



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

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

August 19, 2011

In Reply Refer To:
HSST/CC-109A

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 Wide (X-TEN Wide)
Type of system: Variable width Redirective Non-Gating Crash Cushion
Test Level: NCHRP Report 350 TL-3
Testing conducted by: Safe Technologies Inc.
Date of request: December 27, 2010
Request Initially acknowledged: January 4, 2011
Task Force 13 designator: SCI23b

You requested that we find alternative widths to your narrow X-TEN crash cushion 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 described in FHWA Acceptance letter CC-109 was a parallel-sided attenuator 36-inches (926-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 Wide variable width Redirective Non-Gating Crash Cushion

Description

The X-TEN system is a 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 system is comprised of an energy absorbing nose bracket and cover, dual X-Tension impact heads and cables, front cable anchors, W-Beam side panels, specially designed posts and post braces and a separate rigid backstop. Standard W-Beam offset blocks are used to attach the side panels to the posts. Enclosure 1 shows both an alternate new narrow design and the new wide design.

The X-TEN Wide design differs from the original design in three significant ways:

1. The Energy Absorbing Nose was replaced with a steel actuator (Enclosure 2) that serves to reduce the flare of the panels as they move rearward by spreading the impact heads apart during impact.
2. In lieu of the single support posts used in the narrow X-TEN, the wide design uses a double row of modified posts that can be adjusted outward, and bracing was added to provide the appropriate support for side impacts (Enclosures 3 and 4).
3. A collapsible pipe section was added to the backstops to account for the increased impact forces on the flared system during side impacts near the back of the system (Enclosure 5).

Crash Testing

The X-TEN Wide crash cushion was successfully tested at its maximum width of 60 inches (1500 millimeters) under NCHRP Report 350 test designations 3-31, 3-32, 3-37, and 3-38 by Safe Technologies Inc. Test 3-31 was also conducted on the 36-inch (915-millimeter) narrow design using double posts. In tests 3-31(narrow design), 3-32, and 3-38, the X-TEN 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 sixty-eight (68) 20-millimeter (3/4-inch) long all thread studs embedded 400 millimeters(16 inches) and epoxied in place. In tests 3-31 (wide design) and test 3-37, the X-TEN Wide design was attached to a 250-millimeter (10-inch) thick Portland Cement Concrete (PCC) pad with fifty-two (52) 20-millimeter (3/4-inch) long all thread studs embedded 150 millimeters (6 inches) and epoxied in place. This crash cushion can also be used on a 200-millimeter (8-inch) thick unreinforced or a 150-millimeter (6-inch) thick reinforced PCC pad. You will be expected to provide users with concrete specifications and anchor designs for these applications.

Enclosures 6 through 10 summarize the results of the tests that were run.

Findings

The tests you ran conformed to the matrix agreed to beforehand by members of my staff, with slight modifications in scope based on your decision to limit development to a 60-inch (1500 millimeter) wide unit. Each test met the appropriate Report 350 evaluation criteria. In your letter, you have requested FHWA acceptance of the following:

- The X-TEN Wide system as an NCHRP Report 350 TL-3 design with a backstop width ranging from 36 inches (915 millimeters) to 60 inches (1500 millimeters) when secured to an Asphalt Concrete (AC) or Portland Cement Concrete (PCC) base as described above.

- Acknowledgment that the X-TEN Wide system has redirective capacity beginning at the impact head behind the nose cover,
- Acknowledgment that the X-TEN Wide system can be attached to other roadside barriers 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 Wide system 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-109A 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 Wide system 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