

Master Specification Part RD-PV-C2

Construction of Shoulders

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RD-PV-C2 Construction of Shoulders

1 General

- a) This Master Specification Part sets out the requirements for the construction of unstabilised shoulders using the existing material and where necessary, “topping up” with imported material including:
 - i) the documentation requirements, as set out in section 2;
 - ii) the material requirements, as set out in section 3;
 - iii) the requirements for geometric design, as set out in section 4;
 - iv) the construction requirements, as set out in section 5;
 - v) the test procedures, as set out in section 6;
 - vi) the Hold Point requirements, as set out in section 7; and
 - vii) the verification requirements and records, as set out in section 8.
- b) This Master Specification Part does not apply to shoulders:
 - i) being constructed of entirely new material (see RD-PV-C1 “Construction of Unstabilised Granular Pavements” and RD-PV-D1 “Pavement Investigation and Design”); or
 - ii) that are being stabilised (see RD-PV-S2 “Plant Mixed Stabilised Pavement”, RD-PV-C3 “In situ Pavement Stabilisation” and RD-BP-C2 “Construction of Foamed Bitumen Stabilised Pavement” (as applicable)).
- c) For the purpose of this Master Specification Part, the shoulder is deemed to be pavement and may be sealed or unsealed.
- d) Prior to application of this Master Specification Part, the functional purpose of the shoulder and its alignment with traffic lane line marking must be completed to ensure the pavement has sufficient strength to support the traffic loading in accordance with RD-PV-D1 “Pavement Investigation and Design”. Evidence of compliance with this requirement must be submitted to the Principal as part of the Construction Documentation.
- e) The construction of unstabilised shoulders using existing materials must comply with the Reference Documents including:
 - i) Austroads Test Method AGPT-T251 Ball Penetration Test;
 - ii) AGRD Part 3: Geometric Design;
 - iii) AS 1289 Methods of testing soils for engineering purposes;
 - iv) Department Test Procedure TP164 Determination of the Dry Density/Moisture Content Relation of a Soil - 3 Point Method (available from: https://dit.sa.gov.au/standards/test_procedures);
 - v) Department Test Procedure TP166 Assignment of Maximum Dry Density and Optimum Moisture Content Values (available from: https://dit.sa.gov.au/standards/test_procedures);
 - vi) Department Test Procedure TP226 Sampling of Soil, Aggregates and Rocks (available from: https://dit.sa.gov.au/standards/test_procedures); and
 - vii) Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio (available from: https://dit.sa.gov.au/standards/test_procedures).

2 Documentation

2.1 Construction Documentation

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

- a) evidence of compliance with section 1d);
- b) the geometric details required in section 4b) (where applicable); and
- c) the method of MDD determination required in section 5.4c).

2.2 Quality Management Records

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

- a) NATA endorsed test results for the pavement material as required in section 3b);
- b) pavement compaction test results as required in section 5.4d);
- c) pavement hardness test results as required in section 5.5a); and
- d) the verification records required by section 8.

3 Materials

- a) If there is insufficient material in the shoulders to achieve the crossfall specified in the Contract Documents, the Contractor must import additional suitable pavement material in accordance with the Contract Documents and RD-PV-S1 “Supply of Pavement Materials” and add it to the existing material prior to mixing.
- b) The Contractor must provide test results endorsed by a NATA accredited laboratory for the pavement material bulk sample, in accordance with RD-PV-S1 “Supply of Pavement Materials”, as part of the Quality Management Records.

4 Geometric design

- a) The finished surface of the shoulder and batters must comply with AGRD Part 3: Geometric Design and the following:
 - i) the geometric details must achieve the requirements of the Contract Documents including:
 - A. minimum sealed width and minimum sealed shoulder width;
 - B. minimum unsealed shoulder width (where specified);
 - C. minimum sealed shoulder widths on outside of curves (where applicable);
 - D. target cross-falls (where specified); and
 - E. minimum verge widths (where specified);
 - ii) for sealed shoulders on straight sections of road, crossfalls must be 3% or generally match the adjacent traffic lane;
 - iii) on superelevated sections of road, the shoulder on the high side and low side must have the same crossfall as the traffic lanes;
 - iv) the surface must not impede the free flow of water;
 - v) ponding of water must not occur;

- vi) the invert level in table drains must be ≥ 300 mm below the surface at the edge of formation;
 - vii) the formation width must not be widened; and
 - viii) the shape of shoulders at road junctions and access points to adjoining properties must be maintained.
- b) Where the shoulder geometric details have not been specified in the Contract Documents, the Contractor must provide proposed geometric details as part of the Construction Documentation.

5 Construction

5.1 Surface preparation and cut line position

- a) Prior to commencing construction of the shoulder, the area affected by the Works must be cleared of vegetation, rubbish and other unsuitable material by the Contractor and disposed of in an environmentally acceptable manner.
- b) The location of the proposed bitumen cut line must be set out 50 mm into the existing seal and allow for the following:
 - i) any irregularities in the existing edge of seal must be considered in the placement of the cut line; and
 - ii) the cut line must not be placed in the wheel path.
- c) Following set out of the proposed bitumen cut line required in section 5.1c) a **Hold Point** will apply. Cutting of the existing seal must not occur until this Hold Point has been released.
- d) The edge of the existing seal must be either planed, saw-cut or re-mixed to provide a cut line that is free of irregularities and is neat and uniform.
- e) Prior to adding new material in accordance with section 3, the existing shoulder must be graded to ensure a minimum 50 mm level difference from the existing edge of seal to the existing shoulder, when measured using a 3.0 m straight edge.

5.2 Construction staging

- a) Construction work on Site must only be undertaken on one side of the road at any time in accordance with the Contractor's approved Workzone Traffic Management Plan in accordance with PC-SM1 "Traffic and Pedestrian Management".
- b) Prior to the completion of each working day, the existing seal must be swept by the Contractor to remove all loose construction material.
- c) At the completion of construction work on Site, the Contractor must ensure no large stones or windrows of surplus construction material remain.

5.3 Shoulder construction

- a) The existing shoulder pavement must be pulverised and wet mixed to the depth specified in the Contract Documents at the edge of existing seal.
- b) The Contractor must ensure that the pulverising and wet mixing process incorporates the following steps in a single operation:
 - i) cutting and pulverising any existing pavement (including bituminous seal if applicable);
 - ii) mixing of any additional material placed;
 - iii) concurrent mixing and addition of water; and
 - iv) screeding.

- c) The Contractor must ensure that the pulverising and wet mixing machine:
 - i) is specifically designed to carry out the operation detailed in section 5.3b);
 - ii) has provision for automatically adding water at a variable controlled rate whilst mixing to bring the material to the moisture content necessary for compaction and to prevent excessively wet areas; and
 - iii) is equipped with a variable depth of cut control with an accurate gauge of depth of cut readily visible to the operator. The depth of cut must have a tolerance of -0, +10%.

5.4 Pavement compaction

- a) The shoulder pavement layer must be compacted uniformly to the full depth and over the full width to the following dry density ratios as a minimum, unless specified otherwise in the Contract Documents:
 - i) pavement layers: 96% modified compaction; and
 - ii) shoulder forming an extended base course layer: 98% modified compaction.
- b) The Contractor must determine the dry density ratio of a test sample using Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio. The Contractor must utilise a 'one for one' MMD testing for each test site.
- c) The Contractor must submit details of the method of MDD determination as part of the Construction Documentation.
- d) Compliance with the requirements of this section 5.4 must be based on the analysis of a random set of tests taken from each Work Lot in accordance with the test procedures in section 6. The Contractor must submit the test results to the Principal as part of the Quality Management Records.

5.5 Pavement hardness

- a) Where the shoulder pavement is to be covered with a spray seal wearing course, the Contractor must conduct hardness testing prior to sealing and provide test results to the Principal as part of the Quality Management Records.
- b) Pavement hardness testing must be taken in the area that is most likely to be trafficked such as adjacent to the cut line.
- c) Hardness testing must be undertaken at a minimum test frequency of 1 test per 1000 m² of shoulder and achieve a pavement hardness result of ≤3.5 mm.
- d) All hardness tests must be undertaken in accordance with the test procedures in section 6.

5.6 Surface finish

- a) The Contractor must ensure that the surface of the shoulder pavement is:
 - i) homogenous and uniformly tight; and
 - ii) free of:
 - A. loose uncompacted materials;
 - B. segregated or 'bony' materials;
 - C. soft over wet areas;
 - D. excessive fines or slurry;
 - E. roller indentations; and
 - F. defects.

- b) Batters must be compacted so that the surface is uniformly tight and free of loose uncompacted or surplus material.
- c) The Contractor must ensure excess material is not left on the batter or windrowed into adjacent vegetation. Any excess material against batters-in-cut must be removed and disposed of by the Contractor.
- d) Debris and spoil must not be left on the roadside or impede surface drainage and culvert inlets / outlets.

6 Test procedures

The Contractor must use the test procedures specified in Table RD-PV-C2 6-1 to verify conformance with this Master Specification Part.

Table RD-PV-C2 6-1 Test procedures

Test	Test procedure
Sampling of soil, aggregates and rocks	Department Test Procedure TP226 Sampling of Soil, Aggregates and Rocks
Preparation of samples	AS 1289.1.4.2 Methods of testing soils for engineering purposes, Method 1.4.2: Sampling and preparation of soils - Selection of sampling or test sites - Stratified random number method
Site selection by stratified random technique	AS 1289.5.8.1 Methods of testing soils for engineering purposes, Method 5.8.1: Soil compaction and density tests - Determination of field density and field moisture content of a soil using a nuclear surface moisture-Density gauge - Direct transmission mode
Field density:	
Nuclear method	AS 1289.5.8.1 Methods of testing soils for engineering purposes, Method 5.8.1: Soil compaction and density tests - Determination of field density and field moisture content of a soil using a nuclear surface moisture-Density gauge - Direct transmission mode
Moisture content:	
Oven drying method	AS 1289.2.1.1 Methods of testing soils for engineering purposes, Method 2.1.1: Soil moisture content tests - Determination of the moisture content of a soil - Oven drying method (standard method)
Microwave method	AS 1289.2.1.4 Methods of testing soils for engineering purposes, Method 2.1.4: Soil moisture content tests - Determination of the moisture content of a soil - Microwave-oven drying method (subsidiary method)
Maximum dry density:	
Modified compaction	AS 1289.5.2.1 Methods of testing soils for engineering purposes, Method 5.2.1: Soil compaction and density tests - Determination of the dry density/moisture content relation of a soil using modified compactive effort
Three point method	Department Test Procedure TP164 Determination of the Dry Density/Moisture Content Relation of a Soil - 3 Point Method
Selection of maximum dry density	Department Test Procedure TP166 Assignment of Maximum Dry Density and Optimum Moisture Content Values
Dry density ratio	Department Test Procedure TP320 Compaction Control Test - Dry Density Ratio, Moisture Variation and Moisture Ratio
Pavement hardness	Austrroads Test Method AGPT-T251 Ball Penetration Test

7 Hold Points

Table RD-PV-C2 7-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.

Table RD-PV-C2 7-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
5.1c)	Set out of the proposed bitumen cut line	Construction quality	24 hours review

8 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-PV-C2 8-1 have been complied with.

Table RD-PV-C2 8-1 Verification requirements

Subject	Property	Frequency	Acceptable limits
Pavement material properties	Refer RD-PV-S1 "Supply of Pavement Materials"	Refer RD-PV-S1 "Supply of Pavement Materials"	Refer RD-PV-S1 "Supply of Pavement Materials"
Pavement hardness	Ball penetration	1 test per 1000 m ² of shoulder with a minimum of 2 tests per Work Lot	≤3.5 mm
Pavement compaction	Dry density ratio	1 test per 1000 m ² of shoulder with a minimum of 2 tests per Work Lot	Refer section 5