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

May 31, 2019

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

In Reply Refer To:
HSST-1/B-319

Mr. Terry Colquhoun
Safe Direction
Unit 2, 5 Simpson Close
Smeaton Grange NSW, Australia

Dear Mr. Colquhoun:

This letter is in response to your December 5, 2018 request for the Federal Highway Administration (FHWA) to review a roadside safety device, hardware, or system for eligibility for reimbursement under the Federal-aid highway program. This FHWA letter of eligibility is assigned FHWA control number B-319 and is valid until a subsequent letter is issued by FHWA that expressly references this device.

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:

- RamShield w-beam barrier system

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: RamShield w-beam barrier system
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 3 (TL3)
Testing conducted by: Holmes Solutions
Date of request: January 27, 2018
Date of final package: May 19, 2019

FHWA concurs with the recommendation of the accredited crash testing laboratory within the length of need 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-319 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.

- If the subject device is a patented product it may be considered to be 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,

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:	December 05, 2018	(•) New ( ) Resubmission
	Name:	Terry Colquhoun	
	Company:	Safe Direction	
	Address:	Unit 2, 5 Simpson Close, Smeaton Grange NSW	
	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

!-!-!

System Type	Submission Type	Device Name / Variant	Testing Criterion	Test Level
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	(•) Physical Crash Testing ( ) Engineering Analysis	RamShield w-beam barrier system	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:	Terry Colquhoun	Same as Submitter ☒
Company Name:	Safe Direction	Same as Submitter ☒
Address:	Unit 2, 5 Simpson Close, Smeaton Grange NSW	Same as Submitter ☒
Country:	Australia	Same as Submitter ☒

Enter below all disclosures of financial interests as required by the FHWA `Federal-Aid Reimbursement Eligibility Process for Safety Hardware Devices' document.

Holmes Solutions completes testing activities for Safe Direction. For the completion of this service, Holmes Solutions receive payment in the form of professional fees. In no circumstances are the fees received linked to the performance of the product nor the outcome of the tests. In accordance with the requirements of their ISO 17025 accreditation, all testing activities are completed free from undue commercial influence.
Holmes Solutions does not have, nor ever had, any financial interest in Safe Direction, or any of the products that they sell. Holmes Solutions does not receive any research funding (or other forms of research support) from Safe Direction. Holmes Solutions have no patents, copyrights or other intellectual property rights on any of the Safe Direction. Holmes Solutions has no business ownership or investment interest in Safe Direction. No licensing agreements exist between Holmes Solutions and Safe Direction.

PRODUCT DESCRIPTION

(•) New Hardware or Significant Modification ( ) Modification to Existing Hardware

The RamShield barrier system consists of W-beam guardrail supported on sigma section steel line posts at 2 m centres. The height to the top of the guardrail was 730 mm (28.7").
All posts are driven into the AASHTO standard soil at 2 m centres. The W-beam rail elements are connected with lap joints at 4 m centres. The lap joint coincides with every second post location. All lap joints were all orientated so as to reduce snagging in the direction of traffic flow. All lap joints are formed with 8 x M 16 splice bolts and nuts.

CRASH TESTING

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.

Engineer Name:	Emerson Ryder	
Engineer Signature:	Emerson Ryder — Digitally signed by Emerson Ryder Date: 2018.12.06 12:09:43 +13'00'	
Address:	Holmes Solutions LP, Level 2, 254 Montreal Street, Christchurch 8013	Same as Submitter ☐
Country:	New Zealand	Same as Submitter ☐

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-10 (1100C)	The W-beam longitudinal barrier successfully contained and redirected an 1100C test vehicle impacting the test article at 26.0 degrees with a velocity of 98.2 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. The vehicle remained upright during and after the impact and vehicle stability was considered satisfactory. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Dynamic Deflection was 782 mm (30.8") Working Width was 978 mm (38.5")	PASS

Required Test Number	Narrative Description	Evaluation Results
3-11 (2270P)	The W-beam longitudinal barrier successfully contained and redirected a 2270P test vehicle impacting the test article at 25.5 degrees with a velocity of 98.2 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. The vehicle remained upright during and after the impact and vehicle stability was considered satisfactory. Occupant risk factors satisfied the test criteria and the vehicle exit trajectory remained within acceptable limits. Dynamic Deflection was 1.566 m (61.7") Working Width was 1.631 m (64.2")	PASS
3-20 (1100C)		Non-Relevant Test, not conducted
3-21 (2270P)		Non-Relevant Test, 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:	Emerson Ryder — Digitally signed by Emerson Ryder Date: 2018.12.06 12:10:39 +13'00'	
Address:	Holmes Solutions LP, Level 2, 254 Montreal Street, Christchurch 8013	Same as Submitter ☐
Country:	New Zealand	Same as Submitter ☐
Accreditation Certificate Number and Dates of current Accreditation period :	1. Accreditation Certificate Number: 1022 NZS ISO/IEC 17025:2005 2. Accreditation period, valid until April 2018 until April 2019	

Submitter Signature*:

Submit Form

ATTACHMENTS

Attach to this form:

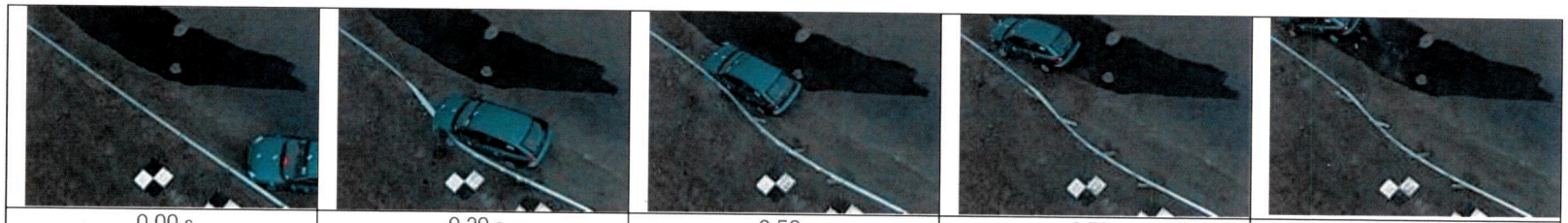
1) Additional disclosures of related financial interest as indicated above.
2) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
3) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [Hardware 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.

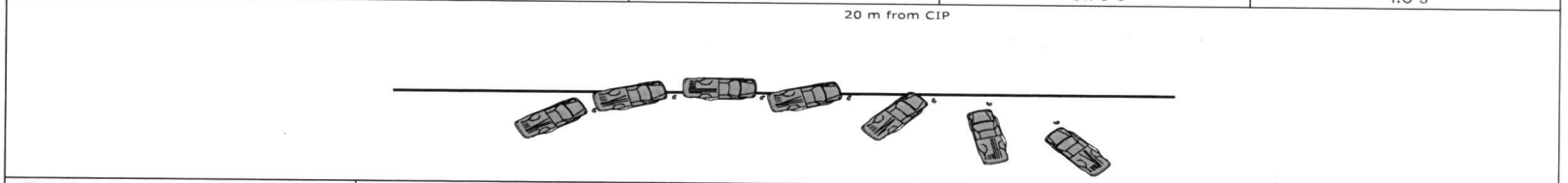
FHWA Official Business Only:

Eligibility Letter		
Number	Date	Key Words

Holmes Solutions

Level 2, 254 Montreal Street
Christchurch Central 8013
PO Box 6718
Upper Riccarton, Christchurch 8442
holmessolutions.com



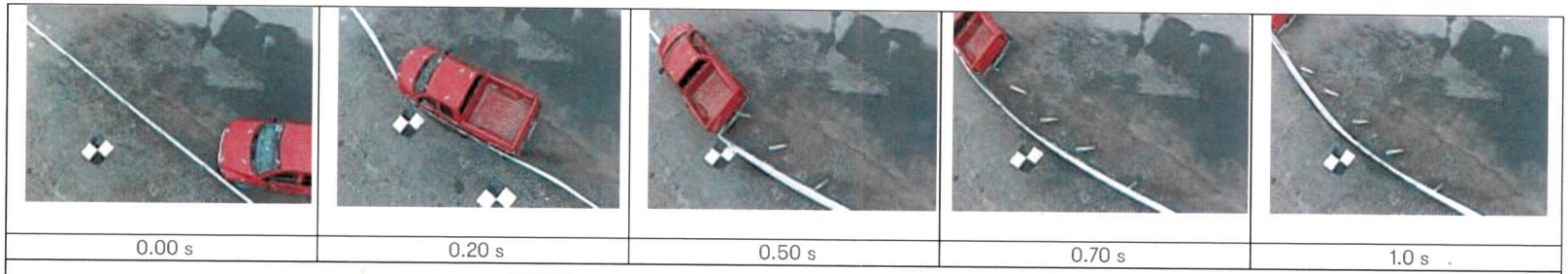


Test Article:	Safe Direction longitudinal W-beam guardrail
Total Length	96.5 m
Key Elements - Barrier	
Description	W-beam barrier installed at 2m Centres
Length of Barrier Installation	Mash 09 Test 3-10
Height	66 meters LON
	730 mm (28.7")
Length of Barrier Segments	2.0 meters nominal
Test Vehicle	
Designation	1100C
Make/Model	Kia Rio
Dimensions (LxWxH)	4140 L x 1690W x 1420H
Curb Wt	1077.0 kg
Test Inertial Wt	1093 kg
Gross Static	1168 kg
Impact Conditions	
Speed	98.2 km/h
Angle	26.0°
Impact Point	300 mm upstream of line post 17
Exit Conditions	
Exit Speed:	Est. 47 km/h
Exit Angle:	15.5.0°
Test Date	10th December 2014
Test Number	113005.02.3-10WB

Post Impact Vehicle Behaviour	
Vehicle Stability	good
Stopping Distance	20.0 metres from CIP
Vehicle Snagging	None
Vehicle Pocketing	None
Occupant Impact Velocity (m/s)	@ 0.2582 seconds on right side of interior
Longitudinal	-4.2 m/s
Lateral (optional)	4.8 m/s
Occupant Ride-down Deceleration	
X-direction (g)	0.6 (0.4311 - 0.4411 seconds)
Y-direction (g)	-7.1 (0.2792 - 0.2892 seconds)
THIV (optional) (m/s)	23.3 km/h at 0.2603 seconds (6.5 m/s)
PHD (optional) (g)	7.1 (0.2792 - 0.2892 seconds)
ASI (optional)	0.67 (0.1236 - 0.1736 seconds)
Test Article Damage	Moderate
Test Article Deflections	
Dynamic	782 mm
Permanent	504 mm
Working Width	978 mm
Vehicle Damage Exterior	
VDS	11FD-3
CDC	11FLEE3
Maximum Deformation	220 mm

Holmes Solutions

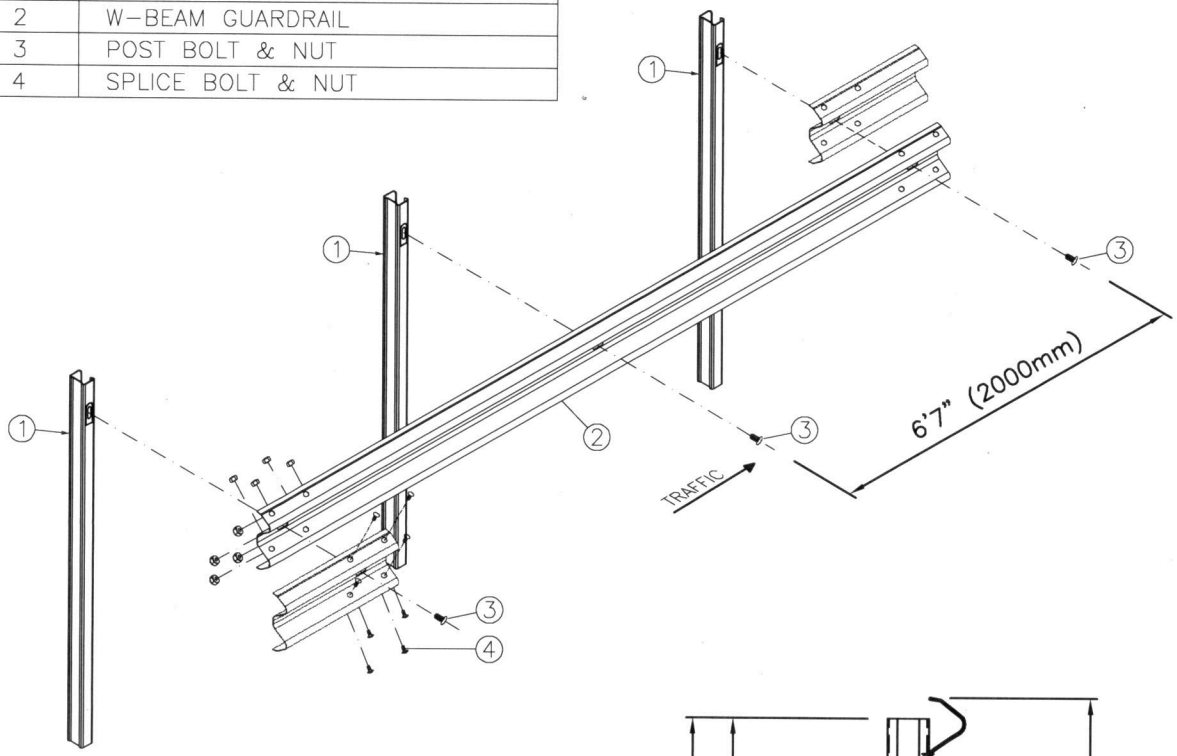
Level 2, 254 Montreal Street
Christchurch Central 8013
PO Box 6718
Upper Riccarton, Christchurch 8442
holmessolutions.com

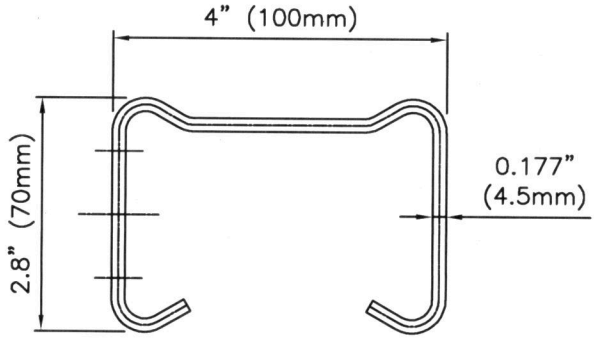


Test Article:	Safe Direction longitudinal W-beam
Total Length	96.5 m
Key Elements - Barrier	
Description	W-beam barrier installed at 2m Centres
Length of Barrier Installation	MASH 09 Test 3-11
Height	66 meters LON
	730 mm (28.7")
Length of Barrier Segments	2.0 meters nominal
Test Vehicle	
Designation	2270P
Make/Model	Dodge Ram 1500
Dimensions (LxWxH)	5890 L x 2040W x 1895H
Curb Wt	2092.0 kg
Test Inertial Wt	2269.0 kg
Gross Static	2269.0 kg
Impact Conditions	
Speed	98.2
Angle	25.5°
Impact Point	517 mm upstream of line post 17
Exit Conditions	
Exit Speed:	Est 42 km/h
Exit Angle:	13.0°
Test Date	8th December 2014
Test Number	113005.01.3-11WB

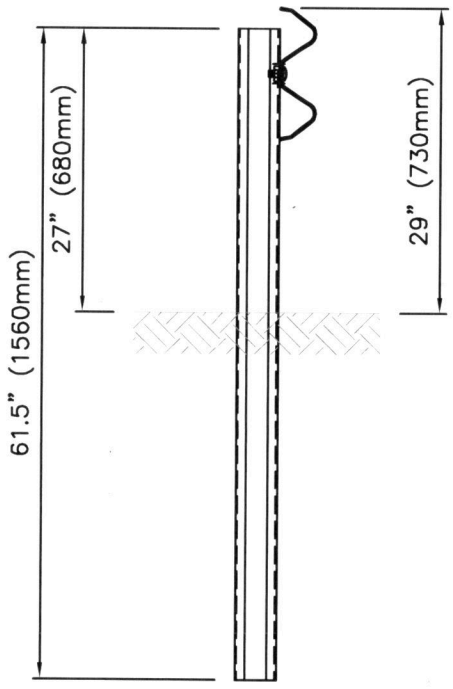
Post Impact Vehicle Behaviour	
Vehicle Stability	good
Stopping Distance	42.0 metres from CIP
Vehicle Snagging	None
Vehicle Pocketing	None
Occupant Impact Velocity (m/s)	@ 0.2691 seconds on right side of interior
Longitudinal	-4.1 m/s
Lateral (optional)	4.6 m/s
Occupant Ride-down Deceleration	
X-direction (g)	3.8 (0.6268 - 0.6368 seconds)
Y-direction (g)	-5.7 (0.4061 - 0.4161 seconds)
THIV (optional) (m/s)	23.4 km/h at 0.2683 seconds (6.5 m/s)
PHD (optional) (g)	5.9 (0.2993 - 0.3093 seconds)
ASI (optional)	0.52 (0.3978 - 0.4478 seconds)
Test Article Damage	Moderate
Test Article Deflections	
Dynamic	1.566 m
Permanent	1.145 m
Working Width	1.631 m
Vehicle Damage Exterior	
VDS	11FL-3
CDC	11LFEE3
Maximum Deformation	150 mm

BILL OF MATERIALS	
ITEM	DESCRIPTION
1	RAMSHIELD POST
2	W-BEAM GUARDRAIL
3	POST BOLT & NUT
4	SPLICE BOLT & NUT





POST PLAN



POST ELEVATION

RAMSHIELD Guardrail

SafeDirection
CRASH BARRIER SOLUTIONS

RAM-WB-01

SHEET No	DATE
1 OF 2	12-12-18

INTENDED USE

RAMSHIELD is a MASH Test Level 3 compliant w–beam guardrail barrier. The system comprises posts at a maximum 6'7" (2m) spacing supporting a w–beam guardrail with top of rail height of 29" (730mm). Each post is 61.5" long (1560mm) and embedded to a depth of 34.6" (880mm). The top of post measures 26.8" (680mm) above ground level rail, approximately 2" (50mm) below the top of rail. The rail splice is located at every 2nd post location.

Each post is fabricated with a mounting tab designed to pull forward and tear from the post during collision. This mechanism provides controlled release of the guardrail from the support posts allowing safe vehicle containment and redirection. The release tab remains attached to the rear of the w–beam guardrail.

RAMSHIELD must be anchored with a suitable end terminal, preferably compliant with MASH Test Level 3. All components are hot dip galvanised.

CONTACT INFORMATION
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Smeaton Grange
NSW 2567, Australia
+61 2 4648 0394
sales@safedirection.com.au
www.safedirection.com.au

RAMSHIELD Guardrail

SafeDirection
CRASH BARRIER SOLUTIONS

RAM–WB–01

SHEET No	DATE
2 OF 2	12–12–18