

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

May 20, 2014

In Reply Refer To: HSST/B-250

Ms. Sydney D. Chase XavierC, LLC 1220 Pennell Drive Glendora California 91740

Dear Ms. Chase:

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:	Non Blocked BMS2-TL3 Single Steel Guardrail
Type of system:	31-inch Tall High Strength W-beam Guardrail on C posts.
Test Level:	MASH Test Level 3
Testing conducted by:	CIDAUT of Spain
Task Force 13 Designator:	SGR51
Date of request:	March 8, 2014
Date of completed package:	April 13, 2014

### **Decision:**

The following device is eligible, with details provided in the form which is attached as an integral part of this letter. This letter applies to the Length of Need of the BMS2-TL3 guardrail. Complete barrier systems need crashworthy terminals to anchor the barrier, and transitions to rigid barriers or bridge rails. The sloped anchors used in the crash tests and shown in the attached drawings adequately anchored the barrier length of need but were not of a crashworthy design.

• Non Blocked BMS2-TL3 Single Steel Guardrail, 31 inch height, W-beam of Grade 70 steel per ASTM A 607, mounted on "C" posts.

Based on a review of crash test results submitted by the manufacturer certifying the device described herein meets the crash test and evaluation 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.

### Requirements

To be found eligible for Federal-aid funding, roadside safety devices should meet the crash test and evaluation criteria contained in the American Association of State Highway and Transportation Officials' Manual for Assessing Safety Hardware (MASH).

### Description

The device and supporting documentation are described in the attached form.

### **Summary and Standard Provisions**

Therefore, the system described and detailed in the attached form 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 does not cover other structural features of the systems, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may influence system conformance with MASH 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 are expected to supply potential users with sufficient information on design and installation 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 the MASH.
- To prevent misunderstanding by others, this letter of eligibility is designated as number B-250 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 FHWA does not become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.
- Steel used in guardrail is a material subject to the Buy America requirements. These requirements, including waiver provisions, are found in Title 23 of the Code of Federal Regulations, Section 635.410. Please note that all manufacturing processes of

steel and iron materials, including the application of coatings for these materials, must occur in the United States.

• The XavierC, LLC, W-beam guardrail system is a patented product 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,

Maluel S. Fallth

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

Enclosures

# Request for Federal Aid Reimbursement Eligibility Of Highway Safety Hardware

	Date of Request:	3-8-2014	New      Resubmission
	Name:	Sydney D. Chase	Signature:
ter	Company:	XavierC, LLC	
Submitter	Address:	1220 Pennell Drive Glendora, CA	
Sub	Country:	USA	
	To:	Michael S. Griffith, Director FHWA, Office of Safety Technologie	15

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, Median, Bridge Railings)	Physical Crash Testing     FEA & V&V Analysis	BMS2-TL3 Single Steel Guardrail	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:	Sydney D. Chase	Same as Submitter 🔀
Company Name:	XavierC, LLC	Same as Submitter 🔀
Address:	1220 Pennell Drive Glendora, CA	Same as Submitter 🔀
Country:	USA	Same as Submitter 🔀

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.

## PRODUCT DESCRIPTION

New Hardware	C Modification to Existing Hardware	
from hot rolled steel shee Class A to base metal, non nominal height of 31" at th with characteristics per AS shoe is made from hot rol	t with the following characteri ninal thickness according to st he top of the embedded post. STM A 36; Class A base metal n led steel sheet per Class 33 to	2-TL3-161213-I-004) consists of W-beam sections made stics: Class 2 Grade 70 to base steel per ASTM A 607; andard AASHTO M 180. W-beam is installed at a The posts are are made from hot rolled steel sheets ominal thickness per AASHTO M 180. The W-Beam end base steel, per ASTM A 570. Guardrail is hot dip o must comply with Type I of Standard Specification
the ground. The splice of t splice are M16X30 round I ASTM A 307 Grade A. The washers according to ISO neck and over the W-bear hot rolled steel sheet of G torque between 30 N.m. a	the W-Beams are bolted to the head bolts; the bolts used to jo hex nuts, M16 per ASTM A 56 7091 minimum hardness of 10 n and squared washer, located rade 33 per ASTM A 570. Bolts nd 50 N.m. All remaining join	set at 6'3" centers. The posts are embedded 36" into face of every other post at 12' 6". The bolts to Join bin W-beam to posts are M16X40 all made of steel per 3 for Class 5. The W-Beam splices shall use round steel 10 Hv. A rectangular plate washer (located under the 1 just under the nut inside the post) are both made of fastening W-Beam to the post shall be tightened with a ts shall be tightened with a torque from 60 N.m. to 80 que from between 130 N.m. to 150 N.m.

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Required Test Number         Narrative Description         Evaluation Results           The results of Test No. E14-0001 (MASH 3-10) conducted January 8, 2014 are found in Report No.0109-131031/01_ENG. A small car (2420 lbs), with a simulated accurant in the left front seat, impacted the non-blocked BMS2-TL3 Single Steel Guardial, installed at a height of 31°, at a speed of 62.5 MPH at an angle of 25.5 degrees. The impact severity was 5.44% greater than the target. At. 404 safter impact the left front comer of vehicle contacted between post no. 15 and 16. Vehicle began to redirect and run parallel to system at post no. 18 at. 260 s. At. 564 s the vehicle lost contact with rail traveling at an exit speed of 35.1 MPH at 10 degrees coming to rest 282.9' downstream toward traffic face of the guardrail at 32.8'.         PASS           Damage to vehicle was moderate. Minimal occupant deformations occurred to the left side floor pan. A maximum transversal deflection of rail was 3.17° and maximum permanent deformation was 2.42; working width 3.93'. All occupant risk measures were well below recommended values, and the test vehicle showed no tendency to roll over. The system comfortably met the criterion of MASH 3-10.           The results of Test No. E13-3032 (MASH 3-11) conducted December 30, 2013 are found in Report No.0109-131031/01_ENG. A pickup truck (5,000 lbs), with a simulated occupant risk measures were well below recommended values, and the test vehicle showed no tendency to roll over. The system comfortably met the criterion of MASH 3-10.           The results of Test No. E13-3032 (MASH 3-11) conducted December 30, 2013 are found in Report No.0109-131031/01_ENG. A pickup truck (5,000 lbs), with a simulated occupant risk measures were well below recommended values, and the test vehicle began to redirect. The left front their on the left side floor pant on th			Page 4 of 5
<ul> <li>8. 2014 are found in Report No.0109-131031/01_ENG. A small car (2420 lbs), with a simulated occupant in the left front seat, impacted the non-biocked BMS2-TL3 Single Steel Guardrali, installed at a height of 31", at a speed of 62.5 MPH at an angle of 25.5 degrees. The impact severity was 5.4% greater than the target. At .044 s after impact the left front comer of vehicle contacted between post no. 15 and 16. Vehicle began to redirect and run parallel to system at post no. 18 at .260 s. At .564 s the vehicle lost contact with rail traveling at an exit speed of 35.1 MPH at 10 degrees coming to rest 282.9' downstream toward traffic face of the guardrali at 32.8'.</li> <li>Damage to vehicle was moderate. Minimal occupant deformations occurred to the left side floor pan. A maximum transversal deflection of 16.0°. Damage to the barrier was moderate and consisted of deformed and disengaged posts, contact marks on post and guardrali, and deformed W-beam rail. Maximum dynamic deflection of rail was 3.17° and maximum permanent deformation was 2.42°; working width 3.93°. All occupant risk measures were well below recommended values, and the text vehicle showed no tendency to roll over. The system comfortably met the criterion of MASH 3-10.</li> <li>The results of Test No. E13-3032 (MASH 3-11) conducted December 30, 2013 are found in Report No.0109-131031/01_ENG. A pickup truck (5000 lbs), with a simulated occupant in the left front seat and installed at a height of 31°, traveling at an impact speed of 62.6 MPH impact the ther of 15.4° CAD and maximum per of the vehicle contacted post no. 15, the vehicle contacted post no. 17 at 0.166 s, and it contacted post no. 20 at 0.485 s. At 0.70 s after impact, the left front time or forta with the BMS2-TL3 Single Steel Guardrali 15.5° at an impact angle of 25.4 degrees. The ethicle contacted post no. 17 at 0.166 s, and it contacted post no. 20 at 0.485 s. At 0.214 s. The left front other of the vehicle loct contacted post no. 17 at 0.166 s, and it contacted pos</li></ul>			Evaluation Results
<ul> <li>30, 2013 are found in Report No.0109-131031/01_ENG. A pickup truck (5,000 lbs), with a simulated occupant in the left front seat and installed at a height of 31", traveling at an impact speed of 62.6 MPH impacted the non-blocked BMS2-TL3 Single Steel Guardrail 15.5' at an impact angle of 25.4 degrees. The left side of the front bumper impacted between post 14 and 15. At 0.040 s after impact, the left front tire contacted post no. 15, the vehicle began to redirect. The left front comer of the bumper of the vehicle contacted post no. 17 at 0.166 s, and it contacted post no. 18 at 0.242 s. The vehicle began traveling parallel with the BMS2-TL3 Single Steel Guardrail at 0.270 s. At 0.370 s after impact, the left front tire contacted the post no. 19; it contacted the post no. 20 at 0.485 s. At 0.614 s, the vehicle lost contact with the rail while traveling at an exit speed and angle of 39.9 MPH and 4.3 degrees. The vehicle came to rest 128.0' downstream of impact and 0.0' toward the traffic face of the rail.</li> <li>Damage to vehicle was moderate. Minimal occupant deformations occurred to the left side floor pan A maximum transversal deflection of .55". Damage to the barrier was moderate and consisted of deformed and disengaged posts, contact marks on post and guardrail, and deformed W-beam rail. Maximum dynamic deflection of rail was 4.06' and maximum permanent deformation was 2.80'; working width 4.75'. All occupant risk measures were well below recommended values, and the text vehicle showed no tendency to roll over. The system comfortably met the criterion of</li> </ul>	3-10 (1100C)	8, 2014 are found in Report No.0109-131031/01_ENG. A small car (2420 lbs), with a simulated occupant in the left front seat, impacted the non-blocked BMS2-TL3 Single Steel Guardrail, installed at a height of 31", at a speed of 62.5 MPH at an angle of 25.5 degrees. The impact severity was 5.4% greater than the target. At .044 s after impact the left front corner of vehicle contacted between post no. 15 and 16. Vehicle began to redirect and run parallel to system at post no. 18 at .260 s. At .564 s the vehicle lost contact with rail traveling at an exit speed of 35.1 MPH at 10 degrees coming to rest 282.9' downstream toward traffic face of the guardrail at 32.8'. Damage to vehicle was moderate. Minimal occupant deformations occurred to the left side floor pan. A maximum transversal deflection of 1.60". Damage to the barrier was moderate and consisted of deformed and disengaged posts, contact marks on post and guardrail, and deformed W-beam rail. Maximum dynamic deflection of rail was 3.17' and maximum permanent deformation was 2.42'; working width 3.93'. All occupant risk measures were well below recommended values, and the test vehicle showed no tendency to roll over. The system comfortably met the criterion of	PASS
	3-11 (2270P)	30, 2013 are found in Report No.0109-131031/01_ENG. A pickup truck (5,000 lbs), with a simulated occupant in the left front seat and installed at a height of 31", traveling at an impact speed of 62.6 MPH impacted the non-blocked BMS2-TL3 Single Steel Guardrail 15.5' at an impact angle of 25.4 degrees. The left side of the front bumper impacted between post 14 and 15. At 0.040 s after impact, the left front tire contacted post no. 15, the vehicle began to redirect. The left front comer of the bumper of the vehicle contacted post no. 16 at 0.124 s. The left front comer of the bumper of the vehicle contacted post no. 17 at 0.166 s, and it contacted post no. 18 at 0.242 s. The vehicle began traveling parallel with the BMS2-TL3 Single Steel Guardrail at 0.270 s. At 0.370 s after impact, the left front tire contacted the post no. 19; it contacted the post no. 20 at 0.485 s. At 0.614 s, the vehicle lost contact with the rail while traveling at an exit speed and angle of 39.9 MPH and 4.3 degrees. The vehicle came to rest 128.0' downstream of impact and 0.0' toward the traffic face of the rail. Damage to vehicle was moderate. Minimal occupant deformations occurred to the left side floor pan A maximum transversal deflection of .55". Damage to the barrier was moderate and consisted of deformed and disengaged posts, contact marks on post and guardrail, and deformed W-beam rail. Maximum dynamic deflection of rail was 4.06' and maximum permanent deformation was 2.80'; working width 4.75'. All occupant risk measures were well below recommended values, and the test vehicle showed no tendency to roll over. The system comfortably met the criterion of	PASS

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### CRASH TESTING

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
3-21 (2270P)		WAIVER REQUESTED

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:	CIDAUT	
Laboratory Contact:	Oscar Blanco Salgado & Jose Alberto De Prado Rodriguez	Same as Submitter 🗌
Address:	Parque Technologico de Boecillo P-209 47151 Boecillo. Valladolid	Same as Submitter 🗌
Country:	SPAIN	Same as Submitter 🗌
Accreditation Certificate Number and Date:	ISO 17025 ENAC Accreditiation No 412/LE858	

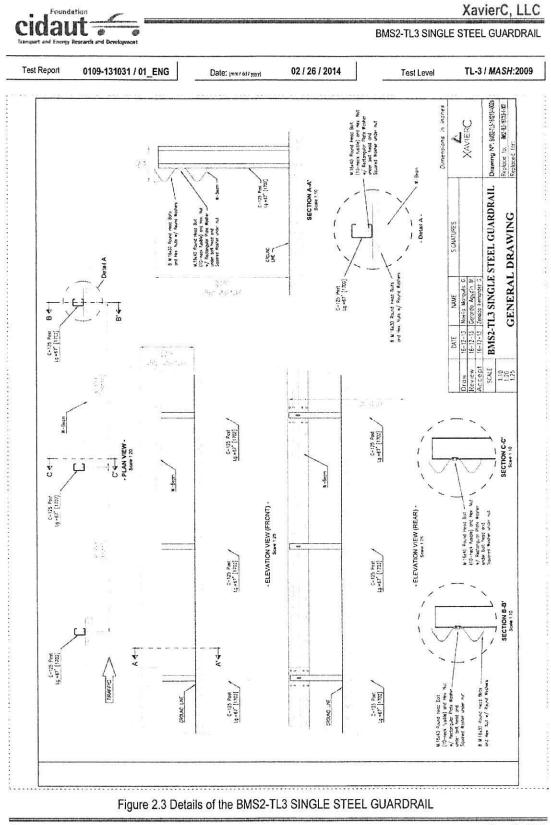
#### ATTACHMENTS

Attach to this form:

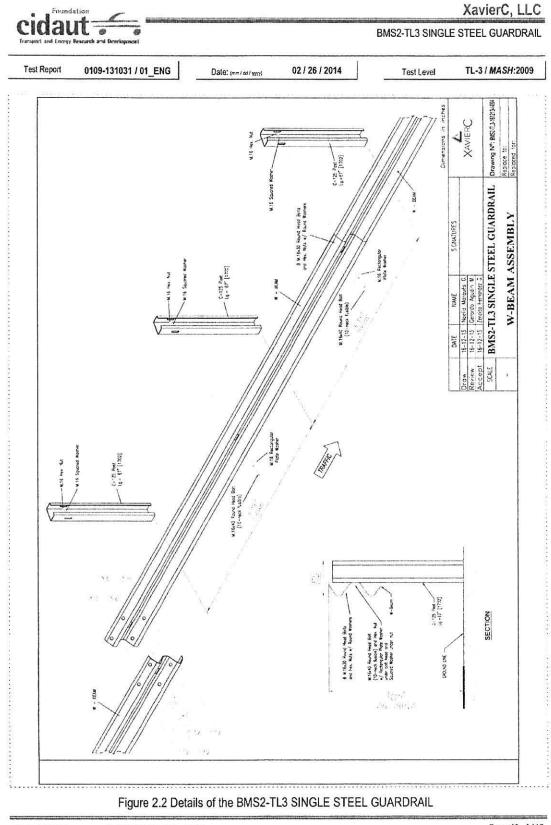
- 1) A copy of the full test report, video, and a Test Data Summary Sheet for each test conducted in support of this request.
- 2) A drawing or drawings of the device(s) that conform to the Task Force-13 Drawing Specifications [Hardware Guide Drawing Standards]. For proprietary products, a single isometric 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:

Eligibili	ty Letter	AASHTO TF13		
Number	Date	Designator	Key Words	
11				



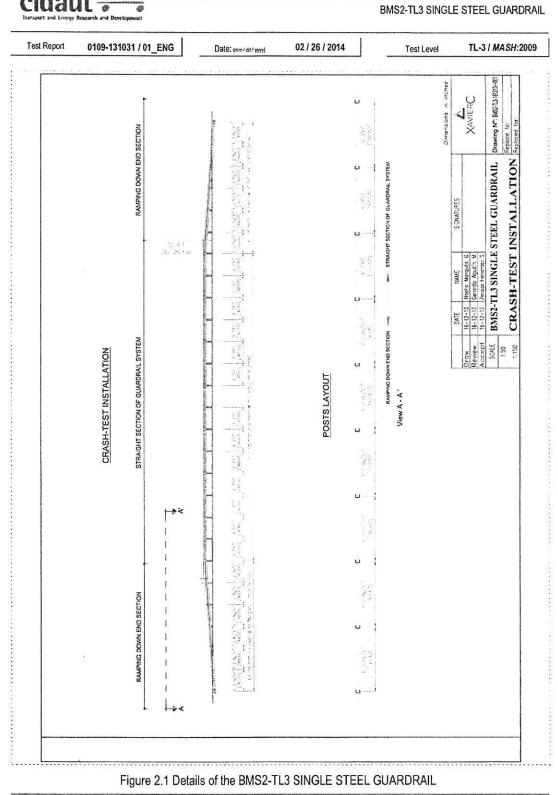
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cidaut -

XavierC, LLC



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F-795

Transport and Energy Research and Dev	n/up files				TL3 SINGLE STEEL GUARD
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eral information		Impact conditions		Post-Impact Trajectory	
est Agency	CIDAUT Road Infrastructure Laboratory	Impact conditions Speed	62.6 mi/h		
st Agency Ist Standard Test No	CIDAUT Road Infrastructure Laboratory 	Impact conditions Speed Angle	62.6 mi/h 25.4 degrees	Post-Impact Trajectory Stopping Distance	128.0 ft downstream 0.0 ft twd traffic face
st Agency st Standard Test No st No.	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 	Impact conditions Speed	62.6 mi/h 25.4 degrees	Post-Impact Trajectory Stopping Distance	0.0 ft twd traffic face
st Agency st Slandard Test No st No. st Date (mm-dd-yyy)	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 	Impact conditions Speed Angle Location/Orientation	62.6 mi/h 25.4 degrees	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle	0.0 ft twd traffic face 35 degrees
st Agency st Standard Test No st No. st Date (mm-dd-yyy) t Article	CIDAUT Road Intrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013	Impact conditions Speed Angle Location/Orientation Exit Conditions	62.6 mi/h 25.4 degreas 15.5 ft upstream of post 17	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Pitch Angle	0.0 ft twd traffic face 35 degrees -11 degrees
st Agency st Standard Test No st No. st Date (mm-dd-yyy) Article pe	CIDAUT Read Infrastructure Laboratory     MASH Test 3-11     E13-3032     12-30-2013     Longtudinal barrier	Impact conditions Speed	62.6 mi/h 25.4 degrees 15.5 fl upstream of post 17 39.9 mi/h	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Pitch Angle	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees
st Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL	Impact conditions Speed	62.6 mi/h 25.4 degrees 15.5 flupstream of post 17 39.9 mi/h 4.3 degrees	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Pich Angle Maximum Roll Angle Vahide Snaging	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No
st Agency st Standard Test No. st No. st Date (mm-dd-yyy) Article pe me italiacion Length	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ff (without terminals)	Impact conditions Speed	62.6 mi/h 25.4 degrees 15.5 flupstream of post 17 39.9 mi/h 4.3 degrees	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Pitch Angle	0.0 ft wed traffic face 35 degrees -11 degrees -16 degrees No
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st Agency st Standard Test No. st No. st Date (mm-dd-yyy) Article pe me italiacion Length	CIDAUT Road Intrastructure Laboratory MASH Test 3-11 E13-3032 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 186 ft (without terninals) W-beam S500MC, 2.67mm thickness C-125 steel post 5235JR, 4.5 mm thickness	Impact conditions Speed	62.6 mi/h 25.4 degrees 15.5 fl upstream of post 17 39.5 mi/h 4.3 degrees PASS	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Rol Angle Maximum Rol Angle Vehicle Stagging Vehicle Posteing Test Article Deflections	0.0 ft twd frantic face 35 degrees -11 degrees -16 degrees No No
st Agency st Standard Test No st No. st Date (mm-dd-yyy) Article pe	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longhudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam \$500MC 2.67mm thickness	Impact conditions Speed	62.6 mi/h 25.4 dagrees 15.5 fl upstream of post 17 39.9 mi/h 4.3 degrees PASS 15.7 ft/s	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yax Angle Maximum Pich Angle Maximum Roll Angle Vahide Snagging Vahide Pocketing	0.0 ft twd traffic face 35 dogrees -11 dogrees -16 dogrees No No No 4.05 ft
st Agency st Slandard Test No st No. st Date (mm-dd-yyy)  Article pe me tallation Length tallation Length tallation Key Elements	CIDAUT Road Infrastructure Laboratory MAISH Test 3-11 E13-3032 12-30-2013 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terrinanis) W-beam #SOUMC. 26 /mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post frangible bolt joint	Impact conditions Speed	62.6 mi/h 25.4 dagrees 15.5 fl upstream of post 17 39.9 mi/h 4.3 degrees PASS 15.7 ft/s	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Roll Angle Vahide Snagging Vehicle Pocketing Test Article Deflections Dynamic	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No No 2.60 ft 2.60 ft
st Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terrinals) W-beam #SOMOK_2.67mm thickness C-125 steel post S235/R, 4.5 mm thickness W-beam = post frangible bolt joint Standard soil, dry Grading B = AASHTO M 147-55 (2004)	Impact conditions Speed Angle Location/Onentation Exit Conditions Speed Angle Exit Conditions Cocupant Risk Values Impact Valocity Long tudinal Lateral Lateral	62.6 mi/h 25.4 dagrees 15.5 fl upstream of post 17 39.9 mi/h 4.3 degrees PASS 15.7 ft/s	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Rol Angle Wahide Snaging Vehicle Pocketing Test Article Deflections Dynamic Permanent	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No No 2.60 ft 2.60 ft
st Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terrinals) W-beam #SOMOK_2.67mm thickness C-125 steel post S235/R, 4.5 mm thickness W-beam = post frangible bolt joint Standard soil, dry Grading B = AASHTO M 147-55 (2004)	Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Conditions Cocupant Risk Values Impact Valocity Longtudinal Lateral Refectown Accelerations	62.6 mi/h 25.4 degrees 15.5 ft upstream of post 17 39.9 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -5.4 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Rol Angle Vehicle Stability Vehicle Anaging Vehicle Pocketing Test Article Deflections Dynamic Permanent Working Width Vehicle damage VDS	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.60 ft 4.75 ft -11FL2
st Agency st Standard Test No	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 Longtidnal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 186 ft (without terminals) W-beam #S00MO: 2.67mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post frangible bolt joint Standard soil, dry Grading 3 – AASHTO M 147-55 (2004) 8-inch lifts tamped with compactor	Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Conditions Exit Concurrent Risk Values Impact Velocity Longtudinal Lateral Ridedown Accelerations Lateral Lateral Lateral Lateral THIV	62.6 mi/h 25.4 degrees 15.5 ft upstream of post 17 39.9 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -15.7 ft/s -5.4 G 7.8 G 22.1 km/h	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yax Angle Maximum Pich Angle Maximum Roll Angle Vahide Brocketing Vahide Pocketing Permanent Permanent Working Width Vahide Manage VDS CDC	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.60 ft 2.60 ft 4.75 ft 11FL2 11FL2 11FL2
st Agency at Slandard Test No	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAL 186 ft (without terrinals) W-beam \$500MC: 2.67mm thickness C-125 steel post \$235JR, 4.5 mm thickness W-beam - post frangible bolt joint Standard soil, dry Grading B - AASHTO M 147-65 (2004) 8-inch lift stanged with compactor 2210P	Impact conditions Speed Angle Location/Onentation Exit Conditions Speed Angle Exit Conditions Cocupant Risk Values Impact Velocity Longstudinal Lateral Ridedown Accelerations Lateral THIV PHD	62.6 mi/h 25.4 degrees 15.5 fl upstream of post 17 39.5 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -15.4 G 7.8 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Rol Angle Wehicle Stopping Vehicle Pocketing Test Article Deflections Dynamic Permanent Working Width Vehicle damage VDS CDC Max. Exteror Deformation	0.0 ft wd traffic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.80 ft 2.80 ft 4.75 ft -11FL2 11FL2W1 11.33 inches
st Agency at Standard Test No	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 12-30-2013 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 186 ft (without terrininals) W-beam S500MC 2.67mm thickness C-125 steel post 5235/R, 4.5 mm thickness W-beam – post franjible bolt joint Standard soil, dry Grading B – AASHTO M 147-65 (2004) 8-Incl. Iffits tamped with compactor 2008 Dodge Ram 1500	Impact conditions Speed Angle Cocation/Orientation Social Social Cocupant Risk Values Impact Velocity Impact Velocity Lateral Ride down Accelerations Long/tudinal Lateral Ride down Accelerations Long/tudinal Lateral THIV PhD ASI	62.6 mi/h 25.4 degrees 15.5 fl upstream of post 17 39.5 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -15.4 G 7.8 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yax Angle Maximum Pich Angle Maximum Roll Angle Vahide Bocketing Vahide Pocketing Dynamic Permanent Permanent Working Width Working Width Vehicle damage VDS CDC CDC Max. Exterior Deformation OCD	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.80 ft 2.80 ft 4.75 ft -11FL2 11FL2 11FL2W11 11.33 inches
st Agency st Slandard Test No	CIDAUT Road Infrastructure Laboratory MAISH Test 3-11 E13-3032 12-30-2013 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 186 ft (without terrinanis) W-beam #SOUMC, 26 /mm thickness C-125 steel post S235/R, 4.5 mm thickness W-beam – post frangible bolt joint Standard soil, dry Grading B – AASHTO M 147-65 (2004) Ø-inch lifts tamped with compactor 2270P 2008 Dodge Ram 1500 S011 ib	Impact conditions Speed Angle Location/Onentation Exit Conditions Speed Angle Exit Conditions Cocupant Risk Values Impact Velocity Longtudinal Lateral Reledown Accelerations Longtudinal Lateral THIV PHD ASI	62.6 mi/h 25.4 degrees 15.5 ft upstream of post 17 39.5 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -15.7 ft/s -15.7 ft/s -15.4 G 7.8 G 22.1 km/h 7.8 G 0.68	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Pich Angle Maximum Roll Angle Vehicle Pocketing Vehicle Pocketing Dynamic Permanent Working Width Vehicle damage VDS CDC Max. Exteror Deformation CCDI Max. Occupant Compartment	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.60 ft 4.75 ft -11FL2 11FL2 11FL2 11.33 inches LF0000000
esi Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-11 E13-3032 Longtudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 186 ft (without terminals) W-beam S500MC, 2.67mm thickness C-125 steel post 5235JR, 4.5 mm thickness W-beam – post franjble boli joint Standard sol, dry Grading B – AASHTO M 147-65 (2004) 0-in/h lifts tamped with compactor 2200 2008 Dodge Ram 1500 5001 b 5002 b	Impact conditions Speed Angle Cocation/Orientation Speed Argle Argle Argle Argle Cocation/Orientation Exit Conditions Speed Argle Cocation/Orientation Cocation Exit Box criteron Cocation Cocat	62.6 mi/h 25.4 degrees 15.5 fl upstream of post 17 39.5 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -15.7 ft/s -5.4 G 7.8 G 22.1 km/h 7.8 G 0.68 -4.3 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yax Angle Maximum Pich Angle Maximum Roll Angle Vahide Bocketing Vahide Pocketing Dynamic Permanent Permanent Working Width Working Width Vehicle damage VDS CDC CDC Max. Exterior Deformation OCD	0.0 ft twd traffic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.60 ft 4.75 ft -11FL2 11FL2 11FL2 11.93 inches LF0000000
neral Information sist Agency sist Agency sist Agency sist Agency sist Date (mm-dd-yyy) at Article ype Asterial or Key Elements sistalation Length Asterial or Key Elements sistalation Length Asterial or Key Elements sistalation of Placement si Vehicle Ype/Designation Asterial Safe and Model Darb Safe Static Sons Static	CIDAUT Road Infrastructure Laboratory     MASH Test 3-11     E13-3032     12-30-2013     Lorghudnal barrier     BMS2-TL3 SINGLE STEEL GUARDRAIL     188 ft (without terminals)     W-beam #SOMOX_2.67mm thickness     C-125 steel post S235/R, 4.5 mm thickness     W-beam – post frangible bolt joint     Standard soil, dry     Grading B – AASHTO M 147-55 (2004)     6-inch lifts tamped with compactor     2270P     2008 Dodge Ram 1500     S011 b     S0021b     No dummy	Impact conditions Speed Angle Location/Onentation Exit Conditions Speed Angle Exit Conditions Cocupant Risk Values Impact Velocity Longtudinal Lateral Reledown Accelerations Longtudinal Lateral THIV PHD ASI	62.6 mi/h 25.4 degrees 15.5 ft upstream of post 17 39.9 mi/h 4.3 degrees PASS 15.7 ft/s -15.7 ft/s -15.7 ft/s -5.4 G 7.8 G 2.2.1 km/h 7.8 G 0.68 -4.3 G 6.0 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yav Angle Maximum Pich Angle Maximum Roll Angle Vehicle Pocketing Vehicle Pocketing Dynamic Permanent Working Width Vehicle damage VDS CDC Max. Exteror Deformation CCDI Max. Occupant Compartment	0.0 ft twd frantic face 35 degrees -11 degrees -16 degrees No No 4.05 ft 2.60 ft 4.75 ft -11FL2 11FL2 11FL5W1 11.33 inches LF0000000

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	5 mph (100 6 km/r) 36 1 mph (56 5 km/r)	14 8 x32 8 (4 5×10 0m)			
rat information		14 8'x32 8' (4 5×10 0m) Impact conditions		Post-Impact Trajectory	
anal information	CIDAUT Road Infrastructure Laboratory	14 85/32 8 [4 5x10 0m] Impact conditions Speed	62.5 mi/h		
eral information at Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-10	14 81:32 81 [4 5x10 0m] Impact conditions Speed Angle	25.5 degrees	Post-Impact Trajectory     Stopping Distance	282.9 ft downstraam 32.8 ft twd traffic face
rat information It Agency It Standard Test No.	CIDAUT Road Infrastructure Laboratory MASH Test 3-10 E14-0001	14 85/32 8 [4 5x10 0m] Impact conditions Speed	25.5 degrees 10.3 fl upstream of post	Post-Impact Trajectory     Stopping Distance Vehicle Stability	32.8 ft twd traffic face
aral information It Agency st Standard Test No It No. st Date (mm-dd-yyy)	CIDAUT Road Infrastructure Laboratory MASH Test 3-10	14 81x22 81 [45x10.0m] Impact conditions Speed Angle Location/Orientation	25.5 degrees	Post-Impact Trajectory Stopping Distance Vahicle Stability Maximum Yew Angle	32.8 ft twd traffic face 35 degrees
eral information It Agency It Standard Test No	CIDAUT Road Infrastructure Laboratory MASH Test 3-10 E14-0001 01-06-2014	14 8°32 8° (45×10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions	25.5 degrees 10.3 fl upstream of post 17	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle	32.8 ft twd traffic face 35 degraes -2 degrees
rat information It Agency IS Standard Test No	CIDAUT Road Infrastructure Laboratory MASHT Test3-10 E14-0001 01-08-2014 Longitudinal barrier	14 8%22 8* (4 5x10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions Speed	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yew Angle Maximum Pitch Angle	32.8 ft wd traffic face 35 degrees -2 degrees 10 degrees
ral information I Agency I Standard Test No	CIDAUT Road Infrastructure Laboratory MASH Test 3-10 E14-0001 01-06-2014 Longitudinal barriar BMS2-TL3 SINGLE STEEL GUARDRAIL	14 8%22 8° (45×10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees	Post-Impact Trajectory Stopping Distance Vahicle Stability Maximum Yaw Angle Maximum Pich Angle Maximum Roll Angle	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No
ral information It Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-fL3 SINGLE STEEL GUARDRAIL 1888 ff (without terminals)	14 8%32 8* (4 5x10 0m) Impact conditions Spead Angle Location/Orientation Exit Conditions Spead Angle Exit Box criterion Exit Box criterion	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yew Angle Maximum Pitch Angle	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No
ral information It Agency	CIDAUT Road Infrastructure Laboratory MASH Test3-10 E14-0001 U-06-2014 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam SSOMC, 2.87mm thickness	14 8%22 8° (45×10 0m) Impact conditions Speed Angle Location/Orientation	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees	Post-Impact Trajectory Stopping Distance Vahicle Stability Maximum Yav Angle Maximum Pitch Angle Maximum Rol Angle Vahicle Snagging Vahicle Pockoting	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No
ral information It Agency	CIDAUT Road Infrastructure Laboratory MASH Test 3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam SS00MC; 2.67mm thickness C-125 steel pois S235JR, 4.5 mm thickness	14 8%22 8 (4 5x10 0m) Impact conditions Speed Location/Orientation Exit Conditions Speed Angle Exit Box criterion Exit Box criterion Coccupant Risk Values Impact Velocity	25.5 degrees 10.3 fl upstream of post 17 35.1 mi/h 10.0 degrees PASS	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Roth Angle Maximum Roth Angle Vehicle Snarging Vehicle Societing Test Article Deflections	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No
ral information It Agency	CIDAUT Road Infrastructure Laboratory MASH Test3-10 E14-0001 U-06-2014 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam SSOMC, 2.87mm thickness	14 8%22 8* (4 5x10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Box criterion Occupant Risk Values Inpact Velocity Longitudinal	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yew Angle Maximum Pich Angle Maximum Rich Angle Vehicle Snagping Vehicle Snagping Vehicle Pocketing Test Article Deflections Dynamic	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft
ral information It Agency	CIDAUT Road Infrastructure Laboratory MASH Text 3-10 E14-0001 01-08-2014 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminale) W-beam S500MC, 2:57mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post frangible bolt joint	14 8%22 8° (45×10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Conditions Speed Cocupant Risk Values Impact Velocity Longitudinal Lateral	25.5 degrees 10.3 fl upstream of post 17 35.1 mi/h 10.0 degrees PASS	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Roch Angle Maximum Roch Angle Vahicle Stopping Vahicle Stopping Vahicle Pockeling Test Article Deflections Dynamic Permanent	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft
ral information It Agency Is Jandard Test No	CIDAUT Road Infrastructure Laboratory MAS/FTes:3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-fL3 SINGLE STEEL GUARDRAIL 188/f (without terminals) W-beam S500MC, 2.67mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post (rangible bolt joint Standard sol, dry	14 8%32 8* (4 5x10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Box criterion Occupant Risk Values Impact Velocity Longitudinal Lateral Riskdown Accelerations	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Pich Angle Maximum Rol Angle Vehicle Stagging Vehicle Pocketing Test Article Deflections Dynamic Permanent Working Width	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft
ral information I Agency I Standard Test No	CIDAUT Road Infrastructure Laboratory MASHT Test 3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-fL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam S500MC, 2.87mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post frangible bolt joint Standard sol, dry Grading B – AASHTO M 147-65 (2004)	14 8%22 8° (45x10 0m) Impact conditions Speed Angle Location/Orientation	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Rich Angle Maximum Rich Angle Vehicle Stability Vehicle Angling Vehicle Pocketing Dynamic Permanont Working Width Vehicle damage	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft , 3.93 ft
rel information It Agency It Standard Test No It Standard Test No It Date (mm-d8-yyy) Article Be	CIDAUT Road Infrastructure Laboratory MAS/FTes:3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-fL3 SINGLE STEEL GUARDRAIL 188/f (without terminals) W-beam S500MC, 2.67mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post (rangible bolt joint Standard sol, dry	14 8%22 8% [4 5x10 0m] Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Box oriferion Coccupant Risk Values Impact Velocity Longitudinal Lateral Ridedown Accelerations Longitudinal Lateral	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s -6.9 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yerk Angle Maximum Rolt Angle Maximum Rolt Angle Vehicle Pocking Test Article Deflections Dynamic Permanent Working Width Vehicle damage VDS	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft 3.93 ft . 11FL4
erel information st Agency	CIDAUT Road Infrastructure Laboratory MASHT Test 3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-fL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam S500MC, 2.87mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post frangible bolt joint Standard sol, dry Grading B – AASHTO M 147-65 (2004)	14 8%22 8* (4 5x10 0m) Impact conditions Speed Angle Location/Orientation	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s -8.9 G 8.3 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yex Angle Maximum Rich Angle Vehicle Snagping Vehicle Snagping Vehicle Deflections Dynamic Permanent Working Width Vehicle damage VDS CDC	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft 3.93 ft .11FL4 11LFE4 11LFE42
erel information st Agency	CIDAUT Road Infrastructure Laboratory MASHT Test 3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-FL3 SINGLE STEEL GUARDRAIL 188 ft (kithout terminals) W-beam post Gragible bolt joint Standard sol, dry Grading B – AASHTO M 147-65 (2004) 6-Inch lifts tamped with compactor	14 8%22 8% [4 5x10 0m] Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Box oriferion Coccupant Risk Values Impact Velocity Longitudinal Lateral Ridedown Accelerations Longitudinal Lateral	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s -6.9 G 8.3 G 25.2 km/h	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yaw Angle Maximum Rich Angle Maximum Rich Angle Vehicle Snarging Vehicle Socketing Test Article Deflections Dynamic Permanont Working Width Vehicle damage VDS CDC Max. Exterior Deformation	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft .3.93 ft .11FL4 11FEW2 6.97 inches
ral information It Agency It as and and the set of the	CIDAUT Road Infrastructure Laboratory MASH Test 3-10 E14-0001 01-08-2014 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminals) W-beam SS00MC; 2.67mm thickness C-125 steel post 5235JR, 4.5 mm thickness W-beam – post frangible bolt joint Standard sol, dry Grading B – AASHTO M 147-65 (2004) 6-inch lifts tamped with compactor 11000C	14 8%22 8% [4 5x10 0m] Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Box orierion Coccupant Risk Values Impact Velocity Longitudinal Lateral Ridedown Accelerations Longitudinal Lateral THV PHD	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s -6.9 G 8.3 G 26.2 km/h 10.2 G	Post-Impact Trajectory Stopping Distance Vehicle Stability Maximum Yex Angle Maximum Rich Angle Vehicle Snagping Vehicle Snagping Vehicle Deflections Dynamic Permanent Working Width Vehicle damage VDS CDC	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft .3.93 ft .11FL4 11FEW2 6.97 inches
aral information at Agency arat information at Agency at No. at Date (mm-d0-yy) at Date (	CIDAUT Road Infrastructure Laboratory MAS/FTes:3-10 E14-0001 01-06-2014 Longitudinal barrier BMS2-fL3 SINGLE STEEL GUARDRAIL 1828 ft (without terminals) W-beam S500MC; 2.67mm thickness C-125 steel post S235JR, 4.5 mm thickness W-beam – post frangible bolt joint Standard sol, dry Grading B – AAS/FTO M 147-65 (2004) 6-inch lifts tamped with compactor 1100C 2003 Kia Rio Sedan	14 8%22 8% (4 5x10 0m) Impact conditions Spead Angle Location/Orientation Exit Conditions Spead Angle Exit Box criterion Coccupant Risk Values Impact Velocity Longitudinal Lateral Ristedown Accelerations Longitudinal Lateral THIV PHD ASI Max. 0.050-s Average Longitudinal	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s -6.9 G 8.3 G 26.2 km/h 10.2 G	Post-Impact Trajectory Stopping Distance Wehicle Stability Maximum Yew Angle Maximum Rol Angle Maximum Rol Angle Vehicle Stagging Vehicle Pocketing Test Article Deflections Dynamic Permanent Working Width Vehicle damage VDS CDC Max. Exterior Deformation OCDI	32.8 ft hvd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft .3.93 ft .11FL4 111FEV2 6.97 inches LF0001000
APACT PATH and information st Agency st Standard Test No	CIDAUT Road Infrastructure Laboratory MASH Text 3-10 E14-0001 01-08-2014 Longitudinal barrier BMS2-TL3 SINGLE STEEL GUARDRAIL 188 ft (without terminale) W-beam - post frangible bott joint Standard sol, dry Grading B - AGSHTO M 147-55 (2004) 6-Inch lifts tamped with compactor 1100C 2003 Kia Rio Sedan 2376 lb	14 81:52 61 (4 5x10 0m) Impact conditions Speed Angle Location/Orientation Exit Conditions Speed Angle Exit Conditions Coccupant Risk Values Impact Velocity Longitudinal Lateral Ridedown Accelerations Longitudinal Lateral THIV PHD ASI 0.050-6 Average	25.5 degrees 10.3 ft upstream of post 17 35.1 mi/h 10.0 degrees PASS 22.0 ft/s -16.1 ft/s -6.9 G 8.3 G 28.2 km/h 10.2 G 0.76	Post-Impact Trajectory     Stopping Distance     Vehicle Stability     Maximum Yex Angle     Maximum Rol Angle     Maximum Rol Angle     Vehicle Stability     Vehicle According     Test Article Deflections     Dynamic     Permanont     Working Width     Vehicle damage     VDS     CDC     Max Exterior Deformation     OCDI     Max Occupant Compartment	32.8 ft twd traffic face 35 degrees -2 degrees 10 degrees No No 3.17 ft 2.42 ft .3.93 ft .11FL4 111FEW2 6.97 inches LF0001000

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