



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

June 19, 2020

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

In Reply Refer To:

Matt Harriman  
Hill & Smith Ltd,  
Springvale Business & Ind. Park, Bilston,  
West Midlands, UK, WV14 0QL

HSST-1/B-245A

Dear Mr. Harriman:

On December 17, 2013, the Federal Highway Administration's Office of Safety issued eligibility letter B-245 for the Brifen Wire Rope Safety Fence O-Post, MASH. The Office of Safety has recently made updates to its eligibility letter website to be more consistent with the 2<sup>nd</sup> Edition of American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH) and the additional test matrices for cable barriers therein. These updates have necessitated the modification of certain eligibility letters including B-245. The modification for B-245 consists of adding the phrase "Level Terrain" after the original description of the device to indicate the as-tested conditions for the device. Additionally, the language of this letter has been updated to be consistent with current Office of Safety policy for the issuance of eligibility letters.

Please note that this modification to letter B-245 will in no way affect the eligibility for the associated device as was determined on December 17, 2013. This FHWA letter of eligibility is assigned FHWA control number B-245A and is valid until a subsequent letter is issued by FHWA that expressly references this device. This letter will supersede the original B-245 letter in full.

### **Decision**

The following device is eligible within the length-of-need, with details provided in the form which is attached as an integral part of this letter:

- Brifen Wire Rope Safety Fence O-Post, MASH, Level Terrain

### **Scope of this Letter**

To be found eligible for Federal-aid funding, new roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' (AASHTO) Manual for Assessing Safety Hardware (MASH). However, the FHWA, the Department of Transportation, and the United States Government do not regulate the manufacture of roadside safety devices. Eligibility for reimbursement under the Federal-aid highway program does not establish approval, certification or endorsement of the device for any particular purpose or use.

This letter is not a determination by the FHWA, the Department of Transportation, or the United States Government that a vehicle crash involving the device will result in any particular outcome, nor is it a guarantee of the in-service performance of this device. Proper manufacturing, installation, and maintenance are required in order for this device to function as tested.

This finding of eligibility is limited to the crashworthiness of the system and does not cover other structural features, nor conformity with the Manual on Uniform Traffic Control Devices.

### **Eligibility for Reimbursement**

Based solely on a review of crash test results and certifications submitted by the manufacturer, and the crash test laboratory, FHWA agrees that the device described herein meets the crash test and evaluation criteria of the AASHTO's MASH. Therefore, the device is eligible for reimbursement under the Federal-aid highway program if installed under the range of tested conditions.

Name of system: Brifen Wire Rope Safety Fence, O-Post, MASH, Level Terrain

Type of system: Longitudinal Barrier

Test Level: MASH Test Level 3 (TL3)

Testing conducted by: Southwest Research Institute (SwRI)

Date of request: October 6, 2013

FHWA concurs with the recommendation of the accredited crash testing laboratory on the attached form

### **Full Description of the Eligible Device**

The device and supporting documentation, including reports of the crash tests or other testing done, videos of any crash testing, and/or drawings of the device, are described in the attached form.

### **Notice**

This eligibility letter is issued for the subject device as tested. Modifications made to the device are not covered by this letter. Any modifications to this device should be submitted to the user (i.e., state DOT) as per their requirements.

You are expected to supply potential users with sufficient information on design, installation and maintenance requirements to ensure proper performance.

You are expected to certify to potential users that the hardware furnished has the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the test and evaluation criteria of AASHTO's MASH.

Issuance of this letter does not convey property rights of any sort or any exclusive privilege. This letter is based on the premise that information and reports submitted by you are accurate and correct. We reserve the right to modify or revoke this letter if: (1) there are any inaccuracies in the information submitted in support of your request for this letter, (2) the qualification testing was flawed, (3) in-service performance or other information reveals safety problems, (4) the system is significantly different from the version that was crash tested, or (5) any other information indicates that the letter was issued in error or otherwise does not reflect full and complete information about the crashworthiness of the system.

### Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-245A 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 upon request.
- This 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.
- This FHWA eligibility letter is not an expression of any Agency view, position, or determination of validity, scope, or ownership of any intellectual property rights to a specific device or design. Further, this letter does not impute any distribution or licensing rights to the requester. This FHWA eligibility letter determination is made based solely on the crash-testing information submitted by the requester. The FHWA reserves the right to review and revoke an earlier eligibility determination after receipt of subsequent information related to crash testing.

Sincerely,



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

Enclosures

## Request for Federal Aid Reimbursement Eligibility Of Highway Safety Hardware

|                  |                  |                                                                      |                                                                                               |
|------------------|------------------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Submitter</b> | Date of Request: | October 6, 2013                                                      | <input checked="" type="checkbox"/> New <input type="checkbox"/> Resubmission                 |
|                  | Name:            | Matt Harriman                                                        | Signature:  |
|                  | Company:         | Hill and Smith Ltd.                                                  |                                                                                               |
|                  | Address:         | Bilston, Wolverhampton West Midlands, WV14 0QL                       |                                                                                               |
|                  | Country:         | UK                                                                   |                                                                                               |
|                  | To:              | Michael S. Griffith, Director<br>FHWA, Office of Safety Technologies |                                                                                               |

I request the following devices be considered eligible for reimbursement under the Federal-aid highway program.

| System Type                                       | Submission Type                                                                                           | Device Name / Variant         | Testing Criterion | Test Level |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------------|-------------------|------------|
| 'B': Barriers (Roadside, Median, Bridge Railings) | <input checked="" type="checkbox"/> Physical Crash Testing<br><input type="checkbox"/> FEA & V&V Analysis | Brifen Wire Rope Safety Fence | AASHTO MASH       | TL3        |

By submitting this request for review and evaluation by the Federal Highway Administration, I certify that the product(s) was (were) tested in conformity with the AASHTO Manual for Assessing Safety Hardware and that the evaluation results meet the appropriate evaluation criteria in the MASH.

Identification of the individual or organization responsible for the product:

|               |                                                |                                                       |
|---------------|------------------------------------------------|-------------------------------------------------------|
| Contact Name: | Matt Harriman                                  | Same as Submitter <input checked="" type="checkbox"/> |
| Company Name: | Hill and Smith Ltd.                            | Same as Submitter <input checked="" type="checkbox"/> |
| Address:      | Bilston, Wolverhampton West Midlands, WV14 0QL | Same as Submitter <input checked="" type="checkbox"/> |
| Country:      | UK                                             | Same as Submitter <input checked="" type="checkbox"/> |

### PRODUCT DESCRIPTION

|              |
|--------------|
| New Hardware |
|--------------|

## Request for Federal Aid Reimbursement Eligibility Of Highway Safety Hardware

|                  |                  |                                                                      |                                                                         |
|------------------|------------------|----------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Submitter</b> | Date of Request: | October 6, 2013                                                      | <input checked="" type="radio"/> New <input type="radio"/> Resubmission |
|                  | Name:            | Matt Harriman                                                        | Signature:                                                              |
|                  | Company:         | Hill and Smith Ltd.                                                  |                                                                         |
|                  | Address:         | Bilston, Wolverhampton West Midlands, WV14 OQL                       |                                                                         |
|                  | Country:         | UK                                                                   |                                                                         |
|                  | To:              | Michael S. Griffith, Director<br>FHWA, Office of Safety Technologies |                                                                         |

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| Contact Name: | Matt Harriman                                  | Same as Submitter <input checked="" type="checkbox"/> |
| Company Name: | Hill and Smith Ltd.                            | Same as Submitter <input checked="" type="checkbox"/> |
| Address:      | Bilston, Wolverhampton West Midlands, WV14 OQL | Same as Submitter <input checked="" type="checkbox"/> |
| Country:      | UK                                             | Same as Submitter <input checked="" type="checkbox"/> |

### PRODUCT DESCRIPTION

|              |
|--------------|
| New Hardware |
|--------------|

The Brifen MASH TL-3 WRSF is a high tension cable barrier that consists four (4) separate wire ropes (cables) interwoven between O-shaped steel posts. The ropes are held at the design height by notches/dimples with a rope retention device (plastic) in the side of the O-shaped steel posts. The total length of the WRSF used in the test was approximately 183 m (600 ft), and it was anchored at each end using Brifen's WRGT-RD terminals. The WRGT-RD terminal was previously accepted to NCHRP 350 Test Level Three (TL-3) by the FHWA (letter HAS-10/CC-86A dated August 10, 2005).

Each of the four wire ropes are 0.75 in (19 mm) in diameter, pre-stretched galvanized steel 3 x 7 construction, with a minimum breaking strength of 39,000 lbs (173.5 kN) and have a modulus of elasticity after pre-stressing of 11,805,00 psi (8,300 kg/mm<sup>2</sup>). Nominal rope heights (center of rope) are: top 35 in (890 mm), upper middle 28 in (710 mm), lower middle 21 in (530 mm) and bottom 14 in (355 mm). The posts in the test section are round HSS2.875x0.132 and are inserted in steel sockets. The post embedment into the steel socket is 12 in (305 mm). The steel sockets were placed in 12 in (305 mm) diameter concrete footers through the concrete pavement. The first four posts were spaced at 6.5 ft (2.0 m) as part of the WRGT-RD anchor, and the length of need line posts were spaced at a minimum distance of 7 ft (2.1 m) and a maximum distance of 21 ft (6.4 m), depending on the test.

Rigging screws were purposely arranged so they would be located in the area where vehicle-barrier contact occurs to demonstrate that their location does not affect barrier performance.

We request the following for eligibility:

I. Brifen MASH TL-3 Cable Barrier, 4-cable system, for use with O-Post spacing of 7 ft. (2.1 m) through 21 ft. (6.4 m).

All systems can utilize pre-stretched or non pre-stretched cables (ropes), socketed posts in concrete footings, driven posts, surface mounted posts, post cast directly into concrete and driven post sockets. (The sockets are manufactured from either plastic or steel).

## CRASH TESTING

A brief description of each crash test and its result:

| Required Test Number | Narrative Description                                                                                                                                                                                                                                                 | Evaluation Results |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 3-10 (1100C)         | Test 1:<br>SwRI Test No. BUSA-OP-03 / Test Date May 23, 2012 @ 7' post spacing (Impact between posts)                                                                                                                                                                 | PASS               |
| 3-11 (2270P)         | Test 2:<br>SwRI Test No. BUSA-OP-1/Test Date May 22, 2012 - @ 7' post spacing<br>(Impact on post - establish minimum deflection)<br>Test 3:<br>SwRI Test No: BUSA-OP-2/Test Date May 22, 2012 - @ 21' post spacing<br>(Impact on post - establish maximum deflection) | PASS               |
| 3-20 (1100C)         |                                                                                                                                                                                                                                                                       |                    |
| 3-21 (2270P)         |                                                                                                                                                                                                                                                                       |                    |

Full Scale Crash Testing was done in compliance with MASH by the following accredited crash test laboratory (cite the laboratory's accreditation status as noted in the crash test reports.):

|                                            |                                                  |                                            |
|--------------------------------------------|--------------------------------------------------|--------------------------------------------|
| Laboratory Name:                           | Southwest Research Institute                     |                                            |
| Laboratory Contact:                        | Karol Hricisak / Jenny Ferren                    | Same as Submitter <input type="checkbox"/> |
| Address:                                   | 6220 Culebra Road, San Antonio, Texas, 78228     | Same as Submitter <input type="checkbox"/> |
| Country:                                   | USA                                              | Same as Submitter <input type="checkbox"/> |
| Accreditation Certificate Number and Date: | A21a Certificate Number: 1110.02. March 31, 2014 |                                            |

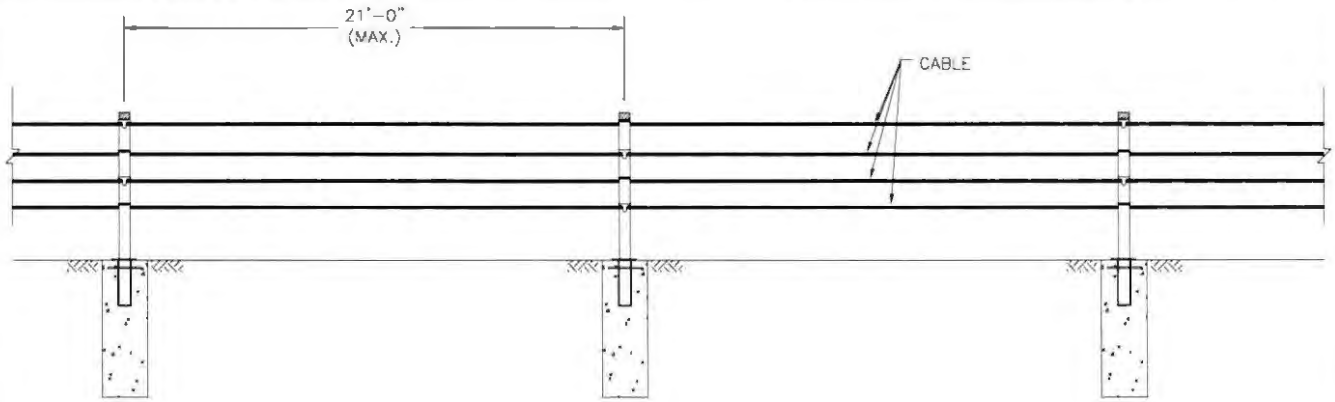
## ATTACHMENTS

Attach to this form:

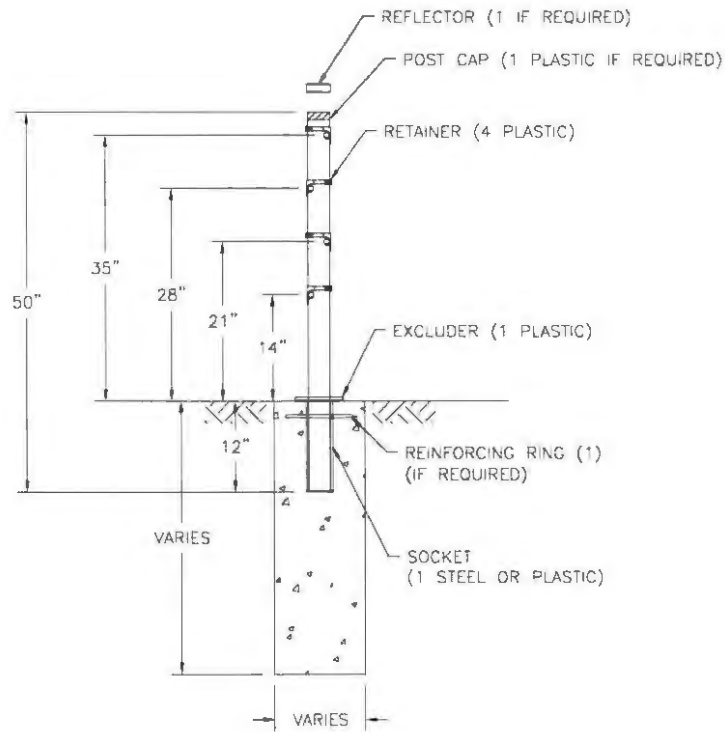
- 1) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 2) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [[Hardware Guide Drawing Standards](#)]. For proprietary products, a single isometric line drawing is usually acceptable to illustrate the product, with detailed specifications, intended use, and contact information provided on the reverse. Additional drawings (not in TF-13 format) showing details that are key to understanding the performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

| Eligibility Letter |                   | AASHTO TF13 |                                                                                              |
|--------------------|-------------------|-------------|----------------------------------------------------------------------------------------------|
| Number             | Date              | Designator  | Key Words                                                                                    |
| B-245              | November 19, 2013 |             | Longitudinal Barrier, Wire Rope, Interwoven, OShaped Steel Posts, NCHRP 350 Test Level Three |



ELEVATION



SECTION

# ROUND STEEL POST CABLE MEDIAN BARRIER

O-POST  
MASH

SHEET NO.

DATE:

1 OF 2

10/21/2013



SPECIFICATION

Rope heights shall be  $\pm 1$ " to ground line. Post shall be  $\pm 4$ " from vertical plumb. Post caps shall be used if specified. Reflectors shall be spaced according to agency specifications. Reflectors can be placed on the post cap or post. O-excluder shall be used. Sacket can be steel or plastic. Socket shall be  $\pm 2$ " of vertical plumb. Reinforcing ring will be used according to foundation size and type.

INTENDED USE

This O-Post systems must be anchored using Brifen Attachment to Guardrail, Brifen Attachment to Bridge Pier Bracket, Brifen WRGT-FL, WRGT or WRGT-RD anchor. It shall be placed on a smooth surface, without humps, drop-offs, holes, etc, that would interfere with the stability of the errant vehicle. Grading, fill and compaction may be required to assure that ropes are installed at the design height.

COMPONENTS PER POST

| QTY | DESCRIPTION                                     |
|-----|-------------------------------------------------|
| 4   | Plastic Retainer                                |
| 1   | Plastic Post Cap (if required)                  |
| 1   | Prismatic Reflector (if required)               |
| 1   | Plastic Excluder                                |
| 1   | Steel or Plastic Socket                         |
| 1   | Reinforcing Ring (per foundation size and type) |



12501 N. Santa Fe Ave, Oklahoma City, OK 73114 Phone: 405-751-8062 Fax: 405-751-8338

ROUND STEEL POST CABLE MEDIAN BARRIER

O-POST  
MASH

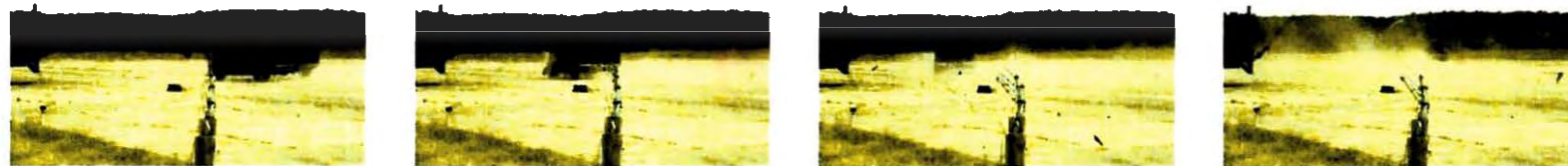
SHEET NO.

DATE:

2 OF 2

10/21/2013

**Table 4.1 – Summary of Test Results and Conditions**



**General Information**

Test Agency .....Southwest Research Institute  
 Test Number .....BUSA-OP-1  
 Test Date .....05/22/2012  
 Test Category .....3-11

**Test Article**

Type .....Longitudinal Barrier  
 Installation Length .....187 m (614 ft)  
 Nom. Barrier Height .....0.89 m (2.92 ft)  
 Type of Primary Barrier.....Wire Rope Safety Fence

**Soil**

Concrete Footings Embedded in  
 Concrete Runaway

**Test Vehicle**

Type .....¾-ton pickup  
 Designation .....2270P  
 Model .....2007 C15543  
 Mass (kg) .....2,269  
 Inertial Mass(kg).....2,269  
 Dummy Mass (kg) .....NA  
 Gross Static Mass (kg).....2,269

**Impact Conditions**

Speed (km/h) .....96.2  
 Angle (degrees) .....25.0

**Exit Conditions**

Speed (km/h) .....92.8 (calculated)  
 Angle (degrees) .....10.9

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction .....1.4  
 y-direction .....2.7  
 Ridedown Accelerations (g's)  
 x-direction .....1.8  
 y-direction .....2.8

**Post Impact Vehicular Behavior**

Maximum Roll Angle (degrees) .....6.6 @ 5.7858 sec.  
 Maximum Pitch Angle (degrees) .....-1.9 @ 0.6689 sec.  
 Maximum Yaw Angle (degrees) .....29.4 @ 3.3388 sec.

**Test Article Deflection**

Dynamic .....3.6 m (11.9 ft)

Permanent (top of barrier) .....0.9 m (3.0 ft)  
 Permanent (base of barrier) .....0 m (0 in)

**Vehicle Damage**

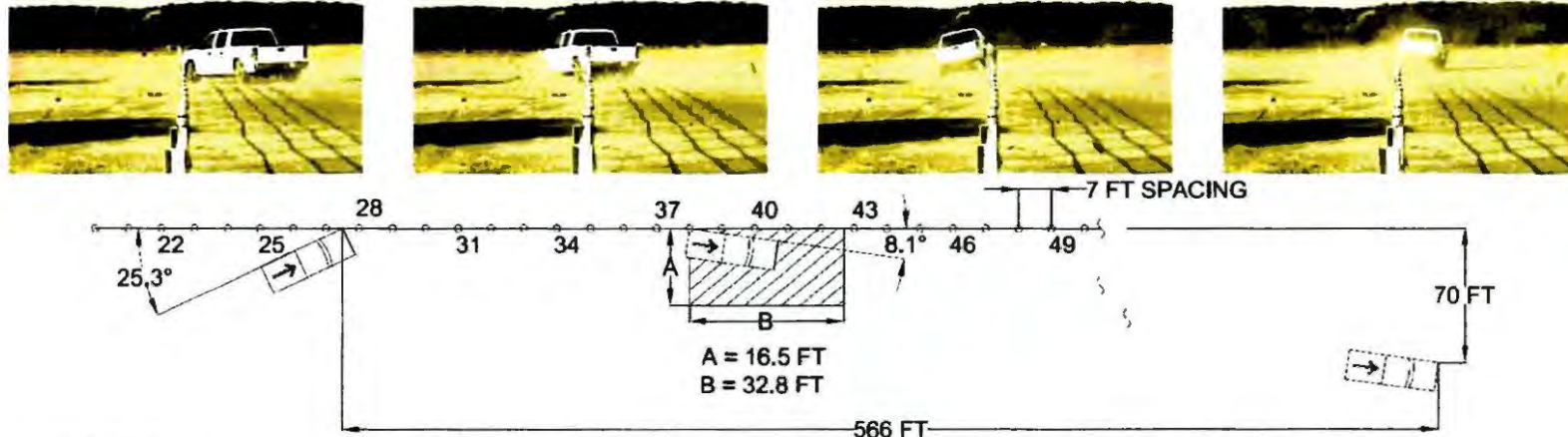
**Exterior**

CDC .....11LFEW9  
 VDS .....11-LFQ-3

**Interior**

OCDI .....LF0000000  
 Max. Deform. (mm) .....0

**Table 4.1 – Summary of Test Results and Conditions**



**General Information**

Test Agency ..... Southwest Research Institute  
 Test Number ..... BUSA-OP-2  
 Test Date ..... 05/22/2012  
 Test Category ..... 3-11

**Test Article**

Type ..... Longitudinal Barrier  
 Installation Length ..... 187 m (614 ft)  
 Nom. Barrier Height ..... 0.89 m (2.92 ft)  
 Type of Primary Barrier ..... Wire Rope Safety Fence

**Soil**

Concrete Footings Embedded in  
 Concrete Runaway

**Test Vehicle**

Type ..... ¾-ton pickup  
 Designation ..... 2270P  
 Model ..... 2007 C15543  
 Mass (kg) ..... 2,260  
 Inertial Mass(kg) ..... 2,260  
 Dummy Mass (kg) ..... NA  
 Gross Static Mass (kg) ..... 2,260

**Impact Conditions**

Speed (km/h) ..... 97.7  
 Angle (degrees) ..... 25.3

**Exit Conditions**

Speed (km/h) ..... 78.6 (calculated)  
 Angle (degrees) ..... 8.1

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction ..... 2.6  
 y-direction ..... 3.2  
 Ridedown Accelerations (g's)  
 x-direction ..... 3.5  
 y-direction ..... 4.0

**Post Impact Vehicular Behavior**

Maximum Roll Angle (degrees) ..... 14.7 @ 1.0979 sec.  
 Maximum Pitch Angle (degrees) ..... -6.8 @ 5.7354 sec.  
 Maximum Yaw Angle (degrees) ..... 32.0 @ 1.5836 sec.

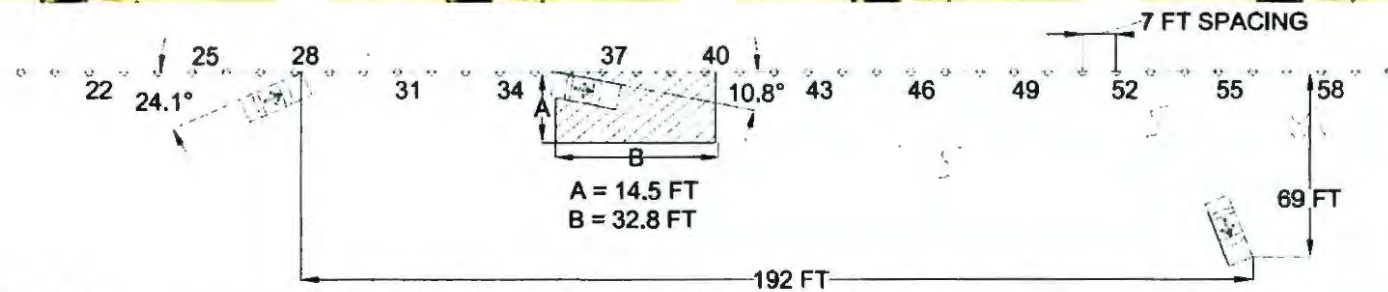
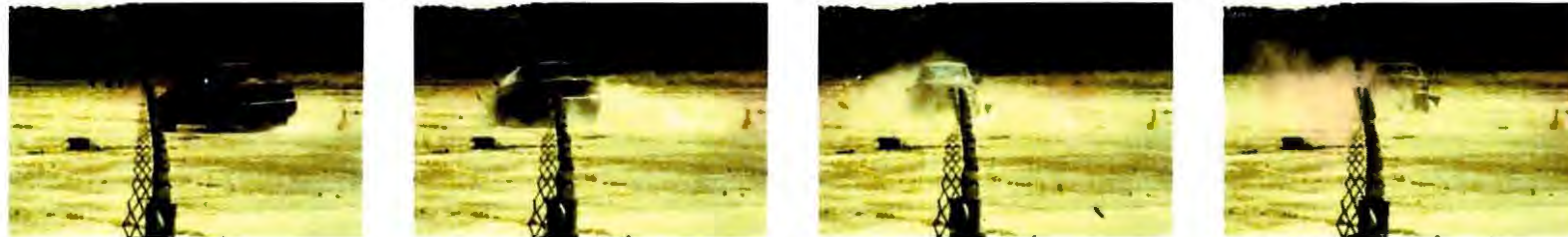
**Test Article Deflection**

Dynamic ..... 2.4 m (8.0 ft)  
 Permanent (top of barrier) ..... 0.9 m (3.0 ft)  
 Permanent (base of barrier) ..... 0 m (0 in)

**Vehicle Damage**

Exterior  
 CDC ..... 11LFEW9  
 VDS ..... 11-LFQ-3  
 Interior  
 OCDI ..... LF0000000  
 Max. Deform. (mm) ..... 0

**Table 4.1 – Summary of Test Results and Conditions**



**General Information**

Test Agency .....Southwest Research Institute  
 Test Number .....BUSA-OP-3  
 Test Date .....05/23/2012  
 Test Category .....3-10

**Test Article**

Type .....Longitudinal Barrier  
 Installation Length .....187 m (614 ft)  
 Nom. Barrier Height .....0.89 m (2.92 ft)  
 Type of Primary Barrier .....Wire Rope Safety Fence

**Soil**

Concrete Footings Embedded in  
 Concrete Runaway

**Test Vehicle**

Type .....car  
 Designation .....1100C  
 Model .....2003 7 C15543  
 Mass (kg) .....1,155  
 Inertial Mass(kg) .....1,080  
 Dummy Mass (kg) .....75  
 Gross Static Mass (kg) .....1,155

**Impact Conditions**

Speed (km/h) .....103.9  
 Angle (degrees) .....24.1

**Exit Conditions**

Speed (km/h) .....69.1 (calculated)  
 Angle (degrees) .....10.8

**Occupant Risk Values**

Impact Velocity (m/s)  
 x-direction .....3.8  
 y-direction .....4.0  
 Ridedown Accelerations (g's)  
 x-direction .....7.8  
 y-direction .....8.9

**Post Impact Vehicular Behavior**

Maximum Roll Angle (degrees) .....8.3 @ 6.0981 sec.  
 Maximum Pitch Angle (degrees) .....-4.8 @ 0.5220 sec.  
 Maximum Yaw Angle (degrees) .....91.0 @ 6.3452 sec.

**Test Article Deflection**

Dynamic .....1.6 m (5.1 ft)  
 Permanent (top of barrier) .....0.9 m (3.0 ft)  
 Permanent (base of barrier) .....0 m (0 in)

**Vehicle Damage**

**Exterior**

CDC .....11LFEA9  
 VDS .....11-LFQ-5

**Interior**

OCDI .....LF0000000  
 Max. Deform. (mm) .....91