

**SUMMARY REPORT 296-1F(S)**

**A CRASH CUSHION FOR NARROW OBJECTS**

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## **A Crash Cushion for Narrow Objects**

by

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In recent years the concrete safety shape barrier has gained widespread acceptance. A nagging problem with this barrier has been the serious hazard to traffic posed by the end of the CSSB when it must be terminated within the "clear zone". There are currently no inexpensive end treatments available for the CSSB that are crashworthy for permanent installations and are suitable for use in narrow medians.

A crash cushion was developed and crash tested to shield the ends of the concrete safety shape barrier (CSSB) and other narrow rigid objects. Steel barrels, some empty and some containing sand ballast, were used in conjunction with three-beam fish scales in the design. Factors considered in its development were safety, performance, cost, ease of installation and maintenance, and the use of readily available components.

In detail it consists of a single row of steel drums with three-beam plates and steel cables on each side. For head-on impacts, empty drums provide a yielding mechanism and sand-filled drums aid in smoothly decelerating an errant vehicle. Steel cables and inertia of sand-filled drums provide redirective capability for the cushion. The narrow hazard crash cushion is only slightly wider than the concrete safety shape barrier and can be used in narrow medians as well as on the roadside.

All materials used in the construction of this crash cushion are available commercially, and the components of the cushion can be shop-fabricated and field-assembled. Thus the installation and maintenance costs of this crash cushion should be significantly less than those of the commercial crash cushions currently employed to protect the end of the CSSB.

This crash cushion can be placed in narrow medians that could not be previously treated. The reduced cost associated with this cushion will allow placement of a safety treatment to become cost effective in more sites and allow the construction of more crash cushions than was previously possible. Therefore the narrow hazard crash cushion should improve the level of highway safety.

Four full-scale vehicular crash tests were conducted to evaluate the impact behavior of the design in accordance with recom-

mended procedures in TRC 191. The crash cushion satisfactorily met the performance standards of NCHRP 230 and TRC 191.

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