PART R49

INSTALLATION OF SIGNS

CONTENTS

1. GENERAL

This Part specifies the requirements for:

(a) supply and selection of sign supports;

(b) placement of signs;

(c) installation of sign supports; and

(d) installation of signs.

It does not cover:

(a) the manufacture, testing and commissioning of electronic signage such as Changeable Message Sign (CMS) & Variable Message Sign (VMS) (refer Part R66 “The Supply of Variable and Changeable Message Signs”);

(b) the design and supply of bespoke support structures such as gantries, cantilevers, portal frames; and

(c) signs for temporary works.

The Contractor must install signs in accordance with the following (in order of precedence):

1. any contract specific drawings or **Contract Specific Requirements**;
2. the requirements of this Part; and
3. standard drawings.

The terminology in the applicable Austroads publications applies to this Part.

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”

Any proprietary supports must have a minimum design life of 40 years.

2. SUPPLY OF SIGN SUPPORTS

2.1 General

Steel sign supports must:

(a) comply with either AS 1163 or AS 1450;

(b) be manufactured using steel with a yield stress of ≥250 MPa; and

(c) comply with the dimensions specified in Clause 3. “Selection of Sign Supports”.

The Contractor must provide a certificate of compliance to AS 1163 or AS 1450. The mill supplying AS 1163 product must be third party certified.

Submission of the certificate of compliance shall constitute a **HOLD POINT**.

Steel Rectangular Hollow Sections (“RHS”) must be drilled in accordance with Attachment R49D.

Steel Circular Hollow Sections (“CHS”) must be capped and must 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.

2.2 Protective Coating

A protective coating that complies with the following must applied to steel posts:

RHS

Zinc coated to Class Z275 in accordance with AS 1397, Table 3.1; or

Zinc alloy coated to Class ZM275 in accordance with AS 1397 Table 3.3; or

Hot-dip galvanized accordance with AS 4680.

CHS

Where a coloured finish is specified:

a coating applied in accordance with Part S35 "Protective Treatment of Structural Steelwork" (the colour must be G61 to AS 2700);

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.

2.3 Aluminium Circular Hollow Sections

Aluminium Circular Hollow Sections (“CHS”) must:

(a) comply with AS 1867; and

(b) comply with the dimensions specified in Clause 3. “Selection of Sign Supports”.

The Contractor must provide a certificate of compliance to AS 1867.

2.4 Proprietary Frangible Posts

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

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 must include all necessary supporting information and shall constitute a **HOLD POINT**.

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.

2.5 Identification of Sign Supports

The supports must be clearly marked with the supplier / manufacturer’s name, applicable Australian Standard, grade and any other information specified in the applicable Australian Standard. The marking must 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 must be visible once the support has been installed.

3. SELECTION OF SIGN SUPPORTS

3.1 Small / Medium Signs

Small to medium size signs (i.e. general regulatory or warning type signs) must be supported by steel RHS supports complying with Table 3.1 "Rectangular Hollow Section Supports". Circular Hollow Sections must not be used for small to medium size signs under any circumstances.

TABLE 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

3.2 Large Signs

Except for overhead signs, steel CHS supports (nominal 100 mm diameter) must be used where non-frangible posts are permitted.

Where frangible posts are required, the posts must be either:

(a) aluminium CHS complying with Table 3.2 "Posts Deemed to be Frangible";

(b) steel CHS complying with Table 3.2 "Posts Deemed to be Frangible"; or

(c) an approved proprietary frangible sign support in accordance with Clause 2.4 "Proprietary Frangible Posts".

TABLE 3.2 - POSTS DEEMED TO BE FRANGIBLE

Circular Steel Posts	
Speed Zone (Km/h)	**Diameter x Wall Thickness (mm)**
≤ 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)

Overhead signs must be supported by cantilever, gantry or portal type structures.

3.3 Number of Supports

Where RHS or CHS steel supports are used, the number and spacing of supports must be in accordance with Attachment R49A "Steel Post Selection" and Table 3.4 - Support Spacing. The sign height must be determined from Attachment R49E. If the sign width is ≤ 1400 mm, the sign can be installed on one post.

Where CHS aluminium supports are used, the number and spacing of supports must be in accordance with the manufacturers post selection specification. If the sign width is ≤ 1400 mm, the sign can be installed on one aluminium post.

Where other materials / type of supports are used, the Contractor must verify that the posts will comply with applicable Australian Standards.

3.4 Support Spacing

The spacing of supports of signs must comply with the Table 3.4 “Support Spacing”:

TABLE 3.4 - 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

3.5 VMS and CMS

VMS and CMS signs that weigh in excess of 100 kg must 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

4.1 General

Signs must be installed as close as practical to the locations specified on the drawings. All signs must be positioned to:

(a) be clearly legible to all road users with adequate sight distance;

(b) not create a hazard to road users;

(c) provide adequate clearance from underground and overhead services;

(d) not compete with other traffic signs, traffic control devices or roadside furniture;

(e) 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

(f) not be placed in locations where the sign will be partially hidden by any roadside objects, furniture or vegetation.

4.2 Lateral Placement

Except for overhead signs, the edge of the sign must be located in accordance with Table 4.2 (a).

TABLE 4.2 (a) – 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: • 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)

The nearest edge of an overhead sign must not be further than 5.0 m from the closest running lane.
The Clear Zone must be determined in accordance with Table 4.2 (b).

TABLE 4.2 (b) – 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

Table 4.2(b) 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.

4.3 Longitudinal Placement

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

< 75 km/h	80-120 m
75 – 90 km/h	120-180 m
> 90 km/h	180-250 m

The minimum distance between any sign and another road sign must be:

< 60 km/h	30 m
60 – 70 km/h	35 m
80 – 90 km/h	50 m
100 – 110 km/h	60 m

4.4 Vertical Clearance

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

Overhead sign

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

Roadside sign

Above a defined pathway:	2.5 m
Urban environment not subject to pedestrian movements:	2.0 m
Rural environment with pedestrian movements:	2.0 m
Rural areas not subject to pedestrian movements:	1.5 m

4.5 Orientation of Signs

Signs must 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 must be placed at an angle of approximately 5 degrees away from the left edge side of the roadway as shown in Figure 4.5.

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.

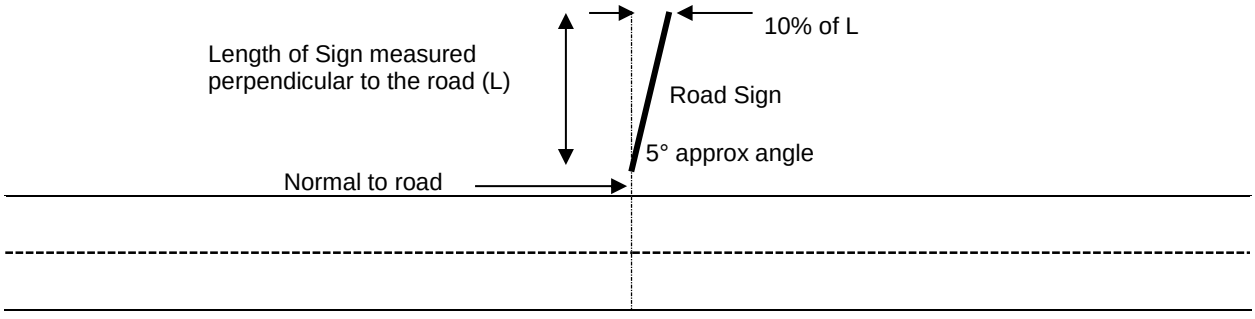


FIGURE 4.5 - ANGLE OF SIGN ALONG STRAIGHT ROAD

5. INSTALLATION OF SIGN SUPPORTS

5.1 General

The Contractor must ensure that the footings do not interfere with any existing Utility Services and the clearance requirements of the Service Authority are complied with.

Footing concrete must be Grade N20 unless specified otherwise in the post manufacturer's installation guidelines. Unless approved otherwise, the Contractor must remove spoil from the site.

5.2 Footing Spikes

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

5.3 Sleeves

Breakaway and frangible supports must be inserted into sleeved footings to enable replacement of damaged supports without affecting the footing.

Where aluminium sleeves are to be placed into concrete surrounded with soils of a highly acidic or alkaline nature, the following treatment must 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 must be applied prior to transportation of sign post to the point of installation.

The Contractor must remove loose debris prior to pouring footing concrete. Steel sleeves must be placed full depth into the pavement with a protrusion of 20 mm above the surrounding surface. Aluminium sleeves must 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 must be determined in consultation with the Principal.
Footing holes must be back filled with poured concrete which must be compacted for the full depth of the footing. Signs must not be attached to supports for a minimum of 24 hours after concrete is poured.

5.4 Rectangular Hollow Section Supports

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

5.5 Steel Circular Hollow Section Supports

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

5.6 Breakaway Supports and Frangible Supports

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

6. INSTALLATION OF SIGNS

6.1 General

Signs must be erected in accordance with the work method approved under the manufacturer's warranty provisions of Part R48 "Supply of Signs". Where signs are to be installed on new works, the signs must be installed prior to traffic using the new configuration.

6.2 Height of Signs

Signs must be erected such that the lowest edge of the main sign plate is in accordance with the heights shown in Attachment R49E. The post must not protrude above the top edge of a sign.

If multiple signs are installed, the gap between each plate must be 50 mm -150 mm.

6.3 Fixing

All fittings must be hot dipped galvanised to 125 g/m^2 in accordance with AS 4680.

Signs must be attached to one or more supports by either:

(a) bolting directly to the support;

(b) by means of Unistrut clamps; or

(c) galvanised steel straps to existing furniture.

Unbraced signs must be attached to Rectangular Hollow Section supports by using galvanised bolts, washers and vandal proof nuts. Braced signs must be attached using galvanised steel clamps compatible with the bracing system, using galvanised bolts, washers and vandal proof nuts.

Signs must not be attached to frangible or slip base light poles. All signs affixed to the post i.e. metal or non-metallic must not create a punching through effect and must not be affected by wind vibration. Signs attached to other street furniture by means of galvanised steel straps must not damage the support.

6.4 Covering

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

6.5 Cleaning

Cleaning of the sign must not damage the sign face or legend.

7. RECORDS

The Contractor must maintain a record of each sign installed, which must include the following (where relevant):

(a) Road Number;

(b) Maintenance Marker Point (MMP);

(c) Offset from closest travel lane;

(d) Sign Type;

(e) TES Drawing Number;

(f) Date Installed; and

(g) Sign Support Type.

The Contractor must provide records confirming that both legends and background of supplied signs comply with the new material requirements of AS 1906.1

8. HOLD POINTS

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

CLAUSE REF.	HOLD POINT	RESPONSE TIME
2.1	Submission of the certificate of compliance to AS 1163 or AS 1450	2 days
2.4	Submission of alternative design for a frangible post	21 days
5.2	Proposal for alternative sleeve footing	2 days

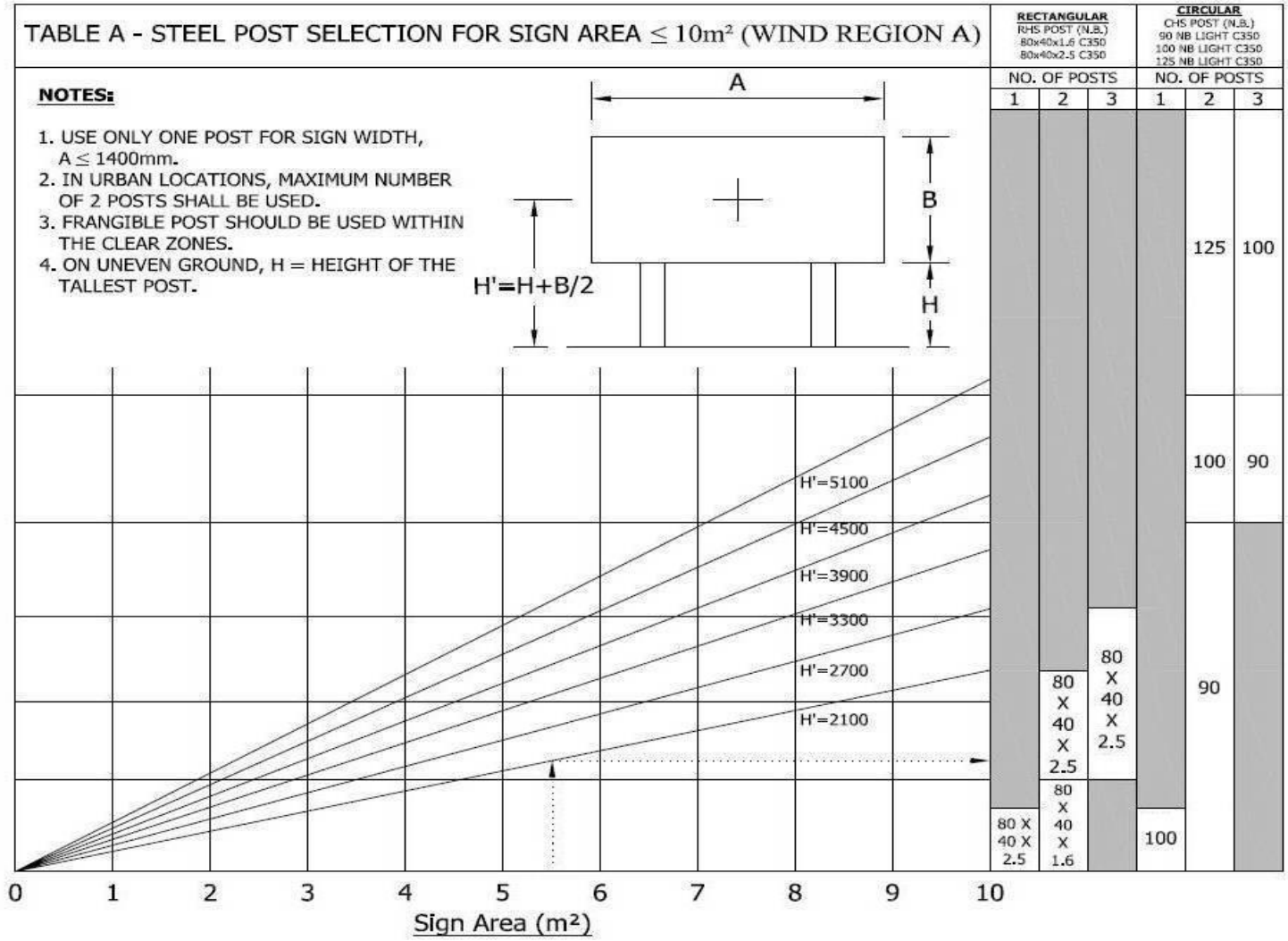
9. VERIFICATION REQUIREMENTS AND RECORDS

The Contractor must supply the following records:

CLAUSE REF.	SUBJECT	RECORD TO BE PROVIDED
6.	Installation records	Details of installation
6.	Retroreflective sheeting	Evidence of compliance with AS 1906.1
Refer Part R48	Sign manufacturers warranty	Retro reflective warranty

ATTACHMENT R49A

STEEL POST SELECTION



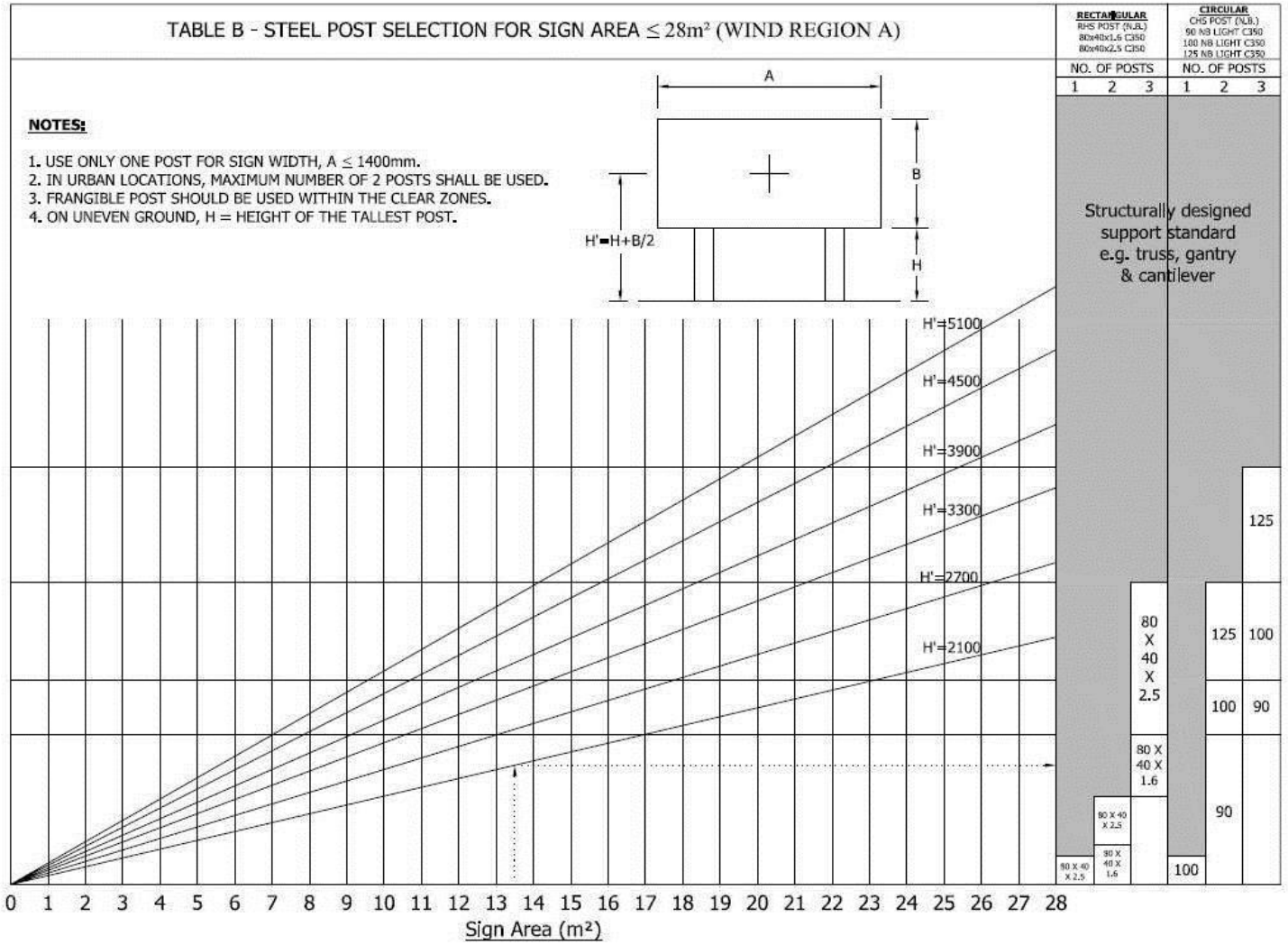


TABLE B - STEEL POST SELECTION FOR SIGN AREA ≤ 28m² (WIND REGION A)
NOTES:
1. USE ONLY ONE POST FOR SIGN WIDTH, A ≤ 1400mm.
2. IN URBAN LOCATIONS, MAXIMUM NUMBER OF 2 POSTS SHALL BE USED.
3. FRANGIBLE POST SHOULD BE USED WITHIN THE CLEAR ZONES.
4. ON UNEVEN GROUND, H = HEIGHT OF THE TALLEST POST.
A
B
H
H'=H+B/2
H'=5100
H'=4500
H'=3900
H'=3300
H'=2700
H'=2100
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
Sign Area (m²)
RECTANGULAR
RHS POST (N.B.)
80x40x1.6 C350
80x40x2.5 C350
NO. OF POSTS
1 2 3
CIRCULAR
CHS POST (N.B.)
90 NB LIGHT C350
100 NB LIGHT C350
125 NB LIGHT C350
NO. OF POSTS
1 2 3
Structurally designed support standard e.g. truss, gantry & cantilever
80 X 40 X 2.5
80 X 40 X 1.6
90 X 40 X 2.5
80 X 40 X 1.6
125
125 100
100 90
90
100

ATTACHMENT R49B: 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
Determine Sign Size Dimensions: Width: A Height: B	Any Contract Specific Drawings; AS 1742.2
↓	
Determine Clear Zone	Clause 4.2 Austroads Guide to Road Design Part 6:Roadside Design, Safety & Barriers
↓	
Determine Lateral Clearance	Any Contract Specific Drawings; Clause 4.2 Attachment R49E Appendix D of AS 1742.2
↓	
Determine Frangibility Requirement	Clauses 2, 3 and 4
↓	
Determine Sign Vertical Clearance Sign Ground Height: H	Clause 4.4 Attachment R49E
↓	
Calculate for Selection of Sign Post & Number Sign area = A x B H`= H + B/2 If sign area > 28m^2, refer to Structural Engineer	Attachment R49A
↓	
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.	Attachment R49A or Manufacturer's Installation Guidelines
↓	
Determine Support Spacing	Clause 3.4
↓	
Order & Install	Clauses 4 and 5

ATTACHMENT R49C

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 attachments to this Part or to the post manufactures guidelines.

i.e. *Sign area* $= A \times B$
$= 3.75 \times 2.10$
$= 7.90\ m^2$

Height from ground level to centre of sign,
H' $= H + B/2$
$= 2 + 2.10/2$
$= 3.05\ m$

Since the sign width A, is greater than 1.40 m, a minimum of two supports should be used. An example from the manufactures guideline, the number of posts required can be either one of the followings:

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

Aluminium CHS Frangible Posts (Determined from Manufacture 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*60/100 = 2.25 m between posts and 3.75*20/100 = 0.75 m overhang*
*For 3 supports - 3.75*35/100 = 1.31 m between posts and 3.75*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.

ATTACHMENT R49D

STEEL SIGN SUPPORT – HOLE SPACING

Rectangular Hollow Section Post Drilling Pattern (all dimensions in mm)

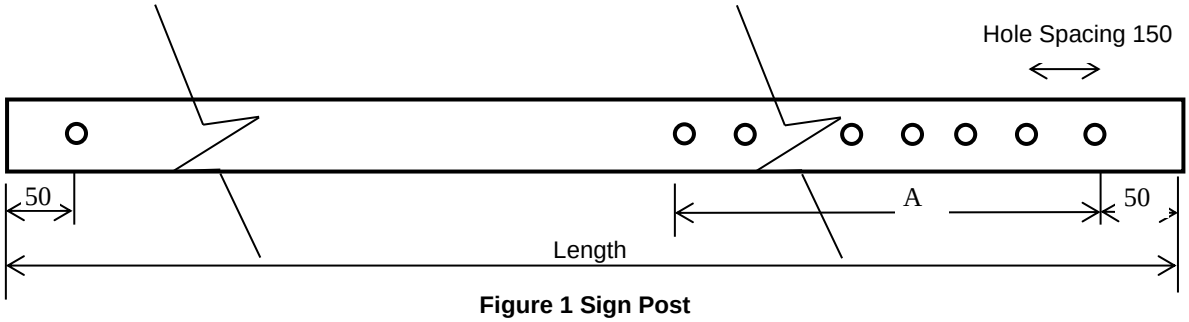


Figure 1 Sign Post

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

Extra holes may be drilled for special installations subject to approval from the Principal.

Maximum length of a Rectangular Hollow Section post is 4.2 m, unless certified by a Structural Engineer and approved by the Principal.

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