



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

June 3, 2020

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

In Reply Refer To:
HSST-1/B-337

Mr. Fernando Montesinos Alarcon
Industrias Duero, S.L.
Gonzalez Davila, 1-28031 Madrid
Spain

Dear Mr. Montesinos:

This letter is in response to your December 18, 2019 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-337 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:

- BLIDTL4C2-MASH

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: BLIDTL4C2-MASH
Type of system: Longitudinal Barrier
Test Level: MASH Test Level 4 (TL4)
Testing conducted by: CIDAUT.
Date of request: December 18, 2019

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

Full Description of the Eligible Device

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

Notice

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

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

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

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

Standard Provisions

- To prevent misunderstanding by others, this letter of eligibility designated as FHWA control number B-337 shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed upon request.
- This letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder.
- This FHWA eligibility letter is not an expression of any Agency view, position, or determination of validity, scope, or ownership of any intellectual property rights to a specific device or design. Further, this letter does not impute any distribution or licensing rights to the requester. This FHWA eligibility letter determination is made based solely on the crash-testing information submitted by the requester. The FHWA reserves the right to review and revoke an earlier eligibility determination after receipt of subsequent information related to crash testing.

Sincerely,

A handwritten signature in blue ink that reads "Michael S. Griffith". The signature is written in a cursive style with a large initial "M".

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 18, 2019	<input checked="" type="radio"/> New <input type="radio"/> Resubmission
	Name:	FERNANDO MONTESINOS ALARCON	
	Company:	INDUSTRIAS DUERO, S.L.	
	Address:	GONZALEZ DAVILA, 1 - 28031 MADRID	
	Country:	SPAIN	
	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
'B': Rigid/Semi-Rigid Barriers (Roadside, Median, Bridge Railings)	<input checked="" type="radio"/> Physical Crash Testing <input type="radio"/> Engineering Analysis	BLIDTL4C2-MASH	AASHTO MASH	TL4

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:	FERNANDO MONTESINOS ALARCON	Same as Submitter <input checked="" type="checkbox"/>
Company Name:	INDUSTRIAS DUERO, S.L.	Same as Submitter <input checked="" type="checkbox"/>
Address:	GONZALEZ DAVILA, 1 - 28031 MADRID	Same as Submitter <input checked="" type="checkbox"/>
Country:	SPAIN	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.		
CIDAUT completes testing activities for INDUSTRIAS DUERO S.L. For the completion of this serving, CIDAUT 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. CIDAUT does not have, nor ever had, any financial interest in INDUSTRIAS DUERO S.L. or any of the products that they sell.		

PRODUCT DESCRIPTION

<input checked="" type="radio"/> New Hardware or Significant Modification	<input type="radio"/> Modification to Existing Hardware
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BLIDTL4C2-MASH is a guardrail barrier system comprising thrie-beam rails supported by steel posts and including steel spacers.

BLIDTL4C2-MASH posts are made from hot rolled steel sheets and cold formed to a C cross section 130x80x25mm with characteristics per S355JR according to EN ISO 10025 and with a nominal thickness of 5mm. Posts are installed to an above ground height of 35,8in [910mm] at 79in [2000mm] centres. Posts are hot dip galvanized according to EN ISO 1461.


Thrie-beam rails are made from hot rolled steel sheets with the following characteristics: steel S355JR according to EN ISO 10025 and 2.5mm nominal thickness. The nominal height to top of the rail is 38,6in [980mm]. Rails are hot dip galvanized according to EN ISO 1461.

Spacers are made of steel S355JR according to EN ISO 10025 and 5mm nominal thickness. The spacers are bolted to the posts using Hexagonal Head Bolts M16x40 class 8.8. Hexagonal nuts M16 are class 8. A rectangular plate 100x35x5mm of steel S275JR according to EN ISO 10025 is mounted between the post face and nut.

Bolts fastening the thrie-beam rails to the spacers are hexagonal head bolts M10x40 class 8.8. A rectangular plate 100x35x5mm is located under the head of the bolt and a flat washer M10 is located between the spacer and a M10 nut class [8]. Bolts fastening thrie-beam rails are round head bolts M16x30 class 8.8 and shall be tightened with a torque between 140Nm to 160Nm. Bolts used in the joints between the posts and the spacers shall be tightened with a torque from 90Nm to 110Nm. Bolts fastening the thrie-beam rails to the spacers shall be tightened with a torque between 35Nm to 45Nm.

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:	J. ALBERTO DE PRADO	
Engineer Signature:		
Address:	P.T. Boecillo. 47454-Boecillo-VALLADOLID	Same as Submitter <input type="checkbox"/>
Country:	SPAIN	Same as Submitter <input checked="" type="checkbox"/>

A brief description of each crash test and its result:

Required Test Number	Narrative Description	Evaluation Results
4-10 (1100C)	<p>MASH 4-10 Test No. E19-1533 Test Date - November 6th, 2019 Test Report No. 1910-191024 / 02_ENG The TL4 MASH SAFETY BARRIER "BLIDTL4C2-MASH" contained and redirected the 1100C vehicle. The vehicle did not penetrate, underride, or override the installation. Maximum dynamic deflection during the test was 3.04 ft. No detached elements, fragments, or other debris were present to penetrate or to show potential for penetrating the occupant compartment, or to present hazard to others. Maximum occupant compartment deformation was 1.26 inches in the front-left lateral panel area. The 1100C vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 11 degrees and 2 degrees, respectively. Occupant risk factors were within the preferred limits specified in MASH. The 1100C vehicle exited within the exit box specifications.</p>	PASS
4-11 (2270P)	<p>MASH 4-11 Test No. E19-1532 Test Date - October 31st, 2019 Test Report No. 1910-191024 / 02_ENG The TL4 MASH SAFETY BARRIER "BLIDTL4C2-MASH" contained and redirected the 2270P vehicle. The vehicle did not penetrate, underride, or override the installation. Maximum dynamic deflection during the test was 3.34 ft. No detached elements, fragments, or other debris were present to penetrate or to show potential for penetrating the occupant compartment, or to present hazard to others. Maximum occupant compartment deformation was 1.14 inches in the front-left floor pan area. The 2270P vehicle remained upright during and after the collision event. Maximum roll and pitch angles were 15 degrees and 3 degrees, respectively. Occupant risk factors were within the preferred limits specified in MASH. The 2270P vehicle exited within the exit box specifications.</p>	PASS

Required Test Number	Narrative Description	Evaluation Results
4-12 (10000S)	MASH 4-12 Test No. E19-1531 Test Date - October 28th, 2019 Test Report No. 1910-191024 / 02_ENG The TL4 MASH SAFETY BARRIER "BLIDTL4C2-MASH" contained and redirected the 10000S vehicle. The vehicle did not penetrate, underride, or override the installation. Maximum dynamic deflection during the test was 4.06 ft. No detached elements, fragments, or other debris were present to penetrate or to show potential for penetrating the occupant compartment, or to present hazard to others. Maximum occupant compartment deformation was 2.64 inches in the left cockpit area. The 10000S vehicle remained upright during collision event and it overturns over the barrier and breaks the continuity of the longitudinal element as a result of a second impact, once the vehicle has already been redirected. Maximum roll and pitch angles were -87 degrees and -59 degrees, respectively. Occupant risk factors were within the preferred limits specified in MASH. The 10000S vehicle exited within the exit box specifications.	PASS
4-20 (1100C)	Transition test is not applicable for the BLIDTL4C2-MASH Barrier.	Non-Relevant Test, not conducted
4-21 (2270P)	Transition test is not applicable for the BLIDTL4C2-MASH Barrier.	Non Relevant Test, not conducted
4-22 (10000S)	Transition test is not applicable for the BLIDTL4C2-MASH Barrier.	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:	Fundación CIDEMAT	
Laboratory Signature:		
Address:	P.T. Rocillo - 47151 Rocillo - VALLADOLID	Same as Submitter <input type="checkbox"/>
Country:	SPAIN	Same as Submitter <input checked="" type="checkbox"/>
Accreditation Certificate Number and Dates of current Accreditation period :	ENAC (IILAC-ARA) - 420/LE858 Date: 02 April 2004 to present	

Submitter Signature*:

Submit Form

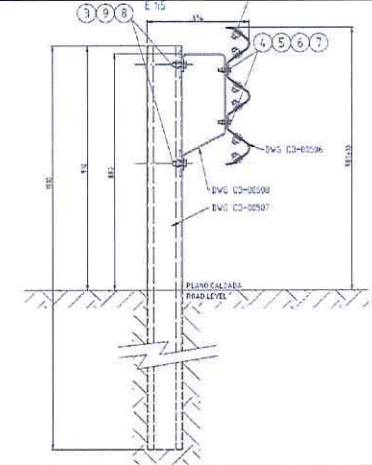
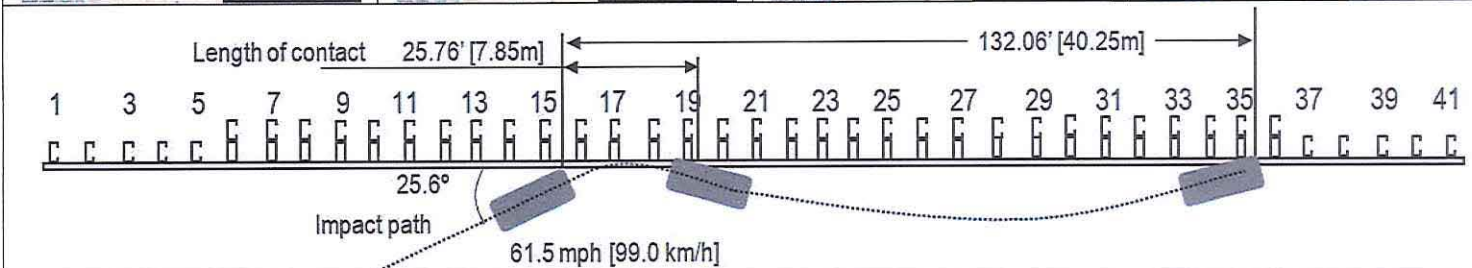
ATTACHMENTS

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



General information

Test Agency CIDAUT
 Test Standard Test No. MASH Test 4-10
 Test No. E19-1533
 Test Date (mm-dd-yyyy) 11-06-2019

Test Article

Type Longitudinal barrier
 Name "BLIDL4C2-MASH"
 Installation Length 210,0 ft (without terminals)
 Material or Key Elements Thrie beam – C130 Post

Soil

Soil type and condition Standard soil, dry
 Type of soil Grading B – AASHTO M147-65 (2004)
 Description of Placement 6-inch lifts tamped with compactor

Test Vehicle

Type/Designation 1100C
 Make and Model 2006 Kia Rio Sedan
 Curb 2441 lb
 Test Inertial 2473 lb
 Dummy 165 lb
 Gross Static 2639 lb

Impact conditions

Speed 61.5 mph
 Angle 25.6 degrees
 Location/Orientation 10.7 ft upstream of post 17

Exit Conditions

Speed 26.6 mph
 Angle 16.4 degrees
 Exit Box criterion PASS

Occupant Risk Values

Impact Velocity
 Longitudinal 22.6 ft/s
 Lateral -17.3 ft/s
 Ridedown Accelerations
 Longitudinal -12.0 G
 Lateral 8.4 G
 THIV 29.2 km/h
 PHD 13.6 G
 ASI 0.97
 Max. 0.050-s Average
 Longitudinal -8.1 G
 Lateral 6.0 G
 Vertical -2.9 G

Post-Impact Trajectory

Stopping Distance 132.06 ft downstream
 0.00 ft twd traffic face

Vehicle Stability

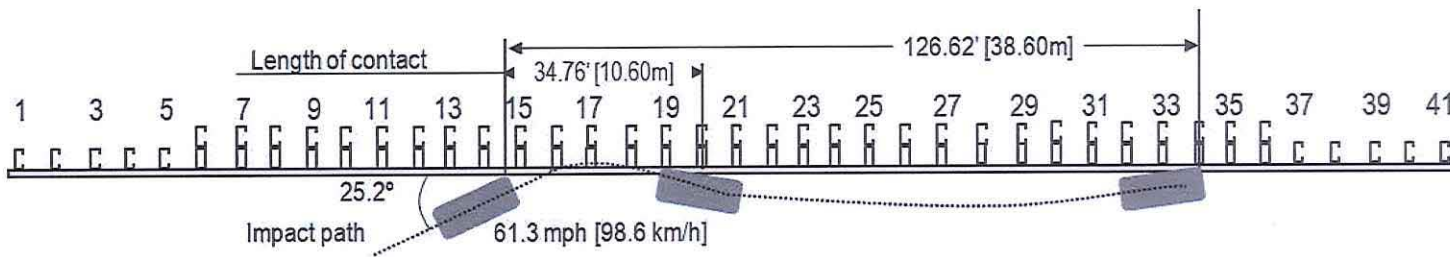
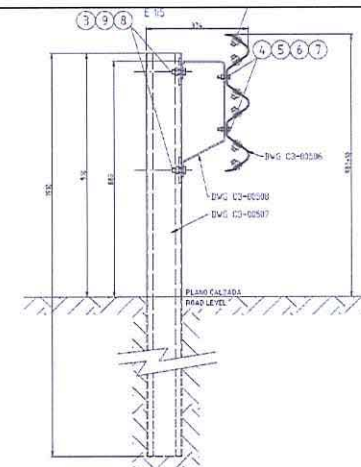
Maximum Yaw Angle 32 degrees
 Maximum Pitch Angle 2 degrees
 Maximum Roll Angle 11 degrees
 Vehicle Snagging No
 Vehicle Pocketing No

Test Article Deflections

Dynamic 3.04 ft
 Permanent 1.36 ft
 Working Width 3.70 ft

Vehicle damage

VDS 11LFQ3
 CDC 11FYEW2
 Max. Exterior Deformation 9.06 inches
 OCDI ND0000000
 Max. Occupant Compartment
 Deformation 1.26 inches



General information

Test Agency CIDAUT
Test Standard Test No. MASH Test 4-11
Test No. E19-1532
Test Date (mm-dd-yyyy) 10-31-2019

Test Article

Type Longitudinal barrier
Name "BLIDL4C2-MASH"
Installation Length 210,0 ft (without terminals)
Material or Key Elements Thrie beam – C130 Post

Soil

Soil type and condition Standard soil, dry
Type of soil Grading B – AASHTO M147-65 (2004)
Description of Placement 6-inch lifts tamped with compactor

Test Vehicle

Type/Designation 2270P
Make and Model 2013 Dodge Ram 1500
Curb 4969 lb
Test Inertial 5013 lb
Dummy No dummy
Gross Static 5013 lb

Impact conditions

Speed 61.3 mph
Angle 25.2 degrees
Location/Orientation 15.1 ft upstream of post 17

Exit Conditions

Speed 36.2 mph
Angle 9.8 degrees
Exit Box criterion PASS

Occupant Risk Values

Impact Velocity
Longitudinal 14.2 ft/s
Lateral -16.8 ft/s
Ridedown Accelerations
Longitudinal -11.7 G
Lateral 7.3 G
THIV 23.3 km/h
PHD 12.0 G
ASI 0.68
Max. 0.050-s Average
Longitudinal -4.9 G
Lateral 5.3 G
Vertical -1.9 G

Post-Impact Trajectory

Stopping Distance 126.62 ft downstream
0.00 ft twd traffic face

Vehicle Stability

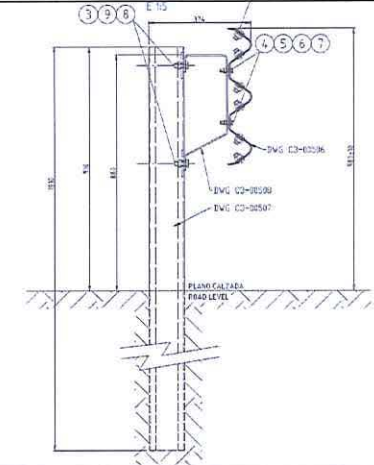
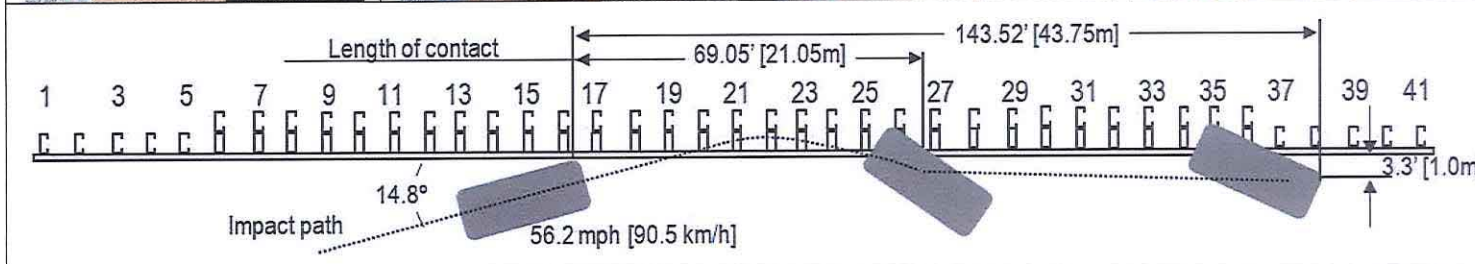
Maximum Yaw Angle 29 degrees
Maximum Pitch Angle 3 degrees
Maximum Roll Angle 15 degrees
Vehicle Snagging No
Vehicle Pocketing No

Test Article Deflections

Dynamic 3.34 ft
Permanent 1.83 ft
Working Width 3.64 ft

Vehicle damage

VDS 11FL2
CDC 11FYEW2
Max. Exterior Deformation 15.28 inches
OCDI ND0000000
Max. Occupant Compartment
Deformation 1.14 inches



General information

Test Agency CIDAUT
 Test Standard Test No. MASH Test 4-12
 Test No. E19-1531
 Test Date (mm-dd-yyyy)..... 10-28-2019

Test Article

Type Longitudinal barrier
 Name "BLIDTL4C2-MASH"
 Installation Length 210,0 ft (without terminals)
 Material or Key Elements Thrie beam – C130 Post

Soil

Soil type and condition Standard soil, dry
 Type of soil..... Grading B – AASHTO M147-65 (2004)
 Description of Placement..... 6-inch lifts tamped with compactor

Test Vehicle

Type/Designation 10000S
 Make and Model 1990 Renault M-230
 Curb 14296 lb
 Test Inertial 22172 lb
 Dummy No dummy
 Gross Static 22172 lb

Impact conditions

Speed 56.2 mph
 Angle 14.8 degrees
 Location/Orientation..... 5.7 ft upstream of post 17

Exit Conditions

Speed - mph
 Angle - degrees
 Exit Box criterion..... PASS

Occupant Risk Values

Impact Velocity
 Longitudinal 5.3 ft/s
 Lateral -9.5 ft/s
 Ridedown Accelerations
 Longitudinal -2.8 G
 Lateral 5.2 G
 THIV 11.5 km/h
 PHD 5.4 G
 ASI 0.60
 Max. 0.050-s Average
 Longitudinal -2.1 G
 Lateral 4.2 G
 Vertical 4.9 G

Post-Impact Trajectory

Stopping Distance 143.52 ft downstream
 3.3 ft twd traffic face

Vehicle Stability

Maximum Yaw Angle 57 degrees
 Maximum Pitch Angle -59 degrees
 Maximum Roll Angle -87 degrees
 Vehicle Snagging No
 Vehicle Pocketing No

Test Article Deflections

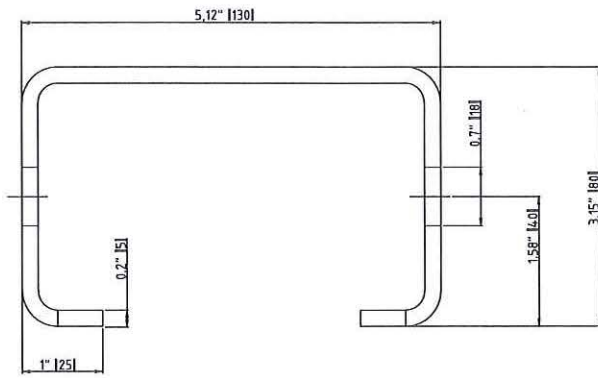
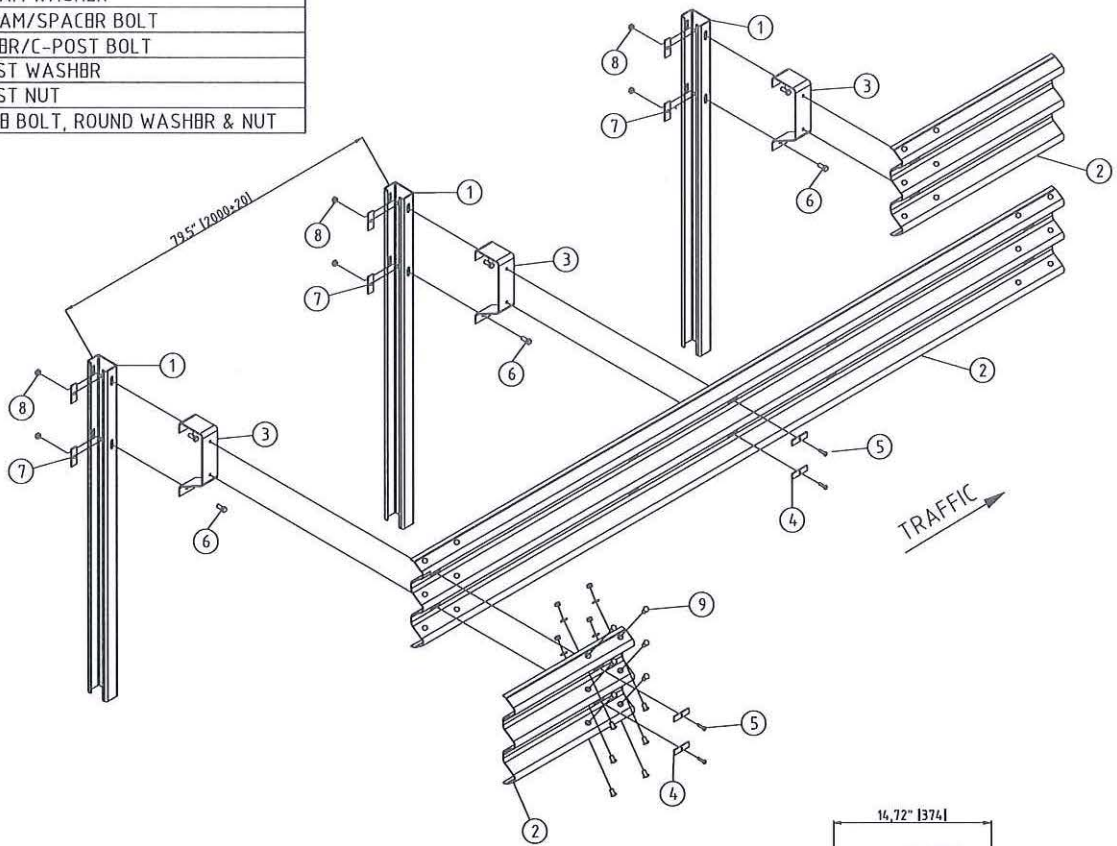
Dynamic 4.06 ft
 Permanent 1.98 ft
 Working Width 7.86 ft

Vehicle damage

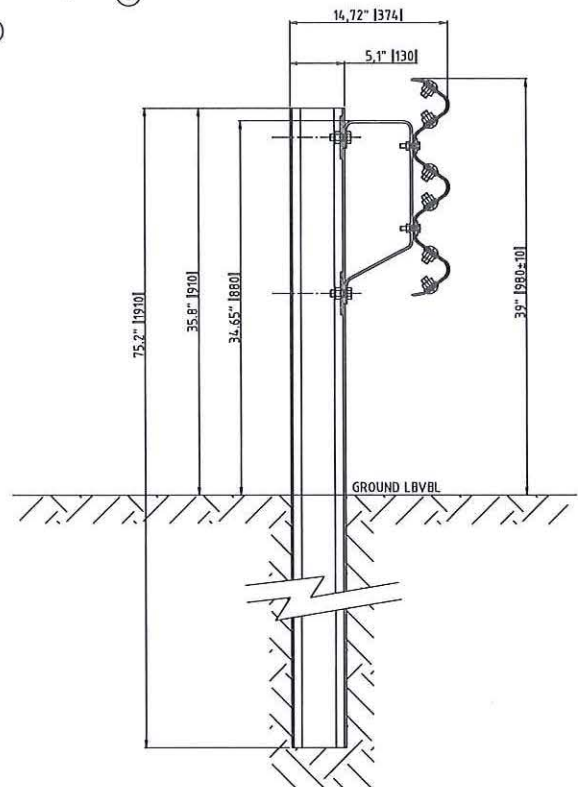
VDS 11L&T2
 CDC 11FLEW6
 Max. Exterior Deformation 10.47 inches
 OCDI LF1000100
 Max. Occupant Compartment
 Deformation 2.64 inches

BILL OF MATERIALS

1	C- POST
2	W-BBAM GUARDRAIL
3	SPACBR
4	W-BBAM WASHBR
5	W-BBAM/SPACBR BOLT
6	SPACBR/C-POST BOLT
7	C-POST WASHBR
8	C-POST NUT
9	SPLICR BOLT, ROUND WASHBR & NUT



C-POST PLAN



C-POST ELEVATION



TL4 MASH COMPILANT BARRIER

BLIDTL4C2-MASH

SHOBT No
1 OF 2

DATE
16/12/19

INTENDED USE

BLIDTL4C2-MASH is a fully compliant TL4 MASH longitudinal guardrail barrier system and it can be used in TL4 design locations where maximum dynamic deflection of 4.06ft. or less is acceptable. BLIDTL4C2-MASH system must be anchored with a suitable terminal system. The system post spacing is 79 inches [2000mm].

COMPONENTS (unit length 157 in [4000 mm])

Component	Quantity
Thrie-beam rail 4320mm	1
Post C130x80x25x5	2
Spacer thickness 5mm	2
M16x30 Round Head Bolt Class 8.8	12
M16x40 Hexagonal Head Bolt Class 8.8	4
M10x40 Hexagonal Head Bolt Class 8.8	4
Rectangular plate 100x35x5 ø18mm	4
Rectangular plate 100x35x5 ø12mm	4
M16 Nuts Class 8	16
M10 Nuts Class 8	4
Flat Washer M10	4

CONTACT INFORMATION

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28031 MADRID
SPAIN

+34 917775001
www.industriasduero.com



TL4 MASH COMPILANT BARRIER

BLIDTL4C2-MASH

SHBBT No

2 OF 2

DATE

16/12/19