PennDOT LTAP
technical
INFORMATION
SHEET #212
SPRING 2021

BREAKAWAY SIGN POSTS

If not installed properly, sign posts can be hazardous to road users. To reduce the number of fixed object hazards on the roadside, post-mounted sign and object marker supports must be crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) if within the clear zone, according to Section 2A.19 of the *Manual on Uniform Traffic Control Devices* (MUTCD).

Municipalities must use crashworthy sign posts on all newly installed or replaced signs within the clear zone of their roadways. For local roads, this includes most traffic sign posts.

Clear Zone Concept

The clear zone concept is used to help minimize the number and severity of crashes involving vehicles running off the road and encountering fixed objects. The MUTCD refers to the clear zone as "the total roadside border area, starting at the edge of the traveled way, that is available for an errant driver to stop or regain control of a vehicle. This area might consist of a shoulder, a recoverable slope, and/or a non-recoverable, traversable slope with a clear run-out area at its toe."

Many variables are involved in determining the desired clear zone along a roadway, including design speed, side slope, and average daily traffic, but typical dimensions for low-speed, low-volume local roads are 7 to 10 feet.

Crashworthy Criteria

The MUTCD defines crashworthy as "a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the National Cooperative Highway Research Program (NCHRP) Report 350, *Recommended Procedures for the Safety Performance Evaluation of Highway Features.*"

In other words, sign posts must meet criteria established by the American Association of State Highway and Transportation Officials (AASHTO) and must have Federal Highway Administration (FHWA) approval of the system. The AASHTO *Manual for Assessing Safety Hardware* (MASH) has updated criteria from the NCHRP Report 350 and presents uniform guidelines for crash testing permanent and temporary highway safety features. MASH also recommends evaluation criteria to assess test results. For example, to be considered crashworthy, a sign post must be forgiving (as opposed to a rigid fixed object) and should not become a flying projectile when hit.

Only FHWA- and PennDOT-approved sign posts can be used in Pennsylvania. This is emphasized in Section 212.105 of Title 67 (Publication 212), which states, "Unless physically protected by guide rail or a barrier, or installed beyond the clear zone as defined in the *Department's Design Manual, Part 2* (Department Publication 13M), all sign posts must be of a Department-approved breakaway design as listed in the *Approved Construction Materials* (Department Publication 35) and in accordance with the *Signing and Marking Standards* (Department Publication 111)."

Breakaway Post Types

A typical breakaway post assembly consists of a sign support post, an anchoring post, and a breakaway component. A breakaway post is designed to lessen the impact to a vehicle if struck and thereby minimize injury to occupants and damage to vehicles.

The three types of breakaway posts identified in PennDOT Publication 111 are the steel square tube, the channel bar, and the wood post. Each of these types has benefits and limitations. A few factors to consider when selecting a post type are cost, location, durability, safety, maintenance, and aesthetics. These factors may influence a municipality to select one type over another.

The **square tube** offers several advantages, including the ability to mount signs on all four sides, greater loading capacity, and greater torsional strength. The steel square tube post costs about 5 to 10% more than the channel bar but provides more sign-mounting options.

The **channel bar** post has the lowest cost and is easy to install, making it the most common post on local roads. The disadvantage of the channel bar post is its lower loading capacity and the inability to mount signs at right angles on the same post.

Wood posts tend to have a higher cost, but they can support larger size signs and can provide a more natural feel in parks, recreational areas, and other environmentally friendly areas.

Installation

PennDOT Publication 111 (TC-8702A through TC-8702E) contains details for installing each sign post type. It is important to follow the installation details so that the crashworthy characteristic of the sign post is not compromised. Based on the sign area and distance above the ground, the tables in Publication 111 can be used to determine the proper number of sign posts as well as their size and length.

Before digging, be sure to call PA One Call. Next, determine which type of base is required for installation. A concrete base must be used when installing a wood post in Pennsylvania — no other base is acceptable according to the TC-8702 series. A 4-by-4-inch wood post is considered crashworthy, whereas 4-by-6-inch posts and larger are only crashworthy if required holes are drilled perpendicular to the direction of vehicular travel.

An anchor post can be used as a base for the channel bar and steel square tube posts. It should be driven into

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the ground with a drive cap, allowing for quick and easy installation. The anchor post should be driven at least 3 feet deep leaving a maximum of 4 inches above ground for channel bar posts and 1 inch above the ground for steel square tube posts.

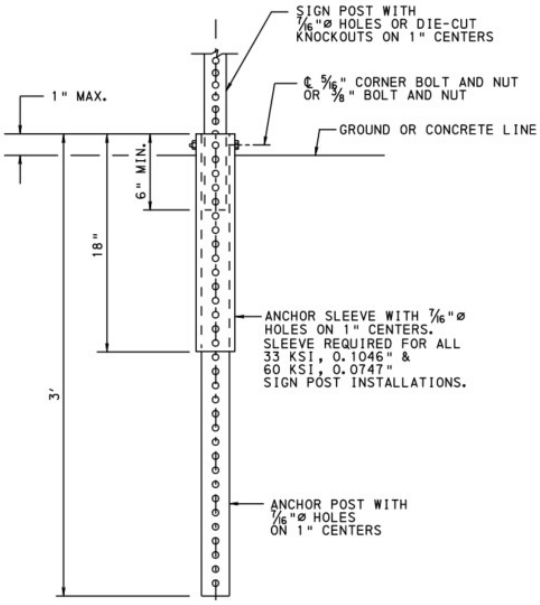
The required breakaway hardware should then be used to connect the sign post to the selected base. The direct-bury method for channel bar, square steel, and wood post installation is not acceptable in Pennsylvania. All posts, hardware, and mounting bases should be periodically inspected to ensure that all pieces are tight and working properly.

INSTALLATION INSTRUCTIONS:

1. DETERMINE THE PROPER SIZE AND NUMBER OF SIGN POSTS FROM THE APPROPRIATE GRAPH ON SHEET 4.
2. DETERMINE THE PROPER SIZE ANCHOR POST AND ANCHOR SLEEVE FROM THE SQUARE STEEL POSTS TABLE ON THIS SHEET.
3. DRIVE THE ANCHOR POST AND ANCHOR SLEEVE INTO THE GROUND SIMULTANEOUSLY, USING THE APPROPRIATE SIZE DRIVE CAP, UNTIL ONLY ONE HOLE REMAINS ABOVE THE GROUND OR FINISHED ELEVATION OF THE CONCRETE.
4. SLIDE A MINIMUM OF 6" OF THE SIGN POST INTO THE ANCHOR POST.
5. ATTACH THE SIGN POST TO THE ANCHOR POST AND SLEEVE WITH ONE 5/16" CORNER BOLT AND NUT (OR ALTERNATELY ONE 3/8" BOLT AND NUT) THROUGH THE TOP HOLE OF THE ANCHOR POST AND SLEEVE.
6. TIGHTEN THE BOLT AND NUT BY THE TURN-OF-NUT METHOD. BRING NUT TO A SNUG CONDITION TO ENSURE THAT ALL PARTS ARE BROUGHT TOGETHER INTO FULL CONTACT WITH EACH OTHER, THEN TIGHTEN AN ADDITIONAL 1/2 TURN.

INSTALLATION IN CONCRETE:

INSTALL AS NOTED ABOVE.



INSTALLATION DETAIL