

**[Note: Some of the information in this memo was superseded in August 1998 and later memos.]**



U.S. Department  
of Transportation  
**Federal Highway  
Administration**

# Memorandum

Subject: **ACTION:** Traffic Barrier  
Safety Policy and Guidance

Date: September 29, 1994

From: Executive Director

Reply to  
Attn. of: HHS-11

To: Regional Administrators  
Federal Lands Highway Program Administrator

Reviews and reports from the field show that some obsolete roadside hardware or poor practices thought to have been upgraded or eliminated as a result of the "Yellow Book" safety reviews of a generation ago, still remain on the Nation's main roadway systems. Recent trips to several States have also shown that continued attention to roadside safety is essential on new projects, particularly in the selection, location, and design of traffic barrier terminals.

We believe that roadside hardware selected by a highway agency to improve safety should do so, and that agencies must provide due care in not allowing inappropriate devices to remain indefinitely. Consequently, we expect the selection and maintenance of roadside safety hardware will be key elements of a State's safety management system, with the objective of assuring that current crashworthy designs will be employed where appropriate. To assist the States in the development of their design and maintenance policies and increase the safety of the National Highway System (NHS), with particular attention given to the Interstate component, the Federal Highway Administration (FHWA) has a responsibility to provide the latest technical information on safety hardware performance and to identify hardware designs and practices that are no longer acceptable for specific conditions. As an exercise of this responsibility, the following nationwide traffic barrier upgrading issues, most of which involve terminals, are identified as needing attention.

## I. Replacement of Blunt End Terminals

The 1974 second edition of the American Association of State Highway and Transportation Officials' "Highway Design and Operational Practices Related to Highway Safety," commonly called the "Yellow Book," stated:

Equally important is proper treatment of the exposed end of the guardrail. The untreated or square approach end of a barrier is one of the more formidable roadside obstacles with which traffic must contend. The many spectacular accidents involving collisions with a guardrail end document this serious hazard.

After 20 years, we believe there should be no blunt ends on the leading edge of corrugated steel beam guardrail or median barrier within the clear zone of highways on the NHS. This includes stand-up ends anchored by a cable connected to a concrete deadman.

**Action:** Highway agencies should survey and replace any such blunt ends with crashworthy terminals. (See TA 5040.33, dated February 9, 1993, titled "Corrugated Steel Guardrail Terminals" for information on crashworthy terminals.) This replacement upgrading should be completed within 2 years from the date of this memorandum. Within the first 6 months of this period, the State should develop a plan and schedule for accomplishing the upgrading to the satisfaction of the FHWA Division Administrator.

## II. Use of Turned-Down Terminals

The FHWA's prohibition on the use of this type of end-anchor on high speed, high volume highways is contained in Mr. Willett's September 7, 1990, memorandum titled "Guidelines for Application of the AASHTO Roadside Design Guide on Federal-Aid Highway Projects." Originally applied to strong post W-beam guardrail and rigid barrier systems only, the prohibition is now extended to weak post W-beam guardrail as well. Recent testing has shown that a Modified Eccentric Loader Terminal (MELT) will perform as intended with this system, but that a transition design (see attachment) is necessary between the terminal and the barrier itself. The restriction on the use of turned-down ends does not apply to downstream terminals on freeways or other one-way roadways.

**Action:** A year from the date of this memorandum, turned-down ends will no longer be acceptable for installation on the approach end of roadside or median weak post W-beam barriers on high-speed, high-volume roads on the NHS. Units that have been damaged and must be replaced, should be upgraded with crashworthy terminals.

Existing turned-down ends within clear zones, including strong post designs and sloped concrete ends, should be replaced in conjunction with any significant roadway work in the same area. On the Interstate System, State highway agencies should develop a plan and schedule that will lead to the eventual replacement of all approach end turned-down terminals. This plan and schedule should evolve from each State's safety management system and be submitted to the FHWA Division Administrator for concurrence.

## III. Breakaway Cable Terminal (BCT)

Because the BCT does not pass high-speed, head-on tests at 100 km/h with the 820-kg car, several alternate designs have been developed. Of the various alternative designs, many agencies have adopted the MELT or a commercial proprietary design as their current standard, but some continue to install the BCT on new construction.

**Action:** A year from the date of this memorandum, the BCT will no longer be acceptable for installation on the approach end of barriers on high-speed, high-volume roads on the NHS. Where site conditions permit or are modified to permit, an eccentric loader terminal, a MELT or any other approved terminal may be used in lieu of the BCT. Where the necessary flare cannot be accommodated, a crashworthy terminal that can be installed without a flare would be the appropriate choice.

The FHWA does not recommend a wholesale replacement of existing BCTs. Units that must be replaced due to accident damage should be upgraded with a crashworthy terminal and any BCT installed without the specified flare should be replaced in conjunction with regularly scheduled roadway work in the same area.

#### IV. Terminal Replacement

It is the policy of some agencies to restore damaged features to their original condition or "replace in-kind." Opportunities to improve or upgrade a safety appurtenance occur when it becomes necessary to repair or replace a damaged or deteriorated device. In these situations, cost-effective analysis often favors upgrading or replacement for two reasons. First, because the repair or replacement costs must be incurred, a relatively minor commitment of resources above the costs for repair may result in accomplishing safety upgrading. Second, accident damage can constitute prior knowledge that a potentially hazardous situation exists, making a highway agency vulnerable to tort losses. A process that considers and implements safety improvements in a logical and cost-effective manner provides a good basis for defense in tort liability suits. Thus, upgrading obsolete hardware that fails to meet current standards when it is damaged could support a responsible practices tort defense and will reduce future exposure to potential tort losses.

**Action:** Approximately one fourth of the reported guardrail accidents involve terminals (upstream end). Therefore, on high-speed, high-volume roads on the NHS when damaged substandard terminals are being repaired or replaced, they should be replaced with crashworthy terminals.

This is being accomplished by some agencies through the establishment of contingency maintenance funds earmarked for the specific purpose of upgrading damaged roadside features.

#### V. Connection of Approach Guardrail to Bridge Rail

The 1967 "Yellow Book," stated:

To afford maximum protection and to develop the full strength of the rail in tension, all guardrail on the approaches to structures must be attached securely to the structure and provide a relatively smooth configuration on the traffic side.

**Action:** Any remaining unconnected bridge-approach guardrail on the NHS should be connected by an acceptable transition design. This effort should also be completed within 3 years from the date of this memorandum.



E. Dean Carlson

Attachment



