

Sign Posts and Supports

To address various signing needs and agency preferences, several types of supports are available. Small signs (less than 50 square feet) are commonly supported with either wood or steel posts. When available and with permission, small signs also can be mounted on existing utility or roadway light poles. Larger signs (greater than 50 square feet) may be mounted on specially designed steel or aluminum structures such as trusses, bridges, or cantilevered supports.

Small Sign Supports

Small sign supports most generally are either wood or steel. Wood posts are available in standard sizes of 4x4, 4x6, and larger. Box beams of laminated plywood are available to support larger signs. Major types of steel sign posts for small signs include U-channel, round pipes, and square tube.

Posts for small signs are installed by direct driving, drilling and backfilling, or setting in a concrete foundation. In soft or sandy soils, use

of soil-bearing plates or concrete footings may be required to hold the sign in a stable position.

All sign supports located within the clear zone* of the road or street must meet acceptable breakaway standards. Small sign steel supports described above and 4x4 wood posts generally meet breakaway standards when installed in “normal soil” conditions and may be used within the clear zone without barrier protection. When soil-bearing plates or special foundations are needed in sandy or marshy soils, it is advised that you consult with the Department of Transportation or Federal Highway Administration. Breakaway criteria adopted by the FHWA assume a 7-foot path width for vehicles. (It is assumed that all posts less than 7 feet apart would be impacted simultaneously.) The table “Common sign posts,” on the following page, lists the number of posts of various types and sizes that can be installed within a 7-foot width and still meet breakaway requirements.

* Clear zone is an unobstructed area adjacent to the traveled way that is provided to enable an errant driver to return to the road or stop without potential for a serious crash. Criteria for determining clear zone width are contained in AASHTO’s *Roadside Design Guide*.

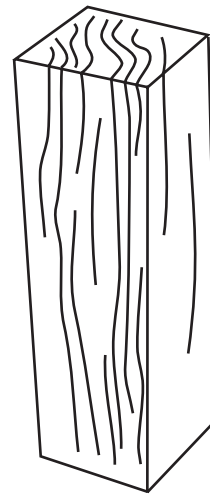
Common Sign Posts¹	
Description	Maximum in 7-foot path
Wood Posts, Southern Yellow Pine²	
4" x 4", direct burial	2
4" x 4" with two 1" holes, in 24" diameter, 30" deep concrete foundation	2
4" x 6" with two 1.5" holes, direct burial	2
4" x 6" in 18" diameter, 30" deep concrete foundation	1
4" x 6" with two 1.5" holes, in 24" diameter, 30" deep concrete foundation	2
6" x 6" with two 2" holes, in 24" diameter, 30" deep concrete foundation	1
6" x 8" with two 3" holes, in 24" diameter, 30" deep concrete foundation	1
U-Channel, 80 ksi Steel (Marion Steel)	
3-ppf and less, direct burial	2
3-ppf and less with 6" splice and two grade 9 bolts and spacers on 4" centers	3
4-ppf and less with 6" splice and two grade 9 bolts and spacers on 4" centers	2
Steel Square Tube, 33 ksi (Unistrut Corp.)	
1.75" square in a 2" square 12-gauge (Ga.) anchor	3
2.0" square and smaller, 12-gauge post in the next larger size anchor	2
2.5" square and smaller, 10-gauge post in the next larger size anchor	1
2.5" square and smaller, 10-gauge post with triangular slip base	3
Steel Square Tube, A570, 12 or 14 gauge (Allied Tube)	
2" square and smaller 14 gauge in a 12-gauge anchor	2
2.25" square 14-gauge post in a 12-gauge anchor	1
Slip Base	
S7 x 15.3 steel posts, inclined slip base, and concrete foundation	1
8" x 4" x 3/16" thick steel tube, inclined slip base, and concrete foundation	1
W6 x 12 steel post, omni-direction slip base, and concrete foundation	1
Breakaway Couplings (Transpo Industries, Inc.)	
45-ppf and less, and a weight of 600 pounds below the hinges	1
18-ppf and less, and a total weight of 600 pounds below the hinges	2

¹ In "standard" soil or in concrete as noted. Contact the manufacturer for other soil types and for installation details.

² Holes in wooden posts are drilled on the center line of the sides of the posts, perpendicular to the direction of adjacent traffic at heights of 4 and 18 inches above the ground. See the illustration "Typical breakaway modification for wood sign posts" on page C14.5.

Source: Arthur Breneman

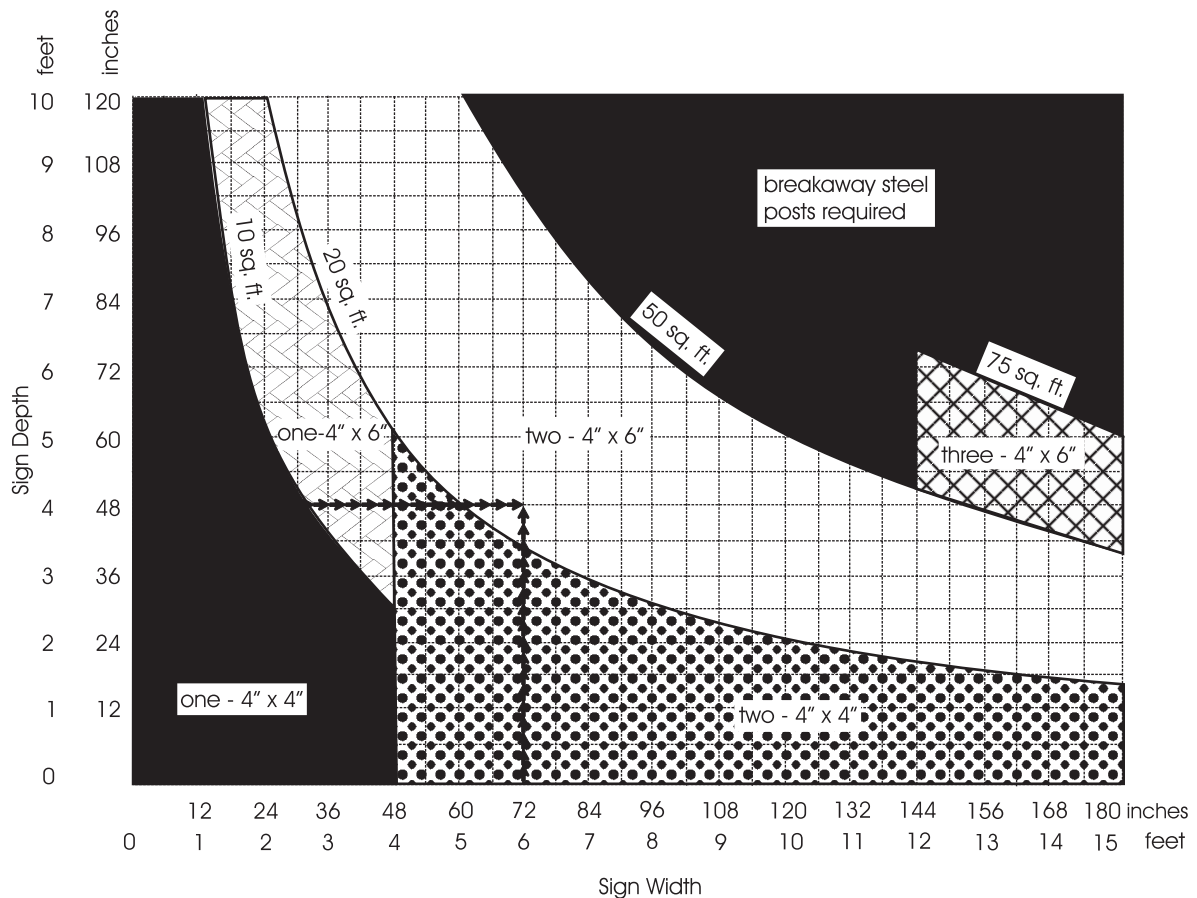
Wood Posts. Wood posts are most commonly 4x4, available in lengths from 10 to 14 feet and 4x6, usually in lengths of 16 to 24 feet. The length of the post is dictated by elevation of the selected location in relation to road surface and desired embedment (usually recommended at approximately 4 feet). To select the proper size and number of wood posts for a given sign, refer to the diagram, "Determination of sign post size and number," at the bottom of this page.



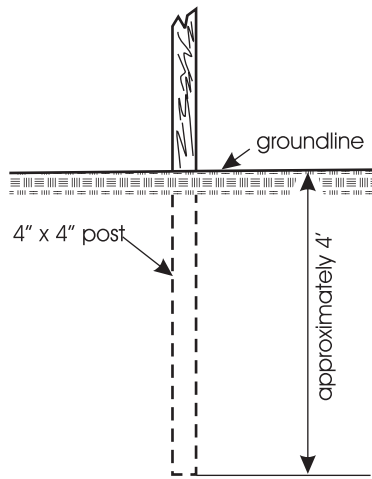
Wood post

In addition, these dimensions can be used as a guide to select the size and number of wood posts:

<u>Sign Area</u>	<u>Post Number and Size</u>
less than 10 sq. feet	one or two 4x4s
10-20 sq. feet	one 4x6 or two 4x4s
20-50 sq. feet	two 4x6s
50-75 sq. feet	three 4x6s or steel
greater than 75 sq. feet	steel posts

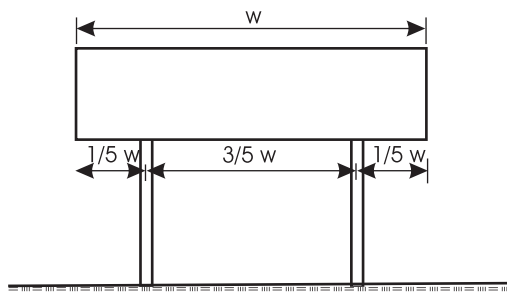


Determination of sign post size and number

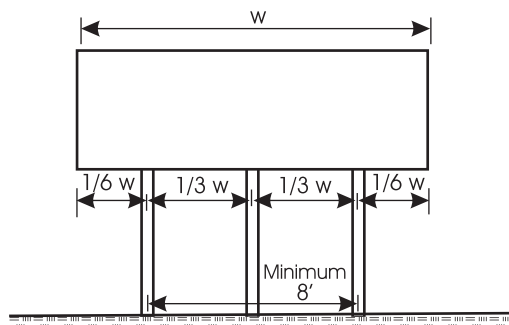


Suggested sign post installation

For stability considerations, a maximum width of 4 feet is recommended for signs to be mounted on a single post. The recommended minimum sign width for a three-post assembly is 12 feet to avoid having two posts within the path of an errant vehicle. Refer to the following diagrams for suggested two- and three-post mounting configurations.

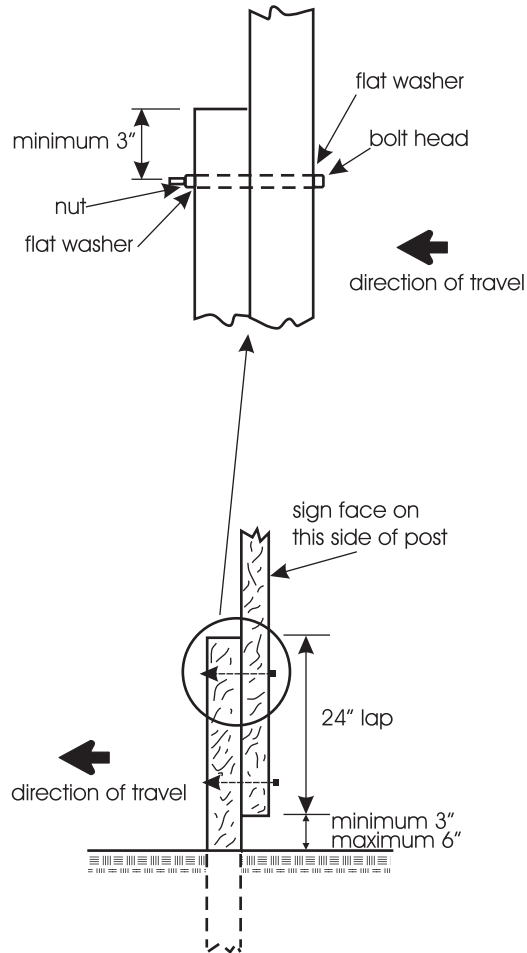


Typical two-post assembly



Typical three-post assembly

In special situations, wood posts may need to be spliced. Refer to the following diagram, “Post Splicing Details,” for splicing detail suggestions. Splices should be made just above the groundline to allow breakaway features to function properly. No part of the splice should be below ground elevation.



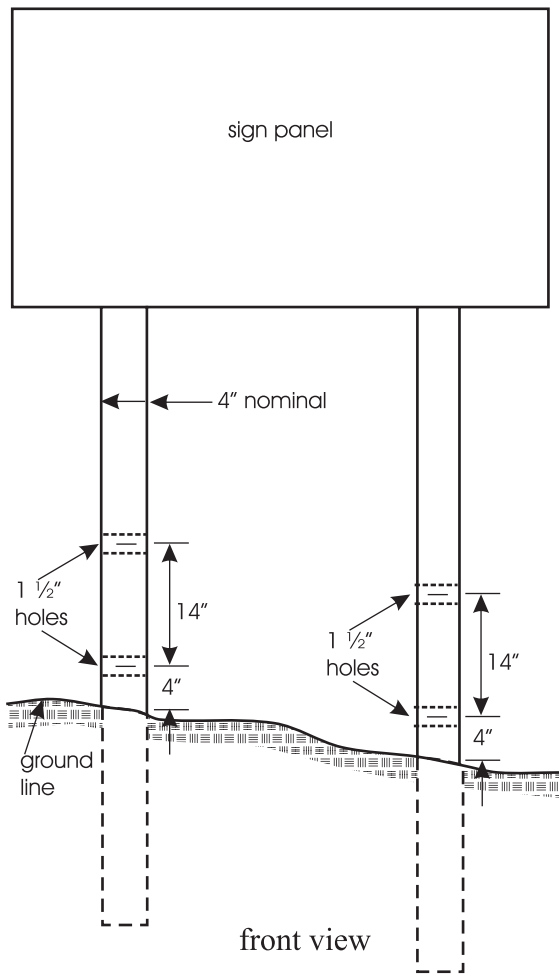
Post-splicing details

Notes:

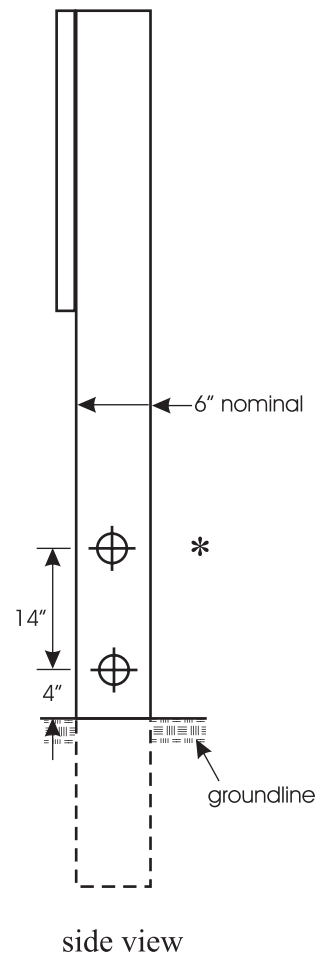
Posts for smaller signs with less than 10 square feet of area should be installed with approximately 4 feet below the ground surface. For larger signs and longer post lengths, the portion below the ground surface should be a minimum of 5 feet. Post holes should be backfilled with suitable soil tamped in place. In cases where the soil is unsuitable, crushed rock or crushed concrete should be used. Care should be taken in the process to see that the posts are plumb, insofar as possible, at all times. If properly placed, posts should remain firmly in position without needing further attention.

All wood posts 4x6 or larger must be modified to meet breakaway requirements if located within the clear zone. This modification can be achieved by drilling two holes near the bottom of the post as shown in the following figure.

All wood posts for permanent mounting should be pressure-treated for maximum service life.



Typical modification for wood sign posts



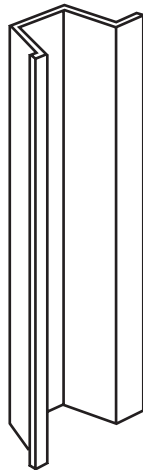
* Hole size for larger posts:
 6" x 6" - 2" diameter
 6" x 8" - 3" diameter

**Typical breakaway modification
 for wood sign posts
 (4 in. x 6 in.)**

Note:
 All 4x6 inch posts shall be modified by having two 1 1/2 inch diameter holes drilled perpendicular to the roadway center line.

Steel Posts. Steel posts for small signs are available in U-channel, round pipe, and square tube form.

U-channel posts are preferred in many cities because of the light weight, direct-driving feature, and low initial cost. U-channels generally exhibit lower loading capacities than other steel designs and do not permit signs to be mounted at right angles on a common post. Signs on U-channel posts may vibrate in the wind, causing rotation or loosening from the ground support. Use of soil-bearing plates may be necessary to stabilize some signs. These posts also can be installed back-to-back for greater stability. The posts may be spliced for more efficient use. A major manufacturer of U-channel posts is Marion Steel.

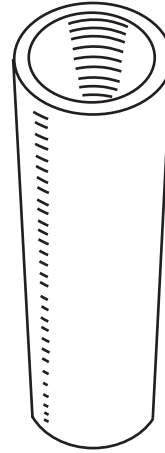


Steel U-channel post

The following posts are recommended for various sign dimensions:

<u>Sign Size</u>	<u>Post Weight</u>
18" x 24"	2 lbs./ft
30" x 30"	3 lbs./ft
36" x 48"	2 posts at 2 lbs./ft

Round pipes and newer, modified shapes have been used successfully for small sign supports in many jurisdictions. These pipes are also light and can be driven directly or placed in concrete footings. A threaded coupling also can be used as a breakaway feature and a more efficient replacement. Round pipes are somewhat more stable than U-channel posts and permit sign mounting at any angle.

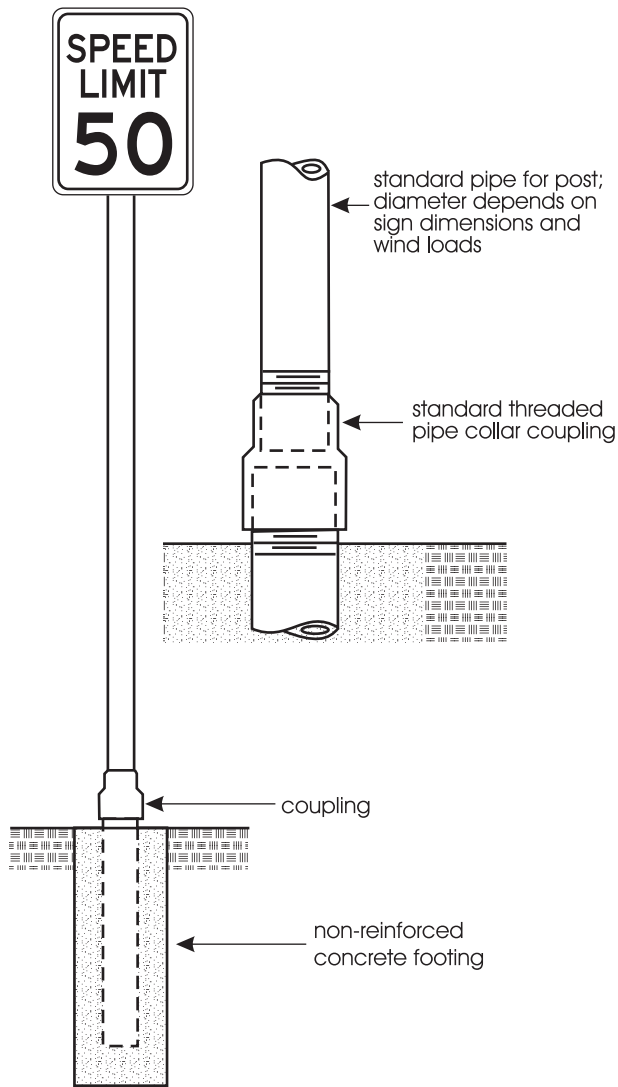


Steel pipe post

Standard galvanized, schedule 40 steel pipe is often specified. Steel posts can be driven directly into the ground to a depth of at least 3.5 feet. However, these posts may not meet current breakaway standards, and this feature should be considered before installation. Steel plates attached to the posts add stability in windy conditions. Recommended post sizes follow:

<u>Sign Size</u>	<u>Post Size</u>
30" x 30"	2" I.D.
36" x 48"	2.5" I.D.

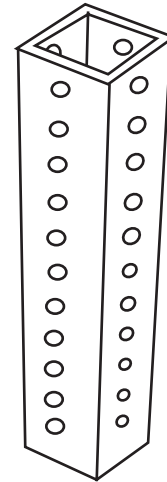
S-Square Tube Products of Commerce City, Colorado, is one manufacturer of this type of post. An example of round pipe supports and the threaded coupling breakaway feature can be seen on the following page.



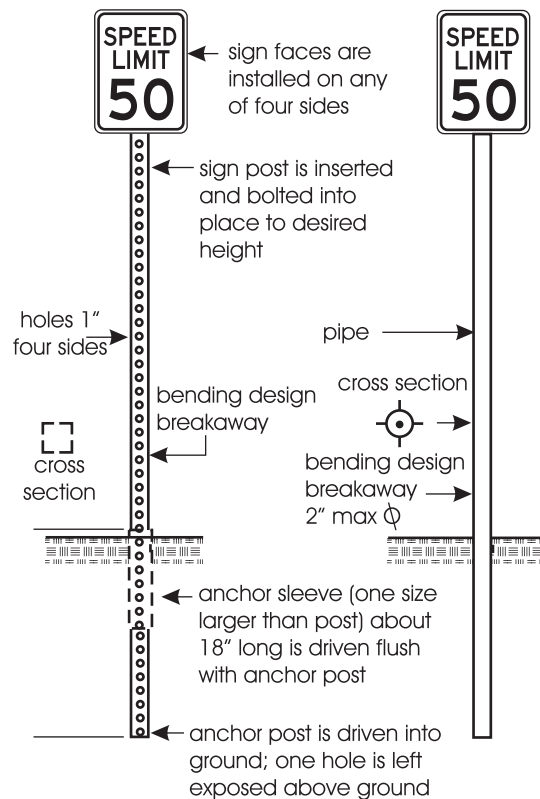
Round pipe sign support system and threaded coupling breakaway feature (inset)

Square tube posts for small sign supports are becoming more popular in both rural and urban applications. Typically, these posts are furnished with mounting holes prepunched at 1-inch spacings. Common sizes range from 1 1/2 inches to 2 1/2 inches in either 12 or 14 gauge. These supports can be driven directly or installed in a larger-sized anchor post, which makes replacement much easier. Advantages of square tube posts include flexible mounting and use options, increased strength compared to U-channel posts, option to mount on any side, and simple replacement. Damaged posts also can be recycled efficiently. Furthermore, special hard-

ware is available to increase flexibility. However, the cost of square tube posts is generally higher than U-channel. Whenever installing patented support systems, users should refer to manufacturer instructions.



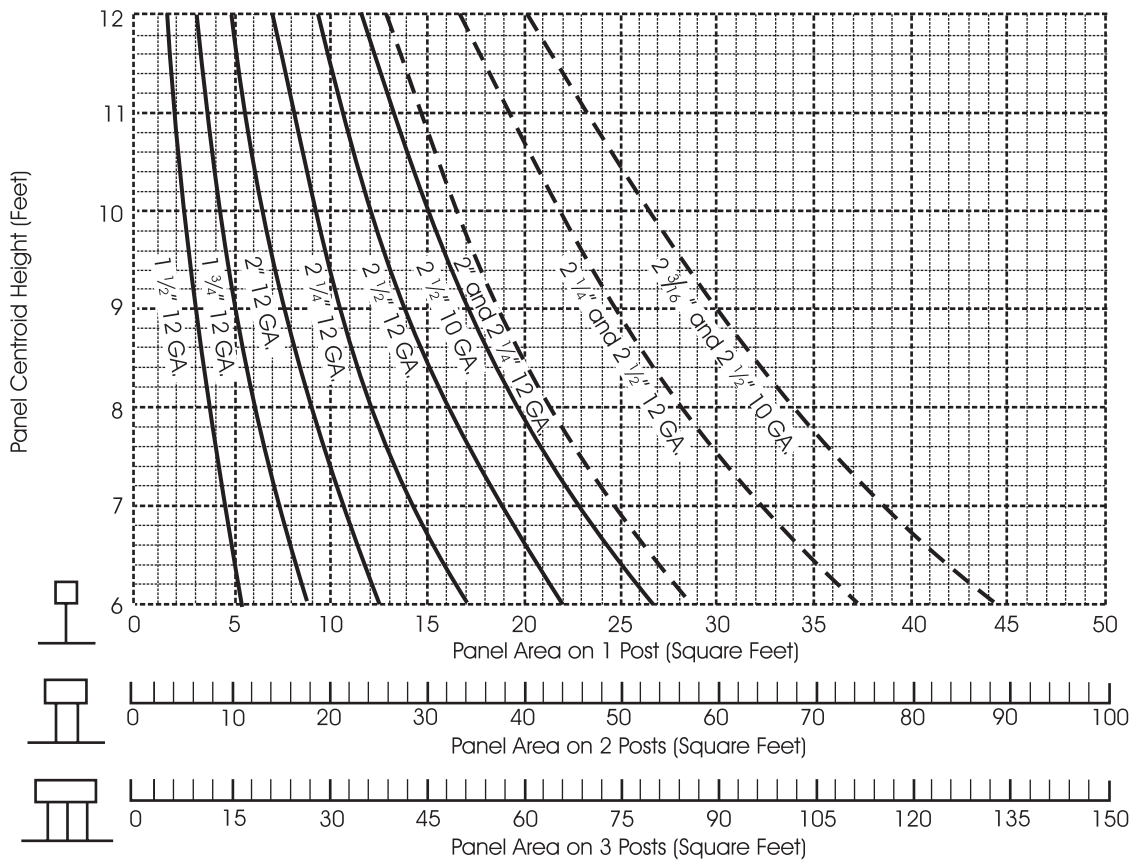
Square steel tube



Sign support systems

The following figures and tables provide guidance in selecting post size for various sign dimensions. Additional information is available

from vendors. Major manufacturers of square tube posts include Unistrut, S-Square Tube Products, and Western Highway Products.

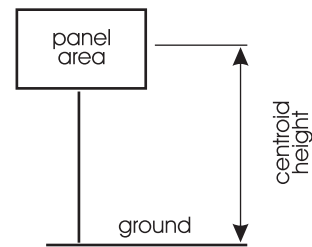


At intersection of panel area and centroid height on the chart, select post size from the line to the immediate right of the point.

Slip bases are required on the following:

- all posts with two sizes telescoped
- two-post supports 2 1/4" and larger
- all three-post supports

Lines plotted using design information in AASHTO specifications for supports for highway signs.



Telespar sign post chart (70 mph wind speed) for square tube posts

Source: Unistrut.

12-gauge perforated square posts¹

Sign Size (inches) Width x Height	Height to Bottom of Sign (feet)					
	5	6	7	8	9	10
12 x 12	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
12 x 18	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
12 x 24	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4
12 x 30	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4
12 x 36	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4
12 x 48	1 1/2	1 3/4	1 3/4	1 3/4	2	2
18 x 12	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
18 x 18	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4
18 x 24	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4
18 x 30	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2
18 x 36	1 1/2	1 3/4	1 3/4	2	2	2
18 x 48	1 3/4	2	2	2	2 1/4	2 1/4
24 x 12	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
24 x 18	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4
24 x 24	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2
24 x 30	1 1/2	1 3/4	1 3/4	2	2	2
24 x 36	1 3/4	1 3/4	2	2	2 1/4	2 1/4
24 x 48	2	2	2 1/4	2 1/4	2 1/2	2 1/2
30 x 12	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4
30 x 18	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	2
30 x 24	1 1/2	1 3/4	1 3/4	1 3/4	2	2
30 x 30	1 3/4	1 3/4	2	2	2	2 1/4
30 x 36	1 3/4	2	2	2 1/4	2 1/4	2 1/2
30 x 48	2	2 1/4	2 1/4	2 1/2	2 1/2	A
36 x 12	1 1/2	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4
36 x 18	1 1/2	1 3/4	1 3/4	1 3/4	2	2
36 x 24	1 3/4	1 3/4	2	2	2	2 1/4
36 x 30	1 3/4	2	2	2 1/4	2 1/4	2 1/4
36 x 36	2	2	2 1/4	2 1/4	2 1/2	2 1/2
36 x 48	2 1/4	2 1/4	2 1/2	A	A	B
42 x 12	1 1/2	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4
42 x 18	1 1/2	1 3/4	1 3/4	2	2	2
42 x 24	1 3/4	2	2	2	2 1/4	2 1/4
42 x 30	2	2	2 1/4	2 1/4	2 1/2	1 1/2
42 x 36	2	2 1/4	2 1/4	2 1/2	2 1/2	A
42 x 48	2 1/4	2 1/2	A	A	B	C
48 x 12	1 1/2	1 1/2	1 3/4	1 3/4	1 3/4	2
48 x 18	1 3/4	1 3/4	1 3/4	2	2	2 1/4
48 x 24	1 3/4	2	2	2 1/4	2 1/4	2 1/2
48 x 30	2	2 1/4	2 1/4	2 1/2	2 1/2	A
48 x 36	2 1/4	2 1/4	2 1/2	2 1/2	A	A
48 x 48	2 1/2	2 1/2	A	B	C	C

Note: All posts are 12 gauge, except as noted below.

A – 2 1/2 square tube, 10 gauge perforated.

B – combine 2 and 2 1/4 tubes, 12 gauge with slip base.

C – Combine 2 1/4 and 2 1/2 tubes, 12 gauge with slip base.

D – Combine 2 3/16 and 2 1/2 tubes. 10 gauge with slip base.

Design specification: Standard specification for structural supports for highway signs, luminaires, and traffic signals.

¹Single posts; wind speed 70 mph.

Source: Unistrut.

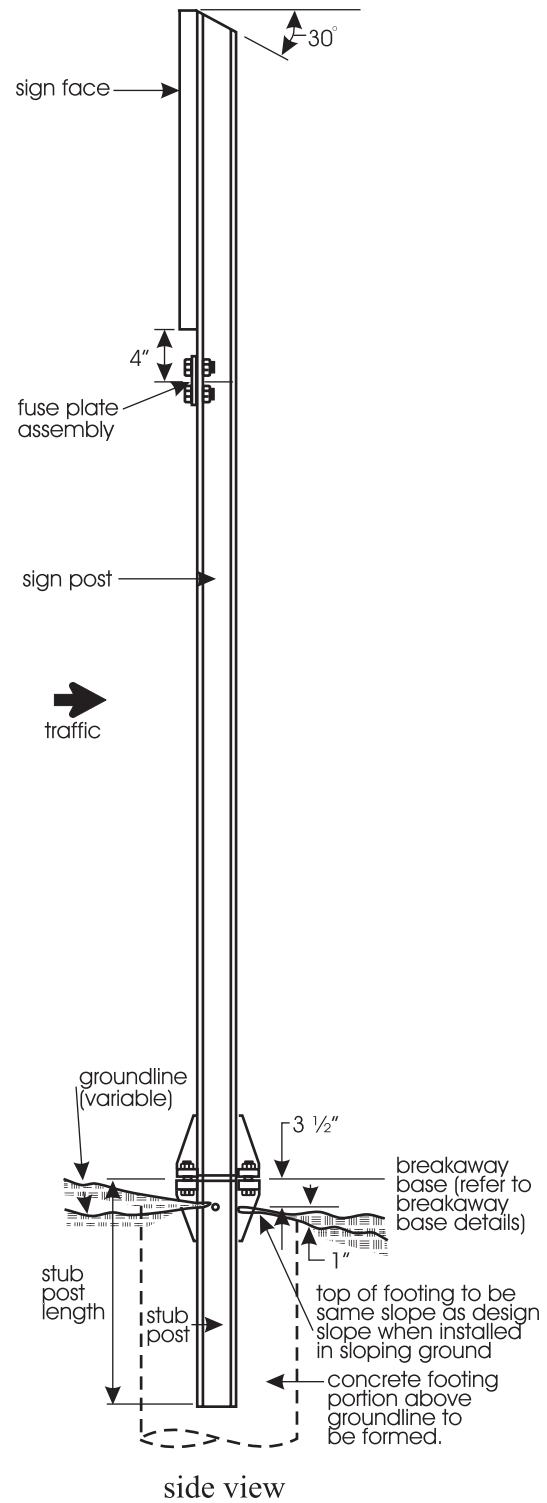
Additional Small Sign Considerations. To save installation and material costs and to minimize sidewalk obstruction, consider alternate mounting on existing supports such as utility poles, roadway light poles, and signal poles. Overhead span wires may also be appropriate in special situations. When considering alternate mounting, bear in mind that permission from the pole owner is needed, and visibility to motorists should be paramount.

Any sign support system should be durable and structurally adequate to endure wind and ice loadings. Also look for characteristics such as relatively low material and maintenance costs, ease of installation and replacement, availability, crashworthiness, and visual aesthetics.

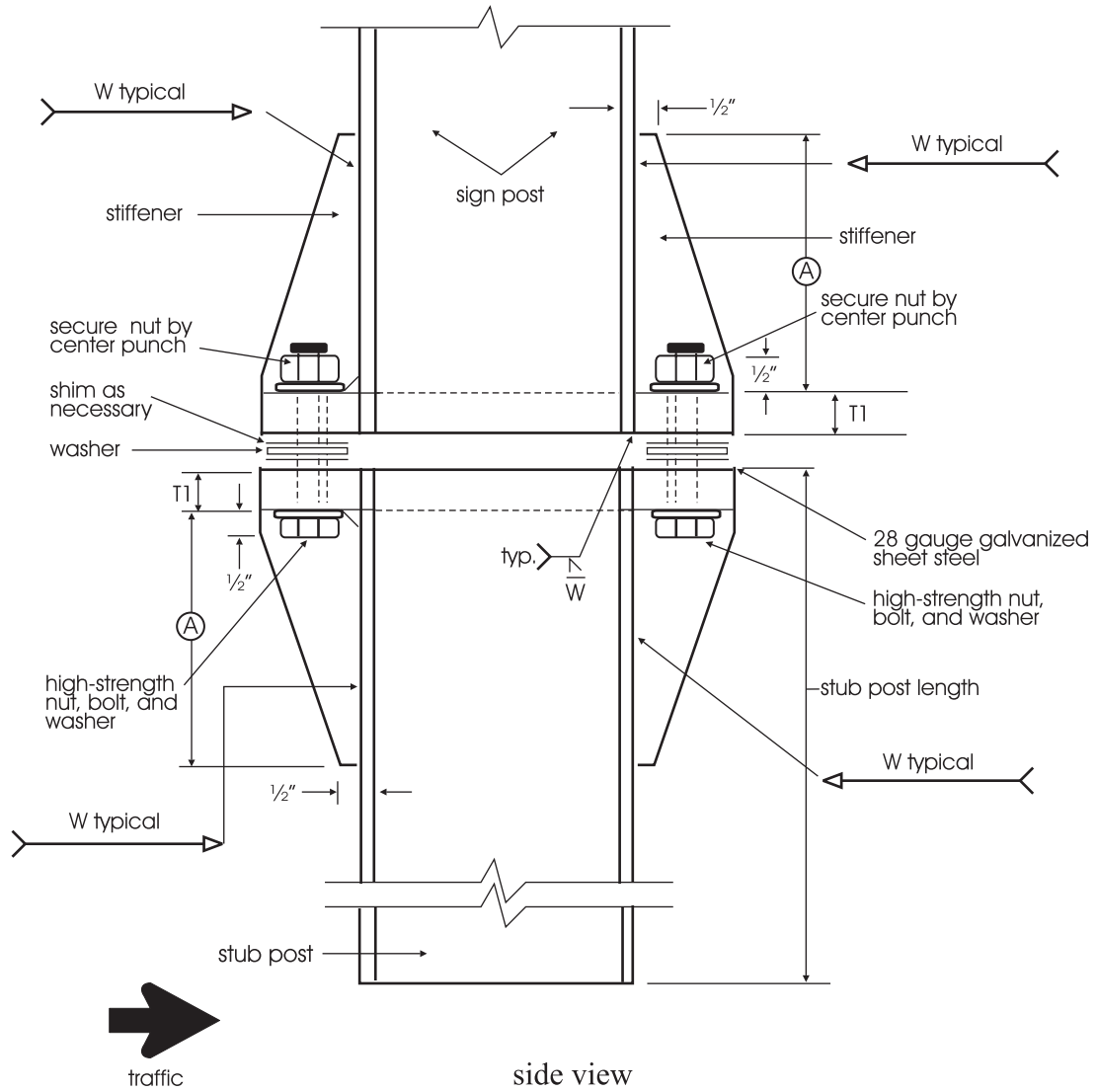
Large Sign Supports

Large signs (greater than approximately 50 square feet) are commonly supported with steel or aluminum posts fabricated from w-beams or s-sections and usually have several unique features. When located within the clear zone (see page C14.1 for a definition of clear zone), special breakaway designs must be used. The following figure illustrates a typical design for a large sign support. Additional advice and design information can be obtained from the Iowa Department of Transportation.

Other types of supports commonly used for large signs include cantilever and sign bridge overhead structures. Materials used for these structures include tapered steel tube, single steel tube and truss construction. Aluminum is another popular construction material.



Typical sign installation



(W) welds shall be continuous fillet welds and of a depth equal to the thickness of the flange for the post unless otherwise specified

Breakaway Base Data				
Post Size	Bolt Size and Torque	(A)	(T1)	(W)
W 6 x 9 W 6 x 12 W 6 x 15 W 8 x 18	$\frac{5}{8}$ " dia. x $2 \frac{3}{4}$ " Torque = $37 \frac{1}{2}$ ' lbs.	5"	$\frac{3}{4}$ "	$\frac{1}{4}$ "
W 8 x 21 W 10 x 22 W 10 x 26 W 12 x 26	$\frac{3}{4}$ " dia. x $3 \frac{1}{2}$ " Torque = $62 \frac{1}{2}$ ' lbs.	6"	1"	$\frac{5}{16}$ "

Breakaway base details