



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

1200 New Jersey Ave., SE  
Washington, D.C. 20590

March 3, 2011

In Reply Refer To:  
HSST/SS-167

Mr. K. Brent Pooles, B.A., C.I.M.  
Safety Base Ltd.  
1036 Waverley Street  
Winnipeg, MB, Canada R3T 0P3

Dear Mr. Pooles:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system:	Safety Base C10S Couplings
Type of system:	Breakaway Sign Support
Test Level:	NCHRP Report 350 Test Level 3 (TL-3)
Testing conducted by:	N/A
Date of request:	December 4, 2010
Date of completed package:	December 14, 2010
Request initially acknowledged:	December 10, 2010

You requested that we find this system acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

### **Requirements**

Roadside safety devices should meet the guidelines contained in the NCHRP Report 350 or the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH). Requirements for breakaway supports are those in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

### **Decision**

The following device is found acceptable:

- Safety Base C10S Couplings for use in breakaway sign supports.

### **Description**

The C10S coupler is based on the currently tested and accepted C10 version but is of a smaller size that has been developed for round, S Section and square post signs that use more compact supports and typically do not have as large base reactions.



A drawing is enclosed for reference. Similar to the larger C10 unit, it utilizes a gray cast iron coupling but with a nominal tensile capacity of 15,000 lbs. Upon impact, fracture occurs at the groove machined into the coupler and is designed and tested to fail in bending. Coupler compressive and shear ultimate strengths are in excess of the nominal tensile strength. The coupler is designed for 5/8-inch anchor bolts but may be used with female thread anchors with the provision of a short threaded stud. The coupler has a wide base that helps to protect the anchor bolts and the foundation.

As noted in the draft report you provided, the lateral load for failure is less than half of that required for the larger coupling. If one assumes that the energy required for failure of two sets of couplers is less than or approximates that of one set of the larger couplers, then the balance of energy absorbed is the translation and rotation of the supported post(s). A single post at 21 pounds per foot has already been tested with the large couplers with a change in velocity of 5.23 ft/s low speed and an extrapolated high speed velocity change of 9.74 ft/s which is well under the maximum of 16.4 ft/s. The heaviest post in this request is the 4-inch sq post at 12 lb/ft. On a 2 post installation this equates to 24 lb/ft which although is slightly heavier than the W8x21 post tested, it is close in weight, the posts are generally shorter, the attachment brackets and hardware is lighter and the W8x21 post tests were well under the very conservative extrapolated high speed calculated change in velocity.

The intent is to use the round posts on single post signs and the square posts on both single and double post signs where the posts may or may not be 7 ft apart. For these multipost signs, breakaway knee plates, similar but smaller than the units used on the W8x21 post are used.

### **Crash Testing**

No new crash testing was conducted in conjunction with this request. However, variations of this system have been previously crash tested (acceptance letter LS-33 dated October 12, 1993, for luminaire supports and SS-97 on July 20, 2001, for sign post couplings) and FHWA has found the test results acceptable according to NCHRP 350 TL-3. The findings of this letter recognize and utilize the results of previous testing and associated acceptance letters issued for earlier variations of this system.

### **Findings**

You have requested we accept the use of the C10S couplings for use on sign supports on the NHS. This request is accepted. The basis for this acceptance is that FHWA previously has found the system acceptable with larger varieties of the coupling. Your calculations show that the smaller C10S coupling will break at much lesser loadings. Therefore, the couplings described in the requests above and detailed in the enclosed drawings acceptable for use on the NHS, on one or two posts within a seven-foot span as noted above, under the range of conditions the original couplings were tested, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, non conformity with the Manual on Uniform Traffic Control Devices.

- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number SS-167 and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The Safety Base Couplings are patented products and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.
- The Intermodal Surface Transportation Efficiency Act of 1991, section 1048 (a) included iron as a material subject to the Buy America requirements. These requirements, including waiver provisions, are found in Title 23 of the Code of Federal Regulations, Section 635.410. Please note that all manufacturing processes of steel and iron materials, including the application of coatings for these materials, must occur in the United States.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely,



Michael S. Griffith  
Director, Office of Safety Technologies  
Office of Safety

Enclosures

cc: Mr. Michael Bulman, P. Eng.  
Torjak Engineering  
208 Cliffwood Drive  
Winnipeg, MB Canada R2J 3M5