

---

**CONTENTS**

<b>10</b>	<b>ROAD SIGNS</b>	<b>10-2</b>
<b>10.01</b>	<b>SCOPE</b>	<b>10-2</b>
<b>10.02</b>	<b>STANDARDS</b>	<b>10-2</b>
<b>10.03</b>	<b>DEFINITIONS</b>	<b>10-3</b>
<b>10.04</b>	<b>MATERIALS</b>	<b>10-4</b>
10.04.1	Sign Blanks	10-4
10.04.2	Retroreflective Material for Backgrounds, Legends, Symbols and Borders	10-4
10.04.3	Non-Reflective Material	10-5
10.04.4	Fluorescent Material	10-5
10.04.5	Paint Material for Non-reflective Backgrounds and Sign Backs	10-5
10.04.6	Posts	10-5
<b>10.05</b>	<b>FABRICATION</b>	<b>10-6</b>
10.05.1	Sign Blanks for Guide Signs, Regulatory & Warning Signs	10-6
10.05.2	Sign Blanks for Fingerboards & Street Name Signs	10-7
10.05.3	Provision for Mounting	10-8
10.05.4	Sign Blank Preparation	10-9
10.05.5	Painting of Non-Reflective Backgrounds	10-10
10.05.6	Application of Sign Face Material	10-10
<b>10.06</b>	<b>LEGENDS, SYMBOLS AND BORDERS</b>	<b>10-11</b>
10.06.1	Standards	10-11
10.06.2	Abbreviations	10-12
10.06.3	Tolerances	10-12
10.06.4	Application	10-12
10.06.5	Packing, Transportation and Storage of Sign Blades	10-14
<b>10.07</b>	<b>DURABILITY AND WARRANTY</b>	<b>10-14</b>
10.07.1	Sign Face Material	10-14
10.07.2	Sign Structure	10-15
10.07.3	Warranty Claims	10-15
<b>10.08</b>	<b>REFERENCE MARKINGS</b>	<b>10-16</b>
<b>10.09</b>	<b>SAMPLES</b>	<b>10-16</b>
<b>10.10</b>	<b>INSTALLATION</b>	<b>10-16</b>
10.10.1	Location	10-16
10.10.2	Mounting Height	10-17
10.10.3	Supports	10-17
10.10.4	Footings	10-20
10.10.5	Sign Blade Attachment	10-21
<b>10.11</b>	<b>TESTING</b>	<b>10-21</b>
<b>10.12</b>	<b>NONCONFORMING WORK.</b>	<b>10-21</b>
<b>10.13</b>	<b>MEASUREMENT AND PAYMENT</b>	<b>10-22</b>
<b>10.14</b>	<b>SCHEDULE OF HOLD POINTS</b>	<b>10-23</b>

**10 ROAD SIGNS****10.01 SCOPE**

The works covered by this Specification comprise:

- (a) the manufacture, supply and installation of regulatory , warning, information, direction and guide signs
- (b) the supply and erection of sign support structures to support the signs, and
- (c) the adjustment of existing signs and sign support structures.

For the purposes of this Specification, street name and fingerboard guide signs fabricated from extruded aluminium sections are categorised separately from standard guide signs.

Signs shall consist of aluminium alloy sign blanks to which have been applied various combinations of retro-reflective sheeting, polyurethane paint, legends, numerals, arrows, borders, route markers and other road symbols. Where specified, mild steel or aluminium alloy backing plates and lateral support extrusions designed for stiffening and mounting shall be affixed to the backs of the signs.

**10.02 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 and/or project specific Drawings.

**Australian Standards**

AS B118	Dimensions of Small Rivets for General Purposes
AS 1074	Steel Tubes and Tubulars for Ordinary
AS 1111	ISO Metric Hexagon Commercial Bolts and Screws
AS 1112	ISO Metric Hexagon Nuts
AS 1163	Structural Steel Hollow Sections
AS 1390	Metric Cup Head Bolts
AS 1627.0	Metal Finishing - Preparation and Pretreatment of Surfaces - Method Selection Guide
AS 1627.1	Metal Finishing - Preparation and Pretreatment of Surfaces - Cleaning using Liquid Solvent or Alkaline Solutions
AS 1734	Wrought Aluminium and Aluminium Alloy Flat Sheet, Coil Sheet and Plate for General Engineering Purposes.
AS 1742.1	Manual of Uniform Traffic Control Devices -Part 1: General Introduction and Index of Signs
AS 1742.2	Manual of Uniform Traffic Control Devices - Part 2 : Traffic Control Devices for General Use

---

AS 1743	Road Signs - Specifications
AS 1744	Standard Alphabets for Road Signs
AS 1866	Aluminium and Aluminium Alloys - Extruded Rod, Bar, Solid and Hollow shapes
AS 1906	Retro-reflective Materials & Devices for traffic Control Purposes
AS 2700	Colour Standards for General Purposes
AS 2709	Paints for Road Signs - Low Gloss Polyurethane (Two Pack)
AS 3750.16	Paints for Steel Structures - Waterbourne primer and paint for galvanised, zinc/aluminium alloy coated and zinc-primed steel
AS 3600	Concrete Structures

**ACT Government - Standard Traffic Control Device Drawings:**

STD – 11	Vertical and Lateral Sign Locations
STD – 12	Sign Systems Endorsed for High Risk Areas
STD – 13	Special Signs
STD – 14	Finger Boards
STD – 15	Signpost and Footing 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.

### 10.03 DEFINITIONS

Definitions of terms used in this Specification are as follows :

**FRANGIBLE POST:** Post manufactured to facilitate controlled breakaway in the event of vehicular impact – may incorporate a slip base (see below). Frangible posts shall be tested to meet relevant Australian and State Codes of Practice for the particular speed limit zones in which they are to be placed.

**LATERAL DISTANCE:**Distance from the edge of a sign blade to the centre of the edge line of a roadway, kerb face or other measurement point designated on the sign inventory form.

**MULTI-PANEL SIGN:** Sign with a blade manufactured from more than one sheet of aluminium but erected as one section

**MULTI-SECTION SIGN:** Sign with a large blade manufactured from more than one section allowing field bolting together. Individual sections may be of single panel or multi-panel construction.

---

REVERSE CUT:	A sign manufacturing process whereby a white retro-reflective background is overlaid with a coloured, translucent, electronically cuttable film (ECF) from which the legend has been cut to expose the white background
SIGN BLANK:	Aluminium plate or extruded section substrate forming support for sign face materials.
SIGN BLADE:	Sign blank complete with background and legend.
SLIP BASE:	Post base which incorporates special mating flanges bolted or otherwise fixed together to provide tension and compression capacity but which allows controlled shear failure to occur in the event of vehicular impact.

## 10.04 MATERIALS

### 10.04.1 Sign Blanks

The aluminium used for sign blanks shall be free of cracks, tears, and other surface blemishes, and shall conform to the following requirements for the various types of signs;

**(i) Guide Signs, Warning and Regulatory Signs**

Sign blanks shall be manufactured from 1.6mm thickness aluminium alloy *5251-H38 or 5052-H38* as specified in AS 1734.

**(ii) Fingerboards and Street Name Signs**

Sign blanks shall be manufactured from high tensile 6061-T5 extruded aluminium alloy in accordance with AS 1866.

### 10.04.2 Retroreflective Material for Backgrounds, Legends, Symbols and Borders

The retro-reflective material used for backgrounds, legends, symbols and borders on the sign face shall be either Class 1/1A/1W or Class 2/2A material, pre-coated with pressure sensitive adhesive in accordance with AS 1906, and as specified on the drawings and/or sign inventory form.

Colours specified for retro-reflective materials are based on those shown in Appendix C of AS 1743.

**10.04.3 Non-Reflective Material**

Non-reflective material used for backgrounds, legends, symbols and borders on the sign face shall be vinyl sheet, pre-coated with pressure sensitive adhesive in accordance with AS 1906, and equal to “3M Scotchcal”. The material shall be of uniform density and compatible with the material used for the legend both in application and durability.

Colours for non-reflective materials specified for tourist route signs shall be equal to the “3M Scotchcal” colours as defined in Table 10.1.

**Table 10.1**

Sheeting Colour	Colour Number
Black	12
Satin Gold	131
Burgundy	58
Peacock Blue	77
Royal Purple	38
Bright Orange	14
Satin Aluminium	120

Where white is specified for tourist route signs, it shall be White Class 1 retro-reflective material as shown in Appendix C of AS 1743.

**10.04.4 Fluorescent Material**

Fluorescent material may be used for sign faces intended for day-time use only.

Fluorescent material used for sign faces shall be Red-Orange vinyl sheeting or approved equivalent in accordance with the relevant Australian or British Standard specification and as shown in Appendix *D* of AS 1743.

Red-Orange sheeting for both day and night use shall be Class 1 or 2 retro-reflective material as specified in Clause 10.04.2.

**10.04.5 Paint Material for Non-reflective Backgrounds and Sign Backs**

Paint material for non-reflective purposes shall be an approved stoving enamel or a low gloss, non-yellowing industrial quality two-pack polyurethane in accordance complying with the requirements of AS 2709.

**10.04.6 Posts**

Material for posts shall be Grade 250 or 350 hot dipped galvanised tubing meeting the requirements of AS 1074 and AS 1163. Posts shall conform to the diameters and wall thicknesses shown on the inventory form or calculated in accordance with the requirements shown on Standard Drawing STD-15 “Sign Post and Footing Details” for the appropriate sign.

**10.05 FABRICATION****10.05.1 Sign Blanks for Guide Signs, Regulatory & Warning Signs**

The aluminium plate material shall be cut to ensure that signs are supplied to the finished dimensions shown on the relevant drawings. If sizes are not detailed, Dimensions shall be determined from details given in AS 1743. Tolerances on sign blank dimensions are as follows:

**(i) Guide Signs**

Corner Radii	90° Corners - radii +/- 2mm all other angles - no corner radii required.
Overall Dimensions	may be adjusted as set out below to best suit the cutting and joining of standard sheet sizes. +5% / -1%
Face Alignment	the finished sign face shall be flat within a maximum tolerance of +/- 0.5% in and direction.

No variation to the calculated area of the signs will be made for the above adjustments.

**(ii) Regulatory and Warning Signs**

Tolerance on the overall dimension of each sign shall be +/- 5mm. The finished sign face shall be flat within a maximum tolerance of +/- 0.5 %in any direction.

Unless otherwise specified, all regulatory and warning signs shall be made from the one piece of aluminium, that is no vertical or horizontal joints.

Guide signs specified with overall dimensions of 2400mm x 1200mm or less shall also be constructed from a single piece of aluminium.

Guide signs larger than 2400mm x 1200mm overall dimensions shall be constructed utilising a minimum number of panels of aluminium sheet consistent with a maximum panel size of 1800 x 1200mm. The individual sizes of panels of aluminium sheet used in the construction of a multi panel sign shall be such that the horizontal or vertical dimension of the smallest panel shall not be less than half the corresponding horizontal or vertical dimension of the largest panel.

For signs constructed from more than one panel of aluminium sheet, the panels shall be neatly butt jointed together

The gap between two adjoining panels shall not exceed 0.25mm at any point along the joint, and adjoining panel edges shall be aligned longitudinally so steps between sheets at the ends of joints do not exceed 0.5mm for external edges, or 0.25mm for internal edges forming part of another joint. Where prefaced sheets are used in the guide sign manufacture, these tolerances shall apply to both the aluminium backing and the Class 1 background material

Vertical butt joints are preferred, but horizontal butt joints shall be acceptable if the full strength of the aluminium sheet can be transferred through the joint. Horizontal joints may only be located between lines of legend unless otherwise approved by the Superintendent in writing.

Vertical butt joints shall be reinforced with a 100mm wide 1.6mm thick aluminium backing strip of the same grade as the sign blank. The strip shall be fixed on the reverse face of the sign for the full length of the butt joint, except that backing strips shall be cut a maximum 2mm clear of each edge of lateral supports to enable the lateral supports to be mounted flush with the reverse face of the sign. The joint shall be located centrally along the backing strips which shall be neatly affixed flush to the reverse face of the sign using Very High Bond (VHB) cold weather joining tape in accordance with the manufacturers recommendations in a manner which transfers the full panel strength through the joint.

Vertical butt joints shall not be made through the vertical stroke of letters, symbols or borders.

The face of both panels on either side of the joint shall be matched for both colour and material type.

Where the Contractor considers a sign is too large to be constructed and transported as a single sign, written acceptance may be sought from the Superintendent for construction of a sign in more than one section.

If written acceptance has been given to the Contractor by the Superintendent for the construction of a particular sign in more than one section, then each section shall be constructed so as to butt join together horizontally. Each section of the sign to be joined shall be reinforced with a lateral support mounted flush with the edge of the section on the reverse face of the sign and along the joint for the full length of the joint. Fixing of each lateral support shall comply with method (a) or (b) above for the respective class of face material. These lateral supports shall be provided with matching slotted holes to fit 6mm diameter bolts placed vertically through the lateral supports at a maximum spacing of 900mm.

The sign shall be assembled in the factory prior to delivery to ensure correct fitting, alignment and matching of all components.

Sufficient 6mm diameter 65mm long zinc plated hexagon head bolts and nuts shall be supplied with each multi-section sign for bolting the sections together.

### 10.05.2 Sign Blanks for Fingerboards & Street Name Signs

Sign blanks for fingerboards and street name signs shall be manufactured from an approved "I" Section or similar shape, with the following properties:

**(i) 150mm overall depth blank:**

Web thickness	2.5mm
Moments of inertia	$I_{xx} = 1.8 \times 10^6 \text{ mm}^4$
(Minimum values)	$I_{yy} = 5.4 \times 10^3 \text{ mm}^4$

**(ii) 200mm overall depth blank:**

Web thickness	2.5mm
Moments of inertia	$I_{xx} = 3.6 \times 10^6 \text{ mm}^4$
(Minimum values)	$I_{yy} = 5.45 \times 10^3 \text{ mm}^4$

Full details of the section or sections proposed for use shall be submitted by the Contractor for approval by the Superintendent at least five (5) working days before commencement of sign manufacture.

Unless otherwise specified or approved by the Superintendent, blanks shall be sized to suit the requirements of AS 1743 for G5 series signs. The overall length of 150mm deep blanks shall not be less than 450mm nor more than 850mm. The overall length of 200mm deep blanks shall not be less than 600mm nor more than 850mm. Length increments shall be in multiples of 50mm.

**10.05.3 Provision for Mounting****(i) Regulatory Signs**

For A and B size regulatory signs (excluding parking restriction signs), 11mm square holes shall be provided on the vertical axis of each sign to take 10mm diameter cup head square neck bolts. Holes shall be positioned to suit the varying size of sign with standard hole centres and minimum distances from the lower hole to the bottom edge of the sign to be as shown in Table 10.2:

**Table 10.2**

Hole Centres	Distance from Bottom
520mm	40mm
406mm	22mm
230mm	60mm
230mm	25mm
130mm	60mm

For each sign, the largest combination of hole centres and bottom distances is to be used which will fit the sign blank and provide a minimum distance of 25mm between the centre of the top hole and the top of the sign blade.

Regulatory signs not listed above are to be fitted with approved aluminium extrusion stiffeners at 450mm maximum centres. The Contractor is to submit proposed mounting details for unlisted signs to the Superintendent for approval at least five (5) working days prior to manufacture.

**(ii) Warning Signs**

11mm square holes shall be provided on the vertical axis of each sign to take 10mm diameter cup head square neck bolts. Holes shall be positioned as shown in Table 10.3:

**Table 10.3**

Sign Size and Types	Hole Centres	Distance from Bottom
Diagonally mounted A and B sized square W1 – W7 series signs	520mm	100mm
Normally mounted A sized W8 series signs:		
W8-3,7,8,9,13,24,203	300mm	50mm
W8-5,6	130mm	35mm



Warning signs not listed in Table 10.3 are to be fitted with approved aluminium extrusion stiffeners at 450mm maximum centres. The Contractor is to submit proposed mounting details for unlisted signs to the Superintendent for approval at least five (5) working days prior to manufacture.

### (iii) Guide Signs

Guide signs shall be supplied complete with lateral supports manufactured from 28.5mm x 25.5mm extruded aluminium 'C' section to CAPRAL die E15052 or approved equal, or manufactured from Grade 5050 – T5 aluminium, slotted to receive M10 square neck galvanised cup head bolts, or M10 galvanised bolts with 'twist-lock' heads.

The lateral supports shall be continuously flush with the reverse of the sign face for the full length of the supports. The lateral support extrusions shall be affixed to the reverse face of signs by an approved method as described in Clause 10.05.1 for Class 1 background signs. The lateral supports shall finish 50mm clear of the edges of signs.

The lateral supports on guide signs shall be fixed at a maximum spacing of 450mm centres. The uppermost and lowest lateral support shall be fixed with the centre line of the support at a distance of 100mm from the top and lower edge of the sign respectively.

For guide signs which incorporate chevrons at one or both ends, a lateral support shall be provided between the point of each chevron and the closest post, extending a minimum distance of 100mm beyond the post, or, where required due to the height of the blade, the support shall extend for the full width of the blade at the height of the chevron point/s.

### (iv) Fingerboards and Street Name signs

Provision shall be made for fixing of fingerboards and street name signs using ACT Government approved proprietary post mounting clamps.

## 10.05.4 Sign Blank Preparation

After cutting the sign blanks to size, including corner radii where applicable, and any necessary trimming and shaping and punching of holes, and before application of the retro-reflective sheeting, fluorescent sheeting, or non-reflective paint coatings, the sign blanks shall be prepared as follows:

All burrs shall be removed. All rough edges shall be dressed. Blanks shall be smooth and true edges and be free from fabrication defects.

Prior to the application of sheeting and legend, all unpainted blanks or blank components, excluding stiffening sections, shall be degreased in a vapour degreaser or by total immersion in a suitable alkaline bath during which all trade marks and all identification marks shall be removed from both sides of each sheet. Where the size of the blank precludes both of these processes, degreasing shall be achieved by thorough swabbing with a solvent. Such degreasing shall be followed by an effective rinse in, or with, clean water.

Following degreasing, blanks shall be etched on both sides by one of the following methods:

- Method A  
Acid etching in a 6-8% phosphoric acid bath at a temperature in the range 35 degrees to 40 degrees Celsius, followed by thorough rinsing in clean water.
- Method B  
Acid etching in a bath of commercial acid etching solution at the temperature recommended by the manufacturer of the solution, followed by thorough rinsing in clean water, chromate conversion, and further rinsing.

- Method C

Alkaline etching in a bath of commercial alkaline etching solution at the temperature recommended by the manufacturer of the solution, followed by thorough rinsing in clean water, chromate conversion, and further rinsing.

- Method D

Abrasive etching producing a finished finish no coarser in texture than that produced with a dull 100 grit belt, followed by cleaning with a suitable solution to remove all foreign materials.

The sign blanks shall not be handled between all cleaning and etching operations except by device or clean gloves. The sign blanks shall be kept free from contact with greases, oils or other contaminants prior to the application of the specified coating.

Full details of the preparation processes that the Contractor proposes to use shall be submitted in writing to the Superintendent for approval at least five (5) working days prior to commencement of sign manufacture, together with written evidence that the processes are in accordance with recommendations made by the manufacturers of sheeting or paint coatings to be applied to the blanks.

### 10.05.5 Painting of Non-Reflective Backgrounds

#### (i) Regulatory, Warning, Fingerboard and Street Name Signs

For non-reflective regulatory, warning, fingerboard and street name signs, the face of the prepared blanks shall be coated with the specified colour of either stoving enamel to a dry film thickness of 0.035mm to 0.045mm, or an approved low gloss polyurethane paint applied as specified for guide signs below, after appropriate pre-treatment and priming in accordance with manufacturers directions.

#### (ii) Guide Signs

For non-reflective guide signs, the sign face background shall be painted after appropriate pre-treatment and priming, with an approved low gloss finish polyurethane paint.

The polyurethane paint shall be applied using conventional spray methods to give a total dry film thickness of 0.04mm. This film thickness shall be achieved by a wet on wet application, allowing a five minute flash-off period between coats, or a light bake through infra-red heaters when placed on an endless conveyor. Touching up of small areas by brush to fully match the spray painted surface shall be carried out without the addition of a reducer.

The colour of the non-reflective background of the sign face shall be either X 65 dark brown polyurethane ground or G 12 standard green polyurethane ground, as specified in AS 2700 and AS 1743.

Full curing of the paint is critical, in order that blistering of the retro-reflective lettering, symbols and borders does not occur in the subsequent process, which may involve exposure for several minutes of approximately 90°C.

The contractor shall submit full details of proposed primer and paint materials to the Superintendent for approval at least five (5) working days prior to commencing sign manufacture.

### 10.05.6 Application of Sign Face Material

All retro-reflective or fluorescent sheeting, lettering, symbols and borders shall be applied to the sign blank and background in strict accordance with the sheeting manufacturer's recommendations. Full details of the retro-reflective material and application technique that a Contractor proposes to use must be accepted by the Superintendent in writing before sign manufacture.

Background sheeting for fingerboards and street name signs shall be centrally spaced in the blank, 125mm deep for 150mm deep blanks, 175mm deep for 200mm deep blanks, and shall comprise not more than one piece of sheeting per side of blank. For single sided fingerboards and street name signs, the background shall extend the full length of the blank, and for double sided signs, the full length except for 100mm at the end containing the mounting holes.

On other blanks or panels 900mm or less in width, no splices in the reflective sheeting applied to the blank or panel will be permitted.

On other blanks or panels more than 900mm wide, longitudinal and transverse splices will be permitted parallel to the edges of the blank, but not within 50mm of any edge parallel with the splice. Parallel splices less than 900mm apart shall not be used unless on each occasion consent in writing is given by the Superintendent.

When fabricating large single panel signs or sign backgrounds the sheeting shall normally run the long dimension of the sign in order that splices are horizontal and a minimum number of splices are made. The bottom piece of sheeting shall be applied first so that the top sheet overlaps the bottom sheet.

Splices shall be lapped 5mm to 10mm, and sheeting on both sides of the splice shall be colour matched when viewed in daylight. Splices in retro-reflective sheeting shall be matched for retro-reflective colour and night reflective appearance. For proper matching of sheeting, only sheeting from rolls having the same shipping date and matching symbol should be used on any one sign blank. After sheets or applied panels have been matched, particular care should be taken to ensure that the matched sheets or panels are not mixed during the application and construction of the sign.

Sheeting on both sides of a panel joint shall be colour matched. All sheeting shall be applied strictly in accordance with the sheeting manufacturer's instruction using a mechanical applicator fitted with a heater accessory as approved by the sheeting manufacturer. Legends, symbols, borders and strip sheeting less than 150mm in width may be direct hand applied using a plastic squeegee or 50mm, diameter rubber roller. Sheetting shall not be applied over any protuberance, including bolt or rivet heads. Unsatisfactory adhesion of the retro-reflective sheeting to the sign blank, in particular creases and bubbles, shall be cause for rejection of the sign.

### Hold Point 10.1

Process Held:	Sign manufacture
Submission Details:	At least five (5) working days prior to proposed commencement of sign manufacture provide details of sign fabrication including proposed support sections, mounting details, preparation for painting and primer and paint details as applicable.
Release of Hold Point:	The Superintendent will inspect the submitted documentation prior to authorising the release of the Hold Point.

## 10.06 LEGENDS, SYMBOLS AND BORDERS

### 10.06.1 Standards

All letters, numerals, symbols and borders shall comply with AS 1743.

All letters and numerals shall comply with AS 1744 in respect of height, series and spacing and shall be in accordance with the following:

**(i) Fingerboards and Street Name Signs**

Letters and numerals for fingerboards and street name signs shall have series D dimensions. Where D letters and numerals would result in a sign in excess of 850mm long, letters and numerals shall be the widest of series C, B, or A, which will result in a sign less than 850mm long.

**(ii) Other Signs**

Letters and numerals shall be as specified in the relevant drawing and/or sign inventory form for the particular sign.

**10.06.2 Abbreviations**

Abbreviations acceptable for legends on fingerboards and street name signs are as per AS1742.

**10.06.3 Tolerances**

Tolerances for placing of lettering, legends, symbols and borders shall be as per Table 10.4:

**Table 10.4**

Item	Tolerance
Borders and location of bottom of each line of lettering	+ 5mm from nearest edge of sign
Lettering and spaces along each bottom line of lettering	+ 3 mm
Vertical axis of each letter	* 3 degrees
Width of borders	+0.5mm
All other dimensions	+5%

**10.06.4 Application****(i) Fingerboards and Street Name Signs**

Legends shall be provided on the reflective material by either

- Silk screening in opaque black screening ink

OR

- Approved black plastic film die cut with sharp even edges applied to the background by means of a heat and pressure process in accordance with the material manufacturers recommendations.

Legends shall fill the length of sign blanks to the extent that a length of clear reflectorised background approximately equal to 1.5 times the letter spacing remains at each end of the blank.

The Contractor shall submit details of the type of material to be used for the legends etc., including manufacturer and trade name to the Superintendent for acceptance prior to commencement of sign manufacture.

**(ii) Regulatory and Warning Signs**

When required, Symbols, Legends and Borders shall be provided on the reflective material by either:

- Silk screening in transparent ink, the colours of which shall closely match the standard colours given in AS 2700.

Red - Colour code R13 - Signal Red

Green - Colour code G12 - Standard Green

OR

- Silk screening in opaque black screening ink of an approved brand compatible with the sheeting as recommended by the sheeting manufacturer.

OR

- Reverse screen processing for signs with a narrow width of legend, border or symbol.

In all cases, the inks used shall be of an approved brand recommended by the sheeting manufacturer as compatible with the sheeting.

Where silk screened transparent ink is used in the application of a legend, border or symbol, the ink shall be applied in such a thickness as to give a luminance contrast ratio between screened surface and adjacent unscreened background material of not less than 7 to 1 nor more than 15 to 1, when viewed under retro-reflected light at 4 degrees entrance angle as defined in AS 1906. Inks shall be applied without toner unless otherwise specified, and shall be thinned only as recommended by the ink manufacturer, and to the extent necessary to obtain an even coating.

The Contractor shall submit details of the type of material to be used for the legends etc., including manufacturer and trade name to the Superintendent for acceptance prior to commencement of sign manufacture.

**(iii) Guide Signs**

The application of retro-reflective lettering, symbols and borders to the background shall be performed in strict accordance with the sheeting manufacturer's recommendations.

Chevrons shall be cut from a single sheet of retro-reflective material. Formation of the chevron symbol using a number of strips of retro-reflective material will not be allowed.

All letters and numerals in retro-reflective material shall be die cut and all letters and numerals on the one sign shall be cut using the same roll of sheeting and the same set of dies.

The vertical stroke of letters and numerals shall not be located over a vertical butt joint in the sign blank. Where the horizontal stroke of letters, numerals, symbols and borders is located over a vertical butt joint in the sign blank, the retro-reflective material shall be cut on the line of the vertical butt joint.

The application of non-reflective lettering, symbols and borders shall be by silk screen printing or by applying letters, symbols and borders which have been die cut from an approved non-reflective sheeting which is suitable for use and compatible with the reflective sheeting background. The application of the non-reflective lettering, symbols and borders shall be carried out in accordance with the recommendations of the manufacturer of the reflective background sheeting.

The lettering symbols and borders shall have a life expectancy equal to or greater than the life expectancy of the reflective sheeting background to which they are applied.

Full details of the type and method of application of the non-reflective lettering symbols and borders that the Contractor proposes to use must be submitted to the Superintendent for acceptance prior to commencement of sign manufacture.

### 10.06.5 Packing, Transportation and Storage of Sign Blades

Signs shall be braced, packaged and wrapped to prevent damage during storage, transit and handling. Interleaves of suitable material shall be provided between adjoining faces.

Each package of sign blades shall have a manufacturers notice fixed to the outside giving clear instructions of the particular transportation and storage requirements.

All packaging, transportation and storage shall be in strict accordance with the sheeting manufacturer's recommendations.

The Superintendent may reject any or all signs found to be damaged through the actions of the Contractor or his agents. The Contractor shall raise a nonconformance report for any damaged signs as soon as practicable after discovery of such damage.

## 10.07 DURABILITY AND WARRANTY

### 10.07.1 Sign Face Material

The Contractor shall provide a warranty that all retro-reflective and fluorescent materials used in the manufacture of signs to this Specification shall, when exposed to normal usage, remain in good condition in the following respects :

- No evidence of cracking, crazing, peeling or lifting from the substrate, delamination, blistering, chalking, wrinkling or edge shrinkage greater than 2mm;
- No evidence of fading or appreciable colour change, except that loss of fluorescence in a fluorescent material will be accepted, provided that the colour change is not significant;

In the case of retro-reflective materials, maintenance of a photometric performance equal to at least the percentage of the CIL values shown in Table 10.6 as given in the photometric performance tables in Clause 2 of AS 1906.1 for the corresponding type and colour at all entrance and observation angles given in those Tables

**Table 10.5**

Class	Retained Min CIL (%)
1	80
2	50

The warranty shall apply for the following periods from the date of manufacture as indicated on the sign by stampings or engravings in accordance with Clause 10.08 below:

**Table 10.6**

<b>Legend/border</b>	<b>Background</b>	<b>Period</b>
Class 1	Class 1	12 years
<b>Electronic Cuttable Film</b>	<b>Class 1</b>	<b>12 Years</b>
<b>Vinyl Film</b>	<b>Class 1</b>	<b>7 Years</b>
Screen Printed	Class 1	10 years
Class 2	Class 2	7 years
Screen printed	Class 2	7 years
<b>Vinyl Film</b>	<b>Class 2</b>	<b>7 Years</b>
<b>Vinyl Film</b>	<b>Vinyl Film</b>	<b>7 Years</b>
Fluorescent	Fluorescent	18 months
Screen printed	Fluorescent	18 months

### 10.07.2 Sign Structure

The Contractor shall provide a warranty that the sign structure shall remain in good condition in all respects, other than those covered in Clause 10.07.1 above, accidental damage or vandalism excepted, for a period equal to that specified in Clause 10.07.1 for the relevant legend/border and background combination of sign face material.

### 10.07.3 Warranty Claims

If any sign structure, retro-reflective or fluorescent material used on a sign deteriorates to a condition poorer than those indicated in Clauses 10.07.1 and 10.07.2 above within the time limits therein specified, the Contractor shall replace the sign on a pro-rata basis as follows:

- Failure within 1 year of stamped date - total cost of supply, delivery and erection of a new sign to be borne by the Contractor.
- Failure after more than 1 year from the stamped date - the Contractor to bear the total cost of supply and delivery of a new sign less an allowance equal to that cost multiplied by the ratio of the expired life to the total warranty life.

The Contractor shall be solely responsible for meeting all claims under these provisions, and shall not reassign any such responsibility to any other organisation, excepting that in the case of sign face material, the Principal will accept a performance warranty complying with the requirements of Clause 10.07.1 from the manufacturer of the material.

---

**10.08 REFERENCE MARKINGS**

The manufacturer's symbol, computer drawing number and where applicable, sign number and the month and year of delivery shall be clearly and permanently stamped or engraved in ciphers, approximately 12mm high on the rear of each sign, positioned as follows :

**(i) Fingerboards and Street Name Signs**

For single sided signs, the markings shall be located on the rear of the sign blade between the bolt holes. For double sided signs, the markings shall be located between the bolt holes on the side of the sign blade which has the initial letter of the legend on the left end and the bolt holes on the right end.

**(ii) Other Signs**

On the rear of each sign blade, parallel to and close to the lower right hand edge.

The month and year of delivery shall be separated by a stroke. Marking shall be done in such a manner that the faces of the signs are not damaged in any way.

**10.09 SAMPLES**

If required by the Superintendent, the Contractor shall submit samples of the signs he proposes to supply, which shall be similar in every respect to the signs which will be supplied under the Contract. The Superintendent shall have the right to undertake any tests of the sample signs to assess performance and durability.

**10.10 INSTALLATION****10.10.1 Location**

Signs shall be located in strict accordance with details shown on the authorised Traffic Control Device Plan, approved Inventory Forms, and with details shown on Standard Drawing STD-11 Signs which are deemed by the Superintendent to be incorrectly located, shall be relocated at no additional cost to the Principal.

Signs shall be aligned approximately at right angles to the direction of the traffic they are intended to serve. On curved alignments, the angle of placement should be determined by the course of approaching traffic rather than the orientation of the road at the point where the sign is located.

The Contractor shall submit details of and set out, for the Superintendent's inspection and approval, the proposed location and alignment of each sign support structure.

Work on the foundations of the sign support structure shall not commence until the Superintendent has approved the location and alignment of the sign support structure.

Any trees and undergrowth within three metres of the sign support structure and along a driver's line of sight to the front of the sign shall be cleared and removed



**Hold Point 10.2**

Process Held:	Excavation for sign foundations.
Submission Details:	At least one (1) working day before proposed excavation work for sign foundations is to commence provide notice that sign locations showing sign alignment and arrangement has been pegged in the field for each sign support structure.
Release of Hold Point:	The Superintendent will inspect the proposed sign locations, prior to authorising the release of the Hold Point.

**10.10.2 Mounting Height**

The mounting height for each sign shall be in accordance with details shown on Standard Drawing STD-11 and in accordance with AS 1742.2 for the appropriate sign.

**10.10.3 Supports****(i) General**

All supports shall be permanently secured and free standing in the ground, without supplementary props or supports.

All materials used in the erection of the signs and sign supports, together with associated fixings shall comply with the relevant Standards listed above.

The top of each pipe support post shall extend sufficiently beyond the upper extrusion section or bolt holes on the sign panels to enable attachment of the signs. The top of each post shall be below the top edge of the sign panel.

For pipe support multi-post installations, the tops of the posts shall be at the same level except where sign shape or the arrangement of sign panels dictates otherwise.

During erection, sign panels shall be suitably supported and braced and the sign face protected from damage. Signs damaged during erection shall be repaired to a standard equivalent to the original sign or replaced by the Contractor at the Contractor's cost.

Galvanised coatings on purpose-designed support structures which are scratched or slightly damaged during erection shall be renovated by using an organic zinc-rich primer, or inorganic zinc silicate paint, in accordance with the repair requirements in Appendix E of AS 4680. This method of renovation shall be restricted to areas not exceeding 2500 square millimetres on any one structure. Any structure with totally damaged coating areas exceeding 2500 square millimetres shall be regalvanised.

The cost of regalvanising such damaged coating areas shall be borne by the Contractor.

Each post shall be cut from a continuous length of stock material. Welding of pieces together to make up the required post length will not be allowed unless approval is given for existing posts to be extended to suit new sign blades. Where extension of posts is approved or directed, extensions shall be formed from one piece of the same diameter and equal or greater wall thickness, and shall be securely clamped to match the existing post alignment prior to being continuously butt welded around the circumference. Welds shall be ground flush and painted with two coats of inorganic zinc silicate followed by an approved 'chrome' spray top coat to match adjacent galvanised finishes.

Where details of posts and footings are not specified in the Contract, the basic design of the sign supports shall be in accordance with details shown on Standard Drawing STD - 15.

Any detailed design drawings and calculations for signs, such as urban arterial / freeway signs or others as required below or in special circumstances, require the submission of detailed design calculations and drawings. The preparation and submission of these details shall be the responsibility of the Contractor.

Low maintenance post mounting system (LMT) allowing removal and replacement of damaged posts without excavation shall be used where tubular posts are surrounded by concrete paving, and in locations identified as high risk areas. For example zones within 50 metres of urban arterial intersections including intersections with distributor roads, traffic islands, roundabouts, the verge adjacent to the outside edge of small radius curves, traffic calming devices such as slow points and raised platforms, pedestrian crossings, parking areas, town centres and group centres).

In car park areas and pedestrian zones, a low maintenance telescopic (LMT) post mounting system or approved equal shall be used in accordance with Standard Drawing STD – 12.

In high risk areas, a low maintenance telescopic (LMT) post mounting system shall be used for all posts sizes up to and including 60.3mm diameter.

Alternative mounting systems proposed for use will be required to have demonstrated their suitability for use in high risk areas over a minimum period of six (6) months.

Post sizes above 60.3mm diameter in high risk areas are to be:

- taper threaded to enable coupling with a threaded anchor socket, or;
- cast directly into concrete footings, or;
- be of an approved frangible design with re-useable socket or flanged base, or;
- incorporate an approved socket system equivalent to a LMT.

Unless otherwise specified, in locations identified as low risk areas (for example rural roads and residential streets), posts shall be cast directly into concrete footings

All posts shall finish 50mm below the top of the sign blade and be fitted with approved galvanised steel caps.

Posts in multipost supports shall be of the same diameter and wall thickness, be uniformly spaced, aligned accurately and finished to a common level. The maximum spacing between the centres of posts shall be 2300mm, and the maximum end overhang shall be 750mm.

Tolerances on spacing and alignment for posts shall be as set out in Table 10.8:

**Table 10.7**

Post Type	Tolerance
Face alignment (multi-post signs)	+/- 5mm
Verticality over the height of the sign	+/- 2.5mm
Post spacing (centre to centre) (multi-post signs)	average spacing +/- 0 50mm

**Hold Point 10.3**

Process Held:	Installation of signs.
Submission Details:	At least five (5) working days prior to the proposed installation of signs submit to the Superintendent the proposed details for each sign support system.
Release of Hold Point:	The Superintendent will inspect the details of the proposed sign support system, prior to authorising the release of the Hold Point.

**(ii) Street Name Signs, Regulatory Signs, Warning Signs and Hazard Markers**

Street name signs, regulatory signs, warning signs and hazard markers shall be installed on either single or multiple tubular steel posts of diameters and grades as specified, fixed as specified or directed and shall use footing materials complying with Clause 10.10.4 of this Specification. Unless otherwise directed, street names shall always be located above information fingerboards.

**(iii) Guide Signs****(a) Tubular Post Mounted.**

Guide signs shall be installed on either single or multiple galvanised tubular steel posts, fixed as specified in Clause 2.05 of this Specification.

**(b) Modular Mounted (Steel Rectangular Hollow Section).**

Unless otherwise specified, posts for modular support systems shall be galvanised steel complying with the relevant Standards.

Unless otherwise specified, frangible supports are to be used for all modular installations.

Where details of the support and sign face stiffening are not provided in the Contract Documentation, drawings and calculations shall be prepared by an approved Practising Structural Engineer for the Contractor prior to manufacture. Drawings shall be fully detailed and shall show the proposed means of strengthening the sign face and achieving post frangibility.

The cost of these drawings, calculations and submission shall be borne by the Contractor.

All supports shall be attached to the concrete footing by securing with suitable strength galvanised bolts cast into the concrete foundation. Materials used in the footings shall comply with Clause 2.05.5 of this specification. Where a frangible support cannot be provided, details for a proposed alternative arrangement are to be submitted for approval.

The granting of any approval by the Superintendent shall not remove the liability for the performance of the support system from the Contractor.

**(c) Overhead Gantry Mounted**

Support posts for overhead gantry mounted guide signs shall be galvanised steel complying with the relevant Standards.

Where details of the support and sign face stiffening are not provided in the Contract, drawings and calculations shall be prepared by a Chartered Professional Engineer specialising in Structural Engineering for the Contractor and submitted for approval prior to manufacture. Drawings shall be

fully detailed and shall show the proposed means of strengthening the sign face and providing protection of the posts against impact by errant vehicles.

All supports shall be attached to the concrete footing by securing with suitable strength galvanised bolts cast into the concrete foundation. Materials used in the footings shall comply with Clause 2.05.5 of this Specification.

The granting of any approval by the Superintendent shall not remove the liability for the performance of the support system from the Contractor.

(d) Overhead Cantilever Mounted

Posts for overhead cantilever mounted guide signs shall be galvanised steel complying with the relevant Standards.

Where details of the support and sign face stiffening are not provided in the Contract, drawings and calculations shall be prepared by a Chartered Professional Engineer specialising in Structural Engineering for the Contractor and submitted for approval prior to manufacture. Drawings shall be fully detailed and shall show the proposed means of strengthening the sign face and achieving post frangibility.

All supports shall be attached to the concrete footing by securing with suitable strength galvanised bolts cast into the concrete foundation. Materials used in the footings shall comply with Clause 2.05.5 of this specification. Where a frangible support cannot be provided, details for a proposed alternative arrangement are to be submitted for approval.

#### 10.10.4 Footings

The footings for a simple pipe support or the footings for each post of a purpose-designed sign support structure shall be constructed in accordance with the drawings, or with the details shown on Standard Drawing STD-15 or as directed by the Superintendent.

Anchor sockets for single post signs shall be fitted with a locking pin as detailed or similar approved method, to prevent twisting of the socket within the footing.

Sockets shall finish flush with the finished ground surface and be installed in such a manner as to ensure verticality and correct alignment and spacing of sign posts.

The footings shall be neatly excavated to the depth and width shown on the drawings. The material from the excavation shall be disposed of in a responsible and legal manner.

When anchor bolt assemblies are specified they shall be accurately placed and firmly supported. Anchor bolt assemblies shall be provided with levelling nuts under the sign structure baseplates to allow adjustment of the structure after installation.

Steel reinforcement shall be placed as shown on the Drawings.

Concrete in the footings of sign support structures shall comply with the Section 6 of this Specification and have a minimum compressive strength at 28 days of 20MPa for pipe support footings and 32MPa for purpose-designed support footings.

If ready mixed concrete is used, the concrete shall be mixed and delivered in accordance with AS 1379.

### 10.10.5 Sign Blade Attachment

#### (i) Fingerboards and Street Name Signs

Fingerboards and street name sign blades shall be fixed to posts with 10mm diameter galvanised hexagon head bolts, either directly in the case of centrally mounted signs, or with approved proprietary mounting brackets to facilitate end-of-blade mounting or top-of-post mounting.

Where sign blades are required to be attached to lighting columns or similar column structures which cannot be drilled for through bolting, they shall be fixed to the columns with 12mm wide by 0.75mm thick Grade 201 stainless steel banding, secured with approved mechanical locking devices. One strap shall be provided at each sign bolt location, and shall be fitted with a stainless steel stand-off bracket to accept the sign bolt or where necessary, the blade mounting bracket. The stand-off brackets shall be fixed to the banding in such a way as to prevent removal. Where necessary to facilitate tightening of the banding around octagonal columns and the like, stainless steel packing pieces shall be fitted between the column and the banding, and the whole assembly made secure. Loose or otherwise poorly constructed banding assemblies will be rejected.

#### (ii) Regulatory and Warning Signs

Regulatory and warning signs shall be fixed to posts with 10mm diameter galvanised cup head bolts. Nuts shall be fitted and tightened within a cup washer of a size which will not allow the entry of a standard 10mm. socket.

Where sign blades are required to be attached to lighting columns or similar column structures which cannot be drilled for through bolting, they shall be fixed to the columns with 12mm wide by 0.75mm thick Grade 201 stainless steel banding, secured with approved mechanical locking devices. One strap shall be provided at each sign bolt location, and shall be fitted with a stainless steel stand-off bracket to accept the sign bolt. The brackets shall be fixed to the banding in such a way as to prevent removal. Where necessary to facilitate tightening of the banding around octagonal columns and the like, stainless steel packing pieces shall be fitted between the column and the banding, and the whole assembly made secure. Loose or otherwise poorly constructed banding assemblies will be rejected.

#### (iii) Guide Signs

Guide signs shall be attached to posts by the use of approved proprietary sand-cast aluminium adjustable brackets or galvanised steel saddle brackets, both complete with 10mm diameter galvanised cuphead square necked bolts. One bracket shall be provided at each available connecting point between posts and lateral supports. Each bracket shall be a snug fit over the sign post. Oversize and undersize brackets will be rejected and each sign shall have only one type of fixing bracket. Care shall be taken to avoid distortion of the blade stiffeners by over-tightening of fixing bolts.

Fixing brackets shall be painted to match the back of signs.

## 10.11 TESTING

Unless otherwise specified all testing required to prove conformance under this Section of the Specification shall be carried out by a laboratory which is registered with the National Association of Testing Authorities. The Contractor shall store and distribute the test certificates and other inspection records as specified

## 10.12 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.

**10.13 MEASUREMENT AND PAYMENT**

Payment shall be made for all activities associated with completing the work detailed in this Specification in accordance with the Pay Items 1005P1 and 1010P1-P4 inclusive.

A lump sum price for any of these items shall not be accepted.

If any 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.

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.

The cost of any provision for traffic including the covering of signs prior to use is to be measured in accordance with Section 1 of this Specification. The cost of covering and uncovering permanent signs shall be deemed to be included generally in the pay items in this Specification.

Any costs associated with the provision of warranties as set out in Clause 10.07 of this Specification are to be included in the rates generally.

**Pay Item 1005P1          Manufacture of Guide Signs**

The unit of measurement shall be the area in square metre of signs manufactured.

This pay item includes mounting extrusions, labelling, packaging, delivery to site, storage and handling and erection including Hessian covers where required. Signs are to have the background and legend type as specified.

**Pay Item 1010P1          Manufacture and Delivery of Guide Sign Support Structures**

The unit of measurement shall be the tonne of sign support structure manufacture.

This pay item shall include hot dip galvanising, fittings, packaging and delivery.

**Pay Item 1010P2          Erection of Guide Sign Structures**

The unit of measurement shall be per post erected.

This pay item shall include the costs of clearing, excavation, erection, bracing, casting of concrete footings and hold down bolt assemblies where required.

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

1010P1.1	Tubular Post Mounted
1010P1.2	Modular Mounted (Steel Rectangular Hollow Section)
1010P1.3	Overhead Gantry Mounted
1010P1.4	Overhead Cantilever Mounted

**Pay Item 1010P3      Modification to Existing Guide Signs and Support Structures**

The unit of measurement shall be the area in square metre of signs modified

Separate pay items shall be included for each modification required to existing signs and sign support structure.

This pay item includes the costs of dismantling signs and sign structures, demolition of existing footings, relocation, modification or replacement of sign structures, clearing, excavation and construction of new footings and erection or re-erection of signs including all fittings.

**Pay Item 1010P4      General Signs**

The unit of measurement shall be per sign manufactured and erected, inclusive of excavation and footings where required.

1010P4.1	Traffic signs
1010P4.2	Street name blades

**10.14      SCHEDULE OF HOLD POINTS**

Hold Points	Clause	Description
10.1	10.05	Manufacture of signs
10.2	10.10.1	Excavation for foundations of sign support structure.
10.3	10.10.3	Installation of signs.