



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

August 17, 2022

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

In Reply Refer To:  
HSST-1/CC-171

John Annison  
Valmont Highway International Pty Ltd  
57-65 Airds Road  
Minto, NSW, 2566  
Australia

Dear Mr. Annison:

We received your correspondence of January 13, 2021 requesting issuance of a reimbursement eligibility letter under the Federal-aid highway program for the roadside safety system, device, design, product, or hardware (collectively “device”) described below. This letter is assigned Federal Highway Administration (FHWA) control number CC-171.

#### **ELIGIBILITY LETTERS**

The FHWA issues Federal-aid reimbursement eligibility letters for new roadside safety devices that are crash tested in accordance with the industry standard of the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH).

FHWA, the Department of Transportation, and the United States (government) do not regulate roadside safety devices, crash test facilities, or the manufacturing industry. Issuance of eligibility letters is discretionary and provided only as a service to the states. FHWA may, at its discretion, decline to issue, revise, or rescind an eligibility letter. Eligibility letters are only issued by the FHWA headquarters Office of Safety.

Eligibility letters are issued only as notice to the states that a device is eligible for reimbursement under the Federal-aid highway program. They do not establish approval or certification for any other purpose. Issuance of an eligibility letter is not a prerequisite or requirement for state transportation agencies seeking to use Federal-aid funds for roadside safety devices. State agencies may use a device for which an eligibility letter has not been issued and seek Federal-aid reimbursement.

#### **FEDERAL-AID REIMBURSEMENT**

The request for issuance of this letter certified the device was crash tested in accordance with the industry standard of AASHTO’s MASH. This eligibility letter is based on that certification and the material offered in support of its issuance. The device described below is eligible for reimbursement under the Federal-aid highway program.

Name of system: ArmorBuffa  
Type of system: Crash Cushion  
Test Level: Test Level 3  
Testing conducted by: Holmes Solutions LP  
Date of request: January 13, 2021

Information about the device, including material such as the eligibility request, crash test reports, drawings, or images are included in one or more attachment(s) to this letter.

In accordance with FHWA's Memo "Federal-aid Reimbursement Eligibility Process for Safety Hardware Devices" dated November 12, 2015, FHWA will make note of any reported damage to a test vehicle's fuel tank, oil pan, or other feature that might serve as a surrogate of the fuel tank. AASHTO's MASH states "Although not a specific factor in assessing test results, integrity of a test vehicle's fuel tank is a potential concern. It is preferable that the fuel tank remains intact and not be punctured. Damage or rupture of the fuel tank, oil pan, or other feature that might serve as a surrogate of the fuel tank should be reported". The test report included in this submittal states there was minor damage noted to the vehicle oil pan in Tests 3-40, 3-42, and 3-43.

Eligibility letter CC-171 is inapplicable to devices, optional equipment, alternate materials, or other features that were not crash tested in accordance with AASHTO's MASH.

This letter is issued only for the subject device as crash tested under AASHTO's MASH. Later modification(s) of the device are not eligible for Federal-aid reimbursement under this letter. Notice of later modification(s) should be given to transportation agencies, facility owners, and operators (collectively "agencies").

Agencies should be provided appropriate information about the device's design, installation, maintenance, materials, and mechanical properties.

Issuance of this letter is discretionary, and it may be revised or rescinded at FHWA's discretion. This letter is not a determination of compliance with the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) or ownership of any intellectual property rights.

This eligibility letter is not a determination by the government that a crash involving the subject device will result in any particular outcome. It is limited to only the device's eligibility for Federal-aid reimbursement.

### **INTELLECTUAL PROPERTY**

Issuance of this eligibility letter does not convey property rights of any sort nor any exclusive privilege. This letter is not authorization or consent by the government for the use, manufacture, or sale of any patented or proprietary system, device, design, product, or hardware for which the requester is not the patent owner. Eligibility letters are not an expression of any view, position, or determination by the government as to the validity, scope, or ownership of any intellectual property rights to a specific device. These letters do not grant, impute, suggest, or otherwise establish any ownership, distribution, or licensing rights to the requester. The government

expresses no opinion about the intellectual property rights relating to any device for which this or any other eligibility letter is issued.

**PUBLIC DISCLOSURE**

To prevent any misunderstanding, and as discussed above, this eligibility letter is assigned FHWA control number CC-171. It should only be reproduced in full with its attachment(s). This letter and the material offered by the requester supporting its issuance is public information. All eligibility letters and supporting material are subject to public disclosure under the Freedom of Information Act (FOIA). Eligibility letters are available to the public at [https://safety.fhwa.dot.gov/roadway\\_dept/countermeasures/reduce\\_crash\\_severity/](https://safety.fhwa.dot.gov/roadway_dept/countermeasures/reduce_crash_severity/).

If you have any questions please contact Aimee Zhang at [Aimee.Zhang@dot.gov](mailto:Aimee.Zhang@dot.gov).

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:	January 13, 2021	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	John Annison	
	Company:	Valmont Highway International Pty Ltd	
	Address:	57 -65 Airds Road, Minto, NSW, 2566	
	Country:	Australia	
	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.

**Device & Testing Criterion** - Enter from right to left starting with Test Level

1-1-1

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'CC': Crash Cushions, Attenuators, & Terminals	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	ArmorBuffa™	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.

**Individual or Organization responsible for the product:**

Contact Name:	John Annison	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	Valmont Highway International Pty Ltd	Same as Submitter <input checked="" type="checkbox"/>
Address:	57 -65 Airds Road, Minto, NSW, 2566	Same as Submitter <input checked="" type="checkbox"/>
Country:	Australia	Same as Submitter <input checked="" type="checkbox"/>
Enter below all disclosures of financial interests as required by the FHWA 'Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.		
<p>Valmont Highway International Pty Ltd and Holmes Solutions LP share no financial interests between the two organisations. This includes no shared financial interest but not limited to:</p> <ol style="list-style-type: none"> <li>1. Compensation including wages, salaries, commissions, professional fees, or fees for business referrals.</li> <li>2. Research funding or other forms of research support.</li> <li>3. Patents, copyrights, licenses, and other intellectual property interests.</li> <li>4. Business ownership and investment interests.</li> </ol> <p>Holmes Solutions LP completed all of the documented testing activities under a commercial contract with Valmont Highway International Pty Ltd. In accordance with the requirements of ISO 17025, all testing activities completed by Holmes Solutions LP were undertaken free from any undue commercial influence. For the completion of this testing service, Holmes Solutions LP received payment in the form of professional fees. The fees received for the testing activities were not linked to the technical performance of the product nor the outcome of the tests.</p> <p>Holmes Solutions LP does not have, nor ever had, any financial interest in Valmont Highway International Pty Ltd. Holmes Solutions LP does not receive any research funding (or other forms of research support) from Valmont Highway International Pty Ltd.</p>		

## PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware
<p>The ArmorBuffa™ Temporary Crash Cushion is a non-redirective, gating, crash cushion designed to protect the ends of temporary concrete safety barrier from errant vehicles. The ArmorBuffa™ is free standing and does not require anchoring to the road surface, and can be installed on concrete road surfaces (as tested). The ArmorBuffa™ system utilises a steel Transition connection that is bolted to the end of the concrete temporary safety barrier, four water-filled plastic segments with interlocking ends and a Nose Piece to absorb kinetic energy and safely contain or control the penetration trajectory of impacting errant vehicles. The four plastic segments are always filled with water. Each segment contains 185 gallons (700 litres) of water. The plastic segments are interlocked by a galvanised steel twin pin at the joint of each segment, and a wire rope lanyard is linked to each pin to minimise debris. The system has a nominal height of 43.7 inches (1100mm), 20.7 inches (525mm) width, and an effective length of 366.6 inches (9,313mm) for TL-3 when installed on temporary concrete barrier.</p> <p>For this series of MASH TL-3 tests the ArmorBuffa™ Temporary Crash Cushion was attached to 39.4 Feet (12m) of temporary anchored F shaped concrete barrier.</p> <p>ArmorBuffa™ passed the series of tests outlined below (3-40, 3-41, 3-42, 3-43 and 3-44) as defined in the Manual for Assessing Safety Hardware (MASH), Second Edition, 2016.</p>	
<h3>CRASH TESTING</h3>	
<p>By signature below, the Engineer affiliated with the testing laboratory, agrees in support of this submission that all of the critical and relevant crash tests for this device listed above were conducted to meet the MASH test criteria. The Engineer has determined that no other crash tests are necessary to determine the device meets the MASH criteria.</p>	
Engineer Name:	Emerson Ryder
Engineer Signature:	<div style="font-size: 24pt; font-weight: bold; margin: 0;">Emerson Ryder</div> <div style="font-size: 10pt; margin: 0;">Digitally signed by Emerson Ryder Date: 2021.01.15 11:26:56 +13'00'</div>
Address:	7 Canterbury Street, Hornby Christchurch
Country:	New Zealand
	Same as Submitter <input type="checkbox"/>
	Same as Submitter <input type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-30 (1100C)		Non-Relevant Test, not conducted
3-31 (2270P)		Non-Relevant Test, not conducted
3-32 (1100C)		Non-Relevant Test, not conducted
3-33 (2270P)		Non-Relevant Test, not conducted
3-34 (1100C)		Non-Relevant Test, not conducted
3-35 (2270P)		Non-Relevant Test, not conducted
3-36 (2270P)		Non-Relevant Test, not conducted
3-37 (2270P)		Non-Relevant Test, not conducted
3-38 (1500A)		Non-Relevant Test, not conducted

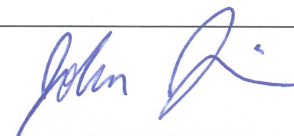
Required Test Number	Narrative Description	Evaluation Results
3-40 (1100C)	<p>The Valmont ArmorBuffa Crash Cushion system successfully contained and brought to a controlled stop, an 1100C test vehicle impacting the test article at 0.0 degrees with a ¼ offset and a velocity of 101.5 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel.</p> <p>Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Working Width was 6.07 m (19.9ft.)</p>	PASS
3-41 (2270P)	<p>The Valmont ArmorBuffa Crash Cushion system successfully contained and brought to a controlled stop, a 2270P test vehicle impacting the test article at 0.0 degrees with a 0 offset and a velocity of 100.5 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel.</p> <p>Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Working Width was 1.20 m (3.9ft.)</p>	PASS
3-42 (1100C)	<p>The Valmont ArmorBuffa Crash Cushion system successfully contained and brought to a controlled stop, an 1100C test vehicle impacting the test article at 5.1 degrees and a velocity of 100.7 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel.</p> <p>Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Working Width was 4.07 m (13.35ft.)</p>	PASS

3-43 (2270P)	The Valmont ArmorBuffa Crash Cushion system successfully contained and brought to a controlled stop, a 2270P test vehicle impacting the test article at 5.4 degrees and a velocity of 100.4 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Working Width was 3.56 m (11.7ft.)	PASS
3-44 (2270P)	The Valmont ArmorBuffa Crash Cushion system successfully contained and brought to a controlled stop, a 2270P test vehicle impacting the test article at 19.9 degrees and a velocity of 99.6 km/h. No debris or detached elements penetrated or showed potential to penetrate the occupant compartment. No fragments were distributed outside of the vehicle trajectory and therefore did not present any undue hazard to other traffic, pedestrians or work zone personnel. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Working Width was 3.21 m (10.5ft.)	PASS
3-45 (1500A)		Non-Critical, not conducted

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:	Holmes Solutions LP	
Laboratory Signature:	<b>Emerson Ryder</b>	Digitally signed by Emerson Ryder Date: 2022.05.12 13:02:02 +12'00'
Address:	7 Canterbury Street Hornby Christchurch	Same as Submitter <input type="checkbox"/>
Country:	New Zealand	Same as Submitter <input type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	1022 ISO/IEC 17025:2017 Client Number 7559 Feb 2022 to Feb 2023	

Submitter Signature\*:



Submit Form

## ATTACHMENTS

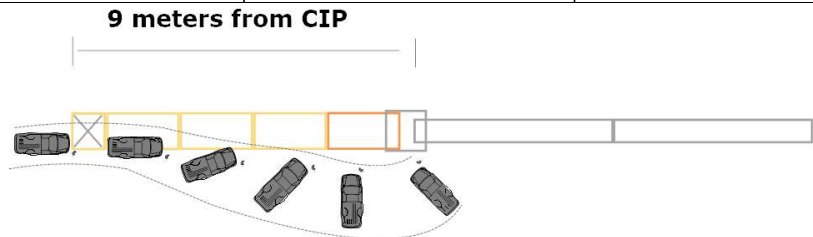
Attach to this form:

- 1) Additional disclosures of related financial interest as indicated above.
- 2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 3) 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 relevant to understanding the dimensions and performance of the device should also be submitted to facilitate our review.

FHWA Official Business Only:

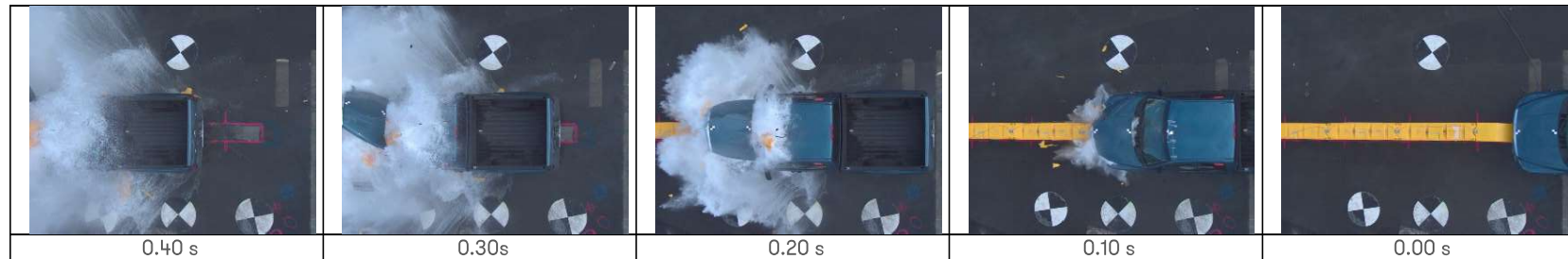
Eligibility Letter		
Number	Date	Key Words



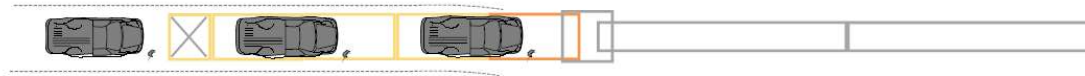


<b>Test Article:</b>	ArmorBuffa Crash Cushion	<b>Post Impact Vehicle Behaviour</b>	
<b>Total Length</b>	21.4 m	Vehicle Stability	Good
<b>Key Elements - Barrier</b>	MASH TL3-40 Test	Stopping Distance	9 metres from CIP
Description	Water Filled Plastic Crash Cushion	<b>Vehicle Snagging</b>	None
Length of Barrier Installation	21.4 m	<b>Vehicle Pocketing</b>	None
Crash Cushion Height	1060 mm	<b>Occupant Impact Velocity (m/s)</b>	at 0.0638 seconds on front of interior
Crash Cushion Overall length	9.313 m	Longitudinal	7.4
<b>Test Vehicle</b>		Lateral (optional)	-0.8
Designation	1100C	<b>Occupant Ride-down Deceleration</b>	
Make/Model	2011 Toyota Yaris Sedan	X-direction (g)	-11.0 (0.0963 - 0.1063 seconds)
Dimensions (LxWxH)	4275 mm x 1620 mm x 1470 mm	Y-direction (g)	-3.6 (0.1160 - 0.1260 seconds)
Curb Wt	1045.0 kg	THIV (optional) (m/s)	7.5 at 0.0636 s on front of interior
Test Inertial Wt	1081.5 kg	PHD (optional) (g)	11.1 (0.0961 - 0.1061 seconds)
Gross Static	1156.5 kg	ASI (optional)	1.13 (0.0007 - 0.0507 seconds)
<b>Impact Conditions</b>		<b>Test Article Damage</b>	Moderate
Speed	101.5 km/h	<b>Test Article Deflections</b>	
Angle	0.0°	Permanent	6.07 m
Impact Point	¼ Offset on the nose covering	Working Width	6.07 m
<b>Exit Conditions</b>		Dynamic Deflection	n/a
Exit Speed:	19.7 km/h	<b>Vehicle Damage Exterior</b>	
Exit Angle:	N/A	VDS	12FD-3
Test Date	20th October 2020	CDC	12FEE3
Test Number	135858.3-40	Maximum Deformation	195 mm



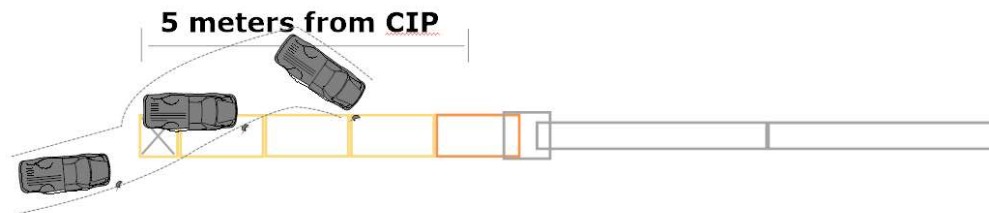


**8 meters from CIP**



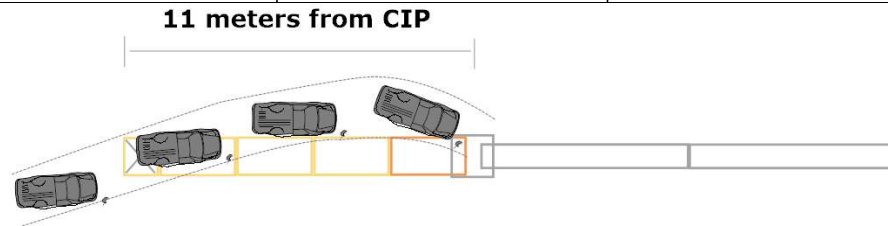
<b>Test Article:</b>	ArmorBuffa Crash Cushion	<b>Post Impact Vehicle Behaviour</b>	
<b>Total Length</b>	21.4 m	Vehicle Stability	Good
<b>Key Elements - Barrier</b>	MASH TL3-41 Test	Stopping Distance	8 metres from CIP
Description	Water Filled Plastic Crash Cushion	<b>Vehicle Snagging</b>	None
Length of Barrier Installation	21.4 m	<b>Vehicle Pocketing</b>	None
Crash Cushion Height	1060 mm	<b>Occupant Impact Velocity (m/s)</b>	at 0.0941 seconds on front of interior
Crash Cushion Overall length	9.313 m	Longitudinal	6.7
<b>Test Vehicle</b>		Lateral (optional)	0.1
Designation	2270P	<b>Occupant Ride-down Deceleration</b>	
Make/Model	2005 Dodge Ram 1500 Quad Cab	X-direction (g)	-9.9 (0.1913 - 0.2013 seconds)
Dimensions (LxWxH)	5735 mm x 1990 mm x 1870 mm	Y-direction (g)	3.0 (0.1097 - 0.1197 seconds)
Curb Wt	2250.5 kg	THIV (optional) (m/s)	6.7 at 0.0941 s on front of interior
Test Inertial Wt	2230.5 kg	PHD (optional) (g)	9.9 (0.1913 - 0.2013 seconds)
Gross Static	2230.5 kg	ASI (optional)	0.81 (0.0193 - 0.0693 seconds)
<b>Impact Conditions</b>		<b>Test Article Damage</b>	Moderate
Speed	100.5 km/h	<b>Test Article Deflections</b>	
Angle	0.0°	Permanent	n/a
Impact Point	Centreline aligned with the nose covering	Working Width	1.20 m
<b>Exit Conditions</b>		Dynamic Deflection	n/a
Exit Speed:	0.0 km/h	<b>Vehicle Damage Exterior</b>	
Exit Angle:	N/A	VDS	12FD-3
Test Date	19th October 2020	CDC	12FEE3
Test Number	135858.3-41	Maximum Deformation	190 mm





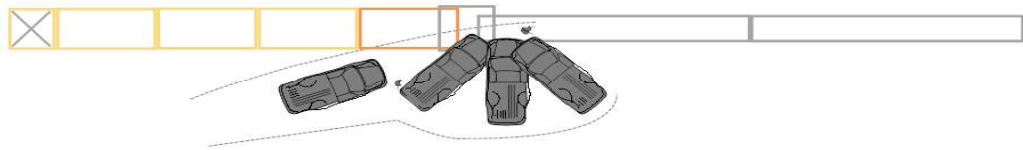
<b>Test Article:</b>	ArmorBuffa Crash Cushion	<b>Post Impact Vehicle Behaviour</b>	
<b>Total Length</b>	21.4 m	Vehicle Stability	Good
<b>Key Elements - Barrier</b>	MASH TL3-42 Test	Stopping Distance	5 metres from CIP
Description	Water Filled Plastic Crash Cushion	<b>Vehicle Snagging</b>	None
Length of Barrier Installation	21.4 m	<b>Vehicle Pocketing</b>	None
Crash Cushion Height	1060 mm	<b>Occupant Impact Velocity (m/s)</b>	at 0.1379 seconds on front of interior
Crash Cushion Overall length	9.313 m	Longitudinal	7.8
<b>Test Vehicle</b>		Lateral (optional)	-0.1
Designation	1100C	<b>Occupant Ride-down Deceleration</b>	
Make/Model	2010 Toyota Yaris Sedan	X-direction (g)	-13.0 (0.1498 - 0.1598 seconds)
Dimensions (LxWxH)	4260 mm x 1690 mm x 1480 mm	Y-direction (g)	-4.3 (0.1551 - 0.1651 seconds)
Curb Wt	1055.0 kg	THIV (optional) (m/s)	7.8 at 0.1379 s on front of interior
Test Inertial Wt	1077.0 kg	PHD (optional) (g)	13.0 (0.1502 - 0.1602 seconds)
Gross Static	1152.0 kg	ASI (optional)	1.20 (0.0816 - 0.1316 seconds)
<b>Impact Conditions</b>		<b>Test Article Damage</b>	Moderate
Speed	100.7 km/h	<b>Test Article Deflections</b>	
Angle	5.1°	Permanent	4.07 m
Impact Point	Centreline aligned with the nose covering	Working Width	4.07 m
<b>Exit Conditions</b>		Dynamic Deflection	n/a
Exit Speed:	0.0 km/h	<b>Vehicle Damage Exterior</b>	
Exit Angle:	N/A	VDS	12FD-3
Test Date	8th October 2020	CDC	12FEE3
Test Number	135858.3-42	Maximum Deformation	185 mm





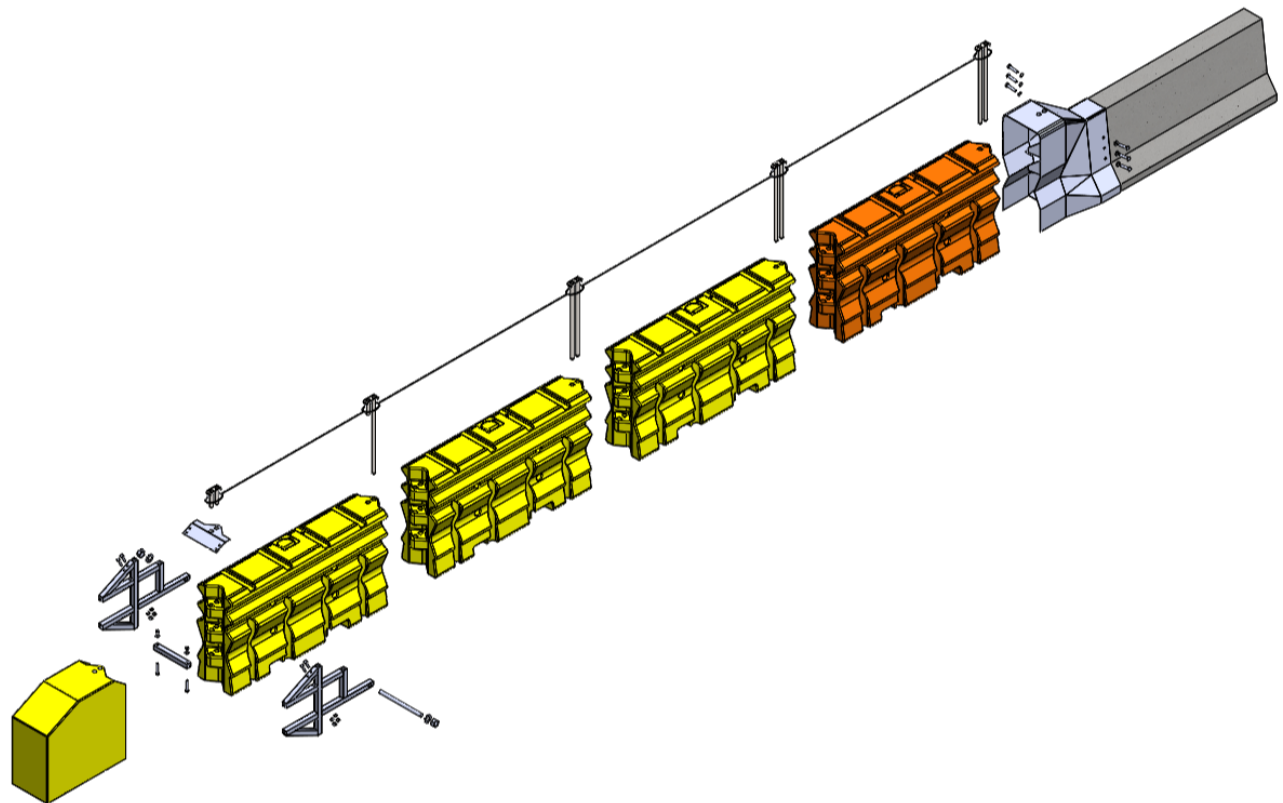
<b>Test Article:</b>	ArmorBuffa Crash Cushion	<b>Post Impact Vehicle Behaviour</b>	
<b>Total Length</b>	21.4 m	Vehicle Stability	Good
<b>Key Elements - Barrier</b>	MASH TL3-43 Test	Stopping Distance	11 metres from CIP
Description	Water Filled Plastic Crash Cushion	<b>Vehicle Snagging</b>	None
Length of Barrier Installation	21.4 m	<b>Vehicle Pocketing</b>	None
Crash Cushion Height	1060 mm	<b>Occupant Impact Velocity (m/s)</b>	at 0.1660 seconds on front of interior
Crash Cushion Overall length	9.313 m	Longitudinal	6.7
<b>Test Vehicle</b>		Lateral (optional)	-0.2
Designation	2270P	<b>Occupant Ride-down Deceleration</b>	
Make/Model	2010 Dodge Ram 1500 Quad Cab	X-direction (g)	-7.9 (0.1881 - 0.1981 seconds)
Dimensions (LxWxH)	5760 mm x 1990 mm x 1900 mm	Y-direction (g)	-2.3 (0.8177 - 0.8277 seconds)
Curb Wt	2331.5 kg	THIV (optional) (m/s)	7.9 at 0.1661 s on front of interior
Test Inertial Wt	2275.5 kg	PHD (optional) (g)	7.9 (0.1880 - 0.1980 seconds)
Gross Static	2275.5 kg	ASI (optional)	0.78 (0.1329 - 0.1829 seconds)
<b>Impact Conditions</b>		<b>Test Article Damage</b>	Moderate
Speed	100.4 km/h	<b>Test Article Deflections</b>	
Angle	5.4°	Permanent	3.56 m
Impact Point	Centreline aligned with the nose covering	Working Width	3.56 m
<b>Exit Conditions</b>		Dynamic	n/a
Exit Speed:	0.0 km/h	<b>Vehicle Damage Exterior</b>	
Exit Angle:	N/A	VDS	12FD-3
Test Date	9th October 2020	CDC	12FEE3
Test Number	135858.3-43	Maximum Deformation	140 mm





<b>Test Article:</b>	ArmorBuffa Crash Cushion	<b>Post Impact Vehicle Behaviour</b>	
<b>Total Length</b>	16.51 m	Vehicle Stability	Good
<b>Key Elements - Barrier</b>	MASH TL3-44	Stopping Distance	2.1 metres from CIP
Description	connected to anchored concrete F Shape	<b>Vehicle Snagging</b>	None
Length of Barrier Installation	16.51 m	<b>Vehicle Pocketing</b>	None
Crash Cushion Height	1100 mm	<b>Occupant Impact Velocity (m/s)</b>	at 0.1737 seconds on front of interior
Crash Cushion Overall length	9.31 m	Longitudinal	14.0
<b>Test Vehicle</b>		Lateral (optional)	-2.1
Designation	2270P	<b>Occupant Ride-down Deceleration</b>	
Make/Model	2013 Dodge Ram 1500 Quad Cab	X-direction (g)	-27.4 (0.1845 - 0.1945 seconds)
Dimensions (LxWxH)	5820 mm x 1995 mm x 1890 mm	Y-direction (g)	-11.5 (0.1801 - 0.1901 seconds)
Curb Wt	2231.5 kg	THIV (optional) (m/s)	14.3 at 0.1732 s on front of interior
Test Inertial Wt	2242.0 kg	PHD (optional) (g)	28.2 (0.1837 - 0.1937 seconds)
Gross Static	2242.0 kg	ASI (optional)	1.79 (0.1523 - 0.2023 seconds)
<b>Impact Conditions</b>		<b>Test Article Damage</b>	Moderate
Speed	99.6 km/h	<b>Test Article Deflections</b>	
Angle	19.9°	Permanent	2.63 m
Impact Point	Centreline of the test vehicle aligned with the corner of Concrete barrier	Working Width	3.21 m
<b>Exit Conditions</b>		<b>Impact Energy (KE)</b>	858.1 kJ
Exit Speed:	0.0 km/h	<b>Vehicle Damage Exterior</b>	
Exit Angle:	N/A	VDS	12FD-4
Test Date	14 <sup>th</sup> April 2022	CDC	12FEE4
Test Number	135858.3-44	Maximum Deformation	80 mm (structural frame rails)





## ArmorBuffa MASH TL3

**valmont**   
HIGHWAY

SHEET NO.

1 OF 2

DATE:

21/01/2021

## INTENDED USE

The ArmorBuffa™ Temporary Crash Cushion is a non-redirective, gating, crash cushion designed protect the ends of temporary concrete safety barrier and temporary steel safety barrier from errant vehicles.

The ArmorBuffa™ is free standing and does not require anchoring to the road surface, and can be installed on concrete road surfaces (as tested) and also asphalt, gravel and dirt road surfaces.

The ArmorBuffa™ system utilises a steel Transition connection that is bolted to the end the concrete or steel temporary safety barrier, four water-filled plastic segments with interlocking ends and a Nose Piece to absorb kinetic energy and safely contain or control the penetration trajectory of impacting errant vehicles.

The four plastic segments are always filled with water. Each segment contains 185 gallons (700 litres) of water. The plastic segments are interlocked by a galvanised steel twin pin at the joint of each segment, and a wire rope lanyard is linked to each pin to minimise debris. The system has a nominal height of 43.7 inches (1100mm), 20.7 inches (525mm) width, and an effective length of 366.6 inches (9,313mm) for TL-3 when installed on temporary concrete barrier or temporary steel barrier.

For this series of MASH TL-3 tests the ArmorBuffa™ Temporary Crash Cushion was attached to 39.4 Feet (12m) of temporary concrete barrier.

ArmorBuffa™ passed the series of tests outlined below (3-40, 3-41, 3-42, 3-43 and 3-44) as defined in the Manual for Assessing Safety Hardware (MASH), Second Edition, 2016.

## CONTACT INFORMATION

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## ArmorBuffa MASH TL3

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