Master Specification
Part RD-LM-C1

Application of Pavement Marking

September 2024

Government of South Australia
Department for Infrastructure and Transport

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Document Information

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0	Initial issue	31/08/2023
1	Updated cover page, addition of new section 3b) for the Contractor to supply evidence of PCCP accreditation, addition of new section 5.4b)iii) for the Contractor to apply an additional coat of paint within the 2 month period prior to Handover, and update to align retroreflectivity requirements in Table RD-LM-C1 8-1 with Austroads.	30/09/2024

Document Management

 This is a controlled document and it will be updated and reissued as approved changes are made.

Contents

RD-LM-C1 Application of Pavement Marking

1 General

a) This Master Specification Part sets out the requirements for the application of pavement marking including:

i) the documentation requirements, as set out in section 2;

ii) the requirements for Contractor accreditation, as set out in section 3;

iii) the material requirements, as set out in section 4;

iv) the requirements for application of pavement marking, as set out in section 5;

v) the requirements for raised pavement markers, as set out in section 6;

vi) the requirements for pavement bars, as set out in section 7;

vii) the requirements for retroreflectivity, as set out in section 8;

viii) the requirements for skid resistance, as set out in section 9;

ix) the test procedures, as set out in section 10;

x) the Hold Point requirements, as set out in section 11;

xi) the verification requirements and records, as set out in section 12; and

xii) the measurement requirements, as set out in section 13.

b) The application of pavement marking must comply with the Reference Documents, including:

i) AS 1742 Manual of uniform traffic control devices;

ii) AS 1742.3 Manual of uniform traffic control devices, Part 3: Traffic control for works on roads;

iii) AS 4049.4 Paints and related materials - Pavement marking materials, Part 4: High performance pavement marking systems;

iv) Department Pavement Marking Manual (available from: https://dit.sa.gov.au/standards/standards_and_guidelines);

v) Department Test Procedure TP344 Determination of Skid Resistance with the GripTester (available form: https://dit.sa.gov.au/standards/test_procedures);

vi) Department Test Procedure TP345 Determination of Skid Resistance with the British Portable Skid Tester (available from: https://dit.sa.gov.au/standards/test_procedures);

vii) Department Test Procedure TP907 Determination of Retroreflectivity of Pavement Markings (available from: https://dit.sa.gov.au/standards/test_procedures); and

viii) Department Test Procedure TP950 Audit: Line Marking Product (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) documentation demonstrating that the plant, processes and personnel used to apply pavement marking comply with the specified certification requirements and are capable of delivering the quality of marking required;

b) controls for the quality of materials used;

c) procedures and processes to verify that materials have been applied at the specified application rates;

d) procedures and processes to verify that the field performance meets specified requirements;

e) evidence of the PCCP accreditation required by section 3b);

f) manufacturer's requirements for the application of pavement marking as required by section 5.1c) (where relevant);

g) details of the proposed pavement marking removal method as required in section 5.15e);

h) methodology to remove raised pavement markers and repair any damage to the road surface as required by section 6d); and

i) methodology to remove pavement bars and repair any damage to the road surface as required by section 7d).

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) data records in the daily diary, as required by section 5.1d);

b) photographic documentation of the pavement markings, as required by section 5.4a);

c) time and date of installation of regulatory lines, as required by section 5.4i);

d) evidence of low angle retroreflectometer calibration, as required by 8a);

e) records of all retroreflectivity test report, as required by section 8f)iv); and

f) verification records, as required by section 12.

3 Contractor accreditation

a) The Contractor must ensure that the pavement marking Works are undertaken by an entity that has PCCP accreditation appropriate for the type of pavement marking Works being undertaken in accordance with Table RD-LM-C1 3-1.

b) The Contractor must supply evidence of the PCCP accreditation required in section 3a) as a part of the Construction Documentation.

Table RD-LM-C1 3-1 PCCP accreditation

Class	Accreditation class description	Materials	Sub-class
21	Long-run longitudinal pavement marking on major roads	Paint	Class 20-1
22	Short to medium-run longitudinal pavement marking on minor roads	Paint	Class 21-1
23	Pavement marking; car park	Paint	Class 22-1
24	Transverse pavement marking including intersections and messaging	Thermoplastic	Class 24-2
		Multi-component or CAP	Class 24-3
		Non-skid paint	Class 24-4
25	Raised pavement marker / pavement bar installation		Class 25-1
26	High friction surfacings	Coloured bus or cycle lanes	Class 26-2
27	Pavement marking; removal		Class 27-1

4 Materials

The Contractor must ensure that all pavement marking materials comply with RD-LM-S1 “Materials for Pavement Marking”.

5 Application of pavement marking

5.1 General

a) The Contractor must ensure that pavement markings are as detailed on the Contract Documents and in accordance with the Department Pavement Marking Manual.

b) The Contractor must ensure that the application of pavement marking to the road surface only takes place under the following conditions:

   i) when the surface is dry and free from foreign matter (including oil, loose material and sealing aggregate);

   ii) at air temperatures >10ºC; and

   iii) when relative humidity is <85%.

c) Should the manufacturer’s written recommendations for the application of pavement marking vary from the requirements set out in section 5.1b), the Contractor must include such requirements in the Construction Documentation.

d) The Contractor must record all data of the pavement marking Works in the form included in Appendix 1: Pavement Marking Spray Sheet and submit as part of the Quality Management Records.

e) The Contractor must undertake mechanical or hand brooming if section 5.1b)i) cannot be achieved by the use of a surface cleaning apparatus incorporated in the line marking machine.

f) The Contractor must ensure that the following requirements are satisfied:

   i) the Contractor must determine the appropriate application process and application rates of the paints, beads and other additives as required to provide the specified colour, luminance, retroreflectivity and skid resistance requirements of this Master Specification Part;

   ii) the Contractor must ensure that it selects the directions of spraying and the number of coats of paint, beads and other additives as required to meet the requirements of this Master Specification Part;

   iii) the Contractor must select the appropriate thermoplastics, CAP or other, where high performance pavement marking is required;

   iv) the Contractor must undertake all preparation works to ensure that all of the manufacturer’s instructions have been met and the pavement is properly prepared and cleaned prior to the application of materials; and

   v) the Contractor must ensure that the appropriate materials and application of pavement marking is used to meet the required performance standards based on the traffic volumes of the road as set out in:

      A. the Contract Documents; or

      B. where not specified in the Contract Documents, as otherwise sourced from Location SA interactive online map (refer to: http://location.sa.gov.au/viewer/) and applying a traffic growth of 10% per year.

5.2 Protection of work

a) Until full drying of the pavement marking has been achieved, the Contractor must ensure that all pavement marking work is protected from traffic damage by the use of cones and signs in

accordance with AS 1742.3 Manual of uniform traffic control devices, Part 3: Traffic control for works on roads.

b) If pick-up is evident, the Contractor must obliterate any re-distributed material caused by vehicles passing over uncured work by removing or covering the re-distributed material with a treatment of appropriate colour and type to match the existing road surface.

c) The Contractor must reapply pavement marking damaged by vehicles passing over uncured work.

d) Longitudinal line marking will be considered damaged and will constitute a Non-Conformance where the initial retroreflectivity measured within 10 days of application using a calibrated low angle retroreflectometer using 30 m geometry is below the relevant minimum retroreflectivity value, as required by Table RD-LM-C1 8-1.

e) Without limiting the requirements of PC-QA1 “Quality Management Requirements” or PC-QA2 “Quality Management Requirements for Major Projects” (as applicable) in relation to the Non-Conformance, the Contractor must submit retroreflectivity testing results for the damaged longitudinal line marking following remediation to close out the Non-Conformance.

5.3 Spotting alignment

a) When pavement marking an unmarked surface or undertaking the modification of existing markings, the Contractor must carry out spotting prior to the application of all pavement markings.

b) Following spotting, the Contractor must give the Principal 24 hours’ notice before any pavement marking is applied.

c) Provision of the notice before pavement making is applied will constitute a **Hold Point**. Pavement marking must not be applied until this Hold Point is released.

5.4 Paint application - general

a) For existing sealed roads, the Contractor must undertake photographic documentation of the pavement markings and submit them as part of the Quality Management Records:

   i) prior to the commencement of the Works (existing condition);

   ii) upon completion of the first coat of paint (intermediate condition); and

   iii) upon completion of the pavement marking application (as-constructed condition).

b) For new or resurfaced spray seals or asphalt roads, the Contractor must ensure that the following requirements are satisfied:

   i) newly laid spray seal or asphalt surfacing must be left to cure for a minimum of 7 days prior to the application of the first coat of paint (primer or base coat) and temporary retroreflective raised pavement markers (TRRPM) must be installed to provide temporary line marking. The Contractor must leave TRRPM in place until the final coats of paint or permanent RRPMs are installed;

   ii) at the final pavement marking visit, the Contractor must apply a minimum of 2 coats of paint to ensure that all new works meet the performance criteria of this Master Specification Part;

   iii) within the 2 month period prior to Handover, the Contractor must apply an additional coat of paint to ensure that all new works meet the performance criteria of this Master Specification Part;

   iv) the retroreflectivity requirements must be met in both directions of traffic flow on all separation lines;

   v) traffic speed restrictions may be removed once the first coat of paint (primer or base coat) has been placed for all line markings and the Principal has been provided with photographs of the site in accordance section 5.4a)i) and section 5.4a)ii);

vi) where the site is classified as high risk in the Contract Documents, the Contractor must conduct a risk assessment prior to the removal of temporary traffic speed restrictions under section 5.4b)v); and

vii) until installation of the separation line, the Contractor must maintain appropriate signage in accordance with AS 1742 Manual of uniform traffic control devices and PC-SM1 "Traffic and Pedestrian Management".

c) The Contractor must ensure that the risk assessments conducted under section 5.4b)vi) include consideration of the following:

i) the condition of the pavement markings prior to the commencement of the Works;

ii) the alignment and geometry of the road;

iii) the proposed speed limit;

iv) the estimated daily traffic volume (total);

v) the estimated daily traffic volume (overnight);

vi) the lighting configuration;

vii) the presence and condition of other traffic control devices (including retroreflective guide posts and RRPMs); and

viii) the presence and severity of environmental hazards.

d) Longitudinal line work in rural areas must be undertaken with a class A line marking machine.

e) Longitudinal line marking in metropolitan areas must be undertaken with a class A line marking machine if practicable, otherwise a class B line marking machine must be used.

f) Hand spraying with the use of templates to control the pattern and shape may be used by the Contractor for transverse lines, chevrons, diagonals, pavement messages, symbols and traffic island and median kerbing.

g) Where 2 coats of paint are to be applied for separation lines on carriageways with 2-way traffic, the Contractor must ensure that the coats are applied in opposite directions. Paint for separation lines on carriageways with one-way traffic and all edge lines must be applied in the direction of traffic.

h) Where 2 coats of paint are to be applied, the Contractor must ensure that the first coat is cured in accordance with the manufacturer's requirements prior to the application of the second coat. The Contractor must ensure that all paint and beads are evenly applied to the markings.

i) The time and date of installation of regulatory lines must be recorded by the Contractor and submitted as part of the Quality Management Records.

5.5 Longitudinal paint systems

a) The Contractor must ensure that the longitudinal paint system is as described in Table RD-LM-C1 5-1.

b) Large beads or the large bead / glass anti-skid mix must be used when specified in the Contract Documents.

Table RD-LM-C1 5-1 Longitudinal paint system

Treatment	Materials	Typical application
Standard	Paint and type B high retroreflectivity drop on beads (traditionally referred to as "virgin", "pristine" or "high refractive index" beads).	Roads where standard performance and limited wet weather reflectivity is acceptable.
Large beads	Paint and type D-HR large beads (traditionally referred to as larger "high reflectivity" beads).	High traffic volume roads where enhanced performance and wet weather retro-reflectivity is required.

Treatment	Materials	Typical application
Large bead / glass anti-skid mix	Paint and type D-HR large bead / glass anti-skid mix.	High traffic volume roads where enhanced performance and wet weather retroreflectivity is required and skid resistance must be provided on a smooth road surface.

5.6 Transverse “non-skid” marking systems

a) The Contractor must ensure that the transverse paint system is as described in Table RD-LM-C1 5-2.

b) High performance markings must be used when specified by the Contract Documents.

Table RD-LM-C1 5-2 Transverse paint system

Treatment	Materials	Typical application
Standard	Premixed paint and skid resistant additives.	Roads and intersections where skid resistance is required, but retroreflectivity is not required.
High performance multi component	2 part cold applied material, aggregate and type D-HR large beads with an adhesion coating.	High traffic volume roads and intersections with a large number of heavy vehicles where enhanced performance and dry and wet weather retroreflectivity is required.
High performance pre-form thermoplastic	Thermoplastic material and anti-skid mixture containing type C intermix glass beads and crushed glass.	High traffic volume roads and intersections where enhanced performance and retroreflectivity is required.

5.7 Longitudinal paint application (PCCP class 20-1 and 21-1)

a) When longitudinally pavement marking a new unmarked surface or undertaking the modification of existing markings, the Contractor must ensure that the following treatments are satisfied:

i) standard treatment must include 2 coats of paint which must be applied during the same Site visit;

ii) large beads and large bead / glass anti-skid treatment must include 2 coats of paint. The first coat must be the standard treatment and the second coat the large bead treatment;

iii) 2 coats of paint must be applied together with a concurrent application of beads. The first coat must be fully cured prior to the application of the second coat. The timing of the application of paint must comply with any requirements specified by the Contract Documents; and

iv) until installation of the separation line, the Contractor must maintain appropriate signing in accordance with AS 1742 Manual of uniform traffic control devices and PC-SM1 “Traffic and Pedestrian Management”.

b) When undertaking maintenance repainting, the Contractor must apply one coat of the specified paint treatment together with a concurrent application of beads.

5.8 Transverse “non-skid” paint application (PCCP Class 24-4)

a) The Contractor must ensure that transverse “non-skid” paint application (PCCP Class 24-4) includes:

i) when pavement marking a new unmarked surface or undertaking the modification of existing markings, 2 coats of pre-mixed paint and skid resistant additives must be applied during the same Site visit. The first coat must be fully cured prior to the application of the second coat; and

ii) when undertaking maintenance repainting, one coat of pre-mixed paint and crushed skid resistant additives must be applied.

b) The Contractor must ensure that transverse high performance pavement marking application includes:

i) multi component (PCCP Class 24-3) consists of a 2-part cold applied pavement marking material applied according to the manufacturer's recommendations and comprising:

A. a base coat;

B. aggregate;

C. a top coat to encapsulate the aggregate; and

D. type D-HR beads with an adhesion coating;

ii) the aggregate and beads must be applied while the material is fluid to ensure embedment and must be evenly distributed to provide a complete coverage; and

iii) pre-form thermoplastic pavement marking (PCCP class 24-2) consists of pre-formed thermoplastic pavement marking material applied according to the manufacturer's recommendations. An anti-skid mixture containing type C Intermix glass beads and crushed glass must be applied immediately after heating while the material is still liquid. The mixture must be evenly distributed to provide a complete coverage of the surface of the thermoplastic.

5.9 Coloured pavement surfacings application (PCCP class 26-2)

a) The Contractor must ensure that coloured pavement surfacings are used on pavement designated as bus or cycle lanes and are in accordance with Department Pavement Marking Manual.

b) The Contractor must ensure that multi component consists of a suitably pigmented 2 part cold applied pavement marking material applied according to the manufacturer's recommendations and comprising:

i) a base coat;

ii) aggregate; and

iii) a top coat to encapsulate the aggregate.

c) The Contractor must ensure that the aggregate is applied while the material is fluid to ensure embedment and must be evenly distributed to provide a complete coverage.

d) The Contractor must ensure that the pigmented binder system consists of a 2 or more component thermosetting resin suitably pigmented to provide the necessary depth of specified colour in the finished surface coating and the application of coloured aggregate. The aggregate must be applied while the material is fluid to ensure embedment and must be evenly distributed to provide a complete coverage of the treated area.

5.10 Kerb treatment

a) The Contractor must ensure that, when pavement marking a new unmarked surface or undertaking the modification of existing markings:

i) the concrete surface of the kerb must be dry and cured for a minimum of 3 days prior to the application of paint, and any curing agents used must be removed;

ii) the paint must be applied in one or more coats to achieve the specified minimum dry thickness; and

iii) glass beads must be applied to the final coat immediately following the application of paint to ensure embedment and retention.

b) When undertaking maintenance repainting:

i) the Contractor must remove and dispose of any lifting or flaking paint coatings, rubbish, grass, and vegetation to achieve a sound surface prior the application of paint;

ii) repainting must consist of a single application of paint to achieve the specified minimum dry film thickness; and

iii) glass beads must be applied immediately following the application of paint to ensure embedment and retention. The Contractor must ensure that over-spray does not cause paint contamination to adjacent surfaces.

5.11 Glass bead and glass bead / anti-skid application

a) The Contractor must ensure that all beads and bead / anti-skid mix is applied using a method that ensures uniform cover and retention to the surface of the marking, with minimal wastage of material.

b) The Contractor must ensure excessive application of material, which may present a hazard for road users, does not occur.

c) Glass beads and glass bead / anti-skid mix must be applied immediately following application of pavement marking material to ensure embedment and retention.

5.12 Pavement marking application rates

a) The Contractor must ensure that pavement marking and additives are applied in accordance with Table RD-LM-C1 5-3.

b) Written verification of all application rates must be provided as required in section 12.

Table RD-LM-C1 5-3 Pavement marking application

Item to be treated	Paint			Additive	
	Type	Colour	Film thickness	Type	Rate
Longitudinal lines standard beads	Waterborne pavement marking	White	Wet 300 to 375 µm	Type B High retroreflectivity drop-on glass beads	Min. retained 275 g/m^2
Longitudinal lines large beads	Waterborne pavement marking	White	Wet 600 µm	Type D-HR large wet weather glass beads	Min. retained 500 g/m^2
Longitudinal lines large bead / glass anti-skid mix	Waterborne pavement marking	White	Wet 600 µm	Type D-HR large wet weather glass bead and 1 mm - 2 mm crushed glass mix	Min. retained 750 g/m^2 mix ratio 70:30
Pavement messages, symbols, chevrons, diagonals and transverse lines	Waterborne pavement marking	White	Dry 250 to 350 µm	Premixed with skid resistant additives	Min. 0.50 kg/L
Pavement messages, symbols, chevrons, merge arrows, diagonals and transverse lines	High performance multi component	White Yellow	Base coat 1 mm Top coat 0.5 mm	1-3 mm aggregate type D-HR large wet weather glass beads with adhesion coating	400 gm/m^2 400 gm/m^2
	High performance pre-form thermoplastic	White Yellow	Pre-form thickness 2.5 mm ±0.5 mm	Type C intermix glass bead and 1 mm - 2 mm crushed glass mix	1.60 kg/m^2 retained mix ratio 70:30
Bus and cycle lanes	Multi component	Various	Base coat 1 mm Top coat 0.5 mm	1-3 mm aggregate	1.50 kg/m^2

Item to be treated	Paint		Additive		
	Pigmented binder	Various	Binder uniform thickness to provide adhesion to aggregate and substrate	1-3 mm aggregate	Complete coverage of treated area
Traffic island and median kerbing	Latex exterior flat or low gloss	White	New: dry 60 to 90 µm Maintenance: dry 40 to 60 µm	Type B high retroreflectivity drop-on glass beads	Min. retained 275 g/m^2
Pavement bars	Latex exterior flat or low gloss	Yellow	New: dry 60 to 90 µm Maintenance: dry 40 - 60 µm	Type B high retroreflectivity drop-on glass beads	Min. retained 275 g/m^2
Clearway markings	Waterborne pavement marking	Yellow	Wet 300 to 375 µm	Type B high retroreflectivity drop-on glass beads	Min. retained 275 g/m^2
No standing zones	Waterborne pavement marking	Yellow	Wet 300 to 375 µm	Type B high retroreflectivity drop-on glass beads	Min. retained 275 g/m^2
Blacking-out	Waterborne pavement marking	Black	Dry 250 to 350 µm	Premixed with skid resistant additives	Min. 0.50 kg/L
Rail crossing box hatchings	Waterborne pavement marking	Yellow	Dry 250 to 350 µm	Premixed with skid resistant additives	Min. 0.50 kg/L

5.13 Placement of markings

a) For maintenance repainting, the Contractor must ensure that existing road markings are repainted to restore the original size, shape and line pattern.

b) The Contractor must ensure that pavement marking is placed on the road surface in correct position within the tolerances specified in Table RD-LM-C1 5-4.

Table RD-LM-C1 5-4 Placement of markings

	New work	Maintenance repainting
Spotting		
Line marking	+/-50 mm of pavement / seal centre or to surveyed design strings	-
Road marking	+/-50 mm of drawing dimensions and control lines	-
Road marking	+/-25 mm in relation to “spotting”	Areas must not be less than existing shape and size and not more than 10 mm greater than the existing all round (i.e. 0, +10 mm).
Line marking		
Edgeline distance from centreline	+/-25 mm	-
Resultant lane width	+/-50 mm	-
Lateral deviation from spotting	+/-25 mm	-
Stripe width	+10, -0 mm	+10, -0 mm
Stripe length, less than 12 m	+150, -0 mm	+150, -0 mm
Stripe length, greater than 12 m	+300, -0 mm	+300, -0 mm
Module length, 12 m	+150, -0 mm	+150, -0 mm
Module length, greater than 12 m	+300, -0 mm	+300, -0 mm
New over old line placement (lateral)	-	<10 mm

	New work	Maintenance repainting
New over old line placement (longitudinal)	-	+150, -0 mm

5.14 No overtaking zones

a) The Contractor must accurately locate the extent of no overtaking zones from the Contract Documents prior to the commencement of works or replicate the existing pavement marking in the case of maintenance works.

b) To locate no overtaking zones, the Contractor must use a calibrated, precise vehicle mounted measuring device capable of measuring to 1 m accuracy. If any discrepancies are identified the Contractor must notify the Principal immediately.

c) Under no circumstances must the Contractor install new or modify existing no overtaking zones.

5.15 Removal of pavement markings (PCCP class 27-1)

a) The Contractor must ensure that the removal of pavement marking is undertaken so as to not adversely affect the skid resistance, texture depth, susceptibility to ponding and appearance of the road surface.

b) Blacking out of pavement marking by the use of paint is not permitted.

c) The Contractor must remove pavement markings by:

i) emulsion and chip seal (for spray seal pavement surfaces only);

ii) grinding (for asphalt pavement surfaces only); or

iii) water blasting.

d) The Contractor must use the highest order of pavement marking removal where possible from section 5.15c).

e) The Contractor must provide details of the proposed pavement marking removal method in the Construction Documentation.

f) The Contractor must ensure that any materials produced by removal activity are immediately collected and removed from Site and disposed of in accordance with PC-ENV1 “Environmental Management” and PC-ENV2 “Environmental Protection Requirements”.

5.16 Transition between existing and new work

a) This section 5.16 applies where a change of lane width after resealing works or road reconstruction results in a miss-match of an edge line.

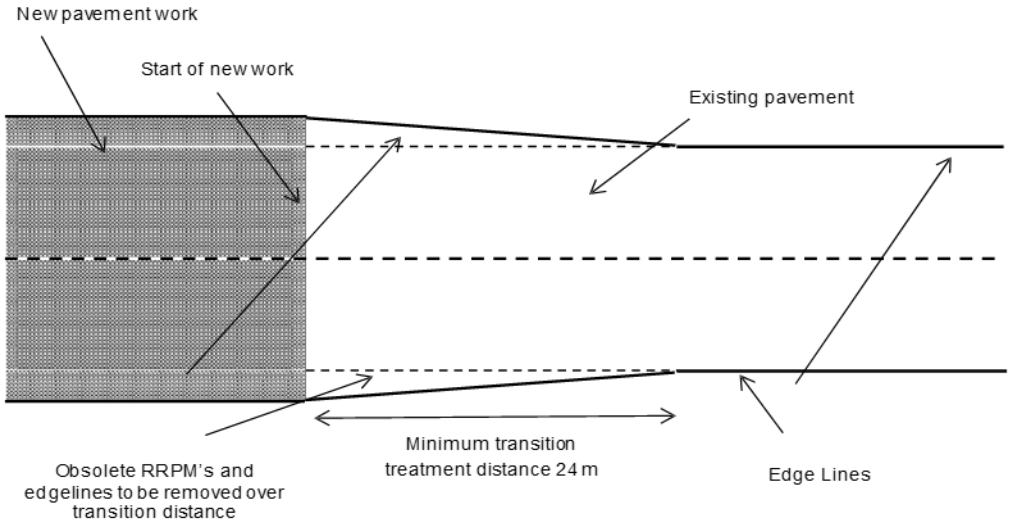
b) Where this section 5.16 applies, the Contractor must ensure that the edge lines transition smoothly between the old and new work.

c) The Contractor must ensure that a transition treatment is made as indicated in Figure RD-LM-C1 5-1.

d) The Contractor must ensure that the existing edge line and RRPMs are removed from the existing pavement and the new edge line must transition between the old and new work on the existing pavement.

e) The transitional line marking treatment must not be applied to new pavement work.

Figure RD-LM-C1 5-1 Edge line mismatch treatment



6 Raised pavement markers (PCCP class 25-1)

a) The Contractor must ensure that the installation of raised pavement markers is in accordance with the Department Pavement Marking Manual.

b) The Contractor must ensure that raised pavement markers are placed to a tolerance of +/- 25 mm.

c) The Contractor must ensure that adhesives are 2-part epoxy or hot melt used in accordance with the manufacturer's instructions and applied evenly over the whole contact surface area of the raised pavement marker so that a bead of adhesive forms around the perimeter when the raised pavement marker is pressed onto the road surface during installation.

d) If removal of raised pavement markers is required, the Contractor must provide a methodology to remove raised pavement markers and repair any damage to the road surface in the Construction Documentation. The Contractor must remove the raised pavement marker and adhesive in such a way that minimum damage is caused to the road surface. Any damage to a wearing surface must be repaired by the Contractor. Raised pavement markers removed from the road must be collected and disposed of by the Contractor.

e) The Contractor must ensure that the temporary RRPMs are sufficiently robust to survive the existing traffic conditions until permanent markings are installed.

7 Pavement bars (PCCP class 25-1)

a) The Contractor must ensure that installation of pavement bars is carried out such that the pavement bars are placed true to the locations indicated in the Contract Documents. Bars must be placed to a tolerance of ±25 mm.

b) The Contractor must ensure that pavement bars are treated with a paint and bead application in one or more coats to achieve the specified paint and glass bead application rates.

c) The Contractor must ensure that adhesive is 2-part epoxy or hot melt used in accordance with the manufacturer's instructions and applied evenly over the whole contact surface area of the pavement bar so that a bead of adhesive forms around the perimeter when the pavement bar is pressed onto the road surface during installation.

d) If removal of pavement bars is required, the Contractor must provide a methodology to remove the pavement bars and repair any damage to the road surface in the Construction Documentation. The Contractor must remove the pavement bar and adhesive in such a way that minimum damage is caused to the road surface. Remaining adhesive deposits must be removed to surface level to give a textured surface finish. The pavement bar must be collected

and disposed of appropriately by the Contractor and any surface damage repaired by the Contractor.

e) If maintenance repainting of pavement bars is required, the pavement bars must be treated with a paint/bead application to achieve the specified paint and glass bead application rates. The Contractor must ensure that "overspray" and damage by traffic does not occur whilst drying.

8 Retroreflectivity

a) The Contractor must carry out measurement of retroreflectivity in accordance with Department Test Procedure TP950 Audit: Line Marking Product, using a low angle retroreflectometer using 30 m geometry. The Contractor must provide evidence that the retroreflectometer has been calibrated within the last 12 months as part of the Quality Management Records.

b) The Contractor must ensure that the initial retro-reflectivity before the final coating is placed has a minimum of 90% of readings passing the value shown in Table RD-LM-C1 8-1 with no reading to be below the 160 day requirement set out in Table RD-LM-C1 8-1.

c) Any test locations that fall below the value shown in Table RD-LM-C1 8-1, the affected area, as defined in Department Test Procedure TP950 Audit: Line Marking Product, must have temporary speed restrictions reintroduced as soon as practicable, and the pavement marking must be re-applied.

d) Retroreflectivity testing of pavement markings must be in accordance with AS 4049.4 Paints and related materials - Pavement marking materials, Part 4: High performance pavement marking systems, Appendix K to demonstrate compliance with the performance standards required by this Master Specification Part.

e) The Contractor must record all retroreflectivity readings produced pursuant to section 8a) and provided in an initial retroreflectivity test report in accordance with Table RD-LM-C1 8-1 which will constitute a **Hold Point**. The Contractor must not remove the temporary warning signage in accordance with section 8f) until this Hold Point has been released.

f) The Contractor must:

   i) display temporary warning signage (T1-23 series, T1-SA23 series, T1-SA143, or equivalent approved in accordance with PC-SM1 "Traffic and Pedestrian Management") until compliant 10 day retroreflectivity test results have been submitted with the Hold Point in section 8e);

   ii) mark test sites on the pavement to allow repeated testing;

   iii) reference all test sites' GPS coordinates in WGS84 equivalent format; and

   iv) submit ongoing retroreflectivity test reports to the Principal as part of the Quality Management Records in tabular form on a monthly basis, or as required in the Contract Documents.

g) The Contractor must ensure that the frequency of testing is conducted at the same locations at the intervals set out in Table RD-LM-C1 8-2.

h) At each test site, the Contractor must take the following minimum number of measurements of longitudinal lines:

   i) 3 readings on all edge lines, outlines of lane lines taken in the viewing direction of road users; and

   ii) 6 readings on all dividing lines (3 readings in each direction).

i) Readings at each test site must be a minimum of 1 m apart. Both individual and averaged tests results must be presented as part of each retroreflectivity test report.

j) At each test site the Contractor must take 2 readings on each reflectorised transverse pavement marking taken in the viewing direction of road users.

Table RD-LM-C1 8-1 Retroreflectivity

Test interval	Retroreflectivity (mcd/lx/m²)	
	White pavement markings	Yellow pavement markings
Within first 30 days	350	200
Between 365 - 395 days	200	150
Between 700 - 720 days	150	100

Table RD-LM-C1 8-2 Pavement marking testing intervals

Pavement marking testing intervals	
Longitudinal pavement marking testing intervals	
Length of road (km)	Minimum no. of test sites
<0.5	1
0.5 - 5	2
5 - 50	Every 5 km, minimum 2 test sites
>50	Every 10 km
Transverse and other pavement marking testing intervals	
No. of transverse and other markings	Minimum no. of test sites
Sites with <4[1] transverse markings	2
Small intersections (>12)[1]	4
Large intersections (>20)[1]	6
Give way and stop bars	1 at each site
All other markings (turn lines, chevrons, arrows etc.)	25% of overall no. of markings

Table notes:

(1) "<4, ">12" and ">20" refers to the number of transverse and other pavement markings existing at given intersection.

9 Skid resistance

The Contractor must ensure that skid resistance for transverse marking is greater than 45 BPN (known as the British pendulum number), until at least the issue of the Final Certificate, when measured in accordance with Department Test Procedure TP344 Determination of Skid Resistance with the GripTester or Department Test Procedure TP345 Determination of Skid Resistance with the British Portable Skid Tester. If the skid resistance is below 45 BPN the Contractor must re-apply pavement marking to the affected area.

10 Test procedures

The Contractor must use the test procedures specified in Table RD-LM-C1 10-1 (refer to: https://dit.sa.gov.au/standards/standards_and_guidelines) to verify conformance with this Master Specification Part.

Table RD-LM-C1 10-1 Test procedures

Test	Test procedure
Determination of skid resistance with the grip tester	Department Test Procedure TP344 Determination of Skid Resistance with the GripTester
Operation of a British pendulum portable skid tester	Department Test Procedure TP345 Determination of Skid Resistance with the British Portable Skid Tester
Determination of retroreflectivity of pavement markings	Department Test Procedure TP907 Determination of Retroreflectivity of Pavement Markings
Audit: line marking product	Department Test Procedure TP950 Audit: Line Marking Product

11 Hold Points

Table RD-LM-C1 11-1 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-LM-C1 11-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
5.3c)	Following spotting and prior to application of pavement marking paint	Construction quality	24 hours notification
8e)	Submission of initial retroreflectivity testing results for all pavement markings	Documentation	2 Business Days review

12 Verification requirements and records

The Contractor must supply written verification as part of the Quality Management Records that the requirements listed in Table RD-LM-C1 12-1 have been complied with.

Table RD-LM-C1 12-1 Verification requirements

Subject	Property	Procedure	Frequency	Acceptance limits
Application conditions	Measurement of temperature and relative humidity	Contractor to provide details of measurement method	Every work session	Air temperature > 10°C. Relative humidity < 85%
All pavement marking applications	Material application rate	Contractor to provide evidence through materials consumption and area	Every work session	As per Table RD-LM-C1 5-4
Retroreflectivity	Retroreflectivity	TP907 and TP950 Contractor to provide results	Refer Table RD-LM-C1 8-2	As per Table RD-LM-C1 8-1
Skid resistance	Skid resistance	TP244 or TP345	As requested	As per section 9

13 Measurement

Where the Contract Documents include a mechanism for the measurement for the application of pavement marking, it will be made in accordance with the following:

a) a line pattern will be measured as though it is a continuous line (i.e. the measurement will be the sum of the painted and unpainted dimensions);

b) a barrier line will be measured as though it is a single line; and

c) pavement marking which involves a 2-coat paint system will be measured as though it is a single coat (i.e. the quantity shown in any schedule is the actual measurement of the marking on the pavement surface).

14 Appendix 1: Pavement Marking Spray Sheet

Government of South Australia
Department for Infrastructure and Transport

Contractor:	
Contractor Representative:	
Contract No:	
PO/Job No:	
Date :	

SCOPE OF WORK

Work Location:					
Weather	Location	Time	Temperature	Humidity	Method of measurement
Description of work:				Pre start time:	
Contractors' supervisor:				PH:	

Set out		Kerbs		Yellow		CAP ALTM		Black Out	
Long Line		RRPM's		Preform		Therm. ATLM		Grinding	
		P/Bars		T/verse CAP		Wheel Stops		W/Blast	
OTHER:									

DATE OF WORK:		TIME START:		DAY SHIFT:	Y/N
		TIME FINISH:		NIGHT SHIFT:	Y/N

Work	QTY	Work	QTY	Work	QTY	Work	QTY	Work	QTY

MATERIALS USED

Material	Colour / Type	Brand	Batch	Amount Used

GPS START:	Lat:		Long:		
GPS FINISH:	Lat:		Long:		
Comments:				Work complete: Yes	No
Contractor Sign Off:					
Principal Sign Off:			Date:		