



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

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

June 7, 2013

In Reply Refer To:
HSST/B-233

Mr. Wolfgang Ganster
Delta Block International GmbH
Industriestrasse 28
A-2601 Sollenau
Germany

Dear Mr. Ganster:

This letter is in response to your request for the Federal Highway Administration (FHWA) to review a roadside safety system for eligibility for reimbursement under the Federal-aid highway program.

Name of system:	Delta Bloc DB 80 F-Shape 12 ft 6 in long units
Type of system:	Portable concrete barrier
Test Level:	MASH Test Level 3
Testing conducted by:	Midwest Roadside Safety Facility
Task Force 13 Designator:	SWC18
Date of initial request:	October 5, 2011
Date initially acknowledged:	December 20, 2011
Date of completed package:	December 19, 2012

Decision:

The following device is eligible, with details provided in the enclosed form which is considered an integral part of this letter:

- Delta Bloc DB 80 F-Shape portable concrete barrier 12 ft 6 in long units

Based on a review of crash test results submitted by the manufacturer certifying the device described herein meets the crashworthiness criteria of the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH), the device is eligible for reimbursement under the Federal-aid highway program. Eligibility for reimbursement under the Federal-aid highway program does not establish approval or endorsement by the FHWA for any particular purpose or use.

The FHWA, the Department of Transportation, and the United States Government do not endorse products or services and the issuance of a reimbursement eligibility letter is not an endorsement of any product or service.

FHWA:HSST:NArtimovich:sf:x61331:6/6/13

File: s://directory folder/hsst/nartimovich/HSST/B233_DeltaBloc_V2.docx

cc: HSST (Reader, HSA; Chron File, HSST; NArtimovich, HSST), BFouch, HSST

Requirements

Roadside safety devices should meet the guidelines contained in the MASH.

Description and Crash Tests

The enclosed copy of your form, as well as the letter from Thomas Wolfe sent on October 5, 2011, details the construction of the barrier as well as tests 3-10 and 3-11, both of which were conducted in compliance with the MASH and resulted in successful performance. Vehicle trajectory, barrier structural adequacy, and occupant risk factors conformed to the evaluation criteria contained in the MASH.

Findings

Therefore, the system described and detailed in the attached letter, drawings, and test data summary is eligible for reimbursement and may be installed under the range of conditions tested.

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

- This letter provides a AASHTO/ARTBA/AGC Task Force 13 designator that should be used for the purpose of the creation of a new and/or the update of existing Task Force 13 drawing for posting on the on-line 'Guide to Standardized Highway Barrier Hardware' currently referenced in AASHTO Roadside Design Guide.
- This finding of eligibility 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 influence the crashworthiness of the system will require a new reimbursement eligibility letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals safety problems, or that the system is significantly different from the version that was crash tested, we reserve the right to modify or revoke this letter.
- 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 the same chemistry, mechanical properties, and geometry as that submitted for review, and that it will meet the crashworthiness requirements of the Manual for Assessing Safety Hardware.
- To prevent misunderstanding by others, this letter of eligibility is designated as number B-233 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.
- 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. The finding of eligibility 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.

- The Delta Bloc Barriers are patented products and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid 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.

Sincerely yours,

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

Enclosures



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of Transportation
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Washington, D.C. 20590

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Sincerely yours,



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

Enclosures

Request for Federal Aid Reimbursement Eligibility Of Highway Safety Hardware

Submitter	Date of Request:	19.December 2012	<input type="radio"/> New <input checked="" type="radio"/> Resubmission
	Name:	Wolfgang Ganster	
	Company:	DELTA BLOC International GmbH	
	Address:	Industriestrasse 28, 2601 Sollenau	
	Country:	AUSTRIA	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologies	

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

[Help](#)

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Barriers (Roadside, Media	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> FEA & V&V Analysis	DELTABLOC DB 80 F-Shape 12 ft 6 in	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:	Wolfgang Ganster	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	DELTA BLOC International GmbH	Same as Submitter <input checked="" type="checkbox"/>
Address:	Industriestrasse 28, 2601 Sollenau	Same as Submitter <input checked="" type="checkbox"/>
Country:	AUSTRIA	Same as Submitter <input checked="" type="checkbox"/>

PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware	<input type="radio"/> Modification to Existing Hardware	
<p>The DELTABLOC DB 80 F-Shape 12 ft 6 in barrier system is comprised of 12-ft 6-in. (3,810-mm) long by 2-ft 8-in. (813-mm) tall, F-shape temporary concrete barrier segments. The barrier segments have to be fabricated using a concrete material with a minimum 28-day compressive strength of 5,000 psi (34.47 MPa). The steel reinforcement consists of ASTM A615 Grade 60 rebar and ASTM A185 Grade 60 welded wire reinforcement. A 3/8-in. (10-mm) diameter rebar is installed along the bottom of the barriers on both the traffic and back sides to reinforce the toes of the barriers. A U-shaped 1/2-in. (13-mm) diameter rebar is installed along the bottom of the barriers on both ends. The welded wire reinforcement is installed inside the faces of the upper half of the barriers.</p> <p>The barriers are connected together with a tension link that consisted of two Y-profile hooks and the connecting K150 coupling. The K150 coupling and the Y-profile hooks are approximately 5/8 in. (149 mm) tall. The Y-profile hooks are connected together through each barrier by two 3/4-in. (19-mm) diameter deformed steel reinforcing bars, which are welded to the top and bottom surfaces of the Y-profile hook. The K150 couplings and the Y-profile hooks are constructed from ASTM A570 Grade 36 steel, and the tension bars are constructed from ASTM A615 Grade 60 steel. The Y-profile hooks and tension bars are cast into the concrete barrier. After the concrete barriers are placed in position, the K150 coupling is dropped into the gap between the two hooks, securing the barrier ends together. A rubber pad, constructed from EPDM 80 ShA rubber, is inserted and connected in the gap between the toes of adjacent barrier segments. The rubber inserts are approximately 5 1/2 in. (140 mm) tall by 5 1/8 in. (130 mm) wide. The inserts are tapered from thicknesses of 1 5/8 in. (41 mm) to 7/16 in. (11 mm), respectively, for the edge located on the outside face of the barrier as well as the edge located toward the inside of the barrier.</p>		

CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	<p>The analysis of the test results for test no. DB-1 showed that the DB 80 F-shape temporary concrete barrier system adequately contained and redirected the 1100C small car passenger vehicle with controlled lateral displacements of the barrier. No detached elements or fragments showed a potential for penetrating the occupant compartment or presented undue hazard to other traffic. Deformations of, or intrusions into, the occupant compartment that could have caused serious injury did not occur. The test vehicle did not penetrate nor ride over the barrier and remained upright during and after the collision. Vehicle roll, pitch, and yaw angular displacements were deemed acceptable because they did not adversely influence the occupant risk safety criteria nor cause rollover. The vehicle left the high speed camera view before leaving the barrier, thus an exit angle and exit velocity was not obtained. Therefore, test no. DB-1 (test designation no. 3-10) was determined to be acceptable according to the MASH safety performance criteria.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
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:	Midwest Roadside Safety Facility	
Laboratory Contact:	Benjamin J. Dickey	Same as Submitter <input type="checkbox"/>
Address:	2200 Vine Street, Lincoln	Same as Submitter <input type="checkbox"/>
Country:	Nebraska 68583-0853	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Date:	Certificate Number 2937.01; 26th October 2010	

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	Key Words
Number	Date	Designator	
B-233	June 7, 2013	SWC18	F-Shape Portable Concrete Barrier TL-3



Mr. Nicholas Artimovich II.
Roadway Departure Team Room E71-322
Office of Safety Technologies - HSST
Federal Highway Administration
1200 New Jersey Avenue SE
Washington, DC 20590

Code: WOT
E-Mail: thomas.wolf@deltabloc.com
Phone: +43 57715 / 470 - 148
Fax: +43 57715 / 470 - 474

Application for FHWA Acceptance

Dear Mr. Artimovich!

Herewith we apply for a FHWA acceptance for our precast concrete safety barrier system **DB 80 F-Shape 12'6"** for test level **TL3**.

DELTA BLOC International is one of the leading provider of vehicle restraint systems made of precast concrete and has more than 33 licence partners in more than 30 countries in and out of Europe. DELTA BLOC International also has subsidiary companies in Germany, Netherlands, United Kingdom, France and South Africa which are acting directly on their markets. These unique constellation of partnerships and establishments allows DELTA BLOC International to fulfil highest requirements and to support all its partners with up-to-date technologies for production and installation for a long-term. With the experience of more than 15 years in the area of development of vehicle restraint systems and the know-how of more than 80 years in regard of prefabricated concrete elements at the main production facility in Austria, DELTA BLOC International grewed to an independent expert on the field of road safety and to an international contact person for authorities and planers in and out of Europe. Since a couple of years DELTA BLOC International also assists direct or indirect in major projects in Europe.

The DELTA BLOC product range includes application for temporary and permanent use. DELTA BOC differs the line of products: temporary systems, permanent systems, bridge systems and noise barrier systems. On the field of noise barrier systems DELTA BLOC International is the unique provider of combined tested systems. All system types of the DELTA BLOC product range are tested according the European regulation EN1317 and are or will be approved in the respective countries.

For detailed information about the products and activities of DELTA BLOC International please visit also DELTA BLOC's homepage www.deltabloc.com <<http://www.deltabloc.com/>>

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Registered at: LG Wiener Neustadt FN 71175w
Court of law: Wiener Neustadt | UID No.: ATU22408302
Bank account: Raiffeisenbank OÖ | Acc. No.: 2614790 | code: 34000
IBAN: AT4434000 00002614790 | BIC: RZOOAT2L

DELTA BLOC® - This name and the precast concrete safety barrier system it stands for, is in many European countries already a well known and familiar term amongst traffic experts, road authorities and civil engineering companies. This system is already represented by successful license partners in many European countries: Germany, Denmark, Norway, Austria, Switzerland, Luxemburg, Spain, Greece, United Kingdom, Ireland, Poland, Czech Republic, Hungary...

Application

We apply for a FHWA acceptance for our DB 80 F-Shape precast concrete safety barrier system with the length of 12'6".

DB 80 F-Shape 12'6"

Description of the product

The **DB 80 F-Shape** is a temporary, longitudinal safety barrier made of precast concrete. The safety barriers consist of a tension bar, reinforcement and concrete. The single units are connected with a special coupling (*drawing DELTA BLOC (1100C)-V3 sheets 6, 7*).

One unit is 12'-6" (3810 mm) long and is designed in the "F-Shape" profile. The dimensions of the F-Shape profile are base width 1'-10 ¾" (0,58 m) and height 2'-8" (0,81 m). The weight of the single unit is 5026 lb (2280 kg).

The safety barrier is made of concrete, reinforcement bars, welded wire reinforcement, a special tension bar and butt-joint-inserts:

- ▶ concrete (compressive strength min. 5000 psi (34.47 MPa))
- ▶ steel reinforcement (ASTM A615 Grade 60 rebar)
- ▶ K150 coupling and Y-profile (ASTM A570 Grade 36 steel)
- ▶ welded wire reinforcement (ASTM A185 grade 60)
- ▶ special tension bar (ASTM A615 Grade 60 steel)
- ▶ butt-joint-inserts made of EPDM 80 ShA rubber

Description of the crash tests

The safety barrier was tested for the test level TL 3 (tests 1100C and 2270P). The tests have been performed by the Midwest Roadside Safety Facility (MwRSF), Nebraska Transportation Center and the University of Nebraska-Lincoln and are fully described in the MwSRF Research Report No. TRP-03-245-10 dated December 8, 2010.

During the 1100C test there was only a minimal damage of the barrier. The damage of the vehicle was moderate and non of the MASH established deformation limits were violated. The test showed that the DB 80 F-Shape temporary concrete barrier system adequately contained and redirected the 1100C small car passenger vehicle with controlled lateral displacements of the barrier.

Test results 1100C test:

- ▶ Working width 56.8" (1,443 mm)
- ▶ Impact severity 60,58 kip-ft > 51 kip-ft (82,14 kJ > 69,7 kJ)
- ▶ OIV Longitudinal -17,90 ft/s (-5,45 m/s)
- ▶ OIV Lateral 22,60 ft/s (6,89 m/s)
- ▶ ORA Longitudinal -4,61 m/s²
- ▶ ORA Lateral 7,20 m/s²
- ▶ THIV 7,57 km/h

- ▶ PHD 7,71 m/s²
- ▶ ASI value 1,59

During the 2270P test there was only a minimal damage of the barrier. The damage of the vehicle was moderate and non of the MASH established deformation limits were violated. The test showed that the DB 80 F-Shape temporary concrete barrier system adequately contained and redirected the 2270P vehicle with controlled lateral displacements of the barrier.

Test results 2270P test:

- ▶ Working width 76.2" (1,935 mm)
- ▶ Impact severity 125,4 kip-ft > 106 kip-ft (170 kJ > 144 kJ)
- ▶ OIV Longitudinal -15,27 ft/s (-4,65 m/s)
- ▶ OIV Lateral 19,67 ft/s (6,00 m/s)
- ▶ ORA Longitudinal -5,38 m/s²
- ▶ ORA Lateral 12,44 m/s²
- ▶ THIV 7,01 km/h
- ▶ PHD 13,16 m/s²
- ▶ ASI value 1,19

As a result of both tests the DB 80 F-Shape features the following performance:

- ▶ TL 3
- ▶ Working width 76.2" (1,935 mm)
- ▶ OIV Longitudinal -17,90 ft/s (-5,45 m/s)
- ▶ OIV Lateral 22,60 ft/s (6,89 m/s)
- ▶ ORA Longitudinal -5,38 m/s²
- ▶ ORA Lateral 12,44 m/s²
- ▶ THIV 7,57 km/h
- ▶ PHD 13,16 m/s²
- ▶ ASI value 1,59

Accreditation of test laboratory

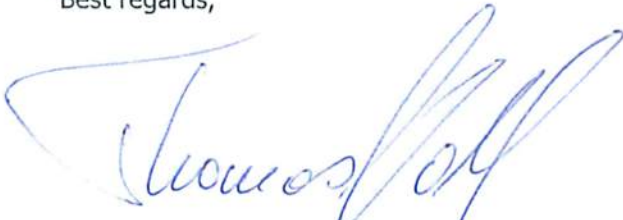
The test laboratory is accredited according American Association for Laboratory Accreditation with the certificate number 2937.01 (*certificate see annex*).

Owner's certification that the product(s) meet(s) the appropriate evaluation criteria in MASH

Two full-scale vehicle crash tests were conducted to evaluate the safety performance of DELTA BLOC International's DB 80 F-shape temporary concrete barrier segments utilized in a 200-ft 8¼-in. (61.2-m) long barrier system. Both tests were conducted and reported in accordance with the Test Level 3 (TL-3) requirements specified in the Manual for Assessing Safety Hardware (MASH). The first crash test consisted of an 1100C small car vehicle (test designation no. 3-10) impacting the free-standing, temporary concrete barrier system at a speed of 62.8 mph (101.1 km/h) and at an angle of 25.0 degrees. The second crash test consisted of a 2270P pickup truck vehicle (test designation no. 3-11) impacting the free-standing, temporary concrete barrier system at a speed of 63.1 mph (101.5 km/h) and at an angle of 25.3 degrees. Following an evaluation of the satisfactory test results, the DB 80 F-shape, temporary concrete barrier was determined to meet the Test Level 3 (TL-3) impact safety standards provided in MASH.

(See page i in the test report stated by MIDWEST ROADSIDE SAFETY FACILITY, Nebraska Transportation Center, University of Nebraska-Lincoln.)

Best regards,



Dipl. Ing. (FH) Thomas Wolf

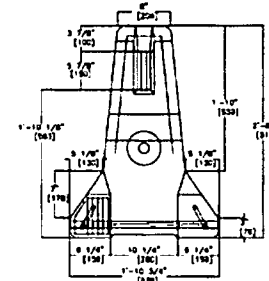
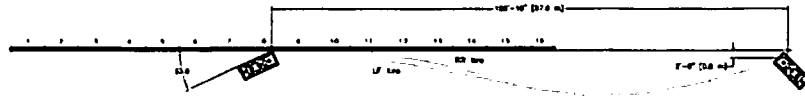
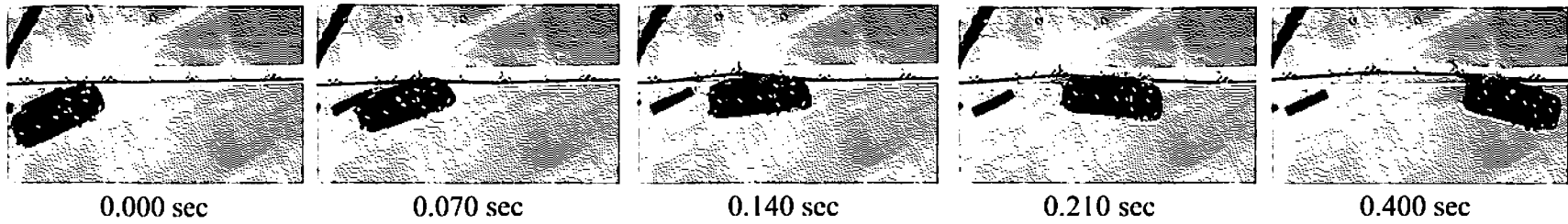
DELTA BLOC International GmbH
International Product Manager

DELTA BLOC International GmbH
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A-2601 Sollenau
Tel.: +43 57715 / 470 473
Fax: +43 57715 / 400 474
office@deltabloc.com

Enclosure: *Test Reports – DB 80 F-Shape 12'6" K150S*
 Accreditation of the test laboratory
 Photos – DB 80 F-Shape 12'6" K150S
 Videos – DB 80 F-Shape 12'6" K150S
 Drawings – DB 80 F-Shape 12'6" K150S (3D isometric line drawing and sales drawing)

TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. TRP-03-245-10		2.		3. Recipient's Accession No.	
4. Title and Subtitle Dynamic Evaluation of the DELTA BLOC DB 80 F-Shape Temporary Concrete Barrier				5. Report Date December 20, 2010	
				6.	
7. Author(s) Dickey, B.J., Faller, R.K., Lechtenberg, K.A., Bielenberg, R.W., Reid, J.D., and Sicking, D.L.				8. Performing Organization Report No. TRP-03-245-10	
9. Performing Organization Name and Address Midwest Roadside Safety Facility (MwRSF) Nebraska Transportation Center University of Nebraska-Lincoln 2200 Vine Street 130 Whittier Research Center Lincoln, Nebraska 68583-0853				10. Project/Task/Work Unit No.	
				11. Contract or Grant (G) No.	
12. Sponsoring Organization Name and Address DELTA BLOC Europa GmbH A Kirchdorfer Fertigteilverwaltungsgesellschaft Wollersdorf, Feuerwerksanstalt Nr.236 A-2752 Wiener Neustadt, Austria, PF 65				13. Type of Report and Period Covered Final Report: 2010 (Revised)	
				14. Sponsoring Agency Code	
15. Supplementary Notes Not applicable					
16. Abstract (Limit: 200 words) Two full-scale vehicle crash tests were conducted to evaluate the safety performance of DELTA BLOC International's DB 80 F-shape temporary concrete barrier segments utilized in a 200-ft 8¼-in. (61.2-m) long barrier system. Both tests were conducted and reported in accordance with the Test Level 3 (TL-3) requirements specified in the <i>Manual for Assessing Safety Hardware</i> (MASH). The first crash test consisted of an 1100C small car vehicle (test designation no. 3-10) impacting the free-standing, temporary concrete barrier system at a speed of 62.8 mph (101.1 km/h) and at an angle of 25.0 degrees. The second crash test consisted of a 2270P pickup truck vehicle (test designation no. 3-11) impacting the free-standing, temporary concrete barrier system at a speed of 63.1 mph (101.5 km/h) and at an angle of 25.3 degrees. Following an evaluation of the satisfactory test results, the DB 80 F-shape, temporary concrete barrier was determined to meet the Test Level 3 (TL-3) impact safety standards provided in MASH.					
17. Document Analysis/Descriptors Highway Safety, Crash Test, Compliance Test, Roadside Appurtenances, MASH, Portable, Temporary, and Concrete Barrier				18. Availability Statement No restrictions. Document available from: National Technical Information Services, Springfield, Virginia 22161	
19. Security Class (this report) Unclassified		20. Security Class (this page) Unclassified		21. No. of Pages 151	22. Price



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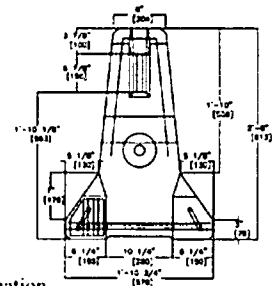
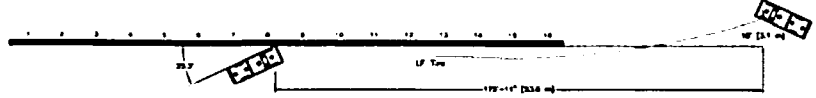
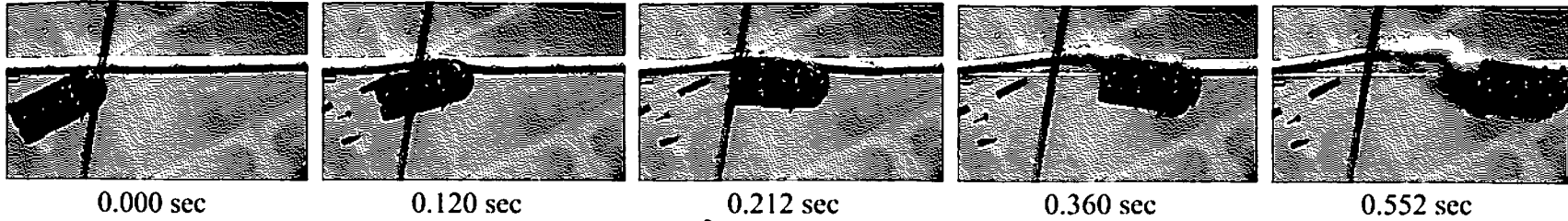
- Test Agency MwRSF
- Test Number DB-1
- Date 8/3/2010
- MASH Test Designation 3-10
- Test Article DB 80 F-Shape Temporary Concrete Barrier
- Total Length 200 ft - 8 3/4 in. (61.17 m)
- Key Component - Concrete Barrier Segment
 - Description F-Shaped Concrete Barrier
 - Length 12 ft - 6 in. (3.81 m)
 - Base Width 1 ft - 10 1/4 in. (0.58 m)
 - Height 2 ft - 8 in. (0.81 m)
- Key Component - Tension Link
 - Description Y-Profile Hook and I-91lapped Coupling
 - Material ASTM A370 Grade 36
 - Hook Length 5 13/16 in. (148 mm)
 - Hook Width 2 11/16 in. (68 mm)
 - Coupling Length 3 13/16 in. (97 mm)
 - Coupling Width 1 9/16 in. (40 mm)
- Vehicle Make /Model 2004 Kia Rio
 - Curb 2,416 lb (1,096 kg)
 - Test Inertial 2,421 lb (1,098 kg)
 - Gross Static 2,590 lb (1,175 kg)
- Impact Conditions
 - Speed 62.8 mph (101.1 km/h)
 - Angle 25.0 deg
 - Impact Location 4 ft - 5 1/4 in. upstream of joint at nos. 8 and 9
- Exit Conditions
 - Speed NA
 - Angle NA
- Exit Box Criterion Pass
- Vehicle Stopping Distance 188 ft - 10 in. (57.6 m) downstream
2 ft - 8 in. (0.8 m) laterally in front
- Vehicle Damage Moderate
 - VDS⁽⁶⁾ 11-LFQ-3
 - CDC⁽⁷⁾ 11-LDEW3
 - Maximum Interior Deformation 2 1/4 in. (57 mm)

- Vehicle Stability Satisfactory
- Test Article Damage Minimal
- Test Article Deflections
 - Permanent Set 22 1/4 in. (565 mm)
 - Dynamic 22 1/4 in. (565 mm)
 - Working Width 45.4 in. (1,153 mm)
- Maximum Angular Displacements
 - Roll -8.3° < 75°
 - Pitch -6.8° < 75°
 - Yaw 49.3°
- Impact Severity (IS) 60.58 kip-ft (82.14 kJ) > 51 kip-ft (69.7 kJ)
- Transducer Data

Evaluation Criteria		Transducer		MASH Limit
		EDR-3	DTS	
OIV ft/s (m/s)	Longitudinal	-17.90 (-5.45)	-16.13 (-4.92)	≤ 40 (12.2)
	Lateral	22.37 (6.82)	22.60 (6.89)	≤ 40 (12.2)
OFA g's	Longitudinal	-4.61	-4.39	≤ 20.49
	Lateral	6.34	7.20	≤ 20.49
THIV - ft/s (m/s)		NA	24.82 (7.57)	not required
PHD - g's		NA	7.71	not required
ASI		1.60	1.59	not required

Figure 23. Summary of Test Results and Sequential Photographs, Test No. DB-1





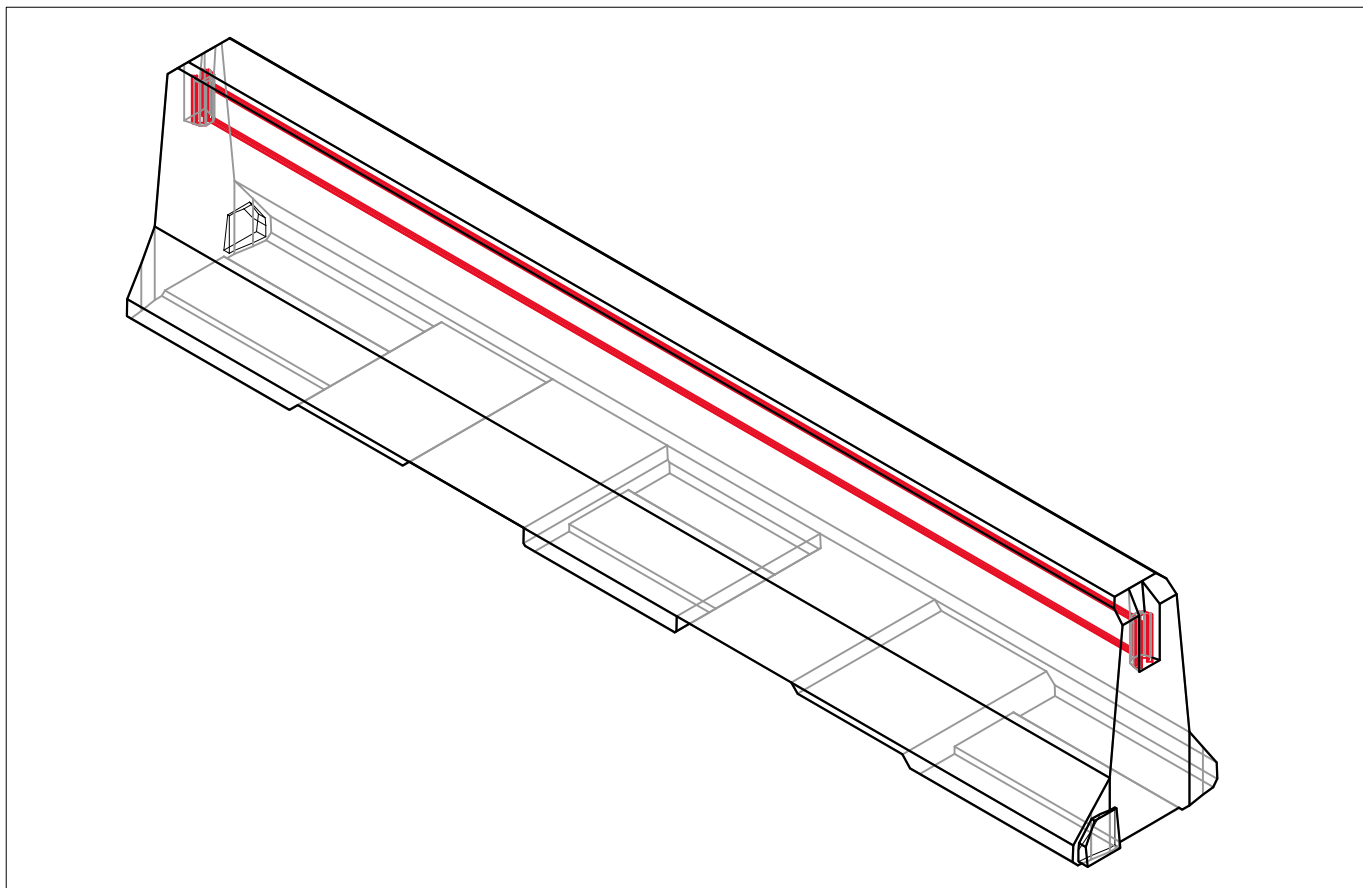
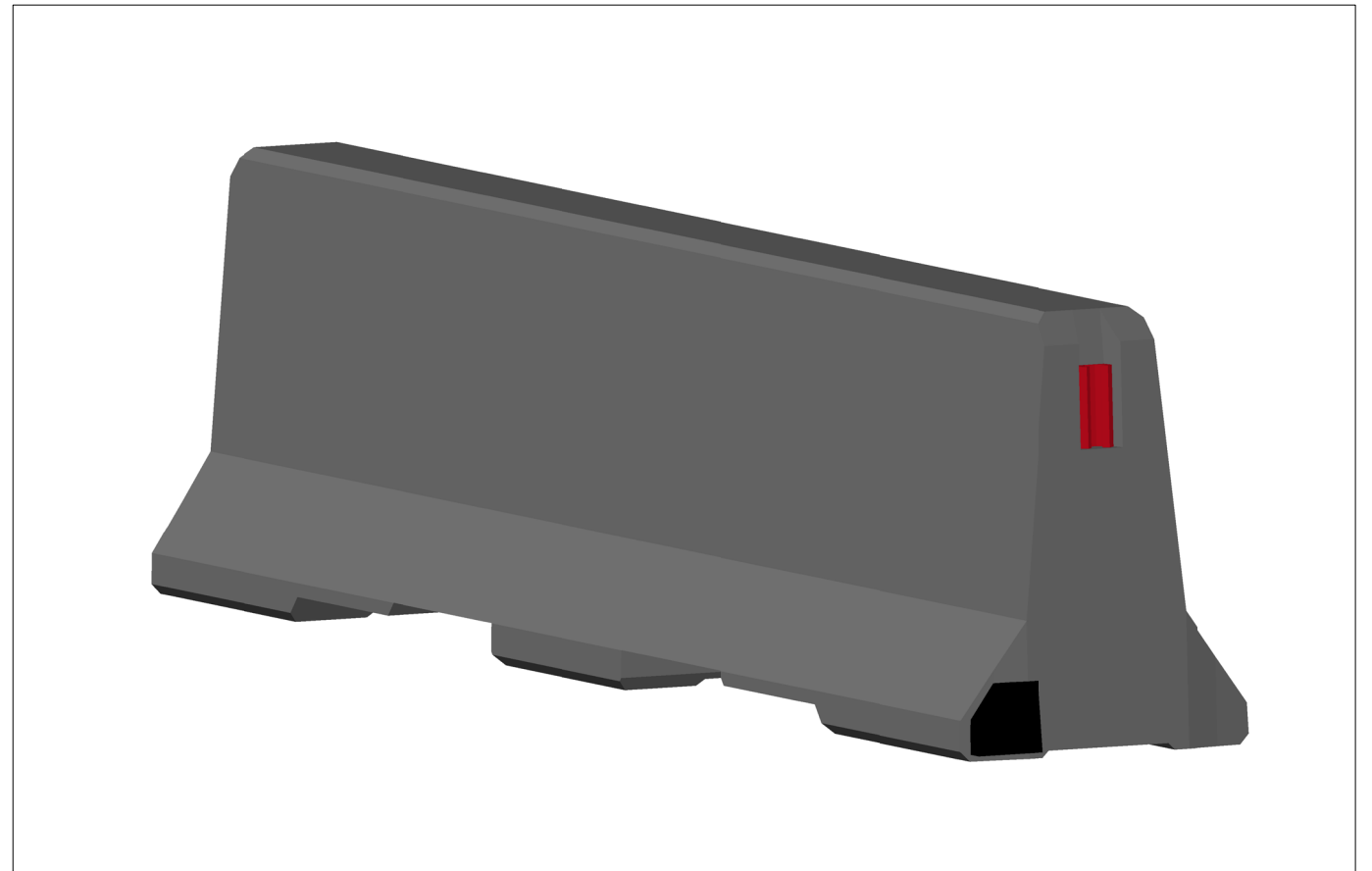
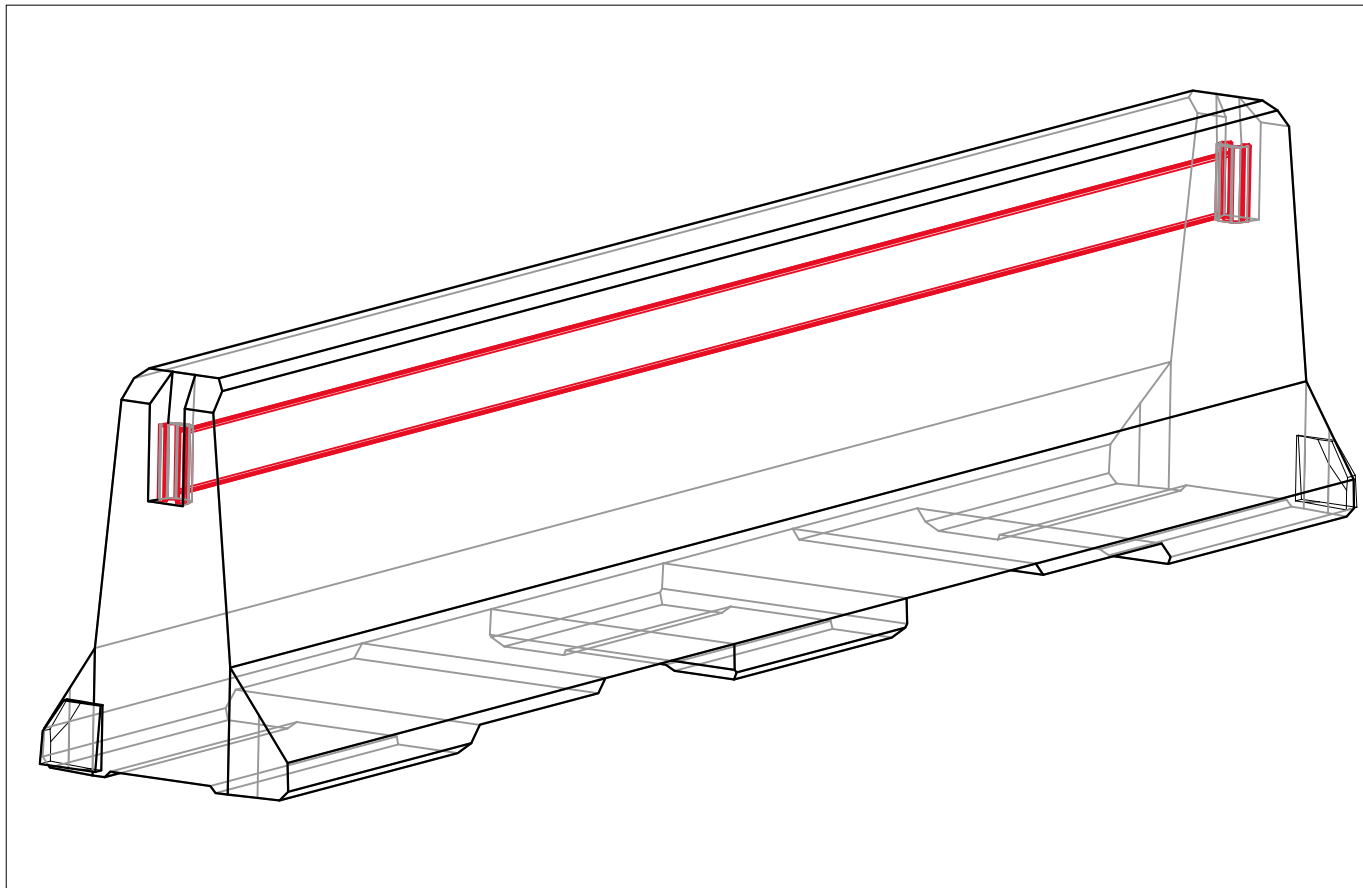
- Test AgencyMwRSF
- Test Number DB-2
- Date 8/5/2010
- MASH Test Designation 3-11
- Test Article DH 80 F-Shape Temporary Concrete Barrier
- Total Length 200 ft - 8 1/4 in. (61.17 m)
- Key Component - Concrete Barrier Segment
 - Description F-Shaped Concrete Barrier
 - Length 12 ft - 6 in. (3.81 m)
 - Base Width 1 ft - 10 1/4 in. (3.15 m)
 - Height 2 ft - 8 in. (0.81 m)
- Key Component - Tension Link
 - Description Y-Profile Hook and I-Shaped Coupling
 - Material ASTM A570 Grade 36
 - Hook Length 5 1/16 in. (148 mm)
 - Hook Width 2 1/16 in. (68 mm)
 - Coupling Length 3 1/16 in. (97 mm)
 - Coupling Width 1 1/16 in. (40 mm)
- Vehicle Make /Model 2004 Dodge Ram
 - Curb 5,145 lb (2,334 kg)
 - Test Inertial 4,995 lb (2,266 kg)
 - Gross Static 5,165 lb (2,343 kg)
- Impact Conditions
 - Speed 63.1 mph (101.5 km/h)
 - Angle 25.3 deg
 - Impact Location 4 ft - 5 1/2 in. upstream of joint at nos. 8 and 9
- Exit Conditions
 - Speed 51.2 mph (82.4 km/h)
 - Angle 2.5 deg
- Exit Box Criterion Pass
- Vehicle Stability Satisfactory
- Vehicle Stopping Distance 175 ft - 11 in. (53.6 m) downstream
10 ft (3.0 m) laterally behind
- Vehicle Damage Moderate
 - VDS^[6] 11-LFQ-3
 - CDC^[7] 11-LDEW2

- Maximum Interior Deformation 1 1/4 in. (32 mm)
- Test Article Damage Moderate
- Test Article Deflections
 - Permanent Set 56 1/4 in. (1,443 mm)
 - Dynamic 56 1/4 in. (1,443 mm)
 - Working Width 76.2 in. (1,935 mm)
- Maximum Angular Displacements
 - Roll NA
 - Pitch NA
 - Yaw NA
- Impact Severity (IS) 125.4 kip-ft (170.0 kJ) > 106 kip-ft (144 kJ)
- Transducer Data


Evaluation Criteria		Transducer	MASH
		EDR-3	Limit
OIV ft/s (m/s)	Longitudinal	-15.27 (-4.65)	≤ 40 (12.2)
	Lateral	19.67 (6.00)	≤ 40 (12.2)
ORA g's	Longitudinal	-5.38	≤ 20.49
	Lateral	12.44	≤ 20.49
THIV - ft/s (m/s)		23.00 (7.01)	not required
PHD g's		13.16	not required
ASI		1.19	not required

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Figure 36. Summary of Test Results and Sequential Photographs, Test No. DB-2



Dimensions:	12'6" / 1'10 ³ / ₄ " / 2'8" (381/58/81 cm)
Weight:	5026 lb (2280 kg)
Material:	Concrete 5,875 psi (40.51 MPa)
Intended use:	Temporary Safety Barrier
Contact info:	E-Mail: office@deltabloc.com

	DB 80 F - SHAPE 3D - view	DATE: 18.03.11
		DRAWING NUMBER: 110318