

Roads

Master Specification

RD-LM-C4 Sign Installation

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RD-LM-C4 Sign Installation

1 General

- 1.1 This Part specifies the requirements for:
- supply and selection of sign supports;
 - placement of signs;
 - installation of sign supports; and
 - installation of signs.
- 1.2 This Part does not cover:
- the manufacture, testing and commissioning of electronic signage such as Changeable Message Sign (CMS) & Variable Message Sign (VMS);
 - the design and supply of bespoke support structures such as gantries, cantilevers, portal frames; or
 - signs for temporary works.
- 1.3 The Contractor shall install signs in accordance with the following (in order of precedence):
- any contract specific drawings or Contract Documents;
 - the requirements of this Part; and
 - standard drawings.
- 1.4 The terminology in the applicable Austroads publications listed in Clause 1.5 applies to this Contract.
- 1.5 Documents referred to in this Part are listed below.
- AS 1163 Cold Formed Structural Steel Hollow Sections.
 - AS 1450 Steel Tubes for Mechanical Purposes.
 - AS 1742.2 Manual of Uniform Traffic Control Devices - Traffic control devices for general use.
 - AS 1867 Aluminium and aluminium alloys - Drawn tubes.
 - AS 1906.1 Retroreflective Materials and Devices for Road Traffic Control Purposes - Retroreflective sheeting.
 - Austroads Guide to Road Design – Part 6: Roadside Design, Safety and Barriers.
 - Austroads Guide to Road Safety – Part 9: Roadside Hazard Management.
- 1.6 Any proprietary supports shall have a minimum design life of 40 years.

2 Supply of Sign Supports

General

- 2.1 Steel sign supports shall:
- comply with either AS 1163 or AS 1450;
 - be manufactured using steel with a yield stress of ≥ 250 MPa; and
 - comply with the dimensions specified in Clause 3. "Selection of Sign Supports".
- 2.2 The Contractor shall provide a certificate of compliance to AS 1163 or AS 1450. The mill supplying AS 1163 product shall be third party certified.

- 2.3 Submission of the certificate of compliance shall constitute a **Hold Point**.
- 2.4 Steel Rectangular Hollow Sections (RHS) shall be drilled in accordance with Appendix 4: Steel Sign Support – Hole Spacing.
- 2.5 Steel Circular Hollow Sections (CHS) shall be capped and shall not consist of sections welded together unless the Contractor provides evidence that the strength and durability of the join welds meet the loading applicable to the support and has a 25-year design life.

Protective Coating

- 2.6 A protective coating that complies with the following shall be applied to steel posts:
 - a) RHS:
 - i) zinc coated to Class Z275 in accordance with AS 1397, Table 3.1;
 - ii) zinc alloy coated to Class ZM275 in accordance with AS 1397 Table 3.3; or
 - iii) hot-dip galvanized accordance with AS 4680.
 - b) CHS:
 - i) Where a coloured finish is specified:
 - a coating applied in accordance with ST-SS-S2 "Protective Coating of Structural Steelwork " (the colour shall be G61 to AS 2700).
 - ii) Where a finish is not specified:
 - zinc alloy coated ZM275 alloy in accordance with AS 1397, Table 3.3; or
 - hot-dip galvanized in accordance with AS 4680.

Aluminium Circular Hollow Sections

- 2.7 Aluminium Circular Hollow Sections (CHS) shall comply with:
 - a) AS 1867; and
 - b) the dimensions specified in Clause 3. "Selection of Sign Supports".
- 2.8 The Contractor shall provide a certificate of compliance to AS 1867.

Proprietary Frangible Posts

- 2.9 Proprietary frangible posts may be used if the product is approved by the Principal. A list of approved products is included in the DPTI Approved Products List, available from: <https://www.dpti.sa.gov.au/documents> The Contractor may apply for approval of a proprietary frangible post not included in the Approved Products List. Any request for approval of a post shall include all necessary supporting information and shall constitute a **Hold Point**.
- 2.10 The Contractor acknowledges that for efficiency of maintenance, the Principal requires that the number of types of proprietary frangible posts on the road network is kept to a minimum. The Principal reserves the right to withhold approval of any proprietary frangible posts at its absolute and unfettered discretion.

Identification of Sign Supports

- 2.11 The supports shall be clearly marked with the supplier / manufacturer's name, applicable Australian Standard, grade, and any other information specified in the applicable Australian Standard.
- 2.12 The marking shall be applied after the application of any surface coating and consist of either indelible lettering or a durable, graffiti resistant, UV stable sticker. The marking / sticker shall be visible once the support has been installed.

3 Selection of Supports

Small / Medium Signs

- 3.1 Small to medium size signs (i.e. general regulatory or warning type signs) shall be supported by steel RHS supports complying with Table RD-LM-C4 3-1. Circular Hollow Sections shall not be used for small to medium size signs under any circumstances.

Table RD-LM-C4 3-1 Rectangular Hollow Section Supports

Post Length (mm)	Post Size width x depth x wall thickness (mm)
≤ 3 200	75 x 38 x 3.0 or 80 x 40 x 1.6
> 3 200 to ≤ 4 200	80 x 40 x 2.5

Large Signs

- 3.2 Except for overhead signs, steel CHS supports (nominal 100 mm diameter) shall be used where non-frangible posts are permitted.
- 3.3 Where frangible posts are required, the posts shall be either:
- aluminium CHS complying with Table RD-LM-C4 3-2;
 - steel CHS complying with Table RD-LM-C4 3-2; or
 - an approved proprietary frangible sign support in accordance with Clause 2.9 "Proprietary Frangible Posts".

Table RD-LM-C4 3-2 Posts Deemed to be Frangible

Speed Zone (Km/h)	Diameter x Wall Thickness (mm)
Circular Steel Posts	
≤ 80	80 x 3.3
≤ 70	90 x 3.3*
≤ 60	80 x 5.0 or 100 x 3.5*
≤ 40	125 x 3.5*
Circular Aluminium Posts	
≤ 110	100 x 4.6/5.5

*indicates the preferred sizes for use on DPTI roads

Note: All circular post sizes are shown as Nominal Bore (inside dimension).

- 3.4 Overhead signs shall be supported by cantilever, gantry or portal type structures.

Number of Supports

- 3.5 Where RHS or CHS steel supports are used, the number and spacing of supports shall be in accordance with Appendix 1: Steel Post Selection and Table RD-LM-C4 3-3. The sign height shall be determined from Appendix 3: Sign Support Selection Example. If the sign width is ≤ 1400 mm, the sign can be installed on one post.
- 3.6 Where CHS aluminium supports are used, the number and spacing of supports shall be in accordance with the manufacturer's post selection specification. If the sign width is ≤ 1400 mm, the sign can be installed on one aluminium post.
- 3.7 Where other materials / type of supports are used, the Contractor shall verify that the posts will comply with applicable Australian Standards.

Support Spacing

- 3.8 The spacing of supports of signs shall comply with Table RD-LM-C4 3-3.

Table RD-LM-C4 3-3 Support Spacing

Number of Supports	% of Sign Width	
	Between outermost support and sign edge	Between supports
1	50	-
2	20	60
3	15	35
4	12.5	25

VMS and CMS

- 3.9 VMS and CMS signs that weigh in excess of 100 kg shall be supported on bespoke supports. VMS and CMS signs that weigh less than 100 kg may be supported by steel CHS supports (nominal 100 mm diameter).

4 Placement of Signs

General

- 4.1 Signs shall be installed as close as practical to the locations specified on the drawings. All signs shall be positioned to:
- be clearly legible to all road users with adequate sight distance;
 - not create a hazard to road users;
 - provide adequate clearance from underground and overhead services;
 - not compete with other traffic signs, traffic control devices or roadside furniture;
 - where appropriate, be placed in locations that allow adequate reading time for all road users and adequate time and travel distance for the road user to act on the message; and
 - not be partially hidden by any roadside objects, furniture or vegetation.

Lateral Placement

- 4.2 Except for overhead signs, the edge of the sign shall be located in accordance with Table RD-LM-C4 4-1.

Table RD-LM-C4 4-1 Lateral Placement of Signs

Lateral Placement of Signs	
Rigid safety barrier present:	A minimum of 1.0 m from the face of the safety barrier (regardless of kerb position).
Wire rope safety barrier present:	A minimum of 1.5 m from the face of the safety barrier (regardless of kerb position).
No safety barrier present, frangible post used:	The minimum clearance from the travelled way or kerb is: <ul style="list-style-type: none"> Rural area: 2.0 m Urban area (kerb & gutter): 0.3 m Urban area (semi mountable kerb): 0.5 m
No safety barrier present, non-frangible post used:	Outside of the Clear Zone (unless vehicles are prevented from impacting the supports e.g. steep cutting).

- 4.3 The nearest edge of an overhead sign shall not be further than 5.0 m from the closest running lane.
- 4.4 The Clear Zone shall be determined in accordance with Table RD-LM-C4 4-2.

Table RD-LM-C4 4-2 Clear Zone

Speed (km/h)	Clear Zone (m)
60	4.5
70	5.5
80	5.5
90	6.5
100	9.0
110	9.0

4.5 Table “Clear Zone” is based on an AADT of 1501 – 6000 vpd. For information on clear zones with other traffic volumes refer to Austroads Guide to Road Design – Part 6: Roadside Design, Safety and Barriers.

Longitudinal Placement

4.6 The location of a sign in advance of a hazard, decision point or intersection shall be:

- a) < 75 km/h: 80-120 m
- b) 75 – 90 km/h: 120-180 m
- c) > 90 km/h: 180-250 m

4.7 The minimum distance between any sign and another road sign shall be:

- a) < 60 km/h: 30 m
- b) 60 – 70 km/h: 35 m
- c) 80 – 90 km/h: 50 m
- d) 100 - 110 km/h: 60 m

Vertical Clearance

4.8 The minimum vertical clearance from the ground or road surface to any part of a sign or structure shall comply with the following:

Overhead Sign

- a) Over a running lane - absolute minimum: 5.5 m
- b) Over a shoulder, parking lane or emergency lane: 4.6 m

Roadside Sign

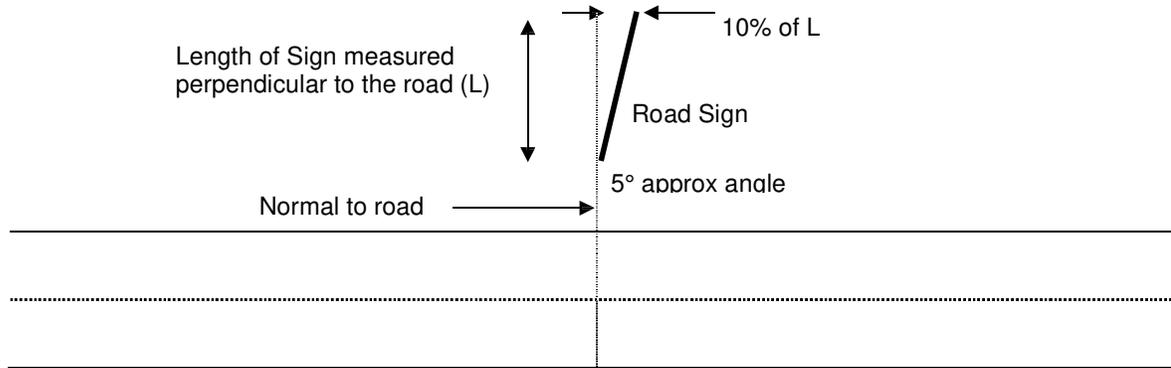
- c) Above a defined pathway: 2.5 m
- d) Urban environment not subject to pedestrian movements: 2.0 m
- e) Rural environment with pedestrian movements: 2.0 m
- f) Rural areas not subject to pedestrian movements: 1.5 m

Orientation of Signs

4.9 Signs shall be angled slightly away from the driver's line of travel in accordance with AS 1742.2 Clause D3. Where a sign is to be installed on a straight section of road, the sign face shall be placed at an angle of approximately 5 degrees away from the left edge side of the roadway as shown in Figure RD-LM-C4 4-1.

4.10 This may be determined by using a longitudinal offset of 10% of the sign length (L) measured perpendicular from the outer edge of the road.

Figure RD-LM-C4 4-1 Angle of Sign Along Straight Road



5 Installation of Sign Supports

General

- 5.1 The Contractor shall ensure that the footings do not interfere with any existing Utility Services and the clearance requirements of the Service Authority are complied with.
- 5.2 Footing concrete shall be Grade N20 unless specified otherwise in the post manufacturer's installation guidelines. Unless approved otherwise, the Contractor shall remove spoil from the site.

Footing Spikes

- 5.3 Unless specified otherwise, footing spikes shall not be used. Any proposal to use alternative or spike footings shall be supported by the manufacturer's installation guidelines. Submission of a proposal shall constitute a **Hold Point**.

Sleeves

- 5.4 Breakaway and frangible supports shall be inserted into sleeved footings to enable replacement of damaged supports without affecting the footing.
- 5.5 Where aluminium sleeves are to be placed into concrete surrounded with soils of a highly acidic or alkaline nature, the following treatment shall be applied to all surfaces of the sleeve:
 - a) Apply by brush 1 full coat of Denso Primer D, at an average spreading rate of 10m²/L, and allow to tack off for 10 to 20 minutes.
 - b) Apply small cut pieces of Denso Ultraflex 1500 tape to the socket end cap to cover all edges and surfaces, then spirally wind Denso Ultraflex 1500 tape, starting at the socket end, to cover all surfaces, ensuring a minimum overlap of 50% between strips. The security bolt section at the top of the sleeve should be left clear to facilitate fixing of the post.
 - c) The treatment shall be applied prior to transportation of sign post to the point of installation.
- 5.6 The Contractor shall remove loose debris prior to pouring footing concrete. Steel sleeves shall be placed full depth into the pavement with a protrusion of 20 mm above the surrounding surface. Aluminium sleeves shall be installed according to the post manufacturer's installation guidelines with a protrusion of 50-90 mm above the surrounding surface. The final surrounding surface height shall be determined in consultation with the Principal.
- 5.7 Footing holes shall be back filled with poured concrete which shall be compacted for the full depth of the footing. Signs shall not be attached to supports for a minimum of 24 hours after concrete is poured.

Rectangular Hollow Section Supports

- 5.8 Rectangular Hollow Section supports shall be installed with a minimum embedded length of 600 mm. The extent of embedment shall be proportional to sign size, height above the ground and the soil type. Footing holes shall be backfilled with PM2/20 and compacted.

Steel Circular Hollow Section Supports

- 5.9 Steel Circular Hollow Section supports shall have a minimum footing of 1m depth and a minimum of 0.5 m diameter. Footing holes shall be back filled with poured concrete or dry mix concrete which shall be compacted for the full depth of the footing. Signs shall not be attached to supports for a minimum of 24 hours after concrete is poured or compacted. The surface level of the footing shall be finished such that water is shed to the outer edge of the footing.

Breakaway Supports and Frangible Supports

- 5.10 Breakaway and frangible supports shall be installed in accordance with the drawings and / or manufacturer's installation guidelines.

6 Installation of Signs

General

- 6.1 Signs shall be erected in accordance with the work method approved under the manufacturer's warranty provisions of RD-LM-S2 "Supply of Sign". Where signs are to be installed on new works, the signs shall be installed prior to traffic using the new configuration.

Height of Signs

- 6.2 Signs shall be erected such that the lowest edge of the main sign plate is in accordance with the heights shown in Appendix 3: Sign Support Selection Example. The post shall not protrude above the top edge of a sign.
- 6.3 If multiple signs are installed, the gap between each plate shall be 50 mm -150 mm.

Fixing

- 6.4 All fittings shall be hot dipped galvanized to 125 g/m² in accordance with AS 4680.
- 6.5 Signs shall be attached to one or more supports by either:
- bolting directly to the support;
 - by means of Unistrut clamps; or
 - galvanized steel straps to existing furniture.
- 6.6 Unbraced signs shall be attached to Rectangular Hollow Section supports by using galvanized bolts, washers and vandal proof nuts. Braced signs shall be attached using galvanized steel clamps compatible with the bracing system, using galvanized bolts, washers and vandal proof nuts.
- 6.7 Signs shall not be attached to frangible or slip base light poles. All signs affixed to the post (i.e. metal or non-metallic) shall not create a punching through effect and shall not be affected by wind vibration. Signs attached to other street furniture by means of galvanized steel straps shall not damage the support.

Covering

- 6.8 Any temporary covering of the sign face after installation shall not void the manufacturer's warranty.

Cleaning

- 6.9 Cleaning of the sign shall not damage the sign face or legend.

7 Records

- 7.1 The Contractor shall maintain a record of each sign installed, which shall include the following (where relevant):
- Road Number;
 - Maintenance Marker Point (MMP);
 - Offset from closest travel lane;
 - Sign Type;
 - TES Drawing Number;
 - Date Installed; and
 - Sign Support Type.
- 7.2 The Contractor shall provide records confirming that both legends and background of supplied signs comply with the new material requirements of AS 1906.1

8 Hold Points

- 8.1 The following is a summary of Hold Points referenced in this Part:

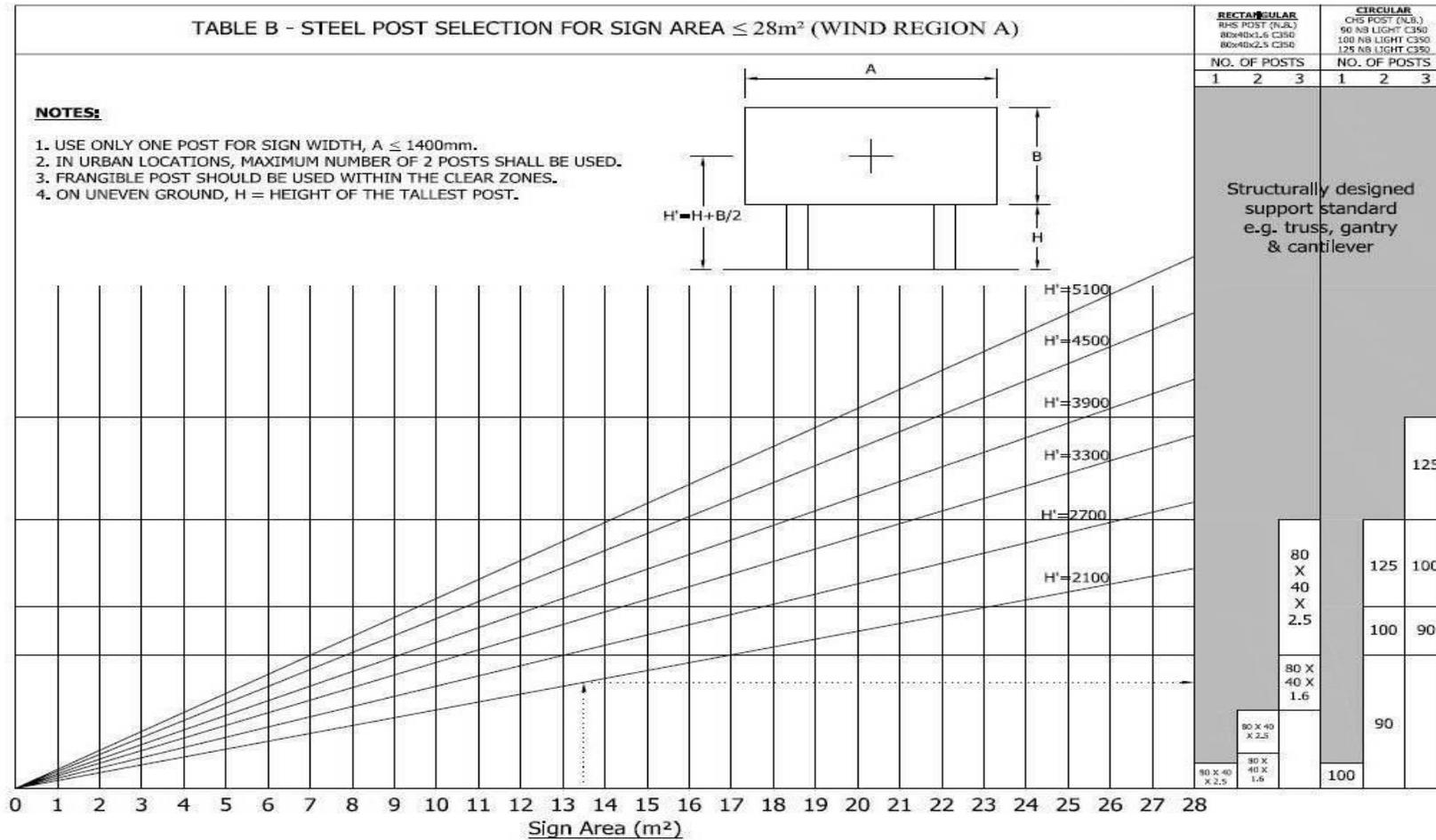
Document Ref.	Hold Point	Response Time
2.3	Submission of the certificate of compliance to AS 1163 or AS 1450	2 working days
2.10	Submission of alternative design for a frangible post	21 working days
5.3	Proposal for alternative sleeve footing	2 working days

9 Verification Requirements and Records

- 9.1 The Contractor shall supply the following records:

Table RD-LM-C4 9-1 Verification Requirements

Document Ref.	Subject	Record To Be Provided
7.1	Installation records	Details of installation
7.2	Retroreflective sheeting	Evidence of compliance with AS 1906.1
Part RD-LM-S2	Sign manufacturer's warranty	Retro reflective warranty



11 Appendix 2: Overview of Sign Support Selection Process

To determine the number, size and position of the supports and placement of the sign, the process described below should be followed.

STEP	REFERENCE
<input type="checkbox"/> Determine Sign Size Dimensions: Width: A Height: B	Any Contract Specific Drawings AS 1742.2
<input type="checkbox"/> Determine Clear Zone	Clause 4.2 Austroads Guide to Road Design Part 6: Roadside Design, Safety & Barriers
<input type="checkbox"/> Determine Lateral Clearance	Any Contract Specific Drawings Clause 4.2 Appendix 1: Steel Post Selection Appendix D of AS 1742.2
<input type="checkbox"/> Determine Frangibility Requirement	Clauses 2, 3 and 4
<input type="checkbox"/> Determine Sign Vertical Clearance Sign Ground Height: H	Clause 4.4 Appendix 1: Steel Post Selection
<input type="checkbox"/> Calculate for Selection of Sign Post & Number Sign area = $A \times B$ $H^2 = H + B/2$ If sign area > 28m ² , refer to Structural Engineer	Appendix 1: Steel Post Selection
<input type="checkbox"/> Select Suitable Sign Supports Number & type of post: 1 support for sign width up to 1.4m. 2 or 3 supports for sign width over 1.4m.	Appendix 1: Steel Post Selection or Manufacturer's Installation Guidelines
<input type="checkbox"/> Determine Support Spacing	Clause 3.4
<input type="checkbox"/> Order & Install	Clauses 4 and 5

12 Appendix 3: Sign Support Selection Example

An example calculation is provided to illustrate the use of these guidelines.

Location = Mawson Lakes
 Type of sign = Advance Direction Sign

Step 1 – Sign Size

Determine the dimension of the proposed sign face by measuring the sign width, A and sign height, B.

Normal sign (single panel construction)
 Sign width A = 3.75 m
 Sign height B = 2.10 m

Step 2– Vertical and Lateral Clearance

A site assessment of the location is recommended to determine clearances and other site conditions.

From site assessment and Standard Drawing MS-249-1, the sign ground height, H = 2.0 m

Step 3 – Selection of Number and Type of Support

The selection of number and types of sign posts depends on sign face area. In order to make the right selection, calculate the sign face area (A x B) and the height from ground level to centre of sign, H' = H + B/2. From the calculated sign face area, and H', select the appropriate number and type of support by referring the tables and appendices to this Part or to the post manufacturer's guidelines.

$$\begin{aligned} \text{i.e. Sign area} &= A \times B \\ &= 3.75 \times 2.10 \\ &= 7.90 \text{ m}^2 \end{aligned}$$

Height from ground level to centre of sign

$$\begin{aligned} H' &= H + B/2 \\ &= 2 + 2.10/2 \\ &= 3.05 \text{ m} \end{aligned}$$

Since the sign width A, is greater than 1.40 m, a minimum of two supports should be used. An example from the Manufacturer's Guideline, the number of posts required can be either one of the following:

Steel CHS Posts
 2 x 90 NB LIGHT C350
 3 x 80 x 40 x 2.5 C350

Aluminium CHS Frangible Posts (determined from Manufacturer's Guidelines)
 2 x 90 NB
 3 x 80 NB

From these options, select the final number and types of posts that suits your requirements.

Step 4 – Support Spacing

Sign width, A = 3.75 m

For 2 supports - $3.75 \times 60 / 100 = 2.25$ m between posts and $3.75 \times 20 / 100 = 0.75$ m overhang

For 3 supports - $3.75 \times 35 / 100 = 1.31$ m between posts and $3.75 \times 15 / 100 = 0.56$ m overhang

NOTE:

There may be occasions when non-frangible supports are used within the clear zone. The reason for their use in the clear zone, along with a risk assessment should be documented and signed off by the Principal.

13 Appendix 4: Steel Sign Support – Hole Spacing

Rectangular hollow section post drilling pattern (all dimensions in mm)

Figure 1 Sign Post

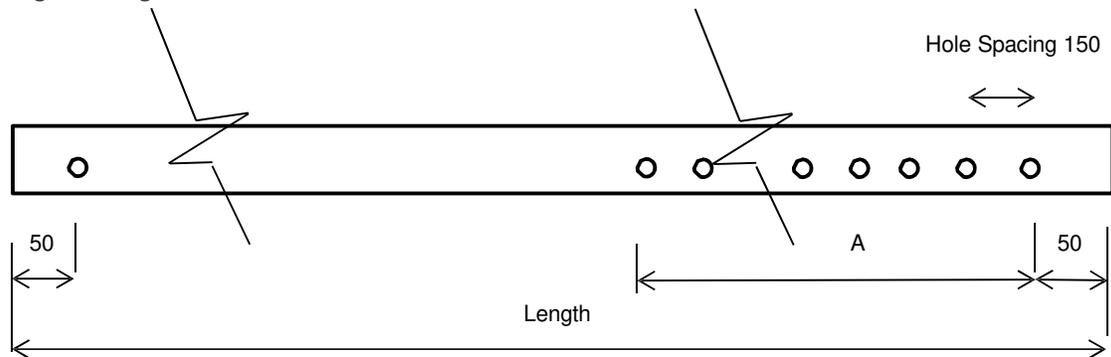


Table RD-LM-C4 13-1 Steel Sign Support – Hole Spacing

Length (m)	Dimension "A" (m)	No. Of Holes
4.2 (Max)	1.35	10
3.7	1.2	9
3.2	1.65	12
2.8	1.05	8
2.1	0.9	7
1.7	0.9	7
1.3	0.6	5

- 13.1 Extra holes may be drilled for special installations subject to approval from the Principal.
- 13.2 Maximum length of a Rectangular Hollow Section post is 4.2 m, unless certified by a Structural Engineer and approved by the Principal.

14 Appendix 5: Sign Height and Offset details

Figure RD-LM-C4 14-1 Sign Height and Offset details

