



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

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

August 17, 2011

In Reply Refer To:
HSST/ CC-109B

Mr. Gerrit A. Dyke, P.E.
Barrier Systems, Inc.
3333 Vaca Valley Parkway, Suite 800
Vacaville, CA 95688

Dear Mr. Dyke:

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: X-TENUator and X-TENUator Wide Backstop Extension
Type of system: Backstop Extension for X-TEN and X-TEN Wide Crash Cushions
Test Level: NCHRP Report 350 Test Level 3 (TL-3)
Testing conducted by: Safe Technologies Inc.
Date of request: December 29, 2010
Request Initially acknowledged: January 7, 2011
Task Force 13 designator: SCI23c X-TENUator Backstop Extension; and,
X-TENUator Wide Backstop Extension

You requested that we find a backstop extension design used in conjunction with your X-TEN and X-TEN Wide crash cushions 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." The original design width described in FHWA Acceptance letter CC-109 for your parallel-sided attenuator was 36-inches (926-millimeters) and the maximum width for your X-TEN Wide described in Acceptance letter CC-109A was 60-inches (1525-millimeters) wide.

Requirements

Roadside safety devices should meet the guidelines contained in the NCHRP Report 350 if tested prior to December 31, 2010 or the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH) if tested after that date. The FHWA Memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997 provides further guidance on crash testing requirements of longitudinal barriers.

Decision

The following system design was found acceptable, with details provided below:

- X-TENUator and X-TENUator Wide Backstop Extension

FHWA: HSST: WLongstreet: ms: x60087:8/11/11

File: h://directory folder/HSST/CC109B_X Tenuator Wide Backstop.docx

cc: HSST Will Longstreet

Description

The X-TEN and X-TEN Wide systems are both redirective, non-gating crash cushion designed to decelerate an errant vehicle to a safe stop when struck end-on or redirect an errant vehicle away from roadside or median hazards when impacted along either side. The systems are comprised of an energy absorbing nose bracket and cover, dual X-Tension impact heads and cables, front cable anchors, and W-Beam side panels. The narrow X-TEN uses single posts or double support posts with braces, whereas the X-TEN Wide uses only the double row of specially designed posts and post braces. Standard W-Beam offset blocks are used to attach the side panels to the posts.

The X-TEN Backstop Extension is intended for use with the X-TEN when hazards wider than 36 inches (926 millimeters) are encountered or with the X-TEN Wide for hazards greater than 60 inches (1525 millimeters) in width. By separate correspondence, you indicated that the Backstop Extension would be marketed to shield hazards 48 inches, 60 inches, and 72 inches (1.2 meters, 1.5 meters, and 1.9 meters) wide when used behind the narrow, parallel-sided X-TEN, and 86 inches, 98 inches and 110 inches (2.2 meters, 2.5 meters, and 2.8 meters) wide hazards when used with the X-TEN Wide unit. The Backstop Extension (Enclosure 1) uses fabricated steel posts (Enclosure 2), variable-sized cross braces (Enclosure 3), and attachment brackets (Enclosure 4) in addition to standardized hardware items.

Crash Testing

Since both the X-TEN and the X-TEN Wide designs were fully crash-tested and accepted for use on the NHS by FHWA, only two tests were considered necessary to verify the crashworthiness of the X-TEN Backstop Extension. Tests 3-36 and 3-38 were conducted with the Backstop Extension installed at its maximum 10-degree angle and connected to the narrow X-TEN design. For both tests, the system was attached to a 75-millimeter (3-inch) thick Asphalt Concrete (AC) pad over 300 millimeters (12 inches) of a dense graded aggregate with eighty-six (86) 20-millimeter (3/4-inch) long all thread studs embedded 400 millimeters (16 inches) and epoxied in place. Enclosures 5 and 6 summarize the results of these tests.

Findings

The FHWA concurs that the tests you ran were sufficient to verify acceptable crash performance under NCHRP Report 350 and that each test met the appropriate evaluation criteria. In your letter, you have requested FHWA acceptance of the following:

- The X-TEN Backstop Extension may be considered an NCHRP Report 350 TL-3 design
- The Backstop Extension may be used with the narrow X-TEN to shield hazards up to 72-inches (1830-millimeters) wide, or with the X-TEN Wide to shield hazards up to 110-inches (2800-millimeters) wide.
- As with the crash cushions, the Backstop Extension can be installed on an AC pad as described above or on a 10-inch (250-millimeter) PCC pad.
- The X-TEN Backstop Extension can be further extended using Thrie-beam barrier and/or attached to concrete barrier by using standard transitions that have been accepted for attaching “W” profile guardrails to rigid barrier systems.

Based on our review of the submitted information, including test reports, the X-TEN Backstop Extension described above and detailed in the enclosed drawings is acceptable for use on the NHS under the range of conditions tested, when such use is acceptable to a highway agency.

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

- This letter includes a Task Force 13 designator to be used when drafting new or revised Task Force 13 drawings.
- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor 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 CC-109B 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 X-TEN Backup Extension is a patented product 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.

- 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 yours,

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

Enclosures



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Sincerely yours,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large initial "M" and "G".

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

Enclosures