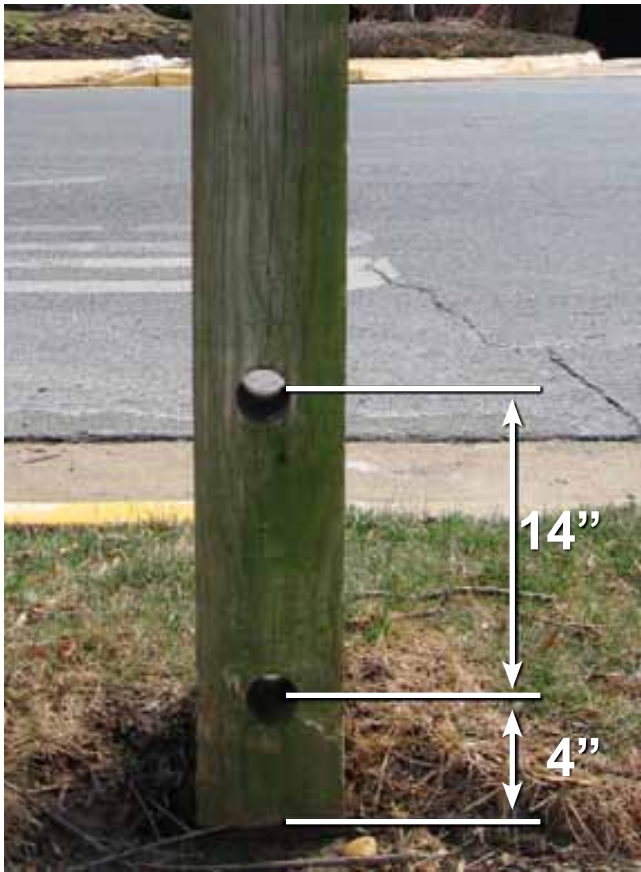


Wood vs. steel post

Foundation design. The key factor of the breakaway design occurs at the foundation of the post installation.

For a **wood post foundation**, a hole is dug in the ground, and a steel sleeve encased in concrete is constructed to form a pocket to a certain depth. The wood post is inserted and stabilized with steel shim plates, and holes are drilled near the base of the post perpendicular to the flow of traffic to provide a breaking point upon impact.



Wood post

To install a **steel post foundation** for a channel or a square shape, an anchor post is driven into the ground to a specific depth. The sign post is then attached to the specific height of the anchor that remains above the ground with spacers, nuts, and bolts. This design, in comparison to a wood post foundation, is less labor intensive and typically less expensive.

The advantage of a breakaway system is that a sign struck by a motorist can be quickly replaced. If a sign is hit, the damaged post is removed, and a new post is installed onto the existing anchor, which should remain undamaged after the



Channel post

impact. This system helps to take the guesswork out of where the sign was originally placed.

The number of posts. The number of posts required per sign is based on the surface area of the sign face and the mounting height (*refer to the charts in PennDOT Pub 111*). Most municipal sign installations require one steel post.

Square posts are often preferred over channel bar posts because they offer torsional strength in a single post installation, which is desirable in areas that experience high-wind loads. In contrast, signs that are 30 by 30 inches or larger require two 4-by-4-inch or two 4-by-6-inch wood posts.



Square post

PennDOT typically installs square steel tube posts for regulatory and warning signs on state roads. Although PennDOT chooses to use the square steel tube posts, municipalities can use either the U-channel or square steel tube post signs on locally owned roads.

Maintenance

Municipal road crews should make sure design guidelines for breakaway sign posts are followed any time they are installing a new sign, conducting routine maintenance, or checking the retroreflectivity of a group of signs. When conducting routine maintenance, inspect the sign posts to ensure they meet current standards and are properly installed.

A Sign Inspection Checklist is provided in the FHWA Maintenance of Signs and Sign Supports Guide (FHWA-SA-09-025). Following is an enhanced checklist that can be used in the field to provide a more conclusive inspection during routine maintenance:

When erecting and maintaining signs, careful consideration of the sign post is as important as the sign itself. Proper post installation can result in safer roads and quick maintenance whenever a sign post is struck or damaged.

Sign & Post Inspection Checklist	
Check the purpose and need of the sign:	
<input type="checkbox"/>	Is the sign needed?
<input type="checkbox"/>	Is the sign missing?
<input type="checkbox"/>	Is the sign portraying the correct message?
<input type="checkbox"/>	Is the sign in accordance with the MUTCD & Pub 236?
Check the position of the sign with respect to:	
<input type="checkbox"/>	Does the sign meet minimum lateral clearances from the travelway?
<input type="checkbox"/>	Is the sign positioned so that it will not be frequently hit?
<input type="checkbox"/>	Does the sign meet minimum height requirements above the ground?
<input type="checkbox"/>	Does the sign meet minimum longitudinal distances from other signs along the road?
<input type="checkbox"/>	Is the sign post outside of the clear zone?
Check the sign for visibility at the required distance:	
<input type="checkbox"/>	Is the sign blocked by vegetation?
<input type="checkbox"/>	Is the sign blocked by other signs?
<input type="checkbox"/>	Is the sign blocked by other?
Check the condition of the sheeting:	
<input type="checkbox"/>	Is the sign cracked or delaminated?
<input type="checkbox"/>	Is the sign faded or discolored?
<input type="checkbox"/>	Is there good contrast between colors?
<input type="checkbox"/>	Does the sign have good retroreflectivity?
<input type="checkbox"/>	Is the sign damaged or vandalized? (graffiti, bullet holes, etc.)
Check the condition and number of posts:	
<input type="checkbox"/>	Is the wood or steel sign post damaged or bent?
<input type="checkbox"/>	Is the correct number of posts installed per sign?
If the sign post is in the clear zone, check that it is of an approved breakaway design:	
<input type="checkbox"/>	Is the steel breakaway sign post designed properly with the correct overlap of the posts at the foundation?
<input type="checkbox"/>	Are holes drilled perpendicular to traffic in the wood posts?
<input type="checkbox"/>	Can you see shim plates at the base of the wood post at the ground level?
<input type="checkbox"/>	Are there unnecessary supports and braces that diminish the crashworthiness?
Check that the sign posts are stabilized in the ground:	
<input type="checkbox"/>	Are sign posts leaning?
<input type="checkbox"/>	Is there evidence of soil erosion?

SIGN POST SELECTION & MAINTENANCE

by Wendy Kelley, PE, Pennoni, Inc.

Selecting and maintaining proper sign posts and making sure they meet standards is just as important as maintaining the retroreflectivity of a sign face itself. A sign post can become a deadly hazard if it's struck by a motorist, so it is important to make sure posts are crashworthy if they are installed within the clear zone.

According to Section 2A.19 of the Manual on Uniform Traffic Control Devices (MUTCD), "Post-mounted signs and object marker supports shall be crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) if within the clear zone."

When is a breakaway post required?

The first step is to determine the clear zone and if any sign structures are located within it. PennDOT Pub 13 (DM2) defines the clear zone:

The total roadside border area, starting at the edge of the traveled way, available for safe use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a non-recoverable slope, and/or a clear run-out area. The width of the desirable clear zone is influenced by the traffic volume, the design speed, and embankment slope.

Curbs are not considered a roadside safety feature since they can be easily mounted by errant vehicles; therefore, their presence does not alter how a clear zone is measured. For local roads, clear zones typically range from 7 to 12 feet, depending on speed and volume.

If signs are installed within the clear zone as defined by PennDOT Pub 13 (DM2), the next step is to ensure they are installed on breakaway posts. Most local road signs are installed in the clear zone and must be on breakaway posts. Therefore, it is good practice to install **all** signs on breakaway posts to promote roadside safety.

What is a breakaway post?

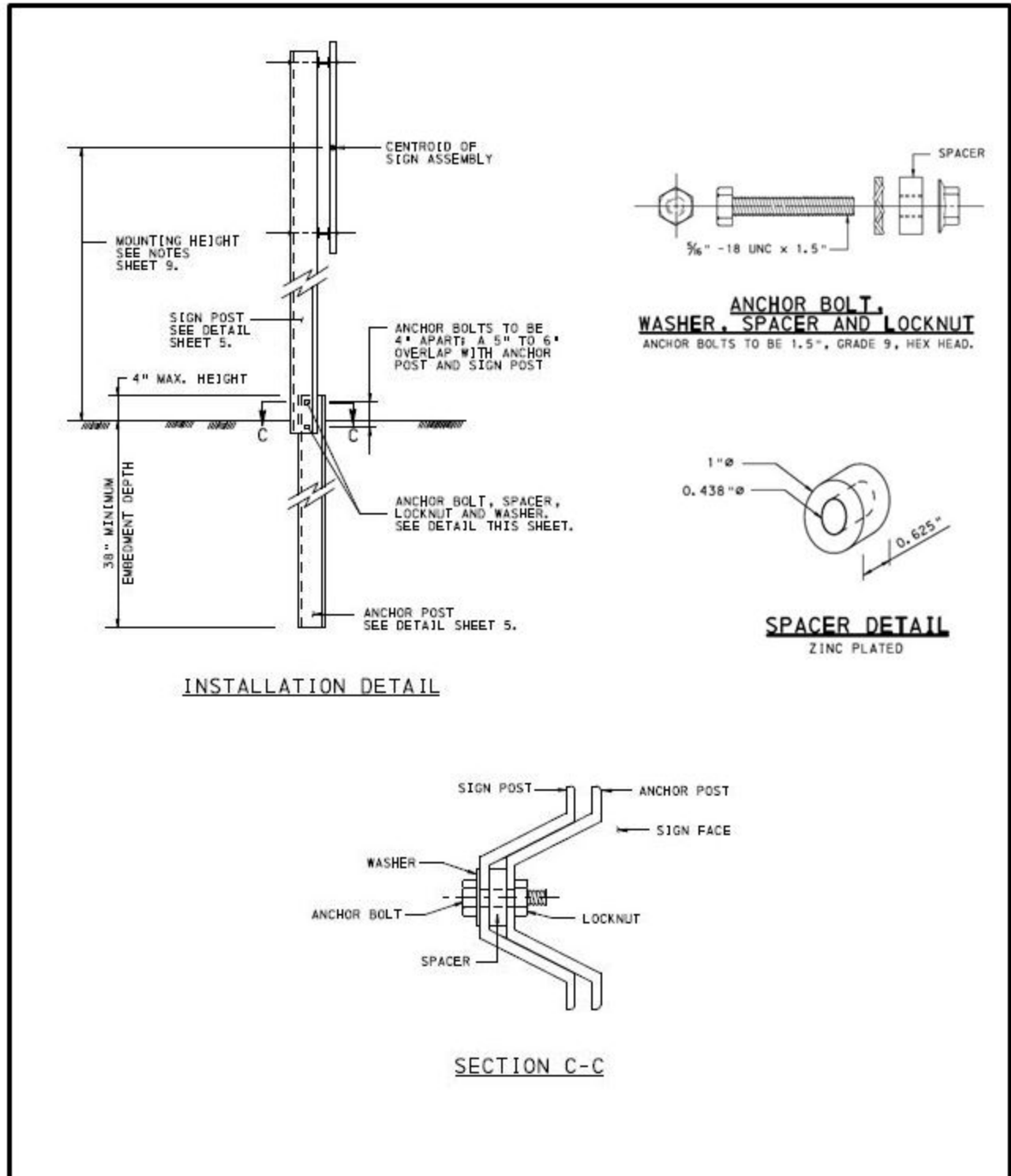
A breakaway post is a crash-tested sign support that, by design, will break or bend upon impact. When it breaks, it separates from the base and is bumped ahead or up and over the errant vehicle.

Posts typically used for roadside post-mounted signs on local roads in Pennsylvania are U-channel or square-tube steel (Type B) and wood (Type C). Breakaway designs of these three types of posts are included in PennDOT Publication 111, TC-8702B & TC-8702C. This tech sheet provides important details of each as a quick reference.

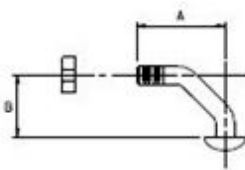
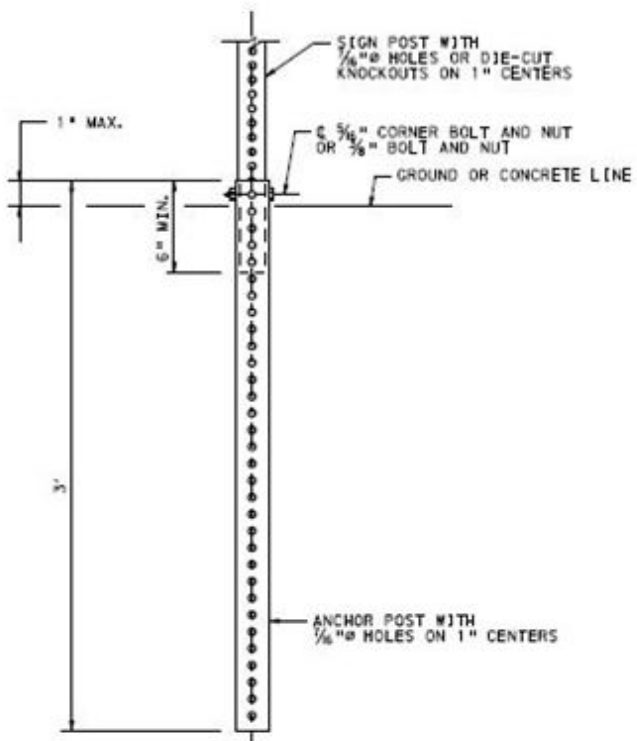


A breakaway post is a crash-tested sign support that, by design, will break or bend upon impact.

PennDOT Publication 111, TC-8702B & TC-8702C, provides charts and details on the breakaway designs of three types of posts: channel bar, steel square, and wood.

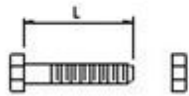


Channel Bar Post (Type B) Erection Details
TC-8702B



SIGN POST SIZE (INCHES)	DIMENSION (INCHES)	
	A	B
1.75	1.343	0.969
2.00	1.562	1.188

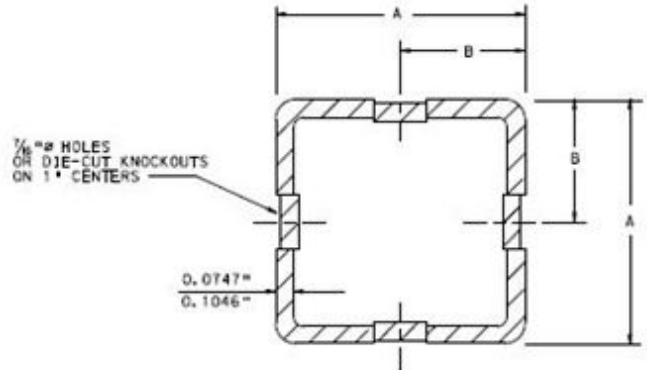
**5/16" - 18 UNC
CORNER BOLTS & NUTS**
CADMIUM PLATED STEEL,
ZINC PLATED STEEL OR
ALUMINUM



SIGN POST SIZE (INCHES)	DIMENSION L (INCHES)
	3.0

**3/8" - 16 UNC
ANCHOR BOLTS & NUTS**
CADMIUM PLATED STEEL,
ZINC PLATED STEEL OR
ALUMINUM

INSTALLATION DETAIL

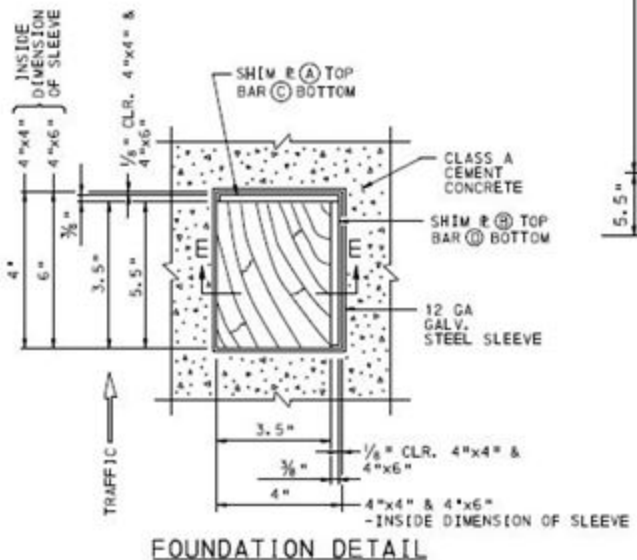
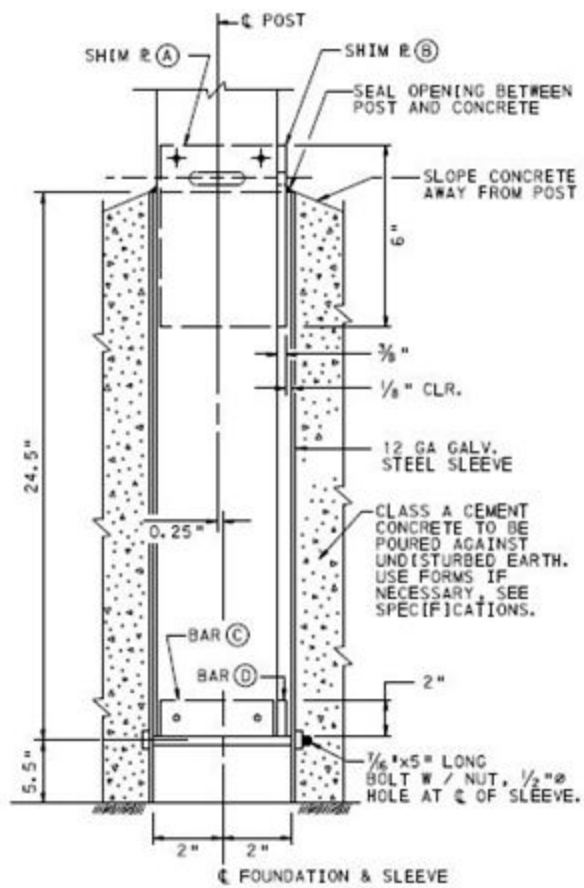
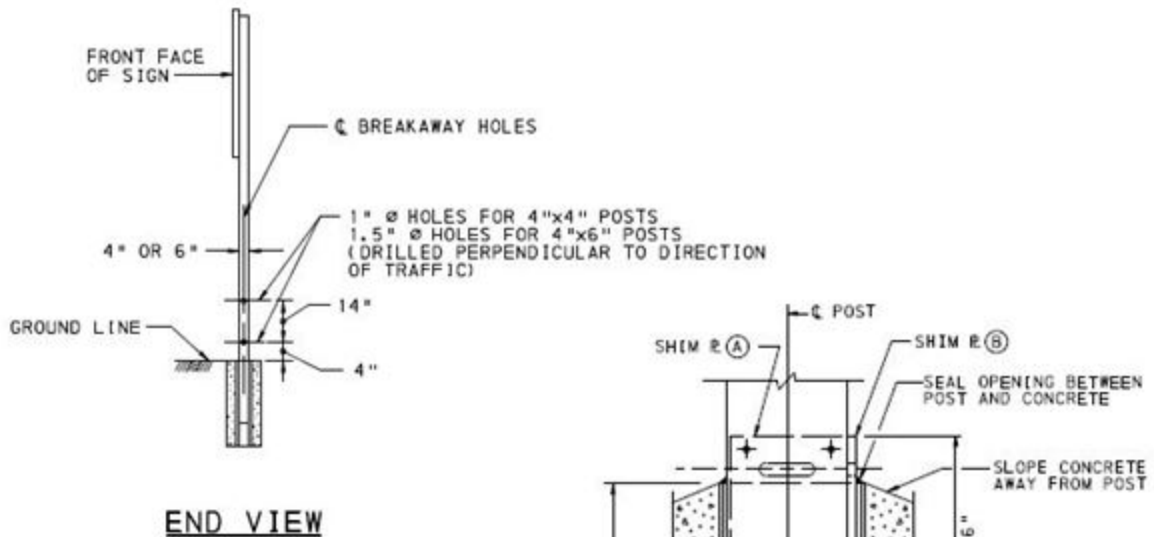


SIGN POST				ANCHOR POST				ANCHOR SLEEVE *				SPLICE SLEEVE			
SIZE	DIMENSION		THICK.	SIZE	DIMENSION		THICK.	SIZE	DIMENSION		THICK.	SIZE	DIMENSION		THICK.
	A	B			A	B			A	B			A	B	
1.75"	1.75"	0.875"	0.0747"	2.00"	2.00"	1.000"	0.1046"	2.25"	2.25"	1.125"	0.1046"	1.50"	1.50"	0.750"	0.0747"
2.00"	2.00"	1.000"	0.0747"	2.25"	2.25"	1.125"	0.1046"	2.50"	2.50"	1.250"	0.1046"	1.75"	1.75"	0.875"	0.0747"
2.25"	2.25"	1.125"	0.0747"	2.50"	2.50"	1.250"	0.1046"	3.00"	3.00"	1.500"	0.1875"	2.00"	2.00"	1.000"	0.0747"

* ONLY REQUIRED FOR INSTALLATIONS IN CONCRETE.

**SQUARE STEEL POSTS
SYSTEM A**

0.1046" AND 0.0747" - 60 KSI



**Wood Post (Type C) Erection Details
TC-8702C**