shall also be used to determine the optimum moisture content. | <i>Time for Testing</i> |
| 6. | The maximum dry density so determined shall be used as the comparative dry density in relative compaction calculations for all material from that lot or day's production placed in a single layer of work whichever is the lesser. | <i>Comparative Dry Density</i> |

C242.20 COMPACTION REQUIREMENTS AND ACCEPTANCE

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| 1. | A lot shall be accepted for compaction if: | |
| | (a) The minimum value of all calculated relative compaction for standard compactive effort is not less than 100 per cent within the lot or the area of pavement being assessed. | |
| 2. | Lots or areas of pavement not achieving these specified values shall be rejected. Unbound layers may be reworked as provided by Clause C242.21, but the bound materials in rejected layers/courses shall be removed and replaced with fresh materials in accordance with Clause C242.24. | <i>Rejection of Lots</i> |

C242.21 REWORKING OF REJECTED UNBOUND LAYERS

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| 1. | Lots or areas of pavement that have been rejected in regard to compaction shall be reworked before resubmission for compaction assessment. | <i>Reworking</i> |
| 2. | Material that has become degraded, segregated or otherwise reduced in quality by reworking shall be rejected. The rejected material shall be removed, disposed of and replaced with fresh material complying with this Specification in accordance with Clause C242.24. When a lot or area of pavement is resubmitted for compaction assessment, testing shall be carried out in accordance with Clauses C242.18 and C242.19. | <i>Rejected Material</i> |
| 3. | All costs associated with corrective work carried out before the resubmission of a lot for compaction assessment, including rewatering, re-rolling, removal and replacement of material as well as reworking shall be borne by the Subdivider. | <i>Subdivider's Costs</i> |

C242.22 TOLERANCES

a) General

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| 1. | The tolerances stated are the acceptable limits of departure from the dimensions shown on the design plans, which may occur during construction. | <i>Tolerances</i> |
| 2. | Areas for assessment of conformity with tolerance requirements shall be divided into lots and presented to the Certifying Engineer together with survey reports covering line and level. | <i>Lots for Assessment of Conformity</i> |

b) Width

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| 1. | At any cross section without kerb and/or guttering, and for pavement layers extending under the kerb and/or guttering, the horizontal dimension measured from the design centre line to the edge of the constructed pavement surface shall be neither less than 50mm less than the dimension nor more than 300 mm greater than the dimension shown on the design plans. | <i>Horizontal Dimensions</i> |
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| 2. | The average width of the layer determined from measurements at three (3) sites selected at random by the Certifying Engineer over any 200 metre road length, or part thereof, shall be not less than the specified width. | <i>Average Width</i> |
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| c) Levels and Surface Trim | | |
| 1. | The levels of the finished surface of the top of the unbound subbase course shall not vary from the design levels by more than ± 10 mm. | <i>Subbase Surface Level</i> |
| 2. | Level tolerances at the top of the unbound base course shall not exceed those stated above for subbase. In addition, where kerb and gutter exists or is being constructed, the level of the top of the base course adjacent to the kerb and gutter shall not vary by more than ± 5 mm from the lip level of the gutter minus the design thickness of the wearing surface. | <i>Base Surface Level</i> |
| 3. | The design level of the top of the subbase course shall be determined from the design level of the finished road surface less the thickness of the base course and the wearing course, including an allowance for any flush seal layer in the pavement design. | <i>Subbase Design Level</i> |
| 4. | The pavement surface after trimming and immediately prior to sealing shall be of a quality such that the deviation under a 3 metre straight edge placed in any direction does not exceed 12mm. Measurements for conformance shall be taken in accordance with the maximum lot size and minimum test frequencies in the Specification Part for Quality Requirements. | <i>Straight Edge Deviation</i> |

C242.23 ACTION ON REJECTION

(a) Unbound Materials

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| 1. | A lot that has not complied with the requirements for width or level tolerance as set out in Clauses C242.22(b) and C242.22(c) respectively shall be rejected except as otherwise provided in this Clause. Rejected lots shall be removed, disposed of and replaced with fresh material in accordance with Clause C242.24. | <i>Rejection Criteria</i> |
| 2. | Notwithstanding the above, where the rejected lot can be corrected by further trimming, the Certifying Engineer may allow the surface to be corrected without complete removal and replacement with fresh material. Such trimming shall be undertaken in a manner that produces a uniform, hard surface and shall be achieved by cutting only without filling. After any such cutting, the level tolerances in Clause C242.22(c) shall apply. | <i>Corrective Action</i> |
| 3. | The cost of surface correction or replacement work ordered in accordance with this Clause including removal of material, disposal and supply and transport of replacement material, shall be borne by the Subdivider. | <i>Subdivider's Costs</i> |

(b) Bound Materials

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| 1. | An area of bound material that has not complied with the requirements for width or level tolerance as set out in Clauses C242.22(b) and C242.22(c) respectively shall be rejected except as otherwise provided for in this Clause. Rejected areas shall be removed, disposed of and replaced with fresh material in accordance with Clause C242.24. | <i>Rejection Criteria</i> |
| 2. | The cost of removal and disposal of rejected material and its replacement with fresh material shall be borne by the Subdivider. | <i>Subdivider's Costs</i> |
| 3. | Notwithstanding the above, the Certifying Engineer may allow the Subdivider to rectify the area in the following cases: | <i>Corrective Action Circumstances</i> |
| (i) | Where the cause for rejection is under Clause C242.22(c), the course is a subbase course and rejection is due to departures from design level being too far below the | |

design level, the Subdivider may increase the thickness of the base course to make up such deficiency in thickness.

- (ii) Where the cause for rejection is under Clause C242.22(c), the course is a subbase course and rejection is due to departures from design level being too far above the design level, the Subdivider may propose a regrading of the design level of the base course, to allow for its design thickness to be laid, up to a maximum of 20mm above the original design level. Approval by the Certifying Engineer shall be subject to the following requirements:
 - The rate of change of grade from the original finished design surface level shall be less than 3 mm per metre.
 - The regrading shall not interfere with the proper design functioning of the drainage system.
 - The regrading shall not interfere with levels at the property boundary, or increase or decrease footpath or footpath crossover levels or grades beyond Council's allowable design limits.
 - The regrading shall not interfere with clearances.

- (iii) Where the cause for rejection is under Clause C242.22(c), the course is a base course and rejection is due to departures from design level being too far above the design level, the Subdivider may propose a regrading of the design level of the base course. Approval by the Certifying Engineer shall be subject to the requirements of this Clause in (ii) above.

The cost associated with surface level corrections required in this Clause shall be borne by the Subdivider.

Subdivider's Costs

C242.24 REMOVAL AND REPLACEMENT OF REJECTED COURSES

- 1. Sections of the work that have been rejected shall be removed from the work and replaced with fresh material. Rejected material shall be removed from site. ***Rejected Material***
- 2. In rejected sections the material shall be removed over the full length of the rejected lot, except that a minimum length of 50 m of pavement layer shall be removed and replaced. Any damage to underlying or abutting layers or structures shall be made good by the Subdivider using methods approved by the Certifying Engineer. ***Length to be Removed***
- 3. The Certifying Engineer may approve removal for less than the full width as constructed if the cause of the rejection of the work can be isolated transversely to the Certifying Engineer's satisfaction. In this case, the new longitudinal cold joint shall be formed and located along the centreline of the road pavement. ***Certifying Engineer's Discretion***
- 4. After removal of rejected base or subbase course material, the section shall be presented for inspection by the Certifying Engineer before replacement work is commenced. ***Inspection Before Replacement***
- 5. Materials used as replacement materials, and the subsequent spreading, compaction, trimming, curing and testing of the replacement materials, shall comply with the requirements of this Specification. ***Replacement Material***
- 6. All costs associated with removals, replacements and corrections of base and subbase courses required under this Clause and the extra costs incurred by the Subdivider in respect of delays caused by such removals, replacements and corrections shall be borne by the Subdivider. ***Subdivider's Costs***

C242.25 MAINTENANCE BEFORE COMPLETION OF WEARING SURFACE

- 1. Following the Certifying Engineer's acceptance of any section of the work, the Subdivider shall maintain the prepared surface of the base in the condition specified for acceptance until the wearing surface is completed. The base course of sections ***Primerseal***

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of the accepted work shall be covered with a primerseal over the full width of pavement in accordance with the Specification for SPRAYED BITUMINOUS SURFACING within seven (7) days of the date of the acceptance of such sections, unless otherwise approved by the Certifying Engineer.

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| 2. | Should the pavement condition deteriorate before the application of the primerseal and consent to proceed with the bitumen surfacing work is withdrawn by the Certifying Engineer, the Subdivider shall re-prepare the pavement and re-present the pavement for inspection by the Certifying Engineer. | <i>Subdivider's Responsibility</i> |
| 3. | The cost of re-preparing areas of the deteriorated pavement shall be borne by the Subdivider. | <i>Subdivider's Cost</i> |
| 4. | The Subdivider shall maintain adequate drainage of the pavement, and remove any ponded water within 12 hours of its creation if free drainage cannot be achieved, prior to the completion of the wearing course. | <i>Surface Drainage</i> |

OPENING PAVEMENT TO TRAFFIC

C242.26 GENERAL REQUIREMENTS

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| 1. | For unbound pavements, construction plant and vehicles not involved in the current construction or testing of the work shall not be permitted to use the pavement until the primerseal has been applied, unless otherwise approved by the Certifying Engineer. | <i>Restrictions on Movement</i> |
| 2. | For bound pavements, construction plant and vehicles not involved in the current construction or testing of the work shall not be permitted to use the pavement until the primerseal has been applied and seven (7) days have elapsed since placement of the base. In any case only vehicles registered for legal road usage and loaded within legal limits will be allowed to use the pavement. | <i>Restrictions on Movement of Construction Traffic</i> |
| 3. | For bound pavements, traffic shall not be allowed to use the constructed pavement until a minimum of seven (7) days after completion of the full pavement depth and the primerseal. | <i>Open to Traffic Bound Pavement</i> |

LIMITS AND TOLERANCES

C242.27 SUMMARY OF LIMITS AND TOLERANCES

The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C242.6 below:

Item	Activity	Limits/Tolerances	Spec Clause
1.	Stockpile Sites	(i) Relative Compaction >95% (ii) Stockpile height <3m (iii) Stockpile batter <1.5:1 and >3:1	C242.12 C242.12
2.	Spreading Pavement Materials		
	(i) Compacted Layer Thickness	≥100mm, ≤200mm	C242.14
3.	Compaction Acceptance		
	Minimum value of all calculated relative compaction results	>100 per cent (standard compactive effort).	C242.20
4.	Width of Pavement		
	(i) Design centre-line to edge of constructed pavement	-50mm to +300mm of dimensions on design plans	C242.22(b)
	(ii) Average Width	The average width determined from 3 random sites over any 200m road length, or part thereof, shall be not less than the specified width.	C242.22(b)
5.	Surface Level		
	(i) Subbase levels	<±10mm from design level	C242.22(c)
	(ii) Base levels	<±10mm from design level	C242.22(c)
	(iii) Base levels adjacent to Kerb and Gutter	<±5mm from the lip levels of adjacent gutter minus design thickness of wearing surface.	C242.22(c)
	(iv) Shape	Deviation from a 3m long straightedge on base surface immediately prior to sealing shall be less than 12mm	C242.22(c)

Table C242.6 - Summary of Limits and Tolerances

SPECIAL REQUIREMENTS

C242.28 RESERVED

C242.29 RESERVED

C242.30 RESERVED

C242.31 RESERVED