

**Specification (Measurement)**

**Transport and Main Roads Specifications  
MRS40 Concrete Pavements Base**

**November 2018**

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## 1 Introduction

This Specification applies to the construction of road pavements using concrete base for plain (PCP), jointed reinforced (JRCP), continuously reinforced (CRCP) and steel fibre reinforced (SFCP) concrete pavements.

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications*, MRS50 *Specific Quality System Requirements* and other Specifications as appropriate.

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

## 2 Measurement of work

### 2.1 General

All requirements in the Specification are the responsibility of the Contractor and are a cost to the Contractor unless specifically stated otherwise.

The Administrator may alter the base thickness and levels by up to 30 mm before the commencement of each section of work. Such variations in the scope of work will be covered by the scheduled rate, and the Contractor is not entitled to any additional payment over and above payment at the scheduled rate.

### 2.2 Standard Work Items

In accordance with the provisions of Clause 2 of MRS01 *Introduction to Specifications*, the Standard Work Items covered by this Specification are listed in Table 2.2.

**Table 2.2 – Standard Work Items**

Standard Item No.	Description	Unit of measurement
<b>Concrete Pavement Base</b>		
42901	Supply and place concrete in jointed unreinforced base	m <sup>3</sup>
42902	Supply and place concrete in continuously reinforced base	m <sup>3</sup>
42903	Supply and place concrete in jointed reinforced base	m <sup>3</sup>
42904	Supply and place steel fibre reinforced concrete base	m <sup>3</sup>
42905	Terminal and slab anchors	m <sup>3</sup>
42906	Finish, cure and texture base	m <sup>2</sup>
42907	Longitudinal joints	m
42908	Expansion joints and isolation joints	m
42909	Transverse contraction joints	m
42910	Supply and place reinforcing mesh	m <sup>2</sup>
42911	Supply and place steel bar reinforcement	tonne

### 2.3 Work Operations

Work Operations include the removal from the site and safe disposal of Work and materials which do not conform and are not accepted for a reduced level of service, and their replacement with Work and materials that conform to the requirements of the documents and Standard Drawings for the project.

**Item 42901      Supply and place concrete in jointed unreinforced base**

**Item 42902      Supply and place concrete in continuously reinforced base**

**Item 42903      Supply and place concrete in jointed reinforced base**

Work Operations incorporated in the above items include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the costs of mix designs and trials, paving trials, construction joints, outer edges and all concrete required to produce paved concrete.

The width and length are as specified on the Standard Drawings or as directed by the Administrator. The thickness is the thickness specified or as directed by the Administrator across each section. Include in the measurement the additional base above terminal anchors, taken from the Standard Drawings.

**Item 42904      Supply and place steel fibre reinforced concrete base**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the costs of steel fibre reinforcement, mix designs and trials, paving trials, construction joints, outer edges and all concrete required to produce paved concrete.

The width and length are as specified on the Standard Drawings or as directed by the Administrator. The thickness is the thickness specified or as directed by the Administrator across each section. Include in the measurement the additional base above terminal anchors, taken from the Standard Drawings.

**Item 42905      Terminal and slab anchors**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*
- b) excavation for the anchor, and
- c) the provision of concrete anchors.

The volume is taken from the Drawings or as directed by the Administrator. The depth is measured from the top of the subbase.

**Item 42906      Finish, cure and texture base**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the achievement of conforming finish, cure and texture.

The width and length are as specified on the Standard Drawings or as directed by the Administrator. The sides of the slabs must not be included in the measurement of surface area.

#### **Item 42907 Longitudinal joints**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the provision of tiebars (where specified) and the application of debonding treatment at formed joints.

The measurement is along the line of the joint.

#### **Item 42908 Expansion joints and isolation joints**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the provision of dowels (where specified).

The measurement is along the line of the joint.

#### **Item 42909 Transverse contraction joints**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the provision of dowels (where specified).

The measurement is along the line of the joint. Provide a separate rate for SFCP (where applicable).

#### **Items 42910 Supply and place reinforcing mesh**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the supply and placement of reinforcing mesh.

The width and length are as specified on the Standard Drawings or as directed by the Administrator. The areas that contain laps must only be measured once.

#### **Item 42911 Supply and place steel bar reinforcement**

Work Operations incorporated in the above item include:

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*, and
- b) the supply and placement of bar reinforcement in base and anchors, but excluding dowels and tiebars.

The mass is determined from the unit masses given in Clause 7 of AS/NZS 4671 *Steel Reinforcing Materials* and the actual length of bar, excluding laps and splices, measured in place. Only one bar may be measured within a lap or splice.

### **3 Payment adjustment for ride quality**

Unless indicated otherwise in Clause 1 of Annexure MRS40.1, an additional payment shall be made for the additional benefit of an improved standard of surface evenness as represented by the International Roughness Index (IRI). The additional payment shall be determined from the incentive values in Table 3.

Where approved by the Administrator, a lot which has an IRI greater than the maximum roughness limit, but not greater than the grinding limit, may be utilised for a reduced level of service at a reduced rate provided that:

- a) the Contractor takes the necessary action to prevent recurrence of the nonconformance, and
- b) the Contractor accepts payment for the lot at the reduced value determined from the deduction values in Table 3.

A payment adjustment does not apply:

1. to any area which is to be removed, for whatever reason, at no cost to the Administrator, and/or
2. where an adjacent and adjoining lane was constructed in a prior contract.

The payment adjustment is applied to Standard Work Items 42901, 42902, 42903 and 42904 after conversion to a square metre rate (based on the thickness as specified or as directed by the Administrator) across each segment. The width and length are as specified in Clause 9.5.3 of *MRTS40 Concrete Pavement Base*. Grinding may be used under Clause 9.5.3 of *MRTS40 Concrete Pavement Base* to increase the level of incentive payment.

The payment adjustment for any segment (with the exception of ramp junction zones) applies to the width of the slab bounded by longitudinal joints. For the left (slow) lane of a typical dual lane carriageway, the payment adjustment applies to the slab width bounded by the formed shoulder joint and the induced central joint. For the adjacent right (fast) lane, the result applies to the width bounded by the central induced joint and the outer median edge, including any integrally placed median shoulder. Within ramp junctions, the payment adjustment applies to the total width of the traffic lanes bounded by outer edge lines.

For base which is nonconforming in terms of thickness, compaction or strength:

- a) an incentive will not apply, notwithstanding its possible acceptance by the Administrator, and
- b) a deduction will be applied to base which is accepted by the Administrator.

Replacement base (as covered by Clause 9.6 of *MRTS40 Concrete Pavement Base*) shall be assessed for both incentive and deduction.

**Table 3 – Payment adjustment (incentive / deduction) for concrete pavement ride quality**

Roughness (m/km)	Incentive/deduction (%)				
	PRC 1	PRC 2	PRC 3	PRC 4	PRC 5
< 0.90	+ 3.0	+ 3.0	+ 3.0	+ 3.0	0
0.90–1.10	+ 2.0	+ 2.0	+ 2.0	+ 2.0	0
1.10–1.30	+ 1.0	+ 1.0	+ 1.0	+ 1.0	0
1.30–1.50	+ 1.0	+ 1.0	+ 1.0	+ 1.0	0
1.50–1.70	0	0	0	+ 1.0	0
1.70–1.90	- 2.0	0	0	+ 1.0	0
1.90–2.10	- 2.0	- 1.0	0	0	0
2.10–2.30	- 4.0	- 3.0	- 2.0	0	0
2.30–2.50	- 8.0	- 5.0	- 2.0	0	0

Roughness (m/km)	Incentive/deduction (%)				
	PRC 1	PRC 2	PRC 3	PRC 4	PRC 5
2.50–2.70	- 16.0	- 8.0	- 4.0	- 1.0	0
2.70–2.90	Grind	- 12.0	- 8.0	- 4.0	- 2.0
2.90–3.10	Grind	- 16.0	- 16.0	- 8.0	- 4.0
3.10–3.30	Grind	Grind	Grind	- 12.0	- 8.0
3.30–3.50	Grind	Grind	Grind	- 16.0	- 12.0
> 3.50	Grind	Grind	Grind	Grind	- 16.0

Notes:

1. PRC categories defined in MRS40 *Concrete Pavement Base*.
2. "+" denotes an incentive (increased payment).
3. "-" denotes a deduction (reduced payment).

#### 4 Utilisation of a nonconforming lot for a reduced level of service

Where approved by the Administrator, a nonconforming production lot may be utilised for a reduced level of service provided that:

- a) the Contractor takes the necessary action to prevent recurrence of the nonconformance and states, on the non-conformance report, what action is to be taken, and
- b) the Contractor accepts payment for the lot at a reduced value.

##### 4.1 Standard Work Items 42901, 42902 and 42903

###### 4.1.1 Compressive strength

Nonconforming concrete accepted by the Administrator at a reduced level of service will be subject to a deduction of 4% of the schedule rate for each 0.5 MPa or part thereof deficiency in strength.

###### 4.1.2 Thickness

Nonconforming works accepted by the Administrator at a reduced level of service will be subject to deductions of the schedule rate as shown in Table 4.1.2.

**Table 4.1.2 – Deductions for nonconforming thickness**

Thickness deficiency (mm)				Deduction
Mean of subplot <sup>(1)</sup>	Individual points <sup>(1,2)</sup>			
	≥ 20 mm	10–15 mm	5 mm	
≥ 15 mm	U	U	U	NA <sup>(4)</sup>
10 mm	2 or more	U	U	NA <sup>(4)</sup>
	0–1	U	U	60%
5 mm	2 or more	U	U	NA <sup>(4)</sup>
	0–1	3 or more	U	60%
		0–2	U	45%

Thickness deficiency (mm)				Deduction
Mean of subplot <sup>(1)</sup>	Individual points <sup>(1,2)</sup>			
	≥ 20 mm	10–15 mm	5 mm	
≤ 0 mm <sup>(3)</sup>	2 or more	U	U	60%
	1	3 or more	U	45%
		0–2	U	24%
	0	3 or more	U	24%
		1–2	U	12%
		0	U	0%

Notes:

- (1) All values represent deficiencies except as stated in Note 3.
- (2) In cells labelled "U", there is no limit on the allowable number of under-thick points.
- (3) A value less than zero denotes a mean thickness that exceeds the specified minimum so is conforming.
- (4) Cannot be accepted at a reduced level of service. Remove and replace.

## 4.2 Standard Work Item 42904

### 4.2.1 Flexural strength

Concrete with a 28 day flexural strength between 5.0 MPa and 5.5 MPa may be accepted by the Administrator providing it represents no more than one in 20 sublots placed up to and including that subplot. Such concrete is subject to a deduction of 8% of the schedule rate for Standard Work Item 42904, for each 0.1 MPa or part thereof deficiency in flexural strength.

### 4.2.2 Thickness

Nonconforming works accepted by the Administrator at a reduced level of service will be subject to deductions of the schedule rate as shown in Table 4.1.2 with the following amendments:

- a) 18% deduction for areas with a mean thickness of 5 mm less than the specified thickness, and
- b) 45% deduction for areas with a mean thickness of 10 mm less than the specified thickness.

