

SECTION 721 - PAVEMENT MARKINGS

~~##This section cross-references Sections 175 and 853.~~

~~If any of the above sections are relevant, they should be included in the specification.~~

~~If any of the above sections are not included in the specification, all references to those sections should be struck out, ensuring that the remaining text is still coherent.~~

- PART 721.A - GENERAL
- PART 721.B - PAVEMENT MARKINGS FOR NEW WORKS
- PART 721.C - PAVEMENT MARKINGS FOR MAINTENANCE WORKS
- PART 721.D - PAINTED PAVEMENT MARKINGS
- PART 721.E - LONG LIFE PAVEMENT MARKINGS

PART 721.A – GENERAL

721.A01 GENERAL

This section covers the requirements for materials and application of pavement markings including:

- (a) supply and application of pavement marking paint and glass beads, longitudinal lines, intersection markings and other markings on the road surface for all new installations and maintenance of pavement markings;
- (b) supply and application of thermoplastic or cold-applied plastic material and glass beads, and pliant polymer tape for all new installations and maintenance of pavement markings;
- (c) fixing of both reflective and non-reflective raised pavement markers to asphalt, concrete or sealed pavements using epoxy adhesive or hot melt bitumen adhesive.

721.A02 DEFINITIONS

Pavement Marking

The term used to define all linemarking, roadmarking and raised pavement markers.

Linemarking

The term used to define all longitudinal lines such as centre, lane, edge, turn and continuity lines.

Roadmarking

The term used to define all transverse lines and markings applied by hand such as Stop/Give Way lines, pedestrian lines, arrows, and legends.

Maintenance of Pavement Markings

Refers to the refreshing or replacement of an already existing pavement marking.

New Pavement Markings

Refers to applying pavement markings to a new surface where no pavement marking exists i.e. after reseals, asphalt resurfacing, newly constructed pavements, and modifications to existing pavement markings.

Initial Coat

The term used to define initial coat of painted markings placed prior to the final coat.

Final Coat

The term used to define the final application of paint.

Raised Pavement Marker

A device placed on a pavement which may be a:

Non Reflective Marker

A device to provide a degree of delineation during daylight owing to the contrasting colour, reflection and profile with respect to the pavement surface. Also a device which reflects ambient light during the day-time and to a limited degree when illuminated at night.

Reflective Marker

A device which produces an effective point source of light at normal highway viewing distances by reflecting incident light in directions close to the direction from which it came. Also a device to provide a degree of delineation during daylight owing to the contrasting colour, reflection and profile with respect to the pavement surface.

Temporary Reflective Marker

A temporary device performing the same function as a Reflective Marker but with an intended life of not more than two weeks under average traffic conditions.

Retroreflectivity

A property of some materials, such as solid glass beads, to reflect incident light in directions close to the direction from which it came. Retroreflectivity is the value of reflected light measured in millicandella / lux / square metre and is used as a measure of light reflected by pavement markings.

Retroreflectometer

A device used to measure retroreflectivity. For the purpose of this contract the geometry of the retroreflectometer shall be based on 30 m observation geometry.

Urban Area

An area in which:

- (a) a speed limit of 60 kilometres per hour or less applies and is not a speed limit which applies only because of a temporary reason such as roadworks or a street event; or
- (b) there are buildings on land next to the road or where the street lighting poles are not more than 100 m apart for -
 - (i) a distance of at least 500 m; or
 - (ii) if the length of the road is less than 500 m, over the full length of the road.

Rural Area

An area that is not an Urban Area.

721.A03 STANDARDS

The dimensions and colour of pavement markings shall conform to the following standards unless otherwise shown on the Drawings:

- (a) VicRoads Traffic Engineering Manual Volume 2 as listed in Section 175;
- *** (b) the linemarking drawings ~~included in Section ##.~~

Paint and long life material shall be white, except in snow areas and Fairway tramline markings which shall be yellow or as otherwise specified or required in the VicRoads Traffic Engineering Manual Volume 2.

721.A04 INCLUSION AND DELETION OF JOB ITEMS

- ~~(a) The Superintendent may delete any work, subject to notice of deletion being given one month prior to the proposed programmed date. The Contractor will be notified in writing of such deletion and the contract sum adjusted by the price tendered in Schedule 1 for the job item(s) deleted.~~
- ~~(b) No additional payment will be made as a result of the deletion of any work or job item. However, where the deletion of job items results in a contract sum reduction of more than 20 per cent of the original contract sum, the deletion of job items in excess of this amount will be treated as a variation in accordance with the General Conditions of Contract.~~
- ~~(c) The Superintendent may request the Contractor to undertake additional pavement marking works at sites not listed in Schedule 1. These works will be treated as a variation in accordance with the General Conditions of Contract, except that the work shall be valued using Schedule 2 – Rates for Variation Purposes.~~

721.A05 MATERIALS

Pavement marking materials shall conform to the following standards.

(a) Raised Pavement Markers

- (i) Raised pavement markers shall comply with the relevant requirements of AS 1906, Part 3 as listed in Section 175.
- (ii) Temporary raised reflective pavement markers shall comply with the relevant requirements of AS 1906 as listed in Section 175, and shall be at least 100 mm in width and to a height of 50 mm with white reflective material on both sides and include protective covers for the reflective material.

(b) Adhesive

Hot melt bitumen adhesive shall comply with Section 853 - Hot Melt Bitumen Adhesive for Raised Pavement Marker Installation.

Other types of adhesive materials shall only be used with the approval of the Superintendent.

(c) Linemarking and Roadmarking Paint

All paints shall be approved under the Australian Paint Approval Scheme (APAS). Paint shall comply with the requirements of AS 4049.1 for solvent-borne paint or AS/NZS 4049.3 for water-borne paint as listed in Section 175.

(d) Glass Beads

- (i) Glass beads shall be used on all applications of material and for all pavement markings and shall conform to the requirements in AS/NZS 2009 and the Australian Paint Approval Scheme (APAS) Specification 0042 as listed in Section 175.
- (ii) Intermix glass beads for use in long life material applications shall conform to AS/NZS 2009 and the Australian Paint Approval Scheme (APAS) Specification 0042.
- (iii) The amount of heavy metals in the beads shall not be greater than that specified in Specification 0042.
- (iv) Pristine glass beads (Type B-HR)
 Type B-HR glass beads shall comply with the properties of Type B (AS 2009:2006) drop-on glass beads, with an additional high performance retroreflectivity requirement, requiring the delivery of a minimum 450 mcd/lux.m², when tested in accordance with a modified Appendix M* of AS 2009:2006 (described below).
 Section M4 Apparatus clause a) Dry film thickness of paint will be 200-250 µm
 Section M5 Procedure clause b) Weigh 24 +/- 0.5 grams of glass beads
 Section M5 Procedure clause e) Wet film thickness of paint will be 375 µm +/- 25 µm.

(e) Thermoplastic Pavement Marking Material

Thermoplastic pavement marking material used under this Contract shall comply with the requirements of Clause 721.A13 and shall provide a functional service life of a least six years allowing for fair wear and tear.

(f) Cold-applied Plastic Pavement Marking Material

Cold-applied plastic pavement marking material used under this Contract shall be a Poly Methyl Methacrylate resin based pavement marking material conforming with the colour, luminance and bead content requirements of Clause 721.A13 and shall provide a functional service life of at least six years allowing for fair wear and tear.

(g) Pliant Polymer Pavement Marking Tape

Pliant polymer pavement marking tape intended for use under this Contract shall be approved by the Superintendent.

721.A06 SITE PREPARATION

Site preparation shall be the sole responsibility of the Contractor as part of the works, including:

- (a) the removal of existing unsound, obsolete or redundant pavement markings
- (b) the removal of any foreign materials and debris within reasonable limits.

721.A07 PLACING RAISED PAVEMENT MARKERS

Markers shall be placed in accordance with the manufacturer's specification for pavement markers and the adhesives used shall be in accordance with Clause 721.A05(b).

Adhesive on the exposed surfaces of the marker shall be removed.

Where a new or replacement marker is not positioned correctly it shall be removed and a new marker placed.

Markers shall be protected from traffic after placing and any marker dislodged by traffic shall be removed and replaced with a new marker.

On concrete and asphalt pavements, wherever possible, markers shall be placed clear of longitudinal or transverse joints and on all pavements markers shall be placed clear of any surface cracks or positions from which markers have been removed and the surface is damaged.

721.A08 REMOVAL OF PAVEMENT MARKINGS

Where required the Contractor shall remove existing pavement markings to the standard approved by the Superintendent and appropriate to the marking being removed.

Any pavement damage caused by the installation or removal of pavement markings included in the works shall be the Contractor's responsibility. Rectification of any pavement damage to line and level shall be completed on the same day in accordance with the Superintendent's requirements.

On sections of road on which the Contractor has been directed to replace or remove raised pavement markers, the Contractor shall also repair damage to the pavement caused by the loss of pavement markers.

721.A09 LAYOUT OF MARKINGS

The Contractor shall be responsible for the layout of and spotting out for markings in accordance with the VicRoads Traffic Engineering Manual Volume 2.

721.A10 TOLERANCES ON PAVEMENT MARKINGS

The Contractor shall comply with the tolerances as shown in Table 721.A101 when installing pavement markings.

Table 721.A101 Tolerances on Pavement Markings

Markings	Tolerance
(A) Pavement Markings ⁽¹⁾	
Distance between the centreline of the marking and the centreline of the set out mark	<30 mm
Distance between the centreline of the completed marking and the centreline of the previous marking	<15 mm
Width of completed painted markings	±10 mm of the specified dimensions
Width of completed markings for long life materials	0 mm to +10 mm
Length of completed stripes and blocks	0% to +10% of the specified length
Gap between double lines	-10 mm to +0 mm of the required 100 mm gap ⁽²⁾
(B) Raised pavement markers	
(i) Markers in line with broken segments	
Transverse position	±25 mm of the centreline of segments
Longitudinal position	±0.5 m of the specified position
(ii) Markers in a longitudinal group	
Transverse position	±25 mm of specified position and ±10 mm of a line joining the centres of the end markers
Longitudinal position	±0.5 m
Spacing of markers within the group	±50 mm of specified spacing
(iii) Markers adjacent to an unbroken line	
Clearance to edge line	±5 mm of the specified dimensions
Longitudinal mismatch between markers in transverse pairs	<25 mm
Longitudinal position	Lesser of: 0.5 m or 10%
(iv) Orientation of reflective markers	Lower edge of the reflective face at 85° to 95° to centreline of roadway or adjacent line
(C) Thermoplastic profiled lines	
(i) Tolerances on dimension	
Line width	+20 mm, -5 mm
Line height	+2 mm, -0 mm
Extrusion breadth	+10 mm, -0 mm
Extrusion spacing	±15 mm
Extrusion shape	±25 mm at any point from rectangular shape
(ii) Tolerances on position	
Distance between the centreline of the marking and the centreline of the setout	<30 mm
Length of the completed lines	-0% to +5% of the specified length
Longitudinal position of individual extrusions	±50 mm of any previously applied profiled lining
⁽¹⁾ Apparent line of the markings is a smooth, continuous alignment when viewed in the direction of the line.	
⁽²⁾ Maintenance of pavement markings: If the gap between the existing lines is 90 mm or less the gap shall not be reduced by the maintenance application.	

721.A11 PROTECTION OF WORK

The Contractor shall be responsible for protecting the work by an appropriate means until the work can be trafficked without the glass beads being disturbed from their embedded position, or the paint being picked up and/or spread by passing traffic. If paint pick-up or glass bead disturbance does occur, the Superintendent may direct that the marking be re-applied, and paint or long life material spread by traffic be removed.

721.A12 ACCEPTANCE OF WORK

Pavement marking shall comply with the specified requirements as detailed in the following clauses:

- (a) 721.A05 Materials
- (b) 721.A10 Tolerances on Pavement Marking
- (c) 721.A13 Acceptance of Retroreflectivity
- (d) 721.A14 Acceptance of Colour
- (e) 721.D02 Minimum Requirements (for painted markings)
- (f) 721.E02 Minimum Requirements (for long life markings)

Where a particular item fails to satisfy any of the above requirements:

- (a) the Contractor shall rectify the failed sections within 4 weeks of testing at the Contractor's expense
- *** (b) subject to approval by the Superintendent, reduced payment for out-of-tolerance markings may be made in accordance with Clause ##:.

HP Where removal of unsuitable pavement marking is required, the method of removal shall be subject to the approval of the Superintendent before removal works commence.

721.A13 ACCEPTANCE OF RETROREFLECTIVITY

The Contractor shall measure the level of retroreflectivity using the procedure set out in the current revision of VicRoads Test Method RC424.01 – Determination of Retroreflectivity of Pavement Markings as listed in Section 175. Acceptance of the retroreflectivity of any line or road marking will be based on a lot basis.

The average of the six test site Site Retroreflectivity Values (SRV) shall be calculated for each lot. Each lot shall achieve an average minimum level of retroreflectivity as specified in Table 721.A131 Acceptance of Retroreflectivity.

Table 721.A131 Acceptance of Retroreflectivity

	Initial Measurement	Additional Measurement
Testing Period ⁽¹⁾	3 – 5 weeks	5 – 6 months
Minimum level of retroreflectivity on sprayed seal surfaces	350 mcd/lux/m ²	220 mcd/lux/m ²
Minimum level of retroreflectivity on asphalt and all other surfaces	350 mcd/lux/m ²	250 mcd/lux/m ²
⁽¹⁾ Measured after application of the second/final coat of material.		

Measurements shall be forwarded to the Superintendent no later than five days from when the measurements were taken.

721.A14 ACCEPTANCE OF COLOUR

White markings - the colour match test for white materials shall be based on luminance factor and conducted in accordance with AS 4049.4, using Field Method 2 of AS 4049.4 Appendix H4.3 as listed in Section 175. All markings shall have a colour difference detected as whiter than Natural Colour System (NCS) swatch S 2000-N, at all times during the Defects Liability Period.

Yellow markings – the colour match test for non-white (yellow) materials shall be conducted in accordance with AS 4049.4 using Field Method 2 of AS 4049.4 Appendix H4.3, using the reference swatch sample NCS S 1070-Y20R. All yellow markings shall be an approximate match to Natural Colour System (NCS) swatch S 1070-Y20R, at all times during the Defects Liability Period.

Measurements shall be forwarded to the Superintendent upon request no later than five days from when the measurements were taken.

PART 721.B – PAVEMENT MARKINGS FOR NEW WORKS

~~## strikethrough this Part B for Maintenance Contracts:~~

721.B01 GENERAL

This section covers the requirements for new pavement markings.

721.B02 SCOPE OF WORK

The scope of work includes the supply of all materials and placement of pavement markings in accordance with this specification.

For new pavement marking the following works shall be undertaken as part of the works:

- (a) immediately prior to resurfacing, removal of any existing reflective and non reflective markers
- (b) placement of temporary reflective pavement markers including removal of protective covers after surfacing works
- (c) initial placement of pavement markings, including reinstatement of any adjoining pavement markings blackened but not necessarily covered by the surfacing activity, comprising –
 - reinstatement and/or placement of initial coat of painted pavement markings
 - reinstatement and/or placement of other long life pavement markings
 - reinstatement and/or placement of raised pavement markers and removal of temporary raised reflective pavement markers
- (d) final coat of all painted pavement markings
- (e) reinstatement and/or placement of profiled lines after the final coat of paint.

721.B03 LIMIT OF WORK

*** For new pavement markings the limit of pavement marking works shall be the same as the limit of the new surfacing or as shown on the Drawings. ~~in Section ##: – Schedule of Drawings.~~

721.B04 PROGRAM

For new pavement markings the Contractor shall undertake pavement marking works in accordance with the following requirements.

(a) After Surfacing Works

The initial coat of paint, long life pavement markings (other than profiled linemarking) and raised pavement markers (reflective and non-reflective) on newly surfaced pavements shall be installed in accordance with the following timeframes:

AADT ≥5,000 and M class roads	within 24 hours of opening to traffic
AADT ≥1,000 and ≤4,999	within 3 days of opening to traffic
AADT < 1000	within 5 days of opening to traffic

- (b) All new painted pavement markings shall receive two applications of paint. The second/final application shall be applied between 2-6 weeks after the initial application.
- (c) The Contractor shall apply profiled linemarking between 2–6 weeks after the final coat.
- (d) For new works constructed clear of traffic, all pavement markings shall be completed prior to opening of traffic.

721.B05 POSITION OF MARKINGS

All markings are to be set out in accordance with the dimensions and spacings as required by the appropriate standard in Clause 721.A03.

HP Painting/application of material shall not commence until the Superintendent has inspected the set out and given consent to proceed, unless an exemption has been granted in writing by the Superintendent.

(a) New pavement markings shall be positioned in accordance with the following requirements:

- (i) set out by the Contractor in conformance with the appropriate standard required by Clause 721.A03
- (ii) applied within the tolerances listed in Table 721.A101.

(b) Temporary Reflective Markers

Temporary reflective markers for new works shall be placed at the following minimum spacings on all longitudinal lane lines, except that on any curve less than 500 m in radius the spacing shall not be more than 12 metre centres:

AADT ≥5,000 and M class Roads	12 metre centres
AADT ≥1,000 and <5,000	24 metre centres
AADT <1,000	48 metre centres

721.B06 RECORDS AND REPORTING

(a) Job Completion Report

For New Markings the Contractor shall complete and forward to the Superintendent Council a Job Completion Report (Pavement Markings).

(b) Retroreflectivity Report

The Contractor shall complete and forward to the Superintendent Council a Retroreflectivity Report in a form approved by the Superintendent Council showing the level of retroreflectivity determined for each test lot in accordance with the requirements of Clause 721.A12.

PART 721.C – PAVEMENT MARKINGS FOR MAINTENANCE WORKS

~~## strikethrough this Part C for New Pavement Markings:~~

721.C01 GENERAL

~~This section covers the requirements for maintenance of pavement markings.~~

721.C02 SCOPE OF WORK

~~The scope of work includes the supply of all materials and placement of pavement markings in accordance with this specification.~~

~~Maintenance works shall entail preparing the site in accordance with Clause 721.A06 and refreshing the existing pavement markings with the same material as the existing markings in accordance with this specification.~~

~~Existing markings which are in 'Longlife' i.e. thermoplastic, cold-applied plastic, pliant polymer roadmarking tape, or other long durability non-paint product shall not be maintained in paint, unless prior approval has been given by the Superintendent. Missing or badly worn long life markings shall be reported to the Superintendent who may direct the Contractor to maintain the markings in paint.~~

721.C03 LIMIT OF WORK

~~*** For the maintenance of existing pavement markings the works shall include all existing tapers, bell mouths at intersecting roads, pavement widening and traffic lanes. The limits of work at typical intersections are shown in Section ##: - Schedule of Drawings.~~

721.C04 EXCLUSION OF ROADWORKS

~~For works involving the maintenance of pavement markings, the Contractor will not be responsible for maintaining pavement markings unless otherwise directed by the Superintendent where it is evident that roadworks are taking place or will shortly take place which will interfere with the installation of the markings or which will damage the completed markings.~~

~~The Contractor shall record the location of any road lengths not maintained and notify the Superintendent. The Contractor shall state the reason as to why the location is not maintained prior to the pavement marking work being undertaken.~~

~~Long Life Pavement Markings that could result in thicknesses greater than 5mm shall not be applied and shall be brought to the attention of the Superintendent.~~

721.C05 PROGRAM

~~(a) For the maintenance of pavement markings the Contractor shall submit the following programs as specified for review by the Superintendent as part of the works.~~

~~—— (i) **Within two weeks of the Date of Award of Contract, a pavement marking program for the whole of the works that complies with Section ##: – Road Inventory Information. This program shall be reviewed and updated at least annually.**~~

~~(ii) Based on the list of jobs requested by the Superintendent, the Contractor shall submit a monthly detailed program of planned pavement marking jobs at least five working days in advance of the following month.~~

~~The detailed program shall be in bar chart form or other suitable form approved by the Superintendent, including specific jobs to be undertaken with a time scale shown in days. The program shall be in sufficient detail to identify dates covering the following activities:~~

~~date of linemarking~~

~~date of roadmarking~~

~~dates of placement of raised pavement markers~~

~~date of retroreflectivity testing.~~

~~(iii) The Contractor shall submit a weekly program confirming the crew locations for work that will be undertaken in the following week.~~

~~All pavement markings on individual Job Items shall be completed in the programmed month as specified in Section ##: – Road Inventory Information.~~

~~*** Failure to meet this requirement may result in a reduced payment on that item in accordance with Clause ##:.~~

~~(iv) The Works, and the requirements for the Works, undertaken between the months of June and July shall be agreed between the Contractor and the Superintendent.~~

721.C06 INSPECTION AND REPLACEMENT REQUIREMENTS FOR MAINTENANCE OF RAISED PAVEMENT MARKERS

~~For maintenance of raised pavement markers, the Superintendent will conduct a routine program of inspections of the condition of raised pavement markers.~~

~~From the routine program of inspections, requests for replacement of raised pavement markers will be made. For the purpose of replacing raised pavement markers, the Contractor may program this based on a minimum run of 250 markers on urban road sections and M and A class roads, and a minimum run of 125 markers on other road sections. Valuation of these works will be based on rates submitted in Schedule 2 – Rates for Variation Purposes. The Contractor shall replace these markers within one month of the issue of a request from the Superintendent.~~

721.C07 RECORDS AND REPORTING

(a) Job Completion Report

~~For maintenance of pavement markings the Contractor shall complete and forward to the Superintendent a Job Completion Report (Pavement Markings) using the proforma included as Attachment A to this Section 721, for each job item in Schedule 1.~~

~~The Contractor shall hold all records on electronic media in a form approved by the Superintendent. One electronic and one hard copy of each month's completed work shall be forwarded to the Superintendent together with the statement for payment under the Contract.~~

(b) Retroreflectivity Report

~~For both new work and maintenance of pavement markings, the Contractor shall complete and forward to the Superintendent a Retroreflectivity Report in a form approved by the Superintendent showing the level of retroreflectivity determined for each test lot in accordance with the requirements of Clause 721.A12.~~

PART 721.D - PAINTED PAVEMENT MARKINGS

721.D01 GENERAL

Linemarking shall be applied by a self propelled machine, and stencils shall be used with all roadmarking.

All work must be undertaken by a contractor eligible for accreditation under the Painting Contractors Certification Programme (PCCP). This programme is administered by the CSIRO.

Completed markings shall be uniform in appearance from all angles of observation, texture, width and thickness and the surface shall be free from streaks, overlaps, unbeaded areas, tyre marks, stencil breaks or other defects. Edges and cut-offs should be neat and sharp, and there shall be no visible run-off, overspray, dribbles, splash or spillage on to the surrounding area, or on to parked or passing vehicles. The Contractor shall be responsible for the cost of removal of paint from such vehicles.

Glass beads shall be applied to the paint to produce a uniform coverage and be properly embedded and bonded over the whole painted surface. Glass beads shall be applied to all markings.

The Contractor shall be responsible for any spillage on to the surrounding area, and cost of any remedial action required.

721.D02 MINIMUM REQUIREMENTS

The minimum requirements of paint and glass beads shall be as shown in Table 721.D021. The Contractor shall allow for any extra material required when placing on coarse chip seals. This includes the retained quantity of glass beads, to counter the phenomenon of reduced retroreflectivity due to road surface texture and directional visibility limitations.

Table 721.D021 Minimum Requirements – Paint and Glass Beads

	Paint ⁽¹⁾	Glass Beads ⁽²⁾
Linemarking		
New Markings (initial application only)	0.38 mm dft on sprayed seals 0.35 mm dft on asphalt and all other surfaces	Type D-HR ⁽³⁾
Re-marking (including second application on new markings)	0.38 mm dft on sprayed seals 0.35 mm dft on asphalt and all other surfaces	Type D-HR ⁽³⁾
Roadmarking		
All Marking	0.35 mm dft on sprayed seals 0.30 mm dft on asphalt and all other surfaces	Type B-HR
<p>⁽¹⁾ The minimum dry paint film thickness (dft) specified above shall be the end product thickness measured on a 200 mm x 100 mm sheet metal test plate without beads. Consideration shall be given to the texture of the road surface and the method of application used to achieve the requirements of this section.</p> <p>⁽²⁾ A minimum of 400 g/m² shall be retained in the painted marking for all glass beads.</p> <p>⁽³⁾ An alternative glass bead application rate shall be 300 g/m² of D-HR with a separate drop of 200 g/m² of B-HR provided that 75% minimum of the D-HR beads is retained at the 5 to 6 month testing undertaken Table 721.A131. Retention of the D-HR beads shall be demonstrated by photographs at each test site.</p>		

PART 721.E – LONG LIFE PAVEMENT MARKINGS**721.E01 GENERAL**

Long life pavement marking materials shall be prepared and used in accordance with the manufacturer's specification.

All linemarking shall be applied using a self-propelled ride-on machine including Statcon marking unless otherwise recommended by the marking manufacturer and approved by the ~~Superintendent~~ Council.

Glass beads shall be applied to all long life markings. Glass beads shall be sprinkled or sprayed on to the long life material while it is in a fluid state immediately after it has been applied to the pavement to ensure that the beads are embedded by a nominal 60%. The surface beads shall be distributed to give a uniform coverage over the whole surface of the long life material.

Completed markings shall be uniform in appearance, texture, width and thickness and the surface shall be free from blisters, air bubbles, tears, lumps, streaks, overlaps, unbeaded areas, tyre marks or other defects. Edges and cut-offs shall be neat and sharp, and there shall be no visible run-off, overspray, dribbles, splash or spillage on to the surrounding area, or on to parked or passing vehicles. The Contractor shall be responsible for the removal of pavement marking material from such vehicles.

721.E02 MINIMUM REQUIREMENTS

The minimum requirements of long life materials and glass beads shall be as shown in Table 721.E021. The Contractor shall allow for any extra material required when placing on coarse chip seals. This includes the retained quantity of glass beads, to counter the phenomenon of reduced retroreflectivity due to road surface texture and directional visibility limitations.

Table 721.E021 Minimum Requirements – Long Life and Glass Beads

Material	Applied Minimum Thickness, Glass Bead and Other Requirements
Thermoplastic	
sprayed markings	2.0 mm minimum thickness on longitudinal lines containing intermix beads and with a minimum of 400 g/m ² of Type D-HR or Type B-HR ⁽³⁾ drop-on glass beads retained on the marking surface
extruded line markings ⁽¹⁾	2.0 mm minimum thickness on longitudinal lines containing intermix beads and a minimum of 400 g/m ² of Type D-HR or Type B-HR drop-on glass beads retained on the marking surface
extruded road markings ⁽¹⁾	3.0 mm minimum thickness on intersections containing intermix beads and a minimum of 400 g/m ² of Type D-HR or Type B-HR drop-on glass beads retained on the marking surface
preformed markings	2.3 mm with a minimum skidding resistance value of 45 BPN (British Pendulum Number) and retroreflective properties agreed with the Superintendent
profiled lines ⁽¹⁾	8.0 mm minimum thickness with a minimum of 400 g/m ² of Type D-HR or Type B-HR drop-on glass beads retained on the marking surface

(Table 721.E021 continued next page)

Table 721.E021 Minimum Requirements – Long Life and Glass Beads (continued)

Material	Applied Minimum Thickness, Glass Bead and Other Requirements
Cold-applied Plastic	
sprayed line markings ⁽²⁾	1.0 mm minimum thickness for longitudinal line markings only with a minimum of 400 g/m ² of Type D-HR or Type B-HR glass beads retained in and on the marking surface
sprayed road markings ⁽²⁾	2.0 mm minimum thickness for all road markings containing intermix beads and a minimum of 400 g/m ² of Type D-HR or Type B-HR drop-on glass beads retained on the marking surface
trowelled, screeded, or extruded markings ⁽¹⁾	2.0 mm minimum thickness of markings containing intermix beads and a minimum of 400 g/m ² of Type D-HR or Type B-HR drop-on glass beads retained on the marking surface
Pliant Polymer Tape	as approved by the Superintendent Council
<p>(1) The minimum thickness specified shall be the height above the upper road surface level or above the existing marking as appropriate.</p> <p>(2) The minimum thickness specified shall be the height of the material between the glass beads on a metal test plate. All other thicknesses shall be as measured on a metal test plate including glass beads.</p> <p>(3) Pristine drop-on Type B glass beads (Type B-HR), as per Clause 721.A05.</p>	

721.E03 ADDITIONAL REQUIREMENTS FOR PROFILED LINES

The Contractor shall provide measurements of rib height, length, width, and spacing of profiled lines at a minimum of 10 evenly spaced readings per kilometre or part thereof. For lengths of less than 500 metres, a minimum of 2 evenly spaced readings per 100 metres shall be provided.

The Contractor shall carry out remedial work to rectify defective sections of profiled lines where they:

- (a) were not installed to specified dimensions, or distorted in shape or lost shape, such that the height of individual extrusions is less than 8 mm above the top of adjacent road surface aggregate particles, over more than 10 per cent of the profiled edge lining job item; or
- (b) have shattered or no longer adhere to the road surface over more than 1 per cent of the profiled edge lines job item; or
- (c) have shattered or no longer adhere to the road surface over a continuous length exceeding 5 m.

ATTACHMENT A TO SECTION 721
(Page 1 of 6)

JOB COMPLETION REPORT (PAVEMENT MARKINGS)

CONTRACT NO.

Job No.			
Road Name		Map Reference From	
From		Map Type	
To		Map Reference To	
Lane kilometres		Carriageway kilometres	
Responsible Region		Other Region(s)	
Municipality(ies)		Connect Equipment No. VicRoads Use Only	
MABC No. VicRoads Use Only		Road Category	
Comments			

Pavement Marking Maintenance

Paint Maintenance

Treatment	Material	Date of Marking	VicRoads Use Only	
			Next Schedule Date	Next Program Date

RPM, Including RRPM Maintenance

Treatment	Material	Date of Marking	VicRoads Use Only	
			Next Schedule Date	Next Program Date

Long Life, RRPM Special and other Special Treatments Including Part Treatments and other RPM Treatments

Treatment	Material	Date of Marking	VicRoads Use Only	
			Next Schedule Date	Next Program Date

JOB COMPLETION REPORT (PAVEMENT MARKINGS)

CONTRACT NO.

Performance Reporting

Treatment	Performance Criteria	Date of Testing	VicRoads Use Only Next Schedule Date	VicRoads Use Only Next Program Date
Painted Markings	Tolerances on Pavement Markings			
	Retroreflectivity			
	Daylight visibility			
	Colour			
	Skid Resistance			
Raised Pavement Marker	Tolerances on Pavement Markings			
	Retroreflectivity			
	Daylight visibility			
	Colour			
Long Life Markings	Tolerances on Pavement Markings			
	Retroreflectivity			
	Daylight visibility			
	Colour			
	Skid Resistance			

The Contractor shall include in the Job Completion Report the actual status of the item compared to the specified requirement for that item, including:

- tolerances on pavement markings;
- retroreflectivity;
- daylight visibility;
- colour; and
- skid resistance.

I, certify the above details as correct.
(Print Name)

.....
(Signed)

ATTACHMENT A TO SECTION 721
(Page 3 of 6)

JOB COMPLETION REPORT (PAVEMENT MARKINGS)

CONTRACT NO.

Painted Marking Detail

Pattern	Material	Unit of Measure	Quantity
Standard Stripe 100 mm		km	
Semi Barrier 100 mm		km	
Double Barrier 100 mm		km	
Edgeline 100 mm		km	
Single solid lane line 100 mm		km	
Edgeline 150 mm		km	
Single solid lane line 150 mm		km	
Single solid centreline 150 mm		km	
Continuity line 150 mm		km	
Turn lines 100 mm		m	
Lane lines 100 mm		m	
Chevron, diagonal bars or pedestrian crossing stripes, 600 mm		m	
Straight ahead arrow 1.4 m ² including 150 ^o angle arrow		each	
Turn arrow 1.6 m ²		each	
Combination turn/straight arrow		each	
Double turn arrow 2.7 m ²		each	
Combination straight/double turn arrow 3.6 m ²		each	
U turn 2.7 m ²		each	
Pedestrian lines 150 mm		m	
Stop lines 600 mm		m	
STATCON holding bars 150 mm wide 600/600 line/gap		Per block	
STATCON stop line 300 mm		m	
STATCON give way 300 mm wide 600/600 line/gap		Per block	
STATCON centreline 100 mm wide, usually 30 m long		m	
Freeway exit ramp block 1.5 m wide, usually 6 m long		m	
STATCON Roundabout blocks 400 mm wide 600/600 line/gap		Per block	
Special Legends			
KEEP CLEAR, including 150 mm long clearance bars		each	
Small Bicycle Symbol		each	
Large Bicycle Symbol		each	
Rail X		each	
Transit Lane TL		each	
Bus Lane		each	
Other			

ATTACHMENT A TO SECTION 721
 (Page 4 of 6)
JOB COMPLETION REPORT (PAVEMENT MARKINGS)**CONTRACT NO.****Raised Pavement Marker Detail**

Marker Type	Material	Unit of Measure	Quantity
Raised retroreflective pavement marker white mono or bi-directional		each	
Raised retroreflective pavement marker white mono or bi-directional (glass faced)		each	
Raised retroreflective pavement marker, yellow, red or green, mono or bi-directional		each	
Raised non-reflective pavement marker (ceramic)		each	
Raised non-reflective pavement marker (ultra hard plastic alloy)		each	

Long Life Markings Detail

Pattern	Material	Unit of Measure	Quantity
	ST sprayed thermoplastic ET extruded thermoplastic SCT screeded thermoplastic CA cold applied plastic		
Standard Stripe 100mm		km	
Semi Barrier 100 mm		km	
Double Barrier 100 mm		km	
Edgeline 100 mm		km	
Single solid lane line or centreline 100 mm		km	
Continuity line 100 mm		km	
Edgeline 150 mm		km	
Single solid lane line 150 mm		km	
Single solid centreline 150 mm		km	
Continuity line 150 mm		km	
Profiled lines		km	
Turn lines 100 mm		m	
Lane lines 100 mm		m	
Chevron, diagonal bars or pedestrian crossing stripes, 600 mm		m	
Straight ahead arrow 1.4 m ² including 150 ^o angle arrow		each	
Turn arrow 1.6 m ²		each	
Combination turn/straight arrow		each	
Double turn arrow 2.7 m ²		each	
Combination straight/double turn arrow 3.6 m ²		each	

ATTACHMENT A TO SECTION 721
(Page 5 of 6)

JOB COMPLETION REPORT (PAVEMENT MARKINGS)

CONTRACT NO.

Long Life Markings Detail ... continued

Pattern	Material	Unit of Measure	Quantity
	ST sprayed thermoplastic ET extruded thermoplastic SCT screeded thermoplastic CA cold applied plastic		
U turn 2.7 m ²		each	
Pedestrian lines 150 mm		m	
Stop lines 600 mm		m	
STATCON holding bars 150 mm wide 600/600 line/gap		Per block	
STATCON stop line 300 mm		m	
STATCON give way 300 mm wide 600/600 line/gap		Per block	
STATCON centreline 100 mm wide, usually 30 m long		m	
STATCON Roundabout blocks 400 mm wide 600/600 line/gap		Per block	
KEEP CLEAR including 150 mm long clearance bars		each	
Small Bicycle Symbol		each	
Large Bicycle Symbol		each	
Rail X		each	
Transit Lane TL		each	
Bus Lane		each	
Other			

Traffic Signal Site

Job Item No.			
Principal Road Name			
Intersecting Road			
Other intersecting Road			
Map Reference From		Map Type	
Responsible Region		Other Region(s)	
Municipality(ies)		Connect Equipment No. VicRoads Use Only	
MABC No. VicRoads Use Only		Road Category	
Comments			

ATTACHMENT A TO SECTION 721
(Page 6 of 6)

JOB COMPLETION REPORT (PAVEMENT MARKINGS)

CONTRACT NO.

Pavement Marking Maintenance

Paint Maintenance

Treatment	Material	Date of Marking	VicRoads Use Only	
			Next Schedule Date	Next Program Date

RPM, including RRPM maintenance

Treatment	Material	Date of Marking	VicRoads Use Only	
			Next Schedule Date	Next Program Date

Long Life, RRPM Special and Other Special treatments including Part treatments and Other RPM treatments

Treatment	Material	Date of Marking	VicRoads Use Only	
			Next Schedule Date	Next Program Date

I, certify the above details as correct.
(Print Name)

.....
(Signed)