

B9 Road Pavement Marking Construction



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9.1 ROAD PAVEMENT MARKING

9.1.1 SCOPE

This section of the Technical Specification covers the removal of existing linemarking; the setting out, supply and application of road-marking materials, such as paint, thermoplastic pavement markings and raised pavement markers; and the maintenance and/or reinstatement of existing pavement marking works where required.

9.1.2 STANDARDS AND GUIDELINES

Unless stated otherwise in this Technical Specification, the drawings or elsewhere in the documents, the Works shall comply with the TfNSW Delineation Manual and its referenced TfNSW QA Specification documents, and relevant Australian Standards.

Any variations or ambiguity between standards, the Technical Specification and test methods shall be referred to the City's representative for decision before proceeding with the Works.

The following table indicates the TfNSW specifications, City of Sydney Manuals and Australian Standards applicable to this section. This table is not exhaustive and may not include all standards which may apply to the work to be undertaken.

TfNSW Delineation Guidelines	
TfNSW QA Specification R141	Pavement Marking
TfNSW QA Specification R142	Raised Pavement Markers
TfNSW R110	Coloured Surfacing Specification
TfNSW 3353	Glass Beads (for Application to Road Marking Materials)
TfNSW 3356	Waterborne Road Marking Paint
TfNSW 3357	Thermoplastic Road Marking Material
TfNSW 3360	Two Part Cold Applied Road Marking Material
TfNSW T805	Non-Volatile Content of Paint – (Withdrawn)
TfNSW T806	Density of Paints – (Withdrawn)
TfNSW T807	Fineness of Paint (Sieve Test)
TfNSW T808	Consistency of Paint by Flow Cup – (Withdrawn)
TfNSW T815	Soluble Lead Content of Paints (Gravimetric Method) – (Withdrawn)
TfNSW T820	No Pick-up-Time of Road Marking Paints – (Withdrawn)
TfNSW T833	Application Properties of Paint by Brushing or Spraying Conventional and Airless – (Withdrawn)
TfNSW T841	Field Measurement of Wet Film Thickness of Road Marking Paint
TfNSW T852	Degree of Settling of Paint
TfNSW T1203	Refractive Index (R.I.) of Glass Beads
TfNSW T1205	Flow Properties of Spherical Glass Beads
TfNSW T1207	Roundness (Shape) of Glass Beads
TfNSW T1208	Measurement of Rate of Application of Spherical Glass Beads
City of Sydney	Shared Pathways Pavement Guide
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 (retroreflective and non-retroreflective)
AS 2009	Glass beads for traffic markings

TfNSW Delineation Guidelines	
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
AS 1742.9	Bicycle facilities

9.1.3 TYPES OF MARKINGS

Details of the various types of pavement markings such as longitudinal and transverse lines, and pavement arrows are as shown in the *TfNSW Delineation Guidelines*.

Shared pathways are detailed in the *City of Sydney Shared Pathways Pavement Guide*.

9.1.4 PAVEMENT MARKING MATERIALS

9.1.4.1 WATERBORNE PAINT

Waterborne paint must conform to the requirements of *AS 4049.3 - Paints and related materials – Road marking materials*.

Waterborne paint is the recommended temporary pavement marking for all wearing surfaces. Waterborne paint shall be the final linemarking for all traffic islands and kerbs where specified.

9.1.4.2 LONG LIFE MATERIAL

9.1.4.2.1 NON-PROFILE THERMOPLASTIC

Non-profile thermoplastic pavement marking material must conform to the requirements of *AS 4049.2*. Tack coat material shall be to the manufacturer's specification as approved by the City's Representative.

9.1.4.2.2 TWO PART COLD APPLIED PLASTIC

Two part cold applied material must comply with the requirements of *TfNSW 3360*.

9.1.4.3 PAVEMENT MARKING TAPE

Pavement marking tape is a temporary form of pavement marking and shall be a strippable type. All temporary pavement marking tape shall only be used where specified or approved by the City's Representative.

9.1.4.4 SPHERICAL GLASS BEADS

Reflective glass beads must be applied to all pavement markings, except pavement marking tapes or school zone markings, and must conform with the requirements of *AS 2009 Glass beads for traffic markings* for drop-onbeads (when tested in the uncoated state).

Where possible, recycled glass is the preferred material for all spherical glass beads.

9.1.4.5 RAISED PAVEMENT MARKERS

Raised pavement markers, both reflective and nonreflective, shall comply with *AS 1906.3- Raised pavement markers (retroreflective and non-retroreflective)* and shall be installed at the spacing shown in the *TfNSW Delineation Guidelines*.

The adhesive used for attaching the raised pavement markers to the wearing surface of the pavement shall comply with *AS 3554. Adhesives for raised pavement markers*.

9.1.5 COLOURED PAVEMENT

Unless approved by the relevant road authority, the only pavements that are to be coloured are bus lanes and bike lanes. These lanes shall be coloured red and green respectively.

TfNSW QA Specification R110 gives the specification for materials used for coloured surface coatings for buslanes and bike lanes.

9.1.6 CAR SHARE PARKING BAYS

The Service Provider shall be required to mark all car share spaces with the words "CAR SHARE" and have green and white chevron markings as detailed in the standard drawings.

9.1.7 MATERIAL QUALITY

Prior to the programmed date for commencement of linemarking, the Service Provider shall submit to the City's Representative the manufacturer's technical data for the pavement materials proposed for use, together with certification from a NATA-registered laboratory so that the material is accepted, showing compliance with the requirements of this Technical Specification.

The certification supplied shall include evidence that the relevant TfNSW (NSW) tests have been carried out on the pavement materials supplied to prove compliance with the requirements of this Technical Specification.

9.1.8 APPLICATION OF PAVEMENT MARKING

9.1.8.1 SURFACE PREPARATION

Pavement markings shall only be applied to clean dry surfaces. The Service Provider shall clean the surface to ensure a satisfactory bond between the markings and wearing surface of the pavement.

Pavement marking shall not be carried out during wet weather or if rain is likely to fall during the process.

Where raised pavement markers are specified for pavements having a concrete wearing surface, the full area under each raised pavement marker shall be lightly scabbled to remove fine mortar material (laitance).

9.1.8.2 SETTING OUT OF PAVEMENT MARKING

The Service Provider shall set out the work to ensure that all markings are placed in accordance with the drawings. The locations of pavement markings shall not vary by more than 20mm from the locations shown on the drawings.

The required position of all markings except 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 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 Service Provider shall advise the City's Representative, and a joint checking procedure shall be undertaken prior to application of final markings.

9.1.8.3 APPLICATION OF PAVEMENT MARKING PAINT

9.1.8.3.1 MIXING (RUMBLING) OF PAINT

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

9.1.8.3.2 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 with the wet film thickness from 0.36mm to 0.41mm.

Glass beads shall be pressure-applied to the surface of all longitudinal lines at an application rate of 0.30 kg/m². 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 of the *TfNSW QA Specification R141 Pavement Marking*.

9.1.8.4 APPLICATION OF LONG-LIFE MATERIALS

Long-life materials, words and symbols shall be overlaid onto new or existing surfaces, or where specified, inlaid into new bituminous surfacing, all in strict accordance with the manufacturer's recommendation.

9.1.8.4.1 OVERLAY APPLICATION

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 City's Representative, 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 by the Service Provider.

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.

9.1.8.4.2 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 inlaid, 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.

9.1.8.4.3 APPLICATION RATES

9.1.8.4.3.1 NON-PROFILE THERMOPLASTIC

The application rates for non-profile thermoplastic materials and glass beads shall be as specified in *TfNSW QA Specification R141 Pavement Marking*.

9.1.8.4.3.2 TWO-PART COLD APPLIED PLASTIC

The application rates for two-part cold applied materials and glass beads shall be as specified in *TfNSW QA Specification R141 Pavement Marking*.

9.1.8.5 INSTALLATION OF RAISED PAVEMENT MARKERS

9.1.8.5.1 GENERAL

Raised pavement markers shall be fixed to the pavement in strict accordance with the manufacturer's recommendations. Markers of one manufacturer shall not be fixed with adhesive from another manufacturer without the approval of the City's Representative. 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 City's Representative may adversely affect the service life of the markers shall give cause for rejection of any or all areas of the work so affected.

9.1.8.5.2 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 manufacturer's recommendations. The surface shall be clean and dry prior to the application of the pavement markers.

9.1.9 TEMPORARY ROAD PAVEMENT MARKING FOR EMERGENCY WORK

For all emergency works where permanent markings cannot be reinstated immediately, temporary markings are required to be applied to maintain vehicle and pedestrian safety. All messages and delineation provided by the permanent markings must be replicated in the temporary applications.

Pavement marking tapes may be applied as a temporary measure, and removed within six (6) months of application, unless otherwise advised by the City's Representative, so that they are not embedded in the surface and can be readily removed.

9.1.10 TEMPORARY BLACKOUT

Painted blackout or overlay may be applied as a temporary measure, and removed as soon as practically possible. Two-part, cold-applied blackout material with aggregate may be approved by the City's Representative as a permanent marking.

All temporary blackout shall be removed within one (1) month of initial application. On busy roads with high volumes of traffic, the blackout shall be monitored weekly and replaced as required.

9.1.11 REMOVAL OF PAVEMENT MARKING

The Service Provider shall check the extent of eradication with the City's Representative and all markings to be eradicated shall be clearly identified with red paint prior to the commencement of removal. Any markings incorrectly eradicated shall be marked again by the Service Provider.

The Service Provider shall eradicate the nominated road marking as specified on the construction drawings regardless of the colour, number of coats, type and age of the marking.

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 City's

Representative.

The Service Provider shall clean up and remove from the roadway all materials and debris from their 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.

9.1.11.1 PAINTED ROAD MARKINGS

The removal 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 any conditions.

Blasting of painted markings shall be carried out until at least 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.

9.1.11.2 PLIANT POLYMER ROAD MARKINGS

The 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.

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

9.1.12 QUALITY

9.1.12.1 INSPECTIONS

At least two working days' notice shall be given for all inspections.

9.1.12.2 HOLD AND WITNESS POINTS

Pavement Marking	
1. Process Held	Pavement Marking Setout
Submission Details	At least two (2) working days before the new pavement marking is set out on site
Release of Hold Point	The City's Representative will inspect the proposed layout, prior to authorising the release of the Hold Point
2. Process Held	Eradication of Pavement Marking
Submission Details	At least two (2) working days prior to commencement of pavement marking eradication
Release of Hold Point	The City's Representative will inspect the eradicated linemarking, prior to authorising the release of the Hold Point
3. Process Held	Application of Pavement Marking
Submission Details	At least two (2) working days prior to commencement of pavement marking
Release of Hold Point	The City's Representative will inspect the pavement marking, prior to authorising the release of the Hold Point
4. Process Held	Application of Raised Pavement Markers
Submission Details	At least two (2) working days prior to commencement of installing raised pavement markers
Release of Hold Point	The City's Representative will inspect the raised pavement markers, prior to authorising the release of the Hold Point

9.1.12.3 TOLERANCES

9.1.12.3.1 PAVEMENT MARKING

Lines: Horizontal alignment +/- 100mm Symbols: Alignment +/- 100mm in any direction.

9.1.12.3.2 RAISED PAVEMENT MARKINGS

The location of all raised pavement markers shall not vary in the longitudinal direction by more than 100mm 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 TfNSW QA Specification R142 Pavement Marking. 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 1.5m.

Tolerance on direction shall be +/-4° rotational, i.e. the reflector pointed along the centreline.

9.2 ROAD SIGNAGE

9.2.1 SCOPE OF WORK

This section of the Technical Specification covers road signage from road construction projects, programmed replacement or modification to existing signposting not associated with construction projects, and reactive maintenance.

It sets out the requirements for:

- The manufacture, supply and installation of permanent and temporary traffic signs and parking regulatory signs
- The manufacture, supply and installation of sign support structures to support the signs
- The manufacture, supply and installation of street nameplates.

9.2.2 STANDARDS AND GUIDELINES

Unless stated otherwise in this Technical Specification, the drawings or elsewhere in the documents, the Works shall comply with the TfNSW online sign register, TfNSW QA Specifications and relevant Australian Standards.

Any variations or ambiguity between the Technical Specification, standards and test methods shall be referred to the City's representative for decision before proceeding with the work.

The following table indicates the TfNSW QA Specifications, City of Sydney Manuals and Australian Standards applicable to this section. This table is not exhaustive and may not include all standards which may apply to the work to be undertaken.

TfNSW QA Specification R143	Signposting
TfNSW QA Specification 3400	Manufacture and Delivery of Road Signs
City of Sydney	Smart Pole Product Manuals
AS 1163	Structural steel hollow sections
AS 1214	Hot-dip galvanised coatings on threaded fasteners
AS 1250	The use of steel in structures
AS 1379	Ready-mixed concrete
AS 1554	Welding of steel structures, Part 1

AS 1627.1	Cleaning using liquid solvents and alkaline solutions
AS 1627.4	Metal finishing – Preparation and pre-treatment of surfaces – Abrasive blast cleaning
AS 1627	Metal finishing – Preparation and pre-treatment of surfaces
AS 1650	Hot-dipped galvanised coatings on ferrous articles
AS 1734	Aluminium and aluminium alloys – flat sheet, coiled sheet plate
AS 1742.1-13	Manual of uniform traffic control devices
SAA HB 81	Field guide for traffic control at works on roads
AS 1743	Road signs – Specification
AS 1744	Forms of letters and numerals for road sign
AS 1866	Aluminium and aluminium alloys – Extruded rod, bar, solid and hollow shapes
AS 1906	Retroreflective materials and devices for road traffic control purposes
AS 1906.1	Part 1. Retroreflective materials
AS 1906.2	Part 2. Retroreflective devices (Non-pavement application)
AS 2700	Colour standards for general purposes
AS 3600	Concrete structures
AS 3678	Hot-rolled steel plates, floor plates and slabs
AS 3679	Hot-rolled structural steel bars and sections
AS 4506	Metal finishing – Thermoset powder coatings
AS 9002	Quality systems for production and installation.

9.2.3 MATERIALS FOR SIGNPOSTING

9.2.3.1 ROAD SIGN BLANKS

The dimensions, legend and background for each sign shall be in accordance with:

- this Technical Specification
- AS 1742 Manual of uniform traffic control devices
- AS 1743 Road Signs Specifications
- AS 1744 Standard alphabets for road signs
- TfNSW Signs and Markings Manual and the standard drawings.

Sign blanks, except for street nameplates, shall be either:

- 1.6mm thick aluminium sheet alloy; Type 5251 or 5052; temper H38 or H36 in accordance with AS 1743 Road Signs Specifications; and free of cracks, tears and other surface blemishes
- Another sustainable option approved by the City.

Sign blanks for permanent or temporary traffic signs shall be of a dimension and material specified in accordance with TfNSW guidelines or *AS 1743. Road Signs Specifications*.

Street nameplates shall be 6mm thick aluminium.

9.2.3.2 RETROREFLECTIVE MATERIAL

The retroreflective materials used in the background or legend of the signs shall conform in colour and grade to *Appendix C of AS 1743 Road Signs Specifications* for Class 1 and Class 2 materials and comply with *AS 1906, Part 1. Raised pavement markers (retroreflective and non-retroreflective)*.

9.2.3.3 NON-REFLECTIVE MATERIAL

Non-reflective material specified for figures, letters, symbols and borders shall be of uniform density and compatible with the background material, both in application and durability.

All R5 series parking signs should be fully screen ink printed.

Screening ink shall be a high quality, full gloss, non-fade, non-bleed and scratch-resistant type, compatible with the material to which it is applied. Screening inks shall have durability at least equal to the material to which they are applied.

An alternative to the preferred screen printing is non-reflective sheeting (e.g. vinyl printing) which may be used with authorisation from the City of Sydney. Product details for the non-reflective sheeting (vinyl printing) must be provided to the City for approval. If the use of non-reflective adhesive sheeting is proposed, the Service Provider shall submit full details of the adhesive material methods to be used to the City's Representative for approval.

9.2.4 MANUFACTURE OF SIGNS

9.2.4.1 SIGN BLANKS

(a) Preparation

Sign Blanks shall be one piece except where the sign is of such a size as to require more than one full sheet of aluminium or plastic, in which case a multi-piece sign will be allowed.

The face of each sign blank shall be chemically cleaned and etched or mechanically abraded. The back of each sign blank shall be rendered dull and non-reflective either by mechanical or chemical means and shall be free of scratches and blemishes.

(b) Dimensions and tolerances

Sign Blanks shall be free of cracks, tears and other surface blemishes and the edges shall be true and smooth. The dimensions of the sign blanks shall be within ± 1.5 mm of those specified and the finished sign shall be flat within a maximum allowable bow of $0.005(D)$ in any direction where (D) is the maximum dimension of the sign blank in any direction.

9.2.4.2 PROVISION FOR MOUNTING SIGNS

(a) Non-reinforced Signs

Non-reinforced signs shall be manufactured with square holes for mounting purposes.

The holes shall be cleanly punched 11mm square to accept 10mm diameter cuphead square neck bolts. Except where specified otherwise, two (2) holes at 520mm centres shall be placed on the nominal vertical centre line, so that the bolt heads do not obscure the legend.

(b) Reinforced signs

For normal use, all large signs over 750mm width (Size C and larger) and narrow signs with a width to height ratio of 2.5 or greater, shall have aluminium reinforcement extrusions fixed to the rear of the sign in accordance with *TfNSW QA Specification 3400*.

The sign shall be fixed to the sign structure in accordance with *TfNSW QA Specification 3400*.

9.2.4.3 FORMS OF LETTERS AND NUMERALS

The requirements for letter styles, shapes and letter heights are specified in *AS 1744 – Forms of Letters and Numerals for Road Signs*. Word and letter spacings are to be as specified on individual drawings. The stroke width of letters and numerals is to comply with *AS 1744 – Forms of Letters and Numerals for Road Signs* and all individual letters are to have neat, clearly defined edges with smooth curves on round letters.

9.2.4.4 RETROREFLECTIVE

(a) Sheet material

Retroreflective sheeting shall be applied in accordance with the manufacturer's instructions with pressure-sensitive adhesive or track-free, heat-activated adhesive and by a method such that it is securely fixed to the sign and the surface is free of any bubbles and blemishes.

(b) Screening ink

Transparent screening ink shall be applied over the retroreflective sheeting by the silk screening process, using the materials and techniques recommended by the sheeting and ink manufacturers. The ink shall be compatible with the background material, both in application and durability.

9.2.4.5 NON-REFLECTIVE

(a) Screening ink

The legend shall be applied by the screen printing process, using the materials and techniques recommended by the ink manufacturer. The legend shall be compatible with the background material, both in application and durability.

9.2.4.6 OVERLAYS OR STICK-ONS

Alterations to signs must not be carried out using overlays and/or stick-ons, nor will signs be produced using second-hand material (e.g. new overlay over old signs), unless otherwise directed and approved by the City's Representative.

9.2.4.7 STREET NAME SIGNS

For layout and colours of standard street name signs, refer to the standard drawings.

9.2.4.8 TRANSPORT AND STORAGE OF SIGNS

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

9.2.5 MANUFACTURE OF SIGN POSTS

9.2.5.1 MANUFACTURE

Sign support structures shall be standard round galvanised posts of 50mm, 65mm or 80mm nominal bore or purpose-designed steel structures as shown on the relevant drawings and manufactured in accordance with the requirements of *AS 1250 - Steel Structures Code*.

Splices in members shall be restricted to a maximum of one splice per member. Splices shall be full penetration butt welds.

All welding shall be in accordance with the requirements of *AS 1554.1 - Structural Steel Welding*.

9.2.5.2 PROTECTIVE TREATMENT

All steel components, including brackets, shall be protected by hot-dip galvanising after all fabrication processes are completed.

Prior to galvanising, the surface shall be treated in accordance with *AS 1627.1 Metal finishing - Preparation and pretreatment of surfaces* and *AS 1627.4 (Class 2.5 Blast)*.

The steel components shall be finished by the hot-dip galvanising process in accordance with *AS 1650 Metal finishing - Preparation and pretreatment of surfaces - Abrasive blast cleaning of steel* to provide a minimum thickness of 100 microns and a bright finished surface free from white rust and stains.

Splices in standard galvanised posts shall be painted by using a zinc-rich paint in accordance with Appendix G of *AS 1650 Metal finishing - Preparation and pretreatment of surfaces - Abrasive blast cleaning of steel* to provide a zinc-rich coating at least equal to the thickness specified for the galvanised layer.

Bolts, nuts, washers and brackets shall be galvanised in accordance with *AS 1214. Hot-dip galvanized coatings on threaded fasteners*.

9.2.5.3 ADDITIONAL COLOUR TREATMENT TO SIGN SUPPORT STRUCTURES

The City's Representative may direct the Service Provider to provide heritage green powder-coated steel posts.

Powder-coating applications shall be applied in accordance with *AS/NZS 4506:1998 Metal Finishing – Thermoset Powder Coatings*.

Prior to powder coating, the Service Provider shall submit a control sample of the proposed treatment for the City Representative's approval. Any unreasonable variation to the control colour sample approved by the City Representative shall be rectified by the Service Provider.

The finished product should be free of defects and smooth over the entire element with consistent appearance over the entire post.

9.2.5.4 CAPS ON TOP OF SIGN SUPPORT STRUCTURES

All new installations of posts are to be fitted with a galvanized post cap. Powder-coated posts should be fitted with a powder-coated post cap.

9.2.6 INSTALLATION OF SIGNS

All signs shall be precisely located and carefully fixed by a specialist tradesperson skilled in this work. Particular care shall be taken to fix all signs at the correct height and position.

The Works shall be carried out with care and practices necessary to prevent any damage to any building or property. In the event that any damage is caused as a result of the failure by the Service Provider to take necessary precautions, the Service Provider shall repair the damage at their own expense.

All components shall be accurately positioned and supported during installation.

9.2.6.1 SETTING OUT

The Service Provider shall set out the work to ensure that all signs and support structures are placed in accordance with the relevant drawings and/or schedule of notices as directed by the City Representative.

Signs shall be installed with a minimum 300mm from face of kerb to edge of sign and a pedestrian height clearance of 2.1m from the base of the sign face to the pavement surface in accordance with *AS 1742.2 Manual of uniform traffic control devices, Appendix D*.

Signs shall be aligned at appropriate angles to the direction of the traffic they are intended to serve in accordance to *AS 1742.2 Manual of uniform traffic control devices, Appendix D*. On curved alignments, the angle of placement should be determined by the course of approaching traffic under the orientation of the road at the point where the sign is located.

9.2.6.2 REPORTING OF OBSTRUCTIONS

Any trees and undergrowth within 3m of the sign support structure and along a motorist's line of sight to the front of the sign shall be noted and advice made to the City's Representative.

9.2.6.3 SIGN STRUCTURE FOUNDATIONS

The foundations for sign support structures shall be as shown on the relevant drawings.

The foundation footings shall be neatly excavated to the depth and width shown on the relevant drawings.

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 base plates to allow adjustment of the structure after installation.

Concrete placed in the foundations shall be normal class concrete with strength 20MPa in accordance with *AS 3600 Concrete Structures Code* and with a 20mm maximum nominal size of aggregate.

9.2.7 INSTALLATION ONTO GALVANISED POSTS

The top of each post shall extend sufficiently beyond the upper extrusion section or bolt holes on the signpanels to enable attachment of the signs.

In multi-post installations, the top of each post shall be at the same level.

During installation, the sign panels shall be suitably supported and braced with the sign face protected from damage. Signs damaged during installation shall be repaired to a standard equivalent to the original sign or replaced by the Service Provider.

Galvanised coatings which are scratched or slightly damaged during installation shall be renovated by using a zinc-rich paint in accordance with Appendix F of *AS 1650 Hot-dipped galvanized coatings on ferrous articles* - to provide a zinc-rich coating of a minimum of 100 microns thick. This method of renovation shall be restricted to areas not exceeding 2500mm². Any structure with total damaged coating areas exceeding 2500mm² shall be regalvanised by the Service Provider.

9.2.8 CORE DRILLING FOR SIGNPOSTING

The Service Provider may use a core drill to excavate for a pole footing if they are fully aware of the extent of underground infrastructure. The Service Provider is responsible for any service utility damage caused during excavation.

9.2.9 LOCK SOCKETS

Lock sockets are to be used at the base of all sign posts. The Service Provider may be requested to provide a sample of the lock socket prior to installation.

After poles and/or lock sockets are removed, the footpath surfaces are to be repaired to match the existing footpath level.

9.2.10 INSTALLATION ONTO ELECTRICITY OR LIGHT POLES

Installation of signs on steel electrical light poles is to be undertaken using the bandit fastening system and appropriate brackets. No drilling of steel poles is permitted.

9.2.11 INSTALLATION ONTO SMART POLES

Where signage is to be fixed to the main street, smart poles installation shall be in accordance with the *City's Smart Pole Manual*.

9.2.12 TREES

No signs are to be mounted to trees under any circumstances. Attaching a sign to a tree will be considered as vandalism and the Service Provider will be held liable for any damage to the tree.

9.2.13 SPEED REGULATORY SIGNS

All signs with speed limits shall be supplied and installed by the Roads and Maritime Services.

9.2.14 STREET NAME SIGNS

The height, location and orientation of street name signs shall be installed in accordance with *AS 1742.5 Manual of uniform traffic control devices*. Generally, street name signs shall be installed on galvanised poles, installed as detailed above in this Specification.

Where appropriate, street name signs shall be installed on main street smart pole installations to reduce clutter. Where a street name sign is to be fixed to a smart pole, it shall be in accordance with the *City's Smart Pole Manual*.

Street name signs installed on buildings and other structures are to be approved by the City's Representative.

9.2.15 LABELLING SIGNS

All signs shall be clearly and permanently marked with the date and time of installation.

9.2.16 CLEANING OF SIGNS

The Service Provider is required to remove all grime, grease and dust build-up on signs, in order to make all sign markings clearly visible. Where build-up material is removed and sign marking is found to be damaged or faded, the Service Provider is to report the location of damaged sign to the City's Representative.

The removal of build-up material is to be carried out with cleaning agents and tools approved by the City's Representative.

9.2.17 QUALITY

All new signs and poles shall be installed free from scratches, dents and any other defects.

Any signs or posts found by the City's Representative to have defects are to be replaced by the Service Provider.

9.2.17.1 SAMPLE SIGNS

If requested by the City's Representative, a sample of the acceptable standard that will be used for the work will be provided by the Service Provider prior to work commencing. Approved sign samples will be stored at the City of Sydney office and will be regarded as the acceptable standard against which other signs will be compared. These signs will be available for the Service Provider to see upon request.

9.2.17.2 INSPECTIONS

At least two working days' notice shall be given for all inspections.

9.2.17.3 HOLD AND WITNESS POINTS

Installation of New Sign

1. Process Held	Sign Post Setout (Section 9.2.6.1)
Submission Details	At least two (2) day before the new sign posts are set out on site
Release of Hold Point	The City's Representative will inspect the proposed layout, prior to authorising the release of the Hold Point
2. Process Held	Construction of Footings (Section 9.2.6.3)
Submission Details	At least two (2) working days prior to construction of footings
Release of Witness Point	The City's Representative will inspect the footings, prior to authorising the release of the Witness Point unless advised otherwise
3. Process Held	Installation of Posts (Section 9.2.6)
Submission Details	At least two (2) working days prior to installations of posts
Release of Witness Point	The City's Representative will inspect the installed posts, prior to authorising the release of the Witness Point unless advised otherwise
4. Process Held	Installing Signs (Section 9.2.6)
Submission Details	At least two (2) working days prior to installing new signs.
Release of Hold Point	The City's Representative will inspect the new signs, prior to authorising the release of the Hold Point

Installation of New Sign

5. Process Held	Installing Signs onto any Structure other than Poles (Section 9.2.6)
Submission Details	At least two (2) working days prior to installing new signs
Release of Hold Point	The City's Representative will inspect the new signs, prior to authorising the release of the Hold Point

9.2.17.4 TOLERANCES

Item	Activity	Tolerances
1.	Setout	<ul style="list-style-type: none">All signs shall be installed within 100mm of the location shown on the construction drawings

9.3 REVISION REGISTER

Revision	Clause	Description of Revision	Authorised By	Date
Rev. 6	Overall	References to "Roads and Maritime Services" or "RMS" changed to "Transport for NSW" or "TfNSW" respectively.	SA	Aug-23
	9.1.2	TfNSW Delineation Guidelines table updated		

