

Traffic Sign Supports in the Era of MASH 16

A Local Agency Perspective



Victor Lund, PE
Traffic Engineer
St. Louis County

Wednesday, March 17, 2021
2021 ATSSA How To Conference (Virtual)



Focus of Presentation

- Ground mounted signs
 - MnDOT Sign Classification Type C and Type D
 - Not supported by I-beams
- Local agency roadways in Minnesota (other local agencies can benefit from this presentation too)
- Maintaining a consistent vision of Towards Zero Deaths



Typical Sign Post Designs

- U-channel steel post
- Square tubular post
- Wood post



Sign Post Performance Characteristics

- Base-bending or yielding: Typically consist of U-channel steel posts, perforated square steel tubes, thin-walled aluminum tubes or thin-walled fiberglass tubes
- Fracturing: Typically consist of wood posts with drilled holes near the base; or steel posts or aluminum supports connected at ground level to a separate anchor
- Slip-base design: Generally referred to as omnidirectional or multidirectional. Typically consists of a sign support anchored to a slip base near the ground level.

Standards That Apply to Local Agencies

- 2009 Minnesota Manual on Uniform Traffic Control Devices (MUTCD), Section 2A.19 Lateral Offset (pg. 2A-18)

Post-mounted sign and object marker supports shall be crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) if within the clear zone.

Compliance Date: January 17, 2013

The compliance date applies only to those roads with posted or statutory speed limits 50 mph and greater. All other roads with speed limits less than 50 mph are to comply through attrition.

- 2009 MUTCD Definition of “Crashworthy” – 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 Report 350, “Recommended Procedures for the Safety Performance Evaluation of Highway Features.”

Standards That Apply to Local Agencies

- Draft Manual on Uniform Traffic Control Devices (MUTCD), Section 2A.15 Lateral Offset
 - Standard – Post-mounted sign and object marker supports shall be crashworthy if within the clear zone.
- Draft MUTCD Definition of “Crashworthy” – The ability of a roadside safety hardware device or appurtenance that is intended to minimize risks to design vehicle occupants by allowing a vehicle impacting the appurtenance to be slowed, slowed before stopping, redirected, or to continue without significant resistance. Acceptable performance of a crashworthy device is determined by a nationally established standard. Roadside appurtenances include permanent and portable sign supports, other permanent or temporary traffic control devices, and other roadside fixtures that are not traffic control devices, such as longitudinal barriers, bridge railings, barricades, crash cushions, within the clear zone.”

Standards That Apply to Local Agencies

- Minnesota Statutes § 169.06, Subd. 3, Placement and maintenance by local authority.
 - Local authorities in their respective jurisdictions shall place and maintain such traffic-control devices upon highways under their jurisdiction as they may deem necessary to indicate and to carry out the provisions of this chapter or local traffic ordinances, or to regulate, warn, or guide traffic. All such traffic-control devices hereafter erected shall conform to the state manual and specifications.



AASHTO/FHWA Joint Implementation Agreement for MASH 16

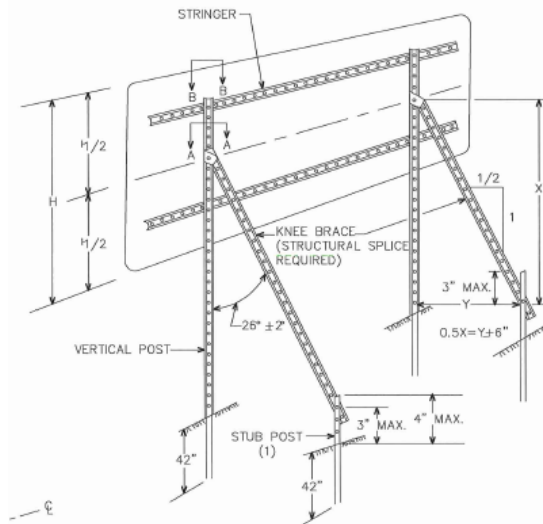
- Agencies are urged to establish a process to replace existing highway safety hardware that has not been successfully tested to NCHRP Report 350 or later criteria
- Agencies are encouraged to upgrade existing highway safety hardware to comply with MASH 16 either when it becomes damaged beyond repair, or when an individual agency's policies require an upgrade to the safety hardware
- For contracts on the National Highway System with a letting date after the dates below, only safety hardware evaluated using MASH 16 will be allowed for new permanent installations and full replacements:
 - December 31, 2017: W-beam barriers and cast-in-place concrete barriers
 - June 30, 2018: W-beam terminals
 - December 31, 2018: Cable barriers, cable barrier terminals, and crash cushions
 - December 31, 2019: Bridge rails, transitions, all other longitudinal barriers (including portable barriers installed permanently), all other terminals, sign supports, and all other breakaway hardware
- Link: <https://design.transportation.org/wp-content/uploads/sites/21/2018/06/MASH-Implementation-Agreement-Final.pdf>

What is a local agency to do?

- Is any portion of your roadway network on the National Highway System? If not...
 - Your agency is not required to install MASH 16 compliant devices in your contracts (subject to change with MnDOT State Aid?)
 - Your agency is not required to upgrade or replace your sign supports with MASH 16 compliant devices
- **However**...Just because you are not required to does not mean you should not try to.
- Consider this...
 - Research sign support options that are either compliant with NCHRP Report 350 or MASH 16
 - You do not need to complete a wholesale change to your method(s)
 - For larger signs (>50 sq ft), consider switching to breakaway I-beam or fracturing wood post supports
 - A-frame structures...

A Specific Word About A-Frame Supports

- Diagonal bracing (A-frames or back braces) should be avoided.
 - Referenced in the AASHTO Roadside Design Guide, 2011, Section 4.3.3
- It is unknown how these supports will perform when hit from the back.
- If necessary to increase the strength of a sign support system, consider larger breakaway sign supports or more breakaway sign supports.
- Think about incorporating a policy statement about A-frame structures into your agency's sign policy.



Questions to Consider

- Is any portion of your agency's roadway network on the National Highway System?
- Does your agency currently have a policy regarding sign supports?
- What is your current safety performance of sign post hits?
- How is your agency's sign maintenance crew currently set up for sign post installation?
- Are you located in a wind-prone region or not?
- What is the rural/urban split of your roadway network?
- What is the volume of your sign inventory?

Resources

- Roadside Safety Pooled Fund for MASH Implementation
 - <https://www.roadsidepooledfund.org/>
- AASHTO MASH Implementation Information
 - <https://design.transportation.org/mash-implementation/>
- AASHTO Roadside Design Guide, Chapter 4
- MnDOT Approved/Qualified Products List – Signing Products
 - Provides a list of approved soil bases for square tube sign posts
 - <http://www.dot.state.mn.us/products/signing/signstructures.html>

Questions and Contact Information

Victor Lund, PE

Traffic Engineer

St. Louis County

Direct Phone: 218-625-3873

Email: lundv@stlouiscountymn.gov