MIDCOAST
council

AUS-SPEC

Infrastructure Specifications

1191 Pavement Markings

1191 PAVEMENT MARKINGS

IMPORTANT: This document has been adapted from the NATSPEC suite of specification templates for use in the MidCoast Council area by both Council and industry. NATSPEC regularly updates the base templates (currently in April and October each year), and Council may incorporate changes into its version of AUS-SPEC from time to time. To assist in highlighting any changes made by Council to the NATSPEC templates, the following conventions are used.

- See ANNEXURE M at the end of this document which contains (where practical) MidCoast Council customisations (also known as 'office master' text). References to the Annexure are to also be inserted at relevant clauses in the main body of the document.
- Where content is added to the main body of the document, it is to be shown in brown text like this.
- Where content is deleted or excluded from the main body of the document, it is to be shown ~~struck through like this~~. Such clauses are to have no effect.

Where there is a conflict between main body text and MidCoast Council specific clauses, Council's specific clauses shall prevail.

1 GENERAL

1.1 RESPONSIBILITIES

General

Requirement: Provide pavement markings, as documented. For asphalt works, all line markings are to be thermoplastic materials except for chevron infills.

Supplier / installer: Shall be a Painting Contractor Certification Program (PCCP) accredited entity. Works shall not be subcontracted out to a non-PCCP entity.

Authority requirements: This worksection does not override any applicable NSW legislation and is to be read in conjunction with AS 1742.3 and the RMS R141 Pavement Marking specification.

1.2 CROSS REFERENCES

General

Requirement: This worksection is not a self-contained specification. In addition to the requirements of this worksection, conform to the following:

- *0136 General requirements (Construction)*.
- *0152 Schedule of rates (Construction)*.
- *0161 Quality management (Construction)*.
- *1101 Traffic management*.

1.3 STANDARDS

General

Pavement markings: To AS 1742.2.

Harmonisation of pavement markings: To Austroads AP-R578.

1.4 INTERPRETATION

Definitions

General: For the purposes of this worksection the following definitions apply:

- AC: Asphaltic Concrete
- Anti-skid media: Is white crushed quartz, crushed glass, calcite bauxite aggregates to provide or improve skid resistance of 45BPN or equivalent.
- Longitudinal linemarking: All lines that are generally parallel to the traffic flow, such as centre, lane, edge, turn, continuity and transition lines and outline markings.
- Other markings: All diagonal and chevron markings on the pavement including symbols, words, numerals and arrows, kerb markings and markings for parking.

- Paint: In this worksection implies pavement marking paint.
- Pavement marking: All longitudinal linemarking, transverse lines, raised pavement markers and other markings placed on the road to control traffic movement or parking.
- PCCP Accreditation: Painting Contractor Certification Program (http://www.apas.gov.au/) that is administered by the CSIRO.
- RMS: (formerly) Roads and Maritime Services, now Transport for NSW (TfNSW).
- Thermoplastic material: In this worksection implies thermoplastic pavement marking material. It consists of aggregate, pigment, binder, glass beads and extenders capable of being softened by heating and hardened by cooling.
- Transverse lines: All lines that are marked at right angles to the general traffic flow, such as Stop/Give way lines and pedestrian crosswalk lines.

1.5 TOLERANCES

Marking tolerances table

Marking type and dimension	New installation	Maintenance
Spotting		
All markings: Documented location	± 50 mm	-
Arrows, chevrons, painted medians, painted left turn islands and speed markings: Each dimension	± 50 mm	± 50 mm of existing marking
Longitudinal linemarkings		
Width	± 5 mm	Width of existing marking ± 10 mm
Width of gap between adjacent lines	± 10 mm	± 10 mm
Length	± 50 mm	Length of existing marking ± 100 mm
Distance between centreline of new and existing	-	< 15 mm
Transverse lines and other markings		
Width	± 10 mm	Width of existing marking ± 10 mm
Length	± 10 mm	Width of existing marking ± 10 mm
Raised pavement markers		
Documented location: Transverse	± 25 mm	-
Documented location: Longitudinal	± 100 mm	
From other markers in the same line for a distance of 1.5 m	± 25 mm	-
Documented direction	± 4°	-

1.6 SUBMISSIONS

Execution details

Methods of application: Submit method of application of materials and methods to protect the work from premature trafficking.

Removal of redundant markings: Submit details of method for removing redundant pavement markings.

Products and materials
Material properties: Submit test reports from a registered laboratory verifying material property conformance, including for paint, glass beads, raised pavement markers and thermoplastic material.
- Test currency: Not older than 3 years.

Samples
Permanent pavement marking tape: If marking tape is required, submit samples and product details for approval.

Tests
Results: Submit results of testing to **ANNEXURE – MAXIMUM LOT SIZE AND MINIMUM TEST FREQUENCIES**.

Warranties
Manufacturer's warranty: Submit the manufacturer's published product warranties for all materials and components.

1.7 INSPECTIONS

Notice
General: Give notice so that inspection may be made of the following:
- Setting out: Completion of pavement marking set-out.
- Surface preparation: Completed surface preparation, before applying pavement markings.
- Completion: Completed pavement marking.

2 MATERIALS

2.1 PAVEMENT MARKING PAINT

General
Road pavement marking: For longitudinal lines, conform to the following:
- White ~~and/or yellow~~ road marking paint.
- White ~~and/or yellow~~ thermoplastic ~~or cold applied plastic material~~.
- Use line marking materials as required by any DA consent conditions or REF recommendations, and in accordance with TfNSW (formerly RMS) specifications, and as documented on the Drawings. If not specified, use thermoplastic material on AC pavements, and paint on bitumen sealed pavements. Paint on AC may be accepted for small infill markings.

Type
Waterborne paint: To AS 4049.3.

Solvent-borne paint: Do not use without prior approval, and conform to AS 4049.1.

2.2 ANTI-SKID PAVEMENT MARKINGS

Properties
Anti-skid materials: Angular, polishing resistant particles which provide skid resistance. Apply anti-skid media, if the skid resistance on the existing is less than 45 BPN or equivalent.
- Colour: Compatible with marking colour.

Particle size:
- For transverse lines and other markings: 0.4 to 0.7 mm.
- For longitudinal linemarking: 0 to 2.0 mm.

2.3 THERMOPLASTIC MATERIAL

Standard
Thermoplastic marking: To AS 4049.2.

Non-profile thermoplastic pavement marking material
Longitudinal linemarkings: Sprayed or extruded thermoplastics applied uniformly.

Transverse lines and other markings: Screeded or preformed thermoplastic.

2.4 ~~TWO-PART COLD APPLIED PLASTIC PAVEMENT MARKING MATERIAL~~ (NOT USED)

~~**Properties**~~
~~Skid resistance: To AS 4049.2 Appendix L.~~

~~Grip test: To DPTI TP343.~~

~~Luminance: To AS 4049.2 Appendix G. Luminance factor > 75%~~

~~Reflectivity To AS 4049.2 Appendix M.~~

~~Degree of wear: AS 4049.2 Appendix N.~~

~~Lead content: Not greater than 0.25% to ASTM D3335.~~

~~No-pick-up time: Measured at 23°C and to AS 1580.401.8, as follows:~~

- ~~For trowel or screed applied material (containing intermix glass beads): Maximum 20 minutes for 2.0 ± 0.25 mm applied film thickness.~~
- ~~For spray material (not containing glass beads): Maximum 5 minutes for 0.200 ± 0.025 mm applied film thickness.~~

~~For light colour pavement surface luminance factor: Not less than 80% as delivered.~~

~~Abrasion resistance: Loss in mass not exceeding 0.3 g for 500 cycles to AS 4049.2 Appendix G.~~

~~Longitudinal linemarking: Sprayed material.~~

~~Transverse lines and other markings: Trowelled, screeded, sprayed or extruded material.~~

2.5 REFLECTIVE GLASS BEADS

Properties

Glass beads for pavement marking: To AS/NZS 2009.

Glass bead proportion: Incorporate glass beads in thermoplastic material as follows:

- In the proportion of a minimum 20% of the total mass.
- As part of the aggregate constituent and conforming to AS/NZS 2009.

Glass beads: Conform to the following:

- Bead type: B-HR, C-HR or D-HR.
- Type D-HR for use with thermoplastic applications: Provide with a proprietary adhesive coating and in clearly labelled packaging.

2.6 PAVEMENT MARKING TAPE

Type

Temporary markings: Strippable tape.

2.7 RAISED PAVEMENT MARKERS

Classification type

Markers: Reflective and non-reflective markers to AS/NZS 1906.3, to the documented dimensions.

Adhesive to wearing surface: Hot melt bitumen adhesive.

Tests

Sampling: To AS/NZS 1906.3.

Testing

2.8 TESTING

Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.

Quality verification: If material/product quality verification can be obtained from the supplier, documented tests need not be repeated.

3 EXECUTION

3.1 GENERAL

Protection of work

Protection of markings: Protect markings until the material has hardened sufficiently so that traffic will not cause damage.

Material application

Pavement marking paint: Provide in conformance with the following:

- Permanent markings: To all wearing surfaces.

- Temporary markings: To surfaces other than final wearing surfaces.

Thermoplastic pavement marking material: Install where permanent markings are required.

Pavement marking tape: Use where temporary markings on final wearing surfaces are required.

Reflective glass beads: Apply to all painted and thermoplastic markings.

Raised pavement markers: Install as permanent and temporary markings, as documented.

~~Cold applied plastics: Install to the manufacturer's recommendations.~~

Pavement marking finish

Pavement marking appearance: Straight or with smooth, even curves, where applicable.

Edges: Clean, sharp cut off.

Faulty application beyond defined edge: Remove and leave a neat and smooth marking on the wearing surface of the pavement.

3.2 ESTABLISHMENT

Colour

All pavement marking materials: White Y35 to AS 2700 with a luminance factor not less than 80% to AS 4049.3.

Anti-skid materials: White, equivalent to or whiter than Y35, Off White to AS 2700.

Setting out

Locations: Place all markings as documented.

Surface preparation

Application surface: Apply to clean dry surfaces only. Clean the surface, make sure there is a satisfactory bond between the markings and wearing surface of the pavement.

Existing material: If the existing surface is flaking, chipping or in a condition where adhesion of new material to the road surface cannot be guaranteed for the required life of the marking, obtain approval for the proposed extent and method of surface preparation.

Curing compound applied to new rigid concrete pavement surface: Remove by physical abrasion such as grinding or blasting.

Wet weather: Do not carry out pavement marking during wet weather or if rain is likely to fall during the process.

Raised markers on concrete wearing surface: Lightly scabble the full area under each marker to remove fine mortar material (laitance).

3.3 PAINT MARKING

General

Glass bead application: Apply to a smooth surface.

Mixing of paint

Requirement: Thoroughly mix all paint in its original container before use to produce a smooth uniform product, consistent with the freshly manufactured product.

Application of paint and beads

Paint thickness excluding surface applied beads: Apply uniformly and at the following minimum dry film thickness:

- Type B beads for transverse lines and other markings: 0.20 mm.
- Type D-HR beads for longitudinal linemarkings: 0.30 mm.

Ambient conditions for applying paint with glass beads: For optimum performance and durability, incorporate glass beads under the following conditions:

- Air and pavement temperature: > 15°C.
- Relative humidity: > 70%.
- Air movement: 10 km/hr (reasonable air movement).
- Protection of markings from traffic during the drying process.

Hand spraying: Hand spraying with the use of templates to control the pattern and shape is permitted for transverse lines, symbols, legends, arrows and chevrons.

Longitudinal lines

Paint application: Spray lines in conformance with the following:

- With a self-propelling machine.
- Two sets of lines forming a one-way or two-way barrier line pattern: Spray concurrently.

Glass bead application rate: Conform to the following:

- Type D-HR beads: Apply to the surface of all longitudinal lines at a minimum application rate of 0.50 kg/m2 immediately after applying the paint.
- Actual application rate: Set to overcome any loss of beads between the bead dispenser and the sprayed line.

Other markings

Dimensions: Conform to RMS requirements for the following:

- Arrows.
- Chevrons.
- Painted medians.
- Painted left turn islands.
- Speed markings.

Thickness of non-profile markings: Maximum 6 mm.

Arrows and speed markings: Place square with the centreline of the traffic lane.

Glass bead application: Apply as for other paint markings at the following rate:

- Type B glass beads: Minimum 0.30 kg/m^2, immediately after applying paint.
- Type D-HR glass beads: Minimum 0.5 kg/m^2.

Field measurement of spherical glass bead application rate

Requirement: Measure spherical glass bead application rate onto wet paint or thermoplastic surfaces as follows:

- Turn off the paint or thermoplastic supply valves and operate the glass bead dispenser for 10 seconds, allowing glass beads to run into a plastic bag or tray.
- Pour the glass beads from the bag or tray into a suitable measuring cylinder calibrated in mL to measure the volume of glass beads collected. Level, but do not compact, the glass beads in the cylinder.
- Compare the volume of glass beads collected with that in **Volume of glass beads (mL) required in 10 seconds of operation table**.

Volume required for 0.50 kg/m^2: For the calibration of application rates to suit type D-HR beads, alter the **Volume of glass beads (mL) required in 10 seconds of operation table** to 0.50 kg/m^2.

Volume of glass beads (mL) required in 10 seconds of operation table

Road speed (km/h)	**Line widths**				
	80 mm	**100 mm**	**120 mm**	**150 mm**	**200 mm**
8	396	495	594	742	990
13	643	804	965	1207	1698
16	791	990	1188	1484	1484

Notes:

- These figures are calculated for an actual application rate of 0.34 kg/m^2 and are used for calibrating the machine because there is a loss of beads between the bead dispenser and the marked line and the volume is measured with beads not compacted.
- Tolerance of + 10% is permissible when measuring these volumes.
- If using two or more glass bead dispensers, check each dispenser separately to make up the required totals.
- Glass beads weigh approximately 1.53 g/mL.

Anti-skid material

Surface application: Apply anti-skid material before applying glass beads.

Anti-skid material application rates for transverse lines and other markings

Material stirred into paint before application: Minimum 500 g/L.

Material surface applied: Minimum 200 g/m^2.

3.4 THERMOPLASTIC (NON-PROFILE) MARKING

General

Arrows and speed markings: Place square with the centreline of the traffic lane.

Application of thermoplastic materials and beads: Uniformly apply the thermoplastic material.

Planning and set out: Prior to installing markings, provide temporary set out reference marks (e.g. by use of stringing for curves). On live and/or large radius roads, submit the methodology and any proposed traffic operational impacts for road authority approval prior to commencement. No trace of the temporary marks shall remain visible once the works are completed.

Preparation of thermoplastic material on site

Heating: Immediately before application, uniformly heat the thermoplastic material in a suitable kettle to the temperature recommended by the manufacturer without overheating.

Molten pot life: Maximum 6 hours for hydrocarbon resins and 4 hours for wood and gum resins.

Discard: Over-heated resin and/or expired molten materials.

Tack coat

Requirement: Apply where wearing surface of the pavement is smooth or polished.

Application: To the thermoplastic and tack coat manufacturer's recommendations.

Timing: Immediately before applying the thermoplastic material.

Anti-skid materials and glass beads

Bead application: Apply materials conforming to the following:

- Generally: Uniformly apply after application of thermoplastic material to pavement, whilst material is molten.
- Longitudinal lines: Separate bead applications, use application methods which retains bead in the materials.
- Type B glass beads: For lines other than longitudinal lines, apply to screeded markings using an approved method.

Bead application rate: Conform to the following:

- Type B glass beads: Minimum 0.30 kg/m^2.
  - . Rate retained in the surface for transverse lines and other markings: Minimum 0.30 kg/m^2.
- Type D-HR glass beads: Minimum 0.50 kg/m^2.
  - . Rate retained in the surface for longitudinal lines: Minimum 0.40 kg/m2.

Anti-skid material application rate: Minimum 0.20 k/m^2.

Longitudinal lines

Applying thermoplastic material: Spray lines in conformance with the following:

- With a self-propelling machine.
- Two sets of lines forming a one-way or two-way barrier line: Spray concurrently.
- Application: Apply uniformly with minimum cold film thickness of 1.8 mm.

Bead application: Conform to the following:

- Type B glass beads: Apply by air propulsion or gravity feed to the surface of all lines immediately after application of thermoplastic material.
  - . Actual application rate: Set to overcome any loss of beads between the bead dispenser and the sprayed line.
- Application rate: Conform to Anti-skid materials and glass beads.

Transverse lines and other markings

Other marking dimensions: Conform to local or state requirements for the following:

- Arrows.
- Chevrons.
- Painted medians.
- Painted left turn islands.
- Speed markings.

Thickness: 3 mm ± 1 mm.

Screeded markings: If required, screed thermoplastic material using a mobile applicator and templates to control the pattern.

Field testing

Thermoplastic material: Verify the cold film thickness applied to the road pavement.

Test method: Use a vernier or suitable dry film thickness gauge to measure the thickness of thermoplastic material applied to a metal test plate. Take the mean of at least 6 readings distributed over the test area.

Field measurement of spherical glass bead application rate

Requirement: Measure to **PAINT MARKING**, **Field measurement of spherical glass bead application rate**.

3.5 ~~TWO-PART COLD APPLIED PLASTIC PAVEMENT MARKING~~ (NOT USED)

~~**General**~~

~~Primer: Apply if the surface is concrete, smooth or polished, or where recommended by the manufacturer. Apply to the manufacturer's recommendations.~~

~~Anti-skid material and glass beads: Uniformly apply onto the two-part cold applied material while fluid and immediately after it has been applied to the pavement.~~

~~**Longitudinal lines**~~

~~Bead applications: Separate bead application. Use methods which retain beads in the material.~~

~~**Application rates for two-part cold applied pavement materials and glass beads table**~~

~~**Material**~~	~~**Longitudinal linemarking**~~	~~**Transverse lines and other markings**~~	
	~~**Sprayed application**~~	~~**Trowelled, screeded or extruded**~~	~~**Sprayed**~~
~~Cold applied material thickness (excluding surface applied beads)~~	~~0.5 ± 0.05 mm (wet)~~	~~2.0 ± 0.2 mm (dry)~~	~~1.00 ± 0.1 mm (wet)~~
~~Completed marking thickness~~	~~-~~	~~-~~	~~2.0 ± 0.2 mm~~
~~Surface applied glass beads*:~~	~~-~~	~~-~~	~~-~~
~~Type (AS/NZS 2009)~~	~~Type D-HR (adhesive coated)~~	~~Type B~~	~~Type B~~
~~Rate retained in the painted surface~~	~~≥ 400 g/m^2~~	~~≥ 300 g/m^2~~	~~≥ 300 g/m^2~~
~~Anti-skid material~~	~~≥ 200 g/m^2~~	~~≥ 200 g/m^2~~	~~≥ 200 g/m^2~~
~~* Glass beads coated with a compatible coupling agent for an improved adhesive bond with thermoplastic or two-part cold applied road marking material.~~			

3.6 PAVEMENT MARKING TAPE

General

Application: To the manufacturer's recommendations.

Removal: If required, remove to the manufacturer's recommendations.

3.7 RAISED PAVEMENT MARKERS

Installation

Adhesive preparation: Freshly heat and mix the adhesive to the manufacturer's recommendations. Do not allow the adhesive to cool and do not reheat before use.

Application of adhesive: Spread the adhesive uniformly over the underside of the marker to a depth of approximately 10 mm.

Fixing marker to pavement: Conform to the following:

- Press marker onto the pavement surface in its correct position and rotate slightly until the adhesive is squeezed out around all edges of the marker.
- Do not disturb the marker until the adhesive has set.

Rough surfaces

Locations: Newly laid coarse sprayed bituminous seals.

Fixing marker to pavement: Conform to the following:

- Apply an initial pad of adhesive 20 mm larger than the diameter of the base of marker.
- Apply adhesive to fill irregularities in the pavement surface to produce a flat, smooth surface, flush with the upper stone level.
- Allow the adhesive pad to set.
- Apply additional adhesive to the pavement in conformance with **Installation** and press down marker onto the adhesive pad on the pavement surface. Make sure there is good adhesion.

3.8 REMOVAL OF REDUNDANT MARKINGS

General

Remove ~~or mask~~ immediately before or after placement of new markings. Make sure the surface is clean, undamaged with surface texture, reflectivity characteristics and colour comparable to the adjacent pavement surface. Resurface any damaged surfaces (whether superficially or otherwise). For short-term temporary masking use black non-reflective masking tapes with skid resistance properties, only with approval from the roads authority.

Removal method

Requirement: Remove marking from wearing surface of pavement as follows:

- Without significant damage to the pavement structure, surface or texture.
- Remove all markings in rectangular areas or blocks.
- Black out markings only as a temporary measure and make sure it has skid resistance properties.
- Use suitable methods of removal by grinding, plane and reseal, sandblasting or high pressure water spraying.
- Repair any damage caused by removal of pavement markings, by resurfacing to the satisfaction of the roads authority.
- Remove redundant pavement marking within 48 hours of application as a temporary measure. Where existing pavement markings are to be removed and replaced, do not remove the pavement marking until the complete installation of the replacement marking has been done.
- Dispose removed marking material in conformance to the EPA guidelines.

3.9 MAINTENANCE OF PAVEMENT MARKINGS

General

Requirement: Maintain and replace, if necessary, all raised pavement markers and pavement marking during the contract period and the Defects Liability Period.

Level of service: Provide minimum level of service in conformance with the **Performance criteria**.

3.10 PERFORMANCE CRITERIA FOR LONGITUDINAL LINES

Dry retroreflectivity

Requirement: To Austroads AG:AM-T017.

For white longitudinal pavement marking: Conform to the following:

- First 30 days after opening to traffic: 350 mcd/lx/m^2.
- 12 months after opening to traffic: 200 mcd/lx/m^2.
- Intervention level when remarking is required: 150 mcd/lx/m^2.

For yellow longitudinal pavement marking: Conform to the following:

- First 30 days after opening to traffic: 200 mcd/lx/m^2.
- 12 months after opening to traffic: 150 mcd/lx/m^2.
- Intervention level when remarking is required: 100 mcd/lx/m^2.

Wet retroreflectivity

Requirement: To Austroads AG:AM-T017.

Minimum wet retroreflectivity after application: 80 mcd/lx/m^2.

Colour

Requirement: To AS 4049.4 Appendix F.

White markings: Whiter than ‘Y35 Off White’ to AS 2700.

Yellow markings: Equivalent to 'Y12 Wattle' or 'Y15 Golden Yellow' to AS 2700.

Non-white colour pavement marking: To AS 4049.4 Appendix G.

Luminance

Requirement: To AS 4049.4 Appendix H Method 2.

Luminance factor: Conform to the following:

- For white markings: 80%.
- For yellow markings: 45-50%.
- Minimum retroreflectivity: 100 mcd/lx/m^2.

Skid resistance

Requirement: To AS 4049.4 Appendix J.

Average skid resistance value (SRV): ≥ 45 BPN or equivalent.

Degree of wear

Requirement: To AS 4049.4 Appendix L or Appendix M.

Thickness

Requirement: Provide maximum thickness of pavement marking material as 5 mm.

Testing

Requirement: As a minimum perform field testing of dry retroreflectivity within first 30 days after opening to traffic and at the end of the maintenance liability period.

Replacement of markings

Requirement: Replace all longitudinal lines within a 300 m segment where length of the defective line exceeds:

- 36 m continuous or 25% of total on any 300 m lane length on curves and barrier lines or
- 72 m continuous or 50% of total on any 300 m lane length on straights.

3.11 TESTING

Quality

Requirement: Test for all characteristics in conformance with **ANNEXURE - MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES**.

4 ANNEXURES

4.1 ANNEXURE – SUMMARY OF HOLD AND WITNESS POINTS

For private developments, certain Hold and Witness Points where specifically noted below require representatives of both the Superintendent and the Principal Certifier (e.g. Council) to authorise release.

Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
SUBMISSIONS, Execution details Removal of redundant markings	H	Removal method of redundant markings.	24 hours before commencement	Removal of markings
SUBMISSIONS, Samples Permanent pavement marking tape	H	Samples and product details.	5 days before commencement	Material ordering and delivery
SUBMISSIONS, Products and materials Type tests, material properties	H	Tests reports verifying material properties.	5 days before commencement	Material ordering and delivery

Clause and description	Type*	Submission/Inspection details	Submission/Notice times	Process held
INSPECTION, Notice Setting out	H	Pavement marking set-out.	5 days before marking application	Marking application
INSPECTION, Notice Surface preparation	H – Superintendent and Principal Certifier	Completed surface preparation.	1 day before marking application	Marking application
INSPECTION, Notice Completion	W – Superintendent and Principal Certifier	Completed marking.	1 day before inspection	-
*H = Hold Point, W = Witness Point				

4.2 ANNEXURE – MAXIMUM LOT SIZES AND MINIMUM TEST FREQUENCIES

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
Materials supply	Material quality – supplier's documentary evidence of:			
	Paint	1 contract	1 per contract or change in material	AS 4049.3
	Glass beads	1 contract	1 per contract or change in material	AS/NZS 2009
	-Thermoplastic material	1 contract	1 per contract or change in material	AS 4049.2
	-Raised pavement markers	1 contract	1 per contract or change in material	AS/NZS 1906.3
Paint application	Paint marking wet film thickness	1 contract	1 per site visit or change in pressure settings	AS/NZS 1580.107.3 Method B, comb gauge
	Application rate of glass beads	1 contract	1 per site visit or change in pressure settings	To **PAINT MARKING**, **Field measurement of spherical glass bead application rate**
Thermoplastic application	Cold film thickness	1 contract	1 per site visit or change in pressure settings	Measure by micrometre
	Unbeaded material thickness applied to road pavement	1 contract	1 per contract or change in material	RMS T841
	Application rate of glass beads	1 contract	1 per site visit or change in pressure settings	To **THERMOPLASTIC (NON-PROFILE) MARKING**, **Field testing**
~~Two-part cold applied material application~~ (Not used)	~~Lead content~~	~~1 contract~~	~~1 per contract or change in material~~	~~ASTM D3335~~
	~~No-pick-up time~~	~~1 contract~~	~~1 per contract or change in material~~	~~AS 1580.401.8~~

Activity	Key quality verification requirements	Maximum lot size	Minimum test frequency	Test method
	~~Abrasion resistance~~	~~1 contract~~	~~1 per contract or change in material~~	~~AS 4049.2 Appendix G~~

4.3 ANNEXURE – PAY ITEMS

This Annexure applies to Council projects. For private development works use of this schedule is optional, at the Superintendent's discretion.

Pay items	Unit of measurement	Schedule rate inclusions
1191.1 Pavement marking paint – longitudinal lines	Line pattern km (including any gaps). Calculate the area from the specified width (excluding tolerances) and the actual application length measured along the centreline of the longitudinal line.	All costs associated with the setting out of the work, paint and beads and traffic control.
1191.2 Pavement marking paint – Transverse lines, symbols, legends, arrows, chevrons, traffic islands and kerbs		Determine the extent of the painted surface by directly measuring the applied markings. All costs associated with the setting out of the work, all material, supply and application and traffic control.
- 1191.2(1) Transverse lines	Linear metres	
- 1191.2(2) Arrow	Each	
- 1191.2(3) Symbols	Each	
- 1191.2(4) Chevrons	m²	
- 1191.2(5) Kerbs	Linear metres	
- 1191.2(6) Traffic Islands	m²	
- 1191.2(7) Legends	Each or m²	
1191.3 Thermoplastic (or cold Applied Plastics) pavement marking material – longitudinal lines	Line pattern km (including any gaps). Calculate the area from the specified width (excluding tolerances) and the actual application length measured along the centre line of the longitudinal line.	All costs associated with the setting out of the work, tack coating, supply and application of thermoplastic material and beads and provision for traffic.
1191.4 Thermoplastic (or cold Applied Plastics) pavement marking material – transverse lines, symbols, legends and arrows		Determine the extent of the thermoplastic material applied by directly measuring the applied markings. All costs associated with the setting out of the work, tack coating, supply and installation of all material and the provision for traffic.
- 1191.4(1) Transverse lines	Linear metres	
- 1191.4(2) Arrow	Each	
- 1191.4(3) Symbols	Each	
- 1191.4(4) Chevrons	m²	
- 1191.4(5) Kerbs	Linear metres	
- 1191.4(6) Traffic Islands	m²	
- 1191.4(7) Legends	Each or m²	
1191.5 Raised pavement	Each marker installed.	All costs associated with the

Pay items	Unit of measurement	Schedule rate inclusions
markers (all applications)		setting out of the work, supply and installation of all material and provision for traffic.
1191.6 Removal of pavement markings	m²	All costs associated with removal and disposal.
Traffic management	Lump sum.	To *1101 Traffic management*.

4.4 ANNEXURE - REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

AS 1580		Paints and related materials - Methods of test
AS/NZS 1580.107.3	1997	Determination of wet film thickness by gauge
AS 1580.401.8	1997	No-pick-up time of road marking paints
AS 1742		Manual of uniform traffic control devices
AS 1742.2	2009	Traffic control devices for general use
AS 1742.3	2019	Traffic control for works on roads
AS 1906		Retroreflective materials and devices for road traffic control purposes
AS/NZS 1906.3	2017	Raised pavement markers (retroreflective and non-reflective)
AS/NZS 2009	2006	Glass beads for pavement-marking materials
AS 2700	2011	Colour standards for general purposes
AS 4049		Paints and related materials - Pavement marking materials
AS 4049.1	2005	Solvent-borne paint - For use with surface applied glass beads
AS 4049.2	2005	Thermoplastic pavement marking materials - For use with surface applied glass beads
AS 4049.3	2005	Waterborne paint - For use with surface applied glass beads
AS 4049.4	2006	High performance pavement marking systems
Austroads AG:AM-T017	2016	Pavement data collection with a Traffic Speed Deflectometer (TSD) device
Austroads AP-R578	2018	Harmonisation of pavement markings and national pavement marking specification.
DPTI TP343	2015	Determination of Skid Resistance with the Micro Griptester
RMS T841	2001	Field measurement of wet film thickness of road marking paint
ASTM D3335	2020	Standard Test Method for Low Concentrations of Lead, Cadmium, and Cobalt in Paint by Atomic Absorption Spectroscopy
RMS R141	2016	Pavement Marking

5 ANNEXURE M – MIDCOAST COUNCIL SPECIFIC CLAUSES

M1.	Variations to or non-conformances with Council's AUS-SPEC are to be evaluated with reference to the procedure in Council's *Development Engineering Handbook*. Acceptance is to be obtained in writing from: a) an authorised representative of Council's Director of Infrastructure and Engineering Services, or b) an accredited certifier where they are the Principal Certifier and hold the relevant accreditation category for the type of work.	**Variation procedure**
M2.	This specification applies in addition to any development consent (DA) conditions. If there is any inconsistency, the conditions of consent shall prevail.	**DA conditions**
M3.	Refer to the MidCoast Council *Development Engineering Handbook* for final inspection, works-as-executed and handover requirements.	**Completion**

6 AMENDMENT HISTORY

0	14/12/2020	First Published