CONTENTS

11 PAVEMENT MARKINGS

11.01 SCOPE

The work covered by this Section of the Specification comprises the eradication of linemarking, the supply and application of road marking paint, pliant polymer (tapes and sheet material), spherical glass beads and raised pavement markers and the maintenance and/or reinstatement of existing pavement marking works where required.

11.02 STANDARDS

Work carried out and testing performed under this Specification shall comply with the requirements of the following Australian Standards and ACT Government Traffic Asset Management Unit Standard Traffic Control Device Drawings to the extent that they are relevant and not overridden by the Specification.

Australian Standards

AS 1742	Manual of Uniform Traffic Control Devices
AS 1906.1	Retro-reflective materials and devices for road traffic control purposes
AS 1906.3	Raised Pavement Markers (retro-reflective and non retroreflective).
AS 2009	Glass beads for traffic markings
AS 2445	Methods of sampling and testing retroreflective materials and devices for road traffic control purposes.
AS 2700	Colour standards for general purposes
AS 3554	Adhesives for raised pavement markers
AS 4049.2	Thermoplastic road marking materials
AS 4049.3	Paints and related materials - Road marking materials - Waterborne paint - For use with drop-on beads

RTA, NSW Materials Specifications and Test Methods

RTA 3353	Glass beads (for Application to Road Marking Materials).
RTA 3359	Profile Thermoplastic Roadmarking Material.
RTA 3360	Two part Cold Applied Roadmarking Material.
RTA T805	Non-volatile Content of Paint
RTA T806	Density of Paints
RTA T807	Fineness of Paint (Sieve Test)
RTA T808	Consistency of Paint by Flow Cup
RTA T815	Soluble Lead Content of Paints (Gravimetric Method)
RTA T820	Thinning or Mixing Properties of Thinners with Paints

RTA T821	No Pick-up-Time of Road Marking Paints
RTA T833	Application Properties of Paint by Brushing or Spraying Conventional and Airless
RTA T841	Field Measurement of Wet Film Thickness of Road Marking Paint
RTA T852	Degree of Settling of Paint
RTA T1203	Refractive Index (R.I.) of Glass Beads
RTA T1205	Flow Properties of Spherical Glass Beads
RTA T1207	Roundness (Shape) of Glass Beads
RTA T1208	Measurement of Rate of Application of Spherical Glass Beads

ASTM Standards

ASTM D638-76

Traffic Asset Management Unit Standard Traffic Control Device Drawings:

STD – 01	Linemarking Types
STD – 02	Pavement Messages
STD – 03	Miscellaneous Details

Testing

A Testing Authority shall be employed by the Contractor to carry out all testing. The Authority shall hold a current NATA (National Association of Testing Authorities) Registration for the relevant tests, and a copy of results shall be forwarded to the Superintendent without delay.

11.03 DEFINITIONS

Definitions of terms used in this Specification are as follows:

PAVEMENT MARKING:	The term used to include all longitudinal linemarking, transverse lines, other markings and raised pavement markers used on the road pavement and kerbs for the purposes of guiding traffic.
STRIPE:	That part of longitudinal linemarking comprising pavement marking material.
LONGITUDINAL LINE MARKING:	All lines that are generally parallel to the traffic flow - Separation, Barrier, Lane, Merge and Edge lines as shown in the standard drawings.
TRANSVERSE LINES:	All lines that are marked at angles including right angles to the general traffic flow - Cross Walk, Stop, Hold and Transverse plus Continuity lines as shown in the standard drawings.
OTHER MARKINGS:	All diagonal and chevron markings, messages on the pavement including words, numerals, arrows and symbols, kerb markings, markings for parking control and any other markings.
PAVEMENT MARKER:	The term used to include Non Retroreflective Raised Pavement Markers and Retroreflective Raised Pavement Markers.

NON-RETROREFLECTIVE RAISED PAVEMENT MARKERS:	Markers applied directly to the pavement surface or installed by means of a suitable adhesive which reflect ambient light during daylight hours and to a limited degree when illuminated by vehicle headlights or roadway lighting at night.
RETROREFLECTIVE RAISED PAVEMENT MARKER:	Markers applied directly to the pavement surface or installed by means of a suitable adhesive which provide a point source of reflected or internal light when illuminated by vehicle headlights when viewed at normal night time viewing angles by vehicle drivers. There may be some delineation during daylight hours due to their contrasting colour, reflection and profile with respect to the pavement surface.
PERFORMANCE REQUIREMENT:	These are objective values of reflectivity, skid resistance and durability measured to ensure that the pavement marking meets the requirements of this specification under day and night as well as wet and dry conditions.
DURABILITY:	The term used to indicate the presence (degree of wear) and longevity of the markings
INTERVENTION LEVELS	These are the values below which a pavement marking is deemed not to provide a satisfactory level of service.
LUMINANCE FACTOR:	This is the ratio of a surface to that of an ideal white diffusing surface when illuminated and viewed under the same conditions and viewing geometry. It is expressed as a decimal point in the range of 0 to 1 where the surface has a matt finish. The values can also be expressed as a percentage.
RETROREFLECTIVITY:	The term is used to indicate the reflectivity provided by solid glass beads and is expressed in millicandellas per lux per square metre (mcd/lux/m^2) as measured by a retroreflectometer approved by the superintendent.
SKID RESISTANCE:	This is an estimation of adherence quality on a wet pavement surface as measured by friction between the surface and the friction equipment. The abbreviation SRN (Skid Resistance Number) is used to describe the value. The BPN (British Pendulum Number) is the nearest whole number to the SRN value.
REPRODUCIBILITY OF EQUIPMENT:	Reproducibility is the ability of devices to produce identical readings at relatively the same point.
AUTHORISED TRAFFIC CONTROL DEVICES PLAN	Drawing showing all traffic control devices for a particular area signed or otherwise shown as approved by the Manager (Traffic), Department of Urban Services, Australian Capital Territory.

11.04 PAINT SUPPLY

All pavement marking paint shall be waterborne and shall conform with the requirements of AS 4049.3

Completed markings shall be uniform in appearance, texture, width and thickness and the surface shall be free from unbeaded areas, traffic damage or other defects. Markings shall be straight or with smooth even curves where intended. All edges shall have a clean sharp cut off. Any marking material beyond the defined marking shall be removed, leaving a neat marking on the wearing surface of the pavement.

Beads shall be applied uniformly to all markings and shall be applied to the paint prior to surface skinning to produce a uniform, properly bonded coverage over the whole marking.

30 mesh angular quartz, or approved equivalent, shall be applied to all markings other than longitudinal lines.

The application rates for the materials and Type of glass beads shall be as specified in Table 11.4.

11.04.1 Colour

The colours of the paints described in this specification shall be as follows:

(a)	White	To be a close approximation of a sheet of magnesium oxide
(b)	Yellow	To correspond with the colour Range No. 355-356 of AS 2700
(c)	Red	To correspond with colour No. 537 of AS 2700
(d)	Black	To be not lighter in colour than No. 642, "Night", in AS 2700

The Contractor shall have available, on request Certification of colour conformance in accordance to AS 2700. The Superintendent may request colour test samples of the, proposed paint for comparison with the standard colours. Test samples shall be prepared by applying the paint evenly by pressure spray to a clean bright strip of tin plate at a rate of 8.2m^2 per litre, and allowing to stand for a period of 30 minutes before comparing it with the standard colour. Paint that does not match the required colour standard will be non-conforming.

11.04.2 Material Conformance

At least ten (10) working days prior to the programmed date for commencement of linemarking, the Contractor shall submit to the Superintendent for acceptance, the manufacturer's technical data for the paints proposed for use, together with Certification from a NATA registered laboratory that the material complies with the requirements of this Specification.

The Certification supplied shall include evidence that the following tests have been carried out on the paint supplied to prove compliance with the requirements of this Specification.

(i) Uniformity of Quality

Within practical limits, all deliveries of paint shall be identical and match the formulation of the Certification above. The following requirements for uniformity shall be met:

(a) Non-volatile Content

When tested in accordance with RTA (NSW) Test Method T805, the non-volatile content of any batch shall not differ from that of the approved sample or from that of any other batch by more than 5% of the non-volatile content of the approved sample.

(b) Density

When tested in accordance with RTA (NSW) Test Method T806 the density of any batch of the paint shall not differ from that of the approved sample, or from that of any other batch by more than 5% of the density of the approved sample.

(ii) Freedom from Lead

When tested in accordance with RTA (NSW) Test Method T815, the pigment shall contain not more than 0.3% lead (as lead oxide).

(iii) Condition at Delivery

The condition of the paint shall be such that when a drum containing 182 litres of the paint is turned over in a "rumbler" for a period of five minutes, no solid material shall remain on the sides or ends of the drum, and all pigment and other solids shall be uniformly dispersed throughout the vehicle.

From an initially uniform dispersion the paint shall not settle to produce a rating of less than eight within four days when tested in accordance with RTA (NSW) Test Method T852.

(iv) Fineness

When tested in accordance with RTA (NSW) Test Method T807, the whole of the paint shall pass through a 300µm sieve and not less than 99.5% shall pass a 75µm sieve when washed through with the thinner supplied with the paint.

(v) Thinners

When tested in accordance with RTA (NSW) Test Method T820, the reducing thinners supplied for use with the paint shall be completely miscible with the paint in any proportion without signs of coagulation. The drying time shall not be increased by reason of the addition of thinner.

(vi) Application Properties

When tested in accordance with RTA (NSW) Test Method T833the paint shall be suitable for application by spray as delivered without the addition of thinners.

When applied by spraying, the paint shall produce an even line without objectionable side spatter, and shall not clog the spray gun under normal operating conditions.

The spray guns used in this test shall have an output of at least 8 litres per minute.

Air atomised spray systems are to perform satisfactorily with paint and atomising air pressures up to 700 kPa and using a gun tip orifice 1.58mm diameter.

Airless spray systems are to perform satisfactorily with paint pressures up to 11,000 kPa and using a gun tip orifice 1.32 mm diameter.

(vii) Consistency

The consistency of the paint shall be 80 +/-10 seconds when measured by the Type B4 cup described in RTA (NSW) Test Method T808, Consistency by Flow Cup.

If the rheological properties of the paint make the use of a BS Cup Viscometer inappropriate, the consistency may be measured by another method subject to approval by the Superintendent.

(viii) Drying Time (No-Pick-up Time)

The drying time (no-pick-up time) as determined by RTA (NSW) Test Method T821 shall not exceed five minutes.

(ix) Bead Retention

The paint shall be capable of adhering to and retaining under traffic, spherical glass beads graded according to Clause 4 of the RTA Specification 3353 for the Supply of Spherical Glass Beads.

When applied to a section of lane divider, the number of beads lost after three weeks under traffic shall not exceed 10% of the total number of beads applied.

Hold Point 11.1

Process Held:	Supply of Paint Materials.
Submission Details:	At least ten (10) working days prior to the proposed commencement of linemarking, the Contractor shall submit, the manufacturer's technical data for the paints proposed for use together with written evidence from a NATA registered laboratory that the material complies with the requirements of this Specification.
Release of Hold Point:	The Superintendent will inspect the documents prior to authorising the release of the Hold Point.

11.05 LONG LIFE MATERIAL

11.05.1 General

Long life material shall consist of white or yellow films with pigments selected and blended to conform with colours specified in Clause 11.04.1 of this Specification for the expected life of the film.

Pre-formed words and symbols shall conform to the applicable shapes and size as prescribed in AS 1742.2.

Where glass beads are incorporated in thermoplastic material, they shall be in the proportion of 10 % of the total mass, as part of the aggregate constituent and shall comply with the requirements of AS 2009, Intermix type.

Glass beads for surface application shall comply with the requirements of AS 2009.

Retroreflective markings shall be supplied without backing tape except that backing tape may be used on symbols and letters. Tack coat material shall be to the manufacturer's specification.

11.05.2 Material Types

Long Life Material (LLM) shall be suitable for various applications such as longitudinal, transverse and word/symbol markings subjected to high traffic volumes and severe wear conditions such as repeated shear action from crossover or encroachment on edge and channelisation lines, and stop, start or turn movements. They shall be manufactured from general purpose, high durability, retroreflective pliant polymer film in accordance with the following:

(i) Profile Thermoplastic Material

Profile thermoplastic road marking material for audible/tactile treatment shall comply with the requirements of RTA 3359.

(ii) Non Profile Thermoplastic

(a) Thermoplastic for Non Profile Pavement Marking shall conform to the requirements of AS 4049.2.

(b) Preformed Thermoplastic shall comply with the requirements of AS 4049.2 and the Manufacturer’s recommendations.

(iii) Two Component Cold Applied Marking Materials

(a) Two component Cold Applied Plastic Pavement Marking Materials shall comply with the requirements of RTA NSW Specification 3360.

(b) Cement-based Marking Materials shall comply with the Manufacturer's requirements.

11.05.3 Material Conformance

The Contractor shall supply to the Superintendent for approval, Certification from a NATA registered laboratory that the thermoplastic material intended for use complies with requirements detailed hereunder. The Certification shall include evidence that the following tests have been carried out to prove compliance with the Specification requirements.

(i) Composition

The retroreflective pliant polymer pavement marking material shall consist of a mixture of high quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, with a reflective layer of beads bonded to the top surface in accordance with Clause 11.06.2.

(ii) Dry Reflectivity

The measured dry reflectivity readings per km (the average of 5 points, at least 50 m apart with each point to be the average of 5 readings in close proximity of the point) shall be a minimum of the values shown in Table 11.1:

Table 11.1

Line Type	Dry Reflectivity (km^{-1})
Longitudinal lines - white	250 mcd/lux/m^2
Transverse lines and other markings (excluding parking control markings) - white	100mcd/lux/m^2
Yellow markings	50mcd/lix/m^2

Notes on Table 11.1

(i) Average minimum wet reflectivity shall be 70% of the requirement for markings measured in the dry.

(iii) Acid Resistance

The beads shall show resistance to corrosion of their surfaces after exposure to a 1% solution made by adding 5.7 cc of concentrated sulphuric acid into 1000 cc of distilled water.

On completion of the test, microscopic examination (20x) shall show no more than 15% of the beads having a formation of a very distinct opaque white (corroded) layer on their entire surface.

(iv) Reflectivity Retention

To have a good, effective performance life, the glass beads must be strongly bonded and not be easily removed by traffic wear.

A Taber Abraser Simulation test shall be employed to measure reflectivity retentions. This shall be carried out using a Taber Abraser with an H-18 wheel and a 125 gram load. The sample shall be inspected, at 200 cycles, under a microscope to observe the extent and type of bead failure. No more than 15% of the beads shall be lost due to popout and the predominant mode of failure shall be "wear down" of the beads.

(v) Skid Resistance

When tested in accordance with AS 4049.2 shall be not less than those values listed in Table 11.7.

(vi) Tensile Strength and Elongation

The retroreflective pliant polymer material shall have a minimum tensile strength of 1.03MPa of cross-section when tested according to ASTM D638-76, except that a sample 150mm x 25mm shall be tested at a temperature between 21°C and 26°C using a jaw speed of 300mm per minute. The sample shall have a minimum elongation of 75% at break when tested by this method.

(vii) Application

Application shall be carried out as recommended by the manufacturer, and all recommendations as to application equipment shall be followed. The supplier of the retroreflective pliant polymer pavement marking tape shall have application equipment as approved by the material manufacturer.

(viii) Patchability

The retrorefleIctive pliant polymer material shall be capable of use for patching worn areas of the same type of retroreflective pliant polymermarkings in accordance with the manufacturer's instructions.

(ix) Thickness

The pliant polymer film without adhesive shall have a minimum thickness of 1.5mm.

(x) Effective Performance Life

The retroreflective pliant polymer material, when applied according to the recommendations of the manufacturer, shall provide a neat, durable marking that will not flow or distort due to temperature. The pavement surface polymer shall provide a cushioned, resilient substrate that reduces bead crushing and loss. The marking shall be weather resistant and, through normal traffic wear, shall show no fading, lifting or shrinkage which will significantly impair the intended usage of the marking throughout its useful life and shall show no significant tearing, roll back or other signs of poor adhesion.

Hold Point 11.2

Process Held:	Supply of long life material.
Submission Details:	At least ten (10) working days prior to the proposed commencement of marking with long life material, the Contractor shall submit the manufacturer's technical data for the LLM proposed for use together with written evidence from a NATA registered laboratory that the material complies with the requirements of this Specification.
Release of Hold Point:	The Superintendent will inspect the documents prior to authorising the release of the Hold Point.

11.05.4 Markings

Markings shall be fabricated from retroreflective pliant polymer , sheet material and pre-formed into letters, numerals and symbols. The outline of these letters, numerals and symbols shall be cleanly cut with smooth curves and straight lines.

When markings are formed in two or more parts, provision shall be made for the mutual alignment of the parts by means of appropriately located notches. In every case, application instructions shall be included with the markings.

11.05.5 Product Acceptance

The pavement marking tapes and sheet material shall have been approved for use on roads in NSW, VIC or ACT by the relevant roads authority.

11.06 SPHERICAL GLASS BEADS

11.06.1 Scope

This specification covers the supply of spherical glass beads suitable for "drop-on" application to road marking paint for the production of a reflective surface to improve the visibility of the paint film at night.

11.06.2 Composition

The beads shall be inorganic silicate glass, colourless, clear, transparent, freeflowing, resistant to dilute hydrochloric acid, and when checked by an optical count on a small sample, shall not contain more than 2% of beads showing opaqueness, "milkiness", tint, or inclusions.

11.06.3 Shape

The beads when subjected to test in accordance with RTA (NSW) Test Method T1207, shall contain not less than 70% of spherical particles by weight, and the portion retained on the 425 µm Australian Standard Sieve shall contain not less than 50% of spherical particles by weight of that portion.

11.06.4 Size

The beads shall comply with the following graduation requirements as prescribed in Table 11.2.

Table 11.2

Australian Standard Sieve	Per cent passing (By Mass)
850 µm	100
600 µm	90-100
425 µm	35-75
300 µm	15-45
150 µm	0-5
75 µm	0-1

11.06.5 Optical Characteristics

The beads, when subjected to RTA (NSW) Test Method T 1203 shall show an index of refraction not less than 1.50. The beads shall exhibit high retro-reflecting efficiency when applied at a rate of 0.30kg of beads per square metre to a film of road marking paint having a wet thickness of 0.36mm to 0.4lmm.

11.06.6 Waterproofing

The beads shall be made waterproof by the application of an exterior coating (in molecular thickness) of silicone or other suitable waterproofing material. The coating shall be applied during production of the beads and shall be suitably cured thereon.

11.06.7 Flow Properties

When tested according to RTA (NSW) test method T1205 the beads shall possess free flowing properties.

11.06.8 Cleanliness

Foreign particles shall not exceed 0.5% by count when the beads are examined microscopically under 40 magnification. Any foreign matter within this limit shall be of such character that it is not objectionable to personnel using the beads.

11.06.9 Packaging and Storing

Unless otherwise specified, all glass beads delivered to site shall be packed in airtight,

(a) flexible jute bags, lined with tar bounded paper and inserted with a polythene liner, or

(b) woven polythene outer bags with an inserted polythene liner.

Each package shall contain not less than 30 kg and not more than 45 kg nett weight of beads.

All packages shall be clearly labelled with the bead type, contents in kg, the batch number and the name of the manufacturer.

Beads delivered to site shall not be caked, and shall be capable of passing the flow property test mentioned in Clause 11.06.7 of this Specification.

11.06.10 Material Conformance

At least ten (10) working days prior to the programmed commencement date for linemarking, the Contractor shall submit Certification from a NATA registered laboratory that the product supplied complies with the requirements of the Specification.

Hold Point 11.3

Process Held:	Supply of thermoplastic material.
Submission Details:	At least ten (10) working days prior to the proposed commencement of linemarking, the Contractor shall submit the manufacturer's technical data for the glass beads proposed for use together with written evidence from a NATA registered laboratory that the galss beads comply with the requirements of this Specification.
Release of Hold Point:	The Superintendent will inspect the documents prior to authorising the release of the Hold Point.

11.07 RAISED PAVEMENT MARKERS

11.07.1 Performance Requirements

Adhesives for raised pavement markers shall comply with AS 3554.

(i) New Works

Pavement markers for new works shall meet, and be verified as meeting, the requirements of AS 1906.3 and shall have initial reflectivity values as shown in Table 11.3.

Table 11.3

Type	Description	Minimum CIL Values for Clean, New Markers (mcd/lx)
CPM	Non reflective white	-
SW	Uni-direction reflective white	300
SY	Uni direction reflective yellow	240
SR	Uni- direction reflective red	120
BB	Bi direction reflective blue	120
BW	Bi direction reflective white	300
BY	Bi direction reflective yellow	240
WY	Bi direction reflective white/yellow	240/300

(ii) Maintenance Works

The contractor shall ensure that the retention rate of all raised pavement markers in good condition is never less than 95% of the number originally placed on the road to the location standard applying at that time. Single spaced markers shall only be altered if specifically identified as part of the project. A pavement marker is to be assessed as in good condition when there is no visible cracking on the surface of the marker and the reflective face on retroreflective markers is not damaged.

11.07.2 Material Conformance

At least ten (10) working days prior to intended application, the Contractor shall submit a minimum of two (2) samples of each type of raised pavement marker specified for use in the contract works, together with full technical details of the adhesive proposed for use. Adhesives shall be of a type recommended by the manufacturer of the raised pavement markers.

The Contractor shall supply to the Superintendent for approval, Certification from a NATA registered laboratory that raised pavement markersproposed for use meet the respective requirements of Clause 11.07 of this Specification. The statement shall include test results from a laboratory registered by NATA for the specified tests or by a laboratory approved by the Superintendent. Such certificates shall be valid for tests conducted no more than 36 months previously.

Hold Point 11.4

Process Held:	Supply of raised pavement markers and adhesives.
Submission Details:	At least ten (10) working days prior to intended application of the raised pavement markers, the Contractor shall submit a minimum of two (2) samples of each type of raised pavement marker specified for use in the contract works, together with full technical details of the adhesive proposed for use, and written evidence from a NATA registered laboratory that the materials and dimensions comply with the requirements of this Specification.
Release of Hold Point:	The Superintendent will inspect the documentation and samples submitted prior to authorising the release of the Hold Point.

11.08 ERADICATION OF PAVEMENT MARKING

11.08.1 General

The eradication of painted road markings shall be carried out by abrasive blasting techniques. No alternative methods will be considered. All numerals, letters, symbols, and arrows will be marked or removed in such a way to avoid any possible confusion of motorists in wet conditions

The eradication of, or removal of pliant polymer markings shall be carried out by grinding or by a scraping and jabbing action using a suitable blade tool. Removal by burning will not be allowed.

The Contractor shall check the extent of eradication with the Superintendent and all markings to be eradicated shall be clearly identified with red paint prior to the commencement of eradication. Any markings incorrectly eradicated shall be remarked by the Contractor at no extra cost to the Principal.

The Contractor shall eradicate the nominated road marking as specified on the drawings regardless of the colour, number of coats, type and age of the paint or pliant polymer marking.

Blasting of painted markings shall be carried out until at least ninety (90) percent of the original area of each road marking has been removed. Any marking remaining shall not be concentrated in any one or two places of the original marking.

Removal of pliant polymer markings shall proceed until all of the marking has been removed from the pavement.

Blasting, grinding, scraping or other eradication activity shall not continue after the markings have been removed and any excessive damage to the pavement shall be repaired to the satisfaction of the Superintendent at no additional cost to the Principal.

The Contractor shall clean up and remove from the roadway all materials and debris from his operations and leave the roadway clear for use by the public.

Abrasive materials shall not be allowed to accumulate on any position of roadways open to traffic.

Hold Point 11.5

Process Held:	Eradication of linemarking.
Submission Details:	At least one (1) working day prior to the intended eradication of linemarking, the Contractor shall provide notification that the linemarking to be eradicated has been marked out on site.
Release of Hold Point:	The Superintendent will inspect the site prior to authorising the release of the Hold Point.

11.08.2 'Blackout' Material

'Blackout' will only be permitted if carried out by the use of 'Degadur' or an equivalent material with a colour and texture matched to the adjacent pavement surface and which minimises the possibility of misleading drivers under daylight/darkness and wet/dry conditions. The 'Blackout' treatment must be equal to or better than mechanically stripping the old marking. Prior to use of 'Blackout', the Contractor shall obtain the approval of the Superintendent.

All linemarking tape shall be removed before 'Blackout' may be used.

Hold Point 11.6

Process Held:	Use of 'Blackout' material
Submission Details:	At least five (5) working day prior to the intended use of 'Blackout' material, the Contractor shall provide manufacturer's documentation on the 'Blackout' material intended for use and details of the areas proposed for usage of the material.
Release of Hold Point:	The Superintendent will inspect the documentation and the site proposed for usage prior to authorising the release of the Hold Point.

11.08.3 Environmental Requirements

Any road marking materials removed from the pavement surface shall be collected and disposed of in landfills licensed by the Environment ACT to receive such materials.

At locations where residences, hospitals or TAFE colleges are exposed to the noise of stripping operations, such work shall be carried out from 7 a.m to 10 p.m. When traffic conditions make it impractical to strip existing markings before 10 p.m., the Contractor shall notify affected residents at least twenty four (24) hours before commencing work that this work will be undertaken during the night. The Contractor shall limit the exposure of each noise-affected person to the minimum possible. The working hours remain subject to the hours specified in the Contract.

11.09 COLOUR OF PAVEMENT MARKINGS

11.09.1 Colour of Lines and Other Markings

(i) Longitudinal Lines

All longitudinal lines shall be white.

(ii) Transverse Lines and Other Markings

All transverse lines, zebra crossing markings and pavement symbols shall be white.

Kerb marking depicting no parking shall be red. Bus stop and disabled bay marking shall be yellow. Taxi rank and loading zone markings shall be yellow.

11.09.2 Shape and Spacing of Longitudinal Lines

Details of the various types of longitudinal pavement markings and devices shall be as shown on the Authorised Traffic Control Device Plan(s), in accordance with the requirements of AS 1742.2, and with details shown on Standard Drawings STD-01 to 03, or in the case of maintenance work, shall coincide with the existing markings.

11.09.3 Shape & Dimensions of Transverse Lines & Other Markings

Details of the various types of transverse pavement markings and other markings shall be as shown on the Authorised Traffic Control Device Plan(s), in accordance with the requirements of AS 1742.2, and with details shown on Standard Drawings STD-01 to 03, or in the case of maintenance work, shall coincide with the existing markings.

11.10 SET OUT OF PAVEMENT MARKING

The required position of all markings excepting symbols and legends shall be defined by a line of painted spots of minimum dimensions 50mm x 50mm. Hooks are to be used to mark the start and finish of each type of line except for Hold and Stop Lines. Except for Double White Lines, Hold Lines and Stop Lines, the type of each line is to be marked with the line code in 150mm high lettering adjacent to the hook. Upon completion of spotting, the Contractor shall advise the Superintendent, and a joint checking procedure shall be undertaken prior to application of final markings.

Notwithstanding the above, the Contractor shall, without additional cost to the Principal, remove and replace any markings which are deemed not to comply with the requirements of the Authorised Traffic Control Device Plans.

Hold Point 11.7

Process Held:	Application of pavement marking.
Submission Details:	At least two (2) working day prior to the commencement of road marking works, the Contractor shall provide notification that the road marking works have been marked out on site.
Release of Hold Point:	The Superintendent will inspect the site prior to authorising the release of the Hold Point.

11.11 APPLICATION OF PAVEMENT MARKING PAINT

11.11.1 Surface Treatment

Paint material shall be applied only to clean dry surfaces. Where considered necessary by the Superintendent, the Contractor shall prepare the surface to ensure that there is a satisfactory bond between the paint and the pavement.

The Contractor shall replace all markings where failure has occurred due to poor adhesion to the road surface.

11.11.2 Mixing (Rumbling) of Paint

Paint shall be thoroughly mixed before use, including internal mixing where necessary to break up settled pigment.

11.11.3 Spraying

All longitudinal lines shall be applied by a self-propelled machine unless specified otherwise. The two sets of lines forming a one-way or two-way barrier line pattern shall be sprayed concurrently.

Hand spraying with the use of a template to control the pattern and shape will be allowed for transverse lines, zebra crossings, symbols and legends.

The paint shall be applied at a uniform thickness across the middle of the line, the wet film thickness being 0.36mm to 0.4lmm.

Glass beads shall be pressure applied to the surface of all longitudinal lines at an application rate of 0.30 kgm/m^2. The actual application rate shall be set to overcome any loss of beads between the bead dispenser and the sprayed line.

The application rates for paint and glass beads shall be as specified in Table 11.4.

Table 11.4

Material	Water Borne Paint		Solvent Based Paint	
	Longitudinal Linemarking	**Transverse Lines and Other Markings**	**Longitudinal Linemarking**	**Transverse Lines and Other Markings**
Dry paint thickness (excluding surface applied beads)	≥ 0.300 mm	≥ 0.200 mm	≥ 0.175 mm	≥ 0.175 mm
Surface applied glass beads:				
- Class (RTA 3353)	Class B	Class A	Class A	Class A
- Rate retained in the painted surface	≥ 400 g/m^2	≥ 300 g/m^2	≥ 300 g/m^2	≥ 300 g/m^2
30 mesh angular quartz, or approved equivalent:				
- if stirred into the paint prior to application	-	≥ 500 g/litre	-	≥ 500 g/litre
- if surface applied	-	≥ 200 g/m^2	-	≥ 200 g/m^2

11.12 APPLICATION OF LONG LIFE MATERIALS

11.12.1 General

The long life materials, words and symbols shall be overlaid onto new or existing surfaces, or where specified, inlayed into new bituminous surfacing, all in strict accordance with the manufacturers recommendation.

11.12.2 Overlay Application

Prior to application of markings the pavement must be swept thoroughly to remove dust, dirt and other contaminants. Under no circumstances shall application proceed unless the pavement is dry, and the surface temperatures comply with the manufacturers specification.

Primer is to be applied at the recommended rate to the area of the markings on the pavement, extending at least 25mm beyond the outline of each marking. Markings must be applied to the primed area after the primer has achieved a tacky state and before the primer becomes contaminated by dirt, dust or other foreign matter. Any areas which, in the opinion of the Superintendent, have become contaminated to a degree which will adversely affect the adhesion of the markings to the pavement, shall be left until completely dry, cleaned of excessive dust and dirt, and reprimed at no additional cost to the Principal.

Markings may be applied to the primed areas by manual means or with an approved applicator, following which they shall be thoroughly tamped with a rolling load of at least 90kg.

11.12.3 Inlay Application

Markings may be applied to the new bituminous surfacing by manual means or with an applicator as approved for use by the product manufacturer, following which they shall be embedded into the surface of the pavement with the finishing roller, using a minimum amount of water on the roller.

The new pavement shall be soft enough to allow the markings to be inlayed, but firm enough to prevent moving of the asphalt mat in front of the roller, or excessive distortion of the markings.

Initial rolling of markings shall be in the same direction as the markings were applied. Additional passes of the roller shall be made until the markings are embedded at least 1mm into the pavement surface.

Any marking which is damaged such as to render it unsuitable for use, shall be removed and replaced at no additional cost to the Principal.

11.12.4 Application Rates

(i) Nonprofile Thermoplastic Pavement Marking Materials and Glass Beads

The application rates for nonprofile thermoplastic materials and glass beads shall be as specified in Tables 11.5.

Table 11.5

Material	Longitudinal Linemarking	Transverse Lines and Other Markings	
		Trowelled, Screeded or Extruded	Preformed
Thermoplastic cold film thickness (excluding surface applied beads)	≥ 1.5 mm	3.0 mm ± 1.0 mm	
Thermoplastic application thickness			2.5 mm ± 0.5 mm
Surface Applied Glass beads: - Class (RTA 3353) - Rate retained in the surface	 Class B ≥ 400 g/m^2	 Class A ≥ 300 g/m^2	 Class A ≥ 300 g/m^2
0.4 - 0.7 mm white crushed quartz, or approved equivalent:		≥ 200 g/m^2	≥ 200 g/m^2

(ii) Two Part Cold-Applied Pavement Marking Materials and Glass Beads

The application rates for two part cold-applied materials and glass beads shall be as specified in Tables 11.6.

Table 11.6

Material	Longitudinal Linemarking	Transverse Lines and Other Markings	
	Sprayed Application	Trowelled, Screeded or Extruded	Preformed
Cold-Applied Material thickness (excluding surface applied beads)	0.50 ± 0.05mm (wet)	2.0mm ± 0.2mm (dry)	1.00mm ± 0.1mm (wet)
Completed marking thickness			2.00mm ± 0.2mm
Glass beads: - Class (RTA 3353) - Rate retained in the marking	 Class B ≥ 400 g/m^2		
Glass beads: - Class (RTA 3353) - Rate retained in the painted surface	 Class A ≥ 400 g/m^2	 Class A ≥ 300 g/m^2	 Class A ≥ 1300 g/m^2
0.4 - 0.7 mm white crushed quartz, or approved equivalent:		≥ 200 g/m^2	≥ 200 g/m^2

11.13 APPLICATION OF RAISED PAVEMENT MARKERS

11.13.1 General

Raised pavement markers shall be fixed to the pavement in strict accordance with the manufacturers recommendations. Markers of one manufacturer shall not be fixed with adhesive from another manufacturer without the approval of the Superintendent. In applying the markers, care shall be taken to achieve a continuous layer of adhesive on the base of each marker, and to avoid excessive areas of adhesive on the pavement beyond the outline of the marker.

Application procedures that, in the opinion of the Superintendent may adversely affect the service life of the markers shall give cause for rejection of any or all areas of the work so affected.

Markers shall be placed in strict accordance with the Authorised Traffic Control Device drawings and with Standard Drawing No. STD 01 and AS 1742 for the line type specified.

The location of all pavement markers shall not vary in the longitudinal direction by more than 100 mm from that specified on the drawings, unless otherwise specified.

The location of raised pavement markers in the transverse direction relative to other pavement markings shall be in accordance with the Tolerances set out in Table 11.9. Where there is no tolerance shown for the transverse direction, the location of the raised pavement markers in the transverse direction shall not vary more than 25 mm

from that specified on the drawings and by not more than 25 mm from that of any other raised pavement marker in the same line within a distance of 1.5 m.

Tolerance on direction shall be 4° rotational, ie reflector pointed along centreline.

11.13.2 Fixing of Markers

Raised pavement markers shall be fixed with adhesive to the wearing surface of the pavement in accordance with the raised pavement marker and adhesive manufacturers' recommendations.

11.14 PROVISION FOR TRAFFIC AND PROTECTION OF THE WORK

Unless otherwise specified, the Contractor shall make provision for traffic, including pedestrians, in accordance with Section 1 of this Specification. The Contractor shall make such provision for traffic notwithstanding anything contained in the Contract and without derogating in any way from the Contractor's obligations pursuant to the Contract.

Work shall not commence or continue at any location until all signs and devices such as lamps, barricades, traffic control apparatus and the like are in place, in accordance with the approved Temporary Traffic Management Plan(s) as detailed in Section 1 of this Specification.

At all times when the Contractor's employees are on site, the Contractor shall render immediate assistance without charge to any person whose lawful passage through a work area may be obstructed or made difficult by or as a result of the Contractor's operations.

Unless otherwise specified, when work is not being performed on the site, traffic shall not be carried through that works zone or works area on sidetracks, detours or part widths of the existing pavement.

The Contractor shall ensure that adequate protection is provided for lines sprayed until such time as the material has hardened sufficiently to resist being damaged by traffic. The Contractor shall replace at his own cost all material laid and subsequently damaged by the action of traffic or other road users before it has hardened.

11.15 CONFORMANCE CRITERIA

11.15.1 General

With all materials, the completed markings shall be uniform in appearance, texture, width and thickness and the surface shall be free from unbeaded areas, traffic damage or other defects. All pavement markings shall be straight, with smooth even curves where necessary and in compliance with the specified tolerances. Any marking material beyond the defined marking shall be removed leaving a neat and smooth marking on the pavement.

Table 11.7

LINE TYPE	CODE	DESCRIPTION	REFLECTIVITY (mcd/lux/m^2)	SKID RESISTANCE (BPN)
SEPARATION LINES	S1	ALL ROADS (EXC RURAL)	250	
	S1	RURAL ROADS	250	
	S2	MULTILANE CARRIAGE WAY IN URBAN AREAS	250	
	S3	CYCLE OR FOOTPATH	Nil	
BARRIER LINES	B1	TRAFFIC LANES	250	
	B2	PARKING BAY	Nil	
	B3	RESERVE PARKING, KEEP CLEAR IN CAR PARKS (YELLOW LINES)	Nil	45
		KEEP CLEAR ON TRAFFIC LANES (YELLOW LINES)	50	45
	B4	NO CROSSING IN ONE DIRECTION	250	
	B5	NO CROSSING EITHER DIRECTION	250	
	B6	CYCLE OR FOOTPATH	Nil	45
LANE LINES	L1	RURAL ROADS & SUB-ARTERIALS	250	
	L2	ARTERIALS	250	
	L3	ARTERIALS SPECIAL CONDITIONS	N/A	
	L4	EXIT LANE ON ROUNDABOUT	100	45
	L5	TRANSIT LANE	250	
CONTINUITY LINES	C1	CONTROLLED INTERSECTIONS, SHORT TAPERS, TURNING LINES	100	45
	C2	BUS BAYS, DISABLED PARK'G, LOADING ZONES, TAXI RANKS (YEL)	50	45
	C3	PARKING BAYS	Nil	
MERGE LINES	M1/M2	MERGE, DIVERGE, LONG TAPERS, ACCEL & DECEL	250	
EDGE LINES	E1	EDGE LINE LEFT HAND SIDE	250	
	E3	DIVIDED ROAD RIGHT HAND SIDE	250	

LINE TYPE	CODE	DESCRIPTION	REFLECTIVITY (mcd/lux/m^2)	SKID RESISTANCE (BPN)
CROSS WALK LINES	XWL	TRAFFIC SIGNALS, CONTROL INTERSECTIONS	100	45
	SCS	CROSSING MARKS AT SCHOOL CROSSINGS	100	45
	ZC	ZEBRA CROSSING STRIPES	100	45
STOP LINES	SL1	AT TRAFFIC SIGNALS & SCHOOL CROSSINGS	100	45
	SL2	AT PRIORITY INTERSECTIONS	100	45
HOLD LINES	HL1	GIVE WAY AT CONTROLLED INTERSECTIONS	100	45
TRANSVERSE	TB	TRANSVERSE BAR SPEED REDUCTION	100	45
OTHER MARKINGS		CHEVRON MARKINGS IN TRAFFIC LANES	100	45
		OTHER MARKINGS AND MESSAGES IN TRAFFIC LANES	100	45
		MARKINGS AND MESSAGES IN PARKING AREAS	Nil	45
		WHITE GORES	100	

11.15.2 Tolerances

Pavement markings shall be located as detailed on the ACT Standard Traffic Control Device Drawings within the tolerance requirements specified in Table 11.8.

Table 11.8

Dimension	Type of Works	
	Maintenance (iii)	Reinstatement and Installation (iv)
Longitudinal Linemarking		
Distance between centreline of new and old marking	< 15mm	NA
Location of new linemarking	NA	< 50mm from the locations shown on the drawings
Width of new linemarking (and for maintenance: total width of new and old linemarking)	+20mm / - 0mm. Negative tolerance of 10mm allowable for no more than 5% of the length of line	+10mm / - 0mm. . Negative tolerance of 10mm allowable for no more than 5% of the length of line
Length of new stripe (and for maintenance: total length of new and old stripe unless otherwise specified) Start of new stripe relative to start of old stripe Gap between double lines	The lesser of:-+10 / - 0% of old stripe or old stripe length + 200mm / - 0mm The lesser of:-+ 0% / -10% of stripe length or old stripe length + 0mm / - 200mm 80mm +20mm / - 0mm	+100mm / - 0mm NA 80mm +20mm / - 0mm
Transverse lines		
Width of new marking	Old marking + 20mm / - 0mm (i)	+20mm / - 0mm
Length of new marking	Old marking +20mm / - 0mm (i)	+ 20mm / - 0mm
Markings in advance of open Level Crossings		
Width of new marking	Old marking +20mm / - 0mm (i)	+20mm / - 0mm
Length of new marking	Old marking + 20mm / - 0mm (i)	+100mm / - 0mm
Arrows, chevrons, painted medians, painted left turn islands, speed markings		
Each dimension	Old marking +100mm / - 0mm (i)	+100mm / - 0mm (ii)
Road Marking Thickness		
Thickness of all road markings other than profile linemarking	= 6mm (unless specified)	As per dimensions specified for each product
Raised Pavement Markers		
Longitudinal displacement	± 20mm.	± 20mm
Lateral displacement	±10mm	± 20mm
Directional	± 4°	± 4°

Notes on Table 11.8

(i) Where the existing markings exceed the dimensions permitted for reinstatement, the dimensions for the new maintenance markings shall not increase the deviation from the dimension permitted for reinstatement, unless otherwise specified.

(ii) Arrows and speed markings shall be placed square to the direction of travel except in the case of oblique arrows which shall be installed in accordance with the ACT Standard Traffic Control Device Drawings.

(iii) The apparent line of longitudinal linemarking shall have a smooth and continuous alignment when viewed in the direction of the line.

(iv) The markings applied in accordance with the Contract are to be as close as practicable to those markings previously existing at that location except where the marking is being relocated in accordance with the Authorised Traffic Control Device Drawings. The Contractor shall ensure that the disruption to the marking pattern at extremities of the reinstatement area is minimised. The ends of the set out of marking applied during new installation shall be such that the disruption to the marking pattern to which it links is minimised.

(v) The Contractor shall be responsible for the establishment of the dimensions for reinstatement and new installations and shall ensure that the markings so produced comply with the requirements of the ACT Standard Traffic Control Device Drawings and the tolerances shown in Table 11.8 above.

11.15.3 Sampling and Testing

All sampling and testing of materials supplied and work carried out under this Clause of the Specification shall be performed in accordance with the relevant Australian Standards or as otherwise specified.

(i) Paint

The thickness of the unbeaded dry film applied to the wearing surface shall be calculated using RTA Test Method T841 and the percent volume solids of the paint used. This shall be confirmed by measuring with a suitable dry film thickness gauge the thickness of the cured unbeaded material on a suitable metal test plate, and taking the mean of at least six readings distributed over the test area.

(ii) Profile Thermoplastic

The thickness of the unbeaded cold film of profile thermoplastic material applied to the road pavement shall be checked with a vernier or a suitable dry film thickness gauge, the thickness of both the peak of the profile section and the line joining the profile sections when applied to a suitable metal test plate.

(iii) Nonprofile Thermoplastic

The thickness of the cold film of unbeaded nonprofile thermoplastic material applied to the road pavement shall be checked, using a vernier or suitable dry film thickness gauge, the thickness of the thermoplastic material when applied to a metal test plate and taking the mean of at least six readings distributed over the test area.

(iv) Two Part Cold-Applied Pavement Marking Material

The thickness of the unbeaded material applied to the road pavement shall be checked using RTA Test Method T841.

(v) Glass Beads

The application rate of glass beads applied to the surface of the markings shall be checked for each line width applied using RTA T1208, the vehicle speed, and the loss of beads during application.

11.15.4 Frequency of Testing

For elements prescribed as requiring testing the frequency of testing shall be appropriate to verify conformity and shall not be less than that stated in Table 11.9 unless approved otherwise by the Superintendent. Where no minimum frequency of inspection or testing is stated, the Contractor shall nominate appropriate frequencies in their Inspection and Test Plan(s).

The Contractor shall include in the management review of the Quality System, a review of the appropriateness of the frequency of testing nominated in the Inspection and Test Plan(s). Such review shall take into account the frequency of nonconformance detected, including nonconformance remedied by simple reworking.

Table 11.9

Clause	Characteristic Analysed	Test Method	Minimum Frequency Of Testing
Road Marking Paint			
11.05	Wet Film thickness	RTA T841	Two (2) per day or *one* (1) per site visit of linemarker whichever is the greater AND after pressure or speed settings are changed.
11.11.3	Application rate of glass beads	RTA T1208	Two (2) per day or *one* (1) per site visit of linemarker whichever is the greater AND after pressure or speed settings are changed.
11.04.2	Uniformity of Quality a) Non Volatile Content b) Density	 RTA T805 RTA T806	One (1) per Contract or per change of supplier.
11.04.2	Freedom From Lead	RTA T815	One (1) per Contract or per change of supplier.
11.0.24	Condition at Delivery	RTA T852	One (1) per Contract or per change of supplier.
11.04.2	Fineness	RTA T807	One (1) per Contract or per change of supplier
11.04.2	Thinners	RTA T820	One (1) per Contract or per change of supplier
11.04.2	Application Properties	RTA T833	One (1) per Contract or per change of supplier
11.04.2	Consistency	RTA T808	One (1) per Contract or per change of supplier
11.04.2	Drying time (No-Pick-Up Time)	RTA T821	One (1) per Contract or per change of supplier
11.04.2	Bead Retention	AS4049.3	One (1) per Contract or per change of supplier

Profile (LLM)			
11.05.3	Dry reflectivity	Clause 11.05.3	One (1) per km or per change of supplier
11.05.3	Skid Resistance (testing in wheelpaths) a) Intersections- b) Arrows / 'FORM ONE LANE' / 'ONLY' c)Other Legends	AS 4049.2 Appendices L and M	 One (1) tests on one stop/hold lines per intersection One (1) test per set of arrows or message Where detailed in Contract
11.06	Thickness of Cold Film	Measure	Two (2) per day or one (1) per site visit of linemarker whichever is the greater and after pressure or speed settings are changed.
11.13.4	Application rate of glass beads	RTA T1208	Two(2) per day or one (1) per site visit whichever is the greater and after pressure or speed settings are changed.
11.15.2	Width and Location Of Longitudinal linemarking	Measure	One (1) test per 50 linear metres for longitudinal markings
Nonprofile (LLM)			
11.05.3	Dry reflectivity	Clause 11.05.3	One (1) per km or per change of supplier
11.05.3	Skid Resistance (testing in wheelpaths) a) Intersections- b) Arrows / 'FORM ONE LANE' / 'ONLY' c)Other Legends	AS 4049.2 Appendices L and M	 One (1) tests on one stop/hold lines per intersection One (1) test per set of arrows or message Where detailed in Contract
11.06	Thickness of Cold Film	Measure	Two (2) per day or one (1) per site visit of linemarker whichever is the greater AND after pressure or speed settings are changed.
11.13.4	Application rate of glass beads	RTA T1208	Two (2) per day or one (1) per site visit whichever is the greater and after pressure or speed settings are changed.
11.13.4	Application rate of glass beads	RTA T1208	Two (2) per day or one (1) per site visit whichever is the greater and after pressure or speed settings are changed

11.05.3	Acid resistance	Clause 11.05.3	One (1) per km or per change of supplier
11.05.3	Reflectivity retention	Clause 11.05.3	One (1) per km or per change of supplier
11.05.3	Tensile Strength and Elongation	ASTM D638-76	One (1) per Contract or per change of supplier
11.05.3	Thickness	Measure	Two (2) per Contract or per change of supplier
11.15.2	Width and Location Of Longitudinal linemarking	Measure	One (1) test per 50 linear metres for longitudinal markings
Raised Pavement Markers			
11.07.1; Table 11.3	Materials certification for reflectivity and dimension	AS 1906.3	One (1) per Contract or per change of supplier.
11.15.2	Location and rotational position	Measure	One (1) test every 60 linear metres

11.15.5 Nonconforming work

A nonconformance report shall be submitted to the Superintendent for any nonconformance detected. Work shall not proceed on any nonconforming item until the Superintendent has approved the disposition for the nonconformance.

11.16 MEASUREMENT AND PAYMENT

Payment shall be made for the activities associated with completing the work detailed in this Specification in accordance with Pay Items 1108P1,1110P1, 1111P1-P2, 1112P1-P2 and 1113P1-P2 inclusive.

Allowance for all works associated with traffic management shall be made under Section 1 of this Specification.

Works required to provide protection of the works shall be included in the pay items generally.

The Contractor shall allow in the pay items generally for the costs associated with all testing required to prove conformance of the works as specified.

Unless otherwise specified a lump sum price for any of these pay items shall not be accepted.

If any pay item for which a quantity of work is listed in the Contract has not been priced by the Contractor, it shall be understood that due allowance has been made in the prices of other items for the cost of the activity which has not been priced.

Pay Item 1108P1 Eradication of Redundant Pavement Marking

This shall be a Lump Sum item.

This pay item shall include all costs associated with the removal and eradication of all redundant pavement marking in accordance with the traffic control plans.

Progress payments shall be made on a pro-rata basis of work performed as part of this pay item, having due regard to the duration of the Contract.

Pay Item 1110P1 Set Out of Pavement Marking

This shall be a Lump Sum item.

This pay item shall include all costs associated with the setting out of the work of all pavement marking in accordance with the Authorised Traffic Control Devices Plan(s).

Pay Item 1111P1 Paint - Longitudinal Lines

The unit of measurement shall be per linear metre installed. Discontinuous lines are measured as gross length.

This pay item shall include all costs associated with the supply and application of the paint and beads.

A separate pay item shall be included in the Contract for each line type.

1111P1.1	Separation Line (S1-12)
1111P1.2	Separation Line (S1-24)
1111P1.3	Separation Line (S2)
1111P1.4	Separation Line (S3)
1111P1.5	Barrier Line (B1)
1111P1.6	Barrier Line (B2)
1111P1.7	Barrier Line (B3)
1111P1.8	Barrier Line (B4)
1111P1.9	Barrier Line (B4G)
1111P1.10	Barrier Line (B5)
1111P1.11	Barrier Line (B6)
1111P1.12	Lane Line (L1)
1111P1.13	Lane Line (L5-12)
1111P1.14	Lane Line (L5-24)
1111P1.15	Lane Line (L6)
1111P1.16	Continuity Line (C3)
1111P1.17	Edge Line (E1)
1111P1.18	Edge Line (E3)

Pay Item 1111P2 Paint - Transverse Lines, Symbols, Legends, Arrows, Chevrons, Traffic Islands and Kerbs

The unit of measurement shall be per square metre installed.

The area of the painted surface shall be determined by direct measurement of the markings as applied.

This pay item shall include all costs associated with the supply and application of all material.

A separate pay item shall be included in the Contract for each marking type.

1111P2.1	Island Nose (WG)
1111P2.2	Chevron (CHEV)
1111P2.3	Bicycle Pavement Marking
1111P2.4	Disabled Pavement Marking

Pay Item 1112P1 Long Life Material (LLM) - Longitudinal Lines

The unit of measurement shall be per linear metre installed. Discontinuous lines are measured as gross length

This pay item shall include all costs associated with the supply and application of the thermoplastic material and beads and tack coating where necessary.

A separate pay item shall be included in the Contract for each line type.

1112P1.1	Continuity Line (C1)
1112P1.2	Continuity Line (C2)
1112P1.5	Merge line (M1)
1112P1.6	Merge Line (M2)
1112P1.7	Barrier Line (B1)
1112P1.8	Barrier Line (B2)
1112P1.9	Barrier Line (B3)
1112P1.10	Barrier Line (B4)
1112P1.11	Barrier Line (B5)
1112P1.12	Barrier Line (B6)
1112P1.13	Edgeline (E1)
1112P1.14	Edgeline (E3)

Pay Item 1112P2 Long Life Material (LLM) - Transverse Lines, Symbols, Legends and Arrows

The unit of measurement shall be as indicated in the pay item for each type installed.

Where the unit of measurement is the square metre, the surface area of the thermoplastic material applied shall be determined by direct measurement of the markings as installed.

This pay item shall include all costs associated with the supply and application of all materials and tack coating where necessary.

A separate pay item shall be included in the Contract for each marking type.

Markings to be measured as per linear metre installed include:

1112P2.1	Stop Line (SL1)
1112P2.2	Stop Line (SL2)
1112P2.3	Hold line (HL1)
1112P2.4	Cross Walk Line (XWL)
1112P2.5	School Crossing (SCS)

Markings to be measured as per marking installed include:

1112P2.11	Pavement Arrow (A1)
1112P2.12	Pavement Arrow (A2)
1112P2.13	Pavement Arrow (A3)
1112P2.14	Pavement Arrow (A4)
1112P2.15	Pavement Arrow (A5)
1112P2.16	Pavement Arrow (A6)
1112P2.17	Pavement Arrow (A7)
1112P2.18	Pavement Arrow (A8)
1112P2.19	Pavement Arrow (A9)
1112P2.20	Lettering “FORM ONE LANE”
1112P2.21	Lettering “ONLY”
1112P2.22	Lettering “KEEP CLEAR”
1112P2.23	Lettering “BUS STOP”

Markings to be measured as per square metre installed include:

1112P2.31	Zebra Crossing (ZC)
1112P2.32	Transverse Bar Speed Reduction (TB)

Pay Item 1113P1 Installation of non-Retroreflective Raised Pavement Markers

The unit of measurement shall be per non-retroreflective raised pavement marker installed.

This pay item shall be inclusive of the cost of surface preparation and all costs associated with the supply and installation of the marker.

Pay Item 1113P2 Installation of Retroreflective Raised Pavement Markers

The unit of measurement shall be per retroreflective raised pavement marker installed.

This pay item shall be inclusive of the cost of surface preparation and all costs associated with the supply and installation of the marker.

A separate pay item shall be included in the Contract for each retroreflective raised pavement marker type.

1113P2.1	Uni-direction reflective white (SW)
1113P2.2	Uni-direction reflective yellow (SY)
1113P2.3	Uni-direction reflective red (SR)
1113P2.4	Bi-direction reflective blue (BB)
1113P2.5	Bi-direction reflective white (BW)
1113P2.6	Bi-direction reflective yellow (BY)
1113P2.7	Bi-direction reflective white/yellow (WY)

11.17 SCHEDULE OF HOLD POINTS

Hold Points	Clause	Description
11.1	11.04.2	Supply of paint materials
11.2	11.05.3	Supply of thermoplastic material
11.3	11.06.10	*Supply of glass beads*
11.4	11.07.2	*Supply of raised pavement markers*
11.5	11.08.1	*Setout of road marking eradication*
11.6	11.08.2	*Use of 'Blackout' materials for road marking eradication*
11.7	11.10	*Setout of road marking works*