



## Florida Department of Transportation

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### **STRUCTURES DESIGN BULLETIN C11-02**

DATE: March 8, 2011

TO: District Directors of Production, District Design Engineers, District Structures Design Engineers

FROM: Robert Robertson, P. E., State Structures Design Engineer 

COPIES: Brian Blanchard, Jeffrey Ger (FHWA)

SUBJECT: Adoption of *Manual for Assessing Safety Hardware (MASH)*

This Structures Design Bulletin (SDB) adopts the *Manual for Assessing Safety Hardware (MASH)*.

### **REQUIREMENTS**

Add the following to *Structures Manual* Introduction Section I.6.B:

11. *Manual for Assessing Safety Hardware*, First Edition (2009)

Replace *Structures Design Guidelines*, Sections 6.7.1.A.1, 2 and 3 with the following:

1. Have been successfully crash tested to Test Level 4 (minimum), Test Level 5 or Test Level 6 criteria (as appropriate) in accordance with *LRFD* and either *National Cooperative Highway Research Program (NCHRP) Report 350* or *Manual for Assessing Safety Hardware (MASH)* for permanent installations.
2. Have been successfully crash tested to Test Level 3 (minimum) in accordance with *LRFD* and either *NCHRP Report 350* or *MASH* for temporary installations shielding drop-offs.
3. Have been successfully crash tested to Test Level 2 (minimum) in accordance with *LRFD* and either *NCHRP Report 350* or *MASH* for temporary installations shielding work zones without drop-offs (45 mph or less design speed).

Replace *Structures Design Guidelines*, Sections 6.7.2.C.2, 3 and 4 with the following:

2. It has been successfully crash tested in accordance with either *NCHRP Report 350* or *MASH* Test Level 4 (minimum) criteria for permanent installations and Test Level 2 or 3 criteria (as appropriate) for temporary installations.
3. It has been approved for specific uses by FHWA after evaluation of results from successful crash testing based on criteria that predate *NCHRP Report 350* or *MASH* Test Levels 2, 3 and 4 (as appropriate).
4. It has been evaluated by the Structures Design Office and identified as similar in strength and geometry to another traffic railing that has been successfully crash tested in accordance with either *NCHRP Report 350* or *MASH* Test Level 4 (minimum) criteria for permanent installations and Test Level 2 or 3 criteria (as appropriate) for temporary installations.

Replace *Structures Design Guidelines*, Sections 6.7.2.F Commentary, first paragraph with the following:

*Commentary: The above guidelines for concrete railing texturing will not adversely affect the NCHRP Report 350 or MASH test level of the railing to which a texture or pattern is applied. However, it is clear from crash test results that textured railings can result in more vehicular body damage in a crash due to increased friction even if crash performance remains within acceptable limits.*

Add the following to *Structures Design Guidelines*, Section 6.7.3:

5. November 20, 2009 memorandum from David A. Nicol outlining the FHWA implementation plan for the adoption of *Manual for Assessing Safety Hardware (MASH)*

[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/policy\\_memo/memo112009/memo112009.pdf](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/policy_memo/memo112009/memo112009.pdf)

Details the implementation of *MASH* on the NHS and addresses the continued use of *NCHRP Report 350* compliant roadside safety hardware.

Replace *Structures Design Guidelines*, Sections 6.7.8.A.1 and 3 with the following:

1. Provide setback distances as shown in Figure 6.7.8-1 to non-crash tested discontinuous items, e.g. light poles, sign supports, traffic signal controller boxes, flood gauges, etc., that are attached to or located behind outside shoulder traffic railings. Discontinuous items located within these setback distances must be crash tested to, or accepted at, *NCHRP Report 350* or *MASH* Test Level 3 minimum as attachments to traffic railings.

3. Provide a setback distance of 5'-0" minimum from the traffic face of outside shoulder traffic railings at deck or roadway level (gutter line) to non-crash tested continuous items, e.g. sound barriers, glare screens, fences, etc., that are attached to or located behind the railings. Sound barrier / traffic railing combinations located within this setback distance must be crash tested to, or accepted at, *NCHRP Report 350* or *MASH* Test Level 4. Other continuous items located within this setback distance must be crash tested to, or accepted at, *NCHRP Report 350* or *MASH* Test Level 3 minimum as attachments to traffic railings.

Replace *Structures Design Guidelines*, Section 6.7.8.B, first and second paragraphs with the following:

Do not place sign supports on median traffic railings unless AASHTO or FDOT standard design requirements for sign visibility cannot be met by placing the sign supports on the outside shoulder of the roadway or outside shoulder of bridge or roadway traffic railing as described above. If sign supports must be attached to or placed within a median traffic railing, utilize a standard FDOT or other crashworthy detail specifically developed for that item as an attachment to a traffic railing. Discontinuous items located on median traffic railings for which no FDOT standard detail or design is available for must be crash tested to, or accepted at, *NCHRP Report 350* or *MASH* Test Level 3 minimum as attachments to traffic railings.

Continuous items, e.g. glare screens and fences, located on median traffic railings must be crash tested to, or accepted at *NCHRP Report 350* or *MASH* Test Level 3 minimum as attachments to traffic railings.

Replace *Structures Design Guidelines*, Section 6.7.8. Commentary with the following:

*Commentary: These criteria are intended to improve crashworthiness of traffic railings and the miscellaneous attachments that are made to them while still meeting minimum standards for accessibility and roadway signing and lighting. No specific guidance on this issue is provided in LRFD, NCHRP Report 350 or MASH. These criteria are based on findings and recommendations from ongoing research that began as a result of this lack of guidance.*

*These criteria are subject to being changed and or supplemented as further studies are completed.*

### **IMPLEMENTATION**

These requirements are effective on projects not yet executed and will be used for the development of new structures related *Design Standards* for roadside hardware and the maintenance of existing ones. No revisions to plan sets or the latest versions of any structures related *Design Standards* for roadside hardware are currently anticipated. *MASH* has already been adopted in the January 1, 2011 update of the *Plans Preparation Manual*, Vol. 1, Section 32.6.

### **CONTACT**

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